

Praise for *No God, No Science?*

“In an era in which it is widely assumed, both popularly and among many professional scientists and philosophers, that the arrival of the Darwinian pronounces the final ‘it is finished’ upon every metaphysical account of reality, theology often appears increasingly pressured by the need to defend its existence against this verdict at the court of scientific rationality. Michael Hanby’s eagerly anticipated and monumental new book radically inverts this standard order with a bold and simple thesis: without God, there is no science; that no scientific account of the world can justify itself apart from God, without whom there is no ‘world.’ A work of stunning erudition and insight that is not only a devastating critique of scientific and theological un-seriousness but a constructive argument for what difference this metaphysical vision makes to the way we live in the world. A profound—and profoundly human—book.”

*Peter M. Candler, Jr.,
Baylor University*

“A truce is sometimes called between science and theology, by thinkers on both sides. Michael Hanby, however, shows a way forward more profitable than truce, found in the common ground between theology and science that is metaphysics. Here is theology offering its most to the discussion by being most theological. For decades we have heard that science can lend clarity to theology. With *No God, No Science?* we have the metaphysical fluency of theology helping science be better science.”

*Andrew Davison,
Westcott House and University of Cambridge*

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No God, No Science?

Theology, Cosmology, Biology

Michael Hanby



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For Rowan and Thomas

*Whither shall I go from Thy spirit? Or whither shall I flee from Thy face?
Ps. 139:7*

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Preface

This book was conceived in the mid 1990s at a dinner party at a professor's house while I was a graduate student studying theology in Cambridge. It began with little more than a spirited conversation, the conviction that theology, properly understood, had something to say about everything, and a vague intuition that Darwinism was the only great nineteenth-century ideology to have survived the twentieth century unscathed and that it was a principal agent in bringing about an increasingly inhuman and antihuman culture. I have labored on this book off and on ever since, trying to learn theology, philosophy, and enough biology to do it right, during which time I have also moved across the Atlantic once, across the US twice, changed jobs three times, written another book, had two children, become a Catholic, and changed my mind about a number of things, though not about my original intuition.

That circuitous itinerary is undoubtedly reflected throughout this book and in the disparate collection of interlocutors who make their appearance within it. There are a number of people, though, who have helped me bring this long odyssey to an end and to produce (I hope) a unified whole, and to them I am exceedingly grateful. I would first like to thank Rebecca Harkin, Isobel Bainton, and Karen Raith of Wiley-Blackwell. They have shown infinite patience during what proved to be a very long writing process. I am especially grateful to Rebecca for the confidence she has shown in this book: for her willingness to publish a book of this size, for the steadfast support she has given it in spite of my many delays, and for her keen editorial judgment. Isobel has been nothing but helpful and supportive throughout the process of bringing the manuscript to term. Karen has done a superb job on the promotional side of things. As a team, they are a model of professionalism, and working with them has been a wonderful experience. I also want to express my deep gratitude to the series editors John Milbank, Graham Ward, and Catherine Pickstock for all they have done on behalf of this book and for including it in the *Illuminations* series and to John, especially, for his helpful advice along the way. Finally, I owe a debt of gratitude to the production and editorial staff at Wiley-Blackwell, most notably to Mahabunnisa Mohamed Jameel, and to the anonymous readers of the manuscript, both for their encouragement and for insights which have helped me improve it.

My former student Caitlin Dwyer worked tirelessly to edit and prepare the manuscript, or rather she worked cheerfully editing and preparing the manuscript even though she was tired and expecting her third child. I don't quite know how she did it, but I do know that I could not have done this without her hard work, her sharp eye, and her smart criticisms. I cannot thank her enough. Rachel Coleman read and edited earlier versions of the manuscript, also offering intelligent criticisms, and she pitched in again at the end to help bring it across the finish line. Her spirit, usually audible in the form of laughter from the office across the hall, always provides timely reminders that the world isn't all bad. I am grateful to Katie Vidmar for preparing the index and casting her keen eye over the page proofs. And I would like to thank my other student assistants who have also provided invaluable help over the years, including Katrina Ten Eyck, Stephen McGinley, and Margaret Bewley.

It is impossible to overstate my debts to friends and colleagues, especially my colleagues at the John Paul II Institute, without whom this would be a very different and much poorer book. The depth and seriousness of thought and the intellectual companionship that they provide at this extraordinary place is quite unlike anything I have experienced anywhere else I have taught or studied. I first want to thank David L. Schindler, the former dean and provost of the Institute, a man of profound metaphysical and theological vision. He is also Aristotle's "magnanimous man," and I can never repay either the big-handed generosity he has shown to my family and me or the intellectual debt which appears throughout the whole of this book. The current dean, Fr. Antonio López, F.S.C.B., is a good friend and a brilliant theologian in his own right, and I thank him very much for his encouragement, his intellectual integrity, and his friendship. David Crawford, Joseph Atkinson, Fr. Paulo Proserpi, F.S.C.B., Margaret McCarthy, and Mary Shivanandan are all wonderful colleagues whose wisdom and conversations have been an invaluable help. Numerous graduate students have also made contributions to this book with their thoughts, their questions, and their own work. I would especially like to thank Lesley Rice, Fr. David Alcade-Morales, Michael Camacho, Annie Devlin, Gregorz Ignatik, Joseph Lanzilotti, Matthew Newell, John Laracy, and Fr. Pietro Rossotti.

Good friends and kindred spirits have enriched my life and thought immeasurably. It is difficult to imagine where I'd be or what I'd think without them. Several merit a special mention for helping me see this book through to completion. Nicolas Healy is a colleague as well as a steadfast friend. He is also a real scholar and a theologian of extraordinary patience and intellectual generosity. His deep knowledge of St. Thomas, Balthasar, and the whole tradition and his bold and expansive Christocentrism has been a reliable resource as well as a constant source of inspiration. I owe him a special debt of thanks for taking the time to read and correct parts of the manuscript for this book. Adrian Walker and I have many overlapping interests—the unity of organisms and the nature of science to name just two—and my own thought has been deepened time and time again by the profundity of his reflections on these matters. I am grateful for his friendship. D.C. Schindler is, quite simply, the best Catholic philosopher of my generation. He is also a true friend and intellectual companion. My debts to him are too vast to list in detail, and they will be immediately apparent to anyone who reads these pages. I am similarly grateful to Simon Oliver, both for his deep and abiding friendship since those first days in Cambridge and for his brilliant work on motion,

Newton, and teleology, which have contributed significantly to this work. Finally, I would also like to thank two friends who have continually inspired me over the years: Peter M. Candler, Jr., an old and dear friend as well as a former colleague at Baylor, and Conor Cunningham, whose own book on evolution (which may have been conceived at that same dinner party, though only he could say) appeared to great acclaim just as I was completing this manuscript. Congratulations to him on his stunning achievement.

My deepest thanks, however, go to my wife Stephanie—there are no words to say what her constant love and support means to me—and to our young sons Rowan and Thomas, the delight of our lives and the source of unspeakable joy for both of us. Their lives are a constant reminder of the novelty and the gift for which this book contends. Though it might have been completed much sooner without their “help”, my understanding of truly important things, things like Cyclops, and wizards, and baseball, would be greatly impoverished, and the book itself would be much poorer.

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Abbreviations

Aquinas:

<i>Comp. theo.</i>	<i>Compendium theologiae</i>	<i>Compendium of theology</i>
<i>Contra Gent.</i>	<i>Summa contra gentiles</i>	<i>Against the Gentiles</i>
<i>De pot.</i>	<i>Quaestiones Disputate De Potentia Dei</i>	<i>On the Power of God</i>
<i>De ver.</i>	<i>De veritate</i>	<i>On Truth</i>
<i>In Boeth. de Trin.</i>	<i>Expositio super librum Boethii De trinitate</i>	<i>Commentary on Boethius' De Trinitate</i>
<i>In Boeth. De Heb.</i>	<i>In Boethii De hebdomadibus</i>	<i>Commentary on Boethius' book De hebdomadibus</i>
<i>In de hebdomadibus.</i>	<i>Expositio in librum Boethii De hebdomadibus</i>	<i>Commentary on Boethius' De Hebdomadibus</i>
<i>In Div. Nom.</i>	<i>Expositio in Dionysium</i>	<i>Commentary on Dionysius's Divine Names</i>
<i>Names.</i>	<i>De divinis nominibus</i>	
<i>In Metaph.</i>	<i>In Libros Metaphysica</i>	<i>Commentary on the Metaphysics</i>
<i>In Sent.</i>	<i>In Libros Sentiarum</i>	<i>Commentary on Lombard's Sentences</i>
<i>ST</i>	<i>Summa Theologiae</i>	

Aristotle:

<i>Metaph.</i>		<i>Metaphysics</i>
<i>De Gen. et Cor.</i>		<i>On Generation and Corruption</i>
<i>Post. An.</i>		<i>Posterior Analytics</i>

Athanasius:

<i>De Incarn.</i>	<i>De Incarnatione</i>	<i>On the Incarnation</i>
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Augustine:

<i>Conf.</i>	<i>Confessiones</i>	<i>The Confessions</i>
<i>De Civ.</i>	<i>De Civitate Dei</i>	<i>The City of God</i>
<i>De Gen. ad Litt.</i>	<i>De Genesi ad Litteram</i>	<i>On the Literal Meaning of Genesis</i>
<i>De Praed Sanct.</i>	<i>De Praedestinatione Sanctorum</i>	<i>On the Predestination of the Saints</i>
<i>De Spiritu et Lit.</i>	<i>De Spiritu et Littera</i>	<i>On the Spirit and the Letter</i>
<i>De Trin.</i>	<i>De Trinitate</i>	<i>On the Trinity</i>

Boethius:

<i>Contra Eutech. et Nest.</i>	<i>Contra Eutychem et Nestorium</i>	<i>Against Eutyches and Nestorius</i>
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Bonaventure:

<i>Itin.</i>	<i>Itinerarium Mentis ad Deum</i>	<i>Journey to the Mind of God</i>
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Honorius of Autun:

<i>Liber XII Quaest</i>	<i>Liber XII Quaestionum</i>	<i>Book of Twelve Questions</i>
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Hugh of St. Victor:

<i>Didasc.</i>	<i>Didascalicon</i>	<i>Didascalicon</i>
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Irenaeus:

<i>Adv. Haer.</i>	<i>Adversus Haereses</i>	<i>Against Heresies</i>
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Justin Martyr:

<i>I Apol.</i>		<i>First Apology</i>
<i>II Apol.</i>		<i>Second Apology</i>

Maximus Confessor:

<i>Amb. 7</i>		<i>Ambigua 7</i>
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Nicholas of Cusa:

<i>De Doct. Ign.</i>	<i>De docta ignorantia</i>	<i>On Learned Ignorance</i>
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Ockham:

<i>Quodl.</i>	<i>Quodlibeta septem</i>	<i>Quodlibetal Questions</i>
<i>Sent.</i>	<i>Quaestiones in quattuor libros sententiarum</i>	<i>Commentary on Peter Lombard's Sentences</i>

Plato:

<i>Apol.</i>		<i>Apology</i>
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Plotinus:

<i>Enn.</i>	<i>Enneades</i>	<i>Enneads</i>
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Ps.-Dionysius:

Div. Nom. *De divinis nominibus* *On the Divine Names*

Richard St. Victor:

De Trin. *De Trinitate* *On the Trinity*

Tatian:

Orat. ad Graec. *Oratio ad Graecos* *Address to the Greeks*

Tertullian:

Adv. Herm. *Adversus Hermogenem* *Against Hermogenes*
Res. Carn. *De Resurrectione Carnis* *On the Resurrection of the
Flesh*

Theophilus of Antioch:

Ad. Autol. *Ad Autolyicum* *To Autolycus*

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Introduction

It has been observed by modern philosophers of rhetoric that every writer or rhetorician creates or constructs his own audience in the very act of writing and speaking. If this is true, then in the act of writing this book I may have created two audiences who do not exist or whose existence is otherwise in short supply: scientists whose wonder and whose sincere desire to get to the bottom of things leads them beyond the positivism and empiricism of their own training and into a good-faith (though not necessarily agreeable) engagement with metaphysics and theology, and philosophers and philosophically minded theologians whose metaphysical wonder or whose faith in the Creator God compels them to recognize that this faith does indeed lay a claim to the truth of nature as a matter of *reason*, and that the authority of science as sole arbiter of nature, powerful though it is, is nevertheless assailable.

This book is, first and foremost, a work of philosophical theology. Its overarching purpose is to retrieve the Christian doctrine of creation *ex nihilo* from the distortions imposed upon it by the totalizing claims of positivist science and especially by that most theological of sciences, evolutionary biology. These distortions are not simply a function of science's astonishing experimental, predictive, and technological success—this I regard as mostly *unassailable*—and so my resistance to them should not be taken as a denial of scientific truth or a compromise of its legitimate autonomy. To the contrary, I wish to *protect* the autonomy and integrity of science in its distinction from metaphysics and theology and to *deepen* its scientific character. These distortions, rather, are a function of the way that science transforms the meaning and nature of reason and its objects, truth, being, and nature *a priori*, thereby distorting in advance the meaning of creation and the nature of *both* scientific *and* theological questions. Renegotiating these fundamental terms is essential to any real dialogue, much less *rapprochement*, between science and religion as well as to a well-ordered science. Failure to do this explains why this dialogue does not really exist at present, despite innumerable volumes on the subject, why

these audiences are in such short supply, and why the power of science poses at least as much threat as promise for the human future.

The title of this book, *No God, No Science?*, is intended to signal both an obstacle standing in the way of this recovery and a task inherent within it. The obstacle is a naïve understanding of science's relationship to metaphysics and theology, which regards them as essentially external to each other, so that science, understood as method or technique, is metaphysically and theologically neutral. This is the basis of the facile and unsustainable distinction between "science" and "scientism," and it helps to underwrite the even more dubious idea that "naturalistic" explanation constitutes an alternative to metaphysical and theological explanation, an idea, we shall see, with a theology all its own. This conventional view is betrayed by history because it is mistaken on both philosophical and theological grounds. In its negative sense, then, the title is intended to signal that this neutrality does not exist. Science does not do, and never has done, without its metaphysics and theology and thus without its God, even if this God is ignored or cast in the negative role of a foil as in so much of Darwinian theory. Conceptions of God and thus metaphysical and theological judgments are an inherent and ineradicable aspect of every conception of reason and nature, not as a matter of historical accident but as a matter of epistemic and ontological necessity. This is especially true, once again, of Darwinian biology, which brings the metaphysical commitments of modern science to their highest expression and therefore sometimes stands in this book for science as a whole, which it claims to represent authoritatively. These commitments do not only distort the theological meaning of creation, making it appear as if creation and evolution were mutually exclusive agencies and explanations or objections to Darwinism were a denial of evolution (they are not), they also result in a deeply incoherent and ultimately dangerous philosophy of *nature and natural science*. This is why we must undertake an extended if unconventional engagement with Darwinian biology in the course of advancing our argument and why the metaphysical and theological judgments inherent in the Darwinian view of nature must be subjected to a metaphysical and theological critique.

These counterintuitive provocations indicate the positive task denoted by our title. Our purpose in making the doctrine of creation intelligible once again is not simply to carve out a "me too" place for theology in a world authoritatively explained by science. The contemporary "dialogue" already reeks too much of this attitude. Rather, it is to argue that the doctrine of creation, properly understood, was and is indispensable for an adequate cosmology, for an account of the world that is comprehensive, nonreductive, and inclusive of its own intelligibility. As we shall see, this requires us to adopt a more nuanced understanding of the relation and distinction between science, metaphysics, and theology and to embrace a more comprehensive notion of reasons and its objects than either science or our politics typically allows. But it also means that what theology affirms by creation is already operative within scientific cognition in spite of itself. There are thus two distinct but related *positive* reasons why there is no science without God. First, not only does science always already presuppose a theology which is tacitly operative in its conception of its objects, but also it requires a true theology to be adequate to its own nature and to the world. Second, the content of this true theology is already operative to some extent within scientific reason despite its best efforts to deny it, because science and its objects are *creatures*.

Part I lays the groundwork for this argument as a matter of principle and as a matter of history. Chapter 1 differs somewhat from the others in tone and is probably the most metaphysically dense portion of the book. (Readers who are averse to metaphysics or to discussions of methodology may wish to read this chapter last.) It attempts to forestall objections that would thwart our argument in advance of its being heard, by explicating, in formal and metaphysical terms, the relationship between science, metaphysics, and theology. In contrast to the various forms of extrinsicism which hold that science, metaphysics, and theology are essentially “outside” of each other, where their relationship and their respective claims can be adjudicated from the neutral standpoint afforded by the empirical and experimental methods of science, I will argue that science is constitutively and intrinsically related to metaphysics and theology, and that metaphysical and theological judgments enter into the conception of the basic units of scientific analysis and into the notion of method itself. This does not compromise the legitimate autonomy of science so much as clarify what this autonomy consists in, but it does indicate the level at which a real engagement with metaphysics and theology must take place and the nature of its adjudication. What is true in the order of being unfolds in the order of history. So in Chapter 2 we will treat “the history of the cosmos,” arguing that the very idea of the cosmos, as it emerges in Greek thought, is irreducibly metaphysical and theological; the unity of the universe is a *metaphysical* unity, a unity of being as *act*. Nevertheless, the Greeks were never able to arrive at an adequately comprehensive conception of this unity because they were never able to arrive at an adequate conception of the difference between God and the world, and this, in turn, introduced limitations into their conceptions of being that would prove fatal to these cosmological ambitions. The Christian doctrine of creation *ex nihilo* completes these ambitions precisely because the Incarnation of Christ discloses a God at once nearer and more remote than was conceivable within the confines of the Greek imagination, disclosing the paradigmatic form of the God-world relation and disclosing within the structure of worldly being a gratuity and novelty beyond Greek conception. The doctrine of creation *ex nihilo*, in other words, is not a freestanding cosmology. Rather, it is a function of the doctrine of God and the modifications forced upon that doctrine by the Incarnation, which inaugurated a metaphysical revolution that would take up the Greek inheritance and fulfill it from beyond its own resources.

Part II treats of the demise and subsequent fragmentation of this cosmological achievement. Chapter 3 considers the scientific revolution which began in the seventeenth century as a metaphysical and theological revolution, drawing out and critiquing the metaphysical and theological judgments latent in modern science since its inception and passed down to posterity primarily through Descartes and Newton. These judgments persist as part of the ontological structure of modern science even though subsequent science has superseded the philosophies that gave them birth. At the heart of this ontology is a reduction of being from act to facticity and a theological extrinsicism which reduces God to a finite object, nature to artifice, and creation to manufacture, and it lays the ontological groundwork for modern naturalism’s juxtaposition of natural and supernatural agencies and forms of explanation. All of this is exacerbated by a new “active” conception of science itself, which replaces an ontological conception of truth with a functionalist conception, thus dampening the

desire for truth and making the very notion of truth, in its original ontological meaning, all but unintelligible. And it radically transforms the meaning of creation, not least by transforming the questions it is expected to answer.

In Chapter 4, we will look at how these ontological and theological judgments are conveyed to the “functionalist” tradition of British biology and on to Darwin through the *Natural Theology* of William Paley, regarded by many Darwinians as the apex of Christian thought on creation. Paley is a minor figure in theological history, but a giant in the history of biology who transmits to the functionalist tradition of British biology the ontological assumptions of Newtonian physics and who bequeaths to Darwinian biology its defining problem, its view of the living organism, and the “God” that Darwinians do not believe in. This is our historical rationale for treating Darwin as a “theologian” in Chapter 5. Darwin’s own Darwinism is a sometimes uneasy amalgam of Malthusian theodicy, Smithean political economy, and continental morphology, with more than a dash of Humboldtian Romanticism thrown in. Despite this amalgam of influences, Darwin basically takes over Paley’s theology in negative form, thus making the theological and ontological assumptions of Paley’s theology endemic to the subsequent Darwinian tradition. These assumptions make little theological sense, are metaphysically disastrous, and compromise the Darwinian conception of nature *as natural*. In consequence of this, the Darwinian conception of nature displaces the living organism as both the subject of its own being and the subject matter of evolutionary biology, thus bringing the mechanistic ontology of modern naturalism to its logical and nihilistic conclusion. Consequently, we regard the disappearance of the organism as the defining drama of evolutionary biology after Darwin, and in Chapter 6 we will look at both sides of this drama, the so-called “modern synthesis” of Darwinian evolution and Mendelian genetics and the return from exile of a developmental biology displaced by the evolutionary paradigm and intent on restoring the organism to the center of evolution. This is a salutary development with metaphysical implications unrealized by its protagonists, an indication that the “Catholicity” of reality propels science beyond the debilitating confines of its own ontology. Even so, developmental biology has yet to escape fully from the mechanistic ontology it shares with Darwinism, and so it ultimately fails to fulfill this ambition.

Though criticism and speculation are intertwined throughout the book, Part III shifts rather abruptly from a predominantly critical and historical perspective to a more speculative and explicitly theological mode, and this is reflected in something of a change of voice and terminology. Though I recognize the risk this poses to an integrated thesis, it is entirely appropriate if, as I am arguing, theology and science belong to different orders of theory, and if the audiences we are trying to conjure into being therefore inhabit somewhat different worlds. It only stands to reason that they would speak different languages, and it is right and just that they do so if we wish to sustain the distinction between theology and science and to disentangle the Christian doctrine of God from its scientific and Darwinian distortions. Nevertheless, the metaphysical concern for the structure of being and the unity and interiority of living things mediates and unites in a new way these different theoretical orders and their incommensurable assumptions and problems. And this points to a deeper, principled reason for this change of voice which bears on the character of this mediation. Earlier I noted that the Incarnation discloses the paradigmatic form of the God-world

relationship, which means that this form extends by analogy to everything else. Consequently, the ontological principle that governs the God–world relation in Christology extends, by analogy, to the relation between theology and science: distinguish in order to unify. The radical difference between God and the world, and thus between the theological and scientific orders, intimates a new and more intimate unity between them that simultaneously preserves and deepens their distinction. This is an important principle to grasp if one is to understand just what we are seeking to recover in the recovery of creation. We have no interest in theology supplanting science or in fusing science and theology into some sort of hybrid (theistic evolution), and so whether or not evolution has occurred (I assume it has) is a matter of indifference to us, and we desist entirely from the sorts of question that usually emerge from theological engagements with science such as how God “uses” evolution, what one can infer about divine agency *from* evolution or what, if anything, the “Big Bang” says about creation (not much, as far as I am concerned). Just as God’s interior presence *to* the world in the Incarnation and in creation is a function of God’s infinite transcendence *of* the world, and just as the world’s positive difference from God is a function of this interior and immediate presence, so too I wish to distinguish *more radically* than usual between theology, metaphysics, and science but in a way that simultaneously brings theology and metaphysics more immediately and interiorly to bear on science while underscoring their abiding difference from it.

With this principle in mind then, I move to a speculative reconstruction of the doctrine of creation *ex nihilo* in the final three chapters. Chapter 7 treats the doctrine of creation in what Aquinas calls its “active” sense, not as a freestanding cosmology or a “mechanical” explanation of how the world came to be but as an implication of the doctrine of God in its Trinitarian and Christological development, which is contrasted both with the tacit theology of Greek metaphysics and with the tacit theology of modern science generally and Darwinian science particularly. Failure to understand this primitive relation between the doctrines of God and creation is already a failure to grasp the doctrine of God at all, and this, along with failure to understand the theology implicit in their theories, is a principal source of Darwinism’s distortion of the meaning of creation. The unwillingness of the doctrine of creation to answer the questions posed to it from within Darwinism’s theological assumptions emerges from this treatment not as a theoretical failure but as a positive principle of any coherent theology. Because the act of creation is distinct from (and presupposed by) all other forms of causation, the doctrine of creation is not a doctrine of *temporal* origins, and it does not answer the question of *how* the world came to be as it is in any conventional scientific sense. Rather, it is a doctrine of *ontological* origins, and it tells us *what the world is* at every moment of its existence. Chapter 8, therefore, treats the doctrine of creation in its second, passive sense as the ontological structure of the world, showing how creation is presupposed in causality as such (and thus in evolution) and arguing that creation restores the ontological identity, indivisible unity, and the incommunicable interiority of things that were evacuated in modern science’s conflation of nature and art and in Darwinism’s perfection of this logic in its attempted conflation of being and history. It thus turns out that creation, far from being the antithesis of evolution, is necessary to preserve the organism as the subject of its own being and as the subject matter of evolution. The theology of creation is thus necessary

to save the scientific character of Darwinism because it saves the objects and the subjects of evolutionary science from Darwinism's own universal acid. Thus, in Chapter 9 we will argue not only that science is compatible with creation, but also that science needs creation in order finally to be science and to avoid falsifying itself and its objects. This is because theology performs for the sciences a service which they cannot perform for themselves. Theology "saves the appearances" for science by saving the being that is the condition of possibility for the truth *of* appearance. We will argue therefore that the doctrine of creation is rationally superior to Darwinian evolution, not because they are strict rivals but because creation can accommodate not only the truth of Darwinian evolution but the possibility of Darwinian theory, whereas Darwinism can finally accommodate neither. Accepting this, however, means not only embracing a more comprehensive conception of reason, it means opening ourselves to the claim of reason, and thus the desire for truth, which 400 years of mechanistic science and a century and a half of Darwinian pragmatism have all but extinguished.

It took a long time to write this book, too long really, and it is time to let it go. Nevertheless, I do so with some trepidation and more humility than is probably apparent in my eagerness to defend the Christian mystery. There is the humility bordering on penitence, the fear and trembling, which properly accompanies any attempt to speak of that mystery which surpasses all understanding, and I hope this is at least occasionally apparent in these pages. But I am also deeply aware of the many flaws and the essential incompleteness of this project. Prolonged immersion in contemporary Darwinian tracts can sometimes leave a theologian grumpy, at least one of my uneven temperaments, and I know that I have not always succeeded in suppressing this fact. Besides this intemperance and the occasional failure of charity, critics will no doubt discover numerous errors of fact and judgment, though I have tried my best to minimize these. And I know only too well that I have opened questions and made claims toward whose vindication my arguments offer little more than a promissory note, a note in all probability, which will have to be paid by others. Hence the question mark in the title, qualifying what is otherwise a thesis. I harbor no pretense that this represents anything like a "complete system", which is both precluded by my subject matter and beyond my modest abilities.

I would have liked, at any rate, to write a better, more beautiful book. But if the book I have written instead can nevertheless aid in changing the terms of the debate, reawakening a dormant wonder at the mystery and gratuity of being, and thus conjuring these two audiences into being or increasing their number, then it will have achieved more success than a theologian writing in this technological age, much less this one, has any right to hope for.

Part I

In the Beginning

Yet the very fact that it is the flesh of the Logos become man that ultimately defines the limits of Christian humanism contains the possibility of almost explosively extending those limits to what is really a limitless degree. Now we may dare—indeed dare we must—to take up with an all-embracing gesture into this pattern of the Christian man whatever in the long perspectives of history or in the depths of the soul is true and noble in thought and deed. All that is good and true has proceeded from the Logos and has its homing-point in the incarnate God, even though this be hidden from us, even though human thought and human good-will may not have perceived it. Every great and noble deed flows from a power which the revealing Logos has shown us to be his own special grace...Here is the meaning of those words written by an ancient Christian... ‘Christ is the Logos, in whom the whole human race has a portion, and all who have lived according to the Logos are Christians, even though, like Socrates and Heraclitus among the Greeks, they are accounted godless.’

Hugo Rahner
Greek Myths and Christian Mystery

I

Discourse on Method

In a withering critique of the “evolutionary mysticism” of P. Teilhard de Chardin, the eminent zoologist George Gaylord Simpson lambasted the French Jesuit’s pretense to scientific legitimacy on grounds that all of “Teilhard’s major premises are in fact religious, and...his conclusions about evolution derive from those premises and not from scientific premises” (1964: 348). Consequently, and in apparent contrast to premises of the sciences, Simpson alleges that Teilhard discovers nothing in evolution that he has not already presupposed.

I note this episode at the outset of this book not because I hold any brief for Teilhard or any other version of “evolutionary theology”; indeed I take the very category to be hopelessly confused for reasons which will eventually become clear. Rather, I recall Simpson’s diatribe because it reflects a naïve view of the nature of science and its relation to metaphysics and theology from whose standpoint this book—which necessarily presupposes its own metaphysics in the course of advancing them—is likely to be deeply opposed and even more deeply misunderstood. In this chapter, I shall offer a formal and metaphysical argument, chiefly with respect to the *act* of scientific knowledge, that this view is false in principle. Thus, this chapter stands somewhat apart and strikes something of a different tone from the rest of the book and may appear metaphysically abstruse to readers of a more scientific and less philosophical bent. Its purpose is to show *that* there is an irreducibly metaphysical and theological dimension to scientific inquiry that is not obviated by retreat to the putative neutrality of scientific method, to explain the metaphysical reasons *why* this is the case, and to show *how* a putatively neutral method conceals a questionable metaphysics and theology. Once we have established this relation, the question of the relationship between science and theology, creation and evolution, becomes not so much *whether* theology but *which*. We will adjudicate this question historically and speculatively in Parts II and III. Nevertheless, in order to avoid misunderstanding and to avoid being accused of a “fault,” which is really only ontological necessity equally

binding on the likely opponents of my argument, I wish to depart in advance from the material task of this book to state briefly what I take to be the formal parameters of the relationship of science to metaphysics and theology and some of the implications which follow from it. This exercise is somewhat artificial since my argument actually militates against any final separation of method and substance or form and content. But when thought must begin without any pure starting points, which is to say whenever thought begins, we do what we must.

Simpson's criticism of Teilhard exemplifies what I will call an "extrinsicist" view of the relation between science, metaphysics, and theology. In its most extreme form, the one Simpson appears to hold, the essential difference between scientific and metaphysical or theological premises consists in the former's indifference to, and thus, independence from the latter. At the root of this is a positivism which takes the world as unproblematically—and uninterestingly—given, a standpoint no less metaphysical than the metaphysics it deplors. We will consider the implications of this positivism in subsequent chapters. A milder form of this view would acknowledge that there are metaphysical and perhaps even *de facto* theological assumptions at the logical and historical origins of scientific inquiry, but that these, being essentially external to science, can be safely "bracketed out" from the strictly scientific work of testing hypotheses through empirical or experimental methods. The difference between these two positions is minimal, however, for they share in the more basic assumption that, whatever other methodological peculiarities may be proper to its "essence," science is science not least because its "essence" excludes metaphysics and theology.¹ In other words, it is here at the point of their mutual exclusivity that the distinction, which is really a wall of separation, is to be drawn between science on the one hand, and metaphysics or theology on the other.

Inherent in this assumption are two others. The first is that scientific premises are ultimately self-justifying, if only *a posteriori*. This is to say then that scientific inquiry does not depend upon any form of rationality "higher" than itself but is rather the final basis upon which other forms of rationality, including one's initial metaphysical assumptions, may ultimately be justified.² Natural science, in brief, is first philosophy which ultimately pulls itself up from the "empirically given" by its own intellectual bootstraps.³ This is the root of Simpson's complaint as well as the whole contemporary movement, exemplified by Dennett (1995) and others, in which evolutionary biology and pragmatic philosophy collaborate in the "Darwinization of everything" without need of submitting the Darwinian "algorithm" of natural selection to anything more comprehensive or fundamental than itself.⁴ In the most extreme forms of Darwinian absolutism, natural selection is not so much an event within the history of thought, but rather all historical theories are episodes within the sovereign activity of natural selection, a notion which finally severs any link between thought and truth.⁵ Perhaps this is why the "debate" between Darwinians and their religious opponents is so perpetually unedifying and why thinking and sloganeering, education and ignorance are often so readily and willingly confused.

Even in the more benign forms of extrinsicism, metaphysics, to the extent that its presence is acknowledged, is reduced to the status of a hypothesis or a system to be verified or rejected through subsequent scientific analysis which, *qua* scientific, is essentially free of metaphysics.⁶ (As we shall see, this is an inadequate understanding

of the metaphysical relation of the creature to God.)⁷ Science is thought to be capable of grounding itself and justifying its own metaphysical hypotheses on the basis of the second assumption, namely, that the empirical and experimental methods of scientific analysis are ontologically neutral precisely as *method*, and thus stand essentially *outside* of metaphysics and theology. This same assumption then allows one to eschew “scientism” and excessive “reductionism” and to regard these as philosophical contaminations extrinsic to “pure” science.⁸ And it even permits one to propose a *rapprochement* of sorts between science and metaphysics or theology, not by entertaining the possibility of integrating the sciences into a theological view of reality or by supposing that theological truth might qualify scientific knowledge without loss to its scientific character—the extrinsicist view dogmatically prohibits this *a priori*—but by urging each, as it were, to “mind its own business.”⁹ There are of course important distinctions to be maintained between science, metaphysics, and theology—distinctions mandated by the doctrine of creation itself. So the notion that philosophy, theology, and science should each stick to its own proper business does indeed contain an important truth. But it is not the whole truth, or rather it is a truth that cannot be adequately comprehended without a good idea of what that business is. There is no question that the sciences enjoy a legitimate autonomy with respect to metaphysics and theology; the question is the meaning and nature of this autonomy. This is ultimately an ontological question.

Talk of “a” normative relation between theology and science is of course fraught with complications. The word “science” conceals a vast array of different and highly specialized theoretical and experimental activities, both within the ever-increasing number of scientific sub-specialties and between them. Those taking an empirical or “sociology of knowledge” approach to the so-called “science–religion dialogue” have therefore developed “models of interaction” based upon the different ways that the science–religion relationship is empirically shown to be operative among the different sciences and in relatively more theoretical and practical applications. This approach entails its own unacknowledged ontological commitments and begs too many ontological questions to be philosophically satisfying, but it is helpful in calling attention to the different complex levels at which the question applies and the concrete obstacles to answering it.¹⁰ Training in the sciences is now so specialized that the vast majority of researchers are isolated from the theoretical genesis of their own disciplines, a problem compounded by the fusion of the scientific and technological revolutions and the ostensible parting of ways between a science now largely equated with technological prowess and what was once known as “natural philosophy.” As a result, there are many biologists who have never really studied Darwin, physicists with little firsthand acquaintance with Newton, and economists who are unfamiliar with Adam Smith. Where these great architects of modern thought are read, it is largely a matter of mere historical interest, or in the case of Darwinism, of occasionally rubbing the forehead of the talisman for the sake of legitimizing oneself in the eyes of the tribe.¹¹ Yet, each of the sciences gets philosophical as it nears its theoretical source—where it did once regard itself as *natural philosophy*—because each at its source and in its most comprehensive theoretical articulation embodies an aspiration to ultimacy or universality that is simultaneously obscured in the mundane work of the specialist and operative within it. The closer one gets to these original sources, the closer one gets to

indispensible assumptions about the meaning of nature, place, body, causation, motion, life, explanation, and truth. In short, one gets closer to the indispensable assumptions about being *qua* being and therefore being in relation to God that remain axiomatic within science in its more mundane practice at the experimental level. The average researcher in applied physics does not have to think about what an entity, a body, truth, or place is, not because these are irrelevant to his work but because he can take them for granted. That ground will have already been plowed by others.

It is not my intention in this chapter to try to provide an exhaustive account of what the normative relation to metaphysics and theology should look like “in the laboratory,” as it were. Indeed it follows from my theological thesis about the meaning and nature of creation, as well as from my formal account of this relation, that this normative relation can only be discovered from *within* each of the sciences in question. This is an aspect of their *legitima autonomia* (*Gaudium et Spes*, 36). This relation is a function of the intrinsic truth of the world and the way this truth impresses itself on the structure of thought and its objects, not the *de jure* imposition of extrinsic theological authority which has all but ceased to exist anyway. However, if my formal account of this relation and my material evaluations of its various historical forms are correct and science’s relation to metaphysics and theology is not merely a sociological accident or a heuristic “model” that can be discarded or altered at will but a constitutive, ontological relation, then two consequences follow for any attempt from within the sciences to adequately address this question or to realize this relation.

First, though this relationship will be most visible and its implications will be felt most strongly at the programmatic level where the sciences strive for universality and thus are most philosophical, this ambition to universality can be present at both ends of inquiry, in what Stenmark calls the initial “problem-stating” phase or later the “application phase” (2004: 217–219). And as with any sort of action, the formulation of problems and ends determines the shape of intermediate steps in the solving or testing of those problems. So to insist that the sciences take philosophical inventory of their theoretical origins is not to say that science’s relationship to metaphysics and theology will be practically irrelevant in the work of abstraction and experimentation, for example. Nor is it to deny that this relationship might “show up” (under other descriptions of course) in the laboratory, for instance, in the intractability of certain phenomena and their resistance to reduction, in ways that may force a rethinking of a discipline’s material ontological commitments. It is only to say that the practical relevance of this relation will be determined largely by how the broader theoretical context mediates the ontological commitments of the discipline in question.

Second, properly recognizing this relationship will mean recognizing its formal and constitutive character, which means that it is always already given and operative and that there is no ontologically neutral ground from which to step outside this relation in order to survey it. In other words, there is no metaphysically neutral starting point from which science can lift itself up by its own intellectual bootstraps. The question, then, is not how the sciences can be “brought into relation” or “reintegrated” with metaphysics and theology, but rather how science’s relation to metaphysics and theology is *already present* within scientific theory and method, and this in two senses: first, how the truth of being *qua* being is already operative, imposing itself upon the scientific act perhaps in spite of whatever theories we may have about that act, and,

second, whether the way that any given science cognizes this relationship, which is materially a matter of historical contingency, is scientifically, metaphysically, and theologically coherent.¹² It is the burden of this chapter to argue that science's relationship to metaphysics and theology does obtain of necessity, to outline the true form of that relationship, and to criticize the tacit formulation of this relationship in the extrinsicist view. Accepting these arguments will mean, finally, not that professional scientists must become professional theologians—*this* is effectively what happens when the relation between science and theology is *not* properly understood and maintained—but that they become better scientists *qua* physics or *qua* biology and so on by allowing their objects to be and to present themselves. To achieve this, science must “return to the sources” to reappraise the metaphysics and theology latent in its own founding assumptions, to assess how these are axiomatic within scientific practice, and to determine the extent to which these falsify science and its objects by making the world inherently less than our elementary experience of it and less than it is in itself.

One might argue that this assessment is already taking place. Since Simpson's brief essay, developments in the history and philosophy of science have vastly complicated our understanding of the nature of science as a historical enterprise and have given us a more complex picture of the role that philosophy and theology—as well as other extra-scientific factors like politics, economics, or racial and cultural prejudice—have played in the course of the actual development of the sciences.¹³ One need not look far within the guild of evolutionary biologists, or sympathetic historians and philosophers, to find the sometimes reluctant admission that there is a metaphysical component inherent in biology and that this component is sometimes even called upon to do significant scientific work.¹⁴ Even so, while these developments may have ameliorated the ostensible naiveté of Simpson's position, they are conducted within the purview of the ontology and ultimately the malign theology latent in his extrinsicist assumptions. To see this fully we must understand that “atheism” too is a form of theology—even a form of *Christian* theology, historically speaking—inasmuch as it requires a determinate conception of God to reject.¹⁵ (As it happens, Darwinism's official atheism is distinctly Protestant: Latitudinarian Anglicanism, to be precise.)¹⁶ Nietzsche was partly correct, then, that Christianity itself bears responsibility for the death of God, something of which the Fathers of the Second Vatican Council were very aware.¹⁷ There seems to be little awareness of this among atheists and naturalists, however, and thus little evidence that the acknowledgment of science's metaphysical and theological dimensions has appreciably altered the nature of its metaphysical and theological assumptions.¹⁸ The pervasiveness of this “theology” within science and the philosophy of science is a crucial reason why this chapter is necessary at the outset of this book. Some may not find these arguments compelling, but they will not even be intelligible from the vantage afforded by the latent theology of modern biology, and taking for granted the meaning of words used in common such as “God” and “creation” will only serve to conceal this theology from our eyes.

We will not get very far in answering the question of the relation between metaphysics, theology, and science if we do not understand what sort of question it is. The relation of science to metaphysics and theology is not *fundamentally* a scientific question, nor is it fundamentally an empirical, historical, sociological, or even philosophical question, though of course it is all of these. Rather it is *fundamentally* a theological question,

logically consequent upon the question of the relation between God and the world. This is because any attempt to answer it will invariably presuppose, project, and enforce some understanding of this most basic relation. Science cannot determine for itself its relation to theology, in other words, without effectively *doing* theology, without saying, explicitly or implicitly where to draw the line, or how to characterize the difference between God and the world (a line, historically speaking, that is drawn in dramatically different fashion after the Incarnation of Christ and drawn differently again from the seventeenth century onward).¹⁹ In fact, the very extrinsicism governing contemporary thinking about the relation between science and theology is premised upon a more basic extrinsicism governing thought about the relation between nature and God, such that “natural” and “supernatural” are taken to denote juxtaposed and mutually exclusive orders of reality and forms of explanation.²⁰ “Nature” is natural precisely in the fact that it excludes God and vice versa.²¹ It is because this is such bad theology, annulling the very difference between God and the world protected by the doctrine of “creation,” that what passes for discussion and debate between so-called creationists and evolutionary biologists never attains to a discussion of creation at all and why most parties seem blindly content to assume that “creation” is a self-evident notion that means whatever Richard Dawkins or Daniel Dennett take it to mean.

The effects of these unavoidable theological judgments are not limited to the “theological” side of the relation. Corresponding to these theological predecisions—and often prior to them in the order in which we articulate things—are judgments regarding what Aristotle called being *qua* being or Aquinas called *esse commune*, the understanding of “being in general” presupposed by and operative within any notion of nature. For example, the decision to regard “being” (*esse*) as synonymous with brute facticity, which is the metaphysical correlate to an extrinsicist understanding of “creation,” exercises a profound influence upon what will be regarded as relevant content in the empirical analysis of “nature” and what inherent features of our being in the world are to be regarded as nonevidentiary, giving ontological precedence to analytically separated parts, for instance, over formal and integrated wholes. Metaphysical judgments are inherent in what counts as empirical evidence, and these judgments mediate between science and theology proper.²²

As obvious as it may seem, we need to be (continually) reminded that all science is undertaken *by* human beings from *within* the world.²³ Because all science is commenced by us from within the world that encompasses us, no science really commences, as our intractable Cartesianism would have it, in “an Archimedean freedom outside nature” (Grant 1969: 32). This is why Aristotle judged that no science established its own subject matter and no science was ultimately self-generating or capable of establishing its own first principles. It receives the former from the world—there could be no biology without living things, for example—and it receives the latter on loan, as it were, from a more fundamental or comprehensive science: with the “laws of biology,” in modern parlance, being irreducible to but dependent upon the laws of physics, and so on.²⁴

Precisely because this Archimedean point is an illusion, because there is no *outside* nature, the entire edifice is *groundless* in the sense that the first principles (the source) of demonstration—ultimately being itself—are not themselves demonstrable on the basis of anything more basic. This is why Aristotle makes the remarkable “concession” that the indemonstrable first principles of being *qua* being which are at the *ontological*

root of every science command faith (πιστεῖν, *pistein*). This “faith” is understood not as a “decision to believe” this untestable hypothesis rather than another—indeed he claims that in the “interior discourse within the soul,” the truth of axioms (as distinct from hypotheses or postulates) cannot be disbelieved—but in the sense of the “yes” implicit in our reception of the world as it “communicates itself” immediately to our understanding (*nous*) (Aristotle, *Topica*, I, 100b20; *Post. An.*, I, 2, 72a30ff, 76ba21ff, 99b15–100b18).²⁵ Aristotelian *pistis* is a kind of trust, a willingness to receive the world on its own terms that is constitutive of cognition as such. It is analogous to the relation between perception and the *lebenswelt* in phenomenology, prior to the “phenomenological attitude” or to its subsequent objectification by science.²⁶ To discover a “decision to believe” is to have arrived too late. It is rather like the faith praised by God in *The Portal of the Mystery of Hope*, the masterpiece by the French poet Charles Péguy. “Faith” in this sense is “easy,” and disbelieving is hard. It follows naturally from a creation so resplendent that God declares, “in order really not to see me these poor people would have to be blind” (Péguy 1996: 6). Thus,

Faith is obvious. Faith can walk on its own. To believe you just have to let yourself go, you need to look around. In order not to believe, you would have to do violence to yourself, frustrate yourself. Harden yourself. Run yourself backwards, turn yourself inside-out, thwart yourself...

In order not to believe, my child, you would have to shut your eyes and plug your ears. In order not to see, not to believe (1996: 9).

Descartes does precisely this, of course, at the origins of modern science, in an act of intellectual self-mutilation so violent that the unbridgeable chasm which it forges between thought and world, matter and meaning, and ultimately, his essence as sheer will and his body as extended malleable “stuff” will be felt down the centuries.²⁷

I will now shut up my eyes, stop my ears, and will withdraw all my senses, I will eliminate from my thoughts all images and bodily things, or rather, *since this is hardly possible*, I will regard all such images as vacuous, false, and worthless (Descartes 1985a: 24).²⁸

Descartes’ violent attempt at refusing the truth of the world is an act of sheer obstinacy which by his own admission can only be half successful. Because in the *actual* world we are flesh and blood persons always already in the world, and because the world has always already taken up residence in the immediacy and intelligibility of our understanding, Aristotle concludes that the indemonstrable first principles “are the *cause* of our knowledge—i.e. our *conviction* (πιστενεῖν, *pistenein*)” (*Post. An.*, I, 72a30). Because we are encompassed by the world, and because the truth of the world therefore precedes (and exceeds) our knowledge of it, all science thus ultimately originates in preexistent, prescientific knowledge, in truth given to experience as an intelligible unity. This unity *in* experience is not *just* a unity *of* experience on Aristotle’s terms, but the metaphysical unity of being-as-*act* binding an efficient cause (the world) and its effect (our experience) into a “single actuality” or event, a notion evident, for example, throughout his account of sense experience in *De Anima*.²⁹ I see this tree, for instance, because it has already taken up residence in me, so to speak, and while it is possible to imagine my

sight and the tree separately (viewed as potencies)—and while it is certainly possible to make subsequent erroneous judgments about the tree—my *seeing* it coincides with its *taking* up residence. “The activity of the sensible object and that of the percipient sense is one and the same activity, and yet the distinction between their being remains” (*De Anima*, III, 425b26). The sciences then proceed from this unity, abstracting “parts of being” from this actual whole and returning to this whole by way of synthesis.³⁰

This unity all but disappeared from view with the demise of the act–potency distinction and the subsequent transformation of efficient causality into a (strictly unintelligible) relation between two events. This is why causality is now reduced to regularity of occurrence.

Yet unlike modern science, which commences in what Galileo approvingly called the “rape committed on [the] senses” in order to get to the “real world” lurking objectively behind their deceptive deliverances, there is a sense in which ordinary sense experience of the world does serve as a kind of rational criterion for Aristotle. This is why he can claim that the indemonstrable first principles of demonstration are better known than the conclusions (*Post. An.*, I, 72a25ff).³¹ (We will take up this point in detail in the final chapter.) Aristotelian experience is not a criterion of rationality, of course, in the critical Kantian (or Fichtean) sense that obliterates the world in itself and reduces it to an object for a subject by converting time and space into *a priori* intuitions for possible sense experience and the predicaments of being into *a priori* categories of understanding.³² Nor is it a criterion in the sense of a “naïve realism” sometimes attributed to him by his seventeenth-century detractors, that all our initial judgments about sense experience are correct and that things are always simply as they appear to be—as if the sun were really no bigger than a coin or a straight stick miraculously bent when one end is stuck in water.

Rather, because I always already *belong* to the world—because the world and I are distinct poles of a single actuality—there is no “subjective experience” of myself that does not already include the prior objective order of the world, and there is thus no real possibility of separating my subjectivity from this order. The Cartesian *epoché* can only be a willful act of self-mutilation that, even then, is no more than half successful. Moreover, this experience in its very intelligibility has to be included in any account of the truth of the world since it is manifestly a part of the world. Joe Sachs put it very well in his commentary on the *De Anima*. An alternative to the modern attempt to reduce the actual world to the parameters of a mechanistic ontology is to “realize that the world must be so constituted in the first place that the soul and the activities of life are genuine possibilities within it” (Sachs 2004: 8). Thus for Aristotle, both analysis and synthesis attempt, in a sense, to “catch up” to the elementary experience of the world as it impresses itself upon us in the single actuality that is our being in it and immediately receiving it. Analysis and synthesis are attempts to “unpack” the truth of being impressed upon this immediate understanding. Since truth is not exhausted in appearance it needs to be unpacked, not because the truth lurks obscurely “behind” appearances (where it can never logically be reached), but because it *overwhelms* appearances, as the light of the sun overwhelms the eye of the owl (Aristotle, *Metaph.*, II, 933b10).³³

The crucial points are these: being precedes knowledge, and a certain *understanding* of the whole or being as such (*esse commune*) permeates scientific inquiry and lies, albeit

differently, at both its origin and end. This is not to say that an articulated metaphysical *system* serves as the deductive basis of subsequent science—indeed in Aristotle’s scheme the science of being *qua* being is *chronologically* last in the order in which the sciences are articulated—rather, it is to say that the truth of being *qua* being (what is) is *ontologically* first and thus lies at the origin and source of all inquiry, imposing itself upon thought in its very structure even if this is inadequately recognized. And since what is true of the whole is by definition true of all its parts, metaphysics, as a matter of ontological and epistemic necessity, is in some sense operative throughout the endeavor of thought. To put the matter in Aristotelian terms, the orders of being and knowledge, while not separate, are distinct and inversely related: what is last in the order that we come to know is first in the order of being, as it must be if knowledge of the world is to be knowledge *of the world* and not simply a tracing around the structures of logic or the finite categories of our understanding. While metaphysics may therefore come *chronologically after* physics, its truths as truths of being and therefore as the condition of possibility for knowledge are ontologically first and thus operative formally in thought as such, even though these truths may be distorted by subsequent, second-order reflection. Because scientific knowledge is both responsive to reality and assumes an understanding of reality in general that is more than it can ever say for itself, and because any such account implies a relation to God in the manner already discussed, all sciences tacitly partake in that *theologia naturalis* which Aquinas said is proper to metaphysics (*In Boeth. de Trin.*, q.5, a.4). For all deal with “divine things,” at least implicitly, as an ineradicable aspect of their treatment of the world as Aristotle himself does in the 12th book of the *Metaphysics*.³⁴ That other sciences differently conceived do so tacitly or unawares or that they fill their metaphysics with content materially different from Aristotle does not obviate this formal point. Precisely because these are judgments about reality *in general*, that is, about the *whole*, they are axiomatic within those sciences such as biology, chemistry, astronomy, and their sub-specialties which ostensibly deal only with a part. Indeed, as I shall argue, these sciences deal with the whole through the attention they give to a part.³⁵ Irreducibly metaphysical judgments as to the nature of being, form, time, space, matter, cause, truth, knowledge, explanation, wholes, parts, and the like are the starting point of science, not its conclusions. Because they are *apropos* of being *qua* being, these judgments are not merely *presupposed* at the origins of scientific inquiry where they may thereafter be bracketed out. Since what is true of the whole is by definition true of every part, they permeate the entire enterprise and are operative inside of every subsequent judgment.

A Most Basic Distinction

To put the point positively, science is constitutively and therefore inexorably related to metaphysics and theology. To say that this science is intrinsically constituted in relation to metaphysics and theology is to say that science is not simply distinguished from metaphysics and theology merely by a difference of method (experimental, empirical, or mathematical) that would demarcate them *externally*, though this is not to deny that there is a methodological difference. Nor are they simply distinguished in virtue of their end or the fact that science typically trades in what can be observed, or measured, or

predicted, or manipulated. The question of precisely *what* the empirical sciences observe is a complicated matter, since empirical experience is already a highly “stylized” experience.³⁶ And it is not always the case, in astronomy, for example, or in certain branches of physics, or even in reconstructing certain features of a hypothetical evolutionary past, that the objects of science can be observed or manipulated. Where it is the case, the very fact that empirical experience is “stylized” is an indication that there is no such thing as empirical observation that is not philosophically mediated. To say, then, that science is intrinsically constituted in relation to metaphysics and theology is to say, first, that it remains dependent upon a tacit metaphysics and theology in the very act by which it distinguishes itself from them, and, second, that science is constituted as such in distinction from philosophy and theology *by the manner* in which it relates itself to them (precisely *by* distinguishing itself from them), as a way of attending to “the whole” through its perspectival attention toward a part. To say that this relation is inexorable is to say that it cannot be willed away. It can be forgotten, neglected, suppressed, or materially distorted, but never escaped. The more vehemently a Dawkins or a Dennett asserts his atheism, for example, the more definitive and grotesque his theology becomes.

Before explaining further the meaning and implications of this claim, it is first important to specify just what sort of claim it is. It is actually three claims which cannot be deduced or inferred from one another as a matter of positive theological principle. Though they form a comprehensive whole when taken together, illuminating and deepening each other, each stands on its own without reference to the other two, and they could thus be articulated in any order. The first sense of the claim is theological. Science’s constitutive and inexorable relation to theology is but the cognitive expression of being’s constitutive and inexorable relation to God. It follows, in other words, from a proper understanding of creation understood (in its passive sense) precisely *as a relation*, a notion we will specify a bit more fully later (Aquinas, *ST*, I.45.3). Inasmuch as relation to God intrinsically constitutes the creature in its very distinction from God, this most basic relation is implicated in all subsequent relations of the creature, including thought.³⁷ There can be no “outside” of relation to God because it is through this relation itself—real on the side of creatures, rational on the side of God—that the being of all that is mysteriously not God is constituted. This is why Aquinas can say not only that all things tend to God and that God is sought in every end, but also that “all cognitive beings also know God implicitly in any object of knowledge” (*De ver.*, III.22.3). If this is true, then there will be in the cognitive order something analogous to the classical understanding in the moral order of sin as a *privatio boni*, where sin is understood as the privation of a more basic goodness which continues to be reflected in and through the privation.³⁸ If relation to God is *ontologically* constitutive, then a defective realization of this relationship in the cognitive order cannot vitiate that relationship utterly. Objectively speaking, this means that this relation, since it is really *in* the creature, must remain phenomenologically “visible,” as it were, even though we try, like Hazel Motes, to turn a blind eye to it.³⁹ “Ever since the creation of the world, his eternal power and divine nature, invisible though they are, have been seen and understood through the things he has made” (Romans 1: 20).

The second sense of the claim, and the principal argument of this chapter, is philosophical. This sense of the claim is not deduced from creation and should certainly not be mistaken for an argument in “proof” of God’s existence. In this sense, this is a

claim about reason's own intrinsic necessities *qua* reason, and consequently, about the nature of science or "natural philosophy." It is argued not from the top down, so to speak, but from the ground up.⁴⁰ Though I maintain that no one can escape what is finally a theological standpoint, and though I hold that the theological standpoint revealed in Christianity purifies and deepens philosophy and does not negate it, this philosophical argument does not require one to assent to Christian faith or the doctrine of creation *ex nihilo* in order to recognize its force. We have already encountered this argument in its most basic form. The notion of a "pure" science free from metaphysical and theological contamination is a fiction and therefore *already* the expression of a theology. This is because every account of scientific knowledge necessarily presupposes something of the object of that knowledge, namely, nature, and this in turn presupposes an account of being *qua* being that mediates both the content of science and the relation to theology. More simply, science is intrinsically related to theology because one cannot identify the object of scientific inquiry—namely, nature—without simultaneously distinguishing it from that which is not nature—namely, God—and without giving tacit specification to the character of this "not." This is confirmed by a fact which we have already noted and which we will see repeated frequently as our argument unfolds over the course of this book: conceptions of nature determine in advance what sort of God is allowed to appear to thought and consequently, the range of meanings that can be intelligibly attached to "creation."

We have not yet stated the point in its full depth, however. If the distinction between God and the world is the most primitive of distinctions, if it is inherent in the very idea of the world even where "God" is thought not to exist (i.e., in much of the modern West), then this distinction will inhere in all subsequent distinctions and in the notion of "distinction" itself. How one understands the very nature of "distinguishing" will therefore also give tacit expression to an ontology and ultimately a theology, which is to say that there is no retreat to an ontologically neutral "methodological" standpoint in order to escape this relation. We will have to make good on this claim, of course; suffice it for now to note the obvious point that we are here discussing the objective *logic* of theorizing and the fact that the *act* of distinguishing God and the world is an irreducibly *theological* act. We are not mandating that one who thinks about nature be *thinking about* God, much less articulating an explicit theology. This is why Aquinas says that we have an *implicit* knowledge of God in the knowledge of everything else. Sincerity of belief, in other words, is not the issue. I have little doubt that Richard Dawkins sincerely *believes* he is an atheist, just as Aristotle reports that there are some who attribute disbelief in the principle of noncontradiction to Heraclitus (Aristotle, *Metaph.*, IV, 1005b25). But Dawkins is a very bad atheist, preserving in his thought at every turn the traces of the theology he purports to reject, much as those purported to disbelieve "the most certain principle of being" affirm it in the very act of denying it. In both cases, professed belief is betrayed by the act of thought itself (1005b20–1006a13). Aristotle suggests that such men, suffering a want of education, do not know themselves.⁴¹ I leave it to the reader's discretion to judge whether he is right.

The third sense of the claim is historical, and indeed what is true in principle in the orders of being and thought we should expect to see enacted in history. Because science cannot do without judgments of an irreducibly metaphysical and theological nature, modern science in general and modern biology in particular have never in fact

done without them. Each in the course of its actual development has both presupposed and enforced particular metaphysical and theological outlooks which are beyond their own scope to adjudicate, outlooks at once parasitic and destructive of the orthodox tradition of Christian theology. One might say that the modern conception of nature, insofar as it is possible to identify the essence of such a thing from among its many articulations, depends upon an unthinking of traditional doctrines of God and creation that is no less theological for being malign. As a result, substitute doctrines of God and creation that make no theological sense have come to be widely accepted only for the purpose of being rejected, while ignorance and an enforced lack of interest about such fundamental human questions are confused with education. Consequently, many contemporary atheists lack the theological literacy to recognize that what they disbelieve in is not in fact God or the incentive to discover otherwise.

One might object that my claim to be making a philosophical argument refutes itself. If there is finally no “outside theology,” as I am arguing, then it would seem that my argument *for* theology cannot be outside theology either. So it appears we are trapped in a vicious circle, which returns us to our starting point in Simpson’s original accusation: that the problem of science’s relationship to theology is not properly “discovered,” but formulated presupposing its own theological solution. But not all circles are vicious—indeed circles were once thought perfect before they became vicious—and the impossibility of finally *separating* the form of a problem from its material content does not preclude the possibility of *distinguishing* the form from the content and from pursuing the problem in formal terms for quite a long way before the content necessarily comes into view. Such a possibility is inherent in the inverse relation between the orders of being and thought which follows in turn from reality’s superiority to all our theories about it. Without this excess of being to thought, the very notion of truth disintegrates into mere logical coherence. To deny the legitimacy of knowing the form of a problem by an abstraction from its material content is to deny the possibility of science, which is also a form of abstraction, for one would have to know the whole of everything in order to know anything whatsoever. As it happens, while I wish to maintain the strongest possible *distinction* between theology and philosophy, and thus a distinction between the formal, philosophical character of this relation and the theological content which ultimately makes sense of it, I do not for a minute wish to *separate* philosophy from theology. To separate the formal problem from its material solution would already be to pronounce theologically upon that solution. The same holds true for the relation between theology and science. While I would wish to make the strongest possible distinction between science and theology, there is no “outside theology” for science either. The distinction between science and theology, in other words, is finally a theological distinction undertaken from within a theological purview.

It turns out, then, that maintaining the rightful and necessary distinction between science, metaphysics, and theology is something of a paradoxical affair. And this paradox is mandated, albeit in distinctly different ways, both by our being in the world and by a doctrine of God that does not annul the difference between God and the world. The necessity of presupposing more of being than one could ever say derives from our being in the world and from the impossibility of demonstrating the principles of being, which would be tantamount to justifying the world on the basis of some

Archimedean point outside it. The impossibility of ever fully justifying that presupposition or getting to the bottom of it derives from the very distinction between God and the world, which forbids us the continuity of being implied in either a deductive or inductive metaphysics and finally prevents the universe from fully explaining itself. It seems that being itself leaves us in the curious position of formally requiring and indeed having thought permeated by a metaphysics that is, by turns, equally necessary and equally impossible. Precisely because this situation prevents us from deducing the world from a metaphysical starting point, there is a distinction (but not a separation) between the order of discovery, that is, the order of reason, and the order of being that is the source of that discovery: having an inkling in advance of what we can never know and cannot help but know, we must nevertheless approach it from the ground up. This permits the philosophical discovery of a formal problematic whose paradoxical structure is only revealed in the end, and by approach from the opposite direction, to be the expression of Christian theological content. This content “resolves” the problematic precisely by disclosing its paradoxical character and thereby smashing any illusion that this necessary metaphysics can ever coherently take the form of a “system” encompassing *or* discretely separating God and the world. And so while the material content of Christian “metaphysics” is alone in “satisfying” the formal problem of metaphysics as such, we avoid vice in this circular conclusion by setting out in opposite directions, and traversing its circumference in two directions at once.

The Impossible Necessity of Metaphysics

In order to understand more deeply just why and how a metaphysics and *theologia naturalis* are intrinsic to the sciences even while remaining distinct from them, we must explore this paradox further.⁴² It is an obscure problem, and to address it, I want to draw upon insights from an obscure text, at least from the point of view of contemporary philosophy of science, the 1932 masterpiece by Erich Przywara, the *Analogia Entis*.⁴³ Przywara helps us to see that the “impossible necessity” of this metaphysics is not simply a function of reason’s limitations, as if these could be determined once and for all by a critical philosophy tacitly exceeding those limits, but ultimately from our paradoxical status as *creatures*, which transforms and enriches the very meaning of limit in a way that has a direct bearing on the distinction between theology and the sciences.

To admit, from outside of the “metaphysics of creation” that science is never without its metaphysics and theology is to recognize that the necessity of metaphysics and its inherent relation to theology are *formal* problems, formally binding on the very structure of thought, “prior to the *theologia naturalis* advanced by any particular metaphysics” (Przywara: 48). This is why, for Aristotle, the “most certain principle of being” the indemonstrable first truth of metaphysics imbibed through the unity of understanding (*nous*) in our elementary experience of the world could *not* be a “hypothesis”: because any such hypothesis could only be stated in terms already presupposing this principle (*Metaph.*, IV, 1005a18–1005b34; *Post. An.*, II, 100a9–100b18).⁴⁴ This, further, is why metaphysics is not merely presupposed at the origins of a science where it can be safely bracketed out from the conduct of “pure” science and why it is not merely a “hypothesis” subject to subsequent verification by an ontologically neutral method.

To say that metaphysics and its attendant *theologia naturalis* present a formal problem in advance of any particular solution is to say that they present a problem of structure, but is it the structure of thought or the structure of being? The many historical attempts to resolve this question decisively in favor of one or the other side of the polarity immediately reveal an aporetic dilemma. With respect to the first form of metaphysics—the metaphysics of act, knowledge, or consciousness which Erich Przywara called a *metanoetics*—not only does the attempt to get critically “behind thought” through thought involve a certain infinite regress, but also “no account can be given at all that is not cast in the form of certain ontological categories” (4).⁴⁵ The second form, which Przywara calls *metaontics*, aspires to an adequation of thought and being so complete that knowledge itself can be understood as the self-expression of being.

The obvious problem in this instance is that a *metanoetic* point of departure is inherent within this aspiration: even if we find thought *about being* in the heart of thought itself, it nevertheless remains irreducibly *thought* about being. (This is one reason why Aristotle says that “the soul is *in a way* all things”—*quodammodo omnia*. This means there is also an important way in which it is *not*, in which thought and being stand in excess to each other (*De Anima*, III, 431b20).) What is crucial from our point of view is that while it is necessary to maintain a distinction between these two forms of metaphysics—the distinction between truth and appearance depends upon it—the line of demarcation between them, like that distinguishing metaphysics from *theologia naturalis*, is not an external limit. Rather, each is internally pervaded from the start with the other; each is always already implicated in the other such that “clearly the final problem of metaphysics must be just this mutual belonging” (Przywara: 6).⁴⁶

It is partly this mutual implication of being and thought, reflected in our earlier comments about Aristotelian “experience,” that led Aquinas and the scholastics to insist that the first object of the intellect is *being (ens)* (Aquinas, *De ver.*, XXI, 4, ad.4). That is, the structure of human thought is “theoretical” or “contemplative” in the traditional sense before it is active. Inherently entailed in its most fundamental operation, that is, in the *act* of consciousness, are a receptivity toward and affirmation of *what is* and of what thus transcends—and therefore *precedes*—the temporal flux of becoming precisely insofar as it is.⁴⁷ An important consequence follows. While we may grant a *methodological* priority to the *metanoetic* (a relative priority granted to the order of thought that allows us to imagine metaphysics as a formal question in advance of metaphysical content), the *metaontic* within the *metanoetic* is that which objectively (i.e., ontologically) precedes it by virtue of the transcendence of its object.⁴⁸ In other words, the truth of being imposes itself on the *act* of thought prior to our material judgments regarding this truth. The primacy of the metaontic is reflected in the priority that Aristotle and Aquinas accorded to *nous/intuitus* not just at the end of discursive reasoning in the goal of a contemplative unity of thought and being, but at the *origin*.⁴⁹

The implications of this, both for the formal structure of metaphysics and for the particular metaphysical assumptions embodied in modern science, are too numerous and momentous for us to give them more than a passing mention at this stage. I would note first that the inherent implication of being in thought immediately provokes questions about what is traditionally referred to as the transcendental attributes of

being—unity, truth, goodness, and beauty—and their convertibility. This issue can be focused by posing the questions: “What makes truth compelling? What is the force of reason?” To answer that reason and truth are compelling in their own right—that they claim and move us by nothing more basic than themselves and that they cannot therefore be defended—is immediately to enter upon a Platonic reflection upon the ontological (and thus causal) priority of the good. To defend reason and truth for their usefulness, by contrast, is already to have abandoned them.⁵⁰ The implications for the sciences are immediate. If reason is structurally contemplative, if the question “what is?” ontologically precedes—or rather, is already entailed within—all questions of “how?” then the claims of pragmatic science to have dispensed with such questions will have the character of a self-inflicted wound and indeed a self-deception. Such claims do not vindicate reason as much as abandon it in service of the Baconian *dictum* equating knowledge and power. And yet, this will be *only* a wound. For inasmuch as reason is structurally—that is, *ontologically*—contemplative, it will be impossible to avoid both posing and answering the ontological question in practice, albeit in an inherently reductive way.⁵¹

We must postpone further reflection on this point until subsequent chapters. At present, I wish to indicate two points that are more immediately relevant. The first is that the structurally contemplative character of reason further deepens the necessity of metaphysics, making it not just a “system requirement” for any given theory but a constitutive if inchoate feature of the act of thought. The second is that the tension between what Przywara calls the *metaontic* and *metanoetic* starting point for a metaphysics at once necessary and impossible is indicative of a deeper and more comprehensive tension between an *a priori* metaphysics that aspires, in its perfected form, to “deduce the world from its idea” and an *a posteriori*, inductive metaphysics that proceeds from particulars to universals and effects to causes.⁵² Each can be regarded *metaontically* or *metanoetically*, that is, from the side of the object or the side of the act, which unveils yet another tension internal to thought between historical existence (*esse*) and suprahistorical “essence” (though we see in Part III that there is also a “suprahistorical” dimension to *esse* and a historical dimension to *essentia*). Our point here is not to duplicate all of the details of Przywara’s profound and subtle analysis. Rather, the point is simply to open a window onto science’s relation to metaphysics and theology. Inasmuch as reason’s act is structurally metaphysical *before* it is scientific and remains metaphysical while it is scientific, it is necessary to determine, as far as possible, the exigencies of this act. Przywara’s formulation helps us to see the paradoxical structure of these exigencies. We have seen, on the one hand, that the strict impossibility of either a pure metaontic or metanoetic metaphysics coincides with the strict necessity of both, and the same is true of an *a priori* or an *a posteriori* metaphysics conceived in metaontic or metanoetic terms. This means that the relationship between these two forms of metaphysics is not an extrinsic relation of mutual exclusion but an intrinsic relation of polarity: “Polarity means that the poles, even as they are in tension, exist strictly through the other” (Balthasar 2000: 105).

A pure *a priori* metaphysics, whether of the object or the act, would be *a priori* not only in the sense of “piori”—an immediate grasp of the first principle—but also and precisely in the sense of the “a”—seeing *from* the vantage of the first principle. (Przywara: 17)

This is manifestly not the position occupied by any would-be metaphysician; he remains within and a part of an order of being that precedes and determines him. It was this which first led Aristotle, the exemplar of *a posteriori* metaphysics, to declare the first principles of metaphysics indemonstrable. The philosopher has no recourse to a starting point “outside” or “above” the order of being but instead always commences his deliberations from within that order. And if we are allowed to follow Aristotle’s own account of the senses or the diverse reflections of Husserl, Wittgenstein, Hans Jonas, and Michael Polanyi on the *lebenswelt* and its bodily mediation, they commence from more deeply within that order than the philosopher is ever capable of realizing, certainly more deeply than the Descartes’ disjunction of *res cogitans* and *res extensa*, perennially repeated in all reductionist science, would ever lead us to believe. Were it even possible to attain to such heights, the world thus derived from its idea, whether conceived in mathematical terms, or in the terms of Platonic *eidos* and Aristotelian *morphē*, would never reduce entirely to that idea.⁵³ Existentially, that is, with respect to what *is*, it would always be bedeviled by an irreducible historical remainder—not merely man, or even *this* man, but “Socrates.”

This seems to militate in favor of an *a posteriori* metaphysics. Yet, a pure *a posteriori* starting point proves just as elusive. Most mundanely,

even the most extreme of empirically experimental metaphysics cannot avoid a theoretical point of departure for its experiments...and every “it is assumed that” already implies an antecedent theory which affects the order of the experiment and thus constitutes at least a negative *a priori*.⁵⁴ (Przywara: 23)

A positive *a priori*, moreover, a universal that transcends its particular, contingent instances, remains the formal object of an *a posteriori* metaphysics, so it appears that an *a posteriori* metaphysics has the *a priori* as both its origin and end. And so with respect to the cognitive act, we see the inverse of the earlier problematic with the *a priori* metaphysical form. Just as from the deductive vantage there was an irreducible existential (historical) remainder in the explication of what *is*, so there is an irreducibly essential (suprahistorical) remainder in grasping of *what is*, something in the apprehension of the “what” (precisely insofar as it is) which presents itself as transcendent and to that extent (ontologically) prior to its singular instantiation.⁵⁵ Przywara uses the formula “essence *in and beyond* existence” to designate this.

These paradoxical necessities do not compel explicit assent to this antique philosophical lexicon, of course, much less to an ontological doctrine of substantial forms or essences as principles of being. I am well aware that such a position is regarded as far from self-evident in the Babel that is contemporary philosophy and is even more despised in the philosophy of science or biology where it will earn you an *anathema sit* as a variation on “typological thinking.”⁵⁶ Positivists like Martin Mahner and Mario Bunge, subscribing to a nominalist position would no doubt dismiss this in advance as yet another “unintelligible discourse about Being, Nothingness, Dasein, deconstruction and the like” (1997: 3). I privilege this language as belonging to philosophy proper not on grounds that it is the only one possible, but on grounds that it expresses something basic, at least so far as the order of knowledge can be abstracted and inversely related to the order of reality: the formal problem of philosophical experience in advance of any particular philosophical content.

One may choose not to subscribe to these terms. Yet inasmuch as our elementary experience is necessarily intelligible, inasmuch as being is a formal object constitutive of thought and intelligible only through form, and inasmuch as form is therefore necessarily affirmed in the *act* of thinking, we may reasonably ask to what extent it is possible finally to *disbelieve* in them—“For what a man says, he does not necessarily believe” (Aristotle, *Metaph.*, IV, 1005b25). Balthasar maintains that there are no real idealists on similar grounds.⁵⁷ One should think it tiring work in any event.⁵⁸ This is why D.C. Schindler (2008) is absolutely correct to say that it is much easier simply to ignore such basic contradictions, as Descartes was forced to do, than to try and overcome them.⁵⁹ Just as hypocrisy is said to be the tribute vice pays to virtue, so pain at contradiction is the residual tribute reason pays to the claim of being as truth. For the most part, the tribute is not exacting, but when it is, one can avoid it simply by remaining numb to the contradiction and subordinating the claim of a comprehensive truth (and the prospect of an integrated, coherent life) to the criterion of efficiency. So just as one can subjectively live contradictory lives at home, at Church, and at the office, one can always respond to this formal problematic with an assertion of nominalism—as indeed modern science has done—and then simply ignore the fact that this carries its own metaphysical implications which are no more self-evident, but much less coherent.⁶⁰ Nevertheless, just as an “essentialist” ontology, whether Platonic or Aristotelian, reflects this formal problematic and attempts to conceive of a universe large enough to include what is experientially basic in it, so nominalism is a second-order stance taken in *response* to what is experientially basic. It is a material response to this formal problem that does not refute the problem but affirms it.

Thus, both *a priori* and *a posteriori* metaphysics turn out to be equally necessary and equally impossible. They are necessary because together they mutually constitute the very form of thought. They are impossible, not because they are mutually exclusive alternatives demarcated by an external limit, but first, because of the “intrinsic reciprocity” that obtains between them and second, because this reciprocity denotes the philosopher’s self-transcending location within an order of being to which there is no “outside.” Let us take these points in turn. Przywara’s formula “essence in and beyond existence” expresses the paradoxical fact that each necessary form of metaphysics is irreducible to the other, and this necessitates a distinction between them. And yet this distinction is *not* a separation. For we have found something of the *a priori* (corresponding to essence) operative at the heart of the *a posteriori*, and conversely we have found something of the *a posteriori* (corresponding to concrete historical existence) at the heart of the *a priori*. While each form is distinct from the other, each exists only in and through the other and so cannot properly be itself without it. The two forms of metaphysics structuring the act of thought constitute a polarity in Balthasar’s sense. This leaves the would-be metaphysician in what Przywara calls the “suspended middle,” oscillating between two poles without ever leaving either behind, in a mutual unity incapable of accounting fully for itself and thus suspended, as it were, from nothing.

This “suspended middle” is crucial for several reasons, although the first is of more remote interest for the time being. Internal to the various tensions we have seen thus far, and indeed to each pole of these tensions, is a movement between the relative and the absolute, the *a priori* moving from the “top-down” as it were from an eidetic source and the *a posteriori* taking the reverse movement from below to above, toward that which transcends its fleeting instantiation in the particular and simply *is*—whatever

that is taken to be. Insofar as both movements press toward a comprehension of the whole, and insofar the whole is not self-explanatory and the less so the more that each pole of approach reveals its dependence upon the other, “the pure formal problem of metaphysics as such leads to the *question of the relation between God and creature*” (Przywara: 45). In reality this question was already implicit from the beginning, formally inherent in the problem of metaphysics *per se*, inasmuch as no metaphysics can avoid giving some sort of “bottom-up” answer to it. But is this the same question as those we have been considering, or is it a question of a different order?

At the risk of abusing the notion of “paradox,” I must point out a certain, shall we say, curiosity with respect to this question. The paradoxical “limits” within which the philosophical act commences make it impossible for philosophy to specify *a priori* and with precision just what reason’s limits *are* in its pursuit of God. For, in order to specify these limits absolutely, one would already have to see beyond them, and it is precisely this that is denied by the philosopher’s paradoxical position. Balthasar put it very well.

The positive definition of grace can only be given through grace itself. God must himself reveal what he is within himself. The creature cannot delimit itself in relation to this Unknown reality. Nor can the creature, as a theologically understood “pure” nature, ever know wherein it is specifically different from God. (Balthasar 1992: 279)

Historically speaking, it is surely telling in this regard that the Greeks, who were able to anticipate a great many conclusions which would find their fulfillment in Christianity, knew no distinction between theology and philosophy. The distinction only comes about as a consequence of the revelation, in Christ, of a transcendence and immanence beyond even the Greek imagination that institutes a hiatus within their ontological monism. I would therefore take exception to the manner in which some contemporary Thomists draw the distinction between philosophy and theology, or rather perhaps, since I take the view articulated here to be more or less Thomistic, I take exception to their understanding of what they are actually *doing* when they draw the distinction. And I do so neither to devalue natural reason nor to limit the autonomy of philosophy, but because by attempting to valorize reason and secure the autonomy of philosophy in juxtaposition to revelation, they *limit* reason prematurely and misconstrue the nature of this autonomy.⁶¹ And they do so on what are fundamentally theological and not philosophical grounds.

Philosophy in its aspiration to ultimacy is inherently open to theology.⁶² Because this aspiration commences from within this “suspended middle,” we cannot completely specify philosophy’s limits vis-à-vis theology from *within* philosophy, and I would be reluctant to place any *a priori philosophical* restrictions—if such an *a priori* even exists after revelation—on philosophy’s capacity for God. And yet, if we do *not* regard this question as in some sense beyond the reach of earlier questions, we run into a different and distinctly *theological* problem: we annul the infinite difference between God and the world, effectively rendering “God as creature” or “creature as God” not simply by effectively equating God with “the all” but also by appropriating through our *scientia* a vantage that only God could possess. This makes philosophy into a theology, albeit one typically emptied of theological content. We will see this repeatedly when we examine the metaphysics of modern biology. This is brought about by collapsing the

constitutive tension of the “suspended middle” through “rounding upon being” in one of two directions: either by attempting to reduce the *a priori* to the *a posteriori* or by reducing the *a posteriori* to the *a priori*.⁶³ Since the paradoxical form is disclosed not simply through the concept of being but through the *act* which implicates being in thought, this annulment of the difference between God and being and this reduction of one pole of the metaphysical form to the other brings about a concomitant reduction of the *world*: reducing “existence” to “essence” conceived now as brute facticity, or reducing “essence” to the “existence” now conceived as the history of accidental becoming, that is, as mere artifact of the historical process.

The implication here is that the formula “essence in and beyond existence,” which expresses the primal form of metaphysics, has implicit within it the formula “God beyond and in the creature” and must pass over into this form, not to collapse philosophy into theology, but in order to preserve the distinction between them, the metaphysical form itself, and the fullness of thought and being. Both philosophy’s intrinsic openness to theology and its distinction from theology are crucial to the integrity of both philosophy and the world. But the distinction itself is *theologically* granted. Because God infinitely transcends the world, the relationship between God and the world cannot be encompassed or systematized within a higher, metaphysical vantage. Being, as Aquinas would say, is not a genus and does not include God and the world (*Contra Gent.*, I.25.6; *ST*, I, q.3, a.5). Theology premised upon God’s infinite otherness from the world thus preserves the noetic order precisely in virtue of its *discontinuity* with that order and the subsequent irreducibility of that order to *a priori* or *a posteriori* thought.⁶⁴ Proceeding thus from what is first in the order of knowledge, we arrive late at what is first in the order of being, where we find that the metaphysical *content* of Catholic theology thus turns out to be the key to sustaining the metaphysical *form* of our engagement with the world, and the ability of being to “appear” within that engagement. The result is once again paradoxical. Only by acknowledging the metaphysical substance of Catholic theology can metaphysics—and science insofar as it is metaphysical—sustain both its formal difference from theology *and* the full rein of its aspiration to ultimacy. Thus, to deny theology its place above and within the noetic order on grounds that it does not submit to scientific verification represents not a rugged adherence to the limits of reason but a misunderstanding of “limit” and a totalitarian closure upon it that refuses to follow reason until that limit is reached.

The relation between theology and metaphysics is no more extrinsic than the forms internal to metaphysics itself. Their distinction, in other words, is not a separation. Thus, to distinguish theology and metaphysics is “not to say that philosophy would thus have God as its negative limit concept, and theology the creature” (Przywara: 52). Rather, just as we found the *metanoetic* in the heart of the *metaontic*, the *a priori* in the heart of the *a posteriori*, the *superhistorical* in the historical and *vice versa*, so we find a metaphysics internal to theology and a theology internal to metaphysics not in spite of but *because of* their abiding difference. They do not inhabit different, mutually exclusive domains but inhabit the same creaturely domain differently. Theology thus comes not to abolish philosophy but to fulfill it—*gratia non destruit sed perfecit naturam*. That is why Christianity was able to fulfill the ambitions of Greek philosophy better than the Greeks, we shall argue. And it is why it is perfectly legitimate to consider Aquinas an Aristotelian philosopher, not because he slavishly follows Aristotle and then tacks

theology onto Aristotle's breaking point, but because the revelation of the world as creation allows him to be a better Aristotelian than Aristotle himself was, to see the gratuitous gift of *esse* in the heart of *philosophy* and thus make deeper sense of Aristotle's concern for the mysterious irreducibility and commonality in every "this-something."

The difference between theology and philosophy consists partly in where each "takes its stand": theology in the transcendent God who as such presides independently over his own self-disclosure, philosophy, in the act and being whose own formal structure cannot be explicated without at least implicit reference to the absolute.⁶⁵ Each then tends to go forth from itself without ever departing from itself, finding itself already in the heart of the other. To paraphrase Aquinas, theology, whose principles are in God and revealed in the Incarnation, thus treats the world as an inexorable aspect of its treatment of God (since it can only know God by way of the world). While that "theology belonging to metaphysics" treats of God as an inexorable aspect of its treatment of the world, regarding God not as he is revealed to be in Christ but as a principle from which the world takes its departure precisely as world. (This remains formally the case even when being "from God" assumes only a negative form, as when naturalism attempts to define nature in opposition to God.)⁶⁶ Each subsists within the other. Philosophy resides in the heart of theology because God, presiding over his own appearance, can only appear to us from within the world in which theology is conducted. Theology resides in the heart of philosophy because an intuition of the whole inheres in the apprehension of a part, because it harbors a legitimate aspiration to ultimacy, and because some form of the God-world relation is inherent in however it understands its subject.⁶⁷ Each occupies its common ground with the other differently in virtue of their respective stands and the distinct way in which each is necessarily inadequate to its object: theology remains constitutively incapable of exhausting the God-world relationship from God's side, while philosophy remains incapable of exhausting it from the side of the world.

This is why Aquinas and the tradition have insisted that philosophy's approach to God is fundamentally negative. It proceeds by negating all finite characteristics to distinguish what God is *not* and insists that any stated similarity between creatures and God is surpassed by an ever-greater dissimilarity. This is easily misunderstood, however. It would be a mistake, for example, to distinguish philosophy from theology as if one were negative and the other positive, as if theology were not called upon to take this unspeakable difference between God and the world even *more seriously* than philosophy. It would also be a mistake to read this *apophatic* approach as an indication of philosophy's breaking point, as if it did not betoken true *philo-sophia*, the restless unwillingness to stop short of God, and as if it did not denote philosophy's *positive* capacity to distinguish a relatively coherent sense of God's difference from the world.⁶⁸ All of which is to say that the *via negativa* attests once again to an *intrinsic* conception of limit and the different way that theology and philosophy each copes with this infinite difference.

Moreover, if "God in and beyond the creature" is arrived at *through the creature*, through the formal structure of "essence in and beyond existence," then this *via negativa* extends not only to the infinite distance *between* created and uncreated being but also analogously—by virtue of the relation between them—*within* the truth of created being itself. In the dynamic interplay between essence and existence, there is a certain bottomless depth, a certain infinity *within* the being of the creature itself,

that is phenomenologically and analogically visible, as it were.⁶⁹ This will become crucial in Part III of this book, once we have explicated the doctrine of creation in its metaphysical meaning. This negative *apophatic* dimension is not eliminated in theology proper any more than the positive *kataphatic* dimension is eliminated in philosophy, but the manner of their presence tends to differ in each case. Whereas philosophy may of its own accord recognize these negations as the reverse side of a more basic affirmation of superabundance, the full meaning of that superabundance as love so transcendently other as being capable of encompassing its own denial and rejection is only revealed in the theology occasioned by God's surprising historical self-disclosure in the Incarnation. Whereas philosophy may recognize this distinction-in-unity as the formal structure of metaphysics, only theology—or philosophy conducted within the ambit of the Incarnation—can properly recognize this as an *analogia trinitatis*. Whereas philosophy attending to its own formal structure may see the mutual irreducibility of “essence” and “existence” negatively as limit—for example, as the incomprehensibility of Socrates *qua* Socrates—or perhaps even positively as the beauty of Socrates *qua* Socrates, theology proper sees in the very incomprehensibility of Socrates the reverse side of a depth, a gratuitous “excess” of being, proper to every concrete act of being as such. Once theology has given this gift of creation to philosophy, or once philosophy receptive to theology comes to discover it, philosophy itself is all the richer, all the more philosophical.

Let us descend from these speculative heights and return to our original concerns: the relation between science, metaphysics, and theology. I began by voicing a general opposition to what I have called an “extrinsicist” view of the relation between science and theology. Whether in the naïve form which denies science's *de facto* dependence upon metaphysics and theology or in the more sophisticated form that admits it, the extrinsicist view conceives of science on the one hand and metaphysics and theology on the other as fundamentally external and therefore exclusive of one another in their inmost “essence.” This then leads the extrinsicist to view metaphysics and theology (the latter, typically, without rational foundation) as systems or hypotheses—“regional ontologies” in the jargon of Mahner and Bunge—subject to verification by empirical or experimental methods which, precisely as method exclusive of metaphysical or theological content, are ontologically neutral.

We began to cast doubt on this viewpoint by showing that the seemingly innocent methodological assumptions of the extrinsicist are founded on an extrinsicist conception of the God–world relation and thus on a definite, if implicit *theologia naturalis*. We then suggested that some such theology is implicit in any and every science, the more noticeably so the more that science approaches its own metaphysical core. The analysis of this section has shown why that is the case and why as a consequence metaphysics and its implicit *theologia naturalis* cannot in the first instance be a system, a hypothesis, or a “regional ontology”: because there is for us no “outside” of the order of being and because from inside it, metaphysics and *theologia naturalis* are formally constitutive and thus ineradicable features of our elementary experience in advance of any subsequent metaphysical and theological commitments, whether in the affirmative or the negative. They are thus implicit within any and every science which can never fully shake that experience and never completely succeed at “committing rape on the senses,” which would only be a secondary metaphysical and theological stance in any

event. Contrary to Mayr, natural theology does not begin with the Greeks and Egyptians and end with the *Bridgewater Treatises* (1991: 52–53). It begins with thought and does not end.

We have therefore claimed that science is constitutively and inexorably related to metaphysics and theology; that as constitutive and inexorable, metaphysics and theology are internal to science even as they are distinct from it; and that this relation to metaphysics and theology cannot be willed away. By allowing for a true theology, which is nothing less than allowing for the real difference between God and the world instead of theologically annulling it, the sciences are permitted *to be* and to be science, not least by being “other than theology.” But their being “other than theology” is not *external* to theology any more than science is external to itself, or any more than their objects—I speak now in a theological voice—are external to the gift of *esse* in creation. Inasmuch as science cannot escape its own constitutive metaphysical and theological basis, it is incapable of grounding itself as first philosophy, incapable of being its own law (*auto-nomos*) in such a way as to be its own queen. Scientific autonomy, then, is not to be found in some illusory freedom from and indifference to metaphysical and theological assumptions. To the contrary, the freedom of metaphysics and the sciences not to be theology is itself *theologically* granted, not, of course, in a juridical sense by theologians and ecclesiastics but by the metaphysical and theological truth of science’s own creaturely constitution. If, then, science is dependent upon a metaphysics and theology which it forever presupposes and toward which it inevitably tends, it stands to reason that it ought to depend upon *good* metaphysics and theology, true to its own formal structure, and that where it does not natural science will suffer deleterious consequences precisely *as* natural and *as* scientific.

If thought is *formally* metaphysical and theological, then there can be no vantage from which to evaluate the metaphysical and theological content of one’s claims about the world that is not itself equally metaphysical and theological, and no recourse to a methodological, empirical, or experimental vantage that is ontologically indifferent. To deny this is to fail (or to refuse) to know oneself and thus to fail (or to refuse) to know the formal structure of one’s own thought or the material metaphysical and theological presuppositions that secretly guide one’s own thinking. As we shall see in the following section, the very notion of methodological or empirical neutrality will already be the expression of an ontology and a *theologia naturalis*, and the refusal to acknowledge this is a failure of self-knowledge. If thought is formally metaphysical and theological, the ultimate question to put to such an ideal is whether the particular metaphysics and theology instantiated in it are adequate to the content implicated in that form, or alternatively, whether a science now wedded to pragmatism still finds reason and truth sufficiently compelling enough to care whether it is adequate or not.

Theology and Science Within and Without Limits

The “extrinsicist view” of the relation between science, metaphysics, and theology runs contrary to the exigencies imposed upon thought by the structure of being. There are nevertheless several variations on this extrinsicist theme. The first, of which we took G.G. Simpson to be a representative, regards science, metaphysics, and

theology as so utterly separate that it disowns any necessary relation whatsoever. A second and more subtle alternative acknowledges a necessary relation between science and metaphysics but nevertheless distinguishes what is “scientific” in science by its exclusion of what is metaphysical in it. This mutually exclusive relation is then treated as a relationship of abstraction, with metaphysics either extrapolating to the general from the particular or functioning as a prior hypothesis, for which the empirical and experimental sciences working in the concrete provide *a posteriori* justification. This understanding of the relation already contains within it the assumption that method itself is prior to ontology and is thus ontologically neutral, and so it begs the question posed here.⁷⁰ Still, these assumptions make it possible to conceive of a reconciliation of sorts between metaphysics and science. They even make it possible to imagine an architectonic of knowledge bearing superficial resemblance to the traditional notion of subalternation, in which fundamental sciences such as physics provide the basis for subsequent sciences, such as biology, dealing with emergent phenomena that are not simply reducible to physics.⁷¹ In this conception of order, however, the empirical and experimental sciences occupy the position of first philosophy; metaphysics, if its necessity is admitted at all, is but a handmaid.

Yet, these assumptions are not ontologically innocent. This equation of abstraction with the movement from the particular to the general reflects the deep-seated mechanistic assumption that the “parts” of reality are ontologically prior to the whole of it, with the latter being merely the aggregation of the former and the result of their history of interaction. This view presupposes, in turn, the demise of the Aristotelian conception of act and the elevation of counterfactual orders to ontological primacy over the actual world that presents itself to experience. But in the *actual* world, the existence of each thing is already characterized by a near infinity of relations which help to constitute it. When the primacy is accorded to the actual world and to these constitutive relations, as in Aristotle and Thomas, “abstraction” has almost an inverse sense (Aquinas, *In Boeth. de Trin.*, q.5, a.3).⁷² To abstract—literally to take or pull from—is to distinguish or isolate in thought what actually belongs together in reality: form and matter, parts and wholes, a thing and the context which is the presupposition of its flourishing.⁷³ Experimentation, in which one attempts to “vary or dissociate phenomena by a kind of analysis” typically by producing “a disturbance of the phenomena,” is a form of abstraction in this sense (Bernard 1957: 9).⁷⁴ Thus for Aristotle, it is the particular sciences which are abstract because, whereas metaphysics treats of “being *qua* being” they each “cut off a part of being” from the whole to which it actually belongs (*Metaph.*, IV, 1003b25).

Now it should be said from the outset that this is both necessary and legitimate and that there is indeed a correct intuition in the extrinsicist’s assumption about the relation of science to metaphysics. While certainly whatever is true of being *qua* being is analogously true of every “part,” and while this means that the truths of metaphysics are tacitly operative within all the sciences, it is manifestly not the case that what is true of each thing—being a rhinoceros, for instance—is true of being as such. So while the sciences are intrinsically related to and indeed tacitly permeated by metaphysics, they are not “branches” of metaphysics which could be either deduced from it or reduced to it. The particular sciences do represent a genuine novelty “over and above” metaphysics, and Aristotle is much more insistent than the architects of

modern science upon an irreducible distinction between the various sciences. It is not in Aristotle but rather in the seventeenth century that “the ideal of a system of our entire knowledge founded on one method was born” (Funkenstein 1986: 6). For Aristotle, to attempt demonstration across *genera* or to translate methods from one science to another would be to fall into the sin of *metabasis* (*Post. An.*, I, 75a38–75b20).⁷⁵ Yet, this novelty “over and above” metaphysics is not *outside* metaphysics; rather it exemplifies the very form of metaphysics unveiled in the previous section.

So there is obviously a basic truth in the notion that the sciences are distinguished from metaphysics by their detailed attention to a (relatively) concrete part of reality abstracted from the broader whole, and it is not just different objects within the world but the formal perspectives that each bring to the same objects within the one world which distinguishes the sciences from one another as physics, chemistry, biology, and so on (Aquinas, *ST*, I, a.3, *resp.*). And it goes without saying that scientific abstraction and experimentation are both perfectly legitimate: metaphysically because of the rightful irreducibility of the sciences to philosophy; theologically because the legitimate autonomy of the sciences is warranted by a proper understanding of God and creation and the irreducibility of created to divine being; and pragmatically because the sciences have obviously proven spectacularly successful in realizing the ends which they have set for themselves.

Nevertheless, there is latent within even the most subtle form of the extrinsicist view an implicit understanding of abstraction within science and a concomitant notion of “limit” which are not finally tenable. This understanding exemplifies the formal problematic of metaphysics and science’s own intrinsic relation to metaphysics by giving expression to a quite particular ontology that determines in advance the limits of what science can “see.”⁷⁶ Already we have supplied one very general corrective to this understanding. Abstraction is as much if not more a matter of deriving the particular from the general as deriving the general from the particular. It is therefore a misunderstanding to think that metaphysics deals very generally with the whole (or theology with God) while the sciences deal “regionally” with an abstracted part which bears no (relevant) relation to that whole (or to God). This notion forever prevents the reintegration of science into a comprehensive order of reason, much less a coherent theological outlook, and transforms this reintegration into a matter of extrinsic “addition.” The sciences rather deal with the whole, namely, the one actual world whose parts are intrinsically related to one another and to God, in and through their detailed attention to the abstracted part and according to their particular modalities as physics, chemistry, biology, and so on. To acknowledge this is to alter what the sciences in principle should be able to “see,” though only if it also alters what they are *willing* to see, without requiring them to alter the particular modality—physics, chemistry, biology, and so on—so as to become metaphysics and theology.

To better understand the ontology latent in the extrinsicist notion of “method,” we must delve further into the nature of abstraction. As D.L. Schindler puts it,

Abstractions and distinctions, which involve separating an entity or pulling it out or excluding it from the web of relations that characterize its concrete existence at any moment, necessarily evoke the notion of limit: of a boundary that sets the object off from its environs (2011: 386).

It goes without saying once again that such abstractions are not only perfectly legitimate but perfectly unavoidable. The act of attention itself is an act of abstraction in this sense, indeed doubly so. Any discrete object of attention is already thus “abstracted” to a certain degree. It moves to the foreground as this infinite “web of relations” imperceptibly recedes into the background, if not into complete invisibility.⁷⁷ This involves a correlative abstraction on the side of the subject. As the subject “loses himself” in the object of attention, “the immediacy of inwardness and outwardness in one” (Jonas 2001b) that characterizes embodied existence in place, the unfathomable depth of learning and conditioning this body must undergo to perform the most basic task, and the “stage-setting done in the language” necessary simply to recognize and name the objects of his attention, are all momentarily forgotten.⁷⁸ An observer forgetting himself in the phenomenon becomes as the eye taking in the world, which sees everything except itself. Yet, all of these things are intrinsic to the most basic acts of cognition, and no one could rightly think that they cease to belong together in reality. So the question is not whether scientific abstraction is legitimate. Rather the question, ultimately, has to do with what is actually occurring when we abstract, whether our understanding of this activity is adequate to its reality, and what it costs, not only with regard to our understanding of the God–world and science–theology relations but to our understanding of the natural world *per se*, when this activity is misunderstood. We will address all these questions in more depth in the final chapter; our present concern is different. Having shown thus far that the sciences harbor a metaphysics and a *theologia naturalis* within themselves, our present concern is to begin to show in formal terms just what sort of metaphysics and theology are entailed in the extrinsicist notion of methodological neutrality, though this too should be clearer after our historical exposition.

It is crucial to recognize that any operative notion of limit contains *both* a tacit conception of what lies on either side of it *and* a tacit conception of how they are related, whether the *relata* be finite wholes such as an organism and an experimentally isolated part or God and the world considered in abstraction from its relation to him. To see this is to see the self-contradiction inherent in extrinsicism and its notion of a preontological limit. Some such view of the *relata* and the relation between them is already intrinsic, albeit tacitly, in the notion of the neutral limit itself, just as each of the various poles of the formal problem of metaphysics contained its opposite in its very distinction from it. So extrinsicism not only falsely accounts for the relation between *relata*, it falsely accounts for itself, displaying its intrinsically metaphysical character in this very fact. If then the assumption that science is extrinsic to metaphysics and theology betrays itself and expresses a distinct metaphysics and theology, what is the distinct ontological and theological content that lies within this extrinsicism and its notions of a metaphysically neutral method and limit?

Implicit in the notion of a methodological purity that precedes any ontology is a conception of “distinction” that is essentially Cartesian, in which the limit’s function is analogous to Descartes’ conception of a line. Geometry provides Descartes with his much sought after clarity because of the “essential” properties of a line, the “purely abstract *externality*,” which divides as essentially *external to and thus separate from each other* whatever falls on either side of it (D.L. Schindler 2011: 396–397).⁷⁹ This notion of limit thus makes it possible to treat entities separated through analysis as if

they were ontologically indifferent to the original wholes from which they were abstracted. *Distinction between* two entities thus becomes *the separation of* those entities, and the original relation between them becomes an extrinsic and thus accidental qualification of each entity's original, "internal" indifference.⁸⁰

Method and abstraction thus understood are not preontological. Rather they are themselves the expression of an *a priori* mechanistic ontology which is "predicated upon the possibility of an exhaustive intelligibility of things" achieved through analysis, even if the advent of statistical dynamics and quantum physics and the demise of Laplacean determinism have placed this ideal permanently beyond reach (D.L. Schindler 2011: 395). The ideal remains precisely insofar as science continues to *equate* intelligibility with control (predictive or manipulative) and thus to emphasize "the primacy of controlling power in its quest for the intelligibility of the object" (2011: 395). As we shall see in Chapter 3, this is precisely what the Baconian equation of knowing and making *is*: knowing not simply for the sake of control but *by means of control*, knowing *by* controlling which accords epistemic and ontological priority to parts separated through analysis.⁸¹

This ontology not only imposes *a priori* determination on the shape of the God-world relationship, but it determines in advance both what is admissible as a "thing" so far as science is concerned and what thereby counts for knowledge of it. This mechanistically conceived limit projects its extrinsicism not only onto the relation between science and theology but also onto the relation between God and the world, now understood as indifferent to any relation to God. This incoherently makes God into a finite object and provides the theological foundation for regarding divine and natural agency as mutually exclusive alternatives in the order of being and "natural" and "supernatural" as mutually exclusive forms of explanation in the order of knowledge. However, since the relation between science and theology is *not* in fact extrinsic, as extrinsicism's own self-contradiction shows, this conception of the God-world relation has a corresponding effect on the notions of nature and natural knowledge latent in this understanding, determining in advance what counts as the relevant content of empirical observation. We shall see in later chapters that this metaphysical and theological extrinsicism evacuates creatures of the unity, intelligibility, and interiority inherent in our elementary experience of them. This erases the difference heretofore distinguishing things "existing by nature" from artifacts, as the objects of science are reimagined as sometimes highly organized aggregations of externally related parts (Aristotle, *Physica*, II, 192b1).⁸² Whatever cannot be accounted for in terms of these mechanical relations between indifferent parts, such as their phenomenal appearance to us, is either regarded as epiphenomenal and thus ultimately unreal, or in what amounts to the same thing, its explanation is endlessly deferred on the assumption that this intelligibility can be reached additively by compounding the abstracted parts "each of which, or indeed all of which as summed, remains exhaustively intelligible in principle" (D.L. Schindler 2011: 397).

We can see that the problems with this metaphysics and this malign theology are not merely metaphysical and theological. Rooted in an empiricism impervious to experience, mechanistic metaphysics will inject a dose of antirealism into the heart of modern science. We will consider its deleterious effects in subsequent chapters. The point at present is that one cannot coherently attempt to distinguish science from

metaphysics and theology or to insist that they keep to discrete disciplinary limits by circumventing science's constitutive and inexorable relation to metaphysics and theology. To attempt to do so by appeal to an empiricism or a method outside metaphysics as a neutral arbiter of metaphysical and theological content is not only to beg the crucial question, it is to substitute one set of theological judgments for another. There is simply no such thing as a methodological naturalism that is not also an ontological naturalism. And ontological naturalism is, at bottom, a bad theology that does not know itself.

Nevertheless, it has become axiomatic that science in its essence is substantially indifferent to theology, except where theology has the temerity to trespass into science's domain—that is, into the universe. We have now shown, in formal terms at least, that this viewpoint is in error. Modern naturalism is not simply an alternative *to* theology, as proponents like Simpson would have it, but an alternative theology that determines in advance both what sort of God can appear to thought and what sort of “nature” may manifest itself. We have yet to specify in its full depth just what this alternative theology is, why it is theologically wanting, and why, for this very reason, it falls short in its understanding of nature *as natural*. These are all matters for subsequent chapters. Our purpose presently is simply to bring the fact of these metaphysical and theological suppositions to light, so that they might not interfere with understanding the argument to follow.

This axiomatic extrinsicism makes misunderstanding all but inevitable. Transforming the meaning of “God” and “creation” beyond all discernible theological sense, it determines in advance what these terms can mean to contemporary minds, to the point that the contemporary debate, insofar as there is one, hardly touches upon God and creation at all. Once God ceases to be the fully transcendent and thus the fully immanent source *of* being and becomes instead a finite object *within* being extrinsically juxtaposed to the world, once being is reduced from “the inner *act* of existence” at once common to all things and proper to each thing, through which they participate in the immutable being of God, then the question of creation ceases to be about creation in its proper sense and becomes instead a question of *manufacture* (Clarke in Anderson 1997: xv). Creation is no longer understood as a question of ontological constitution but is rather misinterpreted as a question of temporal origins in a series of causes and effects which culminate in the manufactured artifact. The possibility of “verifying creation” becomes a nonsensical matter of isolating this process of manufacture as one might experimentally isolate a natural process. The suggestion that science might open itself to creation without harm to its scientific character is regarded as nonsensical and interpreted as the requirement for science to denature itself and to become a kind of *theologia naturalis* by discovering this “process.” When this absurd demand cannot be met, the question of creation degenerates into a matter of calculating probabilities. Creation is then relegated to some hypothetical “time” before the big bang, where the absurd notion of a multiverse is invoked to reduce to zero the improbability of this world arising by accident.⁸³

Within Darwinian biology, the *act* of creation thus comes to be understood as a rival “mechanism” to natural selection while the *doctrine* of creation is regarded as an alternative explanation for the diversity of species. Thus, “creation” is either reduced to a harmless, untestable hypothesis beyond the bounds of reason where it makes no

claim on our understanding of nature and where it can be easily dispensed with by changing the mathematical presuppositions of the hypothesis, or it is regarded as an irrational infringement on both the integrity of nature and the autonomy of science. And to claim, as I have done, that one must critically engage the totalizing claims of Darwinian biology in order to make creation intelligible—or worse that there might be inherent defects in Darwinism’s explanatory power—only reinforces these assumptions, making it seem as if creation and Darwinian evolution were strict rivals. The entire question of creation is thus misunderstood—what it means and what is at stake in it—because God himself is misunderstood. And if conceptions of God and nature are indeed correlative, as we have argued here and will show throughout this book, then we cannot do such violence to our understanding of God without simultaneously doing violence to our understanding of nature and ourselves.

These, at any rate, are the claims that I shall unfold in the chapters to follow: that the universe, historically and theoretically, is an irreducibly metaphysical and theological idea; that because creation is what the world *is*, the doctrine of creation is essential to an understanding of the universe that is both comprehensive and nonreductive; and that the scientific and Darwinian revolutions, for all their stunning success in increasing our knowledge of the universe, have left us with a universe so reduced and fractured that it threatens to undermine the rationality and intelligibility of their own achievement. In short, without God there is no science, because ultimately without God there is no world. Such strong claims will no doubt stretch the bounds of credulity for many readers, particularly those of a scientific bent. But if the arguments of this chapter are substantially correct, then science—least of all evolutionary biology, that most theological of sciences—is never without its God already, in which case the obstacles to understanding and believing the arguments of this book may not be so great as they initially seem. For the first and most crucial step for recovering a true understanding of creation and for effecting reconciliation between creation and the sciences is for the sciences to suspend belief in the tenets of their own theology.

Notes

- 1 I will delineate the distinction and relation between metaphysics and theology in advancing this argument.
- 2 For an example which misstates the nature of this relationship but inadvertently corroborates my argument by displaying its own extra-scientific commitment to a nominalism which cannot be scientifically justified, see Mahner and Bunge (1997), pp. 2–4.

If ontology is general science, then the specific factual sciences, or sciences of reality, are special metaphysics or regional ontologies. In our view, both science and ontology inquire into the nature of things, but whereas science does it in detail and thus produces theories open to empirical scrutiny, ontology is extremely general and can be checked solely by its coherence with science.
- 3 In his attack on scholasticism, Francis Bacon expressed resentment that “natural philosophy,” the true “queen of the sciences” in his estimation, had been relegated to the status of a “handmaid.” It was a situation he set out to rectify. See Bacon (2000), p. 65.
- 4 See Dennett (1995), pp. 52–60. For a critique of “evolution as algorithm” from within the contemporary philosophy of science, see Mahner and Bunge (1997), pp. 361–362.

- 5 Clark (1999) recognizes this. “Believing that we have believed things only so that the beliefs are spread, we have already stopped believing.”
- 6 There is a half-truth here that I am thus half-willing to concede. There is a necessary distinction to be made between science and metaphysics and an obvious sense in which scientific analysis of the world does have a priority over metaphysics and theology and does set limits to metaphysical and theological claims. The question is whether “distinction” must mean total “separation,” and I am arguing that it does not. And I wish to claim as a consequence that the priority of the sciences over metaphysics and theology is a relative priority occurring within the absolute priority of theology over the sciences: even the scientific qualification of theological claims occurs as a consequence of its inherent relation to theology and so occurs within a theological frame. I owe this terminology, as well as a great deal of my understanding on this point, to D.L. Schindler.
- 7 This relation, typically characterized as the “analogy of being,” in which any similarity of the creature to God is transcended by an ever-greater difference from God, prevents our hardening of this relation into a “system” composed of two objects which can be surveyed from outside. The analogy of being, properly understood, is thus tantamount to the “destruction of every system” (Balthasar 1992: 255).
- 8 Carlo Lancellotti (November 10, 2006), a physicist at CUNY, takes this position while defending a nonreductive conception of science in a paper entitled “Science, Contemplation, and Ideology.”
- 9 One of the most banal and self-contradictory of these proposals is offered by Stephen Jay Gould in his proposal of NOMA—nonoverlapping magisteria—between science and religion. There is a basic truth here, namely, that there is a distinction to be maintained and areas of inquiry proper to each, but Gould’s proposal amounts to little more than a warmed - over representation of the “fact–value” distinction. More importantly, he unwittingly bears witness to the true nature of the relation between theology and science by violating his own proposal and trespassing into theological doctrine in the very act of articulating it. See Gould (1999), pp. 3–96.
- 10 The work of Mikael Stenmark, an attempt to improve upon the groundbreaking work of Ian Barbour, is helpful in focusing our attention on the complex ways in which science as practiced “interacts” in its various phases with “religion.” Stenmark maintains that this “interaction” differs depending upon whether science is in its “problem-stating phase,” its “development phase,” its “justification phase,” or its “application phase.” Although this should be borne in mind in any material engagement with science, Stenmark’s project nevertheless falls short in my estimation even when it recognizes the implicit metaphysical commitments of modern naturalism because it regards the question of the relation between science and religion as a (neutral) methodological question rather than a metaphysical one, thus betraying a metaphysics of its own which negatively prejudices the project in advance. See Stenmark (2004), pp. 209–250.
- 11 See, e.g., the *apologia pro vita sua* in Gould (2002), pp. 24–48.
- 12 I shall argue that any historically contingent defective form of this relation will be parasitic upon the ontologically true form of this relation constituting both being and thought. This means that the defective form of the relationship cannot fully vitiate the true form, which continues to “show up” in and through the defects. We shall see how this is true in the case of Darwinism.
- 13 See, e.g., Hull (1989), pp. 62–75, 162–178, 181–204. Hull does a great deal to deepen our appreciation of the historical nature of science generally and Darwinism in particular, and most of what he means by “metaphysics,” of which there is precious little in his book, follows from that historicism. Because of this historicism, he does not appear to grasp the formal and *a priori* nature of the problem, but his own *a priori* commitment to historicism

and to a Darwinian account of theory itself unwittingly exemplifies the problem by giving expression to the metaphysics implicitly held prior to his historical investigations.

- 14 See, e.g., Depew and Weber (1997):

As readers of this book will by now be aware, it is just because metaphors play roles in explanations that one is not entitled simply to say, “Oh, that’s just my way of putting it.” Even when they perform little or no explanatory work, moreover, metaphors carry a good deal of metaphysical and epistemological freight. Indeed, wherever there is a deficit between theoretical reach and empirical support the difference is usually made up by invoking ontology to do the missing work. Similarly, epistemological or methodological ideals are sometimes used to intimate on highly general grounds that the theory in question must be true (374).

- 15 See, e.g., Ratzinger (2004):

Moreover, we have already noted that atheism’s dismissal of the subject of God is only apparent, that in reality it represents a form of man’s concern with the question of God, a form that can express a particular passion about this question and not infrequently does (104).

Retreat to “agnosticism” does not circumvent this dilemma; it merely redefines the God–world relationship as one of indifference, a move which presupposes a world of metaphysical and theological predecision.

- 16 George Grant, following George Santayana, observes that there is generally a difference between Catholic and Protestant atheism, and so too, a difference between (continental) European and Anglo-American nihilism, the latter of which is more optimistic and cheerful because of its roots in a pragmatic, rather than a contemplative tradition. See Grant (1969), pp. 25–40.

- 17 The fact that “atheism has its roots in the Western world, not in Asia or Africa: in other words, that it has sprung up precisely where Christianity has been preached for 2,000 years” (Ratzinger 1969: 147) is both evidence of this thesis and cause for reflection upon the varieties of atheism and upon the nature of Christian responsibility in bringing it about. For an excellent theological explanation of this responsibility and of how Nietzsche is both correct and incorrect, see Hart (2003).

- 18 As evidence, see the excerpts from Hull (1989) and from Mahner and Bunge (1997) cited earlier.

- 19 See, e.g., Balthasar (1992), p. 279.

- 20 Consider the fairly standard definition of “naturalism” given by Depew and Weber (1997):

We take the term naturalism to mean not only that supernatural and immaterial entities cannot explain events and processes but that the purely natural processes and laws that do explain them do not point to anything beyond themselves (147).

There are (at least) three interesting features of this definition: first, that the “purely natural” excludes the “supernatural and immaterial” by definition; second, that this definition determines in advance that God must be *an* “entity”; and, third, that this understanding becomes an *a priori* warrant for refusing to consider nature in alternative terms. For a more nuanced understanding denying that “naturalism,” whether metaphysical, epistemological, or methodological, can be a substantive philosophical position without self-contradiction, see Rea (2002), pp. 50–73. Rea concludes that “naturalism is a research program which treats the methods of science alone as basic sources of evidence.” Inasmuch as this is true, it suggests another reason why naturalism is not a substantive philosophical position: it epitomizes the very abandonment of reason as the search for truth, subordinating this search to the interests of power.

- 21 There is of course a nuanced sense in which this is true. Any coherent, much less orthodox doctrine of God insists upon the absolute difference between God and the world, in both directions, as it were: God cannot be *a* being, and thus not an “item” in the universe, but

- neither can he be *the* being of the universe (pantheism). An error in either direction collapses the difference and thus subordinates God to a higher term (e.g., being, becoming), which would then effectively be God. But this insistence upon the absolute difference between God and the world does not make their agency mutually exclusive or make divine agency essentially violent with respect to the creature as this extrinsicism would require. We will address this point in more depth in subsequent chapters.
- 22 I take the terminology of “metaphysics as mediator” from W. Norris Clarke, S.J., although I differ somewhat from Clarke on the question of what this mediation consists in. See Clarke (2001), pp. 464–487.
- 23 For two very different takes on the consequences of forgetting this, see Jonas (2001b), pp. 26–37 and Lewontin (1992), pp. 3–26.
- 24 There is actually a faint echo of this understanding in Richard Dawkins’ brief account of the relation between physics and biology. See Dawkins (1996), pp. 11–18.
- 25 Despite significant differences, St. Augustine had a similar understanding in defining the act of faith as “thinking with assent” (*assenione cum cogitare*). See Augustine, *De Praed. Sanct.*, II.5; *De Spiritu et Lit.*, XXXI.54.
- 26 See Husserl (1970), pp. 5–7, 48–53, 103–114, 121–123, 137–148, 172–174. In making this comparison and suggesting a basic sympathy with Husserl’s analysis, I do not mean to suggest that Aristotle therefore represents the “natural attitude” which Husserl contrasts with the phenomenological (1970: 145). Nor do I wish to enter into the long-standing debate between “idealists” and “metaphysicians” over the meaning of the phenomenological epoché and its difference from the Cartesian epoché (on this, see Sokolowski 2000: 198–227). Suffice it to say that I think Aristotle himself would resist the distinction (and thus the characterization) because his metaphysics, while it requires a distinction between the orders of being and knowledge, precludes a strictly phenomenological epoché and because I do not think there can be a phenomenology and thus a phenomenological reduction that is not already metaphysical in principle. The reasons for this should become clear later.
- 27 On *res volens* as the true meaning of Descartes’ *res cogitans*, see Hanby (2003), pp. 134–177.
- 28 Emphasis mine.
- 29 We will have a great deal more to say about the significance of all this in coming chapters. For now, see Aristotle, *Physica*, II, 202a15–202a20; *De Anima*, III, 425b26–426a26; Lear (1988), pp. 26–42; and Owens (1978), pp. 403–409.
- 30 Hence Aquinas says that

rational [synthetic/discursive] thinking ends in intellectual thinking [understanding], following the process of analysis, in which reason gathers one simple truth from many things. And again, intellectual thinking is the beginning of rational thinking, following from the process of synthesis, in which the intellect comprehends a multiplicity in unity. (*In Boeth. de Trin.*, q.6, a.1)

- 31 See the venerable Salusbury translation of Galilei (1953).

I cannot find any bounds for my admiration how reason was able in Aristarchus and Copernicus to commit such a rape upon their senses as, in despite thereof, to make herself mistress to their belief. (Galilei 1953: 341)

The Stillman Drake translation reissued in the *Modern Library Science* series edited by Gould (2001) renders the offending phrase, “*tanta violenza al senso*” as making “reason so conquer sense that, in defiance of the latter, the former became mistress of their belief” (381). Although this is certainly legitimate and may be more technically correct, the metaphor of sense as an “unwilling mistress” of reason loses some of its rhetorical force and something of its philosophical importance as well.

- 32 J.G. Fichte was well aware of this reduction, counseling Kant to abolish the fiction of the *ding an sich* in virtue of the fact that his idealist philosophy had in fact already abolished it. See Fichte (1994), pp. 12–16, 54–55, 65–76, 90–99.
- 33 Hence this does not succumb to the charge of naïve realism, for at least two reasons. First, while Aristotle denies that *nous* and sense can ever be mistaken, nothing prevents mistakes in the judgments we make about them—this is why truth is at once easy and hard. Second, to put it in Balthasarian terms, the presence of this objective order in experience is not simply the presence of this order as *object* but rather as *subject* not exhausted in its appearance.
- 34 This is in contrast to that theology disclosed in the person of Christ himself, which treats of the world as a gratuitous aspect of the revelation of God.
- 35 For Aristotle, the cosmos is not an aggregation of externally and accidentally related items. Rather it forms a real unity-in-distinction insofar (a crucial qualification) as the things comprising it are *in act*. For this reason, it is the particular sciences and not metaphysics which are abstract, for they deal with a “part” of being in distinction from its relation to the whole in which it always actually exists, though again, “distinction” should not be equated with “separation” insofar as what is said of the whole applies analogously to all the parts. See Aristotle, *Metaph.*, IV, 1003b25.
- 36 The term is Adrian Walker’s.
- 37 For Aquinas, the creature is intrinsically related to God, and God intimately present to the creature through his granting of *esse*, without which no other qualification of the creature is. See Aquinas, *ST*, I.8.1. We will discuss this crucial understanding in much more detail in subsequent chapters.
- 38 For a classic, first-person expression of this understanding, see Augustine, *Conf.*, II.6.
- 39 Hazel Motes is the primary character in Flannery O’Connor’s *Wise Blood*. He finds the Church without Christ and intentionally blinds himself, possibly in an attempt to craft his own redemption, or possibly in an attempt to deny he needs any.
- 40 I do not wish to give the mistaken impression that determining the inner necessities of reason *qua* reason, i.e., epistemology, is first philosophy. I take these necessities to be determined by the necessities of being *qua* being. Thus, every epistemology is already a metaphysics and vice versa.
- 41 For an extended discussion of this point, see Lear (1988), pp. 99, 249–255.
- 42 This rather dense section attempts to explicate the metaphysical paradoxes embedded in the structure of philosophical thinking, which bear directly on the relation between science, metaphysics, and theology. Readers who are not inclined toward such metaphysical speculations may wish to continue ahead to the final section.
- 43 Przywara’s text is being translated from its nearly impenetrable German by David Bentley Hart and John Betz and is to be published by Eerdmans. I am grateful to Hart and Betz for allowing me an advance look at the manuscript; any citations of Przywara’s work will be from this manuscript.
- 44 I take the so-called principle of noncontradiction to be an ontological and not merely logical principle that presupposes the primacy of act and which only reduces to the empty formula $A=A$ if one has already reduced the act of being *A* to mere brute facticity.
- 45 Przywara continues:
- This is most conspicuous in the very term “act of knowledge”: for “act” implies “potency”, and “act” and “potency” are ontology’s most general categories. Indeed, moreover, this is what proves strangely inevitable in general for all talk—even if it concern only method—of a so-called “pure consciousness.” Not only does the comprehension belonging to consciousness (whether in comprehending itself or in comprehending what is other than itself) occur by way of objects (at the very least, in the inevitability with which the “I” rings out, and then in the

intricate intertwinings of the I in “things” and “fellow I’s”), but even the inner form of this comprehension has itself the character of an object. Even Kant’s pure categories of judgment bear the form of ontological categories: quality, quantity, modality, etc. Even Hegel’s retreat to the inner and most formal species of judgment runs up against an expression proper to ontology: identity and opposition. Even the most formal comportment of consciousness as such—relation (that between act and object)—has an ontological shape. And even what is most proper to “pure consciousness” (in the sense given this phrase by objective idealism) succumbs to this reality: in the permanence of “validity” there rings out the “there”—“*Da*”—of a *Dasein* (existence); in the ideality of “validity”, the “thus”—“*So*”—of *Sosein* (essence) (4).

- 46 This is why Balthasar (2000) insists that “self-knowledge and the disclosure of the world are not just simultaneous but intrinsically inseparable” (46).
- 47 To see this, it helps to have recourse to Aristotle’s distinction between first actuality (which is also a kind of potency) and second actuality, exemplified in the distinction between a man who hears and one who is actively listening to a musical performance. The first sort of actuality can be imagined in separation from its objects, the man who hears, e.g., and the performance (or the musicians who perform). But a man listening to this Mozart concerto is part of a single event with the musicians who are performing it. The power in act and its object belong to what Aristotle calls a single actuality of both alike—hence the claim for an intrinsic correlation between the act of knowledge or consciousness and its objects. This distinction will take on added importance as we proceed through subsequent chapters. See Aristotle, *Physica*, III, 200b25–202b29; *De Anima*, 425b26–426a27.
- 48 Precisely because the *metaontic* is implicated in the *metanoetic* as that which precedes it by virtue of the transcendence of its object, Przywara restates the Aristotelian–Thomist inversion of the orders of being and knowledge, insisting that the *metaontic* is the objectively prior and comprehensive category, even though the metanoetic enjoys a certain methodological priority.
- 49 Aquinas’ reflections are fascinating in this regard.

Now reason differs from intellect as multitude differs from unity. Thus Boethius says that reasoning is related to understanding as time to eternity and as a circle to its center. For it is distinctive of reason to disperse itself in the consideration of many things, and then to gather one simple truth from them... Conversely, intellect first contemplates a truth one and undivided and in that truth comprehends a whole multitude, as God, by knowing his essence, knows all things... It is clear then, that rational thinking ends in intellectual thinking, following the process of analysis, in which reason gathers one simple truth from many things. And again, intellectual thinking is the beginning of rational thinking, following the process of synthesis, in which the intellect comprehends a multiplicity in unity. (*In Boeth. de Trin.*, VI.3)

- 50 For a much more profound reflection on these points than I can offer here, see D.C. Schindler (2008), pp. 1–84, 226–282.
- 51 See, e.g., Veatch (1969) and de Koninck (1960).
- 52 Przywara actually delineates a third tension between a “metaontic transcendentalism,” which regards truth, goodness, and beauty as a determination of the ontic, and a metanoetic transcendentalism, which regards them principally as a determination of the inner form of the noetic.
- 53 As we shall see in subsequent chapters, the doctrine of creation itself must affirm this.
- 54 A Kantianism of “pure method” (furthermore) signifies, by this very phrase, simply that the steps of its research are guided at the outset by this limit concept of “pure method.” Determination by this limit concept thus precedes every initial step, and is intrinsically prior to it. (Przywara: 23)
- 55 I do not intend to equate existence (*esse*) with history simply. To the contrary, in Part III I will spell out what I mean by *esse* and argue simultaneously *against* the equation of being

- and history and *for* an intensified historical concreteness beyond anything which Darwinian theory can accommodate, precisely as a function of this distinction between the ontological and historical orders which will call the meaning of history itself into question.
- 56 This scornful term was coined by Ernst Mayr. It is to be contrasted with the “population thinking” of orthodox neo-Darwinism. See Mayr (1991), pp. 40–42.
- 57 Rather, they adjudge external existence and value to the things that they know inside of themselves, and no argument in the world can convince them that this affirmation is a merely practical one that could be superseded from a higher speculative standpoint. In a word, they affirm the intentionality of intellectual cognition, whose primary direction is out of the subject.... (Balthasar 2000: 54)
- 58 We could do worse for a working definition of “elementary experience” than the one supplied by Luigi Giussani: that experience which one cannot sanely deny (1997: 7).
- 59 Misology, as we characterize it, appears most perfectly not in the person who rejects reason altogether, but in the person who accepts it...most of the time. He will be happy to make assertions, perhaps even with great conviction, but will be just as happy to abandon them when, for example, in a moment of crisis they commit him to some further claim beyond what he is ready to admit...A skeptic in the usual sense feels some obligation to the “truth” of skepticism, an obligation that requires the kind of passion and even ascetical devotion that we associate with profound faith. A radical skeptic, or misologist in our sense of the term, by contrast, is ready to deny even the truth of skepticism whenever he has “good reason” to do so. As people often say, the real opposite of love is not hatred, but indifference; the real opposite of the philologue is the misologist who has simply grown numb to the claim of reason (D.C. Schindler 2008: 12).
- 60 Thus, it is completely beside the point to invoke the likes of Francis Collins, Kenneth Miller, Theodosius Dobzhansky, or R.A. Fisher as figures subjectively capable of reconciling personal piety and orthodox biological commitments, as if the possibility of living a contradiction were a sign of *rapprochement* between science and theology. This is not to deny the possibility of such *rapprochement* by declaring this synthesis a contradiction, nor is it a comment upon the subjective sincerity or even personal holiness of any of these men, about whose lives I know little. It is only to remark on the possibility of maintaining a personal pietism and a theoretical rationalism at odds with any coherent theology. In both historical and theoretical terms, pietism and rationalism are not mutually exclusive alternatives but often mutually inclusive complements.
- 61 For two somewhat different examples, see McInerney (2006) and White (2009).
- 62 It is fraught with problems *simply* to say on the hypothesis of a “pure nature” that “natural reason” can tell us *that* God is (as first cause, etc.) but that only grace eventually gives essential knowledge of *what* God is. There is first the fact that this is itself a theological claim and not a philosophical one, on which basis a counterfactual “pure nature” is abstracted from the one graced theological order and made the basis of the actual order. Quite apart from this, it is doubly problematic to say that the existence of God communicates nothing of the essence of God, not even in an *apophatic* or negative mode or that the *via negativa* conveys nothing positive. First, it presupposes a problematic conception of knowledge (D.C. Schindler 2004b). Second, and even more seriously, if God’s existence, which is identical with his essence, communicates nothing of that essence, then being as such must be essentially empty, or in Thomas Joseph White’s words, banal (2009: 123). This, I would suggest, is the first step toward making Aristotle and Thomas into nominalists, hardly a novel charge in the history of philosophy. Of course, one can retrieve this Thomistic axiom by saying, as we have, that philosophy cannot reveal God as disclosed by Christ, and that this surprising knowledge is different in kind from knowledge outside of faith, but this would mean allowing that Christ and the historical order are capable of revealing something of the divine essence in a way that many Thomists would disallow.

- 63 The phrase “round upon being” is derived from Milbank (1990: 63). His critique of transcendental philosophy and the possibility of distinguishing once and for all between a “necessary finite knowledge and a superfluous and pretended transcendent knowledge” are applicable to the possibility of securing a merely positive empirical knowledge against transcendence.
- 64 It should now be clear that our question can be posed only from the perspective of a “creaturely” metaphysics, and not from that of the absolute of a purely *a priori* or a purely *a posteriori* metaphysics. Theology, as clearly distinct from philosophy, is possible only on the basis of “God beyond the creature”, understood as the fundamental relation between God and the creature. “God as creature”—inasmuch as this is the formal ground of the fundamental relation between God and creature within the *absoluta* of a purely *a priori* and purely *a posteriori* metaphysics—excludes any independent theology, because here philosophy as such is already theology. (Przywara: 53)
- 65 I owe this image of “taking a stand” to an unpublished essay by D.C. Schindler.
- 66 That is to say, one need not concede that the world originates causally in God in order tacitly to acknowledge God’s role as a “principle” of the world. Modern naturalism preserves this idea in negative form precisely by defining nature as that which excludes God by definition. In this sense God’s role as principle is preserved in that nature which by definition takes its leave of God.
- 67 See Balthasar (1982), p. 145.
- 68 Again, this is what makes it possible for Christian theology to assume and transform both Neoplatonism and Aristotelianism. Still, I say “relatively coherent” because I shall argue that neither Aristotle nor Neoplatonism finally succeeded in adequately distinguishing God and the world, a distinction only fully revealed through the Incarnation.
- 69 We will return to this point in later chapters. Meanwhile, see Balthasar (2000), pp. 131–225.
- 70 See, e.g., Mahner and Bunge (1997), pp. 3–4.
- 71 Although he makes no allowance for metaphysics, much less theology, there is something like this operative in Dawkins (1996), pp. 11–18.
- 72 This is one of the reasons, though not the only one, that Aristotelianism–Thomism was slow in giving rise to a fully experimental science. See Oliver (2005), pp. 45–83 and Funkenstein (1986), pp. 152–178.
- 73 For this reason Thomas would have regarded the absolute singular thing, arrived at by Ockham and later nominalists through the “principle of annihilation” and the imaginary destruction of all supporting contexts, as a violation of the principle of noncontradiction. A thing deprived of all the relations constituting it could not be a thing in any meaningful sense. See Funkenstein (1986), pp. 129–145.
- 74 Claude Bernard cites the remark by Cuvier, which echoes Francis Bacon: “The observer listens to nature; the experimenter questions and forces her to unveil herself” (Bernard 1957: 6).
- 75 See also Funkenstein (1986), pp. 36–37.
- 76 Funkenstein’s description of seventeenth-century sciences remains applicable. “The very notion of things was made to fit the mathematical relations governing them, even while conceding that the latter are, in a sense, contingent.” Funkenstein (1986), p. 151. See also Veitch (1969), pp. 126–144.
- 77 The physicist Bohm (1957), p. 134, and Michael Polanyi each make similar observations. We shall revisit this point in the final chapter.
- 78 These remarks loosely paraphrase what Michael Polanyi meant by “indwelling,” “focal awareness,” and by “tacit knowing.” See Polanyi (1969), pp. 123–157. There are some affinities between this and the notion of “stage-setting” explored by Wittgenstein (1958), §257.
- 79 On the nature of lines and the pure externality of matter, whose essential property is its capacity for “occupying space,” see Descartes’ “The World” (1985d), pp. 90–94;

“Discourse on the Method” (1985b), p. 121; and “Meditations” (1985c), p. 54. “Externality” is likewise the defining feature of Newtonian body *qua* body, defined simply as “determined quantities of extension.” See Newton (1962), p. 140.

- 80 In order to avoid the distortions which ensue from taking abstracted parts as ontologically prior to the wholes in which they actually exist and from which they derive their meaning as parts, Aquinas carefully distinguished between abstraction and separation, correlating them to two distinct intellectual operations. The former operation, the “understanding of indivisibles,” corresponds to essences and abstracts what can be known separately but actually belong together in reality—form/matter, wholes/parts, and so on—the latter operation forms positive and negative judgments with respect to existence. The first sort of operation is legitimate precisely because it is able to abstract form from the existents in which it inheres or parts from wholes without losing sight of the actual (i.e., real) priority of the whole. “It is correctly called abstraction, but only when the objects, one of which is known without the other, are one in reality.” In separation, by contrast, the intellect composes and divides, distinguishing “one thing from another by understanding that the one does not exist in the other” (Aquinas, *In Boeth. de Trin.*, q.5.a.3).

Now since the truth of the intellect results from its conformity with reality, it is clear that in this second operation the intellect cannot truthfully abstract what is united in reality, because the abstraction would signify a separation with regard to the very being of the thing (q.5.a.3).

These distinctions presuppose that the cosmos is a unity insofar as it *is*, that is, insofar as the things comprising it participate (through *ens commune*) in the act of being by virtue of which they are “structured in a mutually supporting order (*ordo ad invicem*)” and “are ordained toward each other (*ad alia ordinantur*)” (Funkenstein 1986: 136). We will distinguish between “ordination” in terms of being and the “external teleology” presupposed and rejected by Darwin in later chapters. We will also consider how the epistemic priority of analysis and the ontological priority of parts over wholes are correlated to the reduction of being from act to brute facticity.

- 81 We will be developing our own analysis of this ontology and its equation of knowledge and power in subsequent chapters. In the meantime one may consult, in addition to the essay from D.L. Schindler, Jonas (2001a) “Is God a Mathematician? The Meaning of Metabolism” and “The Practical Uses of Theory.” See also “Seventeenth Century and After: The Meaning of the Scientific and Technological Revolution” (Jonas 1974).
- 82 David Bohm observes that externality, in addition to a reduction to basic elements, is one of the defining characteristics of mechanistic ontology.

These elements are basically external to each other, not only in being separate in space, but more important, in the sense that the fundamental nature of each is independent of that of the other. Thus, the elements, do not grow organically as parts of a whole, but rather...they may be compared to parts of a machine, whose forms are determined externally to the structure of the machine in which they are working...Also...the elements interact mechanically, and are thus related only by influencing each other externally, e.g., by forces of interaction that do not deeply affect their inner nature. (Bohm 1986: 15)

This is because once nature is conflated with artifice, things no longer have an inner nature determining the meaning of the parts as parts of a *per se* (rather than merely aggregated) unity. Rather interiority is reimagined in terms of exteriority, as the interaction of externally related parts whose unity is the end result of its piece-by-piece assembly.

- 83 I judge the multiverse to be nonsensical not because I deny the possibility that the universe is in fact infinitely immense or that it contains infinitely more items or possibilities than we know, but because inasmuch as other “universes” are or were, they would belong to the one order of being (and causality) and thus would not truly be alternative universes,

but simply heretofore unknown parts of the one universe. If they did not so belong, there could be no possibility of ever knowing about them.

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A Brief History of the Cosmos

Every conception of scientific knowledge harbors within itself a metaphysics and a *theologia naturalis* that shape in turn both how the objects of knowledge are conceived and what knowledge of the universe itself—truth—is taken to consist in. Simply as a matter of reason’s intrinsic necessities, though not only because of these necessities, the very idea of a universe remains irreducibly metaphysical and theological. This is so even in our materialist and scientific age and perhaps *especially*, and in spite of appearances, in our Darwinian age. Chapter 1 showed that to be true in a formal sense; metaphysical and theological judgments are implicit in theoretical cognition as a consequence of the mind’s primitive relation to being. This chapter and Part II of this book will show how this is true in a historical and material sense.

It is a commonplace of modern thought that humanity’s sense of its own uniqueness and significance has diminished in inverse proportion to our expanding knowledge of the universe in all its spatiotemporal immensity.¹ Darwinian biology, according to this story, administers the *coup de grace* both to the last tired vestiges of metaphysical and theological “solace” and to the last haughty remnants of human exceptionalism.² As an empirical claim this can hardly be gainsaid. The place or perhaps the placelessness of the human being in a universe now conceived, in Chesterton’s words, as a “dim and monstrous oval germ that laid itself by accident” is a persistent theme of modern arts and letters from John Donne to Nietzsche, whose grasp of the implications of “the Death of God” is so profound that he merits consideration as a friend of Christianity (1994: 18). Even Darwin himself, doughty Victorian though he was, was not immune to fallout from this event, the angst which befalls all but the “last men.” He famously confided in the 1881 letter to Graham his anxiety that the mindless evolution of the mind undermined the foundations of truth and knowledge itself (Darwin 1959: 285). So like most commonplaces, this one has an element of truth to it. To deny it simply would be to deny the principal drama of modern culture and the spectacular successes of modern science in expanding our understanding of the universe. To deny Darwin’s

role in this upheaval would be to minimize the massive achievements of the man who “more than any other modern thinker,” his biographers maintain, “has transformed the way we see ourselves on this planet” (Desmond and Moore 1991: xxi).

And yet, like many commonplaces, this one is only a half-truth, or rather several half-truths. Later, in Chapter 3 and elsewhere, I will contest the idea that the objectified cosmos of modern materialism is any less anthropomorphic than its predecessor.³ And Conor Cunningham is certainly correct when he notes that the ontology of scientific materialism, with its exclusion of intrinsic meaning, is tantamount to “cognitive suicide” and makes ordinary experience miraculous beyond explanation (2007: 100–140).⁴ This “cognitive suicide,” as we shall see, is not adventitious to the success of science. To the contrary, the architects of early modern science were quite explicit in restricting reason’s scope to expand its power, and it is precisely the denial of any *intrinsic* meaning to the cosmos that permits the technological will to triumph over it. Overemphasizing humanity’s cosmic homelessness overlooks the way that moderns tend to “adore instead a nature acclaimed and sought for its inhumanity,” and it disregards how the meaninglessness of the cosmos is frequently treated as a cause for *celebration* rather than despair (Bouyer 1988: 159). It is not at all uncommon to find that those who are most adamant in denying human exceptionalism as the residuum of religious superstition are the very same people who glory in the scientific conquest of nature, including human nature. There is a deep element of false humility in modern man’s modesty about his place in the cosmos.

That this self-limitation of reason excludes itself from the universe it seeks to understand is warrant for a counterintuitive suggestion. Without denying the breathtaking success of science or its many improvements to our common estate, I wish nevertheless to challenge the usual sense of the notion that science has “increased our knowledge of the universe.” I wish to suggest instead that science’s remarkable advances are premised largely upon the thoughtful *destruction* of any coherent notion of a uni-verse. It remains to be seen of course just what this means, but let it suffice for now to say that it is the destruction in thought of a single order of reality comprehensive of its own intelligibility, an order large enough to include *us*, even though a universe in this sense is affirmed by experience and action and remains a necessary starting point for scientific inquiry. But as we saw in Chapter I, scientific reason is already the expression of a mechanical ontology no less metaphysical and theological in its essence than the one that preceded it. While this ontology achieves the Baconian equation of knowledge and power through experimental reason, this achievement comes at the price of deep ontological and epistemic fragmentation (Bacon 2000: II.1). As we shall see in Part II, this fragmentation so transforms the meaning of both rationality and truth that we can scarcely see any longer just what we have lost.

The signs of this fragmentation are legion, not least in the disordered state of contemporary knowledge. The universe as a comprehensive order of reality was the pre-supposition and impetus behind the original universities and their ideal of an order of knowledge that was comprehensive and nonreductive, unified without being uniform.⁵ The degeneration of the university into a “multi-versity” of disintegrated disciplines suppressing their own metaphysical character, refusing integration into a comprehensive view equal to the truth of human life and experience, and vying with one another to become a “theory of everything” reflects the demise of this notion.⁶ As philosophy

becomes just one more academic discipline and theology is expelled from the academy altogether, the sort of comprehensive wisdom envisioned by Aristotle or Aquinas ceases even to be an ideal, and understanding gives way to mastery as the object of reason. This sad state of affairs has its cosmological correlate in the “multiple universe” hypothesis, a counterfactual device aimed at lessening the odds against this dim and monstrous oval germ of a universe laying itself by accident. The true purpose of this incoherent fiction, namely, providing comfort to atheists—is indicated by Henry Adams, who invented the notion. “[F]or, if he were obliged to insist on a Universe,” Adams writes autobiographically, “he seemed driven to the Church” (1918: 429). So, John Leslie comments, “he opted for a ‘multiverse’ of largely separate worlds with different characteristics,” apparently never pausing to consider that if these alternate worlds existed at all, they would necessarily belong to the same order of being as this one (1989: 205, n. 1).⁷

With this we come to the principal theses of this chapter. Though we are led to think that the universe is the province of a special science such as astrophysics or astronomy, the cosmos (or universe) is an irreducibly metaphysical and theological idea. It follows, therefore, that metaphysics and theology remain indispensable to an adequate understanding of it. This is true in a theoretical sense both for reasons that we have already considered and for metaphysical reasons that we shall unfold in due course. It is also true in a historical sense, as the cosmos first emerges as an object of reflection in Greek thought. It remains for us to consider the nature of that unity indicated by the term “universe,” but in the meantime let me anticipate these arguments and say that the unity of the universe, whatever that finally turns out to be, is most fundamentally a unity of *being*. This is not just a historical claim about Greek and Christian cosmology but a theoretical claim about metaphysical necessity. One cannot obviate this necessity by reducing being to facticity and redefining the universe as the aggregation of existing things and their relations, for it is still necessary to account for why each of those things is not a little world unto itself like a Leibnizian monad, or worse, a mere bundle of Humean instances, each separated by an ontological abyss from every other. To regard the universe otherwise, as we invariably do, is already to have assumed a tacit understanding of being that is more than brute facticity. Explicating the notion of *being*, therefore, is essential to an adequate understanding of the universe, a universe large enough to include *us*. This is true for us as well as for the Greeks. If modern science is incapable of articulating this unity adequately, as I am suggesting it is, this is because it is predicated upon a transformation of the meaning of being, or rather the impossible attempt to dispense with the question of being altogether. The roots of this transformation lie in an unthinking of the Christian God and of the metaphysical and cosmological achievement in bringing Greek cosmological ambitions to term, which follows surprisingly from his self-disclosure.

Cosmos, Mythos, Logos: Plato and the Challenge of Cosmology

In what, then, does the unity of the universe consist? A hint of the ancient understanding at least may be found in the very etymology of the term “uni-versus,” literally a turning of all things to the One. The Latin root thus conveys the original

and irreducibly theological dimension of the notion, insinuating a unified order that is more than an accidental aggregation.⁸ The Greek *kosmos* (originally rendered in Latin as *mundus*) likewise connotes not simply an aggregation but the unity and beauty of an order. As Pliny the Elder put it, “What the Greeks call *kosmos*, we call *mundus* due to its perfect and faultless elegance (*a perfecta absolutaque elegantia*)” (cited in Brague 2003: 19).

We cannot underestimate the achievement of the Greeks, therefore, in giving birth to the concept of universe. Let us now explore the emergence of this idea. Whereas Semitic, Akkadian, and ancient Mesopotamian languages each developed adjectives to designate the totality of “all things” (*kol* in Hebrew and *tm* in Akkadian), the Greeks, aided by the definite article, were able, first, to convert the adjective to a noun (*to pan*), “the All,” and then, decisively, to give “the All” a name, and thus a unity and identity of its own: *kosmos* (Brague 2003: 18).⁹ Its basic meaning is apparent in the *Iliad*:

“Order,” always in the fixed expression *kata kosmon* “in good order,” or “ornament,” like the boss or stud of a horse’s bit or Hera’s jewels. The term denotes order and beauty, even more specifically the beauty resulting from order, the beauty that is still implied today by an activity that derives its name from the word—*cosmetics* (Homer: 4.145, 14.187 cited in Brague 2003: 19).

Though the term can be found among a number of the pre-Socratics, it is Pythagoras who is credited with giving the term its substantive designation, while retaining the substance of its original sense: “Pythagoras was the first to call ‘*kosmos*’ the encompassing of all things (*hē tōn holōn periokhē*), because of the order (*taxis*) that reigns in it” (Aeitus 2.2,1 cited in Brague 2003: 19). This capacity to designate cosmic order as a whole is not just a semantic or linguistic achievement, it marks a real advance in thought that is simultaneously extensive and reflexive.¹⁰ Cosmology is not merely, or even primarily, astronomy. Cosmology and anthropology are always correlative.

Thus, “world” has never designated a simple description of reality: it has always translated a value judgment, the fruit of a sort of act of faith, either positive or negative (Brague 2003: 23).

It is Plato, who would fix and deepen the meaning of the term, thus spawning a millennium of cosmological speculation. We see this first in the *Gorgias*, where Socrates tells us that “at heaven and earth and gods and men are held together by communion (*koinōnia*) and friendship, by orderliness (*kosmiotēs*), temperance and justice.” It is for this reason, he goes on to say, that wise men “call the whole of this world (*to holon touto*) by the name of order (*kosmos*) not of disorder (*akosmia*) or dissoluteness” (Plato: 507e6–508a4, cited in Brague 2003: 29).

It is in the vastly influential cosmogony of the Timaeon myth, however, that Plato provides “the first description of reality as providing an ordered whole, both Good and beautiful” (Brague 2003: 22).¹¹ To enter deeply into the thicket of problems raised by the *Timaeus* is both beyond my competence and beyond our scope.¹² Our immediate purpose in invoking Plato is to ascertain the sort of question to which

kosmos is an answer. It is easy to overlook the significance of two very basic facts about the *Timaeus*. The first is the innovation that is the dialogue's inquiry into the "nature of the All" (*phúseos tou pantòs*) (Plato, *Timaeus*, 27a). The second is the *cosmological* significance of the metaphysical distinction which Timaeus invokes in launching his story: "What is that which is always real and has no becoming and that which is always becoming and is never real?" (27c). This distinction is crucial both for formulating the question of cosmic unity and, eventually, for addressing it. "Are we right in saying that there is one world, or that they are many and infinite?" (31a). This question is arguably the central preoccupation of the dialogue. It is so important that Timaeus will pose it a second time later on (55c–55d),¹³ and Plato will give the last word in the dialogue to Timaeus, who ends his speech by insisting upon the unity of the cosmos as a "visible living creature embracing all that are visible and an image of the intelligible, in beauty and perfection, this Heaven *single in its kind and one*" (92c).¹⁴

The distinction between the realms of being and becoming appears, from the modern point of view, to beg the question. Its rationale will suggest itself soon enough. The distinction is crucial, in the meantime, for what follows. Echoing the equation of truth and being (what is) expounded in the *Republic*, Timaeus proceeds from this original distinction to insist that "that which is apprehended by intelligence and reason is always in the same state, but that which is conceived by opinion with the help of sensation and without reason is always in a process of becoming and never really is" (Plato, *Timaeus*, 27d–28; *Republic*, V.476a–V.479e).¹⁵ Drawing upon the figure of the demiurge, he then maintains that

having been created in this way, the world has been framed of that which is apprehended by reason and mind and is unchangeable, and must therefore of necessity, if this is admitted, be a copy of something (Plato, *Timaeus*, 29).

Timaeus' appeal to the agency of the famous demiurge or craftsman presents a host of interpretive problems, some as old as the Old Academy itself.¹⁶ Superficially, it appears as one more "argument from design," refutable by an alternative "natural" agency to that of the designer.¹⁷

However, if one follows the venerable tradition, urged by the dialogue itself, of interpreting the demiurge mythologically and identifies the demiurge with the forms themselves,¹⁸ and if, furthermore, one heeds the cautions in the *Parmenides* against "separating" the forms from their images, then the situation becomes considerably more subtle and complex, and the rationale for the original distinction begins to appear.¹⁹ In this case, the argument for the ontological priority of mind is less an argument for the "design" of the cosmos by an "external" artificer than a refusal to separate intelligibility from the cosmos. For if the cosmos is not *inherently* intelligible, if its logos is not *intrinsic* to it, if ontological identities do not abide and therefore transcend the flux of becoming, then knowledge—much less a true or rational account of the cosmos—becomes impossible by definition. The "really real" would be inherently unknowable because without intelligible being, there is, at bottom, literally *nothing* to know. The very possibility of cosmological truth depends upon reality being intelligible "all the way down (and up)," which is why Plato reduces the Empedoclean elements to Pythagorean geometry.²⁰ This gives a sense of urgency to

Plato's cosmology, whose challenge we can now re-state. The challenge of cosmology is to give an account of the world so comprehensive as to include the possibility of its own truth, which means providing an ontological basis for the meaning in which it is necessarily understood. To deny the ontological priority of reason is to falsify one's own experience and ultimately to undermine this possibility.

To affirm this possibility, by contrast, is to recognize that *logos* requires *mythos*. There are two reasons for this. First, Plato denies the possibility of a "science" of the world, of knowledge that is eternal and unchanging, on the ground that the world itself is an image (*eikon*) of the intelligible being that is eternal and unchanging. "Likely (*eikos*) stories" are the best we can hope for because the objects of knowledge are themselves only likenesses.²¹ Second, if intelligibility is coextensive with being, then intelligibility is no more exhaustible than being itself is. For intelligibility is not one object of perception among others but that which makes every object of perception perceivable, which is why Plato insists that the very intelligibility of forms depends upon the absence of those spatiotemporal qualities which characterize *sensibilia*. This is why they can "present themselves everywhere, each as a multiplicity of aspects" (Plato, *Republic*, V.476). Like God at the outset of *Timaeus*' "likely story," the forms are "past finding out" (Plato, *Timaeus*, 28c). This is due not to a dearth of intelligibility, but from an excess of intelligibility. Moreover, these *mythoi* are not allegorical veneers to be peeled away in order to get at the kernel of hard truth behind them; rather they are demanded by the very nature of the world and its inexhaustible truth. As Cornford puts it,

You cannot, by taking visible things to pieces, ever arrive at any parts more real than the whole you started with. The perfection of microscopic vision can bring you no nearer to the truth, for the truth is not at the further end of your microscope. To find reality you would do better to shut your eyes and think (1937: 31).

Timaeus' argument for the unity of cosmos is premised upon the axiom that "everything that becomes or is created must of necessity be created by some cause" (Plato, *Timaeus*, 28). Once again, the argument is not so much an attempt to account for the world's organized complexity by appeal to an "external" agent as an appeal for the necessity of an origin or source that transcends the transient realm of becoming. This is for the obvious reason that no thing which becomes can fully account for itself, which means that all things that become receive their being from another. Everything that becomes depends ultimately upon what does not become, but is, and so exists, as Plato says in the *Phaedo* and elsewhere, by participation (*methexis*) in what does not become. Irrespective of how one resolves the controversial question of creation *in tempore* in the *Timaeus*, insofar as the visible and sensible cosmos necessarily belongs to the realm of becoming, it too must be said to depend upon, on pain of infinite regress, a source that must necessarily transcend it.²² The transcendent must therefore be conceived as a simple unity, devoid of the qualifications and limitations characteristic of becoming (Plato, *Phaedo*, 100b6–100b7).²³ It is precisely because this simple unity is intelligibility itself that the cosmos is intrinsically intelligible as an image (*eikon*), not just in the harmonic proportions that make it a single body and reflect the unity of its source but in the fact that it is at all (Plato, *Timaeus*, 29b–33a).²⁴ The intelligibility of

the cosmos is there not as an “addition” to its dependence on its transcendent source; rather it is coextensive with dependence on that source and therefore constitutive of its very being. To be in any way whatsoever is to have a measure of unity and intelligibility. The Platonic cosmos, in other words, has its being and unity precisely *as* an image of this transcendent unity, an idea famously captured in the notion of time as a moving image of eternity (Plato, *Timaeus*, 37d). This is why Plato attributes causation (*aitia*) preeminently to goodness and beauty.²⁵ As Cornford puts it, “It is not a matter of mechanical forces holding the world together”—Plato regarded “necessity” as an “errant or wandering cause” subordinate to *nous* (1937: 52). Rather, causation itself is taken to be a communication of meaning (form, intelligibility) from cause to effect, a point to which we will return in subsequent chapters. Geometrical proportion is thus already a bond “holding the world together,” precisely because proportionality is a participation in the unity of transcendent beauty.

The logic of transcendence makes it clear not only why the cosmos is one, but why there can only be one cosmos. “To be” absolutely is to be absolutely transcendent. To be absolutely transcendent is to be replete, to lack nothing, and thus to be *good*—“free from jealousy,” as *Timaeus* says (Plato, *Timaeus*, 29d). Inasmuch as the Good necessarily transcends all, it must comprehend all, and everything that is must therefore be an image of it and related to it.

There must be only one if the created copy is to accord with the original. For that which includes all other intelligible creatures cannot have a second or companion; in that case there would be need of another living being which would include both, and of which they would be parts, and the likeness would be more truly said to resemble not them, but that other which included them (31a).

Statements such as these suggest the familiar problem of “separate” forms (*chōrismos*) which so troubled Aristotle and which seems to result in an unbridgeable dualism between the intelligible world of being and the sensible world of becoming. More rigorous attention to the logic of transcendence ameliorates that difficulty to a great extent and arguably brings Plato closer to the position of Aristotle, though it raises in its place another, more focused and more difficult problem that will persist in Aristotle and beyond.²⁶ At first glance, the problem of separation is exacerbated by the fact that Plato routinely approaches transcendent beauty by way of negation, that is, by denying to beauty and the other intelligibles any of the qualities that qualify sensible things as discrete quantities. He insists, in other words, on an absolute difference between the *participans* and *participatum*, between *intelligibilia* and *sensibilia*. This insistence upon the transcendence of the forms appears dualistic, however, only if one fails to do justice to the meaning of transcendence. Genuine transcendence cannot be contrasted with immanence because the very possibility of such a contrast places them within the same order of reality, which makes transcendence self-negating. Genuine transcendence, to the contrary, *implies* immanence. Thus, in the *Phaedo*, “Plato simply affirms the ‘presence’ of the transcendent form in its sensible image” (D.C. Schindler 2005: 6). Since Plato accords reality to *intelligibilia* (forms) alone and not to their images, as we saw in *Timaeus*, the images themselves are nothing but sensible manifestations of the forms alone. The problem for Plato’s metaphysics, then, is not to bridge the

chasm opened up between two worlds by the distinctions between sensible becoming and intelligible being. There *is* only one world, the world of the forms, manifest visibly in its manifold images. The problem, rather, is to account for the *difference* between form and image within this one world in a way that preserves this unity.

We have seen that Plato equates forms alone with the “really real,” identifying them by virtue of their difference from sensible images, through the negation of those qualities which determine those images as sensible. This does not entail a corresponding denial of the reality of the images but requires instead the affirmation that the image is wholly derived from the form.²⁷ Images receive everything from form, while form “is always the same, uncreated, and indestructible, never receiving anything into itself from without” (Plato, *Timaeus*, 52). It is at precisely this point that the questions arise: What accounts for the difference between the form and image? What accounts for the difference between the images themselves—this flower and that one, for example? And what is the nature of these differences, of difference as such? Plato seems to be on the horns of a dilemma. To admit that the principle of unity—beauty or the good—is also the principle of difference appears to introduce division into the simple unity of the transcendent source. To admit a second positive principle to account for this difference seems tantamount to affirming the Gnostic ultimacy of dual principles, which is unintelligible and thus irrational. If images are *wholly* derived from their forms, moreover, “then the images’ not being the forms cannot be due to some reality *outside* the forms,” for the simple reason that there can be no “outside” (D.C. Schindler 2005: 8). The only alternative is that the differentiation of the image from the form, and likewise the differentiation of the images from each other, must be due to something essentially *unreal*. This is the role performed in the *Timaeus* by the receptacle, which permits the forms to appear as images within the realm of becoming (50–52c).²⁸ Plato is otherwise at a loss to characterize its “negative existence,” however. Devoid of any particular form of its own that might contribute something positive to the composition of images, it is “most incomprehensible,” and indeed must be by definition (51a–51b). For the identification of being and intelligibility makes the characterization of what is “essentially” nonbeing impossible, and yet nonbeing this must be. For “if there is a principle for reality,” writes D.C. Schindler, “there cannot be an additional principle for what is ‘other’ than the really real; there can only be the absence of such a principle” (2005: 8).

While this solution has the advantage of appearing to preserve the transcendence and simple unity of the transcendent principle, and while it does preserve a difference between form and image, it presents an additional problem which we can now specify even further. It is not that Plato simply cannot differentiate between form and image; clearly he can and does. Rather, it is that he can give no *good reason* for this difference that brings the difference *qua* difference within the realm of intelligibility. “If there is no *positive* ground for the multiplicity of images, they have no justification *as* images” (D.C. Schindler 2005: 8). Ultimately, this difference can only appear as a kind of “fall” from a more basic unity, unintelligible and to that extent unreal in its very difference.²⁹ To avoid this, Plato would need to account for how the image *qua* image can “add to” or transcend the form while still affirming the form’s transcendence of the image, and this he cannot do. Yet, insofar as Plato cannot affirm the transcendence of the image, insofar as difference as such is opposed to unity and is just so far inexplicable, the

original cosmic unity which the forms were supposed to secure is threatened. Hence the persistent question of whether necessity (*ananke*), the so-called errant cause, represents something permanently recalcitrant to the “persuasion” of reason (*nous*), limiting the extent to which God the Good can make things like himself.³⁰

Let us consolidate our findings thus far. Just as every “physics” entails a metaphysics, so we have seen that the cosmos, for whatever else it is, is an irreducibly metaphysical notion. From the moment the cosmos was “invented,” the question of its unity has been a question of being, a question of how the multitude of things are related to each other through their common relation to a transcendent principle in which they all somehow partake. Within the history of thought, we have Plato, primarily, to thank for this, and yet his conception of this principle and its relation to the things derived from it introduces a crucial ambivalence about difference *qua* difference that threatens to vitiate the unity of the Platonic cosmos. Plato will transmit this ambivalence to his greatest pupil, Aristotle, who arguably retains as much of Plato’s metaphysics as he jettisons, and he, in turn, will transmit this ambivalence to posterity as he converts the likely story of Plato’s cosmos into a science of nature (*physis*). As we shall eventually see, this ambivalence has never completely left us.

Aristotle and the Actual World

I do not intend to adjudicate in detail the controversial question of whether Aristotle followed or repudiated Plato, though I am inclined toward what Hans Georg Gadamer called the “unity effect in Plato and Aristotle,” in which Plato and Aristotle are united by a common subject matter in a continuous line of thought (1986: 2).^{31,32} At minimum, this means that both subscribe to a “logos philosophy” which trusts that the intelligibility of the world given in experience is not peculiar to consciousness and thus alien to the “extra-mental” universe, insofar as a universe rooted in intelligibility can be called “extra-mental.” On this understanding, Aristotle himself embraces the rationale underlying Plato’s postulation of the ideas: “In view of the ever shifting tides of appearances, everything hinges on knowledge of their ideas if there is to be any knowledge at all,” for we have seen that to know anything is to grasp a unity or identity—what is—that transcends flux (Gadamer 1986: 17).³³ This was the true meaning of Plato’s *chōrismos* between the intelligible and the sensible. The “separation” of the sensible from the intelligible was necessary to secure the meaning of the sensible, and Aristotle will basically preserve this schema in identifying the *logos* (*ratio* or definition of a thing) with its form or essence.³⁴ For Aristotle, as for Plato then, intelligibility must be proper to being itself; impressing itself upon thought and expressing itself in language.³⁵

If thinking is like perceiving, it must be either a process in which the soul is acted upon by what is capable of being thought, or a process different from but analogous to that (Aristotle, *De Anima*, III.4, 429a10–429a15).

Two preliminary observations follow from this. First, to be committed to knowledge is to be committed to the intrinsic intelligibility of being. Thus, to be a philosopher at

all is already to be a philosopher of the whole—a cosmologist—in the most comprehensive sense imaginable (a point made in very different terms in Chapter 1). It is therefore unsurprising that the fundamental question of the *Physics* is virtually identical to that of the *Timaeus*: “In what sense is it asserted that *all* things are one?” (Aristotle, *Physics*, I, 185a21). As in the case of Plato, coming to terms with this question will necessarily mean coming to terms with the very intelligibility of the question itself. Jonathan Lear puts the point very well. “[E]pistēmē is by its nature reflective: one cannot understand the world unless one understands the place of understanding within it” (1988: 8).³⁶ Second, commitment to the intrinsic intelligibility of being makes Aristotle every bit as much of a “philosopher of the ideas” as Plato. The difference between them, according to Gadamer, consists not in the fact that one subscribes to the doctrine of ideas and the other does not. Aristotle tacitly consents to a version of this doctrine simply by seeking truth and granting primacy to the question, “What is it?” (*to estin*), in his search for it (*Metaph.*, IV.7, 1011b20ff). The most basic difference, and that from which the other differences stem, is that Plato approaches the *eidōs* through mathematics while Aristotle approaches it through life science (Gadamer 1980: 194–218).

Gadamer maintains that this approach extends the basic thrust of Plato’s cosmology and should not be seen, therefore, simply as a repudiation of the *eidōs*. Instead, it should be interpreted as Aristotle’s attempt to further “extension of the concept of the idea to all that can be said and meant” (Gadamer 1980: 212). He concludes,

therefore, that Aristotle’s actual critique of the doctrine of ideas turns to the *physis ontōn* because in essence *physis* is where the doctrine of the ideas seems most likely to be exemplified (cf. *Metaph.*, 1070a18) (209).

Needless to say, this will bring about a fundamental transformation, or at least a clarification, of the ideas themselves. In the case of the generation of man, for instance, it is not the genus *per se* or even man but *the* man who propagates himself. This means that the *eidōs* does not exist “by itself” (209).³⁷

Thus the decisive insight in Aristotle, the one which provides the basis for his entire doctrine of categories, is that the unitary nature of the essence which is delimited and comprehended by the logos of the *ti ēn einai* is not a being by itself at all; rather it constitutes *the being by itself of the existent thing* (215).

Aquinas, commenting on Aristotle, will say something similar.

[E]ven though it is said in [Aristotle’s] text that form comes to be in matter, this is not a proper way of speaking; for it is not a form that comes to be, but a composite...the proper way of speaking it to say that a composite is generated from matter according to such and such a form (*In Metaph.*, lect. 7, 1423).

This partial identification of the ideas with “this-somethings” (*tode ti*) combined with the manifold fact of growth, movement, and development on the part of existing things leads Aristotle, in the first book of the *Physics*, to distinguish more clearly than his predecessors between the various senses in which a thing can be said not-to-be, to

be, or to become. There is, he maintains, a distinction to be made between matter and privation, between a kind of not-being “that is not-being only in virtue of an attribute which it is” and a kind of lack that “in its own nature is not-being” (*Physics*, I.192a1–I.192a10). Aristotle has here identified a form of nonbeing which is not nonbeing *simpliciter* and thus simply the opposite of form but is instead a lack determined by its relation to *particular* forms. This means that

there is a not-being in the *eidōs* which has to do not with its relationship to other *eidē* but with existence itself or, in Aristotle’s forceful way of putting it, with being deprived of something *sterēsis* (Gadamer 1980: 210).

It is thus between the poles of *sterēsis* and *eidōs* that every natural thing will run its course, during which it nevertheless transcends this movement by virtue of its form which determines its ontological identity. This movement is the course of its growth and development, of becoming what it already is, so to speak, and the living thing emerging from its seed (ontogeny) becomes the paradigm of this movement.

The living thing which emerges from the seed does not simply assume another eidetic determination and it is not simply something “different,” something defined by essentially different determinations, though if viewed *mathematically* it would be. On the contrary, it is the same, identical being which passes from the state of still lacking determination in itself to the state of fulfilled determinacy; it is an existent which still lacks complete determinacy. Hence, it cannot be described as a combination of different eidetic determinations; rather it is the transition and ascendance of the immature to the ripe (210).³⁸

This transition from the immature to the ripe is the primitive form of two interrelated distinctions which are central to Aristotle’s thought and crucial both to the unity of the Aristotelian cosmos and the priority accorded by Aristotelian science to the *actual* world, the world of things-*in-act* given in the unity of experience. The first is the distinction between act (*energia/entelechia*), which Aristotle equates with being and identifies with form, and potency (*dunamis*), the capacity to receive form and therefore to change, which he identifies, rather like the receptacle in the *Timaeus*, with matter. Matter thus understood has no independent positive existence; its existence is always relative to the form of the being whose matter it is. The understanding of nature which results is necessarily hierarchical, even anthropomorphic. As D.C. Schindler puts it, “If matter is defined as potency for form, the higher, more organized instances of matter represent more fully what matter is than the lower instances” (2010: 25).³⁹ A human or animal body is more representative of matter in its essence—more material, so to speak—than a stone, which has little capacity for form.

The second distinction follows from the different ways that matter can be related to form. This is the distinction between nature and art, perhaps intended as a subtle corrective to Plato’s demiurge, through which Aristotle elaborates his fourfold understanding of causality in the second book of the *Physics*. This distinction gives rise to a philosophical commonplace that will last until the seventeenth century: art imitates nature. It is necessary for us to understand the meaning of this distinction if we are to understand how being (*energia*) is central to the unity of the Aristotelian cosmos.

To say that art imitates nature is to say that a natural thing possesses something an artifact lacks; or rather, that it *is* something an artifact is not. For Aristotle, things “existing by nature,” paradigmatically represented by living things for reasons we have already intimated, are distinguished from artifacts in that the former “has *within itself* a principle of motion and rest in respect of place, or of growth and decrease, or by way of alteration” (*Physics*, II.10–II.15). This principle, of course, is the form according to which the material substrate is organized and develops as this or that kind of thing—a dog, a cat, a tree, and so on—and in virtue of which it remains substantially the same being in the course of its ever-changing existence in time. Aristotle follows Plato in assuming that all knowledge and all recognition of substantial identity takes tacit recourse to form, and he accords ontological primacy to form for the simple reason (but not only for this reason) that there is never an *actual* “this,” not even the Empedoclean elements, which is not always already determined as this or that kind of “what.” A conception of matter as purely positive prior to and independent of form, such as Democritus held or such as becomes predominant from the seventeenth century onward, is therefore strictly unintelligible to Aristotle because form is always invoked in the very act of denoting it.

It is important to specify further what Aristotelian form is. Form, strictly speaking, is neither a universal nor a particular. It is not a truth *about* a thing, but is rather its ontological identity.⁴⁰ “What, then, you are by your very nature is your essence...for the essence is precisely what something is” (Aristotle, *Metaph.*, VII.1029b15, 1030a). This form determines the thing’s matter as what the thing is, giving it an identity that ontologically precedes and transcends the interactions of its parts and is just so far indivisible, an identity from which the parts derive their meaning as parts and for whose sake they unfold and develop in the way that they do. This, again, is why Aristotle says a dead finger severed from the being whose finger it is is a finger in name only (*Metaph.*, VII.10, 1035b20–1035b25; *Parts of Animals*, I.1, 641a3).

In according ontological priority to form, Aristotle thus insinuates a distinction—though *not* a separation—between an ontological order of being and a temporal or historical order of generation, which makes the latter no less a “participation” in and an “image” of the former for Aristotle than it was for Plato. This is most famously the case, of course, with respect to his understanding of the generation of offspring, but it is equally the case of each thing in itself insofar as it actually *is* (i.e., in act). In other words, no thing is ever *merely* temporal—not even time itself—which is the *actuality* of the now dividing a nonexistent past from a nonexistent future.⁴¹ The distinction between the order of being and the historical order of generation makes it possible to conceive of form as *both* prior to the thing (in the order of being) *and* posterior to the thing (in the order of its historical development), even though Aristotle is adamant that form does not subsist in itself. An acorn, for instance, unfolds into an oak tree, rather than, say, a baseball bat or a desk, because it is *already* an oak even though its full maturation as an oak comes at the end process of its development, whereas a baseball bat or a desk is only incidentally related to the wood of an oak from which it is made, and only becomes a bat or a desk as the end product of a process of manufacture. To be sure, there is a certain “aprioricity” to the form of these artifacts as well, but the form which organizes the wood is inherent not in the wood as such but in the mind of the craftsman who makes it.

To say, then, that a natural thing differs from an artifact by having an internal principle of motion and rest is to say that a natural thing has a different relationship to its own being than an artifact does. This is the deepest meaning of Aristotle's assertion that substances are subjects (*Physics*, II.192b30–II.192b35). It is not merely that things are predicated of them while they themselves are not predicated of anything, though this is certainly true enough. It is that proper substances are the subject of their own being and thus possess an interiority and a unity that an artifact does not. In the end, Aristotelian "teleology" simply refers to this interiority and unity conferred by form: "for the sake of which" refers to "(a) the end to achieve which, and (b) the being in whose interest, anything is or done" (*De Anima*, II.415b20).⁴² And this serves to remind us that form is not just a principle of intelligibility but of actuality. It is not merely epistemological but ontological. Inasmuch as form is a principle of actuality, the priority of form leads us of its own inner force to inquire more deeply into the nature of being as *act*.

Energia/entelechia is a difficult concept to translate. Joe Sachs renders it as "being at work remaining itself," a definition which is highly suggestive (1995: 21, 31). On the one hand, "at work in itself," a more or less literal rendering of *en-ergon*, makes work inherently related to form: "to the logos of the essence" (*Physics*, II.7, 194b27).⁴³ For a thing to be *actual* is to be most fully itself—to be ripe, as Gadamer puts it, in contrast to the potency (*dunamis*) of the immature. Motion (*kinēsis*), which we will come to momentarily, is a form of quasi-actuality which nevertheless occupies a kind of middle term between these poles. So, Joseph Owens is right to insist that actuality proper "is not itself dependent upon movement. Rather, in its fullest sense it is contradistinguished from movement" (Owens 1978: 405). Actuality proper has a kind of completion or perfection that the transitivity of motion lacks, a perfection that must be grasped even to specify the potency and change which correspond to it.⁴⁴ And yet, on the other hand, the English gerunds "being" and "remaining" in Sachs' translation capture something equally important about the *energia/entelechia* of things that the simple nouns denoting essences do not. The actuality of things is not a static facticity. Actuality is not a "state" that is merely the opposite of motion and change. It is rather the completion or fullness, and thus the perpetuation, of the activity which is the *logos* and which alone determines the essential incompleteness of motion as incomplete. It is for this reason that Aristotle invests "perfect" circular motion with causal agency and regards it as a paradigm of actuality.⁴⁵ To be *actual* is not only to be this or that kind of thing. *To be* actual is to be in act; to *be* the kind of thing it is by doing what that kind of thing does.⁴⁶

Of course the sublunar world does not exhibit perfect circular motion, and only Aristotle's Unmoved Mover is *essentially* actual, so the course of each thing under the sun is one of *kinēsis* in which it strives to "catch up" with its own essence, as it were, in the passage from generation to maturity. The operative concept of motion here is obviously very different from Newtonian motion, which is really but measured differences in *stasis* plotted against a motionless backdrop. The moved bodies themselves are internally indifferent to that state, and indeed it makes no difference, from a Newtonian point of view, *what* those bodies are.⁴⁷ Aristotelian motion, by contrast, is a function of the priority accorded to form and is therefore an attribute of *things*. It is itself a kind of actuality, in fact, namely, the actuality of a potency *as such*, which we

might paraphrase, not inaccurately I think, as the actuality of *changing*.⁴⁸ This fundamental meaning of motion applies even in the paradigm instance of local motion, whose medium is not homogeneous space but heterogeneous places more or less conducive to the flourishing of the actual things that find themselves at home and moving in them. This too reflects the ontological priority of form and actual things, for as Joe Sachs puts it, it matters to things where they are (1995: 105). As an attribute of a thing, motion is always dependent on the *something* that moves, an observation which gives rise to the distinction between “natural motion,” which a thing does or undergoes as a matter of *per se* activity, and the indifferent “violent motion,” which a thing undergoes *per accidens*. Natural motion, the acorn growing into an oak, for example, reveals the natures of the thing in question, whereas violent motion, an acorn kicked across the sidewalk by my son, does not.⁴⁹ That the object happens to be an acorn in this latter example is entirely incidental.

This conception of act and motion will prove central to the unity of the Aristotelian cosmos, though we must concede that it is also partly responsible for an error that, while of only secondary importance to a unity which is fundamentally *metaphysical*, would nevertheless play a crucial role in bringing the whole of Aristotelian physics and metaphysics into ill-repute and ultimately destroying the very possibility of cosmology. I am speaking of course about Aristotle’s astronomy, which is typically made to bear the whole burden of his cosmology in the wake of the mathematization of motion in the seventeenth century and the unification of celestial and terrestrial mechanics that catapulted natural philosophy to first philosophy and reduced cosmology to a province of astronomy and physics. Hans Jonas (1974) appears to follow in the line of Pierre Duhem (1985) in seeing a certain inevitability to all this, maintaining that Aristotelian *kinēsis* and *topos*, even here below in the terrestrial realm, could not survive the “discovery” of an “infinite” universe, since supporting notions such as proper place depend upon a finite bounded universe with a fixed center and determinate directions.⁵⁰ It is beyond our scope to determine whether they are right, and in point of fact, it is fair to claim that these notions could not survive this paradigm shift for the simple reason that they *did not* survive it.

Still, I would make two brief points in the direction of a reply. First, the scholastics in attempting to determine whether heaven itself had a place had already further developed Aristotle’s notions, according place both a containing and a conserving function, and some such as Roger Bacon had already distinguished different kinds of places according to numeric and specific difference, distinguishing, for example, between *locus circa quem* and *locus in quo* (cited in Duhem 1985: 148). Second, Baroque speculation about an infinite universe prompted by the infinity of God and the Christian doctrine of creation, such as is found preeminently in Nicolas of Cusa, appears to have had no adverse effect on the concepts of natural motion and place not least because they did not dispense with the ontological primacy of *logos*.⁵¹ This suggests a possibility, never fully realized in the Middle Ages and perhaps incapable of realization in that historical context, of reconciling *kinēsis* and *topos* with an infinite universe, or better perhaps, a universe simultaneously finite and unbounded whose actual limits are codetermined (like a field) by the things that comprise them. This seemingly could have accommodated Aristotle’s rejection of an actual infinite magnitude, but it would have required him to understand place not primarily in terms

of a fixed *position* but in terms of its heterogeneity and receptivity to specific things. In other words, it would have required a deeper appreciation of how *topos* is a function of the ontological primacy accorded to form as act. In this case, it is not the infinite universe *per se* that necessitates the death of place and natural motion but an infinity conceived of as the negation of actual form, and an infinite universe which has already expelled form from its ontological inventory.⁵²

The difficulty should be obviated to some extent in any event by the basic discontinuity between the celestial and sublunar realms within the one Aristotelian cosmos. Because accumulated human experience seemed to confirm the perfect, eternal circular motion of the heavens, Aristotle was led to conclude that celestial bodies must be simple, unlike the terrestrial bodies which are compounded of contrary elements (*De Caelo*, I.3, 270bff).⁵³ They seemed to lack the potency of terrestrial bodies, and thus, he surmised, they could not be composed of the earth, air, water, and fire comprising complex terrestrial bodies but instead must be comprised of a matter all their own, the so-called “fifth-element” (I.2, 268b25–269a35).⁵⁴ Because of this composition, he regarded the relationship between the celestial and sublunary spheres as both discontinuous and asymmetrical. The heaven “receives” nothing from the sublunary realm, while the sublunary realm depends upon the movement of the heaven for its cycle of seasons and the cyclical reversion of the elements into one another (Aristotle, *De Gen. et Cor.*, II.10, 336b31–337a7).

That the unity of the Aristotelian cosmos is fundamentally *metaphysical* in character is evidenced by the fact that he thought this unity obtained *in spite* of this basic discontinuity between the celestial and terrestrial realms and the break that this then insinuated between the study of terrestrial *physis* and astronomy.⁵⁵ Insofar as the celestial beings are beings, they are subject to the same axiomatic principles characteristic of being *qua* being. They will be possessed of a determinate nature, and notions of act, potency, cause, and so forth will thus extend analogously to both realms, or rather both aspects, of the one cosmos. One salutary effect of Aristotle’s astronomical error is that it preserved a kind of unity-in-distinction, preserving both in the cosmos and in the sciences an order that was, in Falcon’s phrase, unified without being uniform. We saw this briefly in Chapter 1 in the relation between metaphysics and the other sciences, which are not merely “parts” of metaphysics (Aquinas, *In Boeth. de Trin.*, V.1, ad.6). On the one hand, the sciences are as distinct from one another as are the different genera that determine their subject matter. To attempt to reduce all the sciences to a single science or method is to commit the cardinal sin of *metabasis*, and thus to violate or neglect the *actual* differences between things (Aristotle, *Post. An.*, I.7, 74a35–74a40).⁵⁶ On the other hand, however, the unity conferred on things *qua being* makes real analogical predications possible across genera, predications which do not trespass on their differences. Because “the study of the primary instance embraces in its scope all the instances,” the science of being *qua* being confers a kind of unity upon being as a whole, not in spite but precisely because of the peculiar fact that the subject of this science “being” is not a genus, and yet “this account leaves the primary instance of Being in the status of an unreduced plurality” (Owens 1978: xiv, xx).⁵⁷

Just how this “unreduced plurality” of genera and species is one is a fundamental question animating the *De Caelo*, the *Metaphysics*, and the *Physics*. Aristotle will

conclude the famous meditation of *Metaphysics* XII.10 by declaring that “the mover makes them one,” but this alone is insufficient to answer the question of “how” (XII.10, 1075b38). The disunity among modern scholars attempting to answer this question is testimony to Aristotle’s own struggle to accord the cosmos a unity that is more than an aggregate or accidental unity but which does not undermine the ontological primacy of form and substance. Commentators such as David Balme and Martha Nussbaum, seeking *rapprochement* between Aristotle and modern biology and eager to avoid anything that looks like a “design” argument, deny that finality is an “extra factor” whether within each animal separately or operating upon nature overall,” though the notion of an “extra factor” is not rigorously explicated (Balme 1987a: 281).⁵⁸ (Appearances to the contrary are either treated as a heuristic Kantian *als ob* or as the accidental consequence of hypothetical necessity.)⁵⁹ For these commentators, the specter of specific or intraspecific (as opposed to merely individual) teleology provokes a discomfiting question:

What directs them, and by what means? It is here that tradition has lapsed into philosophy-fiction, inventing for Aristotle such *dei ex machina* as a hypostasized Nature supervising an overall teleology, or a cosmic control operated by the Unmoved Mover, or a living universe, or mysterious entelechies and magical *pneuma* within animals (299).

Commentators intent on denying finality to Aristotle’s cosmos employ several different strategies. They appeal to *Physics* II.8 where, in contrast to the teleology of organisms, Aristotle seems to deny finality to “mechanical” processes such as winter rainfall. They dismiss or ignore *De Caelo* I.9, where Aristotle treats the cosmos as one substance composed of form and matter.⁶⁰ And they relegate the “theological” argument of *Metaphysics* XII.10 to lesser station in Aristotle’s thought.⁶¹ *Metaphysics* XII.10 is then either treated as the “mythical unification” of the untold billions of unmoved movers in his pluralistic philosophy (Randall 1960: 71) or Aristotle’s claim that “all things are ordered together toward one end” is effectively explained away (*Metaph.* XII.10, 1074a19). Balme equates this with “a tendency to regularity in all living beings” (1987b: 278). Nussbaum offers a novel translation of *pros hen* so that the offending passage reads: “For all things are ordered together *in a single system*” (1978: 96).⁶² This allows her to dispose of what she calls “mysterious, non-empirical processes and events” such as “a divine guidance of the universe toward the good, or mysterious strivings in matter to realize form” and to redefine the *logos* as “the end-state which provides a unified account of adaptive behavior” for a self-maintaining system (92). She may well be correct that the standard Ross translation of this phrase as “to one end” is too strong and inconsistent with Aristotle’s standard usage. But surely David Sedley’s translation, “for all things are jointly arranged in relation to *one thing*” better captures the literal sense and is more in keeping with Aristotle’s usage—for instance, in the case of *pros hen* equivocal—wherein unrelated things receive a common designation through reference to “some one thing.”⁶³ It also happens that this translation accords better with Aristotle’s argument and the conclusion she seems so eager to avoid: “the mover makes them one.”⁶⁴

These strategies say as much about the metaphysical assumptions of Aristotle’s modern interlocutors as they do about Aristotle’s own challenge in accounting for

cosmological unity while preserving the ontological priority of substance. While our concern is with the latter and not the former, engaging briefly with these contemporary reconstructions of Aristotle helps us to see his achievement more clearly. In the argument of *Physics* II.8, Aristotle offers a critique in advance of “natural selection,” contrasting the growth of teeth and winter rainfall. Why is it not the case that teeth merely emerge from necessity, like winter rainfall does, and merely happen to confer a useful survival advantage on their possessors, as the rain happens to spoil the crops on the threshing floor? Those so blessed by *fortuna* then survive, while those less fortunate, such as Empedocles’ “man-faced ox-progeny,” perish (*Physics*, II.8, 198b20–198b35). Aristotle’s response to this question is less than immediately satisfying. He merely says that “teeth and all other natural things either invariably or normally come about in a given way,” while the same is not true of spontaneous events (*Physics*, II.8, 198b30–198b35). But the response is sufficient for commentators like Nussbaum and Balme to seize upon this example, to insinuate a distinction between finality and necessity, and to confine the former (in good “Darwinian” fashion) to the level of the individual organism. Aristotle’s argument, however, is a bit more subtle. It follows immediately upon a similar argument in II.7 contrasting form and finality with spontaneity. The conclusion in this case is not that there are no spontaneous causes and events, but that their very intelligibility as spontaneous causes and events is dependent upon what is *per se*, that is, upon form. The same argument is applicable here. In the absence of finality, “necessary” events are finally indistinguishable from spontaneous ones, and each is strictly unintelligible in precisely the same way. Inasmuch as spontaneity and necessity *are* intelligible, they are not simply opposed to form and finality. They *presuppose* it. Thus, no *thing* determined by form—which is everything whatsoever—could ever be *merely* spontaneous or “mechanical.”⁶⁵ David Sedley, David Furley, and others are therefore correct to object that the interpretation of *Physics* II.8 by opponents of cosmic finality contradicts the plain sense of 198b, 34ff, where Aristotle claims that “for teeth and all other natural things”—which includes winter rainfall—“normally or invariably come about in a given way” and thus for an end.⁶⁶ The fact that winter rainfall happens to spoil the farmer’s crops is a spontaneous or incidental event dependent upon the fact and the specific natures of rainfall and crops. At the root of this refusal to countenance any so-called “universal teleology,” we may suggest, is a failure to grasp the ontological primacy of form, and therefore *act*, in its fullest implications.⁶⁷ Nussbaum attests to this when she defines form as a “functional state of matter” (1978: 72).⁶⁸

These basic questions about the ontological status of form and act are similarly ignored in the interpretation of *Metaphysics* XII.10 offered by the opponents of “cosmic teleology.” Nussbaum’s redefinition of the cosmos as a single *system* begs the question of how, on Aristotelian terms, this system can be a determinate *thing* without a form that effects some sort of integration of the parts as parts.⁶⁹ And yet this is precisely how Aristotle treats the cosmos in *De Caelo*, “as a single individual substance with form and matter” (Matthen 2001: 171–199).⁷⁰ If the cosmos is a hylomorphic whole, the question then becomes: What kind and degree of integration of parts is proper to it—and how to square this account with the unreduced plurality of substances?⁷¹ Perhaps more seriously still, Nussbaum offers no explanation of why her self-maintaining systems, whose end-states have no internal reference beyond

themselves, have a stake in self-maintenance (1978: 92). The “desire” to be and the movement from potency to act which manifest it are simply taken for granted as a kind of positivist *datum*.

Balme does not address this either. He adverts to the fact that Aristotle regards generation as an imitation of eternity, which would seem to imply a constitutive relation to “some one thing,” but we have seen that he marginalizes this relation by defining it as an internal tendency toward regularity on the part of individual organisms (Balme 1987b: 278). It is this isolation of the intrinsic ends of organisms from the perfect actuality they seek that makes any real relation to the Unmoved Mover conceivable only as a matter of external “control,” but he is no less positivist than Nussbaum in accounting for the organism’s desire to remain in being at all, and this isolation of intrinsic ends from any transcendent purpose threatens to make Aristotelian generation unintelligible. He writes, for instance, that

Aristotle says in *GA* [*Generation of Animals*] II. 731b35 that the reason why the kind is perpetuated is that the individual achieves through reproduction the only eternity that is possible for it, namely, in form. He never says, however, that reproduction is for the sake of the species, but leaves it that its preservation follows from the individual’s attempt to preserve its own form—i.e., to survive (Balme 1987b: 279–280).

Yet, Balme is conflating the survival of *the organism* with the survival of the *form* common to both parent and offspring. It is the transmission of form, and not ultimately the survival of the individual, which “achieves the only eternity possible” for the organism. Aristotle himself suffers no such confusion, maintaining in the *De Anima* the individual “continues its existence in something *like* itself—not numerically but specifically one” (*De Anima*, II.3, 415b5). The question at issue here is *not* the Darwinian question that seems to have imposed itself on these thinkers, whether generation (or various characteristics of the organism favored by natural selection) is “for the sake of” the individual or the species. The question is more metaphysically basic, and it escapes Darwinians and their neo-Aristotelian contemporaries alike: whether and in what way the individual *qua* individual is inherently related to what is other than itself, and what these relations say about the unity of “the All.” The question, in other words, is what an individual *is*. If the internal sources of motion and direction proper to each animal “are not directed to anything external to themselves,” or “towards the good of anything other than the individual animal,” it is difficult to see how an organism’s own actuality—the limited measure of eternity allotted to it—could ever be realized *in another* (Balme 1987b: 277, 281). Why should the survival of the *form*, which is distinct from the survival of the individual organism, be to the good of the parent organism? Why, in other words, should there be generation at all?

The unity of the Aristotelian cosmos hinges on questions such as these, which go right to the heart of Aristotle’s conception of act, and particularly that transitive activity now known as efficient causality. For it makes precisely the provision we are looking for—indeed this provision is the very essence of transitive activity—and in so doing it provides the metaphysical basis for the sort of unity envisioned in the image of the general and his army in *Metaphysics* XII and the political community of *Politics* II: the unity of a single actuality comprised of distinct beings.

To see this clearly, however, we must first take care to distinguish efficient causality in its Aristotelian sense from its later sense denied by Hume.⁷² It is not simply the case, as the story commonly goes, that the scientific revolution of the seventeenth century threw out all of the Aristotelian causes save the efficient; it is rather that the new mechanistic ontology promoted by the revolution retained all of these causes and could not help but retain them, though each in drastically altered form (D.C. Schindler 2010: 17–28). This, however, is a story for later chapters. The point at present is to distinguish between the Aristotelian and the modern sense of efficient causality.

We have seen that for Aristotle, as for Plato, causality is fundamentally the *communication of form* (Aristotle, *Physics*, III.1, 202a5–202a10). This is why “causes in Aristotle’s sense always stand at the beginning of chains of responsibility, so that they can be adequate answers to the question, Why?” (Sachs 1995: 58). It is also why Aristotle regards a father begetting a child as the paradigm instance of efficient causation and why he is able to distinguish proper or *per se* causes from causes which occur *per accidens*. There is of course no room for such a distinction in Hume’s paradigmatic example, the collision of two billiard balls. Such causes do not *account for* their effects by introducing a form. Rather they *produce* an effect, extrinsic and indifferent to the natures of both agent and patient. This is why the colliding billiard balls provide such an ideal paradigm of causality in a mechanistic ontology, and why it is utterly irrelevant to the paradigm that they *be* billiard balls. All that is required in these terms is contiguity of time and space, and it is why *causing per se*—as the ostensible “glue” binding antecedent and consequent—becomes unintelligible. All we can really say about the relationship between the two events is that experience shows the consequent to follow reliably from the antecedent. This pretends to be a matter of pure empiricism, but it is an empiricism whose gaze has already been determined by the conventions of a mechanistic ontology, reducing both items and experience to a passing show of extrinsically related instances.

As Jonathan Lear points out, Aristotle does not regard an efficient cause and its effect as two events. There is but one event, a change in which a new form is introduced into matter, which can be viewed differently from the perspective of the agent and the patient (Lear 1988: 30–34).⁷³ Aristotle repeatedly refers to this as the “single actuality” of cause and effect.⁷⁴ And he insists, furthermore, that in such transitive activity the actualization of the agent *qua* agent, *qua* teacher, for instance, is realized in the patient. Strictly speaking, only as the student is learning can the teacher actually be said to be teaching (Aristotle, *Physics*, III.2, 202a5ff, 202b5–202b25). The activity of teacher and student is thus one and the same activity with two irreducible poles. The activity of the one is always already implicated in the actuality of the other.

A transaction of efficient causality is not the sum of a series of externally related instances. It is an event with a unity that includes both cause and effect. To understand how this event is a whole and why this is significant, we have to follow Aristotle in distinguishing between two senses of actuality. We can illustrate these with Aristotle’s own example of the builder who builds a house (*De Anima*, II.5, 417a29–417b30, III.2, 425b25–426a26; *Physics*, II.3, 195b5, III.1, 201a15–201b15, II.3, 19). It is perfectly correct, if a bit imprecise, to say in this first sense of actuality that a builder—as opposed to, say, a bus driver—is the (efficient) cause of the house. While the builder thus considered in the “nominative” case is the actual cause of the house in one sense,

he remains a potential cause in another sense unless and until he is actually *building*. So long as we are content to think of the builder as a cause in only this sense, at one remove from the actual work, it is possible to view the builder as cause in abstraction from any particular house he may actually be building. Were we to rest content with understanding him as a cause in this “nominative” sense, we would almost invariably be led to imagine the builder and the coming to be of the house as two items or events, with the cause as the “glue” holding them together. This is essentially the understanding which Hume demolishes. Since we never see this “glue,” but only the spatiotemporal contiguity of the builder and the house, “cause” ceases to be strictly intelligible.⁷⁵ From the Aristotelian viewpoint, however, such an understanding is predicated at least partly upon insufficient attention to the nature of act and therefore upon taking leave of the *actual* world.

For in a second, stricter sense of actuality, it is not the builder but the *builder building* who is the cause of the house, and here, “causes which are at work and particular exist and cease to exist with their effects” (Aristotle, *Physics*, II.3, 195b17). A cause only becomes actual in the strict sense *through* its effect, and so an actual working cause and its effect are always already implicated through their mutual activity in a whole, a “single actuality,” which encompasses them both. The cosmological implications are immediate. Through the lens of first actuality, the cosmos appears to view as an aggregation, even an organized aggregation, of disparate items, and the question then becomes what sort of “mechanism” or “law” accounts for their “fit” or the order that obtains between them. The cosmos is effectively subsequent to the things out of which it is comprised.⁷⁶ But there is nothing which exists unbounded by place and certainly no living thing whose existence is not characterized from the very first by having already actively received the world into itself in manifold ways. Insofar as a thing is in second actuality, insofar as it is actively *knowing*, *touching*, *seeing*, *hearing*, *eating*, and *living*—dare we say insofar as it is in the act of *be-ing*—it is always already implicated in the *actual* whole and its actual existence is always and originally determined by its active relation to that whole. To the extent that what is true of second actuality is true of being as such, we see repeated in the actual order the priority of the whole which was brought to light in the order of knowledge in Chapter 1.⁷⁷ While substance may therefore have a certain *logical* priority over relation in the order of knowledge, *actual* substances are already *constitutively* related. They have their being in already belonging to and being penetrated by the actual world, and this “having *be-ing*” is not a brute facticity but an “activity” that persists insofar as they are at all.

We see this most clearly perhaps in the *De Anima*, where Aristotle deepens this understanding by reflecting on the relation between the various powers of soul and its external objects. Whether in metabolic and respiratory activity or in activities of the senses such as seeing and hearing, the soul and its object are fused into the actuality of a single event, since each is necessary for the event to transpire. Thus, in sense experience,

the activity of the sensible object and that of the percipient sense is one and the same activity, and yet the distinction between their being remains (Aristotle, *De Anima*, III.2, 425b25–425b30).

Just as the builder realized his actuality *qua* builder *in and through the building*, Aristotle interprets each activity as the realization of some intrinsic capacity of the world—*qua*

audible, visible, tangible, or intelligible, for example—in *the soul*, even going so far as to hold that “food is essentially related to what has soul in it” (II.4, 416b9–416b10).⁷⁸ It is because of this unity of a thing and its world within their common actuality that ultimately “the soul is in a way all existing things” (III.8, 431b20).

The sense of touch presents a uniquely interesting case. Aristotle makes the curious claim that humans are the most intelligent of all animals because we have the most discriminating sense of touch, and he concludes the *De Anima* by saying that the loss of this sense alone, which he calls “the essential mark of life,” brings about the death of an animal (II.9, 421a20–421a25, III.13, 435b4–435b5). Why should this be? It is not simply the “Darwinian” observation that an animal lacking touch would soon fail to survive in a hostile environment, though this is true enough. Rather, it is because an animal receives and inhabits the world through all the senses⁷⁹—this is arguably the very definition of sense—but this is uniquely the case with touch because of its special relation to place (*topos*).

Aristotle regards flesh as the medium of touch, drawing on an analogy with water as the medium between two submerged objects, whose contact with each other even at minute distances occurs through their mutual contact with the water itself. The medium, then, is a kind of boundary. In contrast to “static” Cartesian lines, which allow for a clear and distinct separation, through analysis, of what lies on either side of them, Aristotelian boundaries, resting on the act–potency distinction, simultaneously distinguish *and* unite what is joined by them in a single actuality. Aristotle defines place as “the boundary of the containing body at which it is in contact with the contained body” and the “innermost motionless boundary of the body that contains” (*Physics*, IV.4, 212a5–212a20). Because place is an “innermost boundary” joined through a medium to things distinct from itself which ingress upon it, an animal is always already bounded by and in contact with place while remaining distinct from it.⁸⁰ Hence, like respiration but unlike senses such as seeing and hearing, the sense of touch is always actual and thus ensures that a thing and its world, though distinct, are actively fused into a single actuality in which each is always penetrating the other. It is tempting to say that this actuality, this unity of a thing and its world, *is* the animal’s life. Thus, when the sense of touch is lost, the animal dies.

It follows from this understanding of act that no thing is simply a brute fact, ontologically isolated from every other. Insofar as a thing *is*, it must be in a condition of second actuality to a certain extent. *Be-ing*, in brief, is more akin to the builder building than to the builder considered simply (and abstractly) in a state of potency. This is especially the case with *living* things, who are subjects of being in a way that inanimate things and artifacts are not. A thing in its various activities may continually oscillate between potency and act. Underlying this is the fact that it is “being at work remaining itself,” in Sachs’ literal translation of *en-ergia*, insofar as it *is* at all (1995: 31). This means in turn that the thing always already belongs to its world by virtue of being-*in-act*; thing and world comprise a single actuality, each penetrating the other while remaining distinct. This does not compromise the integrity of the thing as a substance. To the contrary, without being constitutively and actively related to the world that is other than itself, a substance cannot even be itself.⁸¹ Though a thing may therefore be a discrete substance (insofar as it is identical to its form), nevertheless such a substance—particularly a living substance—must also

already be a part, essentially related to the whole, in order even to be a thing for itself. And the more deeply a thing is able to realize this relation and internalize the world, in fact, the more profoundly it is able to transcend itself, to the point of becoming, in a way, all things.

A picture is emerging here of an intelligible cosmos whose unity is a kind of actuality, a unity of things-*in-act*. Insofar as substances are the subject of their activity and not just the outcome of that activity, they retain a certain precedence over the whole. And yet insofar as their substantiality implicates the actuality and interiority of the whole, the whole retains a certain precedence over the substances comprising it. This, I would argue, makes sense of the controversial argument and analogies of *Metaphysics* XII. “We must consider also in which of two ways the nature of the universe contains the good and the highest good,” Aristotle writes, “whether as something separate and by itself, or as the order of the parts.” “Probably in both ways,” he concludes, “and more in the latter; for he does not depend on the order but it depends on him” (*Metaph.*, XII.10, 1075a13–1075a15). With this last statement, of course, Aristotle is designating the perfect and essential actuality of the Unmoved Mover. We can therefore conclude that “the mover makes them one” precisely in virtue of its being *essentially actual*, *being* the perfect actuality which all things seek in seeking the fullest actuality allotted to them. This is the fundamental meaning of the so-called cosmological arguments here and in *Physics* VIII.⁸² Balme is therefore correct that finality is not an “extra factor” tacked on, as it were, to the nature of organisms, but wrong that it is merely “a tendency to regularity in all living beings,” because in beings that are *constitutively* related to the perfect actuality of the Unmoved Mover, there is no opposition between their moving themselves and their being moved. Seeking being absolutely is inherent in what it is for them to seek *to be simpliciter* (Balme 1987b: 278, 281).

This is why Aristotle can say that the movement of things that are defined by the capacity for *self-motion* is also their *being moved* by the desire for the eternal actuality of God (*Metaph.*, XII.8, 1072b1–1072b5). Modern commentators who dismiss Aristotle’s “natural love” as quaint anachronism or metaphorical flourish miss what is metaphysically crucial about it: that a thing’s *eros* is at once most properly its own *and* a response testifying to the fact that things are only ever themselves precisely in virtue of their relation to another. This is one crucial reason why the Aristotelian universe, like the Platonic and in spite of the differences between their respective understandings of form, retains the character of an *image*.⁸³

This is also why Aristotle’s universe contains the best and highest good *both* as something separate *and* by itself and in the order of its parts. As we have seen, the very activity of *be-ing*, which implicates things in their relation to the essential actuality of the Unmoved Mover, implicates them in a single actuality with one another. Substances having a “world” are *constitutively* related to that world. These relations are not secondary qualifications of a substance which is given prior to the relations themselves, but are rather the relations through which they have their being as the substances they are. They have their existence and their distinction from the world precisely in virtue of having already received that world into themselves in manifold ways.

The Aristotelian cosmos is therefore a *uni-versus* in the literal sense. It is unified through the turning of all things to “the One,” a turning that is coextensive with their

own endeavor *to be*. Thus, we can begin to see how “the mover makes them one.” Here, the analogy with the general and his army becomes important. Mohan Matthen and David Sedley insist against the sort of arguments advanced by Balme and Nussbaum that the Aristotelian universe is neither a disaggregated heap nor simply a “system” whose systemic properties “supervene” upon an elemental base, but a genuine whole whose nature at least partly determines the meaning and activity of the parts as parts (the qualifier will prove important). Matthen goes so far as to claim that the argument for cosmic unity in *De Caelo* depends upon the assumption that the “corporeal cosmos is a single substance with a motion”—and therefore an end—“proprietary to itself.” It is this proprietary motion which ultimately accounts for the characteristic movement of the elements. He counters one objection, namely, that this “cosmic teleology” would commit Aristotle to a cosmic animism he explicitly rejects, by pointing to a different sort of natural unity with a different degree of functional organization among its parts. The analogy of the general and his army is one example of such a unity. Aristotle offers another, “natural” example of such a unity in *Politics* II.2, where he distinguishes the unity of a polis or a family from the unity of an individual on grounds that the good of the citizens *qua* subject is not determined entirely by the good of the whole in the way that a part of the body is.⁸⁴

For the nature of a polis is to be a plurality, and in tending to greater unity, from being a polis, it becomes a family, and from being a family, and an individual; for the family may be said to be more one than the polis, and the individual than the family (*Politics*, II.2, 1261a16–1261a21).⁸⁵

But what of a second objection, that a cosmic teleology would violate the *entelechia* and the “unreduced plurality” of diverse substances? Certainly this analysis does not dispel the inherent tensions between the intrinsic good of any of the individual “parts,” in relation to each other or to the cosmic whole. There is too much inherent indeterminacy in material things and too much contingency in a temporal order fraught with chance and spontaneity for there ever to be such a tidy synthesis on Aristotelian terms. Perhaps this is why Aristotle teaches in the *Nicomachean Ethics* that “the right thing is to pray that what is good unconditionally will also be good for us” (V.1, 1129b7). And it is a real question whether Aristotle’s conception of the form–matter relation leaves the “parts” of the cosmos, eternally frustrated in the attempt to “catch up” with their own forms and to attain to the unity of thought and being. We will return to this point. Nevertheless, recognizing the priority of act minimizes the *a priori* opposition between intrinsic and extrinsic teleology, between a thing’s being “for itself” and “toward another.”

The truth is quite the contrary, in fact. For if in all transactions of efficient causality, the actuality of the agent is only realized in the patient, then it follows that things have certain intrinsic potencies—*qua* intelligible, sensible, and metabolic, for instance—that can *only* be realized in another by being known, sensed, or eaten. Indeed, if human beings are the only rational animals capable of a contemplative relationship to the whole, and if intelligibility is intrinsic to the cosmos and is at the heart of what it is for the cosmos *to be*, then the cosmos has certain intrinsic potencies that can only be realized in being contemplated by *us*. It is true that intelligibility, as an attribute of

being *qua* being, does not constitute the “essential difference” distinguishing each kind of thing from every other, and so no subject of being is entirely “for us” *simply* in virtue of its intelligibility any more than an edible thing is denied its own incentive to avoid being eaten. Nevertheless, if the cosmos is intrinsically intelligible, then Jonathan Lear is right to suggest that it “wants” to be contemplated in some way (1988: 109).

If this is true, then there can be no simple opposition between being “for oneself” and being “for another,” as those who would simply deny Aristotle a “universal teleology” seem to suppose. For “to be” is to be self-communicating and, therefore, “to be toward another” even—dare we say it—toward *us*. And if realizing one’s intelligibility in the knowledge of another does not negate one’s being for oneself, then something analogous must be true with respect to other potencies that bear reference to us. It follows that Aristotle’s claim in *Politics* I.8 that “animals exist for us” is not simply absurd and does not simply negate or instrumentalize the being of animals *per se.*)⁸⁶

These “anthropomorphic” implications are built into the primitive structure of Aristotelian hylomorphism itself. Aristotelian matter, we have seen, does not possess its own actuality apart from form. It only exists relative to the substance whose matter it is, *according to* this or that form. If the capacity to receive form is the “essential characteristic” of matter as such, then receptivity to being actualized *as* another (the defining characteristic of food, incidentally) must be exemplary of the meaning of matter as such. And inasmuch as assimilation to *human* form is assimilation to the highest level of actuality (save for the Unmoved Mover), assimilation to human form must best exemplify the meaning of matter. There is a similar dynamic at work on the side of form. For forms, as Aquinas will say, “do not have being, properly speaking, but are rather the principles by which things have being” (*In Metaph.*, VII, lect. 7, 1419).⁸⁷ Insofar as we can say (improperly) that form has being, we must say that it has its being “in something else,” namely, in the matter of the composite thing whose form it is (VII, lect. 7, 1420). Self-communicating form is the principle of an actuality that is inherently self-communicating. And it is ultimately because being is self-communicating that the generation of a numerically distinct other in the generation of offspring can serve as a sort of actuality—a measure of eternity—for the one who generates. Apart from this metaphysical basis, this Aristotelian claim and ultimately generation itself become unintelligible.

All of this must be qualified in the light of the fact that Aristotle regards *kinēsis* as *imperfect* actuality (*Metaph.*, IX.1048b28). Whereas the *entelechia* which “denotes act as extended beyond movement,” is self-contained, as it were, the actuality of motion is transitive and thus *depends* upon another for its fulfillment (Owens 1978: 404). What is *essentially* actual cannot, by definition, depend upon anything else. Its unity must be absolutely simple; perfect actuality can brook not even internal differentiation. This is why Aristotle insists on the absolute identity of thinker and thought—thought thinking itself—in the actuality of the Unmoved Mover (*Metaph.*, XII.9, 1074b15–1075a10). Yet, even here, there remains something essentially self-communicative precisely in the very notion of act, which “consequently is able to be known and impart knowability to the composite thing” (Owens 1978: 457).⁸⁸ Plotinus would later recognize and develop this point (*Enn.*, V.3). Were it not the case that the Unmoved Mover, as essential actuality, *is* already *toward* the cosmos in

some basic sense, it could never become an object of desire and emulation in the first place. And while Aristotle's Unmoved Mover may not depend upon its cosmos, it is never *without* its cosmos which is coeternal with it.

This contrast between the perfect *energia* of the Unmoved Mover and the imperfect *energia* of *kinēsis* brings us to a tension in Aristotle's thought more basic than the ambiguous tension between part and whole: the Platonic tension between unity and difference. This tension is why Matthen can maintain that "the corporeal substance [of the cosmos] constitutes, together with its Prime Mover, a composite whole that can be regarded as a self mover" (2001: 177) and why Owens can maintain that form of its very nature denotes difference, insist upon an "irreducible plurality" in Aristotle, and deny that he has a "one-and-the-many problem" and why they can both be right!⁸⁹ (1978: 459–460)— On the one hand, Aristotle's cosmos is one insofar as it is in act. On the other hand, because he excludes transitivity from the perfection of act, Aristotle's thought, like Plato's, contains a certain ambivalence over the inclusion of difference which threatens to vitiate the unity of the cosmos and the comprehensive scope of his cosmology.

At the heart of this ambivalence is the identification of perfect actuality with absolute self-identity. This is why the Unmoved Mover exercises only final causality in the Aristotelian cosmos, because a causality that had an extrinsic terminus, a cause whose actuality was in some sense "outside" itself, would fall short of the perfect actuality required to account for *cosmic* motion. It is also why the efficient causality characteristic of the "single actuality" of the cosmos is *per se* imperfect, as Owens notes (1978: 438–454).⁹⁰ There is an important theological truth in all this. Divinity that requires the world to realize itself is no divinity at all. Not only does the Christian tradition unanimously affirm this truth, the doctrine of creation will radicalize it and bring it to fruition. Aquinas will give this truth a particularly Aristotelian cast when he denies that God has a "real relation" to the world.⁹¹

Nevertheless, the attempt to secure this truth by the simple identification of actuality and self-identity results in a problem not just for the first principle but for everything subordinate to it. In one sense, the Aristotelian cosmos is all difference. As Owens puts it, "the Aristotelian form...of its very nature denotes difference, and therefore intelligible content. The form of anything is most properly expressed by its ultimate difference" (1978: 460). He goes on to say, therefore, that there is not a "One over many" problem in Aristotle; rather "the problem of the Stagarite is to see some kind of unity among all these *different* forms" (460). Aristotle achieves this unity, I have argued, through his understanding of being as act. And yet, because he identifies perfect actuality with self-identity, Aristotle lacks a positive principle of difference to account either for how things emulate or reflect the Unmoved Mover in their very difference from it or, more fundamentally, how to account *positively* for the difference between a thing and its own form. Aristotle's thought in this regard suffers a defect similar to Plato's. Aristotle has transposed Plato's difficulty into the heart of substances themselves. Aristotle's exaltation of difference is thus doubly ambivalent. Whether the difference in question is the difference between the many celestial movers and the Unmoved Mover or more basically still, the difference between each thing and its own form, that *whereby* the thing differs is strictly unintelligible. Kenneth Schmitz is therefore correct to say that

while Aristotle (more than any other philosopher before him and many since) brought to philosophy the concern for the concrete individual entity (*tode ti*)...when he came to formulate the essential meaning of the individual, he turned very quickly to the universal in the form of the specific nature—in a word, to the *ti* (2007b: 57).

And this in turn is why Owens can say “it is the species”—Socrates *qua* man, not Socrates *qua* Socrates—“that is divine and eternal. The singular thing does not matter in itself” (Owens 1978: 461). Lacking a positive principle of difference to differentiate subsistent things from the actuality of their form—or from the perfect actuality of the unmoved mover—this difference can finally only be regarded as an unintelligible defect. This is a serious problem in a metaphysics that ultimately equates being and intelligibility, for the particular as such falls from the unity of the intelligible cosmos.

At first glance, this result appears to follow from the transcendence of the Unmoved Mover, a transcendence so complete as to exclude its agency in the world. On closer inspection, however, the opposite appears to be true. This is because a transcendence set in opposition to immanence, a unity set in opposition to multiplicity is already a transcendent unity that has been brought into “real relation” with the world. The ultimate sign of this relation is of course the coeternity of the Aristotelian cosmos, which Aristotle defends on grounds that the universe is “continuous with its first principle” (*Physics*, VIII.6, 259b25–259b30). The ambivalence over difference in Aristotle’s cosmos is a direct implication of his failure to discoverfully the difference between God and the world.

The Generosity of Plotinus

Plotinus attempted to rectify these problems by bringing to the surface features and implications of both Plato’s and Aristotle’s thought that in them had remained largely implicit. Particularly important are the transformations wrought to Aristotle’s notion of act through his extended meditation on the One. Plotinus concurs with Aristotle in identifying actuality with unity and giving it ontological priority over plurality. “Plurality is later than Unity,” he insists (*Enn.*, III.8.9). He also concurs with Aristotle in insisting upon “the complete identity of knower and known” in the event of knowledge (III.8.8). He differs from Aristotle in that he cannot accept both at once in the case of “the Good” or “the One”; or rather, he cannot accept that the first principle is the object of its own self-enclosed thought or that this “thought,” strictly speaking, even has an object (VI.7.40). This would introduce plurality into the One, and denying this plurality is part and parcel of what it means for Plotinus to place the One beyond all being and knowing, an attempt, perhaps, to correct the defective transcendence of Aristotle’s Unmoved Mover (V.4.2, VI.9.3–VI.9.6). Plotinus reserves the identity of thinker and thought, along with its residual duality, for the second hypostasis of Intellect, which is (and indeed is the One) precisely as a contemplation of this unity (VI.1.7).

Plotinus’ understanding of the Good thus makes explicit what was only hinted at in the Platonic and Aristotelian conceptions of form: the essential generativity of the first principle, and the contemplative nature of form. That is, Plotinus explicitly understands

form itself as the *act* of contemplation.⁹² Because the actuality of the One cannot be reflexive, it must “necessarily” be productive, resulting, as D.C. Schindler notes, in an inextricable link between transcendence and generosity that makes this “necessity” itself something of a paradox (2005: 9).⁹³ Everything that is, then, insofar as it is, is an image of the One; indeed *is* the One, though only in a certain, asymmetrical sense, insofar as the One is “multiplied” in the Intellect.

Whereas the One is beyond being, the Intellect is identical to being; while the One is the productive power of all things by being *none* of them, the Intellect *is* the reality of all things; while the One is utterly without difference, the Intellect is essentially a “One-Many”; while the One is the absolute stillness beyond need and its alleviation, the Intellect is the simultaneity of pure desire and pure satisfaction “always desiring and always attaining.” Finally while the Intellect constitutes itself through an act of contemplative participation, a love that is its very being, the One is not constituted at all. It does not, *cannot* contemplate, and likewise cannot *love* (D.C. Schindler 2005: 11).⁹⁴

Insofar as the One is “multiplied” in nature through Intellect and soul, the essential generativity of the One is multiplied in nature conceived as a contemplative simultaneity of being, living, and thinking. “Life”—by which Plotinus means being insofar as this implies intelligible order—“is an intellection”; it is a multiplication of unity precisely as an active contemplation of and desire for the perfect unity and actuality of the One (*Enn.*, III.8.8).⁹⁵ Intellect “is in its own nature a Contemplative act” (III.8.3). And the generativity of nature, insofar as it is Intellect, is not something it does in addition to being. Rather, nature’s “creative act is simply its possession of its own characteristic Essence” (III.8.3). Because nature is essentially contemplative, and since contemplation is essentially productive, reality is meaningful and creative all the way down, as it were. Plotinus appropriates the Aristotelian account of generation on precisely these terms, as a self-multiplying act of contemplation (III.8.2).

The result is a good bit more subtle than those one-sided interpretations, typically citing Plotinus’ alleged contempt for the body as evidence, that regard this multiplication simply as a fall from unity and a diminution of divinity. Precisely because the One is beyond being, beyond intellection, beyond agency, it cannot fall; it cannot *do* anything. All that “action,” as it were, is entirely on the side of subsequent intellections, which are constituted in their difference *from* the One precisely by their being an active contemplation *of* the One. What appears, then, as a fall, a cascade, or a descent viewed “from the point of view” of the One is “simultaneously” a receptive *act* of ascent on the part of subsequent intellections when viewed from the side of the world. It is this that leads to what D.C. Schindler calls a certain “valorization of difference” on the part of Plotinus, in which difference from top to bottom is the effect and image of the essential generosity of absolute unity (2005: 13). It is this desire “to affirm the participant in the first place as a *positive expression* of the *participartum*” that underlies Plotinus’ endless praise of created harmonies and the scornful condemnation he heaps upon the dualism of the Gnostics (13).

Plotinus does rather notoriously identify matter as such with “evil,” however (*Enn.*, I.8.7–I.8.14). This stems less from an alleged contempt for the world than from his conception of the unity of the first principle. Plotinus’ ambivalence about matter and

his identification of matter with privation reflects the now familiar inability to give a *positive* account of that novelty whereby every particular is differentiated from its universal. This ambivalence obtains between every difference and extends all the way up the scale of being to the difference between the One and Intellect, where the latter is differentiated from Unity precisely by its characteristic activity of contemplation, and where the distinction, from the side of Unity, consists in its *incapacity* to relate or receive from what emanates from it. Plotinus cannot give a positive account of the novelty of difference because the One as such can brook no difference without sacrificing its transcendence. He cannot conceive of the fullness and perfection of unity *per se* as *including* difference and novelty. He can only conceive of these as a “subtraction” from unity even though they remain a positive image of this unity insofar as they are unities themselves. Matter must be a privation in the end because there can be no more than “the All” by definition, and there is no room in Plotinus’ conception of the Unity of the One for a “more,” intrinsic to Unity, that would not imply a prior lack in that Unity. D.C. Schindler’s subtle interpretation of the problem is fundamentally correct.

By virtue of the essential generativity of the first principle, Plotinus affirms the goodness of difference, but he seems to do so insofar as it serves to “multiply” unity, and not because difference is good as such. In order to be able to affirm the goodness of difference as difference, there would have to be some sense in which, to put it crudely, things also get better the more multiple, and indeed the more external and physical they become (D.C. Schindler 2005: 14).⁹⁶

Plotinus attempts to secure the transcendence of the One by placing it beyond being and to “valorize” difference by making it a multiplication of the One’s primal unity. But this is precisely the problem. Insofar as the simple unity of the One can brook no “internal” transitivity or distinction, this unity is still conceived in tacit opposition to difference and multiplicity as such. Consequently, it remains locked in “real relation” to the finite—a fact evidenced by the very need to locate the One “beyond being.” But inasmuch as the One remains “really related” to the finite world after all, inasmuch, that is, as the transcendence of God and his difference from the world remain inadequately conceived, there is in the final analysis little room within cosmic unity for that novelty whereby things differ from the One, little room, in other words, for the being of the world itself.

The cosmos is an irreducibly metaphysical and theological idea, historically and in principle. Because ontology and cosmology are correlative, errors in the one produce corresponding errors in the other, a point equally though differently applicable to modernity and to the Greeks. The inability of the Greeks to distinguish adequately between God and the world ultimately lead, in spite of their ambitions to the contrary, to a reductionist understanding of the world that consigns the world, insofar as it differs from its idea, to privation and unmeaning. Failure to distinguish adequately between God and the world thus ultimately leads to failure in conceiving a cosmos in thought.

“The positive definition of grace can only be given through grace itself,” Balthasar insists (1992: 279). Only God knows what he is in himself. The creature as such can

never “know wherein it specifically is different from God. Only the light of revelation can draw this distinction and make this clear” (279). And yet on this difference between God and the cosmos the integrity of the cosmos and the possibility of cosmology depend. Let us therefore turn to God’s revelation of himself and see how it begins to clarify this most fundamental distinction.

Christology, Creation, and Cosmology

In suggesting that the Christian understanding of creation *ex nihilo* fulfills and surpasses the cosmological aspirations of Greek metaphysics, I do not wish to suggest that this “overcoming” of Greek metaphysics happened completely and all at once. Even at a relatively late stage in the development of Christian thought (and indeed even now), one can still find scattered among traditional authorities the assumption that effects are *mere* images of their causes—“defective” *qua* image—and that particulars are incomprehensible in their particularity.⁹⁷ This is not simply because divine transcendence is so difficult to think of or because the qualified “yes” which the Church offered to Greek metaphysics carried within it deep-seated assumptions which were difficult to dislodge, though both things are true. It is that this judgment does express an important truth, several in fact, that Christianity inherited in different forms both from the Bible and from the Greeks, truths it was determined to maintain.

If God is indeed God, if he is that ineffable fullness of being—perfect, complete, beyond all opposition or any shadow of turning—then of course creation can “add” nothing to God that was otherwise lacking. So, in an obvious sense, creation as an image of this fullness must of course be less than God. The difficulty, as we have seen, is in conceiving of this difference *per se* in positive terms, of conceiving it so that the fullness of infinite being is not tacitly set in opposition and thus real relation to the finite, on the one hand, and or such that the world is robbed of its “own being,” on the other.

The difficulty, in other words, is to conceive of the world’s difference from God without conceiving of divine being as created being writ large, or what amounts to the same thing, collapsing created being into divine being such that God becomes the being of the world. A compromise in the integrity of either pole compromises the integrity of both. And a compromise of either means not only that the doctrine of God falls into incoherence but that the world itself is dramatically reduced. We may put the point positively. An adequate doctrine of God as “other” to the world is necessary for an adequate conception of the world *as world*.⁹⁸

These paradoxical difficulties point to two essential features of the doctrine of creation *ex nihilo*. Each is true both as a matter of positive theological principle and as a matter of the doctrine’s historical development. First, the doctrine of creation is a function of the doctrine of God. Its first task is to secure and protect the difference between God and the world, and thus the mutual integrity of each, to prevent us from falling into the error of treating God like a thing or of identifying the being of the world with the being of God. Second, the differences between an adequate doctrine of God and the Greek conceptions we have considered are themselves a function of Christology, or, to put the matter more strongly, God’s self-disclosure in the Incarnation of Christ. Let us now delve into the doctrine’s historical development.

That God is Creator of the world is a thoroughly biblical idea, part of primitive Christianity's inheritance from Judaism. Yet, even for Judaism, as Joseph Ratzinger notes, the meaning of creation is not confined or even exhaustively expressed in Genesis but unfolds progressively throughout the historical development of the biblical text and as Israel comes face-to-face with the mythologies of Assyrian, Babylonian, and Hellenic civilizations (1986: 8–15). The question acquires particular force in the Babylonian exile. It was

in the seeming defeat of Israel that there occurred an opening to the awareness of the God who holds every people and all of history in his hands, who holds everything because he is the creator of everything and the source of all power (12).

Ratzinger sees the creation narrative of Genesis partly as a refutation of the sort of cosmology of violence and strife encoded in the Babylonian creation account of Enuma Elish. Against this backdrop, the assertion of a God of Reason and Love who “speaks” a good world order out of a void and formless earth emerges as a decisive theological and cosmological gain, a moment of enlightenment.

Perhaps the clearest intimation of a doctrine of creation *ex nihilo* in the Jewish Scriptures can be found in the encounter with Hellenic culture, in 2 Maccabees 7:28.⁹⁹ Even so, Hellenic Judaism would never articulate an unambiguous doctrine of *creatio ex nihilo* in philosophical terms. Philo presents a possible exception, and there is a long tradition of treating him from the point of view of creation *ex nihilo*. However, Gerhard May is persuasive in arguing that while Philo was concerned to vindicate the freedom and omnipotence of God against a God who creates out of the necessity of his being, he did not thoroughly contest the Platonic doctrine of principles and “did not reflect on the problem of how the omnipotence of the biblical God could be united with the view of a mere formation of the world” (1994: 12).

The Judaic inheritance would be infinitely complicated by the founding event of Christianity: the Incarnation, death, and Resurrection of Christ. To interpret this event as the decisive appearance and act of God within history is tacitly to differentiate the very structure of history itself from both the ancient “cyclical” and modern “linear” view, investing linear history with a typological “plot structure” characteristic of the cyclical view. In retrospect we may call this a “sacramental” understanding of time and history. This tacit “sacramental structure” underlay the so-called spiritual and figurative sense of scriptural interpretation, which was not merely a “literary technique” but a reflection of this sacramental or symbolic ontological structure. As Aquinas would later put it,

The multiplicity of these senses does not produce equivocation or any other kind of multiplicity, seeing that these senses are not multiplied because one word signifies several things; but because the things signified by the words can be themselves types of other things (*ST*, I.1, 1a10, ad.1).

The upshot of this understanding is that while it is certainly fitting in a (modern) historical sense to regard the Prologue to John's Gospel as a kind of gloss on the opening verses of Genesis, we must recognize that in the theological mindset of the

early church and the Fathers, it is more appropriate to regard the opening verses of Genesis as a kind of commentary on the Prologue to John's Gospel, since

Christ Jesus, he who came to earth, was begotten of the Father before every created thing. And after he had ministered to the Father in the foundation of all things, for "all things were made through him", in these last times he emptied himself and was made man...¹⁰⁰

The Orthodox theologian John Behr has shown how such a radically Christological interpretation of what is now the Old Testament is on display not only among the Fathers but throughout the New Testament itself (2006: 45–72).¹⁰¹ Its basic presupposition, corroborated by the New Testament witness, is that the truth of the Scriptures is the person of Christ himself. As Origen put it,

By the words of Christ we do not mean only those which formed his teaching when he was made man and dwelt in the flesh, since even before that Christ the Word of God was in Moses and the prophets (*On First Principles*, I, praef., 1).

So commonplace was this sort of understanding that by the time of Augustine it would be customary to interpret the *principium* and the Sabbath rest of Genesis as references to the second person of the Trinity.¹⁰²

This is crucially important, for it indicates a basic truth about the inner logic of the doctrine of creation that is essential to its origin, its historical development, and its meaning. The doctrine of *creatio ex nihilo* does not emerge from a kind cosmological curiosity somehow outside Christian theological convictions, and it is not a freestanding hypothesis devised to explain cosmological origins. As May puts it,

It is not the question of the principle of the cosmos that forms the starting-point for assertion of pre-existence, but these "sprang from Christological reflection which was enquiring about the ultimate origin of the Christ-event and the ascension to be divine messianic Lord contrasting most strongly with the earthly life ending in death" (May 1994: 28 citing Vögtle 1970: 22).

The doctrine of creation emerges, rather, out of the doctrine of God or rather the transformation wrought upon the doctrine of God by the confession that Jesus is Lord—true God and true man in the formulation that would eventually emerge.¹⁰³ From the very outset, this confession required Christianity to distinguish itself from both Judaism and the Greeks in how it conceived of the relationship between the unoriginate first principle and the logos, on the one hand, and between the logos and the flesh and blood man Jesus—and by implication, all material reality—on the other.¹⁰⁴

Just as there is a deepening appreciation of creation within the Scriptures and within Judaism, so too would it require time for the nascent Christian movement to unfold the meaning of its own confession. Nearly two centuries would pass before the doctrine of creation *ex nihilo* began to acquire clear philosophical expression, as Christianity clarified its self-understanding of its Judaic inheritance *both* in opposition to a Gnosticism (and other heresies) which flourished within and without its ranks *and* in distinction from the literal reading of *Timaeus* which had acquired prominence

in Middle Platonism. Justin Martyr, who never fully succeeded in breaking from the Platonic scheme, regarded Platonic philosophy as an imperfect departure from the teaching of Moses and the prophets.¹⁰⁵ Such authoritative admiration may have lessened the urgency to differentiate the Christian understanding from the Platonic one. It seemed a plausible interpretation of Genesis 1.2 to regard God as a demiurge who “creates” the world merely by “fashioning” it out of an eternally unformed matter (*khora/hyle*). This is evidenced by the exegesis of Hermogenes, who equated the *principium* of Genesis 1:1 with the “secondary matter” of the *Timaeus* (Tertullian, *Av. Herm.*, 19.1). Breaking with the Parmenidian axiom “*ex nihilo nihil fit*” and its correlative notion of unformed matter as an eternal, though lesser principle, was a precondition for distinguishing creation from “fashioning.” This break would prove extraordinarily difficult, bound up as it was with questions of the nature of change, difference, and the origin of evil.¹⁰⁶

Tatian appears to be the first to record Christian belief in *creatio ex nihilo* in defiance of this Greek axiom (*Orat. ad Graec.*, 5, 12). Theophilus of Antioch was the first to argue for creation on grounds of philosophical necessity, contending that the admission of a second coeval principle (matter) means that God is not properly Creator (and therefore ultimately God) of matter (*Ad. Autol.*, 2.4, 10). The argument displays, in primitive form, the relation between creation *ex nihilo*, the doctrine of God, and a more radical understanding of divine transcendence.

These arguments were further developed by Tertullian around the turn of the third century in polemics against the Platonism of Hermogenes and in a vigorous defense of the resurrection of the body—and indeed the goodness of created flesh as such—against the Gnostics and the Platonists (*Adv. Herm.*; *Res. Carn.*, 11, 5–10).¹⁰⁷ The cosmological implications of these arguments are immediately apparent. Hermogenes had insisted that matter was eternal for two interrelated reasons. The first is that matter, lacking form and order, had to be regarded as “evil.” One sees echoes of Plotinus here. It followed that to make God the Creator of matter would be tantamount to saddling him with responsibility for evil. The second reason was that the divine title Lord (*kyrios*) implied something to be lord over. Hermogenes then cast matter in this subordinate position. Tertullian responds by distinguishing God as he is in himself from God in relation to us, drawing upon what would later be known as the distinction between substantive and relative predication. He argues, in essence, that predicating lordship substantially of God has the very opposite of its intended effect. It subordinates God and matter alike to a more comprehensive (univocal) notion of being and in so doing introduces what the scholastics would later call a real relation between God and the world. Inasmuch as God is made dependent on a coeval principle external to himself, he is ultimately subordinated *to* that principle (*Adv. Herm.*, 2–8).¹⁰⁸ This scheme makes the doctrine of God incoherent and “good” and “evil” nonsensical. Moreover, placing matter “outside” creation and making it essentially recalcitrant to intelligibility and order ultimately compromise the unity and coherence of the cosmos (13). The Resurrection of Christ, by contrast, requires that materiality be included within the one order of being reconceived entirely as a free and contingent gift. We thus begin to glimpse the cosmological significance of Christology. Tertullian will make this significance clear in his defense of the Resurrection, for it is the Incarnation and Resurrection of Christ and the body created

in Christ which shows that nothing falls outside the gift of being (*Res. Carn.*, 9).¹⁰⁹ The doctrine of creation recognized the whole of being as a radically contingent free *gift*, securing both the difference between God and the world and the inherent goodness of matter as such.¹¹⁰

The doctrine of creation *ex nihilo* developed over time in diverse polemical contexts, so it is not always easy to see the full nexus of cosmological, Christological, and soteriological concerns implicated in this doctrine. In grasping the inner logic of these polemics, we can see the unity of these concerns particularly in the battle against the various forms of Gnosticism. There is a connection, for instance, between the subordinationism of divine principles in Gnosticism and the basic Gnostic antipathy toward the material world and toward philosophy. This antipathy is of course most pronounced in Marcion's dualism of good and evil principles, which led him to regard the Old and New Testaments as antitheses. This scriptural dichotomy not only separated creation from redemption and necessitated a subordination of the divine logos to the unicity of "the One" more radical than anything suggested in Neoplatonism but also it entailed a "docetic" Christology in which both Christ's humanity and his divinity were merely apparent.¹¹¹

Irenaeus of Lyon objects to these Gnostic principles on several grounds. The Gnostic opposition between the Old and New Testaments severs the salvation of the world from its origin, severs the identity of Christ and God, and ultimately ontologizes evil. Perhaps more fundamentally, Irenaeus is clear that this simple opposition between the One and all that is subordinate to it fails to *differentiate* adequately between the world and God in his transcendence (*Adv. Haer.*, II.1.2). Affirming the continuity of the Old and New Testaments would allow Irenaeus and the subsequent tradition to affirm the unity of the Father, the Logos, and Christ and to distinguish more radically between the freedom and positivity of good and the nullity of evil, refusing the consolation which follows from according the latter any ontological status.¹¹² This radical distinction between God and the world would make it possible in turn to affirm without qualification the goodness of the world in all its natural and material dimensions and thus to offer a qualified embrace of philosophy. This fundamental ontological affirmation underlies all forms of genuinely Christian *ascesis*, with far-reaching effect. It would set the stage for Christianity's transformation of the Greek inheritance, preparing the ground for the sciences to flourish eventually on Christian soil. This affirmation is why Justin Martyr, in stark contrast to the Gnostics, can conceive of Christianity as the true philosophy that realizes the aspirations and dimly seen intuitions of Plato (*I Apol.*, 20, 59–62; *II Apol.*, 13). And it is why Tertullian's encomium to the glory of flesh is without parallel in ancient literature (*Res. Carn.*, III-10; *de Carne Domini*, 4–6). All of this follows directly as a consequence from the Christology of the early patristic Church and from the relation between creation, the Incarnation, and Resurrection (*Res. Carn.*, 9).

It would take two more centuries and a good deal of controversy before these issues would begin to find their theological resolution in the Trinitarian and Christological orthodoxy of Nicaea and Chalcedon.¹¹³ We will consider this resolution in more detail in Chapter 7. In the meantime, let me suggest that the *philosophical* result was nothing less than a metaphysical revolution extending equally to the doctrine of God and to

the world. For the central claim that Christ is at once very God and very man, without admixture, blending, or diminution, simply could not be stated within the confines of Greek metaphysics. Nicene–Chalcedonian orthodoxy did not just acknowledge the full divinity of the second hypostasis of the Trinity, but for this very reason, it brought about the first genuine thinking of divine transcendence.¹¹⁴ Affirming Christ as the Incarnation of God required a transcendence so radical as to include reflexivity and reciprocity within itself and the capacity for intimate relation to what is not itself, without losing its own otherness or dialectically negating the world.¹¹⁵ Again and again we see attempts to articulate this, though words ultimately fail to convey it. St. Athanasius, for instance, marvels that the Word

was not, as might be imagined, circumscribed by [Christ’s] body...but thing most marvelous, Word as he was, so far from being contained by anything, he rather contained all things himself; and just as while present in the whole of Creation, he is at once distinct in being from the universe, and present in all things by his own power...thus even while present in a human body and himself quickening it, he was, without inconsistency, quickening the universe as well, and was in every process of nature, and was outside the whole, and while known from the body by his works, he was none the less manifest from the working of the universe as well (*De Incarn.*, XVII, 1–2).

Augustine will say that God is “within everything because all things are in Him, and removed from everything because [He is] beyond all things” (*De Gen. ad Litt.*, VIII). Gregory the Great says that God

encompasses all things by filling them, and fills by encompassing, and transcends by filling, and fills by transcending, and transcends by sustaining, and sustains by transcending (*Moralia*, XVI, 15).

Balthasar gives voice to the logic underlying these and other such formulations: “the true and deepest unity between God and creature could only be guaranteed by effecting a clean *conceptual* separation of God and creature” (1992: 272).

Creation *ex nihilo* expresses precisely this infinite difference between God and the world by denying that any principle is coeternal and thus “outside” God and thus removing all trace of opposition (and therefore identity) between the being of God and the being of all that depends on him. This difference made it possible finally to conceive the doctrine of creation *ex nihilo* in fully ontological terms. So, in one sense, this difference is the condition of possibility for conceiving of the hypostatic union of two natures in Christ, while in another sense, the union of the two natures of Christ is the condition of possibility for conceiving of this difference and of creation *ex nihilo* ontologically. Because God is wholly Other to the world and thus is nowise in competition with it, he is able, as St. Augustine put it, to be closer to the world than it is to itself as the gratuitous source of its being. This is why the human nature of Christ can be united to the divine nature in the person of the Son without the abnegation of either.¹¹⁶ To the contrary, the ever-deeper integrity of the world as world is in proportion to its proximity to God. Maximus Confessor expresses this daringly in his description of eschatological divinization.

God becomes to the soul (and through the soul to the body) what the soul is to the body, as God alone knows, so that the soul receives changelessness and the body immortality; hence the whole man, as the object of divine action, is divinized by being made God by the grace of God who became man. He remains wholly man in soul and body by nature, and becomes wholly God in body and soul by grace and by the unparalleled divine radiance of blessed glory appropriate to him. Nothing can be imagined more splendid and lofty than this (*Amb.* 7, 1088c).

The relation between God and the world revealed in Christ is paradigmatic for the relation that is creation. The world as such is not hypostatically assumed by God, of course. The relation is one of analogy. But if one can conceive of a hypostatic union of natures that is “unmixed and confused,” then one can conceive of divine agency in bestowing being that constitutes, rather than negates, the autonomy of the creature. This is why Aquinas will later be able to say that the autonomy of creaturely agency is not lessened but *established* by the fact that God gives creatures being—because “to enact an actuality is through, itself proper to a being in act” (*Contra Gent.*, II.6, 4). Because being is the actuality of all acts and the most interior of perfections, it must be that God, as the source of being, “is in all things, and innermostly” (*ST*, I.8.1, resp.).¹¹⁷

The doctrine of creation is thus *both* a doctrine of God *and* the ontological structure of the world. We shall return to this crucial point from a more speculative and less historical vantage in Part III. Already, though, we can see enough to glimpse how creation transforms and fulfills the cosmological ambitions of Greek metaphysics. Creation, in rendering worldly being as *gift*, introduces a radical new contingency into the world. This contingency comes into view in contrast with the *nihil*, making possible for the first time to pose fully what Heidegger considered the most profound of metaphysical questions: Why is there something rather than nothing? The doctrine of creation thus pushes Aristotelian wonder—and therefore reason itself—to a limit beyond the scope of Aristotle’s own ontology and certainly beyond all subsequent forms of positivism. Moreover, we have seen that Tertullian, in denying the eternity of matter, had already begun to distinguish the “act” of creation from *ars* or *techne*, even though the tradition would continue to employ the craft images as an imperfect analogy for the divine act. Implicit in both this radical new contingency and this distinction between creation and art is a new distinction between principles within the *object* of the creative act.¹¹⁸ Creation, in other words, entails a distinction within the ontological structure of the creature between existence/being (*esse*) and form or essence.¹¹⁹

Now one could maintain that such a distinction was always latent, for example, in Aristotle. The notion of an *actus purus* existing essentially entails by contrast forms or beings whose essence does not entail existence. And there is some evidence that Aquinas saw the need for this “real distinction” arising from within the structure of Aristotelian hylomorphism itself.¹²⁰ Yet, in Aristotelian terms, this difference would be accounted for largely negatively by taking recourse to contingency within the order of generation and the potency introduced into composite beings by matter, which insinuates a difference between each thing and its form. It is only with the *positive* distinction between being and essence entailed in the notion of creation and in

Christ's embrace of the totality of created existence that it becomes possible to conceive of creatures in a mode that does justice to the simultaneity and fullness of their "ideal" and "real" material historical existence.¹²¹ This simultaneity is captured in Przywara's formulation: "essence in-and-beyond existence," but only in virtue of the more basic "God-beyond-and-in-the creature" (47–49).

The positive meaning of this distinction is encapsulated in a philosophical concept totally foreign to the Greeks.¹²² This is the concept of the *person*, which owes its existence entirely to Christian theology.¹²³ By allowing for a positive distinction between a nature and the bearer of that nature, the concept of the person enables thought unavailable to Plato, Aristotle, and the Greeks: "that someone who 'achieves the universal' attains a *higher level of being than the universal itself*. That the justice realized and made concrete in the just man is more than the idea of justice..." (Spaemann 2007: 19).¹²⁴

The concept of the person developed in stages. *Persona* translates the Greek *prosopon*, a term which originated in the theater to designate dramatic roles and masks worn by actors. In Latin and in the context of imperial jurisprudence, the term would acquire additional connotations and thus function as something of a *nomen dignitatis*. Common to both the Greek and the Latin is the fact that they designate "not instances of a kind or examples of a general concept, but bearers of a social role" (Spaemann 2007: 23). Literary scholars of antiquity employed this sense of the term to uncover the "roles" used to give dramatic life to events in poems and narratives. The Fathers saw something similar as they approached Scripture—Justin Martyr talks of the sacred writer introducing different *prosopa*—particularly in those places where God speaks in the plural. Divine simplicity coupled with belief in Christ dictate that these are no longer mere roles, however, but existent realities within the unity and simplicity of the one God. Tertullian, who gave to the West its formula for expressing the Christian mystery, "*una substantia—tres personae*," would make this explicit in the generation after Justin.¹²⁵

In the first stage of its development, person "expresses in its origin the idea of dialogue and the idea of God as the dialogical being," a notion which already distinguishes the *Trinitarian* personae from the Plotinian hypostases (Ratzinger 1990: 443).¹²⁶ A second stage at the turn of the fifth century further develops the meaning of Tertullian's formula and clarifies the nature of this dialogue. Commitment to Jewish monotheism and to the simplicity of divine transcendence means that the *personae* could not be conceived so as to divide the simple unity of the divine substance. What follows, then, is the concept of the divine person as a *relation* identical to its act.¹²⁷

This identification of *persona* with relation and with a pure act at once donative and receptive would have far-reaching ramifications. It would distinguish the Christian Trinity from its Greek antecedents, and it would transform the very nature of the act of being, making it self-contained and transitive at once. These ramifications would not all be realized at once or in linear, progressive fashion, and not all are equally pertinent to our present focus. The most relevant for our immediate purposes is how this identification subtly distinguishes person from nature, aligning it with existence rather than essence and making it the "subject" of that essence.¹²⁸ This is brought partly to light through a final stage in the development of the concept, the

Christological paradox of reconciling Christ's divine and human natures, which received its definitive resolution at Chalcedon.

The personal name Jesus does not refer to a form of being, but to "someone" who bears it. So one can say "Jesus is God," and (against the protest of the Nestorians) "Mary is God-bearer," *theotokos*. What is born is not something, but someone named by a personal name or personal pronoun. That is how Jesus can say of himself in St. John's Gospel, "Before Abraham was, I am." It was the concept of "person," the equivalent of the Greek *hypostasis*, that made it possible to understand the application of the personal pronoun in this statement without making Jesus appear as a theophany clothed in human form. For the first Christians this point was decisively important, since it decisively excluded all associations with ancient mythology or borrowing from that source to clarify the Christian faith. Zeus appears as man, as cloud, as swan; but Zeus is none of these things. When he comes to Leda in the form of a swan, he begets a demigod. Jesus was never revered as a demigod. He is wholly human, with human soul, human spirit, and human will. This was now expressed in terms of his possession of a human nature (Spaemann 2007: 28).

This understanding can only be sustained on the dual condition that we tacitly distinguish between essence and existence, and that the concept of person be located with the latter and not "at some place in the psychic inventory." Boethius' sixth-century definition of the person as "an individual substance of a rational nature" (*naturae rationalis individual substantia*) attempts to do precisely this, particularly when we see that Boethius restates the definition equating *substantia* with *subsistentia* (*Contra Eutych. et Nest.*, 3). "In this definition, personhood is the specific way that 'rational natures' are concrete and individual" (Spaemann 2007: 29). Unfortunately, this is easily obscured by the formulation itself, which can be interpreted so that *substantia* is equivalent to essence or to the rational nature itself.¹²⁹ Richard of St. Victor's criticism of the Boethian concept amounts, in Spaemann's estimation, to a deepening of Boethius' intention. Spaemann explains:

A person, Richard writes, cannot be a substance, but only the bearer of a substance, for which he appeals for support to the canonical phrasing of the doctrine of the Trinity, where the three divine persons are distinguished from the one divine substance. "Substance," Richard goes on, denotes a something, a *quid*, a given *case of X* where there could in principle always be *other* concrete cases of X. "Person," on the other hand, stands for "a property of a unique subject." What "person" means, then, is something that essentially cannot be encapsulated in description, however carefully specified, but must by definition belong to a unique individual in each case. Richard now offers his own definition: a person is "a sole and self-standing existent in a singular mode of rational existence." Person is a mode of existence, not a qualitative state. It is the sustaining of existence as a particular individual—*existence*, not *essence* (2007: 29–30).¹³⁰

How does all of this complete the cosmological aspirations of the Greeks? We have seen that the Greeks thought of perfected actuality as unity that excluded difference, which subsequently made it difficult to give a positive account of difference. This problem persisted irrespective of whether the difference in question was the difference between image and archetype in Plato, the difference between a subsistent thing and its form in Aristotle, or the difference between the One, *Nous*, and their subsequent

emanations in Plotinus. In Aristotle's case, the ontological primacy of form generated a double tension, which he never entirely resolved, between each thing and its own form, on the one hand, and between ontologically primary substances and the unity of the cosmos, on the other. As a result, the source responsible for difference in all three cases, namely, matter, tended to be regarded as something of a surd moment within cosmic order, and, as such, it must ultimately be transcended, overcome, or bypassed in the perfect realization of that order. Actually existing things such as we know them and such as we ourselves are can only ever hope for a mitigated recuperation into the unity of that order and the self-identity of thought and being which is its goal.

This difficulty is traceable, ultimately, to a failure to cognize fully the difference both *within* the simple unity of the first principle and the difference *between* God the source and the cosmos itself. Christianity achieves the first with the doctrine of the Trinity, which implies a fundamental transformation of act and its perfection, and the second with the doctrine of creation *ex nihilo*, which sunders the various monisms binding God of necessity to the world. With this, created being in its entirety will acquire the structure of a gift, and nothing—not even matter—falls outside of it.¹³¹

In rendering being as gift, creation simultaneously fulfills and transforms the Greek cosmos and the substances comprising it. The difference that Greek philosophy could only register negatively as the incomprehensibility of Socrates now denotes the *positive* difference, the being-in-itselfness, irreducible novelty, and incommunicable depth characteristic of every concrete existent act of being. The novel concept of the *person* paradigmatically expresses this idea.¹³² And yet precisely insofar as being is gift in its very structure, the very act that constitutes the substantiality of substances simultaneously implicates them even more deeply in the “single actuality” of the cosmos than was the case for Aristotle. In other words, the transformation wrought to being by creation *ex nihilo* effects a reconciliation of unity and difference, both in God and in the cosmos, but it does so by intensifying both poles of this “single actuality,” much like the hypostatic union intensifies the distinction between divine and human natures. The Church Fathers were not blind to the cosmic implications of creation. They are inherent in the patristic notion of the *carmen mundi*, for example. And Ps.-Dionysius and Maximus each maintained that the cosmos has a “liturgical” structure. Each thing worships and manifests God in the act through which it seeks to be. And in Christ, the measure of the God–world relation,

Things that are by nature separated from one another return to a unity as they converge together in the one human being. When this happens, God will be all in all (1 Cor 15:28), permeating all things and at the same time giving independent existence to all things in himself. Then no existing thing will wander aimlessly or be deprived of God's presence (Maximus Confessor, *Amb.* 7, 1092c).¹³³

How was this cosmological achievement reflected in the order of knowledge? At the outset of this chapter I noted that the university as it developed in the Christian Middle Ages presupposed the existence of a universe in the sense I have here tried to describe: a comprehensive order bound into an intelligible unity by virtue of its *being related* to God. In the twelfth century, particularly, this unity would receive new attention, with great care taken to correct, in light of creation, the “Platonic

ambivalence prone to see matter as an unmitigated force of disorder” (Chenu 1997: 25), and to revive patristic sense of creation as a *carmen mundi*.¹³⁴

The unmistakable sign of this was the spread of the word *universitas* employed independently and as a concrete noun (not *universitas rerum*) to designate the universe in descriptions or systematic treatises (5).

We have already shown how conceiving of this unity as creation opened up a distinction between being and essence, investing each with the structure of gratuity. This is evident in the definition of nature provided by Hugh of St. Victor in his *Didascalicon*, which served as something of a blueprint for liberal education in Europe prior to the advent of the universities.

But that type of thing in which the very being (*esse*) and “that which is” (*id quod est*) are separate, that is, which has come into being from a principle distinct from it, and which in order that it might begin to be, flowed with actuality out of a preceding cause—this type of being, I say, is nature, which includes the whole world, and it is divided into two parts (I.vi).¹³⁵

The whole world, if it is indeed to be whole, must “be defined as the totality of that which is given to the mind, without any *a priori* exclusion of the conditions it requires in order to be understood” (Gilson 1965: 447). The requisite science for articulating these conditions is metaphysics, properly understood as “the science of the conditions required by, but not contained within, the totality of that which is given. This inevitably implies the transcendent,” that which is *not natura* because it “does not come into being from a principle distinct from it” and is not the type of thing in which *esse* and *id quod est* are separate (447). Indeed, it is no “type of thing” at all, which is why *scientia* cannot comprehend it, and why the transcendent implies just “as inevitably, the supernatural,” that which nature is not able to provide for itself (447).

It is just this rooting of nature in an infinite gratuity which is *not* nature that made it possible to realize the Aristotelian ambition to an order of knowledge that is unified and comprehensive and yet not reductive. In the last chapter, we considered the formal reasons for this in a manner roughly corresponding to the Aristotelian–Thomist understanding of subalternate sciences. Since no science can establish itself or its own subject matter, each science must take its principles “on authority” from a “higher” or more fundamental science and ultimately from metaphysics, though not in a way that is simply deductive. Yet, since there is no standpoint outside being from which to survey being, even being fails fully to explain itself, and so as being opens from within its own necessities to an “extrinsic” source, metaphysics opens from within its own intrinsic necessities to the still higher science, ultimately what Aquinas calls the *scientia divina* of God himself (*ST*, I.1.4, ad.2).

We may now see more clearly the implications of creation for this architectonic of knowledge. On the one hand, the real distinction of the world from God demanded by creation demands a distinction of sciences. Because the world is really other than and irreducible to God, it follows that there must be forms of knowledge of the world that are really other than and irreducible to theology.¹³⁶ And so, as a function of the

world's legitimate autonomy, the sciences each possess their legitimate autonomy. We see this, for instance, in the *Didascalicon*, where the practical and mechanical arts receive their due treatment as necessary and autonomous arts and yet are still subordinate to a higher, contemplative order of knowledge. This autonomy is not opposed to the gratuity of God, but is rather a function of it, and nothing falls outside of it. Formally, this meant that the autonomy of the distinct sciences follows not from their opposition and indifference to metaphysics and theology but from their dependence upon them; materially this meant that the objects of knowledge, constituted as creatures in relation to an infinite gift, possessed a certain intrinsic infinity, a bottomlessness, that could only be adequately apprehended in contemplative adoration and love, in a vision without closure capable of grasping this infinite depth. The fourfold exegetical method, which was not yet a mere literary technique but a way of reading *things*, exemplifies just this assumption (Aquinas, *ST*, I.1.10, ad.1).¹³⁷ In this way, theology in the sense of *sacra doctrina* comprehended and unified the entire order of knowledge not by converting each science to theology but by referring the entire order beyond human *scientiae*, and thus preventing any particular science from either claiming the perspective of the *scientia divina* as its own or denying its objects the mystery of their own being.

Within these parameters, there was of course a great deal of disagreement over the relation between philosophy, theology, and the other sciences, or even over the extent to which the exploration of secondary causes was a fitting end of human enquiry. Chenu observes an abundance of disagreement over such questions—in William of Conches' *Philosophia Mundi*, for instance—well before the theological reforms of Albertus Magnus made it possible to subsume the Aristotelian canon within a Christian theological vision (1997: 4–24). After the thirteenth century, one might follow St. Thomas in his Aristotelian detour, “subordinating philosophy but in such a way that it would appear to be sufficient to itself *within its own sphere*” (Gilson 1965: 103).¹³⁸ Conversely, one might follow Bonaventure in bringing the Augustinian tradition to its culmination, by insisting that “reason is only competent in its own field if it keeps its gaze fixed upon truths beyond its competence,” and thus make the dependence of all science on theology, or at least the dependence of all knowledge upon illumination from the divine mind, more immediately apparent (103). Whichever path one took would obviously go a long way in determining how one treated *natura*—as the *proprium esse* of each created thing (Hugh of St. Victor, *Didasc.*, I.x)—and whether one placed comparatively greater emphasis on the exemplary form in the divine mind or the substantial form inhering in the thing itself.

One's position with respect to these points of disagreement had a bearing on how one understood the knowledge of nature—for instance, whether and in what way the origin of knowledge in sense experience is dependent upon *a priori* illumination by the divine light—and whether one's exploration of causes proceeded in haste to symbolic and mystical contemplation of the first cause, or whether one dwelt among proper essences and their interrelations.¹³⁹ These differences are real, and the disagreements were substantial, but for all that they need not amount in principle to more than a relative stress on the immanent or the transcendent (Guénon 1995: 14). Recent studies of Aquinas, which seek to supplement or correct the nineteenth- and early-twentieth-century scholarship's one-sided emphasis on Thomas' Aristotelianism

at the expense of the Neoplatonic, Augustinian, and Dionysian elements in his thought, help to demonstrate this point.¹⁴⁰ The *Summa*, after all, is no less concerned than Bonaventure's *Itinerarium* to lead its readers toward beatific vision (Candler 2006: 90–139). Despite the ostensive origin of knowledge in *sensibilia*, Thomas too, it can be argued, makes the knowledge of *sensibilia* dependent upon divine illumination, or at least upon our participation in *esse commune* which issues in turn from the *esse subsistens* of God.¹⁴¹ It is true that Aquinas' emphasis on Aristotelian substantial forms and intelligible species for the knowledge of existents and the priority he accords to the historical sense of Scripture both temper the urge to a figurative treatment of nature. Nevertheless, he allows for such a treatment on grounds that God has it in his power to signify his meaning, “not by words only (as man also can do), but also by things themselves” (Aquinas, *ST*, I, q.1, a.10).¹⁴² It is thus that all *sensibilia* are capable in principle of becoming *revelabilia*, and their meaning as “revelation” does not stand over against their “natural” meaning, but rather reveals them as having always already originated from and been intrinsically ordered to God.

Likewise, despite its overtly mystical and figurative character, Bonaventure's *Itinerarium* is no less concerned than the *Summa* to penetrate phenomena in their empirical manifestation. In keeping with the Augustinian distinction between *signa naturalia*, *signa data*, *signa propria*, and *signa translata*, Bonaventure first dissects phenomenal appearance “in the book of creation” according to the categories of origin, greatness, magnitude, multitude, beauty, activity, plenitude, and order in the desire to explicate how things manifest God through these basic “phenomenological categories,” both subjectively in the act of our knowing them and objectively in their self-manifestation, itself a sort of *vestiga trinitatis*. It is only when one has entered deeply into the mundane in its phenomenality, and through it (though never leaving it behind) to higher orders of contemplation, that we are treated to his greater flights of figuration (Bonaventure, *Itin.*, I.14).

Such flights of figuration no doubt appear as mere flights of fancy to modern eyes colored by four centuries of scientific rationalism. And we certainly cannot recover a coherent cosmology by pretending that those centuries have not passed. Nevertheless, once we have understood scientific rationalism in its metaphysical and theological meaning, we may yet see that the underlying premise of such figures—that being is intrinsically intelligible and self-communicating—remains necessary not only for a coherent cosmology but for rationality *tout court*. If we cannot simply recover the symbolic cosmos of medieval theology by pretending that the scientific revolution did not happen, then neither can we pretend that the universe of scientific rationalism is metaphysically and theologically neutral. The cosmos is an irreducibly metaphysical and theological idea, in principle and in history. Historically speaking, the Christian revelation of the Trinitarian God and of the world as creation not only completed the cosmic aspirations of the Greeks, recuperating matter within the remit of the divine gift, but also it broke open the question of being and deepened the Greek sense of wonder, refounding Greek contemplation as prayer, and laying the groundwork for the sciences to flourish. If there is truth in this achievement that persists even now, then there must also be something true in its corollary. The recovery of an adequate sense of cosmos, of a universe large enough to include *us*, may be necessary for sustaining a conception of truth that is more than feasibility and of knowledge that is more than engineering.

If so, then recovering an adequate sense of cosmos is inseparable from the recovery of a contemplative science in precisely this sense, not as a pious addition to the work of the hard sciences but in order to preserve the mystery and the being and the truth of the world which is their object.

Notes

- 1 See, e.g., Burt (2003), pp. 15–35, 89–90.
- 2 Stephen Jay Gould typically refers to Christian consolation in these condescending terms, though of course he is not alone in this. See Gould (2002), pp. 136–137.
- 3 I would suggest instead that the anthropomorphism of modern cosmology reflects an inhuman anthropology, but that is an argument for later.
- 4 Pope Benedict suggests a *positive* sense in which this is true. “All our knowledge, even the most simple, is always a minor miracle, since it can never be fully explained by the material instruments that we apply to it” (2009: 77).
- 5 This phrase is from Falcon (2005), pp. 85–112. Falcon stresses the discontinuity between the celestial and sublunary worlds and maintains that this, coupled with the distinction between the orders of being and knowledge, results in a self-conscious limitation on the notion of natural science in Aristotle.
- 6 This, too, was an explicit goal of Baconian science, as Bacon sought to establish his natural philosophy as first philosophy. See Bacon (2000), p. I.81.
- 7 I am grateful to Todd Buras for calling my attention to Leslie and Adams.
- 8 I am grateful to D.L. Schindler for calling my attention to this point.
- 9 Brague sees an intimation of this view also in Jeremiah 10:16: “Not like these is he who is the portion of Jacob, for he is the one who formed all things, and Israel is the tribe of his inheritance; the LORD of hosts is his name.”
- 10 See Brague (2003), pp. 9–16.

The first condition required for speaking of a “cosmology,” that is, a reflexive relation with the world, is that the idea of “world” has become a theme. The sign of such “thematization” is the presence in the vocabulary of a word for “world.” The word “world,” or rather the series of terms that may be translated by “world” appeared at a relatively late period... we can say that it was only at the halfway point of history that there appeared a word capable of designating all of reality in a unified way. Humanity was able to do without the idea of “world” for half of its history—not to mention the immensity of prehistory.

- 11 On the philosophical foundation for mythos in Plato’s metaphysics and for the philosophical meaning of the genre, see Cornford (1937), pp. 28–33.
- 12 A minefield of difficulties awaits any attempt to map the *Timaeon* myth directly onto the relevant metaphysical elements scattered throughout the Platonic corpus, even though the mythical form of the *Timaeus* is dictated by the metaphysical interpretation of the cosmos. Brague, for instance, is tempted to regard the *Timaeus*

as being thoroughly ironic, as the best vision of the cosmos but not necessarily the truest, as the best possible exposé of a fundamentally impossible knowledge, just as unattainable as the ideal city of the Republic (2003: 32).

Among the many attempts to relate the *Timaeus* to the broader corpus, see Carone (2005); Cornford (1937); and Johansen (2004). For a debate over the historical placement of the *Timaeus* within the Platonic corpus, see Owen (1965), pp. 313–338, and the reply by Cherniss (1965), pp. 339–378.

- 13 On the possible meanings of Timaeus' puzzling willingness to entertain five worlds, see Cornford (1937), pp. 219–224.
- 14 Cornford's translation, emphasis mine.
- 15 The *Timaeus* begins with what appears to be a reference to the *Republic*, so Timaeus' truncated reference back to its theory of truth would be entirely appropriate.
- 16 These ancient difficulties of interpretation persist to the present day. See Cornford (1937), pp. 21–33, especially 26–27, and Carone (2005), pp. 29–52. For more on the antique form of these controversies, see Dillon (2003), pp. 80–94. For an argument that the demiurge is identical to the forms and for antique attestation of this interpretation, see Perl (1998), pp. 81–92.
- 17 Such would seem to be the meaning of Daniel Dennett's interpretation of the traditional view. See Dennett (1995), pp. 64–68.
- 18 See Perl (1998), pp. 81–92, for an account of this venerable tradition and an argument on its behalf.
- 19 See D.C. Schindler (2005), pp. 4–8; Perl (1999), pp. 339–362; Perl (1997), pp. 15–34; and Gadamer (1980), pp. 163 ff.
- 20 "For it is evident that Plato takes the number as his guide in his inquiry into the logos ousia." See Gadamer (1980), p. 202. See Toulmin and Goodfield (1962), pp. 73–82.
- 21 See Cornford (1937), pp. 28–32. This is in contrast to A.E. Taylor who understands myth as "the nearest approximation which can 'provisionally' be made to exact truth" (1928: 59). See also Gadamer (1980), pp. 159–162.
- 22 See Carone (2005), pp. 31–35, for a summary of this controversy.
- 23 Moutroupoulos (2002) indexes a number of Plato's uses of the term in "L'Idée de participation: cosmos et praxis," pp. 17–21; *Protagoras*, 322a; *Symposium*, 208b; *Republic*, VI 486a; *Parmenides*, 132d, 151e; *Sophist*, 256b, 259a; *Timaeus*, 77b; *Laws*, IX 859e. These are cited in D.C. Schindler (2005), p. 1.
- 24 See Cornford (1937), p. 26 and Carone (2005), pp. 31–35.
- 25 See D.C. Schindler (2006), pp. 357–367 and McGinley (1977), pp. 27–57.
- 26 The argument which follows is deeply dependent upon D.C. Schindler (2005), pp. 1–27.
- 27 D.C. Schindler puts it thus:

Here, again, there is no dualism between forms and images because these are not two "competing" realities set over against each other. Instead, forms are the only things in fact that are real. To say this does *not* mean, however, that the sensible world is ultimately a non-existent illusion, as the historical Parmenides seems to have thought. Plato clearly *distinguishes* images from non-being. As he says in the *Republic*, likeness comes between being and nothing. It is not that sensibles do not exist, it is only that their existence is *wholly derived* from the truly existent forms. Sensibles are, in a word, "something" rather than nothing, but that something is their being nothing *but* the forms sensibly manifest. This is, indeed, what it means to call them *likenesses* or participations (2005: 7).

- 28 D.C. Schindler and Kenneth Sayre maintain that the receptacle is unintelligible from top to bottom and speculate that Plato knew this and abandoned the notion. If our analysis is correct, the receptacle may well fulfill a metaphysical necessity in its very unintelligibility. See Sayre (2003), pp. 60–79.
- 29 See Gadamer (1980), pp. 204–205.
- 30 See Cornford (1937), pp. 159–177; Taylor (1928), pp. 299–303, 491–492; and Carone (2005) pp. 39–42.
- 31 One may wonder why I pay comparatively greater attention to Aristotle given the dominance of the Platonic tradition in Christianity up to the thirteenth century. I certainly do not wish to minimize the significance of the Platonic strand, quite the contrary in fact. I emphasize Aristotle, rather, for four reasons: first, because of his historical continuity

with Plato; second, because of his own emphasis on the “life sciences”; third, because one cannot understand the ontological assumptions of modern science, either theoretically or historically, without understanding how they arise from an insurrection against Aristotle; and finally, because of his importance in Thomas’ understanding of creation, which we will appropriate and develop in Part III.

- 32 Jonathan Barnes maintains similarly that “Aristotle’s philosophical interests were shaped and determined by Plato’s philosophical interests” (1995: 18). Gadamer argues it is only after Galileo’s rejection of teleological science that the Pythagorean-mathematical element in Plato is opposed to Aristotelian physics and the two philosophers are set in fundamental opposition to each other. See Gadamer (1980), pp. 194–218.
- 33 See Aristotle, *Metaph.*, I.987a32ff, III.999b1–III.999b10.
- 34 Aristotle, *Metaph.*, VII, 4, 1029b13–1030a25. See D.C. Schindler (2006), pp. 357–367.
- 35 Gadamer notes that

One tends to think that at this point Aristotle abandons the sphere of the *logos* insofar as he views the *tode ti*, the “this here,” as the thing that really is and grants the *eidōs*, that which answers the question *ti esti*, only the function of a δευτερά ουσία, a secondary substance. The actual truth implied in this distinction is, as a matter of fact, the truth of the *logos*. When asked the question what “this here” is, we give the answer by stating its “what,” its essence, its *ti ên einai*. In short, the distinction between *tode ti* and *ti esti* or *eidōs*, which Aristotle is the first to make, reveals the ultimate meaning and structure of all speaking (1980: 199).

- 36 Emphasis original. Joe Sachs and Remi Brague each make a similar point.
- 37 Gadamer notes elsewhere that the concept “choriston” is patient of two senses in Plato and Aristotle:

On the one hand, it refers to a thing’s being separate and, on the other, to its consisting in itself (*In-sich-stehen*). If one starts with the latter, Aristotle’s deviation from Plato becomes understandable at once. It is not the ideas that consist in themselves but the *physei ontā* (things which are by nature), and, ultimately, the highest existent thing, god. For Plato, it is precisely these things that do not exist for themselves, but rather, only the ideas. The divine—like the good—is beyond being (*epekeina tes ousias*), in a sense that prohibits its being called an existing thing. For Plato, eidetic or noetic constructs, for example, numbers, lines, and so forth, are to be separated from phenomenal existence, not fused with it as the Pythagoreans held. For Aristotle, the *physei ontā* are inseparable from their *ti estin* (what-it-is). That is the meaning of his doctrine of primary and secondary substance (*ousia*). But that means, conversely, that the *eidōs* is not to be separated from its phenomenal appearance and, thus, that it is an *enbylon eidōs* (materialized form). And to this extent not only the *todi ti* (this whatever) but also the *ti* (what) is “separate” from all other *symbebēkota* (accidents). That, too, is a fundamental departure from Plato. What *methexis* is in Plato—a being together [*koinonia* (coupling)] of ideas, for example of human being and whiteness—is in Aristotle predication that refers to a subject, the *synholon* (underlying whole). Still, the question remains, despite these differences, is it not possible that what Plato truly intended becomes visible in Aristotle’s discussion, nevertheless—against the latter’s will, as it were? (1986: 132–133)

Gadamer sees Aristotle’s effect on the ideas as more of a clarification that draws subtly on Plato’s own position as suggested by the *Parmenides*, than a transformation.

- 38 Emphasis original.
- 39 D.C. Schindler continues,

[M]atter—understood as formed body—will always have a qualitatively determined nature, in one respect, even while it will remain in another respect open to higher determinations. Thus, in short, we do not speak of matter, simply, as a thing in itself, but always of the material principle of a particular being. The natural being as a whole is in each case the subject, the

fundamental reference point, in relation to which we are able to judge what in fact the material cause is. The material cause alone, without any reference to form or nature, would be simply unintelligible (2010: 25–26).

- 40 See Owens (1978), pp. 367–377 and Lear (1988), pp. 273–293.
 41 This, at least, is how I interpret Aristotle when he says that the “now” is a boundary that simultaneously divides and unites time (*Physics*, V.11, 22a5–22a27). One must interpret his explanation that time is a measure of motion in light of the fact that Aristotelian motion is itself a function of the more basic distinction between potency and act.
 42 On the meaning of Aristotelian teleology, see Sachs (1995), pp. 56–58 and Lear (1988), pp. 15–42.
 43 “*ho logos, ho tou ti ên einai.*”
 44 See Spaemann (1981), pp. 243–249 and Lear (1988), p. 61.
 45 See Aristotle, *On Generation and Corruption*, II, 10, 336b25–337a30.
 46 Mohan Matthen explains this when discussing the actuality of fire and Helen Lang’s assumption that the natural place of the elements constitutes their actuality.

But the actuality of fire is not a place such as the periphery of the sublunary sphere, but rather *being-in-that-place* (το που ειναι, [*Physics*, 8,4, 255b11]). This is an important distinction. A thing is actual when a certain predicable belongs to it actually. Places are not predicables. The importance of this distinction becomes clear when we consider the stary substance. Its actuality is not a place, but exercising a certain activity (rotating) in that place. (Being in a place takes more than merely being there!) Similarly the actuality of fire is not the periphery but being at rest there (2001: 171–199).

- 47 See Oliver (2005), pp. 156–190. We will take up the question of Newtonian motion in Part II.
 48 Aristotle defines motion as “the fulfillment of what exists potentially insofar as it exists potentially” (*Physics*, III.1, 200b25ff). See Lear (1988), p. 60.
 49 This is only partially true for Aristotle. To say that “nothing which is incidental is prior to what is *per se*” is to say that “no incidental cause can be prior to a cause *per se*.” In consequence, the intelligibility of violent motion as violent depends upon the natural motion of things possessed of nature, and barring impediments this motion can be expected eventually to reassert itself. An acorn, composed more of the “earthly element” would tend downward toward its natural place, not necessarily *qua* acorn, but *qua* earthly element or insofar as that element predominates (*Physics*, II.198a5–II.198a15).
 50 See Jonas (1974), pp. 54–65 and Duhem (1985), pp. 139–291.
 51 See, e.g., Nicolas of Cusa, *De Doct. Ign.*, II.11–II.12.
 52 I will reserve discussion of divine simplicity and infinity to later chapters. Suffice it for now to note David Bentley Hart’s helpful reminder that for Christianity, infinity and form coincide in Christ the image and word of the Father. See Hart (2003), pp. 125–151, 155–249. See also Sweeney (1992) and Duhem (1985), pp. 3–136.
 53 For a more detailed reconstruction of Aristotle’s argument, see Falcon (2005), pp. 57–62.
 54 Falcon points out that Aristotle himself never uses the expressions “fifth element” or “fifth body,” and that he is reticent to use the term *aiter* to describe it, given its association with the fiery element, referring to it instead as the “first of the elements” or the “first body” (2005: 10, n. 24). This distinction is crucial, Falcon maintains (113–121), for the material discontinuity between the terrestrial and celestial realms.
 55 See Falcon (2005), pp. 7–16, 85–121.
 56 See Funkenstein (1986), pp. 36–37, 303–307.
 57 See Owens (1978), pp. 1–68, for a fascinating history of the interpretation of the meaning of “being *qua* being.”

- 58 The phrase “extra factor” is from David Balme. John Cooper likewise faults Martha Nussbaum for being led astray by a “certain looseness in use of the expression ‘universal teleology of nature’” (1982: 219, n. 13). For an example of rapprochement between Aristotle and Darwin, see Balme (1987), p. 301. It is also telling that several of these authors take not the scholastic tradition, but Michael Ruse, Ernst Mayr, G.G. Simpson, and—in Randall’s case—Whitehead, Peirce, and Dewey for their interlocutors. So too is the fact that Nussbaum (1978: 66) has her Democritus generally acquit Aristotle of espousing his teleology “in a naïve, Panglossian, fashion,” a term of art in certain inter-Darwinian controversies.
- 59 See Nussbaum (1978), pp. 59–99 and Balme (1987), especially pp. 280–285.
- 60 Randall regards the *De Caelo* as a disaster, and writes off its “imaginative temper” as the “cocksure and bumptious” product of Aristotle’s youth (Randall 1960: 147–148). Balme essentially ignores *De Caelo*, other than to note the essential discontinuity between the celestial and sublunary spheres in order to liberate the latter from the former (1987b: 277).
- 61 Balme effectively does this by interpreting the whole of the Aristotelian corpus through his biological works and by the “genetic” thesis of Aristotle’s developments.
- 62 Emphasis mine.
- 63 See Sedley (1991), p. 193.
- 64 See Aristotle, *Metaph.*, XI.3, 1060b36–1061a7. See also Owens (1978), pp. 118–123.
- 65 Alan Gotthelf makes this point when he denies that Aristotelian organisms are ontologically or methodologically reducible to the sum of various “element-potentials.” I concur, but I would nevertheless wish to insist that something is analogously true of the Empedoclean elements themselves insofar as they are something at all. Gotthelf implicitly states as much when he says that elements “each have a nature and potentials” (1987: 204–242, esp. 212).
- 66 See Sedley (1991), pp. 179–196 and Furley (1989), pp. 115–120.
- 67 This is evident when Balme dismisses the notion that “nature” could be a metaphysical entity without ever explaining what he means by “metaphysical” or “entity” (1987a: 301).
- 68 This definition raises suspicions that she inverts the priority of form over matter and possibly substitutes a modern conception of positive matter for Aristotelian potency. These suspicions are not allayed by the words which her Aristotle speaks to Democritus in her fictional dialogue.

Thus when I criticize your material accounts for living beings, I do not mean to suggest that we want to explain their behavior on the level of form where form is distinct from, and seen in abstraction from, matter. I am distinguishing two levels on which we can give a material account: the level of ultimate particles, and the level of functional states (73).

- 69 The same question applies to a similar attempt by Falcon to secure a causal unity without having to attribute form to the *kosmos* as a whole (Falcon 2005: 14–16, 31–37).
- 70 The relevant passage is from *De Caelo*, I.9, 278a10–278a15.
- 71 Matthen is not alone in protesting the sort of accounts represented by Nussbaum and Balme or their interpretation of *Physics* II.8. See Sedley (1991), pp. 179–196; Furley (1989), pp. 115–120; Cooper (1982), pp. 197–222; and Owens (1968), p. 159, n. 173.
- 72 Failure to do this may be one reason why at least Nussbaum, who seems to concede that transactions of efficient causality are Humean events, fails to contemplate the sort of cosmological unity envisioned here (1978: 88). For Nussbaum, it is precisely the inadequacy of this form of causal explanation for intentional activity especially but also for functional states, that requires its supplementation by teleological forms. This seems to be one of the places where her Kantianism begins to show.

- 73 Lear is right to note (p. 31) that even this is not sufficient to distinguish between Aristotle and Hume. “What is at issue is a disagreement not only about causes but about *what constitutes an event*.” For Aristotle, events are not externally related punctual instances within a linear space–time continuum but are rather the *actualizing*, the activity of bringing forth and realizing, a potency. This is why the event of motion or change cannot be classified simply as a potentiality or as an actuality. See Aristotle, *Physics*, III.2, 201b25–201b33.
- 74 See, e.g., *Physics*, III.3, 202a15–20–202b25.
- 75 Our failure to see this is itself mediated by certain metaphysical conceptions of time, space, and contiguity.
- 76 It is significant, as Allan Gotthelf points out, that Aristotle “makes no use, and certainly no explanatory use, of the concept of law involved in the formulation of the problem” (of determining the relationship between the laws of action of organic phenomena and the laws governing the living organism’s material constituents) (1987: 209).
- 77 The crucial question, which we will take up in a different form in Chapter 8, is whether Aristotle’s understanding of form/soul as a kind of first actuality is adequate (*De Anima*, II.1, 412b1–412b5).
- 78 In their eagerness to deny a “universal teleology of nature,” Balme and Nussbaum each dismiss *Politics* I.8, 1256b16, where Aristotle says that nature “has made all animals for the sake of man.” This passage from *De Anima* complicates both the meaning of the passage from the *Politics* and the attempt to dismiss it.
- 79 “By a ‘sense’ is meant what has the power of receiving into itself the sensible forms of things without the matter” (Aristotle, *De Anima*, II.12, 424a14ff).
- 80 This obviously is why actual places, in contrast to Newtonian space, must be as heterogeneous as the things which occupy them and why it is possible to speak of “proper places” with distinct potencies for the things at home in them. See Casey (1998), pp. 50–71 and Duhem (1985), pp. 139–178.
- 81 The obvious exception to this is metabolic activity, in which food is assimilated or partly assimilated to the being of the organism.
- 82 Matthen criticizes standard interpretations of the so-called “cosmological argument” in *Physics* VIII (the argument from motion) that interpret the First Mover simply as the first member of a series. This fails to take seriously the fact that Aristotelian motion is a function of the more basic distinction between act and potency. (He rightly notes that Aquinas himself had spotted the problem with this sort of interpretation in *Summa Contra Gentiles* I.13.24.) Matthen maintains instead that “the motion proprietary to the universe has a special character: it is eternal and unremitting. Consequently, it requires a mover whose activity is also eternal and unremitting” (2001: 191–192).
- 83 A second crucial reason we have already discussed, namely, that the notion of causality as a communication of form makes every *per se* effect an image of its cause.
- 84 See Matthen (2001), p. 198.
- 85 Matthen’s translation. See Matthen (2001), p. 197.
- 86 David Sedley can plausibly maintain that

Rain *per se* may fall in order to return to its natural place; but rain falls *where and when it regularly does* in order to make plants grow. Grass *per se* grows in order to flourish as grass; but grass grows *where and when it does* in order to feed animals. A deer *per se* grows in order to become a mature deer; but deer grow *where and when they regularly do* in order to feed man (1991: 191).

- 87 For the distinction between elements and principles, see Schmitz (2007a), pp. 21–36.
- 88 Owens contrasts the Aristotelian and Platonic forms as something actual against something potential, “intelligences” rather than “intelligible.” While I would contest his

characterization of Plato, his treatment of Aristotle is nevertheless helpful for grasping the identity of form and act. See Owens (1978), p. 458.

- 89 See Owens (1978), p. 458. See also Matthen (2001), p. 171.
 90 Matthen, following Lindsey Judson, entertains some of the ways that the Unmoved Mover might be understood as an efficient cause without introducing potency into its “agency,” though this seems to me simply to indicate how final causality is necessary for an intelligible account of causality as such (2001: 192–196).
 91 See, e.g., Aquinas, *In Sent.*, II.1.1.2.
 92 For a similar understanding of Aristotle, see Owens (1978), pp. 457–458.
 93 The notion of necessity here needs to be qualified in light of Plotinus’ insistence (*Enn.*, III.8.3) that the second and third hypostases created not by lack but simply from the perfection of possessing their own essence. D.C. Schindler puts it thus.

A comparison with Hegel is helpful here: while Hegel begins with the concept of Being that is empty because of its universality, and thus must externalize itself in order to attain in reality the universality that is already in it logically, Plotinus begins with a principle that, as always-already prior to the distinction between poverty and fullness [V.3.15], externalizes itself (so to speak) not because it needs to, but precisely because it does not need to. Necessity implies a kind of heteronomy that makes no sense in relation to the One, to which of course nothing can ultimately be in fact *heteros*, and we must therefore affirm the production of all things by the One that is just as much an act of free will as an act of (inner) necessity [VI.8.18–20] (2005: 10).

- 94 See Plotinus, *Enn.*, VI.9.2, VI.7.14, III.8.11.
 95 With respect to the equation of being and life, it is significant that Plotinus *does* seem to revive the idea of the cosmos as an organism. See Plotinus, *Enn.*, III.2.7.
 96 Consequently, there is some justice in the diagnosis of David Bentley Hart, that “the infinite, then, is the ground of the finite precisely in that it is ‘limited’ by its incapacity for the finite; the One’s virtues are ‘positive’ only insofar as they negate, and so uphold, the world” (2003: 191).
 97 See, e.g., Ps.-Dionysius (1987), p. 645c, which is vulnerable to being interpreted this way.

In reality there is no exact likeness between caused and cause, for the caused carry within themselves only such images of their originating sources as are possible for them, whereas the causes are located in a realm transcending the caused...

- 98 This presents further paradoxes, however, which we shall take up in Part III.
 99 “I beseech you, my child, to look at the heaven and the earth and see everything that is in them, and recognize that God did not make them out of things that existed.”
 100 See, e.g., Origen, *On First Principles*, I, praef., 4.
 101 In recent decades, modern biblical scholarship has likewise begun to take greater notice of the theology which governs the appropriation of the Old Testament in the New. See, e.g., Hays (1989).
 102 See, e.g., Augustine, *De Genesi ad Litteram*, I.10. See also Tertullian, *Adv. Herm.*, 20.
 103 Hence,

Christian thought is from the beginning in a different position from Jewish. No longer the Old Testament as such, but Jesus Christ, is understood as the creative revelation of God. The Old Testament writings are applied to Christ, expounded in relation to him, and thereby Christian theology cannot remain “biblicist” to the same extent as the Jewish. From the interpretation of the Christ confession stems the dogma of the early Church. Thus the Easter faith forms the starting point of the formation of Christian dogma. The creation faith does not stand at the centre of the history of dogma in antiquity; it was one of those things which

in later centuries, when definitive dogmatic formulations had already been found for the doctrine of the Trinity and Christology, could still be handled with a certain speculative freedom (May 1994: 25).

104 I do not mean to suggest that these distinctions are parallel and equivalent of course. The distinction between Christianity and Judaism, elder brothers and bearers of the covenant which Christ fulfills differs in kind from the distinction between Christianity and Greek philosophy. Since our concern here is to articulate the significance of creation *ex nihilo* in philosophical or ontological terms, I have concentrated on the latter distinction. I will only note that the distinction, apropos of our discussion of distinction in Chapter 9, effects a differentiation and a unification as Christianity is announced and God's covenant extended "to the Jew first and also to the Greek" (Rom. 1:16).

105 See Justin Martyr, *Exhortation to the Greeks*, 20–33.

106 Notions of *ars* or *technē* would continue to be used as imperfect figures of creation.

107 On the Platonism of Hermogenes, see Waszink (1955), pp. 129–147. It is significant for the distinction between creation and *ars* that in the foreword and epilogue of his treatise Tertullian attacks Hermogenes for being a painter and alleges

that by delineating a condition of matter quite like his own—irregular, confused, turbulent, with a disordered, rash, and violent motion—Hermogenes has put on exhibition a sample of his art: he has painted his own portrait.

108 St. Athanasius would distinguish between creation and *technē* even more forcefully early in the fourth century.

But others, including Plato...argue that God has made the world out of matter previously existing and without beginning. For God could have made nothing had not the material existed already; just as the wood must have existed ready at hand for the carpenter to enable him to work at all. But in so saying they know not that they are investing God with weakness. For if he is not himself the cause of the material, but makes things only of previously existing material, he proves to be weak, because unable to produce anything he makes without the material...And how could he in that case be called Maker and Artificer, if he owes his ability to make to some other source—namely the material? So that if this be so, God will be on their theory a Mechanic only, and not a Creator out of nothing: if, that is, he works at existing material, but is not himself the cause of the material (*De Incarn.*, II.3–II.4).

109 Tertullian continues:

To recapitulate, then: Shall that very flesh, which the Divine Creator formed with His own hands in the image of God; which He animated with His own *afflatus*, after the likeness of His own vital vigour; which He set over all the works of His hand, to dwell amongst, to enjoy, and to rule them; which He clothed with His sacraments and His instructions; whose purity He loves, whose mortifications He approves; whose sufferings for Himself deems precious; (shall that flesh, I say), so often brought near to God, not rise again? God forbid, God forbid, (I repeat), that He should abandon to everlasting destruction the labour of His own hands, the care of His own thoughts, the receptacle of His own Spirit, the queen of His creation, the inheritor of His own liberality, the priestess of His religion, the champion of His testimony, the sister of His Christ! We know by experience the goodness of God; from His Christ we learn that He is the only God, and the very good (*Res. Carn.*, 9).

110 On matter as gift, see Tertullian, *Adv. Herm.* 5. In Chapter 1, he says of Hermogenes:

He does not seem to acknowledge another Lord, but he makes a different being of Him whom he acknowledges in a different way; nay, since He will not have it that it was out of nothing that He made all things, he takes from Him everything which constitutes his divinity.

- 111 See Irenaeus, *Adv. Haer.*, I.24.4, II.22.4, III.9.3, III.18.3.19.1; Tertullian, *de Carne Christi*, III, V.
- 112 On the metaphysical consolations of tragedy, see Hart (2003), p. 386.
- 113 This is not to imply that the victory, or even the meaning, of Nicene–Chalcedonian orthodoxy was immediate. It would generate new controversies that would last until the defeat of Monothelitism. See Balthasar (1988), pp. 29–80.
- 114 See Hart (2003), pp. 179–249.
- 115 Though Origen laid much of the groundwork for the later codification of orthodox Trinitarian and Christological doctrine, his “subordinationism” would damage his reputation from the mid-fourth century. Even so, he gives evidence of the ante-Nicene church’s understanding of this point.

Then again: Christ Jesus, who came to earth, was begotten of the Father before every created thing. And after he had ministered to the Father in the foundation of all things for ‘all things were made through him, in these last times he emptied himself and was made man, was made flesh, although he was God; and being made man, he still remained what he was, namely, God. He took to himself a body like our body, differing in this alone, that it was born of a virgin and of the Holy Spirit. And this Jesus Christ was born and suffered in truth and not merely in appearance, and truly died our common death. Moreover he truly rose from the dead, and after the resurrection companied with his disciples and was taken up into heaven (*On First Principles*, I, praef., 4).

- 116 See Maximus Confessor, *Ad Thal.*, 60.
- 117 See also *In Sent.*, II.1.1, a.4. We will examine this in greater depth in subsequent chapters.
- 118 It is necessary to put this distinction in these awkward terms in order to avoid giving the false impression that being (*esse*) is the object of creation and therefore a thing. We will take this up in more detail in later chapters that deal with creation in less historical and more speculative terms. See Walker (2004), pp. 457–480.
- 119 When this distinction takes on its mature form in the Middle Ages, it is largely as a function of reflection on the contingency of beings.
- 120 For instance, in commenting on Aristotle’s *Metaphysics*, he makes forms—the highest principle of actuality for Aristotle—potency with respect to the composite beings whose form they are. See Aquinas, *Metaph.*, VII, lect. 7, 1431.
- 121 This is to say that the *distinctio realis* was converged upon from directions at once: positively, through the Trinitarian and Christological debates; negatively, through the contingency of the world and its implications for the ontological structure of *ens*. More on this point in Part III.
- 122 On the Christian origins of the concept of person, see Spaemann (2007), p. 17 and Ratzinger (1990), p. 439.
- 123 I draw heavily here on Ratzinger (1990), pp. 441–449.
- 124 Spaemann makes this statement in reference to Plato. Obviously its application to Aristotle would have to be qualified in light of the differences between Plato and Aristotle noted above.
- 125 How can a person who stands by himself say, “let us make man in our image and likeness,” when he ought to have said, “Let *me* make a person in my image and likeness,” as someone who is single and alone for himself. If he were only one and single, then God deceived and tricked also in what follows when he says, “Behold, Adam has become like one of us,” which he said in the plural. But he did not stand alone, because there stood with him the Son, his Word, and a third person, the Spirit in the Word. This is why he spoke in the plural, “Let *us* make” and “*our*” and “*us*” (Tertullian, *Adv. Prax.* 12, 1–3, cited in Ratzinger 1990: 442).

- 126 On the distinction from Plotinus, see Spaemann (2007), pp. 23–27.
- 127 Put more concretely, the first person does not generate in the sense that the act of generating a Son is added to the already complete person, but the person is the deed of generating, of giving itself, of streaming itself forth. The person is identical with this act of self-donation (Ratzinger 1990: 444–445).
- 128 Numerous qualifications are required of course, when speaking this way of the Trinitarian *personae*. St. Augustine, e.g., explicitly forbids treating God as “a subject in relation to His own goodness,” on grounds that this compromises divine simplicity (and therefore ultimately, transcendence). See Augustine, *De Trin.*, VII.5.10.
- 129 This is how Ratzinger interprets the Boethian definition (1990: 448).
- 130 The relevant passage from Richard is *De Trin.*, 4, 6, 24. The original definition is *spiritualis naturae incommunicabilis existentia*.
- 131 We will develop this idea more fully in Part III.
- 132 This is exhibited most dramatically in the *Confessions* of St. Augustine.
- 133 On Christ as the “measure” of the God–world relation, see *Ad Thal.*, 60, 75–76.
- 134 See Honorius of Autun, *Liber XII Queast.*, ii, translated and quoted in Chenu (1997), p. 8.

I say the notion was never really extinct, as it is quite evident, for instance, in the influential work of Ps.-Dionysius’ from the fifth or sixth century. See, e.g., Ps.-Dionysius (1987), pp. 693b–713d.

- 135 On further senses of the term nature, see *Didasc.*, I.x.
- 136 The fulfillment, in object and in mode, of every *scientia* in *scientia divina* is seen from below precisely as the other sciences’ hermeneutical incompleteness. The truths of the *physicus* or the mathematician can never be fully grounded in their exponents. This is because they contain terms which cannot be grounded except in the highest *scientia*. Does this mean that physics is not a *scientia*? On the contrary, it is precisely as a *scientia* that it enters the hierarchy in *via* to metaphysics. But is physics finally absorbed into metaphysics? On the contrary, it cannot be absorbed precisely because of the differences in object and in mode and in its own demonstrative character. The members of the hierarchy of *scientiae* are not homogenous elements in a single text. They are, rather, discourses in their own right which participate finally in the first member of their hierarchy. It is, at once, their ground and their completion (Jordan 1986: 82–83).
- 137 Emphasis mine.

The multiplicity of these senses does not produce equivocation or any other kind of multiplicity, seeing that these senses are not multiplied because one word signifies several things; *but because the things signified by the words can be themselves types of other things* (Aquinas, *ST*, I.1.10, ad.1).

- 138 The subordination of philosophy, of course, includes the subordination of the other sciences understood as the “parts of philosophy.”
- 139 See Oliver (2005), pp. 51–84.
- 140 See Fabro (1950) and Fabro (1961). See also O’Rourke (2005); te Velde (1995); Jordan (1992); Candler (2006); and Hankey (1987). I concur with Adrian Walker that a proper understanding of *esse* as *completum et perfectum sed non subsistens* allows one to accord a certain priority, by turns, to both the Aristotelian and Neoplatonic dimensions of Aquinas’ thought. But this is a matter for later. See Walker (2004), pp. 457–480.
- 141 See O’Rourke (2005):

Being is the primary and ultimate object of knowledge; existence grounds all cognition. It is the foundation and horizon of the intentional order. What it is for something to be a cause

is understood only because it is first affirmed that it is. *Quia est* is the first fruit of knowledge; *aliquid est* is the foundation and primary principle of all cognition: being is, and must be affirmed. Being is the cradle of all meaning and from it emerges the intelligibility of all subsequent objects of thought. To a phenomenology of desire, being is revealed, moreover, as the primary goal of all pursuit. Existence, implicitly, is what is first sought by all things, a fact witnessed by the impulse of all things towards self-preservation and the actualization of what is possessed in potency. Being thus has the nature of a good as final cause (112–113).

- 142 Aquinas, *ST*, I.1.10. On the spiritual sense of Scripture and its relation to the literal, see de Lubac (2000), pp. 11–84, and of course his four-volume masterpiece, *Medieval Exegesis* (1998). For treatments of the effect of Thomas' understanding relevant to our purposes, see Funkenstein (1986), pp. 50–57 and Harrison (1998), pp. 28–38.

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Part II

The Eclipse of the Universe

What is love? What is creation? What is longing? What is a star? Thus asks the last man, and he blinks.

Friedrich Nietzsche
Thus Spoke Zarathustra

3

The Scientific and Theological Revolution

The universe is an inherently metaphysical idea because the unity of the universe is a unity of *being-as-act*. If the Christian doctrine of *creatio ex nihilo* represents a fulfillment of this Greek insight, this is due ultimately to those Trinitarian and Christological doctrines which are its foundations and with which it grew to metaphysical maturity. The Incarnation of Christ disclosed a God at once nearer and more remote than that of the Greeks and was indeed both for the very same reason: being no part of any cosmic monism, this God was so wholly other as to be able to become “nonother” in Christ without diminution of his divinity or negation of his humanity (Balthasar 1990: 193). This God, transcendent beyond Greek imagination, introduced a contingency in creation beyond Greek imagination, a contingency not simply with respect to the arrangement of forms comprising the world but with respect to its very *act of being*. But this meant, positively speaking, that gratuity and novelty were intrinsic to the very structure of being; indeed we shall see in Part III that in one of its principal senses, “creation” is just another name for this gratuitous structure. The “*distinctio realis*” between being and essence, as it would come to be called, bears the weight of this insight in both its positive and negative dimensions, underscoring both the nonnecessity of things existing according to diverse natures and the existential excess of those things to their natures. It is this that allowed Christianity to overcome the Greek ambivalence over difference and to articulate a more profound understanding of the cosmos as a unity, while preserving—indeed deepening—the distinctness of its constituents.¹

The scientific revolution, which began in the seventeenth century and has not ceased, was born within this achievement but has proven to be its undoing.² This is not to deny the success of this perpetual revolution in increasing the *extent* of our knowledge and our capacity for manipulating nature to our ends. This success is nothing short of stunning, and it has given us insights into objects whose existence could not even have been imagined. Yet, this increase in reason’s power

has come about, to a great extent, by limiting its scope. It therefore represents a partial abandonment of reason. Accordingly, this astonishing success has come at the cost not only of a coherent grasp of the Creator God but a coherent cosmology inclusive of its own intelligibility and an order of wisdom into which the sciences can be coherently integrated. This chapter will explain these claims by considering the metaphysics and the corresponding view of reason and truth inherent within the scientific conception of nature at its origins. These basic conceptions would later exercise a strong influence over the shape of Darwinian biology which brings them to their logical conclusion, and they continue to form the basic theological and metaphysical constitution of the sciences despite great advances across the sciences and despite the evolution of most if not all of its core physical concepts.

The Seeds of Revolution

The scientific revolution is not just a revolution from without; it owes a great deal both theoretically and historically to a quieter revolution from within. Christian metaphysical cosmology first began to be undermined from within during the late Middle Ages and the Renaissance, not least by attempts to clarify the meaning of the contingency which Christianity had introduced. The difficulty in the Christian assimilation of Aristotelian physics and metaphysics is that certain Aristotelian theses—the eternity of the world, for example—appeared to place *a priori* limits on the scope of divine freedom.³ This led to the formalization of a distinction latent within the tradition between *potentia dei ordinata*, what God in his freedom has in fact ordained, and *potentia dei absoluta*, God’s absolute power. And it enabled the schoolmen to “enlarge as far as possible the horizon of that which is possible to God without violating reason” (Funkenstein 1986: 122). The construction of counterfactual scenarios such as whether God could have created a better world or other worlds was elevated to an art form, although no one yet thought these possible worlds commensurable with this world or thought to employ these scenarios as “limiting cases” for discovering the laws governing the actual world (1986: 154).⁴

We may make two initial and very general observations about this. First, the tacit identification of divine freedom with unqualified *potentia*—a notion with deep roots in Stoicism that would have profound influence over Descartes and Newton—involves a double abstraction.⁵ It abstracts the possible order from the actual order manifest in history, though this does not prevent the latter from limiting the former in greater and lesser degrees.⁶ This “reification of the possible” accords possibility of a quasi-ontological status and makes the realized order just one of so many “logical possibles” that follows inscrutably from it (Funkenstein 1986: 150). It also abstracts the question of divine freedom, strictly considered *as freedom*, from the divine nature of triune love revealed historically in Christ, as well as its corollary, the convertibility of goodness, beauty, and truth in God’s triune essence.⁷ This is an important moment in the history of the concept of “power,” both divine and creaturely.⁸ Second, and consistent with our principle that conceptions of God and nature are correlative, this or any other

conception of divine freedom will have its corresponding effect upon how the world is conceived. The very possibility of “*other* worlds” signals some loss of recognition that the world is not fundamentally a collection of *things* to which other such collections could always be added, but a unity of being (*esse commune*) which would include by definition any further additions even where commerce between them was lacking or impossible.⁹ To forget this is to take one step toward conceiving of the unity of the universe as a unity of aggregation.

This collapse of this achievement is most dramatically evident in the thought of William of Ockham, who helps to inaugurate the *via moderna* (Gilson 1955: 489–499). Ockham insists as a matter of faith that God never does anything inordinately or without wisdom and goodness, and he acknowledges that the Aristotelian “world-picture” is more or less applicable as a matter of logic (Ockham, *Quodl.*, 6.1). Ockham nevertheless appeals to the absolute power of God for his “principle of annihilation,” which he invokes again and again to reduce the forms, relations, and qualities making up the edifice of scholastic metaphysics to mere concepts, on the one hand, and to reduce the external world to a collection of singulars known as “absolute things,” on the other. “[E]very absolute thing that is distinct in place and subject from another absolute thing can by God’s power exist when that other absolute thing is destroyed” (*Quodl.*, 6.6). Gilson sums up the positive inverse of this principle: “every positive thing existing outside of the soul is by that very fact a singular” (1955: 490). Ockham therefore denies the real distinction between essence and existence because if they were really distinct, each would have to be an absolute thing, and if they were absolute things, “God, being omnipotent, could produce the one without the other” (Maurer 1999: 132).¹⁰ *Esse* ceases even to be a proper accident; rather *esse* and *essentia* become merely different ways of referring to the same *res* (1999: 57–62). This is a significant blow to the notion of *being-as-act*, and it is therefore no accident that Ockham “liberates” matter from its relation to form and considers it actual in its own right. This is true even of prime matter, now particularized to singularities (Ockham, *Sent.*, 1d.2q.6Q.).¹¹ This will prove to be a monumental step.

Qualities, universals, and relations, including the relation to God which for Aquinas constituted creation, suffer the same fate as *esse*.¹² Denied any ontological foothold, each becomes a mere concept, a conventional way of referring to singulars either directly and properly (denotatively) or indirectly, abstractedly, or confusedly (connotatively). This fundamentally alters the principal debates of the age, for example, the controversy between Thomists and Scotists over individuation, because it undermines their shared presuppositions at a most basic level.¹³ The difference between Ockham and his predecessors is not that Ockham’s world is more contingent than theirs. “It is rather a difference in the *meaning* of contingent orders and things” (Funkenstein 1986: 135). Only singulars exist. Universals are merely names or concepts. The cosmological implications are immediately obvious. “Now a ‘world of singulars’, in which nothing general exists, is also a world of completely separated individuals each of which can exist apart from any other one” (Gilson 1955: 490). For Thomas, the world is one because “things are structured in a mutual order (*ordo ad invicem*)” and are “ordained toward each other (*quaedam ad alia ordinantur*)” (Funkenstein 1986: 142). At the deepest level, this was a function of the act of being, and this “ordination” is particularly evident in that efficient causality wherein the

actuality of each thing implicated the anterior order of the world. This is why a plurality of worlds like ours was impossible: belonging to a proper place, for example, was part and parcel of what it meant to be a thing. (It is also one reason why Aristotelian philosophy was slow to realize a fully experimental science.)¹⁴ And it is why the very notion of an “absolute thing” made even less sense in Thomistic terms. To preserve a thing while destroying the world that is its essential presupposition was tantamount to a violation of the principle of noncontradiction. Thus, “for Thomas, ‘the world’ meant, first and foremost, the unity and cohesiveness of its structure” (1986: 143). This order and cohesiveness was intrinsic to it, a consequence of the fact that all things in creation are uniquely themselves through their participation in *esse commune*. “For Ockham it was derived from the brute fact that it is one aggregate,” held together, as it were, by the power of God (143).¹⁵

There are any number of things we could say about this, both philosophically and theologically. I will confine myself to a handful of interrelated points which bear on the future development of natural philosophy, our principal concern in this chapter. The first thing to note is that while Ockham’s nominalism ostensibly valorizes singularity over universality, in fact, it abolishes singularity precisely *because* it abolishes universality. For in the absence of real generic and specific difference, each singular becomes utterly equivocal and thus “formally” identical to every other as an opaque *x*. This has far-reaching effects for both philosophy and theology. As Funkenstein points out, the destruction of forms and universals ruled out in advance any *adaequatio rei ad intellectum* mediated by intelligible species: “there is no similarity or identity between concepts and things” (1986: 144). There can only be a causal dependence between cognition and its objects.¹⁶ Yet with form reduced to the status of a concept, causality itself ceases to be a matter of communication of form between cause and effect, as it had been for Plato and Aristotle, and becomes instead a production of “power,” which reveals nothing of the nature of its source.¹⁷

There is no criticism of the notion of causality in the doctrine of Ockham. To him, causality is given in sense intuition together with substances and their qualities. Only, for the same reasons as above, this is all we know about causality. Since no real thing participates in the nature of any other real thing, the simple intuition of a thing cannot give us any knowledge, either intuitive or abstractive, of the nature of another thing which we have not perceived before by sensation or intellection. How do we know that a thing is a cause of a certain effect? Simply by observing that when that thing is present what we call its effect habitually follows (Gilson 1955: 496).¹⁸

Nominalism thus lays the ontological foundation for the seventeenth-century dualism between so-called primary and secondary qualities (so named by Locke in the eighteenth century) and for the reformulation of efficient causality in terms of force, though I do not wish to suggest that nominalism is the only source of this transformation.¹⁹ The foundation is also laid for the separation of faith and reason, and for the same reasons.²⁰ Because causation is no longer a matter of communication of being and form, there being no form or universality to communicate, causal dependence reveals nothing of the nature of causes. Divine omnipotence, which

eliminates form and universality, eliminates the mediation of being in disclosing anything of God. This effectively brings to an end the symbolic cosmos of the patristic and early medieval periods, which had already been tempered to a great degree by the reintroduction of Aristotle, and it paves the way for the homogeneity of nature and the univocity of logic that would become ideals in the seventeenth century.²¹ Though Ockham of course affirms that God is one (and three) as a matter of Christian faith, he denies that even the unity of God is rationally demonstrable (*Quodl.*, 1.1).²² The omnipotent God on whose will all things depend becomes utterly adventitious to a rational, that is to say, a logically coherent grasp of the world, even as his power helps to reduce rationality to logical coherence. But there is a further irony to all of this. Ockham eliminates universality, even from God himself, in order to secure this omnipotence from all “the philosophical necessitarianism of Aristotle, Avicenna, and Averroes” (Gilson 1955: 498).²³ In so doing he reduces being from an actuality proper to God and gratuitously participated in by creatures to a mere “concept” univocally applicable in the predication of names. But inasmuch as what properly bears the name is a singular, “God” himself is reduced to another singular—a fact—juxtaposed to the world, an object at once finite and inscrutable. This will become apparent in the seventeenth century, as the passion for univocation is brought to bear on both poles of the God–world relationship, and as the analogy of being, which secured not only the world’s likeness to God, but God’s ever-greater unlikeness, is still more deeply forgotten.

Ockham and his disciples would remain influential through the Protestant Reformation and its *theological* insurrection against Aristotelian nature. Nevertheless, I do not intend to overstate his importance in bringing about the marginalization of scholasticism or to suggest a neat genealogy linking Ockham directly to the architects of early modern science. It is enough that Ockhamism shaped the ambient scholasticism of the seventeenth century. There seem to have been no scholastic philosophers in the seventeenth century, for instance, who argued against a possible plurality of worlds. And the standard scholastic argument against the void appears as an amalgam of Thomistic and Ockhamist reasoning. There is no void because of the interconnectedness of nature, but “God’s ability to produce a void—for example by annihilating the sphere of fire or air and not substituting another body for it—cannot be denied” (Ariew 1999: 161). And Suárez, losing his grip on Aquinas’ understanding of analogy and believing that Thomas had attempted to prove God’s ubiquity by physical argument, “reads Thomas like a Nominalist even while defending him” (Funkenstein 1986: 63).

The new natural philosophy of the seventeenth century permanently upended the Christian Aristotelianism in which the doctrine of creation had found its most rigorous philosophical expression. But we do best if we recognize that continuity and innovation are not disjunctive, as Funkenstein put it, that this revolution did not fall like light out of the darkened medieval sky. “The new,” he writes, “often consists not in the invention of new categories or new figures of thought, but rather in a surprising employment of existing ones” (Funkenstein 1986: 14). Indeed, historians of philosophy and science in the twentieth century made a virtual (and often competitive) industry of tallying up early modern science’s debts to its scholastic predecessors as well as to a resurgent Neoplatonism, and we shall see that many of the themes we

have highlighted in Ockham prefigure similar themes in Galileo, Bacon, Descartes, and Newton, whatever the historical lines of influence might have been.²⁴ These architects of modern science succeeded, nevertheless, in radically transforming their inheritance and revolutionizing the very “ideas and ideals” of science: transforming not simply the content of scientific knowledge but what is thought possible and worthwhile to know (1986: 18–22). Indeed, we may go deeper and say that these new philosophies of nature transformed both what knowledge and its object—truth—were taken to consist in, a consequence, we shall see, of a radical, if often tacit transformation at the level of being.

To see the depth of this revolution and to see its debts to the scholasticism which it replaced is to see that the scientific revolution was a theological revolution as well. Amos Funkenstein notes that the new “secular theology” that emerged with the philosophies of nature in the seventeenth century was unique in theological history in several respects.²⁵ It was practiced by laymen and was largely divorced from properly dogmatic or ecclesial concerns. Its goal was not contemplative in the traditional sense, even if Newton thought it “a part of natural philosophy” to “treat of God from phenomena,” but neither was it practical—that is, moral—though Newton was a rigorous moralist and Descartes and others sometimes dabbled in moral theory (Newton 1999: 943). Its “practicality” was of a different order; its aim according to Bacon was to remedy the effects of the fall by making us, in Descartes’ words, “the lords and masters of nature” (*Discourse*, CSM I, 142–143).²⁶ This meant univocally extending this new theology into domains and problems such as the nature of space, often in violation of the traditional distinction between primary and secondary causality, where the older, speculative theology had heretofore only had the remotest, analogical applications.²⁷

For all intents and purposes, this meant unthinking the orthodox doctrine of God. To be sure, many of the architects of early modern science were pious men, and all of them continued to affirm the doctrine of creation as a matter of faith. Not all of them rejected the doctrine of the Trinity or nursed secret Socinian heresies, as Newton apparently did.²⁸ Nor did they all engage in radical (and radically self-serving) interpretations of the Old Testament, as did Bacon and Hobbes. Descartes simply exalted these sublime matters of faith into irrelevance. But each interpreted this doctrine, to the extent that he found it necessary, in the light of the ontological assumptions of his own natural philosophy. The philosophical effect in every case was to outfit the basic physical and metaphysical terms inherited from the tradition—terms such as form, matter, being, cause, motion, body, entity—with new meanings, and the theological effect in every case was the same: to render the Incarnation and God’s triune essence utterly adventitious to his relation to the world. This was not coincidence but necessity given the goals which the new science set for itself. If *natura* was to be brought wholly within the purview of a *mathesis universalis* or made fully transparent to experimental reason, if art was to triumph over nature, in Bacon’s famous phrase, then the cosmos of Greek philosophy and the creation of Christianity would have to be destroyed and rebuilt (2000: I.118). Not only the *physis* of Aristotle but the God of Christianity would have to be unthought and reinvented. Modern science, in its most basic ontological judgments, is predicated upon this reinvention.

Nature Imitates Art: The Ontological Foundations of Modern Science

One runs the risk of oversimplification in speaking of *the* ontology of the scientific revolution, as if the diverse thinkers of the seventeenth century comprised one great natural philosophy. Certainly there were real and substantial disagreements between them. Bacon, though he praised Galileo's telescope, distrusted his mathematical *a priori*ism (and heliocentrism) (2000: I.46, II.8, II.46, *prep.*, VII). Bacon's disciple, Thomas Hobbes, objected to Descartes' dualism, his *a priori*ism, and his doctrine of ideas, and proceeded in his own work on materialist terms (Descartes, *Replies*, CSM II, 121–137). Newton objected to Descartes' equation of matter and extension and to his theory of vortices, arguing that it rendered motion unintelligible and culminated in atheism (1962: 122–156). Despite these and other differences, it is nevertheless possible to abstract a number of common ontological judgments that would form the permanent metaphysical inheritance of subsequent science.

These judgments spring from a common root. One simply cannot understand the metaphysics of modern science without recognizing the extent to which the architects of early modern science were united in insurrection against the Aristotelianism of the schools, however much they may have been indebted to the work of the *Calculatores* or to medieval impetus theory and however much they continued to employ scholastic terminology or to address problems framed by scholastic presuppositions.

There is nothing sound in the notions of logic or physics: neither substance, nor quality, nor action and passion, nor being itself are good notions; much less heavy, light, dense, rare, wet, dry, generation, corruption, attraction, repulsion, element, matter, form, and so on; all fanciful and ill-defined (Bacon 2000: I.15).

Here Bacon does the honors, though one can find identical sentiments—albeit sometimes phrased more delicately—in Galileo or Descartes.²⁹ We should reiterate that Bacon in his preface to *The Great Renewal* had already redefined “the true ends of knowledge” as being “for the uses and benefits of life” (2000: 13).³⁰ This is a foundational point, not only for understanding Bacon and the metaphysical meaning of the scientific revolution but for understanding the broader arguments of this book and the metaphysical depth at which a proper engagement between science and the theology of creation must take place if it is really to occur at all. Bacon was well aware of the radical character of his proposal to expand reason's power by restricting its scope.³¹ His bid to replace Aristotle's *Organon* was not merely an offer of a better method of induction but a root and branch reconception of science, its aims, and its objects.³² (Descartes, too, saw himself as the author of a “practical philosophy” which would supplant the “speculative philosophy” of scholasticism.)³³ The goal here proposed is a radical departure from the traditional end of contemplation, as Bacon repeatedly reminds his readers. And it contains within itself a new conception both of knowledge itself, of truth its object, and ultimately of being as such. The new conception of knowledge is summed up in his famous equation of knowledge and power, though it remains to be seen what this means (*praef.*, 6, I.3, I.116, II.4). Truth is no longer the grasp of being itself, *what is*, but comes to be equated with

utility (I.124, II.4). This is why “nature reveals herself more through the harassment of art than in her own proper freedom” (21).³⁴ The rationality of science will henceforth be judged by its success in predicting and manipulating nature for human betterment, and most of all, as Bacon puts it, by its *products* (praef., 6, 13, I.56, I.71, I.73, I.85, I.109).³⁵ Reason and its objects have become essentially technological.³⁶ Whenever contemporary scientists justify the *truth* of their claims by appeal to *results*, it is a sure sign that this Baconian vision remains in force.

We will have a great deal more to say later in the chapter about this conception of science and its implications for the nature of knowledge and truth, as well as what it implies for the meaning of being, but it is important for the time being to keep this point provisionally in mind if we are to grasp the full meaning of the seventeenth-century overthrow of Aristotle. To gain theoretical and experimental control over phenomena, the sciences must reduce their objects to the “simple natures” out of which things are composed. Versions of these simple natures—particles, in Bacon’s view, corpuscles in Descartes’ and Newton’s—are common stock among the natural philosophers of this period, owing perhaps to their common if often critical affection for Democritus.³⁷ In order to arrive at these simple natures, the world of Aristotelian forms and qualities would have to be systematically demolished.³⁸ The sciences would need “a form of induction which takes experience apart and analyzes it” (Bacon 2000: II.5–II.8, 17). The difficulty consists in the fact that Aristotle’s philosophy, like Plato’s, had given ontological expression to the elementary experience through which we necessarily encounter the world: as an intelligible whole comprised of intelligible wholes. This is why Bacon catalogs this philosophy among the idols, which are notoriously difficult to exorcise, though as an idol of the theater, Aristotle’s philosophy would offer less resistance than those innate idols of the tribe and the cave. We have already mentioned Galileo’s admiration for the fact that Aristarchus and Copernicus were able to “commit rape on the senses” in order to make them the “mistress of their belief” (Galileo, *Discourse*, 3, 381). And Descartes, as we noted in Chapter 1, acknowledges that it is “hardly possible” to refuse the sensory inputs through which the world was heretofore understood to communicate itself (Descartes, *Meditations*, III, CSM 2, 24).³⁹ This, presumably, is why he undertakes the most dramatic effort to reject them.

Bacon’s is a new method of induction ostensibly hostile to *a priori*ism. In his view, “natural inquiry succeeds best when the physical *ends* in the mathematical” (Bacon 2000: II.8).⁴⁰ He chafes at the subordination of natural philosophy to metaphysics and proposes to justify the former simply by its practical success (2000: I.80, I.89). Descartes, by contrast, proposes a new method for discovering a basic principle from which to deduce the fundamental laws of nature.⁴¹ There is less to this contrast than meets the eye. We discussed the formal and material impossibility of either a pure *a priori* or a pure *a posteriori* metaphysics in Chapter 1; each, we saw, is always already inherent in the other. This is apparent in Bacon, whose reconception of the sciences already entails his equation of truth and utility and his own nominalism and corpuscularianism. All of this lies at the origin, not the end of his program. The same is true of Descartes. Quite apart from the fact that he arrives at his fundamental principle by the negative induction of the *epoché*, the interconnected theses of divine voluntarism, nominalism, and corpuscularianism are presuppositions not conclusions of his philosophy. They make his hyperbolic doubt possible in the first place.⁴² (And

these are far from the only or even the most subtle of the conclusions which Descartes presupposes.)⁴³ Nevertheless, given the putative difference between their stated objectives, it is presumably enough for Bacon to fault Aristotle for failing to succeed by his own new criteria, relegate his forms to the idols, and get on with the business of analysis. On occasion (especially, one is tempted to suggest, when it is politically risky), Descartes takes a similar approach.⁴⁴ Though Descartes does attack the notion of substantial forms directly on a number of occasions, in the *Meteors* he says that he does not reject or deny substantial forms, only that they are unnecessary for his explanations.⁴⁵ This is evidence that the very meaning and end of explanation have changed for Descartes no less than for Bacon.

Descartes is nevertheless committed not only to a *mathesis universalis* like Galileo and Newton and thus to a certain mathematical *a priorism*, although we should note that this represents a profound transformation in the meaning of number and mathematics.⁴⁶ He is also committed to justifying this commitment as a matter of first philosophy; though here again, the difference is less than meets the eye. Descartes redefines the very meaning of metaphysics to fit his new dualistic conception of substance as *res extensa* and *res cogitans*. No longer understood as the science of being *qua* being, metaphysics now treats “the principles of all *knowledge*” (Descartes, *Principles*, CSM I, 186). In this way metaphysics was to serve as the root of “the tree of philosophy,” whose “trunk” is physics and whose branches would become the so-called applied sciences (Descartes, *Principles*, CSM I, 186). In practice, however, dispensing with being allows physics or natural philosophy to ascend to the position of first philosophy—an ambition championed by Bacon—with epistemology, whose principal purpose is to make the world safe for physics, as its handmaid. This is perhaps one reason why it has proven so easy to detach modern scientific practice and its materialist ontology from the voluntarist theology which gave it birth.

This theology is far from incidental to the emerging concept of nature. Relying on a voluntarist notion of divine omnipotence, Descartes invokes a variation of the “principle of annihilation” to launch his radical *epoché* in order to arrive at the indubitable foundation from which to reconstruct the world from the “clear and distinct” ideas of mathematics.⁴⁷ Newton, would likewise invoke a variation of this principle against Descartes to distinguish body from extension.⁴⁸ It is only the possibility that there is a *deus malignus*, that God might be a deceiver, that warrants Descartes’ hyperbolic doubt of the otherwise indubitable, and we shall see that a radically voluntarist (and ultimately finite) God is essential to the Newtonian conception of nature as well.⁴⁹

Let us nevertheless defer these theological considerations until the ensuing section and consider this emerging concept of nature in its metaphysical meaning. Inasmuch as essence and existence are a genuine polarity, in Balthasar’s sense “that the poles, even as they are in tension, exist strictly through each other,” the elimination of one pole entails the elimination of both (2000: 105). *Neither form nor being is a good notion*, Bacon says. The elimination of form is thus first and foremost a reduction of being from *act*, which is incommunicably interior to each thing and common to all things to brute facticity, *positiva*, in Bacon’s terminology (Bacon 2000: I.48, II.48, II.14). And Descartes, we have said, has already reduced being to substance, either extended or nonextended. Descartes has no use for a *distinctio realis* between *esse* and

essentia, redefining it instead as a distinction between substances (*Principles*, I, 60, CSM I, 213).⁵⁰ This reduction of being to the facticity of substance is crucial. One will recall that because it was proper and common at once, *esse commune* implicated things in the anterior order—the single actuality—of the world in the very act by which they were distinguished from it. The reduction of being from act to fact returns us to the world of Ockham’s “absolute things.” It allows one to separate in thought what exists together in reality, to grant analysis priority over synthesis, and to accord the analytically abstracted parts of reality, however they are conceived, ontological primacy over the wholes from which they were abstracted. This reduction of the single actuality of the cosmos to an aggregation is part of what we meant when in Chapter 2 we said that science is predicated upon the destruction and fragmentation of the Greek cosmos. This process began in the high Middle Ages. Yet, unlike the scholastics of that era, for whom “possible worlds” were never compossible with the actual world, for the architects of early modern science, this counterfactual world of abstracted singularities which never actually exists becomes the theoretical and ontological *basis* of the actual world, which is now a second-order phenomenon “constructed” from the counterfactual.⁵¹ Thus, each of the principal figures we are discussing proceeds to reconstruct the real world from the “simple natures” separated through analysis: Bacon, by “adding together” the phenomena cataloged in his histories and tables of presence; Descartes, by mathematically reconstructing the world reduced to matter and motion by hyperbolic doubt according to the clear and distinct ideas of mathematics; and Newton, by conceiving of the world as the product of countervailing forces diverting bodies from their inertial tendencies.⁵² The problem, as Husserl recognized, is that this reconstruction never adds back up to the original whole.⁵³

There is still one more step that must be taken in order to complete this reduction. Eliminating substantial form and the act of being meant eliminating the distinction between act and potency as well which liberated, matter from its inherent relation to form. Aristotle had accorded form a certain priority over matter because every *actual* material thing was always already a something, formally determined. Matter as such he regarded as unintelligible. Matter was thus a relative term, and matter stood to form as potency to act (Aristotle, *Physics*, II, 194b10). With the reduction of being from act to facticity, matter becomes positive and actual in its own right prior to and outside of form, which is now consequent upon it. The positivity of matter and its independence from form, which now has no ontological toehold, is a persistent and fundamental feature of all modern permutations to the concept of matter, whether in a physics of forces or a physics of energy, and it is one essential reason why modern matter in all its forms remains essentially mechanistic in spite of claims to the contrary by emergence theorists and others.⁵⁴ Descartes identifies this matter with nature itself (Descartes, *The World*, 7, CSM I, 92). We have already alluded to the varieties of “corpuscularianism” that gained such prominence in the seventeenth century. To Bacon, Descartes, Hobbes, and Newton, we could add Huygens and Boyle as proponents of this view.⁵⁵ There are differences among these and other seventeenth-century thinkers, to be sure, differences over whether to identify body with mass or extension, differences over whether the corpuscles were divisible or impenetrable, differences over the possibility of movement in a void.⁵⁶ Yet in spite of these differences, it is possible to identify a common “essence” underlying these diverse formulations.

This positive matter is contradistinguished from form by being emptied of everything—quality, immanence, *intrinsic* intelligibility—that heretofore characterized form.⁵⁷ It is, as René Guénon describes pure quantity, “the ‘residue’ of an existence emptied of everything that constituted its essence” (1953: 13). Matter, henceforth, stands essentially outside of form, and thus outside of intelligibility or meaning.⁵⁸ It is hard to overstate the significance of this new understanding. It amounts to a renunciation of the world (and thus of cosmology) “defined as the totality of that which is given to the mind, without any *a priori* exclusion of the conditions it requires in order to be understood” (Gilson 1965: 447). Those conditions are now conditions of ontological unmeaning.

What is left of this “residue,” then, is sheer abstract externality typified, for Descartes, by the line: the capacity for occupying space to the exclusion of any other quantity of matter. This makes matter homogeneous, as Galileo had argued in unifying celestial and terrestrial mechanics.⁵⁹ It is this externality, this property of occupying space that is matter’s “true form and essence,” a paradoxical idea seeing that quiddity has just been eliminated (Descartes, *The World*, 6, CSM I, 92).⁶⁰ What it means is that matter is now what is *essentially measurable*. Measurability, rather than the being-in-itselfness of quiddity or *esse*, now constitutes its very essence. These essential characteristics of externality and measurability are deeper, as it were, than the dichotomy between inertia and activity, and they persist in all subsequent conceptions of matter (or their functional replacements) even as matter comes to be conceived in terms of energy and as self-organizing and even as space is reconceived so that it is no longer simply the receptacle that matter “occupies.”⁶¹ What has fundamentally changed, rather, is the mathematical and technical sophistication of our measurements.⁶² Contrary to that received wisdom which credits this cold, objectified conception of matter with vanquishing anthropomorphism, a more anthropomorphic conception of matter can hardly be imagined.⁶³ For it effectively reduces the real world to our capacity, in principle, to measure it. “[P]rovided that we refrain from accepting anything as true which is not...there can be nothing too remote to be reached in the end or too well hidden to be discovered” (Descartes, *Discourse*, II, CSM I, 120).

Newton will concur in this essential understanding of matter and in its implication in spite of his disagreement with Descartes, which was really more of a disagreement over the character of space than over the “essence” of body. Having employed his principle of annihilation to destroy all but the bare properties necessary to imagine body as such, Newton defines bodies as “determined quantities of extension which omnipresent God endows with certain conditions,” namely, that they be mobile, that they exclude one another from the same space, and that they be capable of exciting various perceptions of the senses and the mind and of being moved by it in turn, as our wills move our bodies (1962: 140). Beyond that it is unnecessary to say what the “essence” of body, or force, or gravity is. Faced with the prospect of speculating on the cause or essence of gravity, Newton famously responds at the end of the *General Scholium* that “I do not feign hypothesis (*hypotheses non fingo*)” (1999: 943). It is not necessary to know *what* gravity is. It is enough to be able to measure it.

Apropos of our discussion in Chapter 1, it is worth pausing to reiterate a point about this conception of matter, which remained unchanged in its primitive *metaphysical* constitution despite its many permutations and its replacement by energy.

Though it forms the ontological foundation of modern empiricism, authorizing its analytic method, this concept of matter is not empirically *purer* than its predecessor. It is, to the contrary, a highly “stylized” concept conceived (quite proudly) in *defiance* of the intelligibility through which we necessarily experience the world and abstracted from that experience through ideal experiments.⁶⁴ This underscores the point we made in Chapter 1, namely, that empiricism is not, in fact, empirical. There is no empiricism that is not already mediated by a host of judgments regarding the nature of being, entity, knowledge, and truth, and these judgments enter into the controlled conditions under which “the empirical” is allowed to appear.

Let us consider further, then, the metaphysical judgments inherent in this understanding. Insofar as the brute externality of matter is ontologically basic, each thing becomes *ontologically* external to every other thing even if it never actually exists apart from them. This is true even of that other immaterial substance, the *res cogitans*, which for Descartes is the repository of all that meaning and quality expelled from matter.⁶⁵ (Henricus van Loon was therefore correct to conclude from Descartes’ philosophy that the soul and body were an *unum per accidens*.)⁶⁶ No longer the form or actuality *of* the body, the soul or the mind becomes another substance joined, in some inscrutable way, *to* the body—in Descartes’ estimation, in the pineal gland—as something essentially external to it.⁶⁷ Modern materialism, rather than being the antithesis of Cartesian dualism, is really heir to its “residual estate” (Jonas 2001b: 20). Materialism, in other words, *is* Cartesian dualism reduced to one of its poles. This is the ontological basis for the epistemic priority of analysis over synthesis and, for Descartes’ ideal, the clear and distinct idea typified once again by the line, which is distinct precisely insofar as “it is so sharply separated from all other perceptions that it contains within itself only what is clear” (Descartes, *Principles*, I, CSM I, 208).⁶⁸

The result is a radical revision of the basic meaning of entity. The reduction of being from act to the brute facticity of externalized matter eliminates just that unity and interiority which for Aristotle and the tradition had distinguished “things existing” by nature from artifacts. Descartes is quite explicit about this.

For I do not recognize any difference between artefacts and natural bodies except that the operations of artefacts are for the most part performed by mechanisms which are large enough to be easily perceivable by the senses (Descartes, *Principles*, I, CSM, 288).

With nature collapsed into artifice, each thing now stands in the same external and accidental relation to its own form as obtained in the example from Aristotle’s *Physics* between Antiphon’s bed and its wooden substrate, except that form itself no longer designates a quiddity or whatness—these have been eliminated—but denotes instead either the laws governing the process of its coming-to-be (Bacon) or the shape and size of its matter (Descartes). Both are merely consequent upon the brute facticity of matter and represent “the current compromise among the basic actions of aggregate matter” (Jonas 2001d: 201). Each thing becomes an assemblage of parts outside of parts; the universe is a vast collection of these assemblages, indefinitely extended in all directions.

This reduction of nature to artifice follows upon the reduction of being from act to brute facticity. It is a retreat from the *actual* world, the world of things-*in-act*. (Here I take exception to the conventional view that the advent of modern science, which

eventually ushers in a “radically temporal conception of being,” identifies being with “action and process” (Jonas 2001c: 40).⁶⁹ There are several facets to this retreat. The analytic separation of material parts from the wholes whose parts they are has as its subjective corollary the abstraction of the *res cogitans*, whose reconstruction of the world never adds back up to the intelligible world of appearances, from the extended world of matter and motion. It is a bit like when I take apart a machine to try to repair it, only to discover after I have reassembled it that the manufacturer has suddenly supplied me with “extra” parts. The “extra parts” in this case are those so-called secondary qualities of immanence, unity, and intelligibility that make up the intelligibility of our experience and that are now “caused”—that is, *produced*—in some inscrutable way by the primary qualities of extensive matter and motion.⁷⁰ Precisely because causality has been reduced to a transaction of force (or so it would seem), the “causal connection” between primary and secondary qualities remains inscrutable.⁷¹ This again accounts for the brief reign of epistemology before it gives way to pragmatism. Only predictive success, experimental replicability, or successful manipulation finally secures the veracity of our perceptions of secondary qualities, which are inherently deceptive. The abyss separating the poles of this dualism continues to haunt its materialist remainder, and we will explore it further in subsequent chapters.

The other facets of this abstraction are more subtle. The rejection of substantial form, as we have seen, effectively empties things of their quiddity or whatness inasmuch as this is possible. This eliminates Aristotle’s distinction between natural motion and violent motion and the correlative distinction between *per se* and incidental causality. Natural motion and *per se* causation belong to a thing in virtue of what it is and so manifest the nature of that thing, while violent motion and incidental causality are incidental to the thing and reveal little or nothing of its being. Because there are no longer proper things, in an Aristotelian sense, all motion and all causality become violent, a product of force to which the “things” themselves are indifferent. This transforms the meaning of motion as well as cause, if indeed it does not eliminate it altogether.

For Aristotle, motion (*kinēsis*) in its most basic sense was not local motion, even if local motion was a most primitive instance of motion as such. Motion, rather, was a peculiar kind of actuality, namely, the actuality of a potency *qua* potency (*dunamis*) (Aristotle, *Physics*, III, 201a10). Descartes declared himself incapable of making sense of this definition, but we rephrased it in the previous chapter as the actuality of undergoing change or the *act of changing* (Descartes, *The World*, CSM I, 93–94). This is why Aristotle considered motion an attribute of a subject and why the actualization of any potency, a student learning, for example, could serve as an example of motion. The mathematization of motion which is premised upon the elimination of the act of being is tantamount, by contrast, to a “stilling” of the world.⁷² Motion ceases to be a kind of act and becomes rather a state (*status*), local or rectilinear motion being simply a “compact series” of such states “following ‘densely’ one upon the other” (Veatch 1969: 262).⁷³ Descartes and Newton concur in this, though Newton thought Cartesian motion unintelligible without the supposition of absolute space and time.⁷⁴ Moreover, the elimination of substantial form took with it the qualitative aspects of Aristotelian motion. The result is that that bodies become “internally” indifferent to their motion, on the one hand, and motion as such reveals

nothing of the nature of the moving body, on the other. As Simon Oliver puts it, “there is no significant difference between a stone falling and an eagle swooping,” save for the pertinent mathematical variables (2005: 148). That the bodies happen to be a stone and an eagle makes no difference to the meaning of motion. Indeed, since bodies are thus indifferent to their motion, there is no significant difference between motion and rest. Rest is merely “motion reduced numerically to zero,” which is to say that “motion and rest are quantitatively different instances of the same state” (168).

It is not motion, therefore, much less actual moving bodies, that is the subject of the new mechanics, but the *forces* which change the *state* of motion. The significance of this extends well beyond the “mathematization” of motion, or even a new conception of motion and causality, though of course it is all that. This movement from a physics of form to a physics of force is a movement of thought toward the extrinsic relations indifferently governing the interactions between things and away from the *relata* themselves (Funkenstein 1986: 151).⁷⁵ The consequence, as we have seen in the reduction of nature to art, “is that the very notion of things was made to fit the mathematical relationships governing them” (1986: 151).

This is fundamentally important. It would be foolish to deny that nature manifests itself mechanically and lends itself to this sort of analysis, and it would be just as foolish to deny that the transformation we are witnessing here marks such a giant advance in reason’s capacity to analyze, predict, and manipulate the course of nature that the alternative is now literally unthinkable. And yet, for all this, this increase in reason’s power comes at the price of a decrease in its scope. The ontology of modern science, which has succeeded so spectacularly in part *because* it is endemically reductive, does not simply reduce the *objects* of thought. It also effects a subjective reduction in reason’s capacity to *see*.⁷⁶ “Has it never struck anyone as passing strange,” asks Henry Veatch, “that the logic of the *Principia Mathematica*, for all its elaboration, provides no means either for saying or for thinking what anything is?” (1969: 26). Of course this cannot be entirely true if reason is *structurally* contemplative, if being (*ens*), as the scholastics thought, is indeed the object of the intellect. The “what is” question is ontologically unavoidable. But if the modern scientific mind is structured by an ontology premised upon the elimination of this question, then it is inevitable that science will provide a reductive and functionalist answer to ontological questions, and that eventually such questions, though they be inherent in reason’s very structure, will cease even to be intelligible. Insofar as this is now the case, the reduction of being to facticity and of nature to artifice represents much more than a new mathematical approach to nature or the inauguration of a new pragmatic philosophy. It represents a new way of being in the world and a fundamental shift in understanding the relation between God and the world, on the one hand, and the relationship between the mind and world, on the other. Let us consider each of these in turn.

Revolutionary Theology

We have maintained throughout this book that theology and science, conceptions of God and conceptions of nature, are necessarily and *intrinsically* related. There are several senses in which that is true of modern science in its founding (and beyond).

The first is structural and follows from the ontological exigencies of scientific cognition. We considered these in Chapter 1 and will take them up again along with our explication of creation in Part III. The other two senses are historical and contingent. One might call them a strong and a weak sense, though it is probably better to say that each is strong and weak in different ways. There is the theological or “ontological” sense of the God *implied* by this new vision of nature, what God *must be* if this metaphysics of nature is true.⁷⁷ And there is the historical sense of the role of a certain concept of God in *occasioning*—and as we shall see, even forming a *component* of—the emerging view of nature. These two senses are deeply interrelated to be sure, but it is important nevertheless to distinguish them. The latter, historical sense is important in underscoring the fact that the modern conception of nature owes itself to developments in theology, but once the new view of nature is in place, it seems possible to discard the concept of God which occasioned it. And in one sense it is. What difference does it make if Newton used God to help formulate his laws of motion, after all, if these laws *work* without reference to God? I shall argue that the God of modern nature is dispensable as a consequence of the *content* of this new secular theology almost as a matter of planned obsolescence. In the first ontological sense, however, the matter is not so simple. This concept of God remains operative in our conceptions of nature even now, if only in the negative form of atheism, for all the reasons we discussed in Chapter 1. The distinction between God and nature is an irreducibly theological distinction. It is impossible to specify nature in distinction from God without simultaneously giving specification to the God from whom nature is distinguished. The distinction between the world and God, even if only for the sake of denying the latter’s existence, remains an irreducibly *theological* distinction.

We have already touched on some of the ways in which a markedly *untraditional* conception of God was instrumental in helping to bring about this new view of nature. Descartes and Newton both radicalized the voluntarism of the fourteenth century, employing “the principle of annihilation” to destroy the intrinsic intelligibility of the world. Of all the divine predicates traditionally attached to the divine essence—goodness, beauty, and truth, for example—only *summe potens* and *substantia infiniti* elude Descartes’ hyperbolic doubt; this is precisely because these qualities occasion his radical methodological skepticism.⁷⁸ (Only later, after Descartes’ God has done his work, does he become the guarantor of the veracity of clear and distinct ideas.)⁷⁹ This decoupling of divine volition from the transcendental attributes of being amounts to an *a priori* “detrinitization” of God arguably more radical than Ockham’s, and indeed Newton secretly rejected the doctrine of the Trinity. This radical departure from the doctrine of God has an immediate effect on the form of God’s relation to the world. The decoupling of divine volition from God’s Trinitarian essence alters the very meaning of freedom (both divine and human).⁸⁰ In the Trinitarian conception, divine freedom is a function of the relation between the Father and the Son, which is to say that it is fundamentally an expression of *love* and inseparable from all the other predicates with which it is convertible. In the unitarian doctrine of this new secular theology, divine freedom becomes a matter of power, unqualified by goodness, beauty, or truth, closely akin if not indeed identical to the new concept of force.⁸¹ Ironically, for a theology that will entail its own obsolescence, this conception of divine power, coupled with the elimination of the autonomy and actuality which God confers upon

the world through the gift of *esse*, causes these natural philosophers to invoke divine agency for the operation of the world much more directly than was the case for the antecedent tradition. For Descartes, God (force) imparts to the world a certain quantity of motion which remains constant due to divine immutability.⁸² (This is one of those instances where Descartes ingeniously extols God into irrelevance.)⁸³ We find something very similar in Newton. Having employed his principle of annihilation to arrive at the definition of body noted above—“determined quantities of extension which omnipresent God endows with certain conditions”—he continues,

That for the existence of these beings it is not necessary that we suppose some unintelligible substance to exist in which as subject there may be an inherent substantial form; extension and an act of the divine will are enough. Extension takes the place of the substantial subject in which the form of the body is conserved by the divine will; and that product of the divine will is the form or formal reason of the body denoting every dimension of space in which the body is to be produced (Newton 1962: 140).

Important though it is that this voluntarist and unitarian concept of God is the historical *sine qua non* of this new mechanistic understanding of nature, even more important for our purposes is the correlation between this concept of God and this concept of nature in its many variations. How does this concept of nature require us to think about God; what would God be if this concept of nature were true?

We have seen that the seventeenth-century conflation of nature and art emptied entities of the unity, interiority, and actuality conferred on them by *esse* and *essentia*, accorded a counterfactual world of inertial singularities ontological priority over the actual world of things, and elevated a positive, extensive concept of matter to a position of ontological primacy. We have also seen that a voluntarist God of will is the precondition for, and a chief agent in, helping to bring about this understanding. We must now look more closely at how this fundamentally altered the “model” of the God–world relation.

With this new conception of *natura*, God ceases to be immanent in creatures, more interior to them than they are to themselves as Augustine put it, for the simple reason that creatures emptied of *essence* and *esse* no longer have any real interior to be related to. This is one reason for the built-in obsolescence of this theology. Once God’s relation to the world becomes extrinsic and accidental, he is rendered superfluous for the intelligibility of the world. Because God is no longer fully immanent within creatures while remaining distinct from them, he cannot be fully transcendent either. Consequently, God can no longer be regarded as *ipsum esse subsistens*, the subsistent act of being itself, in whom all things participate by virtue of the act of being. Rather, he must be regarded as a singular within the “positivity” of being—a substance, in Descartes’ words—extrinsically confronting the world through relationships of power or force.⁸⁴ The conflation of nature and artifice, in other words, is premised upon not just a detritization but a finitization of God.⁸⁵ It is premised upon the eclipse of that very difference between God and the world which the Incarnation revealed and which the doctrine of creation secured and protected.

There could be no clearer evidence of this than the fate of analogy in seventeenth- and eighteenth-century natural philosophy. The traditional understanding of analogy

is premised on the fact that God, as the subsistent fullness of being, had no “real relation” to the world and thus infinitely exceeded anything we could predicate of him, even if attributions such as true, good, and being applied properly and superlatively to him. A proper understanding of analogy therefore underscored the infinite *difference* between God and the world, as in the classical formulation of the Fourth Lateran Council that within every similarity of the creature to God there is an “ever-greater dissimilarity” (*maior dissimilitudo*) (Denzinger 2002: 432). So, for instance, when Thomas Aquinas employs an analogy from motion to explain God’s ubiquity, likening God’s action in creation to the contiguity between an agent and that which it moves, it simply means that God, as the fullness of actuality, is essentially actual and wholly present “always” and “everywhere.” This is the same thing as saying that spatial and temporal categories do not apply to him except insofar as space and time bear a remote similitude to God in virtue of their being at all. Terms such as “distance” or “proximity” when applied to God do not denote extensivity; rather in using such terms, Thomas simply means “the similitude of things to God inasmuch as they participate in being” (Funkenstein 1986: 54).⁸⁶ Something similar is true of the craft analogy for creation as it was used throughout the tradition. Human art could be invoked harmlessly as an analogue for creation *ex nihilo* precisely because creation infinitely surpassed art, not just in magnitude but in kind. Creation is a gratuitous gift of being which presupposes nothing; art presupposes being and is thus a kind of change in which form is imposed from the outside on preexistent matter.

However, the infinite difference between God and the world is lost once being is reduced to brute facticity. God ceases to be the subsistent act of being itself who gratuitously grants all things participation in the actuality which belongs properly to him. Instead, God and the world become two objects within the positivity of being, and the same concepts apply univocally to both terms of the God–world relation. The question of God’s ubiquity becomes a straightforward physical problem, and debates about God’s body or extensivity in space begin to proliferate in the seventeenth and eighteenth centuries in a manner heretofore unheard of. Instead of expressing God’s surpassing difference from the world, analogy comes to express a simple likeness or parallelism differentiated by a difference of magnitude.⁸⁷ So for Galileo, God knows infinitely more mathematical propositions than we do, and knows them all at once, but when we know the truth of a mathematical proposition, we know precisely what the divine wisdom knows (Galileo, *Dialogue*, 1, 119–120). So, too, for Descartes, the idea of God as *ens summe perfectum* (and thus not a deceiver), once it is recovered in the fifth *Meditation* after the principle of annihilation has done its work, is found among the order of innate ideas which are clear and distinct. Jean-Luc Marion calls it a “stupefying declaration,” that “the idea of God is found to be on the same footing, at least in me, as the idea of a triangle” (1986: 323).⁸⁸ The unknowable God becomes for Descartes a clear and distinct idea on a par with simple natures. The parallelism in the order of volition mirrors Galileo’s parallelism in the order of mathematical propositions. Although God’s will is greater than mine in scope and efficacy, Descartes says, “it does not seem any greater than mine when considered as will in the essential and strict sense” (Descartes, *Meditations*, 5, CSM II, 40). This is because Descartes identifies will with the power to act or to refrain from acting. Newton also finds a simple parallelism between the will’s capacity to move the body and God’s capacity to

move bodies in space; the former, indeed, is proof of the possibility of the latter (1962: 141). Newton appears to take great pride in this argument, for it shows that “the analogy between the Divine faculties and our own is greater than has formerly been perceived by the Philosophers” (141).

The correlation between a reductive understanding of nature and a reduced God is indeed most obvious in Newton. This is important because it is he, perhaps more than any other thinker, who will determine the ontology and the *theologia naturalis* of science in the English-speaking world through the time of Darwin.

Newton was a second-generation mechanist who parted company with Descartes in a number of important respects. Descartes’ geometrical essentialism had required him to introduce his notorious “theory of vortices” to account for accelerated motion, and possibly, to avoid Galileo’s fate.⁸⁹ Newton’s addition of mass as a fundamental characteristic of body and his understanding of motion relative to absolute space rather than to the positions of other bodies allowed him to dispense with Cartesian vortices. His invention of calculus enabled him to treat mechanics and optics algebraically rather than geometrically, an important element in his success in unifying astronomy and mechanics under the banner of physics. And he disagreed with Descartes, as we have seen, on the place of physics in relation to metaphysics, though this apparent disagreement conceals a more basic agreement with respect not only to ontology but to the place of natural philosophy in the pantheon of the sciences.⁹⁰

For Newton, natural philosophy, seeking to recover a lost *prisca sapientia*, was to be first philosophy.⁹¹ It is not simply that Newton rejected Cartesian *a priorism* and sided with Aristotle in placing what is first in the order of being last in the order of knowledge, as Howard Stein suggests. Rather, it is that Newton makes physics, or more accurately, natural philosophy, serve the traditional functions of metaphysics and theology.⁹² Indeed, Newton gives us ample reason to think that he regarded the latter as but vulgar elaborations of the former.⁹³ In the absence of a higher science of metaphysics to which physics is ontologically beholden, and without a theologically adequate sense of analogy, it is inevitable that God will be reimagined fundamentally as a problem for physics and natural science, which given its ontology of extensive quantity, means that God will be reduced *ipso facto* to an object.

The Victorian image of Newton as a paradigm of autonomous, scientific rationality has given way to a much more complex picture, as several generations of scholars have begun to show the intellectual unity of Newton’s physics and his considerable theological and alchemical preoccupations.⁹⁴ The addition of the *General Scholium* to the second and third editions of the *Principia* helps bring this unity into view.⁹⁵ The *General Scholium* “acts as a conclusion for the book as a whole and a potent summary of Newton’s main agendas” (Snobelen 2001: 171). In it he asserts that “to treat of God from phenomena is certainly part of natural philosophy” (Newton 1999: 943). Newton had indeed been treating of God from phenomena for quite some time; his recorded theological speculations precede the publication of the *Principia* by some 15 years. Unlike Ockham and Descartes, who continued to adhere to the doctrine of the Trinity as a matter of official dogma even as their thought undercut it, Newton semiprivatey regarded Trinitarian dogma as a fourth-century perversion of a “pure ancient Noachian faith” which also contained the mathematical principles of the *prisca sapientia* (Oliver 2005: 158).⁹⁶ In various manuscripts and letters, he advocated what

amounts to an Arian position that the Son, “like one of the prophets,” is merely a created intermediary sent from the Father.⁹⁷ Along with fellow Arians and friends John Locke and Samuel Clarke, he appears to have been a secret devotee of Socinianism, an esoteric Unitarian sect originating in Poland in the aftermath of the Radical Reformation.⁹⁸ Some of Newton’s more perceptive contemporaries, such as William Whiston, who concurred with Newton’s anti-Athanasian predilections, and the Calvinist John Edwards, who opposed them, were quick to see anti-Trinitarian and Socinian elements within the theology of the *General Scholium* (Snobelen 2001: 191–192).⁹⁹

Newton’s unthinking of the Trinity and his univocal conception of being led to a reconception of divine agency. Without a Trinitarian doctrine of God, divine agency ceases to be understood at the level of being, much less as a gratuitous reflection of Trinitarian love, and instead an expression of sovereign power.¹⁰⁰ Unsurprisingly, then, Newton’s unitarian God is characterized first and foremost by the power of his omnipotent will. And yet, such power is not actual, Newton maintains, unless and until it is exercised over a domain. Hence, in a passage from the *General Scholium* with clear Socinian overtones,¹⁰¹ Newton appears to claim that it is precisely his dominion *over the world* that constitutes God as God.

He rules all things, not as the world soul but as lord of all. And because of his dominion he is called Lord God *Pantokrator* [Newton’s note: “that is, universal ruler”]. For “god” is a relative word and has reference to servants, and godhood is the lordship of God, not over his own body as is supposed by those for whom God is the world soul, but over servants. The supreme God is an eternal, infinite, and absolutely perfect being; *but a being, however perfect, without dominion is not the Lord God*. For we do say my God, your god, the God of Israel, the God of Gods, the Lord of Lords, but we do not say my eternal one, your eternal one, the eternal one of Israel, the eternal one of the gods; we do not say my infinite, or my perfect one. These designations [i.e., eternal, infinite, perfect] do not have reference to servants. The word “god” is used far and wide to mean “lord”, but every lord is not a god. *The lordship of a spiritual being constitutes god, an imaginary lordship an imaginary god*. And from true lordship it follows that the true God is living, intelligent, and powerful, from the other perfections, that he is supreme, or supremely perfect. He is eternal and infinite, omnipotent, and omniscient, that is, he endures from eternity to eternity, and he is present from infinity to infinity; he rules all things, and he knows all things that happen or can happen. He is not eternity and infinity, but eternal and infinite; he is not duration and space, but he endures and is present. He endures always and is present everywhere, and by existing everywhere he constitutes duration and space. Since each and every particle of space is always, and each and every indivisible moment of duration, is everywhere, certainly the maker and lord of all things will not be never or nowhere (Newton 1999: 940–941).¹⁰²

Newton’s attempt to assert divine sovereignty over the world backfires because he lacks an adequate grasp of the analogical difference between God and the world. This is the condition upon which God’s agency can be brought perilously close to an immanent force and God’s ubiquity could be made into a physical problem presided over by the new queen of the sciences. But the reverse is true as well. This natural theology, though it can hardly be said to be properly theological at all, is also an

integral dimension of the Newtonian reconfiguration of nature and scientific explanation. We can see this first in connection with the all-important notion of absolute space.

Newton's concept of absolute space was anticipated in many ways by Henry More, who had partially followed Descartes in identifying being with extension but had dissented in identifying extension and matter, positing space as a kind of substratum in which motion occurs. It was on the basis of this distinction that More had attributed extension to God, rescuing him, he thought, from being reduced to a mathematical point.¹⁰³ In Newton's hands, this would yield a physical benefit as well. It is because of the homogeneity of absolute space that "nature can also be homogenous; the same forces can act everywhere in the same manner, the same laws of nature can be valid everywhere" (Funkenstein 1986: 91). Newton does not set out to "prove" the existence of absolute space. It is a logical axiom of his thought. His purpose, rather, is to persuade his readers that "true motion and rest can be adequately understood only in reference to motionless places, and hence to absolute space as characterized in the scholium" (Rynasiewicz 1995: 133–153). As such, absolute space (along with the corollary absolutes of motion and time) is a precondition of motion understood in Newtonian terms. In his *De Gravitatione et Aequipondio Fluidorum*, a foundational, anti-Cartesian tract and perhaps the most overtly metaphysical of Newton's works, Newton follows More's lead and invokes the principle of annihilation to distinguish absolute space from body, substance, or accident.¹⁰⁴ The astonishing conclusion reveals the close connection between Newton's God and his concept of space.

Space is a disposition of being *qua* being. No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an effect arising from the first existence of being, because when any being is postulated, space is postulated. And the same may be said of duration: for certainly both are dispositions of being or attributes according to which we denominate quantitatively the presence and duration of any individual thing. So the quantity of the existence of God was eternal, in relation to duration; and infinite in relation to the space in which he is present... (Newton 1962: 136).

Space is a disposition of being *qua* being, which is to say that being as such is an extensive and thus measurable quantity (even if its measure is infinity). The extensivity of being means that time too is conceived as an extensive quantity, analogously to space, and is thus conflated with its measurement. This is a dramatic departure from the Aristotelian conceptions of place and time, which rested upon the more primitive distinction between potency and act, and it represents the final replacement of the act of being by sheer "inert" positivity. That God is included univocally as an object falling under the facticity of being is evidenced by the fact that Newton conceives of God's existence as a *quantity in relation* to absolute space and time. Indeed, Newton conceives of God's existence as a quantity precisely because he has already brought God into "real relation" with the world. Space and time are the "measurement" of God's existence. "The quantity of God's existence is eternal," it would seem, because he exists *at all times*, and infinite because his being extends endlessly in all directions. But of course this is nothing like what the tradition had meant in ascribing infinity to God. It is what

Hegel would call a “bad infinite.” The infinity of God is unity beyond number, a fullness of actuality that is, as such, utterly simple. It is “everywhere entire,” as Augustine put it (*De Civ.*, XI.5; *Conf.*, I.3), precisely because it is also nowhere. It is thus wholly and entirely present and actual at each finite point, which is to say once again that it bears no “real relation” to any finite point and is indivisible by them. It is of an entirely different order and indeed transcends all orders as the source of their limited and participated actuality. It is, as Alan of Lille struggled to put it, like an “intelligible sphere whose center is everywhere and whose circumference is nowhere” (*Theological Rules*, n.7 [PL 210, 627] in Bonaventure, *Itin.*, V.8). Endless extension, by contrast, is only infinite “by addition” and endlessly divisible into innumerable finite parts, which is to say that it is not properly infinite at all.

Simon Oliver has pointed out that Newton has invested absolute space with many of the attributes traditionally reserved for the second person of the Trinity (2005: 172). It is “eternal in duration and immutable in nature.” As an “eminent effect of God,” it almost appears to be “begotten, not made” (Newton 1962: 132). Yet, even if we decline to go so far as to say that Newton has “divinized” space, it is clear that Newton has eclipsed the difference between God and the world, radically compromising divine infinity and transcendence and bringing God into a “real relation” with creation. This consequence is inscribed from the outset in the subordination of metaphysics to physics, which insures that he will subordinate God and the world to a univocal concept of being. God becomes another “individual thing” whose quantity of existence happens to be “eternal” and “infinite,” relative to time and space, but his is still an existence dependent upon the *extensivities* of time and space. “For no being can exist who is not related to space in some way” (1962: 136). Thus, “If ever space had not existed, God at that time would have been nowhere; and hence either he created space later (in which he was not himself), or else, which is less repugnant to reason, he created his own ubiquity” (137).

God’s dependence upon space for his ubiquity is precisely parallel to God’s dependence upon his creation for the lordship which constitutes his divinity. In fact, God’s dependence upon creation is *manifest* in the role absolute space plays in permitting God to exercise his dominion. Absolute space is the receptacle for the divine will, the medium through which God can establish his dominion. This is what Newton was referring to when later he called absolute space God’s “boundless uniform Sensorium” (Newton 1952: 403).¹⁰⁵ What he means is that “the relationship between God and entities in space is analogous to that between the sensing subject and his sensations,” just as earlier he had drawn an analogy between the divine will moving bodies in space and “our faculty of moving our bodies” (Newton 1962: 141).¹⁰⁶ Thus, absolute space serves the double function of providing a medium through which things can almost literally be said to be “in God” while nevertheless making them immediate *to* the power of God’s will.¹⁰⁷ While the divine will of Newton’s God is therefore dependent upon absolute space, absolute space is just as dependent upon the divine will, not only in the sense that it is the eminent effect of God but in the fact that it is the unmitigated power of the divine will that allowed Newton to decouple body from extension, and thus liberate absolute space to be absolutely.

Newton’s understanding of God and his equation of being and extensivity fundamentally transfigures the God–world relation for all subsequent science, even

after Newton's theology and his physics are ostensibly left behind. The fundamental model of the God–world relation here is that of two entities of the same order extrinsically juxtaposed to one another and conjoined through a relationship of power whereby one acts *upon* the other. The preposition is significant. The conflation of nature and art elevated a positive and purely externalized matter—“that which fills a place”—to a position of ontological primacy (Newton 1962: 122). Being as such is now essentially extrinsic, all surface and no depth. Consequently, all actions and relations are now an ontologically secondary qualification of this primary singularity and externality, an acting *upon*.¹⁰⁸ All action, including divine action, is therefore violent in Aristotle's terms, an extrinsic and forceful imposition upon this primary singularity.

As the seventeenth century passes into the eighteenth, this imposition acquires a proper name: laws of nature.¹⁰⁹ That “laws of nature” ever became the chief subject matter of the sciences is due in no small measure to the triumph of voluntarist theology in the seventeenth and eighteenth centuries. It is these laws governing the extrinsic interactions of blank entities that are inherently indifferent to them that comprise the “final causes” that Newton refers to in the *General Scholium* (1999: 942). They will henceforth determine the meaning of “teleology” for British science.¹¹⁰ These final causes are not intrinsic to a thing's nature—there is no longer a nature to be interior to—they do not form part of creation's ontology. Rather they are “merely imposed from without by a God whose rule is supreme” (Oliver 2005: 160). Newton's voluntarism thus provides the occasion for the shift in the locus of nature's intelligibility from entities to the forces and processes indifferently governing them. As concrete and intelligible form is supplanted by an abstract formalism, it alters the very meaning of thing (*ens*). An entity conceived within this ontology can no longer be regarded as a proper *per se unum*, an incommunicable subject of its own interior being. Rather, an entity is now the accidental aggregation of parts outside of parts, the accidental by-product of nature now identified with those forces and processes whose being and intelligibility lie not in itself but outside in the laws governing its construction. The entity is now an artifact. But inasmuch as an artifact is only externally related to its maker, the same conception of nature meant to display God's power and sovereignty invites his replacement when alternative forces and mechanisms can be found. Indeed, precisely insofar as God and the world are now two objects within the same order, and insofar as all such forces and mechanisms within that order are necessarily violent, Newton's theological extrinsicism tacitly juxtaposes God and the world in mutually exclusive opposition, thus supplying subsequent naturalism with its theology.

This reduction of nature to art, premised upon a voluntarist and unitarian theology, thus comes with two corresponding reductions. The first, which we have just seen, is a theological reduction whereby God effectively ceases to be the creator God of Christianity, intimately and interiorly present to creatures as the source of their being because he infinitely transcends them, and becomes instead an artisan: a finite subject within the positivity of being who imposes his designs upon his passive objects. This is the God at once presupposed and supplanted by Darwinism, which develops within these ontological assumptions. The second reduction is simultaneously ontological and epistemic, and its consequences are even more far-reaching than is usually recognized. We noted at the conclusion of the previous section the difficulty, if not

the impossibility, of stating in mechanistic terms *what* anything is, and we said that this reflects a fundamental transformation of the relationship between mind and world and thus of the meaning of reason itself. It is now clear that this reflects a still more basic transformation at the level of being. The reduction of nature to art empties the world and the things in it of the interiority of their own being and identifies both their ontological identity and the locus of their intelligibility with the extrinsic relations governing the interaction of their parts. With the evacuation of being, truth loses its identification with being (*verum est ens*) and is identified with the made (*verum est factum*) and, soon enough, the feasible (*verum est faciendum*) (Ratzinger 2004: 59–63).¹¹¹ And knowledge of the truth is itself *made*, by generating or superinducing “on a given body a new nature or natures” through experimental abstraction, which confirms our mathematical descriptions of the laws governing the construction of artifacts. The reduction of nature to art thus subordinates contemplation to action and completes the reduction of knowledge to power. Aquinas, like Aristotle before him, explains this and explains in the process why, contrary to received wisdom, this reduction is the highest form of anthropomorphism: because “we in a sense are the end of artificial things” (Aquinas, *Metaph.*, lect. 4, 173).

Contemplating Action and Ontological Sophistry

The new conception of science, as proposed by Bacon or Descartes, is not just a new and better means or *method* for achieving the same ends as traditional science. Theirs is rather a new charter for what the sciences ought to *be* and the ends they will henceforth serve. In tendering his proposal, Bacon anticipated the objection that such a radical manifesto was likely to provoke, that he had not “first declared the true and best goal or purposes of the sciences,” namely, the contemplation of truth (2000: I, 124). He responds to this objection, first, by equating truth and utility. Inverting the traditional order of contemplation and action, he then proposes to let “the active tendency itself mark and set bounds to the contemplative part,” before declaring that the “the active and the contemplative are one and the same; and what is most useful in operating is truest in knowing” (2000: II, 4).¹¹²

These proposals cast a vast shadow over all subsequent science. Their importance in forming the self-understanding of modern science vastly exceeds the importance of their meager experimental results or their respective methodological approaches. The former were quickly superseded while the latter never took root in the form in which they were proposed. Yet, as significant as these proposals are as a charter for a new kind of science, they amount to much more than even that. We have seen already that Bacon’s *a posteriori* method conceals an *a priori* ontology: “the analytical method thus implies a primary *ontological reduction* of nature, and this precedes mathematics or other symbolism in its application to nature” (Jonas 2001d: 200).¹¹³ Bacon’s charter also offers a radical new understanding of reason itself and truth, its object. But in order to understand just how radical it is, or the true nature of its lingering effects, we must understand it in ontological terms.

We have seen that the conflation of nature and art in the seventeenth and eighteenth centuries eliminated the quiddity and actuality of essence and existence and replaced

them with a positive conception of matter, whose very “form and essence,” we said, were abstract externality, and thus measurability. With this new notion of matter, reality becomes *superficial* in a strict (and often literal) sense; it is composed entirely of surfaces (brute facts, *positiva*) which admit of potentially endless analysis but no further *penetration*.¹¹⁴ Analysis disassociates these surfaces, synthesis relates them. And depth can only mean a compounding of them. Anything manifesting the traditional depth of immanence and actuality—thought, intelligibility, suffering, love, desire, intention, perspective, self-movement, *conatus, entelechia*, action—either must be treated as an epiphenomenon of the relation between surfaces or it becomes essentially invisible to this perspective, which means that the mechanist, who has effectively retreated *in his activity* to an Archimedean point outside of nature irrespective of whether he subscribes to Descartes’ dualism, becomes invisible to himself. The cosmos, now an accidental aggregation of parts outside of parts, is no longer large enough to include *us*, which is to say that it is no longer a cosmos.

This ontology kills contemplation in the traditional sense by evacuating the world of its object: the mystery of being. But there is more. Making externality and thus measurability the “form and essence” of matter does not simply *eliminate* quiddity. Rather, it tacitly *equates* quiddity with measurability. Insofar as measurement entails the isolation of discrete quantities external to and comparable with other quantities, identifying matter with *measurability* is tantamount to identifying it with manipulability (one lesson, perhaps, of the “observer effect” in physics).¹¹⁵ The *truth* and thus for all intents and purposes the *being of things* in themselves becomes precisely identical to *our* various capacities for measurement and control—in the form of predictive success, the replication of experimental results, or successful manipulation—even if there is no end to such analysis in practice. This is the ontological meaning of the Baconian equation of knowledge and power. Joseph Ratzinger is thus profoundly correct in his counterintuitive suggestion that the sciences are premised in an important sense upon a *renunciation* of the search for truth (2004: 57–66, 77). Claude Bernard, one of the fathers of modern physiology writing in the mid-nineteenth century, gives perfect expression to this.

Our feelings lead us at first to believe that absolute truth must lie within our realm; but study takes from us, little by little, these chimerical conceits. Science has just the privilege of teaching us what we do not know, by replacing feeling with reason and experience and clearly showing us the present boundaries of our knowledge. But by a marvelous compensation, science, in humbling our pride, proportionately increases our power. Men of science who carry experimental analysis to the point of relatively determining a phenomenon doubtless see clearly their own ignorance in its primary cause; but they have become its master; the instrument at work is unknown, but they can use it. This is true of all experimental sciences in which we can reach only relative or partial truths and know phenomena only in their necessary conditions. But this knowledge is enough to broaden our power over nature. Though we do not know the essence of phenomena, we can produce or prevent their appearance, because we can regulate their physico-chemical conditions. We do not know the essence of fire, of electricity, of light, and still we can regulate their phenomena to our advantage. We know absolutely nothing of the essence of life; but we shall nevertheless regulate vital phenomena as soon as we know enough of their necessary conditions (Bernard 1957: 82).¹¹⁶

This renunciation of truth is mirrored in the new analytic structure of thought in its complementary logical/theoretical and empirical/experimental dimensions.¹¹⁷ (This is a principal reason why the common contrast between theoretical *a priori*ism and a pure empiricism is overdrawn.) The reduction of nature to art eliminated the quiddity and actuality of essence and *esse*, leaving us with a world of formally identical “brute facts” or “bare particulars” which can be abstractly represented by *x*. These bare particulars, being composed of surfaces admit of no further *penetration*, though they may conceivably be *analyzed* (taken apart, broken down) to “infinity,” provided we bear in mind that endless divisibility is a “bad infinity” no less than endless extension. This capacity for endless analysis is one of several negative reasons why scientific activity is interminable in principle and why its operative ontology therefore entails a “technological imperative” impervious to moralism.¹¹⁸ This new “artificial” conception of nature shifted attention, we have seen, away from *relata* and toward the relations governing them, effectively reconceiving the *relata* as the sum of those relations.¹¹⁹ Hans Jonas is therefore correct to say that “scientific cognition is essentially an analysis of distribution” (2001d: 202).

This ontology manifests itself cognitively in what Henry Veatch calls the “relating logic” characteristic of both scientific analysis and Anglo-American analytic philosophy. He contrasts this with the “what logic” of Aristotle. The difference between them, as D.C. Schindler sums it up, turns on a “radical reconception of the basic instance of human thought, namely, the simple proposition: S is P” (2010: 31). In the “what logic” of Aristotle, the proposition articulates a subject–predicate relation, such that the predicate reveals the being of the subject through the mediation of the “is,” which expresses this being differently depending upon whether the predicate restates the ontological identity of the subject or one of its accidents.¹²⁰ The ontology of the physical sciences, by contrast, admits no interior being-in-itselfness. It has “shut its eyes and stopped its ears to it,” with the consequence that it either can no longer see the entity in its depth or can no longer make sense of what it does see (Descartes, *Meditations*, 3, CSM I24).¹²¹ So, in the relating logic of the physical sciences, the logic of the compounding of surfaces, the proposition expresses a relation between two terms conceived as a logical function, with the “is” functioning as a copula joining them.¹²² D.C. Schindler explains:

In other words, it assumes an extrinsic relationship between the two terms, so that either the predicate is already contained in the subject and so is not different from it (analytic statement), or the predicate is separate from the subject and can be connected either formally by the logic of categories (synthetic a priori) or materially by experience (synthetic a posteriori). But this way of conceiving things leaves us, on the one hand, the sphere of necessity that is limited to logical analysis of “what we mean” by the language we use to describe the word or the necessary relations between concepts, and on the other hand the contingent sphere of empirical facts, which can be recorded and organized according to patterns (i.e., form understood extrinsically as law) but not intellectually penetrated as an essential, intrinsic meaning (form as ontological principle). Intelligibility is therefore “saved” in this case by separating thought altogether from things, allowing it the much more modest goal of coherence and consistency, and subsequently re-connecting to the world only in the apparently equally modest mode of a positivistic empiricism (2010: 32).

Here in the replacement of truth (being) by function, we see the bridge connecting the *a priori* “relating logic” of science with its *a posteriori* empiricism, whose own act of cognition mirrors this logic—indeed *is* this logic in *action*.¹²³ The action itself is necessitated by the inherent *unintelligibility* of the phenomena and by the fact that nature “in its own proper freedom” does not yield the secrets we want (Bacon 2000: 21). Experimental abstractions thus “vary or dissociate phenomena by a kind of analysis,” separating them from the “single actuality,” which characterizes their actual existence, and treating them as essentially external to—and therefore inherently unaffected by—that actuality.¹²⁴ This they do by “producing a disturbance of the phenomena” (Bernard 1957: 9). Indeed, insofar as a thing’s being is interiorly determined in relation to this single actuality, the very act of separating in thought or under controlled experiment is already tantamount to “producing a disturbance in the phenomena,” so the intervention in the phenomena by what Bacon calls “action” obtains even in those cases where the object of analysis, say a nebula, is beyond the reach of experimental manipulation.¹²⁵ This experimental control gives one putative knowledge of causes, which act as the physical equivalent of “functions” between the terms, though insofar as this ontology renders causality itself unintelligible: both “cause” and “function” serve, in similar ways, as logical “placeholders.”¹²⁶ The real upshot of this conflation of knowledge and action is that it gives *pragmatic* knowledge of construction of the *factum*, in theory if not always in practical fact, for which the intelligibility of causality is not finally necessary. As Jonas puts it, modern knowledge of nature is a “know how and not a know what,” a knowing by making and unmaking, though we have seen that it is never entirely possible to dispense with the “what,” and that this calls into question the adequacy of the “how” (2001d: 204).

This understanding of Bacon’s equation of knowledge and power illuminates his further conflation of truth and utility, and it helps us understand what it means to say “that what is most useful in operating is truest in knowing” (2000: II, 4). It is not simply that knowledge is *for the sake* of power and control. The question is not a matter of motive. Bacon for his part proposes to subordinate action to charity, though Jonas notes importantly that benevolence is now necessarily extrinsic to theory as such and must come as a supplement from outside (2001d: 197).¹²⁷ We need not deny the wonder or even the piety that motivates some scientists, and we need not regard every scientist as Goethe’s Wagner, trying to cook up Homunculus in his basement.¹²⁸ It is rather that scientific knowledge is knowledge *by means of control* and that the *truth*, and thus for all intents and purposes the *being—of things—*becomes precisely identical with *our* various capacities for measurement and control of them in the form of predictive success, the replication of experimental results, or their successful manipulation to fit our purposes.

The equation of truth and utility underlies Bacon’s injunction to judge the truth of science by its products, and the universal acceptance of this criterion, in turn, underlies a typical response to these sorts of criticisms, namely, that science *works*. This rejoinder is not so much an argument as what Daniel Dennett calls a “conversation stopper” designed to bring argument to a premature end (1995: 507). Even so, there is undoubtedly a certain power, even truth, in this reply. Although we are entitled to ask how well a perspective “works” that makes ordinary experience epiphenomenal and dismisses as unreal all that is characteristically human, our point is not to dispute that

“science works”—indeed it often works all too well—or even to deny that it reveals a truth in working. It is *science*, after all, that professes no interest in “what things are,” and we maintain that this question imposes itself with ontological necessity and that there is thus more going on in scientific cognition than its own ontology can account for. But all this is for later chapters. A more fundamental and urgent question in the meantime is what this rejoinder, and the equation of truth and function that it presupposes, really amount to.

To invoke *success* as the measure of truth is already to have equated truth with utility and knowledge with power, which of course is precisely what Bacon proposes. This is the very epitome of *sophistry*, however, for it ultimately relinquishes the claim which the truth of being makes upon reason by the very fact of its equating this truth with a functional or practical goal. This claim can only be acknowledged if truth is first and foremost *useless*, if it is good for what it *is* and not for what it does, and if reason is willing to follow it through to the end. The subordination of contemplation to action, then, represents a fundamental inversion of reason’s primitive gesture in response to being. Whereas a contemplative reason was first receptive, and sought to mold the mind and will to reality, the new, active knowledge seeks to mold reality to the mind and will—which makes the scientific and theological revolution a revolt not just against the *ancien régime* of philosophy and theology but a revolt against being itself. Louis Bouyer is therefore onto something in suggesting that it is science and not religion that is in basic continuity with magic (1988: 153–159).¹²⁹

The sophistry inherent in scientific reason does not make its reasoning false. D.C. Schindler has shown that it is perfectly compatible, in fact, with a certain “reasonableness.”¹³⁰ Nor does it necessarily imply deceit or bad will on the part of its practitioners. Sophistry and bourgeois decency, like fideism and rationalism, are more than capable of residing in the same breast. There are a thousand variations on this theme from Darwin’s whiggish moralism dressed up as nature, to Rorty’s “light-minded aestheticism,” to the “nice nihilism” of some contemporary Darwinian philosophers.¹³¹ Sophistry in this *strict* sense is even compatible with a certain commitment to getting to the bottom of things. The sophistry of modern scientific reason in the first instance is not moral but *ontological*. Its subordination of contemplation to action reduces reason to power, which in the end reduces truth to a matter of functional control. Truth ceases to be a matter of being because being itself has been reduced by this ontology to an *instrumentum*, and this determines in advance that the “bottom of things,” however sincerely pursued, can only ever be a surface.¹³²

“Science works” can serve as an effective conversation stopper because the basic unit of science’s ontology, the positive and impenetrable *factum*, is an invitation to stop thinking or to think only so far as usefulness extends. This perhaps explains a great deal about the state of the contemporary “dialogue” between science and theology and the contemporary “debate” between creation and evolution. We wish to contribute to the refounding of this “debate” by arguing that the doctrine of creation, properly understood, was and is ultimately necessary to a comprehensive and nonreductive understanding of a cosmos now thoroughly fragmented by a (still) mechanistic ontology and a technological conception of reason, neither of which is or can ever be metaphysically and theologically innocent. Affirming creation in its proper

sense entails neither the denial nor the embrace of evolutionary doctrine, though, as we shall see, it does require one to concede there are more things in heaven and on earth—namely, human beings and other living things—than are dreamt of in Darwinian theory.

In the current intellectual climate, dominated as it is by positivistic science, these claims are virtually unintelligible. Theology faces a twofold obstacle in making them intelligible once again. The first is that the ontological assumptions of the sciences which we have begun to unearth presuppose and enforce a defective doctrine of God and distort the meaning of God and creation *a priori* and beyond all comprehension. This obstacle is challenging enough, but the second may ultimately be more difficult. From the equation of reason and power, it is but a short step to the equation of truth and victory. If this final reduction were to occur, it would represent the final renunciation of the claim of truth, the final triumph of nihilism, and the strongest argument against the Catholic claim that we have a built-in desire for truth. This desire, which our most authoritative ontology and most dominant modes of reasoning tempt us to renounce, is the presupposition, the shared ground, of any real argument. If the debate has ended without reaching the bottom of things, if the quarrel no longer exists, it calls into question whether this shared ground any longer exists. The question of whether it remains possible to recuperate creation is thus the question not only of whether it is possible, in the face of all assaults against it, to restore to being the integrity, interiority, and intelligibility evacuated in the founding of modern science, but whether it is possible to reawaken ourselves to the claim of reason.

Notes

- 1 We see this, e.g., in the patristic notion of a *carmen mundi*, or in the cosmic liturgy of Dionysius and Maximus.
- 2 On the criterion for stating that we live in perpetual revolution, Hans Jonas proposes that we measure this claim by the length of a generation. He writes,

If a man in the fullness of his days, at the end of his life, can pass on the wisdom of his accumulated experience to those who grow up after him; if what he has learned in his youth, added to but not discarded in his maturity, still serves him in his old age and is still worth teaching the young, then his is not an age of revolution, not counting, of course, abortive revolutions. The world into which his children enter is still his world, not because it is entirely unchanged, but because the changes that did occur were gradual and limited enough for him to absorb them into his initial stock and keep abreast of them. If, however, a man in his advancing years has to turn to his children, or grandchildren, to have them tell him what the present is about; if his own acquired knowledge and understanding no longer avail him; if at the end of his days he finds himself to be obsolete rather than wise—then we may term the rate and scope of change that thus overtook him, “revolutionary” (1974: 46).

- 3 This and other Aristotelian theses were included in condemnations of 1277 issued by Bishop Etienne Tempier of Paris. These condemnations helped pave the way for the voluntarism of the fourteenth century and for the application of voluntaristic theology to physical problems. See Grant (1982), pp. 537–539.
- 4 One exception to this, if Henri de Lubac is to be believed, is the late scholastic notion of *natura pura*. de Lubac alleges that the idea of pure nature (*natura pura*) which develops in the Thomist commentatorial tradition, proceeds by abstracting a counterfactual “pure

nature” from the actual graced order and making the former the ontological basis for the latter, thus anticipating the early modern primacy of the counterfactual. See de Lubac (1998), pp. 53–74.

- 5 For more on the Stoic roots of early modern volition, see Menn (1998) and Hanby (2003).
- 6 St. Thomas, for instance, though he holds open the possibility that God might create any number of different orders, denies that there could be a plurality of worlds like ours or that our world could be made better than it is, precisely because our world is interdependent and a duplication of it would contradict the notion of proper places and therefore of *rei*. See Funkenstein (1986), pp. 131–136.
- 7 See Hanby (2003), pp. 161–177. See also Maurer (1999), pp. 239–265. Funkenstein applies this criticism to Thomas as well as the nominalists. He cites Thomas’ *De potentia* q.3 a.17 resp. where Thomas says,

When we speak of bringing into being the whole universe, we cannot find anything beyond that which is created from which a reason could be elicited why it is such and such; since one cannot elicit a reason for the disposition of the universe either considering divine power, which is infinite, or considering divine goodness, which is not in need of things, it is necessary to elicit its reason from the simple will of the producer; so that it is asked why the quantity of the heavens be such and not greater: one cannot give a reason except the will of the producer.

From passages such as these, Funkenstein concludes that “the conceptual clarification of power does not entail wisdom” and that creation is therefore a “*necessarily* arbitrary act” (1986: 132). While I concur that the formulation of the question generates a certain ambiguity in passages such as these, taken in themselves, this conclusion does not take into account either the metaphysics of creation and its Trinitarian structure in Thomas or the self-diffusiveness of goodness.

- 8 See Hanby (2003), pp. 161–177 and Gillespie (1995), pp. 1–63.
- 9 All of this is complicated by the subtle medieval debate over the very meaning of possibility and in nominalism’s conflation of logical and real possibility.
- 10 See also Maurer (1999), p. 61 and Ockham, *Quodl.*, 7.2.
- 11 See Funkenstein (1986), p. 140 and Goddu (1984), pp. 95–111.
- 12 While *esse* and *essentia* are for Ockham but two words or concepts signifying the same thing, the former differs from the latter in that it can be used as a copula between terms. See Maurer (1999), pp. 57–62. This will later prove important for what Henry Veatch calls the “relating logic” of modern science. See Veatch (1969), pp. 26–62, 126–144, 177–198.
- 13 This is especially true of the debate over “individuation,” which presupposed the ontological primacy of form in Aristotelian hylomorphism. See Funkenstein (1986), pp. 139–140:

The revolution deepened in the fourteenth century, not only due to Ockham’s influence. Time and again the Venerable Inceptor, as Scotus before him, applies his criterion of annihilation for identifying possibly real things: real things are only those capable of being created independently of any other thing. “Forms” and “natures” cannot be attributed with any ontological status; a “form,” even if it existed only as a divine idea, could be annihilated while its presence in that which it informs is conserved. Ockham’s universe of things consists of substances and their absolute qualities alone. Any absolute quality can be subtracted from a subject, or added to it if it is compossible with other qualifications of that subject. No principle of individuation is necessary to account for singulars; on the contrary, any reference structure between singulars needs justification.

- 14 See Funkenstein (1986), pp. 152–179 and Oliver (2005), pp. 51–84.
- 15 See Maurer (1999), pp. 59–60:

Ockham uses the terms *ens* (“being”), *entitas* (“entity”), and *res* (“thing”) as synonyms. The term *esse* (“to be”) also signifies *res*, but it has a different function in language: as a verb *esse* can be used as a copula between two terms, as when we say “Man is an animal”; the noun *res* or *entitas* cannot have this function. The term *esse* can also be used as a noun, and then it means the same as *res*. In this usage *esse* can be applied to God, the first cause, meaning that he does not depend on anything else; but when it is applied to creatures it signifies them as dependent on and thus directed to the first cause. In fact, they have no being except as thus dependent and directed.

- 16 The same holds for Descartes’ notion of objective being, his use of this concept appears to owe more to Scotus than Ockham. See Ariew (1999), pp. 39–57.
- 17 For the significance of this transformation of causality, see D.C. Schindler (2010), pp. 15–44.
- 18 Gilson is one among a number of historians of philosophy to note that Ockham anticipates Hume in this regard (1999: 70–71).
- 19 See, e.g., the arguments by Anneliese Maier that force assumed increasing importance in high medieval accounts of efficient causality, and her famous argument that Galileo first came to the law of inertia within the framework of the medieval impetus theory—a framework, of course, which he later abandoned. See Maier (1982), pp. 40–60, 103–123.
- 20 Of course this separation has many sources. Already in the thirteenth century, the Islamic philosopher Avicenna had begun to pave the way for an ultimate separation between metaphysics and physics from within an ostensibly Aristotelian framework. Like Aquinas, Avicenna too accepted the Aristotelian commonplace that a science cannot demonstrate its subject matter or formulate its own principles. Avicenna then insisted that it falls to metaphysics and not physics to prove the existence of God as first cause of the existence of the universe. As Simon Oliver points out, such a stark division between metaphysics and physics was uncalled for on Aquinas’ terms, and the famous second question of the *Summa* employs arguments from motion in the so-called “five ways” of demonstrating God’s existence. This division presented no problem for Aquinas, first, because “when one speaks of a being’s motion, one also speaks of the nature of that being’s existence,” and, second, because the divine substance is not properly given to metaphysics as a subject matter either, since it does not fall under *ens commune*. Avicenna, by contrast, concludes that it is the subject of metaphysics to consider the attributes of being *qua* being, and he gets around the difficulty imposed by Aristotle—that metaphysics seeking to prove God would seem to be a science proving its own principle—by claiming that God cannot be the cause of all being since he is not the cause of himself. “Metaphysics cannot seek to demonstrate the existence of all being, but only of particular beings. God is included under this latter category, namely as a type of being, the kind which is uncaused” (Oliver 2005: 140–143). Thus, the ground is prepared not only for the separation of physics and metaphysics but the subordination of theology to the latter.
- 21 See Harrison (2001), pp. 11–120 and Funkenstein (1986), pp. 28–116.
- 22 See also Maurer (1999), pp. 179–183 and Gilson (1955), pp. 495–497.
- 23 See Maurer (1999), pp. 209–228, for the fate of the divine ideas.
- 24 See Duhem (1985); Maier (1982); Koyré (1958); Funkenstein (1986); Ariew (1999); Grant (1996); Secada (2000); and Martens (2000).
- 25 See Funkenstein (1986), pp. 6–10. See also Buckley (1987), pp. 68–144.
- 26 See Bacon (2000), p. 12. It is not just the aspiration to “mastery” over nature but the very concept of dominion that is new. A fuller examination of this concept would situate it within the notion of power or sovereignty emerging with the new nation-states in thinkers such as Machiavelli and Hobbes and underwritten, in many instances, by a voluntarist theology. This is beyond our present scope but see Millbank (1990), pp. 9–48; Pocock (2003),

pp. 3–48; Cavanaugh (1995), pp. 397–420; Gillespie (1995), pp. 1–63; and Hanby (2003), pp. 134–177.

- 27 See Funkenstein (1986), pp. 42–116.
- 28 See Snobelen (2001), pp. 169–208 and Oliver (2005), pp. 156–190. Howard Stein disputes J.E. McGuire, H. Metzger, David Kubrin, Alexander Koyré, and others who argue that the basic conceptions of Newton’s natural philosophy are grounded in his theology. Stein insists that because Newton denied—against Descartes—that metaphysics is the foundation of physics, that “the opinion [of these scholars] is at variance with what Newton himself thought about these connections, and therefore at variance with at least the epistemological side of Newton’s own metaphysics.” The truth of Stein’s contention is not so clear. As a voluntarist and a moralist with Socinian sympathies, Newton distinguished between “metaphysics” of a Cartesian variety and true religion which locates the essence of divinity not in “infinity,” “perfection,” and other such predicates, but in God’s “dominion,” i.e., the immutable force of his will. As we will consider, this conception of God fits very neatly with Newton’s natural philosophy and would have been impossible without something like it. See Stein (2002), pp. 260–261, 297–298, n. 17.
- 29 See Ariew (1999), pp. 77–96.
- 30 See also I.80–I.81.
- 31 See the opening words of the preface in Bacon (2000), p. 6.
- 32 Commending his work to King James, Bacon writes that
- It is certainly quite new; a totally new kind of thing; though drawn from a very old model, namely the world itself, and the nature of things and of the mind (2000: 4).
- 33 But as soon as I had acquired some general notions in physics and had noticed, as I began to test them in various particular problems, where they could lead and how much they differ from the principles used up to now, I believed that I could not keep them secret without sinning gravely against the law which obliges us to do all in our power to secure the general welfare of mankind. For they opened my eyes to the possibility of gaining knowledge which would be very useful in life, and of discovering a practical philosophy which might replace the speculative philosophy taught in the schools. Through this philosophy we could know the power and action of fire, water, air, the stars, the heavens and all the other bodies in our environment, as distinctly as we know the various crafts of our artisans; and we could use this knowledge—as our artisans use theirs—for all the purposes for which it is appropriate, and thus make ourselves, as it were, the lords and masters of nature (Descartes, *Discourse*, 6, CSM I, 142).
- 34 See also Bacon (2000), I.98.
- 35 See also Miner (2004), pp. 40–44.
- 36 Hans Jonas makes the important point that while the scientific revolution was technological in nature in that it reconceived of both nature and the knowledge of nature in technological terms, the history of technological development and the history of the new theoretical science would proceed along mostly parallel tracks well into the nineteenth century. See Jonas (1974), pp. 45–80.
- 37 On the prevalence and varieties of “corpuscular” theories, their similarities and differences from Democritus, and the presence in the seventeenth century of a “Peripatetic atomism,” see Ariew (1999), pp. 123–139. In explaining his own conception of form, which is the law governing the latent process which constructs the artifacts of nature, Bacon writes,
- Nor have we forgotten that earlier we criticized and corrected the error of the human mind in assigning to Forms the principal role in being. For though nothing exists in nature except individual bodies which exhibit pure individual acts in accordance with law, in philosophical doctrine, that law itself, and the investigation, discovery and explanation of it, are taken as the foundation of both knowing and doing. It is this law and its clauses which we understand by the term Forms... (2000: II.2).

- 38 See Descartes, *Discourse*, 1–2, CSM I, 111–122.
- 39 There is something analogous to the idols of the “tribe” and the “cave” in the fact that Descartes regards “opinions of childhood” as one of the chief causes of error, and Bacon and Descartes both employ the nominalist criticism that “we attach our concepts to words which do not correspond precisely to real things.” See Descartes, *Principles*, I, 71–74, CSM I, 218–220 and Bacon (2000), pp. I.59–I.60.
- 40 Emphasis mine.
- 41 See Descartes, *Discourse*, 2, CSM I, 116–122; *The World*, 7, CSM I, 93–98.
- 42 I have addressed this in detail in Hanby (2003), pp. 161–177.
- 43 On the presupposition of final causality in Descartes’ assumption of the principle of sufficient reason, see Osler (2001), pp. 154–158. On the importance of this principle and its immunity to Descartes’ hyperbolic doubt, see Marion (1986), pp. 297–338. See also Husserl (1970), pp. 78–84.
- 44 Descartes did not publish his early works *The World* and the *Treatise on Man* because of the condemnation of Galileo.
- 45 During his quarrel with the Utrecht theologians, Descartes responded in a letter to Henricus Regius, who taught Cartesian natural philosophy in Utrecht and whose student had unwisely claimed in a public disputation that man is a being, a unity of body and soul “per accidens.” Descartes cites this text as an example of how one need never “put forward any new opinions, but retained all the old ones in name, and merely brought forward new arguments” (CSM 3: 205). See Ariew (1999), p. 90.
- 46 Charles De Koninck captures an aspect of this difference by asking whether $1+1=1+1$ is the same as $1+1=2$. How one answers this question determines whether one tacitly regards number as premised upon the unity of being (as Plato did and why the ancients had no concept of zero), in which case it has a symbolic relation to logos, or whether one regards number as “merely a collection or aggregate, as a logical fiction or symbolic construction,” whose being as Hermann Weyl put it, “exhausts itself in the functional role which they play and their relations of more or less.” For this reason, De Koninck says that “mathematics is now largely equated with its technique, or rather that all mathematical entities are defined by the technique for manipulating them” (1960: 1–5). For an analogous argument about the transformation of geometry along these lines, see Lachterman (1989). For more on the ancient meaning of number in relation to logos, see the beautiful little book by Stratford Caldecott (2009).
- 47 Funkenstein distinguishes thus between Ockham’s and Descartes’ use of the principle.

Throughout its Nominalist career, the “principle of annihilation” remained only a negative principle, defining what a thing is *not* rather than what it *is*. For Descartes (as, in another way, for Hobbes) it became a constructive principle, since intuitive cognition meant something other for him than it meant for Olivi or Ockham: the immediate evidence of concepts or images rather than the immediate evidence caused by the presence of “things” (Funkenstein 1986: 186).

- 48 See Newton (1962), pp. 138–140.
- 49 The “proof” that God is not a deceiver does not then negate the destructive work of Cartesian voluntarism; it merely secures the veracity of clear and distinct ideas. See Menn (1998), Hanby (2003), and Gillespie (1995).
- 50 See Secada (2000), pp. 7–26, 194–198. Properly speaking, it is only substances and their properties, which are individuated by their forms and are thus purely singular, that are really distinct for Descartes. The real distinction between *esse* and *essentia* is thereby transposed, in us, into a real distinction between *res cogitans* and *res extensa*.

51 Funkenstein puts it thus:

New in early modern physics was certainly not the employment of imaginary, counterfactual states but the insistence on their commensurability. Limiting cases explain nature even while they do not describe it; and they can be measured (1986: 156).

See also p. 177. There is a parallel to this priority of the counterfactual in the “states of nature” in the political theory underlying the artifact which is the modern nation-state.

52 See Descartes, *Principles*, 3, 45–47 and 4, 1, CSM I, 256–257, 267. The priority of the counterfactual is particularly evident in Descartes’ posthumously published treatise, *Le Monde*, CSM I, 81–98. This early treatise is interesting, in contrast to the *Meditations*, because it contains all the elements of Descartes’ mature natural philosophy without the hyperbolic doubt and the fundamental principle that supposedly grounds that philosophy. This is further evidence for the obvious, namely, that Descartes’ mechanical ontology is the presupposition, and not the conclusion of the exercise in the *Meditations*.

53 Husserl (1970), pp. 44–45.

But now we must notice something of the highest importance that occurred even as early as Galileo: the surreptitious substitution of the mathematically substructured world of idealities for the only real world, the one that is actually given through perception, that is ever experienced and experienceable—our everyday life-world. This substitution was promptly passed on to his successors, the physicists of all succeeding centuries.

54 I will argue this point in Chapter 6 and in Part III. David Bohm, e.g., maintains that the usual interpretation of quantum mechanics remains a form of nondeterministic mechanism despite his own view that quantum physics undermines mechanism. See Bohm (1957), pp. 94–103.

55 See Hall (1978), pp. 76–99.

56 See Newton (1962), pp. 121–156; Cohen (1999), pp. 43–64; and Ariew (1999), pp. 123–139.

57 See Descartes, *The World*, 5, CSM I, 89:

If you find it strange that in explaining these elements I do not use the qualities called “heat”, “cold”, “moisture” and “dryness”—as the philosophers do—I shall say to you that these qualities themselves seem to me to need explanation. Indeed, unless I am mistaken, not only these four qualities but all others as well, including even the forms of inanimate bodies, can be explained without the need to suppose anything in their matter other than the motion, size, shape, and arrangement of its parts.

See also Newton (1962), pp. 140–144.

58 I am indebted to D.C. Schindler for this way of putting it.

59 See Galileo Galilei, *Dialogue* (2001), pp. 71–92 and Descartes, *Principles*, II, 23, CSM I, 232.

60 Roger Ariew, noting that Descartes here uses “form” in its traditional sense as a kind of quiddity, writes, “Here we see Descartes struggling with the terminology needed to carry his new conception of nature.” Elsewhere, indeed elsewhere in this essay, form will “unequivocally denote shape and size, the products of local motion” (Ariew 1999: 90).

61 This seems to me to be one implication of the Copenhagen interpretation or the usual interpretation of quantum mechanics. For more on this see McMullin (1978), pp. 271–298. For more on the historical development of the concept of matter more generally, see Toulmin and Goodfield (1962).

62 See Bohm (1957), pp. 34–67. That the essence of existence, so to speak, now consists in measurability can be illustrated in connection with field theory. Bohm notes that eventually scientists simply went around the problem of what if any material medium carried the electromagnetic field by dispensing with the question and simply assuming the existence of fields with or without a medium, since the experimental results at the time were the same either way.

As a result, there arose the notion that fields are qualitatively new kinds of entities, which we have the same right to postulate as we have to postulate material bodies (such as atoms), provided that such a postulate will help in the explanation of a large range of facts and experimental results (Bohm 1957: 44).

- 63 I would suggest further that what has changed is not the basic fact of anthropomorphism, but the concept of the *anthropos* in whose image the world is reflected.
 64 I owe the notion of “stylized” matter to Adrian Walker.
 65 D.L. Schindler, arguing that the mechanistic conception of *physis* entail the loss of immanence, makes this point very well.

Of course it is possible still to conceive the mind, as Descartes in fact does, in some sense inside matter. But note how...the meaning of “inside” (inner, internal) now gets transformed. The mind’s immaterial agency is (can be) inside matter (the body) only after the manner of what is disjoined or separate (somewhat after the manner in which we might picture something like a gremlin lurking at the center of a machine: not in—immanent within—the machine; but rather remaining external to the machine albeit now from somewhere imagined to be at its center) (D.L. Schindler 1986: 9).

- 66 See the *Stanford Encyclopedia of Philosophy* at <http://plato.stanford.edu/entries/henricus-regius>.
 67 See, e.g., Descartes, *The Treatise on Man*, CSM I, 99.
 68 See also Descartes, *Discourse*, 2, CSM I, 121–122. One perhaps hears in the contrast between clear and distinct ideas and their contraries echoes of Ockham’s distinction between denotative and connotative terms.
 69 I concur with Jonas that the conflation of nature and art finds its fulfillment in the conflation of being and history, represented paradigmatically by Darwinism. I disagree, however, that this means the conflation of being with action and process, or more precisely still, that process is equivalent to action. I wish rather to argue that this new metaphysics reduces being to history and process and for this very reason “stills” the world at the same time.
 70 It was Locke who coined the terms “primary” and “secondary” qualities. The distinction itself goes back to the ancient atomists and skeptics, and E.A. Burt traced its development in Kepler and Galileo through Descartes and Hobbes. See Burt (2003), pp. 63–134.
 71 Locke insisted that the causal connexion between “primary” and “secondary” qualities was undiscoverable (1997, II.8.25, II.3.12). We shall argue in subsequent chapters that it is never finally possible to eliminate formal and final causality from our identification of a causal event. See D.C. Schindler (2010), pp. 15–44.
 72 James Weisheipl seems to concur.

The basis for the principle of inertia lies, therefore, in the nature of mathematical abstraction. The mathematician must equate: a single quantity is of no use to him. In order to equate quantities he must assume the basic irrelevance of nullity or other factors, otherwise there can be no certainty in his position. The factors which the mathematician considers irrelevant are, as we have seen, motion, rest, constancy, and unaltered directivity; it is only the change in these factors which has quantitative value. Thus for the physicist it is not motion and its continuation which need to be explained but change and cessation of motion—for only these have quantitative value. The principle of inertia which is necessitated by every equation must exclude the vitality of real existence, spontaneity, motion, and finality. In other words, the logical function of inertia in mathematical abstraction necessarily relinquishes the reality and spontaneity of nature (Weisheipl 1985: 47).

- 73 Veatch is drawing upon Russell (1922), Chapter 5.
 74 Descartes does refer to motion, “in the ordinary sense of the term” as “the action by which a body travels from one place to another.” Motion, in the strict sense, however, he defines as

the transfer of one piece of matter, or one body, from the vicinity of other bodies which are in immediate contact with it, and which are regarded as being at rest, to the vicinity of other bodies (Descartes, *Principles*, II, 25, CSM I, 233).

He distinguishes this “transfer” from the ordinary sense of “force” or action” in order to “make it clear that the motion of something that moves is, like the lack of motion in a thing which is at rest, a mere mode of that thing...” He further specifies this mode as a “state” (*Principles*, II, 25, 27, CSM I, 233–234). In *De Gravitatione*, Newton’s most explicitly anti-Cartesian text, Newton will attack this distinction between the ordinary and strict sense of motion, and argue (partially on voluntarist grounds) that Cartesian motion is not motion at all (1962: 127–128). However, the law of inertia appears as law I in the *Principia* of both Descartes and Newton, and the latter retains the former’s definition of motion as a state (*status*). See Descartes, *Principles*, II, 37, CSM I, 240 and Newton, *Principia*, axioms, law I, p. 416. See also Cohen (1964), pp. 39–46 and Cohen (1999), pp. 46–49.

75 For Descartes this is precisely the point.

When I considered the matter more closely, I came to see that the exclusive concern of mathematics is with questions of order or measure and that it is irrelevant whether the measure in question involves numbers, shapes, stars, sounds, or any other object whatever. This made me realize that there must be a general science which explains all the points that can be raised concerning order and measure irrespective of subject-matter, and that this science should be termed *mathesis universalis*...(*Rules*, 4, CSM I, 19).

76 See Grant (1969), pp. 15–40.

77 I qualify the term “ontologically” because the term is not properly applicable to God since God is not an entity within a broader category of being.

78 See Hanby (2003), pp. 161–177 and Marion (1986), pp. 339–358.

79 I will have more to say about this significant point below.

80 Cartesian freedom is fundamentally negative (and Stoic). It consists in the capacity to withhold assent and thus to refuse the solicitations of the world (see, e.g., Descartes, *Principles*, I, 6, CSM I, 194). We have yet to come to grips with the implications of this understanding. See also Hanby (2003), pp. 161–177.

81 See Hatfield (1979), pp. 113–140.

82 See Descartes, *The World*, CSM I, 94–97; *Principles*, 2, 36, CSM I, 240. See especially Hatfield (1979), p. 129, where Descartes notes, in response to More’s query about the possibility of God’s extension, that God has an “extension of power.” Superficially, this is a very scholastic answer; e.g., Aquinas says something very similar. As usual, however, the meaning of power itself has changed, both because it has been abstracted from a proper doctrine of God and because it has already been reconceived as a transaction of force operating extrinsically between entities. (And, of course, “extension” is no longer a properly analogical term.) Descartes thus goes on to add something which Aquinas does not say, namely, that it is through this extension of power that God communicates motion—no longer a matter of being or actuality, but local motion—to matter:

It must be said that God alone is the author of all the motions in the world in so far as they exist and in so far as they are rectilinear; but it is the various dispositions of matter which render them irregular and curved (Descartes, *The World*, CSM I, 97).

Hatfield notes that the concept of force for Descartes cannot derive from any inherent properties of matter, which has been emptied of all qualities and is therefore passive, but from the constancy of God’s immutable act upon it, the same constancy which is responsible for the conservation of motion.

- 83 Elsewhere I have argued that this is also the function of the argument in the *Meditations* for God as *ens summe perfectum*, which I touch on briefly below. See Hanby (2003), pp. 161–177.
- 84 Descartes follows the schoolmen in denying that *substantia* can be predicated univocally of God and creatures, but he offers uniquely Cartesian grounds for doing so. He objects not on grounds that God is *ipsum esse subsistens* and therefore that to which such terms properly refer. Rather he defines substance as “a thing which exists in such a way as to depend on no other thing for its existence,” and he denies univocal predication on grounds that all other substances apart from God “can exist only with the help of God’s concurrence” (Descartes, *Principles*, I, 51, CSM I, 210).
- 85 I am well aware, of course, that *substantia infiniti* is one of the first names of Descartes’ God. I am suggesting, and have argued elsewhere, that Descartes’ is a “bad infinite” formulated in juxtaposition, and thus in real relation to the finite, and is thus not equivalent to the *ipsum esse subsistens* of God. See Hanby (2003), pp. 161–177.
- 86 See Aquinas, *ST*, I.8.1.
- 87 None of the seventeenth-century thinkers seem as clear as Ockham that univocity implies equivocality as well such that nothing, really, can be positively said of God.
- 88 See also Hanby (2003), pp. 161–177.
- 89 Descartes’ “strict sense” of motion, “the transfer of one piece of matter, or one body, from the vicinity of other bodies which are in immediate contact with it, and which are regarded as being at rest, to the vicinity of other bodies” (Descartes, *Principles*, II, 25, CSM I, 233), allowed Descartes to stipulate that the earth was motionless, since it did not move relative to its vortex, while affirming the Copernican view that all the planets are carried around the sun by the vortex (3, 28–30, CSM I, 252–253). This led Descartes to boast that “the only difference between my position and those of Copernicus and Tycho is that I propose to avoid attributing any motion to the earth, thus keeping closer to the truth than Tycho while at the same time being more careful than Copernicus” (3, 19, CSM I, 251).
- 90 On Newton’s departure from Descartes, see Stein (2002), pp. 256–307.
- 91 See Dobbs (1975), pp. 16–18.
- 92 Of the fusion between the ideal of unequivocation on the one hand and the ideals of homogeneity and monocausality on the other we said that it was accompanied by a fusion of theology and physics into almost one science. Newton’s philosophy of nature proves it (Funkenstein 1986: 89–90).
- 93 The methodological parallel between Newton’s natural philosophy and his biblical exegesis and his belief that later Christianity represents the corruption of the pure moral religion of Noah are evidence in support of this point. See Oliver (2005), pp. 161–162; Snobelen (2001), pp. 202–208; and Manuel (1973), pp. 3–49.
- 94 See the work of Amos Funkenstein, Betty Jo Teeter Dobbs, Stephen Snobelen, Frank Manuel, James Force, and Simon Oliver cited throughout this chapter.
- 95 In a famous letter from 1692, Newton wrote to Richard Bentley,
- When I wrote my treatise about our Systeme I had an eye upon such Principles as might work wth condiering men for the beliefe of a Diety and nothing can rejoyce me more than to find it usefull for that purpose.
- Turnbull et al. (1961), p. 233, quoted in Oliver (2005), pp. 156–157.
- 96 See also Snobelen (2001), pp. 175ff; Manuel (1964), pp. 150ff; Dobbs (2002); and Markley (1999), pp. 121–144. Newton was not a pioneer in this sort of eccentricity. The idea of Moses as a cosmologist had been gaining currency since the late sixteenth century. See Harrison (2001), pp. 138–147.

- 97 For extensive citation of the documentary evidence from Newton's notebooks and manuscripts, see Snobelen (2001), pp. 184–186.
- 98 See Snobelen (2001: 194).
- 99 Snobelen masterfully demonstrates from Newton's previously unpublished manuscripts and correspondence both the anti-Athanasian context of dogmatic claims in the *General Scholium* that are otherwise ambiguous and the Socinian origins of Newton's theological semantics. Edwards had pointed this out in the eighteenth century to mostly deaf ears.
- 100 See Milbank (1990), pp. 9–26, for the significance of the new concept of sovereignty in the political sphere.
- 101 The text in question is Johann Crell's *De Deo et ejus attributis*, quoted in Snobelen (2001: 192):

because the term God...is fond of...additional clauses...which relation is signified to the others, as when God is said to be God of this or that...it is easily understood, that that term is neither by nature particular, nor does it signify God's essence itself...Why therefore is God so frequently called God of these or those? Certainly because the term God is principally a name of power or empire.

- 102 Emphasis mine.
- 103 Of course, Descartes himself attempted to extricate God from this with the dualism of *res extensa* and *res cogitans*. Convinced by Hobbes' materialist rebuttal to this dualism, More attempted to rescue God by granting spirit extension as well. On More, and Newton's debts to him, see Burt (2003), pp. 143–150, 254–264.
- 104 The “principle of annihilation” is operative in several ways here, first in separating body and extension.

Moreover, since we can clearly conceive extension existing without any subject, as when we may imagine spaces outside the world or places empty of body, and we believe [extension] to exist wherever we imagine there are bodies, and we cannot believe that it would perish with the body if God should annihilate a body, it follows that [extension] does not exist as an accident inherent in some subject” (Newton 1962: 132).

Newton is also concerned that Descartes compromises the absolute power and dominion of God insofar as his theory fails to yield a sense of “one motion [that] can be said to be true, absolute and proper in preference to others.”

It follows from the same doctrine that God himself could not generate motion in some bodies even though he impelled them with the greatest force. For example, if God urged the starry heaven together with all the most remote part of creation with any very great force so as to cause it to revolve about the earth: yet from this, according to Descartes, the Earth alone and not the sky would be truly said to move (1962: 127–128).

- 105 Manuel claims that Newton was simply “tossing off a similitude, an analogy” and that Leibniz, who famously took him to task for it, actually knew this. Manuel does note an interesting speculation that the qualifier *tanquam* (as it were) is a later amendment designed to cover Newton's tracks. See Manuel (1973), p. 77.
- 106 Newton confirms our earlier point about the transformed sense of analogy. The passage continues.

Thus I have deduced a description of the corporeal nature from our faculty of moving our bodies, so that all the difficulties of the conception may at length be reduced to that; and further, so that God may appear (to our innermost consciousness) to have created the world solely by the act of will alone; and besides, so that I might show that the analogy between the Divine faculties and our own is greater than has formerly been perceived by the Philosophers (Newton 1962: 141).

Newton most likely took the analogy from Henry More.

- 107 According to Funkenstein, “both objects and sensible species are the same for God” (1986: 97). Inasmuch as we are permitted to take the *sensorium* analogy literally, this too represents a departure from Thomas with respect to the role of the divine powers in creation. For Aquinas, God knows creation in knowing himself, in knowing all the ways he can be related to actually or potentially, and it is in thus knowing the world that God creates the world. Creation is foremost an act of the divine intellect, which is why the Trinity is necessary for an adequate understanding of it. For Newton, creation is principally an act of the divine will, which divorced from the transcendentals, is distinct from the intellect in a manner that it is not for the orthodox tradition. Consequently, it seems that for Newton, God’s knowledge of the world is dependent upon the world in a way that it had not been for Aquinas.
- 108 See Whitehead (1948), pp. 12–14 and Oakley (1961), p. 80.
- 109 See Milton (1981), pp. 173–195 and Oakley (1961), pp. 65–83.
- 110 See Osler (2001), pp. 152–153 and Lenoir (1982), pp. 1–53, 112–154, 246–280.
- 111 See Kant (1987), p. 264.

Why, then, does teleology usually not constitute a distinct part of theoretical natural science, but is employed by theology as a propaedeutic or transition? This is done so that, when we study nature in terms of mechanism, we can keep up to what we can observe or experiment on in such a way that we could produce it as nature does, at least in terms of similar laws; for we have complete insight into what we can ourselves make and accomplish according to concepts.

- 112 For more on this “utilitarianism” and its relation to the new concept of matter, see Hall (1978), pp. 76–99.
- 113 Emphasis original.
- 114 It is a secondary issue whether one conceives of these surfaces in a literal, geometrical sense, like Descartes, or in terms of some other quanta. Husserl captures an essential dimension of this superficiality and its subjective effect.

This schema for a possible clarification of the problem of objective science reminds us of Helmholtz’ well-known image of the plane-beings, who have no idea of the dimension of depth, in which their plane world is a mere projection. Everything of which men—the scientists and all the others—can become conscious in the natural world-life (experiencing, knowing, practically planning, acting) as a field of external objects—and on the other hand, also, in self-reflection, as the spiritual life which functions thereby—all this remains on the “plane,” which is, though unnoticed, nevertheless only a plane with an infinitely richer dimension of depth (Husserl 1970: 118).

- 115 Hans Jonas makes a similar point. See Jonas (2001d), pp. 188–210.
- 116 Bernard’s is not an isolated example. Jacques Loeb, writing in the early twentieth century, makes a similar point.

It is seemingly often taken for granted by laymen that “truth” in biology, or science in general, is of the same order as “truth” in certain of the mental sciences; that is to say, that everything rests on argument or rhetoric and that what is regarded as true today may be expected with some probability to be considered untrue tomorrow. It should, however, be remembered, that modern biology is fundamentally an experimental and not a descriptive science; and that its results are not rhetorical, but always assume one of two forms: it is either possible to control a life phenomenon to such extent that we can produce it at desire...or we succeed in finding the numerical relation between the conditions of the experiment and the biological result (Loeb 1912: 3).

And Gregory Stock, writing in the twenty-first, approvingly declares that in our century, “biological understanding will likely become less an end in itself than a means to

manipulate biology. In one century, we have moved from observing, to understanding to engineering” (Stock 2002: 7).

117 Jonas comments upon the ontological reduction noted above:

Once left to deal with the residual products of this reduction, or rather, with their measured values, mathematics proceeds to reconstruct from the complexity of phenomena in a way which can lead beyond the data of the initial experience to facts unobserved, or still to come, or to be brought about (2001d: 200).

118 There are at least two “negative” reasons for science’s interminably “restless” character. If scientific knowing *is* technological manipulation, as we are arguing, then knowledge and ignorance alike beget further technological manipulation, not only to verify solved problems or to overcome unsolved problems but also because each intervention in the whole generates unanticipated exigencies calling for a response in kind. In Part III, I will nevertheless suggest a positive ground for this, namely, the intensive infinity of nature which follows from a proper understanding of creation *ex nihilo* and which insures that nature can never be exhausted by our knowledge of it. In this case, the manipulability of nature is a function of what the ontology of science suppresses in nature rather than what it affirms. For more on the “restless” character of science, see Heidegger (1977), pp. 311–341; Grant (1986), pp. 11–34; and Jonas (2001d), pp. 188–210.

119 See Funkenstein (1986), p. 151; Jonas (2001d), pp. 200–205; D.C. Schindler (2010), pp. 25–33; and Veatch (1969), pp. 26–62, 106–144.

120 Veatch cautions us against confusing Aristotelian subject–predicate relations with substance–accident relations. These also reveal the being of the subject, but one cannot say simply that a substance *is* its accident, insofar as *is* denotes identity. What is required, and what Veatch does not himself supply, is a more thorough explication of the “logical grammar of the word ‘is’ or of the ‘is’ relationship,” based on a metaphysics of act (1969: 29–31).

121 Jonas makes this point powerfully by asking what God, as “mathematician, could *see*.” Excluded from his vision are all those things which we have associated with metaphysical interiority, and most fundamentally, from life. See Jonas (2001a), pp. 64–98.

122 Such an understanding is implicit in and follows from the Lockean and Humean idea that complex ideas are created by “joining,” “compounding,” “conjoining,” or “annexing” simple ideas or impressions to one another. See Locke (2004), II.12.1–II.12.8, III.8.1–III.8.2; Hume (2009), I.1.1.1–I.1.1.10, I.1.4.1–I.1.4.7.

123 On modern *mathesis* as “technization,” see Husserl (1970), pp. 46–48.

124 This, for the physicist David Bohm, is one of the core judgments of a mechanistic ontology, that the basic elements constituting reality are essentially external to each other, “not only in being separate in space, but more important, in the sense that the fundamental nature of each is independent of the other.” This is the grounds for a physics of force, i.e., for an extrinsic interaction that does not deeply affect the inner nature of the *relata*. See Bohm (1986), p. 15.

125 Of course, one must also take into account that scientific conclusions about the behavior of nebulae will derive in part from extrapolations from smaller scale experiments that do submit of “action,” properly speaking, so that the maxim of Vico and Kant that we can know only what we ourselves have made applies to large-scale phenomena such as nebulae as well. Bernard argues that “it is on this very possibility of acting, or not acting, on a body that the distinction will exclusively rest between sciences called sciences of observation and sciences called experimental” (1957: 9).

126 On the unintelligibility of causality after Hume, see Jonas (2001b), pp. 25–33 and D.C. Schindler (2010), pp. 15–44.

- 127 This is one reason why the moral tempering of science always appears as moralism, a morality unrelated to reality, and is one of the sources of the “technological imperative.”
- 128 We should nevertheless take heed when an eminent scientist such as James Watson asks, “[I]f we could make better human beings by knowing how to add genes, why shouldn’t we?” Watson is quoted in Stock (2002), p. 12.
- 129 Surely the alchemical preoccupations of Newton and his contemporaries are relevant here.
- 130 See D.C. Schindler (2008), pp. 1–40 and Chapter 1, n. 60.
- 131 See Rorty (1991), p. 193 and Sommers and Rosenberg (2003), pp. 653–668.
- 132 Georges Bernanos captures the subjective dimension of this sophistry well in the figure of the imbecile, whose

legendary sense of security comes...from the fact that they are made for only two dimensions. They know the third dimension as we know the fourth—by hearsay. For the imbecile does not have at his disposal any instrument allowing him to enter within himself. All he can do is explore the surface of his own being (cited in Balthasar 1988: 363).

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4

Unnatural “Theology”

The “eclipse of the universe” includes but is not limited to the now-familiar story of epistemic and cultural fragmentation. More fundamentally, it coincides with a revolutionary transformation of the very meaning of entity, unity, and order. It is therefore a metaphysical and even theological revolution as well as a physical revolution, with antecedents and consequences beyond the theoretical range and interests of most scientists, historians, and philosophers of science. Charles Darwin’s contribution to this revolution is generally thought to be so earth-shattering, so original that all attempts to answer the profound questions of human existence “before 1859 are worthless and...we will be better off if we ignore them completely.”¹ In truth, however, Darwin was as much the heir to this revolution as an author of it. According to Richard Lewontin, the real “Darwinian Revolution” was not

the idea of evolution. Nor was it the invention of natural selection as an explanation. Although undoubtedly ingenious, and a correct characterization of a great deal of evolution, it is, in the end, only a completion of the unfinished Cartesian revolution that demanded a mechanical model for all living processes (2001: 66).

Revolutions have many midwives, however, and while Darwin typically receives most of the glory for completing the mechanistic revolution commenced by Descartes, Newton, Harvey, and Hobbes, a substantial portion of the credit should be given to the Anglican clergyman William Paley.² His *Natural Theology, or Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature* (1803) is a footnote in the history of theology, but it is a landmark in the history of biology. The biological complement to his *Principles of Moral and Political Philosophy* (1785), which had already enjoyed two decades of success championing extrinsic law, utilitarian morality, and the right to property, Paley’s *Natural Theology* joined its predecessor text in enjoying a long career within the English establishment. Though already worn

and tattered by the time of Darwin's intellectual maturity (updated versions of Paley's arguments in the infamous *Bridgewater Treatises* had been met with great derision well before the appearance of the *Origin of Species*), it had been an institutionalized part of the biology curriculum at Oxford and Cambridge in Darwin's younger days, and its arguments provided a great deal of impetus for Darwin's own theory. To this day, it remains a favorite foil of Darwin's most ardent defenders, who regard it as the apex of Christian thought on creation (Dawkins 1996: 1–41). But as I shall argue in this chapter and in Chapter 5, it turns out that the *Natural Theology* is neither natural nor theological, failing as it does even to approach a properly theological conception of creation. I shall maintain furthermore that the appearance of a fundamental disagreement between Darwin and Paley is an illusion. As we shall see, what unites them is far more profound than what divides them, and what unites is a set of metaphysical and theological assumptions that ground the science. The fact that Darwin and Paley agree on what God and creation *are* is much more fundamental than the fact that one believes this theology and the other does not.

It nevertheless remains a fixed part of Darwinian lore that Darwin finally achieved for science what Hume had achieved for philosophy, vanquishing once and for all the tradition of natural theology exemplified by Paley.³ A number of commentators have argued that Darwin's theory was able to achieve this victory, establishing scientific respectability and occasioning great scandal in the process, because it succeeded at long last in extending the reach of the Newtonian paradigm of science and nature into the biological realm where it had been held at bay by the cultural power of natural theology.⁴ Newtonian ideals reigned in Victorian science in at least two ways: (a) providing the paradigm for how closed systems, regardless of type, were supposed to behave and (b) supplying the standards by which theories in various fields of inquiry would be regarded as scientific.⁵ John Herschel's *A Preliminary Discourse on the Study of Natural Philosophy*, a "canonical treatise on scientific method" especially for dissenting Whigs such as Darwin and Lyell, exemplified these terms. "Whenever any phenomenon presents itself for explanation," writes Herschel, "we naturally seek...to refer it to some one of those real causes which experience has shown to exist and to be efficacious in producing similar results" (cited in Depew and Weber 1997: 66).

In other words, properly scientific explanations are those that succeed in providing *verae causae* analogous to gravity, mechanisms which act uniformly and thus unite in a single intelligible process a diverse range of natural phenomena. So powerful was this ideal in the eighteenth and early nineteenth centuries that we witness ever-increasing areas of nature, life, and thought—from politics, to economics, to geology—brought within its purview.⁶ Each area is reimagined as a closed system comprised of unrelated individuals deflected from their inertial tendencies by forces analogous to Newtonian forces. It is in conforming to this model "that Darwin's Darwinism was informed," according to David Depew and Bruce Weber, "in a metaphorical but far from empty sense, by dynamical models taken from Newtonian physics" (1997: 3). These axiomatic models were mediated to him specifically by the political-economists Thomas Malthus and Adam Smith, whose own theories also take this form.

This is only part of the story, however, for it does not adequately consider either the depth of the metaphysical revolution wrought by Newton and other natural philosophers of the seventeenth century or the extent to which Paley himself is not just a foil

for Darwinian theory but a crucial source who goes a long way in determining the latent metaphysics and theology of Darwin and the subsequent Darwinian tradition.⁷ Because science is intrinsically related to metaphysics and theology, these influences exercise a great deal of determination not just over the Darwinian understanding of “creation” but over the shape of Darwinian biology *as* biology. Of course, we must still show that Paley himself is heir to the metaphysical and theological presuppositions of early modern natural philosophy in general and the Newtonian revolution in particular and that Darwin is not merely negatively, but positively influenced by him in the ways that I have suggested. The first task is the burden of this chapter; the second task is the burden of the next.

Why Natural Theology Is Not Natural

In Chapter 3, we characterized the vast metaphysical and theological transvaluation that began in the seventeenth century as a reduction of nature to art, which implies a correlative reduction of God from transcendent (and Trinitarian) Creator to finite (and unitarian) artisan extrinsically juxtaposed to his products. This reduction effectively eliminated both poles of the *distinctio realis* between essence and existence. Being was reduced from the *actus essendi* paradoxically common to all things and proper to each to the brute facticity of externalized matter fully positive and actual outside of and apart from form; while form itself was transformed from a principle of unity and identity transcending and thus ontologically preceding the organization of a thing’s matter to the accidental by-product of the matter’s temporary arrangement. This dispensed with what Aristotle had called the “single actuality” of the cosmos and premised the “actual universe” upon a counterfactual world of formally identical, inertial singulars, artificially isolated through analysis, which were ontologically as well as physically external to each other. And it dispensed with Aristotle’s distinctions between natural and violent motion and *per se* and incidental causality, which is to say that it dispensed with the primacy of the *actual* world, the world of things-*in-act* that are always already interiorly implicated in each other’s existence. The elimination of the *actus essendi* paves the way for the ascendancy of physics, now understood as mechanics, to the position of first philosophy and eventually to the eventual pragmatic jettisoning of the notion of first philosophy altogether and ushers in what Balthasar called the “sick blindness” of positivism, which “arises from regarding reality as raising no questions, being ‘just there’” (1990: 286).⁸ As entities are emptied of the interiority and intelligibility that heretofore distinguished them *as things*, the locus of intelligibility is transferred from things themselves to the laws governing their construction, and “explanation” comes to mean supplying those laws or mechanisms by which the real world is constructed from the counterfactual.

William Paley is heir to this view of nature. His *Natural Theology* operates entirely within the ambit of this positivism and is a perfect object lesson in the difference between genuine philosophical wonder at the question of Being and mere “admiration that everything appears so wonderfully and ‘beautifully’ ordered within the necessity of Being” (Balthasar 1991: 614).⁹ Darwinians often ridicule Paley for the enthusiasm of his admiration and justly so. His praise of the marvelous workings of nature is often

lyrical, and sometimes it is almost enough to make one blush. "Regarding the particular configuration of muscles sphincter or circular muscles appear to me admirable pieces of mechanism. It is the muscular power most happily applied..." (Paley 1854: 83).

This difference between these two dispositions is not one of mere sentiment, attitude, or piety; Paley has piety in buckets. Rather, the difference is "phenomenological" and metaphysical. It is a matter of the primitive relation between cognition and being, and it determines in advance what Paley *sees*—and does *not see*—when he looks at the world and what he sees—or at least attempts to see—when he looks at living things.

Paley ambles across his imaginary heath in the opening pages of the *Natural Theology* undisturbed by his surroundings. The heather, the stones, and the blue sky above elicit no commentary from him. The vista ostensibly opening up before him goes without mention. Paley finds nothing remarkable in the utter contingency and irreducible uniqueness of all that exists or even in the fact, which Balthasar called "astonishing beyond measure," that it is not just someone but *he* who is able at that instant to carry on such an exercise in his imagination (Balthasar 1991: 615). It is only when he happens upon his hypothetical watch with its mechanical "contrivances" adapted to a common function that he is moved to curiosity.

In other words, Paley's project does not evince the slightest curiosity in the question of being or the slightest evidence that he can even formulate the question properly. "The question is not simply, *How* came the first watch into existence?" Such questions, however theologically ill-formulated they may be, simply do not interest Paley. As he puts it, "the metaphysics of that question have no place" (Paley 1854: 12). "To suppose it to be so is to suppose that it made no difference whether we had found a watch or a stone" (1854: 12). Reflection on the sheer gratuity of his existence, the self-transcending nature of thought, or the mutual implication of intellect, memory, and desire that makes us enigmas to ourselves might have made him marvel, as did St. Augustine, that his is "a life varied and manifold and mightily surpassing measurement" (*Conf.*, X.17.26, X.33.49). Contemplation of the heath, the sky, or the stones might have provoked him to wonder at the mystery that there is anything at all. For Paley, however, "Dead matter is nothing" (1854: 253). So these are not enough to provoke his wonder, because these do not exhibit the relevant difference or supply the "contriving hand" that adapts the various parts of the watch to a function beyond themselves.

Yet, for all his interest in the difference between a watch and a stone, Paley exhibits remarkably little interest in the difference between a watch and a man. That is to say, he is not the least concerned in the *difference* between the organic and the inorganic or between an animal and a machine, save that

in the animal, we trace the mechanism to a certain point, and then are stopped; either the mechanism becoming too subtle for our discernment, or something else beside the known laws of mechanism taking place... (Paley 1854: 14).

To the contrary, he is interested in animals precisely insofar as they *are* mechanical, for it is this conception of the organism *as artifice* that will warrant the supposition of the

external artificer that Paley seeks for his *vera causa*. “The thing required is the intending mind, the adapting hand, the intelligence by which that hand was directed” (1854: 12). Differences between nature and art, the animate and the inanimate are irrelevant here because for a *vera causa* of this sort, “a piece of dead mechanism would do” (34). Indeed, Paley’s argument is ultimately predicated on converting living organism *into* dead mechanism. His famous inference from functional complexity to an “intending mind” and an “adapting hand” turns, in short, on converting nature into artifice.

This is not to deny that the differences between the animate and the inanimate continue to shine through or to say that all traces of cosmos have disappeared from Paley’s thought. This difference could not fail to shine through if this is indeed “connatural” knowledge and if the obvious as such cannot strictly be denied. Moreover, Paley’s argument does appear to shadow Aristotle’s at a number of points. Paley appears to concur with Aristotle in anticipating and rejecting natural selection. He even cites an example that we saw earlier in the *Physics*, the relation between teeth and the mastication of food, finding it incomprehensible that “the use should arise out of the part” (Paley 1854: 40).¹⁰ “No reasonable mind can doubt,” he claims, “whether the teeth were made expressly for the mastication of food, the feet for walking, the hands for holding,” though Paley’s understanding of what it means for an organism to be “made expressly” will differ vastly from Aristotle’s (1854: 41). Paley’s definition of chance superficially mirrors Aristotle’s, with the important difference that Aristotle’s “purpose” becomes design in Paley’s treatment.¹¹ Both men maintain, in rejecting “proto-Darwinism,” that chance presupposes the “teleological.” There is also at least a superficial similarity between Aristotle’s act–potency distinction and what Paley calls “prospective contrivances,” which give evidence of design by exhibiting “preparation, i.e., the providing of things beforehand which are not to be used until a considerable time afterwards” (145). Paley includes the development of human teeth, the lacteal system, and the eye—that “optical instrument made in a dungeon”—within this category (147). Finally, Paley seems to reject what I have called the “accidental world” in his concern that the “several organizations” constituting the organism “bear a concerted and contrived relation to the substance by which the animal is surrounded” (41). When he asks rhetorically whether it can be doubted that “the wings of birds bear a relation to air, and the fins of fish to water,” he almost seems to be rehabilitating Aristotelian *topos* and dispensing with the homogeneity and indifference of Newtonian space (166).

Taken as a whole, then, the *Natural Theology* can be seen as a sometimes beautiful attempt to reconstruct the cosmos according to mechanical principles and according to these relations.¹² Extending his watch analogy to the organic world, Paley reconstructs these “relations” from the ground up, as it were. He begins with the mechanical and immechanical parts and functions of plants and vegetables, proceeds to the mechanical arrangement of human and animal frames, the “internal relations” governing the mutual interaction of mechanical parts, and the “external relations” of an organism to its world. At each level, he contends that the example exhibits “contrivance” or “adaptation,” thus warranting his inference of a contriver or adapter. Finally, in an anticipation of contemporary arguments for design from cosmic “fine-tuning,” he is able to integrate animal motions with the movement of the heavens, as in this lovely passage.

If the relation of *sleep to night*, and in some instances, the converse, be real, we cannot reflect without amazement upon the extent to which it carries us. Day and night are things close to us; the change applies immediately to our sensations; of all the phenomena of nature, it belongs to the great motions which are passing in the heavens. Whilst the earth glides around her axle, she ministers to the alternate necessities of the animals dwelling upon her surface, at the same time that she obeys the influence of those attractions which regulate the order of many thousand worlds. The relation therefore of sleep to night, is the relation of the inhabitants of the earth to the rotation of their globe; probably it is more; it is a relation to the system, of which that globe is a part; and still further, to the congregation of systems, of which theirs is only one. If this account be true, it connects the meanest individual with the universe itself: a chicken roosting upon its perch, with the spheres revolving in the firmament (Paley 1854: 169).

Paley thus exclaims that "throughout the universe there is a wonderful proportioning of one thing to another" (1854: 67). His "admiration" for these proportions leads him to marvel time and again at "how many things must go right for us to be an hour at ease! How many more, to be vigorous and active!" What great good fortune, and how remarkable, he notes, that our eyes and feet point in the same direction (79).¹³ Of course, these endless examples of "adaptation" indicate just how deeply Paley identifies the good with the useful, a cornerstone of both his natural and moral philosophies that will carry over to Darwin.¹⁴ This identification of the good and the useful lends itself quite easily to a theodicy with explicitly Malthusian overtones, in which pain, privation, and evils both natural and civil become necessary elements in the realization of the good. Paley, for instance, notes that the "system of destruction amongst animals holds an express relation to the system of fecundity; that they are parts indeed of one compensatory scheme" (265). Yet, unlike Malthus, Darwin, and their heirs, Paley has some sense of the notion axiomatic within the classical and Christian tradition that pain, privation, and disorder are only intelligible as such because of the ontological priority of the good. Only because "it is a happy world after all," because being is a good sought naturally by all creatures, are threats to life regarded as such. The tradition recognizes that disorder must presuppose order if it is even to be intelligible as disorder—the fact, in other words, that evil and disorder are *privative*, and Paley retains an echo of this.

Paley's understanding of divine and created goodness otherwise bears only a superficial resemblance to its traditional antecedents, and it remains woefully inadequate, as we shall later see. But his argument for divine benevolence does lead him briefly beyond the relentless argument for adaptive utility that otherwise dominates the *Natural Theology*. He notes the apparent "uselessness" of animal play, and he observes the "redundancy" of pleasure added to sensation (Paley 1854: 254).¹⁵ "It may reasonably be asked," he says, "Why is anything a pleasure?" (1854: 269). It remains a good question that neither he nor Darwin has the metaphysical equipment to answer.¹⁶ He points out that "the necessary purposes of hearing might have been answered without harmony; of smell, without fragrance; of vision, without beauty" (267). Perhaps faintly echoing the self-communicative character of the good as beautiful, he observes that beauty appears to be a "general property of animal form" which seems almost "calculated for display" (216).¹⁷ Darwin apparently took the point seriously enough that he was compelled to "utilize" beauty for his theory of

sexual selection, not realizing perhaps that to the precise extent he “utilizes” beauty, he deprives it of its very character as “the disinterested one” that manifests an interior depth of “being-in-itselfness” (Balthasar 1982: 18).¹⁸ To the extent that he can acknowledge “beauty for beauty’s sake,” it can only finally hold epiphenomenal or subjective status; it can be ascribed no intelligible reality and no meaningful role in his ontology.¹⁹

It is on questions such as these, where he is most likely to incur Darwinian ridicule for rhapsodizing about a “happy world,” that Paley is actually at his metaphysical and theological best, for it is when he refuses to reduce goodness to utility that he comes closest to glimpsing the traditional metaphysical understanding of the good and the beautiful as a complete, and therefore self-communicating *act*, without which the universe dissolves into unintelligibility.²⁰ “Abolish the Good and you will abolish being, movement, life, desire, movement, everything,” not least because you abolish the “sake” for which agents perform one action rather than another (Ps.-Dionysius, *Div. Nom.*, IV.720c).²¹ (Darwinism, as we shall see, is plagued with this problem.) Goodness, properly understood, cannot be equated with the useful—though utility can be an aspect of it—rather, it takes the form of a final cause in virtue of which the useful is genuinely useful.²² Paley declines to reflect upon goodness in its metaphysical meaning, and this, as we shall see, will fatally cripple the explicitly theological aspect of his project. A trace of this understanding nevertheless exhibits itself in the aesthetics of his “happy world.” Darwin, who “almost delights in noting that natural selection unleashes a reign of terror that would threaten our moral values if we tried...to find ethical guidelines for human life in the affairs of nature,” does not refute this aesthetics so much as invert it (Gould 2002: 115).²³ His “struggle for existence” becomes all but unintelligible in the process.

The vast difference between Paley’s mechanical universe and the cosmos of the ancients is indicated by the fact that he overwhelmingly identifies the good with the useful, in spite of glimpses of a higher sense of the good, and that he is led by this to conceive of the question of the world’s “proportioning” as a question of the odds of it arising by accident. Gould inadvertently indicates something of this difference in his “defense” of Paley. He notes, against Paley’s more dismissive critics, that Paley’s principal point is not to rhapsodize about “the happy world” but rather to use “adaptationism as a theoretical argument about the depth of causality” (Gould 2002: 253, 266). Gould regards Paley as one of the principal architects of the “British functionalist” tradition of biology that includes Darwin himself, a tradition which stresses external mechanisms for adapting means to ends over internal “laws of form” (2002: 262–341) of the sort propounded by Goethe, Geoffroy, and Richard Owen.²⁴ (Darwin, as we shall see, had a foot in each tradition.) In all such instances of “relation,” whether they be the internal relations between “the external organs of an animal by which it procures its food, and the internal powers by which it digests it,” or external relations such as those between the “structure of the animal ear” and the “surrounding fluid,” or “the element of light and the organ of vision,” what is crucial is that the relations are seen as “contrived” or artificial (Paley 1854: 152). It is precisely this that demands the inference of an *external* contriver or designer. “[W]herever this is observed in the works of nature or of man, it appears to me to carry along with it decisive evidence of understanding, intention, art” (1854: 149). These relations are at the heart of Paley’s

concern. It is not simply the fact that Paley posits "essential" relations that is absolutely crucial—indeed Darwin will do the same (1991: 54, 57)—but rather what is meant and presupposed by the notion of "relation" and what it portends for the meaning of the living organism as a *per se unum*.

For Aristotle, "the order of generation is opposite of that of being: that which is posterior in generation is prior in nature, and the primary thing is last in generation" (*Parts of Animals*, II.i.646a25). This meant that while a living being is only fully actualized as the end result of its growth and development, its development was always nevertheless the development *of* a subject, of a this-something that is the subject of its own being and the seat of predications, as it were, while not itself being predicated of anything else.²⁵ In other words, in order for development and growth to be the development and growth *of* a thing, this development must presuppose an "indivisible" unity or identity that *ontologically* precedes and transcends its historical unfolding, a unity and identity that is the principle of integration for the parts as they develop and for whose sake they develop. It is indeed precisely the full realization of this identity and unity—its perfect actuality—that all things "seek" in their endeavor *to be* (Aristotle, *Metaph.*, XII.ix.1075a5–XII.x.1075a24; *De Anima*, II.iv.415b8–II.iv.415b22).²⁶ This is what Aristotle means when he states "where a series has a completion, all the preceding steps are for the sake of that" (*Physics*, II.8.199a9–II.8.199a10). And of course it is this identity of what a thing actually is and this unity for whose sake it unfolds that Aristotle meant when he called the "soul" (*anima*) the *actuality* of a body, an idea miles away from the Cartesian notion presupposed and rejected by modern materialism, in which the soul is a separated substance problematically united to a merely mechanical body (*De Anima*, I.ii.412a29–I.ii.412b9).²⁷

In just what sense this self-transcending unity or identity can be said *to be* is a question which Aristotle does not adequately answer, and arguably cannot be adequately formulated apart from a proper sense of creation.²⁸ Nevertheless, without some such notion of form and unity, it is impossible to account for the regular patterns exhibited in the development and growth of a natural thing and the intrinsic integration of its parts, as the growth and integration *of* the thing as the subject, and not just the outcome of that growth and integration. And inasmuch as one fails to account for the unity of the thing as the subject of its own being, growth, and development, it becomes difficult to account for the continuity of a thing's being and identity from one stage of development—indeed from one "moment"—to the next, "the simultaneous and successive" character of experience and existence that so preoccupied Goethe (1989: 81).

Absent this unity and identity, the very functionality and "prospective contrivances" which fascinated Paley become merely incidental and apparent. This problem was at the core of Aristotle's criticism of the "proto-Darwinian" unity of chance and necessity. If a set of teeth or other organs only spring up in a creature due to mechanical necessity, and the creature only survives because they happen to be useful, then the problem is not simply that the teleological relation between the organs and faculties of living things and their objects is merely apparent, though this is indeed problematic. Rather, it is that the relation of biological parts to the whole whose parts they are—indeed the identity and unity of the whole itself—becomes merely incidental and apparent.²⁹ It only *happens* that this two-celled organism develops a metabolic system

belonging to this human being, just as it only happens that these particular bits of wood are made by Antiphon into a bed rather than a desk. That it does so always or “for the most part” or that scientists can trace and manipulate these developmental processes does not alter its accidental character or resolve the question of the continuity of identity at the ontological level. It does not resolve *what* the thing is, or *how* it is one thing. It does not tell us the sense in which it is the same being through the course of its existence, or the status of the “is” itself. It merely provides “Humean” warrant for taking this continuity of identity for granted in practice while denying it in theory. This is simply to say, as indeed Aristotle does, that one who attempts (so far as this is possible) to deny the ontological primacy of form “entirely does away with nature and what exists ‘by nature’” (*De Anima*, II.viii.199b14–II.viii.199b15). The conversion of nature to artifice effectively does away with the organism as the subject of its own being and action. It becomes an accidental aggregation of parts outside of parts which are the parts of no real whole. Let us explore further what this means.

Paley himself is quite straightforward about doing away with nature. Rejecting the neoclassicism of Buffon, he is every bit as explicit as his seventeenth-century forebears in denying that anything resembling Aristotelian *natura*, “any universal law of animal organization” or a natural “principle of order” can account for contrivances or contrived relations (1854: 245).³⁰ Displaying his commitment to Newtonian ideals of explanation, Paley objects that such notions merely “substitute words for reasons, names for *causes*” (42). Darwin would eventually turn this very argument against Paley, arguing that

it is so easy to hide our ignorance under such expressions as the “plan of creation,” “unity of design,” etc., and to think that we give an explanation when we only re-state a fact (Darwin 1991).

In rejecting Aristotelian *physis* for Newtonian mechanism, Paley dramatically alters the very meaning of relation as such, and therefore the meaning of the relation between the parts of organic beings and the wholes that are such beings. “Relation” is at the heart of Paley’s concern, as is obvious from his definition of it. Paley defines a relation as what occurs

when several different parts contribute to one effect, or, which is the same thing, when an effect is produced by the joint action of different instruments to one another, for the purpose of producing, by their united action, the effect... (1854: 149).

There are two things of interest in this definition. The first and most obvious is that Paley has defined relation in purely functional terms, as the ratio of means to ends. The second is that Paley identifies the unity of the parts in these same terms, as the result of their “united action.” This effectively makes the part prior or more basic than the whole whose part it is, and conversely, makes the unity of the whole a unity of function or effect consequent upon the interaction of the parts. Relation as such is therefore a secondary and extrinsic qualification of the *relata*, which, so far as we can tell, are internally unaffected in their own identity or meaning by the relation. In other words, the identity of parts precedes and excludes relation to the wholes of

which they are parts and to the world which has always already penetrated them in the concrete course of their actual existence. In themselves, living things now lack the indivisible unity conferred on them by *physis*. In the act of being, living, and doing, they no longer comprise a single actuality with the world that is their essential presupposition. Relation, then, of whatever species is extrinsic and accidental, as it were, to a more basic "inertial" indifference which precedes and excludes that relation. Relation is something "superadded" when "unconscious particles of matter [that] take their stations, and severally range themselves in an order, so as to become collectively plants or animals, i.e., organized bodies" (Paley 1854: 235). This "superaddition" of relation then becomes the problem requiring an explanation, a problem whose very formulation determines in advance that an explanation takes the form of an extrinsic force or mechanism.³¹

We are now in a better position to contrast how the respective notions of relation correspond to differing conceptions of the ontological unity and identity of organisms. For Aristotle, there is what one might call an asymmetrical reciprocity of whole and parts which correspond to two types of causal dependence, temporal and ontological. On the one hand, in the order of generation in which an incipient organism moves from potency to act, it is perfectly sensible to say that the whole is "made up," and to that extent obviously dependent upon, the unfolding and development of its parts in time. Because Aristotle's dichotomy of form and matter is a polarity rather than a dualism, and because not the form but only the generated organism properly exists, there is no whole without the parts. On the other hand, and in a more fundamental ontological sense, the whole as form "precedes" the parts as the whole whose parts they are, determining them from the very outset, and from the inside, as it were, in their identity *as* parts. This is why Aristotle says that the soul causes the body (*De Anima*, II.iv.415b5–II.iv.415b10). In this case, the whole is not merely the outcome of the aggregation of the parts but is "in" the parts from the very outset, for relation to the already "given" whole is intrinsic and constitutive to the meaning of the parts as parts. This form of intrinsic and constitutive relation extends by analogy to the relation between organisms and their worlds.³² This is especially clear when viewed under the notion of act rather than as potencies. For unlike the builder and the teacher who, as potential causes, can be regarded separately from the house or the student who is the terminus of their respective actions, the builder actually building and the teacher actually teaching "comprise a single actuality of both alike" with the house being built and the student learning (Aristotle, *Physics*, III.2.202a18–III.2.202a19). Their *activity* as such begins and ceases together, and the same is true, by extension, with living things and the worlds that always already penetrate them through the activities of being and living. It is thus that one is able to glimpse the relationship between the ontological priority Aristotle accords to form and his notion of heterogeneous place: everything that exists as a "this-something" and every "this-something" naturally finds itself already "somewhere," conducive to its flourishing as what it is in the course of its actual existence. Once again, "It matters to things where they are" (Sachs 1995: 58).

Paley in his positivism has declared metaphysical inquiry irrelevant to the question of nature, so he lacks any notion of being or act which might have necessitated a distinction between the orders of being and generation.³³ Indifference to the

metaphysics of act frees Paley from the constraints of the actual world—the world of things-*in-act*—leaving him free to follow his mechanistic forebears in premising this world upon a counterfactual aggregation of inertial singularities from which it is then constructed. In the process, living things are emptied of precisely that interior immanence, unity, and actuality—one is almost tempted to say *life*—that for Aristotle had distinguished things existing “according to nature” from artifacts.³⁴ This distinction is now meaningless, as each living thing stands, like Antiphon’s bed, in an incidental and accidental relation to its own quiddity.

What is true of the internal relations constituting the organism is also true of its external relations in relation to the broader world. For example, in his treatment of animal instincts, a species of relation at once internal and external, Paley considers “parental affection” in the case of birds, moths, and butterflies whose offspring gestate outside the body. Without “opportunity either for instruction or imitation,” they nevertheless make provision for these creatures, which differ vastly from their later mature forms (Paley 1854: 173).³⁵ He notes that moths and butterflies “seek out for their eggs those precise situations and substances, in which the offspring caterpillar will find its appropriate food. That dear caterpillar the parent butterfly must never see” (1854: 175). “How shall we account for her conduct?” Paley asks.

I do not mean for her art and judgment in selecting and securing maintenance for her young, but for the impulse upon which she acts. What should induce her to exert any art, or judgment, or choice, about the matter? (175)

These remain good questions, which biology has yet to answer so far as I know. Darwin, quite obviously looking over his shoulder at Paley in his own treatment of instincts, merely begs the question. He contents himself with showing how instincts favorable to a creature’s survival would be preserved by natural selection and how this accounts for diversities of instinct among animals of the same class, doing nothing to answer the question of why a living being would be driven to survive or to secure maintenance in the first place.³⁶ These activities are significant for Paley because they seem to require a capacity for ordering means to ends, and transcending the next contiguous instant, a capacity otherwise denied to “nature” conceived in mechanistic terms. Instincts thus become evidential for Paley because his mechanistic view of nature requires him to conceive of them as something “*superadded* to the constitution of an animal, for the effectuating of a purpose beneficial to the species” (235).³⁷

This artificial or contrived relation holds both between the parts of organisms and between the organism and its environment. We have seen that the ontological priority which Aristotle accords to form as a principle of actuality has its correlate in the notion of heterogeneous place in which things actually belong and to which they are intrinsically and constitutively related. Paley’s conflation of nature and artifice, which premises the actual world upon a counterfactual world of accidentally related parts which ontologically precede their wholes, has as its correlate a Newtonian conception of homogeneous indifferent space, which bears a similarly accidental relation to the things found in it. We can see this in Paley’s argument from astronomy, which anticipates contemporary arguments for design on the basis of so-called cosmological “fine-tuning.” Paley premises his astronomical argument on a set of counterfactual conditions.

Now, concerning this law of variation, we have three things to observe: First, that attraction, for anything we know about it, was just as capable of one law of variation as of another. Secondly; that out of an infinite number of possible laws, those which were admissible for the purpose of supporting the heavenly motions, lay within certain narrow limits. Thirdly; that of the admissible laws, or those which come within the limits prescribed, the law that actually prevails is the most beneficial (Paley 1854: 219–220).

Paley's counterfactual starting point makes accidental the relation between the "laws of variation" and the things governed by them. Such laws do not express the inner nature of the things themselves, either because these things have been evacuated of interiority altogether or—what amounts to the same thing—their interiority has been remade as an order of externally related parts. Rather, these laws are imposed from the outside, as it were, on things which are "internally" indifferent to them, a view which we saw in Newton and we will find echoed in Darwin.³⁸

So far as these propositions can be made out, we may be said, I think, to prove choice and regulation; choice out of boundless variety; and regulation, of that which, by its own nature, was, in respect of the properly regulated, indifferent and indefinite (Paley 1854: 219–220).

The result is a universe of accidents, in the scholastic sense, though they be the accidents of no proper substances. It is a universe whose unity is merely the nominal unity of an aggregate: "The universe itself is merely a collective name: its parts are all which are real; or which are *things*" (1854: 231).

Paley's universe is not really a universe at all, but an accidental aggregation of unrelated things. Only now it should be patently clear that the very meaning of "thing" has changed. Denying natural philosophy's constitutive relation to metaphysics, Paley sees nothing of significance in the notions of being or act. Neglecting the significance of act and thus failing to see that relation is intrinsic to the "event" of the world, Paley takes flight from the "actual world" in several interrelated senses. He abstracts from the actual places in which organisms as actual living beings are always at home, and he abstracts from these beings themselves, making identity prior to relation and making the organism's parts ontologically prior to the wholes whose parts they are. Thus, he reconceives the living organism as a mechanical "cluster of contrivances," whose identity is all but exhausted in functionality (Paley 1854: 109). And most fundamentally, he abstracts from the act of being whereby each thing concretely is, and is all that it is, as both common substance and unrepeatable event.

Beneath Paley's reduction of nature to art lies a metaphysical decision that is absolutely crucial to his argument and that is profoundly important for the subsequent tradition of evolutionary biology. Paley's argument for an external "intending mind and adapting hand" to account for these "purposeful" relations derives its force precisely from the fact that the *relata* themselves, like Newtonian inertial masses or the springs and gears of a watch, are fundamentally *external* and internally indifferent to one another. He has to "dumb-down" nature, so to speak, emptying it of any immanent finality or any *interior* form of order, in order to warrant the relentless inference of an *external* contriver. Paley asks, "How are things, including so many

adjustments, to be made, or, when made, how are they to be put together, without intelligence?" (1854: 87). His treatment of "parental affection" reveals the peculiar sense which he attaches to the question.

The plant has no design in producing the seed, no comprehension of the nature or use of what it produces; the bird with respect to its egg, is not above the plant with respect to its seed. Neither the one nor the other bears that sort of relation to what proceeds from them, which a joiner does to the chair which he makes. *Now a cause, which bears this relation to the effect, is what we want in order to account for the suitability of means to an end, the fitness and fitting of one thing to another, and this cause the parent plant or animal does not supply* (33).³⁹

It is largely through Paley's influence upon Darwin that the problem of "adaptation"—the fit between "biological insides and environmental outsides"—would become, in Gould's words, the "the primary problem of evolution" (2002: 188). To the extent that this is true and to the extent that Darwin remains the patron saint of evolutionary biology, evolutionary biology is constituted from within the metaphysical and theological presuppositions that made adaptation intelligible as the defining problem in the first place. We can now see a bit more deeply into the metaphysical meaning of this problem. *The problem of adaptation is the problem of supplying a mechanism to account for the unity of a thoroughly accidental "universe" to which nothing properly belongs, in which nothing is ever actually at home, and in which there are in fact no proper things at all.* For Paley, this will be the invisible hand of God, for Darwin, the invisible hand of natural selection, but the apparent opposition between them conceals a much more basic agreement at the level of ontology.⁴⁰ In Chapter 5, we will look at this common inheritance from Darwin's side, but suffice it to say that long before Darwin finishes off Paley's God, the decisive move will have already been made. For in a world in which all relations including the relation to God are merely extrinsic and accidental qualifications of a more basic singularity, where God cannot enter deeply into the inner meaning of nature simply because, lacking an interior, nature has no inner meaning, it becomes virtually impossible to imagine what difference God's existence or nonexistence might make to it. Paley himself concedes as much; indeed he seems positively relieved by it, reassuring his readers that divine acts as he understands them "neither alter our measures nor regulate our conduct." Such providence is merely "a doctrine of sentiment and piety" (Paley 1854: 286).

Conceptions of God and nature are mutually and necessarily correlative, with metaphysics, the science of being *qua* being, mediating this correlation.⁴¹ Paley's appropriation of Newton's ontology and his reduction of nature to art fundamentally alter both poles of this relation, a change which is concentrated in the transformed notion of teleology that will become reflexive in the subsequent Anglo-American tradition. (The continental tradition will temporarily retain vestiges of the old "internal" teleology.)⁴² More important than the fact that Paley affirms teleology and Darwin ostensibly rejects it is the more basic implicit agreement between Darwin and Paley over what teleology *means*, and thus over what an organism *is*.

In the *De Anima*, Aristotle had distinguished between two senses of "for the sake of which": "(a) the end to achieve which, and (b) the being in whose interest anything

is or is done" (415b20–415b23). As we have seen, "teleology" in Aristotle's second sense at least amounted to recognition of the ontological primacy of form, of the fact that every living thing is a this-something. As Jonathan Lear reminds us, this does not commend the absurd idea of "backward causation," a notion which "arose by taking the modern notion of efficient cause and putting it at the end of a developmental process for which it was responsible" (1988: 40). Nor does it "impose the human idea of purpose onto non-human nature, but recognizes that all natural beings are wholes and so act as to preserve that wholeness and fulfill its potencies" (Sachs 1995: 58).⁴³

Paley, however, has transformed the indivisible wholeness of an *unum per se* into that of an *unum per accidens*. His organism is an artificial "cluster of contrivances" whose parts are not always already the parts of a subject but are combined by their artificer to produce the subject that, as a whole, is only an epiphenomenon of its parts. Emptying nature of its immanent finality, Paley reduces final causality to conscious intentionality, in contrast to the meaningless dead matter that constitutes Descartes' *res extensa*. Reducing teleological "purpose" to conscious intentionality, and denying intentionality to the indifferent parts making up the contrivance, he then transfers intentionality to an external artificer who imposes his purposes (laws) back on an inert nature.⁴⁴ As with Newton, these purposes "are not immanent in nature, part of creation's ontology, but [are] merely imposed from without by a God whose rule is supreme" (Oliver 2005: 160).⁴⁵

There is a crucial correlation between the extrinsicism governing the God–world relationship in Paley's thought and a similar extrinsicism governing the relation between each thing and its own form and being. Paley's inference of an external designer is premised upon his emptying organisms of the very being-in-itselfness that properly characterizes the living creature as both living and as creature. Paley's nature is thus no longer properly autonomous in the strict and proper sense. Its law is no longer intrinsic to it because it has no real interiority, and thus no being of its own. Paley exemplifies a fundamental shift, commenced in the seventeenth century, toward extrinsicism in the meaning of law itself. As a consequence, the so-called laws of nature in Newton's and Paley's sense are incidental to the things they govern, just as the things governed are "internally" indifferent to them. The myriad "purposes" that Paley adduces in functional organization may incidentally benefit their possessors, but they do not "belong" to them.

Thus, Paley's natural theology is not really natural at all. Rather, it trades on the *elimination* of nature, on emptying nature of those very qualities that heretofore had distinguished it from artifice. This will have enormous consequences as Paley's functionalism is transmitted to posterity through its inverse image in the Darwinian tradition, consequences for how this tradition conceives of nature, for its implicit *theologia naturalis*, and for the subsequent form of the "creation" question as it is shaped by Darwinian theological assumptions. But if we are to understand this question adequately, it is crucial that we understand not just these consequences but their underlying reasons. Conceptions of God and nature are always correlative; each is, in a certain sense, "inside" of the other. The confusions that follow from this correlation as it appears both in Paley and in Darwin stem from the fact that Paley's natural theology ceases in the end to be natural because it fails to be theological as well.

Why Natural Theology Is Not Theology

While numerous biologists and historians have acknowledged Darwin's debts to Paley, and while some such as Gould, Webster, and Goodwin have even paused to consider how Paley shapes Darwin's view of the organism, few have bothered to consider Paley's *Natural Theology* in its *theological* meaning. Ultra-Darwinians like Dawkins are clearly more interested in declaring victory than in understanding theology, and a great many more Darwinian biologists apparently regard theology as simply having no real meaning. These judgments grant Darwinians license for the most galling theological illiteracy and the most absurd theological pronouncements, evincing an ignorance that would be intolerable in any other sphere of life. Dawkins' hateful spasms are only the most obvious and vulgar example. Stephen Jay Gould's ostensibly friendlier overtures to religion, a Trojan horse which would exalt religion into unmeaning and irrelevance, are in many ways worse.⁴⁶ They serve as clear warning that theologians should be wary of Darwinians bearing gifts. Equating all belief in creation with creationism, and regarding it kindly, in the words of Imre Lakatos, as a "degenerating research program," Darwin's contemporary apologists thus seem unwilling or unable to imagine that there could be any genuinely *theological* stakes in Paley's *Natural Theology*. It might come as surprise to learn then that Paley's work is not the apex of Christian thought on creation, that the *Natural Theology* does not even attain to a genuine discussion of creation, and that there is indeed little positive theological meaning in Paley at all. Why is this so? After all, one can find appeals to the artisan analogy for creation and even justifications for divine goodness from observed utility scattered throughout the tradition.

Paley's entire argument, we have seen, operates within the ambit of a metaphysical positivism that takes being utterly for granted. There is no genuine metaphysical wonder in Paley. At best, there is, only admiration, at worst, *curiositas*. And his curiosity begins and ends with the question of functional organization, which takes the place of form as the essence of ontological identity. Briefly raising the question of being only to dismiss it—and therefore raising it improperly—he treats the question of "how came the first watch into existence" as a question of remote historical origins, not of ontological constitution (Paley 1854: 11). Paley's project does not even approach the question of creation properly understood, because it does not approach the mystery of being properly understood, and this is indication of a still deeper problem: a profound deficiency in his understanding of the doctrine of God.

The doctrine of creation, as we saw in Chapter 2, is a doctrine of God before it is a cosmology. This is true both historically and in principle. The doctrine develops, historically speaking, as a consequence of the Incarnation of Christ, which revealed a God so Wholly Other as to be nonother. This is possible, ultimately, because the simplicity of God's own act, as the act of triune love, already includes infinite difference within its unity. The doctrine of creation reflects both this distance and this new intimacy. Theoretically speaking, its first task is to articulate and secure this infinite difference between God and the world opened to view by these mysteries, to prevent us from stumbling into the error of treating God like a *thing* within being, juxtaposed to or in competition with the world. This grants a certain priority to the *apophatic* or

negative way (*via negativa*) in both the doctrines of God and creation, a negativity that is but the reverse side of the positive affirmation that God is *ipsum esse subsistens*, the self-subsistent fullness of being.⁴⁷

Because God and the world are not two things within being, creation *ex nihilo* is not a process in competition with other natural processes. Understanding this, and acknowledging the priority of the *via negativa*, the tradition could make frequent use of analogies from *ars* or *techne* because it was universally understood that any likeness of art to creation (like any other likeness of the creature to God) was infinitely surpassed by an ever-greater unlikeness (*maior dissimilitudo*). We saw in Chapter 3 that this understanding of analogy was lost to the emerging natural theology of the seventeenth century, in the controversies over God's ubiquity, for example.⁴⁸ As nature becomes art and God becomes a finite object, say, an artisan, extrinsic to the cosmos, analogy ceases to mark this difference but comes to express a simple parallelism of mind, will, power, and so on. But all properly Christian analogy operates within this ever-greater unlikeness, and this was certainly true of creation. Aquinas, for instance, was quite explicit that creation is unlike any form of human making, because all of these presuppose being and move from something to something, whereas creation *ex nihilo* presupposes absolutely nothing but the fullness and generosity of divine being.⁴⁹

All of this precludes creation being understood as a kind of manufacture, a process qualifying the world in competition with other such processes. There are different reasons for this, which we will take up in subsequent reflection, depending upon whether one is considering creation from the side of God or from the side of the world. Suffice it for now to say that creation concerns the granting of being (*esse*), that act-fullness that is the creature itself and that is the precondition for any subsequent qualification—the same act-fullness evacuated by the mechanistic turn and the conflation of nature and art. Because the act-fullness of *esse* is the precondition of all subsequent qualifications, being is, to paraphrase Aquinas, the most interior of perfections. That God as the giver of *esse* is more interior to the creature than it is to itself does not negate its natural integrity and autonomy, any more than the hypostatic union of natures in Christ negates Jesus' humanity.⁵⁰ Rather, the creature's "proximity" to God establishes it in its very autonomy (*auto-nomos*); it establishes it in a being that is both an utter gift and truly its "own." All of which is to say that creation *ex nihilo*, properly understood, is a doctrine of God on the one hand and the ontological structure of the world on the other.

All of this must still be developed with much greater depth and precision. That will be our task in Part III. But already it is sufficient to distinguish a proper understanding of creation from Paley's understanding of contrivance. Paley's contrivance is not creation, and does not even begin to approach it, in fact, for a very simple reason: his contriver is not God. And here again, this defect affects both sides of the Creator-creature divide. We can illustrate this easily by returning to his favorite watchmaker analogy. A watchmaker does not bring the whole substance of a watch into being, but merely imposes a form on parts whose existence is presupposed. In other words, contrivance concerns merely the functional arrangement of a thing's parts and not the existence whereby it properly *is*, though from within being's reduction to brute facticity that is a distinction without a difference. Moreover, the form of an artifact may be intelligible as a sign of the

intentions of its maker, as the transformation of wheat into bread might signify our desire to eat, but the meaning of worldly being becomes problematic when conceived in this way. The meaning of bread, after all, lies not in itself but in human hunger. As an artifact, and a useful one at that, its existence is instrumental. The problems are no less substantial from God's side. An artificial creation, whose being is instrumental, implies a God who creates from need, who somehow requires the world in order to be God and who uses its sufferings and travails, perhaps in a great "compensatory scheme," as means to that end. This notion, intrinsic to a number of modern theodicies including Paley's, is as morally repugnant as it is philosophically incoherent.

For the orthodox Christian tradition, Trinity and Christology are essential to an adequate grasp of God as *ipsum esse subsistens* and of divine transcendence. For Paley, Trinity and Christology are utterly adventitious to God's relation to the world. Unsurprisingly, then, Paley's God is not *ipsum esse subsistens*, not the subsistent act of being *per se* wholly other to the world and therefore wholly immanent within it. What is the relation of a designer to his artifact, after all, but the relation of one finite agent externally juxtaposed to another?⁵¹ The artisan is neither responsible for the whole being of the artifact nor immanent within it as the source of its being. Once made, the artifact does not remain dependent upon its maker; indeed, many artifacts "survive" their makers' demise. Paley's contriving God, like Newton's, is finally reduced to the status of a finite thing. Since Paley lacks a clear sense of divine transcendence or the infinite difference between the world and God, it comes as little surprise to find that a properly Christian understanding of analogy is absent in his thought as it is from Newton's. Analogical difference becomes merely a matter of magnitude, with God's power or wisdom being quantitatively greater than ours. Newton, we saw, had invoked the mind's ability to move the body's limbs as a direct analogy for God's movement of bodies in absolute space, perhaps anticipating his suggestion in the *Opticks* that space is the *sensorium dei*. Similarly, we find Paley invoking Newton's *sensorium dei* to hint at how God's action in the world might be conceived on an analogy with gravity.⁵²

There is a similar loss of analogy in Paley's treatment of the divine attributes. Though Paley seeks to justify the traditional attributes of goodness, omnipotence, and eternity, they acquire meanings in his thought which depart substantively from the tradition and are even fundamentally at odds with it. Owing to this loss of analogy, Paley's understanding of these attributes is substantially more anthropomorphic than the tradition's. Indeed, *as theology*, Paley's treatment of the divine attributes scarcely merits consideration, so a brief glance at some of the more notable examples should suffice in the place of an exhaustive analysis. His treatment is of deep historical interest, however, for it reveals both the extent to which the metaphysical revolution of modern natural philosophy had rendered thought about God incoherent and the nature of the "God" against whom modern evolutionary biology has constituted itself.

Newton had asserted in the *General Scholium* of his *Principia* that it is part of natural philosophy to treat of God from phenomena (941).⁵³ Paley, perhaps attempting to follow Newton, proposes to conclude his *Natural Theology* by inferring the divine attributes from the phenomenon of contrivance. He is chiefly concerned with the attributes of "personality" and "goodness"; he gives comparatively less attention to what he calls the "natural attributes of the deity": "omnipotence, omniscience, omnipresence, eternity, self-existence, necessary existence, spirituality" (Paley 1854: 247).⁵⁴

He begins with "the personality of the Deity, as distinguished from what is sometimes called nature, sometimes called a principle," proceeding from the hard-won phenomenon of contrivance to the characteristics which are necessary to contrive (Paley 1854: 229). The argument is predictable and unexceptionable enough, given the premise of a nature converted to artifice. It is not the now-familiar argument but what Paley *means* by "personality" that is most important for our purposes.

Now that which can contrive, which can design, must be a person. These capacities constitute personality, for they imply consciousness and thought. They require that which can perceive an end or purpose; as well as the power of providing means, and of directing them to their end. They require a centre in which perceptions unite, and from which volitions flow, which is mind. The acts of a mind prove the existence of a mind, and in whatever a mind resides, is a person (1854: 230).

Paley's understanding of a person as whatever has a mind in it thoroughly neglects both what it traditionally meant to ascribe "mind" to God and the meaning of "person," which first emerges to thought, and for philosophical and anthropological reflection, out of the Trinitarian and Christological debates of the patristic era.⁵⁵ We indicated the crucial importance of this concept in Chapter 2, and we will treat it again more fully in Part III. For our present purposes, a few brief points should suffice to display how Paley departs from a genuinely theological understanding.

Paley's explanation of the relationship between "mind" and "personhood" is egregiously anthropomorphic and departs radically from traditional theological reflection. The tradition has *never* treated so-called "attributes" such as "mind" or "reason" as constituting some sort of specific difference for God, as if "reason" differentiated God as "a person" in the way that it might differentiate a human being from the Aristotelian genus "animal." God is neither a genus nor member of a genus; he is not *a kind* of being because he is not *a* being at all, a notion which would make "being" higher than God.⁵⁶ Neither can God be said, without significant qualifications that Paley does not supply, to "have" a mind as required by Paley's notion of "personality." This would be tantamount to saying that God is composite, that he "is a subject" in relation to his own intellect.⁵⁷ No true theologian has ever said that God "perceives an end or purpose," except perhaps in the figurative sense in which he is said to have hands or feet or that the earth is his footstool. For this would imply both that God acts for an end otherwise lacking and that God depends upon his perception of the world for his knowledge of it, each of which makes the world the theater in which God realizes himself as God, thus eliminating the integrity of divine and worldly being alike.⁵⁸ Paley comes close to this dangerous conclusion with his invocation of Newton's *sensorium dei*. Rather, because God is the fullness of being as such and the transcendent source of all created being, traditional theology has always held that he is utterly simple, that his essence and existence are identical. God does not "have mind" or any other attributes but *is* mind as well as those attributes. He does not "perceive" the world and thus use it to teach him what he did not know, but knows the world into existence through being and knowing his own superlative perfections.

Paley's identification of "personality" and "mind" are further evidence that his is a finite God. It is important to stress, in contrast, that orthodox theology never took

persona as a designation of *attributes* in the first place. “Persona” is not what Augustine, for instance, had called an instance of “substantive predication.”⁵⁹ It is not a designation like good, true, beautiful, wisdom, and being, which refers to the divine essence wholly identical to each of the divine *personae* and to all together. Rather, *persona* (*prosopon*) enters the intellectual inheritance of the West through the Church’s attempt to grapple with what is revealed in the Incarnation to be at once “simple and manifold” (Augustine, *De Trin.*, VI.6.8). In the Trinitarian controversies, *persona* comes to refer to that which distinguished the Son from the Father, not *qua* substance or essence, for there is nothing that distinguishes the persons of the Trinity essentially. There is but one essence, one goodness, one wisdom, and each person in distinction and together with the others simply *is* this essence in its entirety. The three persons in God are neither three subjects standing side by side nor three participants in an essential substrate. And yet, even though the Son is all things the Father is, though each is wholly the essence, and though the Father, Son, and Spirit are not “more” together than in distinction, the Son is *not* the Father, but rather is the Son in distinction from and relation—specifically a filial relation—to the Father. *Persona* is the name, then, not of a discrete mental subject, but of these *relations*, a notion which Thomas affirms when he designates divine *personae* as substantive relations and equates inter-Trinitarian relations with the divine essence itself (Aquinas, *ST*, I.28.2, I.29.4). This is momentous, as Joseph Ratzinger points out, for it means that the meaning of *persona* lies most fundamentally not on the plane of essence but on that of existence, or more precisely still, that “act of self-donation” where each is constituted precisely as a relation of love to the others (1990: 444).⁶⁰

Paley’s notion of a united psychological subject in which “perceptions unite and volitions flow” differs fundamentally from the theological meaning of *persona*, the incommunicably proper existence of spiritual nature, which we began to consider in Chapter 2. So for Paley, “personality” designates the contents of a psychic inventory of this united subject; in traditional theology, it designates the act of utter self-donation whereby God subsists, in himself, as Trinitarian love.

Paley’s sin of omission against Trinitarian doctrine is not merely an affront to “sentiment and piety.” It follows logically from his metaphysical positivism, his indifference to the question of being, and thus with his failure to grasp the infinite difference between divine and created being. His conflation of nature and artifice and his overly anthropomorphic conceptions of divine knowledge and “personality” both spring from this same root. Lacking an adequate understanding of that infinite difference or an adequate sense of analogy whereby to speak of it, he repeatedly transgresses it: through an extrinsicism which juxtaposes God and the world as two “beings,” in the intimation of an indefinite “sensorium” through which God “perceives” and “acts upon” the world, and in imagining a merely proportional difference when he predicates “intelligence” and “personality” of God and creatures alike.

Paley’s treatment of the two further divine attributes which he infers from contrivance, namely, unity and goodness, suffers from the same problem. In the traditional understanding, these were transcendental attributes of the act of created being, attributes transcending every species and belonging to every entity as such: each thing being a unity insofar as it is and each thing desiring or striving to maintain this unity as a good.⁶¹ In God, unity referred to the perfection, simplicity, and

indivisibility of a oneness beyond number, the fullness of the act which he is as *esse ipsum subsistens* (Ps.-Dionysius, *Div. Nom.*, XIII.977c–XIII.977d).⁶² Likewise, goodness refers to this act in its communicable, self-diffusive, and generous nature, precisely as perfect act and therefore self-communicating cause, but also as the object of desire, that which all things seek in simply seeking *to be*.⁶³ This is why the Areopagite will say that "Good tells of all the processions of the universal Cause," that "the Good returns all things to itself and gathers together whatever may be scattered," and why he will unite both under the identification of the good with divine *eros*: "The divine longing is Good seeking good for the sake of the Good" (V.816b, IV.700a, IV.708b). In God, good is simply another name for the Trinitarian love which is the generous source and end of all things (IV.712a–IV.712b).⁶⁴

Prescinding from Trinitarian reflection and turning a blind eye to the act of being, Paley transforms these attributes beyond recognition. From "the uniformity of plan observable in the universe," Paley reduces "unity" to the mere "unity of counsel" of *a* being who is not one in any significant metaphysical sense, if we take Paley's account of "personality" as our guide (1854: 249). It is as if all that were ever meant by divine unity is that God never changes his mind. As with Descartes, once *this* sort of unity is secured, once uniformity of plan guarantees the regularity and predictability of the "laws of nature," God's existence or nonexistence makes little difference. It "neither alter(s) our measures nor regulate(s) our conduct" (286).

Despite various intimations of a goodness irreducible to utility, Paley ultimately deprives goodness of any ontological weight. Goodness for Paley refers neither to the superabundant perfection of uncreated actuality, much less to the form of inter-Trinitarian love. Indeed, goodness says nothing of God in himself as *ipsum esse subsistens*. Rather, divine goodness is reduced to mere benevolence *toward us*, inferred from the utility of contrivance and the superfluous inutility of pleasure added to sensation (Paley 1854: 252). There is a direct correlation between the reduction of divine goodness to anthropomorphic benevolence and Paley's own appropriation of Malthusian theodicy, which will figure prominently in Darwin. For the demonstration of "benevolence" requires that apparent evidence to the contrary—suffering, death, human wickedness, disease—be "utilized" as much as possible as part of a greater "compensatory scheme." In advancing this theodicy and offering an advance description of "natural selection," Paley may well have helped inspire the theory conventionally regarded as its antithesis.⁶⁵

Theodicies such as we find in Malthus and Paley proliferated throughout the eighteenth and nineteenth centuries. They are scarcely moral, let alone Christian. One can hardly blame Darwin for "inverting" it or Gould for dismissing this mawkish justification of suffering and slaughter as mere sentimental solace, the refuge of weak souls unwilling to confront the harsh meaninglessness of existence (2002: 121).⁶⁶ There is a vast difference, however, between vapid optimism, which one finds in Darwinism no less than Paley, and eschatological hope.⁶⁷ Christianity has always claimed, of course, that God can convert suffering into love and bring life out of death, but it has maintained with equal insistence that these are not a willed part of the created order, that they are privations lacking meaning in and of themselves.⁶⁸ Indeed, the central claim of Christianity is that God in Christ "loved his own who were in the world and loved them to the end" (John 13:1) even taking upon himself

the hell of the world's willful rejection and separation from him.⁶⁹ Yet, it is precisely because God is immutably one and immutably good, because he is at once the act of perfect self-giving and the repose of self-same delight, because he is "immutably compassionate" that he does not *need* our suffering either as a recompense or as a theater to display his goodness—for sin cannot subtract from God; nor can recompense add to his sum. Rather, because of this "immutable compassion," he can suffer as one of us and give himself into our hands to the point of our ultimate estrangement from him. And it is because he is raised from this abyss to the glory which the Son had "from the beginning" that Christian hope is more than mere tragic resignation and vague wish that this sacrificial economy of suffering and death might, by the grace of the invisible hand, produce the "greatest good for the greatest number."⁷⁰ To think otherwise, to make evil an ingredient in goodness in the way that Malthus, Paley, and Darwin each variously do, already fails to take seriously either goodness or evil, for it already obliterates the difference between them. Ultimately, this is because they have already failed to take seriously the difference between God and the world.

The faulty metaphysics of Paley's *Natural Theology* is inscribed into the very conceit animating his enterprise, with far-reaching effect. Because Paley's contriver God is really a finite agent extrinsically juxtaposed to the object of his endeavors, divine action becomes simply one more force within being, where it is brought into competition with other such forces. On this basis, "natural" and "supernatural" come to name mutually exclusive agencies or explanations, with each defined simply by its exclusion of the other.⁷¹ As Depew and Weber put it,

Paley, in effect, had thrown down a challenge. *No natural law, comparable to or derivable from, other genuine natural laws, he tacitly claimed, would ever be found to explain organic function and adaptedness, including the morphological coadaptedness of parts to one another and the ecological fittingness of organisms to their niches* (1997: 102).⁷²

It should be clear, however, that the "natural" and "supernatural" could only be regarded as mutually exclusive forms of explanation, and creation and nature as mutually exclusive forces or processes, if God has ceased to be regarded as God and is reduced from the fully transcendent source of being as such to a finite being juxtaposed to the world. This is the theology inherent in the conflation of nature and artifice, the theology that Paley will bequeath to modern biology along with that "artificial" conception of nature. And it would henceforth govern the way that "God" and "creation" can appear to modern thought, namely, as an inherently coercive violation of the integrity of nature.⁷³ The entire debate over *creationism* perpetually ranges within this suffocating horizon.

Paley's natural theology, then, is not the antithesis to modern naturalism. It *is* modern naturalism in its theological guise.⁷⁴ The only problem with this and all similar naturalisms is that they are not *natural* on their own terms or any other. They are not natural on Thomistic or Aristotelian terms because they conflate nature and artifice, and they are not natural on their own terms because they contain within themselves implicit metaphysical and theological judgments that are no less metaphysical and theological for being malign. The distinction between the natural and the supernatural is always a *theological* distinction; one's every attempt to a boundary

includes an implicit judgment as to what lies beyond it. This is not to deny the necessity of distinguishing between the natural and the supernatural, or better, the first grace of creation and the second grace of redemption.⁷⁵ To the contrary, the distinction remains indispensable and is indeed demanded by the doctrine of creation itself, which protects the mutual integrity of divine and creaturely being by preserving the difference between them as something good in itself. Nevertheless, it is to insist that the attempt to draw the distinction between the natural and the supernatural is always *ipso facto* a metaphysical and theological endeavor. The scientist or philosopher who attempts it

will also be, at the very least—without knowing it—a crypto-theologian. The outlook of his reason will not be the outlook of a *ratio pura* but a reason that already stands within the teleology of faith or unbelief (Balthasar 1992: 280).⁷⁶

And it is also to insist that the failure to draw the distinction properly will result in a distortion, not only of theology but of nature as such. We can already see this in Paley's conflation of nature and art, though we must follow Paley's *theologia naturalis* through to its Darwinian terminus in order to comprehend this point fully.

Because Paley's natural theology is not really theology at all, I noted at the outset that Paley's historical importance is utterly disproportionate to his theological importance. This is a point worth reiterating as we come to the conclusion of this chapter. Paley is but a footnote in theological history, leaving no lasting imprint on theology proper and generating little interest outside of Anglo-American apologetics and his descendants in the Intelligent Design movement, who insist that their project is not theology but "science."⁷⁷ So if Paley's "creationism" is indeed a "degenerating research program," as Depew and Weber have said, perhaps it is for reasons that they altogether fail to entertain: because natural theology in Paley's sense is neither natural nor theological (1997: 18). Despite their vigorous disagreements over the meaning of creation and nature, Barth, Balthasar, and all other major theologians of the twentieth century—Catholic and Protestant—were unanimous in rejecting this sort of natural theology to the extent, that is, that they thought it worth bothering with.⁷⁸ And the most astute theological mind of nineteenth-century England, Darwin's contemporary, John Henry Newman, took this sort of natural theology a lot less seriously than Darwin himself did. This is not because Newman gave up the fight, taking refuge in faith alone to the exclusion of reason, as Depew and Weber suggest.⁷⁹ (This is an odd accusation to make against the author of *The Idea of a University* and the founder of one!) It is rather because he recognized that the incoherent conception of God underlying natural theology was inherently *unreasonable*.⁸⁰ He understood that natural theology in Paley's sense was not really theology at all, noting that enthusiasm for what he called "Physical Theology" was most pronounced among "physical philosophers." Ever the gentleman, Newman politely thanked Paley for his services, but he refused to credit him with any significant advance over pre-Christian paganism. Indeed, the ancients, once refined and redeemed, had found a home within the created cosmos, the intellectual world of Christian theology, and Newman's generous spirit. Newman regarded "physical theology," on the other hand, "with the greatest suspicion" (1947: 337–342).

One would hardly know this judging from Paley's continuing role as a "creationist" foil to the superior rationalism of evolutionary biology, and it is this unending career as a foil that signals both his constitutive role in the birth of evolutionary biology and his lasting significance.⁸¹ Paley's *Natural Theology* and his *Principles of Moral and Political Philosophy* were together massively successful in bringing the ontological assumptions of Newtonian physics to bear on the world of biology *and* baptizing the ontological compromise that Britain had made with mechanical philosophy. He was thereby able not only to help legitimate the privileges of the Anglican establishment at Oxbridge but inadvertently to set the agenda for subsequent Darwinian biology. In accepting this agenda, Paley's view of the organism, and the essential problem presented by that organism, Darwin and his heirs accepted the God upholding this agenda, even if only for the purpose of rejecting him. Darwin's acceptance of Paley's view of what God and the organism are is far more fundamental than the fact that Paley believes in this God and Darwin does not, and this decision continues to determine the way "God" may appear to modern thought in its public, scientific vein. It is for this reason that we are justified in regarding Darwin as a "theologian" and Darwinism—even to this day—as a theology in disguise.

Notes

- 1 These words of eminent zoologist George Gaylord Simpson are quoted approvingly in Dawkins (1976), p. 1.
- 2 This is not to suggest that Paley himself is a kind of philosophical "prime number" between Newton and Darwin; only that he is instrumental in conveying Newtonian ontological assumptions into the tradition of British functionalism shared by Darwin. Paley's crucial notions of "contrivance" and "adaptation"—and even the watch as a paradigm of contrivance!—had already been employed by Locke along with the nominalistic ontological assumptions that warrant thinking in these terms. Paley was intimately familiar with Locke—his lectures on Locke were highly regarded—but it is difficult to know how seriously to take the latter's use of these notions. In the *Essay*, they seem only to give a pious gloss to a philosophy with which they are otherwise at odds, or they are invoked extrinsically and positivistically to "tidy things up" when Locke's separation between mind and world threatens to lead his philosophy into a "Humean" impasse. Locke briefly diverts himself from the main task of the essay to attempt proofs of God's existence, but he did not employ these notions for the purpose of inferring contrivance from the functional adaptation of means to ends in nature. (The example of the watch, e.g., serves an altogether different purpose.) On the other hand, the condensed "arguments from design" articulated by Hume's Cleanthes do anticipate Paley. See Locke (2004), II.23.12, III.1.1, III.6.39–III.6.40, IV.10.1; Hume (1998), pp. 13–22.
- 3 Both points are on display in Dawkins (1996), pp. 1–18, 37–41 and Gould (1990), pp. 8–12. Depew and Weber likewise pass quickly between Paley's "argument from design" and the so-called "five ways" of Thomas. See Depew and Weber (1997), p. 101.
- 4 See Depew and Weber (1997), pp. 3, 113–139. This is not an uncontroversial view. It goes against both the minority view of Robert Richards, who sees Darwinism primarily as a species of Romantic biology, and against the view advanced by Ernst Mayr, George Gaylord Simpson, and other architects of the so-called modern synthesis who deride the "physics envy" of some of their fellow Darwinians and see evolutionary biology as more of an idiographic discipline,

akin to natural history, rather than a nomothetic, or law-governed discipline like physics. Depew and Weber would likely respond that such an assessment confuses the argument over the soul of contemporary theory with a historical argument about Darwin himself, and I would concur. The evidence for Darwin's own "Newtonianism" seems incontrovertible, however much this may be qualified by other Romantic and continental influences. The tension between these two outlooks within the modern synthesis is a persistent theme in Depew and Weber. See also Morris (2003), pp. 298–310.

- 5 The Newtonian paradigm is particularly apt for being extended in this way, for as we saw, Newton's own mechanics are indifferent to the nature of the objects moved.
- 6 The "Newtonian" structure of the American constitution appears to have been first proposed in a 1907 lecture by Woodrow Wilson. For a nuanced and critical assessment, see Cohen (1995), pp. 237–280. For diverse interpretations of the "Newtonization" of political and economic life see Newbigin (1986), pp. 21–41 and Depew and Weber (1997), pp. 85–111.
- 7 Whereas many including Gould have noted Darwin's relationship and even debts to Paley, Gerry Webster's and Brian C. Goodwin's diagnosis of Darwin's problems as a consequence of this relationship is relatively unique and reflects some of our own concerns. See Webster and Goodwin (2006), pp. 99–134.
- 8 For a celebration of the overthrow of "first philosophy," see Dewey (1979), pp. 305–314.
- 9 Balthasar was not here speaking of Paley, but it perfectly describes the positivist ambit common to *both* natural theology in the modern sense and modern naturalism.

Without doubt the phenomenal world contains on all sides an objective order which is not imposed by man, and thus a beauty; the legitimacy of the premise is repeatedly confirmed for him that there is within Nature a greater objective ordering of things than he had previously recognized. Every theoretical science with a practical application, such as medicine or physics, lives from this perennial assumption which forever proves itself anew. So much is this so, that on this basis philosophy dares to make an ultimate forward leap by projecting a totality of sense upon the totality of the actuality of Being in such a way that now necessity is predicated of the latter. Then Being becomes identical with the necessity to be, and when this identity has been taken up by reason, then there is no longer any space for wonder at the fact that there is something rather than nothing, but at most only for admiration that everything appears so wonderfully and "beautifully" ordered within the necessity of Being (Balthasar 1991: 613–614).

- 10 It is not incidental that Paley's argument trades on the comparison between the eye and the telescope as "instruments" (1854: 13ff). For his anticipation of natural selection, see pp. 38–40.
- 11 Compare the following quotes: "It is clear then that chance is an incidental cause in the sphere of those actions for the sake of something which involve purpose" (Aristotle, *Physics*, II.v.197a5–II.v.197a56). "There must be chance in the midst of design: by which we mean, that events which are not designed, necessarily arise from the pursuit of events which are designed" (Paley 1854: 281).
- 12 Paley defines a relation thus:

When several parts contribute to one effect; or, which is the same thing, when an effect is produced by the joint action of different instruments; the fitness of such parts or instruments to one another, for the purpose of producing, by their united action, the effect, is what I call relation...(1854: 149).

- 13 Stephen Jay Gould is condescending toward such judgments, seeing them as mere reflections of "comfortable orthodoxy" and a "primary source of human comfort and solace (Gould 2002: 117)." In "Darwin and Paley Meet the Invisible Hand," he is even more patronizing and dismissive.

We may lose a great deal of easy, unthinking, superficial comfort in the rejection of Paley's God. But think what we gain in toughness, in respect for nature by knowledge of our limited place, in appreciation for human uniqueness by recognition that moral inquiry is our struggle, not nature's display. Think also what we gain in increments of real knowledge—and what could be more precious—by knowing that evolution has patterned the history of life and shaped our own origin (Gould 1990: 16).

I leave aside the hubris of Gould's remarks—is there any evidence that our “real knowledge” has given us a deeper sense of our “limited place”?—to note that Paley appears to be making a more substantive empirical point, namely, that the undeniable brutality and suffering in the world are nevertheless dependent upon a more fundamental abundance of complex organic forms, and that these in turn presuppose a priority of beauty and goodness. That Darwin and his heirs, often with scarcely concealed glee, simply substitute an inverted aesthetic judgment for this one, all the while simply taking as a positivist datum the “desire” of organisms to “be” and to reproduce, does not strictly refute that fundamental judgment. See Gould (2002), pp. 119–121.

- 14 On the relation between these two aspects of his thought, see Paley (1854), pp. 257–258. On the redirection of Malthusian theodicy toward Adam Smithian and Utilitarian ends among Whig Dissenters such as the Wedgwoods, Darwins, and Lyells, see Depew and Weber (1997), pp. 57–139. See also Desmond and Moore (1991), pp. 256–279.
- 15 “The young of all animals appear to me to receive pleasure simply from the exercise of their limbs and bodily faculties, without reference to any end to be attained, or any use to be answered by the exertion” (Paley 1854: 254). See also p. 265.
- 16 See Darwin (1991), p. 153.

How the sense of beauty in its simplest form—i.e., the reception of a peculiar kind of pleasure from certain colours, forms, and sounds—was first developed in the mind of man and of the lower animals, is a very obscure subject. The same sort of difficulty is presented, if we inquire how it is that certain flavours and odours give pleasure, and others displeasure.

- 17 Adolph Portmann would later develop this point more profoundly from within biology, reflecting on the significance of animal visibility as such. We will consider Portmann briefly in Chapter 9. See Portmann (1967).
- 18 On the objectivity of beauty, see Balthasar (1982), p. 18 and Hart (2003), pp. 17–18. We will return to this point in Part III.
- 19 See Darwin (1991), pp. 151–156. Darwin, for his part, is incoherent, on this point. On the one hand, he appears to regard anything resembling a traditional conception of beauty as a threat to his theory.

The foregoing remarks lead me to say a few words on the protest, lately made by some naturalists against the utilitarian doctrine that every detail of structure has been produced for the good of its possessor. They believe that many structures have been created for the sake of beauty, to delight man or the Creator (but this latter is beyond the scope of scientific discussion), or for the sake of mere variety, a view already discussed. Such doctrines, if true, would be absolutely fatal to my theory (Darwin 1991: 151).

Shortly thereafter he seems to invoke his version of the doctrine of the so-called “subjectivity of secondary qualities.” He says,

I may first remark that the sense of beauty obviously depends on the nature of the mind, irrespective of any real quality in the admired object; and that the idea of what is beautiful is not innate or unalterable (1991: 152).

He does not stop to consider that this invites the Platonic distinction between beautiful things and beauty *per se*. Later, he appears to allow an objective and universal awareness of beauty, saying that

a great number of male animals, as all our most gorgeous birds, some fishes, reptiles, and mammals, and a host of magnificently coloured butterflies have been rendered beautiful for beauty's sake (153).

He then concludes that "we may infer from all this that a nearly similar taste for beautiful colours and for musical sounds runs through a large part of the animal kingdom" (153). What this is—or rather, "how it developed" since "what is" questions are no longer intelligible to Darwin—he dismisses as an "obscure subject," in a display of positivism to rival Paley's (154). The very form of the question, which makes the "sense of beauty" a secondary acquisition, effectively denies beauty's character as an attribute of being *qua* being. See also his recapitulation of this discussion where this positivism is again on display. Here he adds,

How it comes that certain colours, sounds, and forms should give pleasure to man and the lower animals,—that is, how the sense of beauty in its simplest form was first acquired,—we do not know any more than how certain odours and flavours were first rendered agreeable (394).

- 20 See among the myriad examples, Plotinus, *Enn.*, VI.6; Richard of St. Victor, *De Trin.*, III.2–III.3; Ps.-Dionysius, *Div. Nom.*, II.640d–II.644a, IV.693b–IV.713d; Aquinas, *Contra Gent.*, I.37.
- 21 Aquinas, perhaps, sheds some light on how good is both a cause and necessary for intelligibility in defending the claim (based on the ontological primacy of form) that all things, even inanimate things, act for an end. However, to appreciate this it is necessary to appreciate that being, insofar as it is being, is complete act and that all things, insofar as they have beings, "strive" to remain in being.

Besides if an agent did not incline toward some definite effect, all results would be a matter of indifference for him. Now, he who looks upon a manifold number of things with indifference no more succeeds in doing one of them than another. Hence, from an agent contingently indifferent to alternatives no effect follows, unless he is determined to one effect by something. So, it would be impossible for him to act. Therefore, every agent tends toward some determinate effect, and this is called his end (Aquinas, *Contra Gent.*, III.1.2.8).

- 22 See Aquinas, *ST*, I.5.4, I.5.6.
- 23 The subsequent tradition bears this out. Compare the following passages. The first is from Paley. The second is from Richard Dawkins, offered with equal glee and without credit to its putative inspiration.

At this moment, in every given moment of time, how many myriads of animals are eating their food, gratifying their appetites, ruminating their wishes, pursuing their pleasures, taking their pastimes! In each individual, how many things must go right for it to be at ease; yet how large a proportion out of every species is so in every assignable instant! (Paley 1854: 256)

During the minute it takes me to compose this sentence, thousands of animals are being eaten alive; others are running for their lives, whimpering with fear; others are being slowly devoured from within by rasping parasites; thousands of all kinds are dying of starvation, thirst, and disease (Dawkins 1995: 32).

Even on the terms of conventional naturalism, it seems there is good reason for according priority to Paley's view over Dawkins' since the activities mentioned by Dawkins—eating, running, hungering, thirsting, being devoured, etc.—presuppose organisms in good working order and organisms for whom it is somehow a "good" to remain that way. That a "Darwinian view of life" chooses arbitrarily to give the second view aesthetic and ontological priority says more about the souls of Darwinians than it says about nature.

- 24 Contrary to popular opinion, and perhaps the opinion of many evangelical Darwinians, Gould notes that “Evolution does not establish an ultimate divide for all transitions in the history of biology” (2002: 279).
- 25 Nose, or even man, might be predicated of Socrates, though the latter improperly since “man” is not an attribute of Socrates but rather what he is. But Socrates is not predicated of anything else.
- 26 It is important to reiterate that Aristotle regards this perfect actuality as perfect act (the image of which is circular motion, without discernible beginning or end), and that motion *per se* is imperfect act, the act of potency insofar as it is potency.
- 27 See Jonas (2001b), pp. 38–63.
- 28 See Owens (1978), pp. 455–473 and Hart (2003), pp. 212–249.
- 29 Depew and Weber’s reading of Aristotle is inadequate because it is anachronistic and isolated from his broader metaphysics. Even so, they seem to grasp this point (1997: 35–42). At least some of the same concerns appear to animate Webster and Goodwin’s critique of the Darwinian organism. See Webster and Goodwin (2006), pp. 107–111.
- 30 Paley equates Buffon’s “internal moulds” with “the essential forms of the Greek Philosophy” (1854: 245). On Paley as a self-conscious opponent of “formalism,” see Gould (2002), pp. 260–270 and Paley (1854), pp. 7, 176. In discussing astronomy, Paley employs arguments of the kind which would later be called arguments from cosmic fine-tuning, which appeal to counterfactual conditions and the internal indifference of the governed to the mutual order in which they are always actually found to warrant the inference of an artificer, or in this case, a regulator, whose law is extrinsic to the regulated. See Paley (1854), p. 220.
- 31 Paley’s distinction between mechanical laws and power performs crucial work in this regard. See Paley (1854), p. 237.
- 32 For now I leave aside consideration of what it is to have a world, as distinct from mere environment. See, however, Pieper (1998), pp. 80–116.
- 33 Paley does not distinguish between an ontological order of being and a historical order of generation. Insofar as organisms as artifacts only acquire their identity as the end result of a process of “manufacture,” the former would seem to be entirely dependent upon the latter. However, in his rejection of the theory of “appentencies,” Paley is rather dismissive of the notions of deep-time that Darwin will take over from Charles Lyell, which would have given the order of generation a historicist dimension. See Paley (1854), p. 241.
- 34 On the demise of interiority and a meaningful distinction between the animate and inanimate, see the work of Hans Jonas in general but particularly Jonas (2001a), pp. 64–98. For more on the conflation of nature and artifice in the orders of being and knowledge, see also Jonas (2001c). On the loss of the distinction between motion and rest, see Oliver (2005), pp. 156–190. For hints at the correlation between these and the demise of the act–potency distinction, though it is a bit dated, see Burt (2003), pp. 72–104. For the lineaments of a contemporary retrieval of interiority, properly understood, see Schmitz (2007), pp. 168–199.
- 35 Paley is well aware that some
 birds and beasts, after a certain time, banish their offspring; disown their acquaintance; seem to have no knowledge of the objects which so lately have engrossed the attention of their minds, and occupied the industry and labor of their bodies (1854: 175).

He notes that “this change, in different animals takes place at different distances of time from the birth,” but, Paley claims, “the time always corresponds with the ability of the young animal to maintain itself; never anticipates it” (175).

- 36 Many instincts are so wonderful that their development will probably appear to the reader a difficulty sufficient to overthrow my whole theory. I may here premise, that

I have nothing to do with the origin of mental powers, any more than I have to do with life itself (Darwin 1991: 194).

Darwin's definition of instincts echoes Paley's, as does his use of the example of the cuckoo later in the chapter. And he seems aware of the difficulties they present. Paley's own examples of instinctual care invoke the difficulty later identified with so-called "altruism," because it appears to involve a form of behavior that benefits the offspring rather than the parent. It is easy enough to imagine, in Darwinian terms, how altruism can be "selected for." (And it is interesting that Darwin later in this chapter appears to provide support for later proponents of so-called "group selection.") But Paley's question of how to account for the origin of this "other-directed" behavior in Darwinian terms remains shrouded in mystery. Darwin's metaphysics, I would suggest, is not up to the task of answering it. The fact is simply taken for granted as a *datum*.

37 While the species may be the incidental beneficiary of natural selection, this is only the cumulative effect of natural selection operating on individuals. Darwin is adamant that the individual organism and not the species is what will later be called the unit of selection.

38 "[B]ut I mean by Nature, only the aggregate action and product of many natural laws, and by laws the sequence of events as ascertained by us" (Darwin 1991: 60). See also, p. 407:

To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes, like those determining the birth and death of the individual.

39 Emphasis mine.

40 This too has been noted by Webster and Goodwin (2006), pp. 99–134.

41 Though again it should be said that "being" is not univocally attributable to God and creatures and that metaphysics does not therefore "contain" theology. Rather, it is to indicate that inasmuch as created being is nonsubsistent, metaphysics opens of its own inner necessity to theology just as created being opens of its own inner necessity to God.

42 The so-called telomachinist program in Germany, whose animating principles were supplied by Kant's third *Critique*, attempted for a time to maintain a sense of internal teleology before dying out or resolving its remnants into the more complicated form of mechanism in the emerging molecular and systems biology. See Kant (1987), secs. 64–81; Lenoir (1982), pp. 1–53, 112–154, 246–280; and Depew and Weber (1997), pp. 169–191.

43 See also Lear (1988), pp. 41–42.

44 Paley thus preserves the Cartesian dualism of *res extensa* and *res cogitans* underlying modern materialism.

45 This reevaluation of final causes issuing in what has since come to be known as "external teleology" is a common feature of mechanism. See Osler (2001), pp. 151–158.

46 For a searing criticism of Dawkins on just this point, see Terry Eagleton's review of Dawkins' *The God Delusion* (October 19, 2006). For a more generous criticism, see McGrath (2005). I take up the issues surrounding Gould's proposal of "nonoverlapping magisteria" (NOMA) in Chapter I. See Gould (1999).

47 Hence, with regard to the supra-essential being of God—transcendent Goodness transcendentally there—no lover of the truth which is above all truth will seek to praise it as a word or power or life or mind or being. No. It is at a total remove from every condition, movement, life, imagination, conjecture, name, discourse, thought, conception, being, rest, dwelling, unity, limit, infinity, the totality of existence (Ps.-Dionysius, *Div. Nom.*, I.593c).

See also Aquinas, *Contra Gent.*, I.34.4.

Now the names said of God and things [such as being] are not said analogically according to the first mode of analogy [as two things having common reference to a third thing, i.e., being] since we would then have to posit something prior to God.

- 48 [O]nly in the seventeenth century did both trends converge into one world picture: namely, the Nominalists' passion for unequivocation with the Renaissance sense of the homogeneity of nature—one nature with forces to replace the many Aristotelian static natures. Protestant theology may have acted at times as a catalyst to the fusion. Once both ideals of science converged, the vision of a unified, mathematized physics could emerge, in which Euclidian space was the very embodiment of both ideals. Now and only now, a clear-cut decision has to be made as to how God's ubiquity—to which the Lutherans added the ubiquity of Christ's body—had to be understood; to decide whether God must be placed within the universe, with or without a body, or outside it (Funkenstein 1986: 72).
- 49 Therefore, no body is the cause of the being of anything, *in so far as it is being*, but it is the cause of its being moved toward being, that is, of the thing's becoming...

But the power of a lower agent depends upon the power of a superior agent, according as the superior agent gives this power to the lower agent whereby it may act; or preserves it; or even applies it to the action, as the artisan applies an instrument to its proper effect, though he neither gives the form whereby the instrument works, nor preserves it, but simply gives it motion (Aquinas, *Contra Gent.*, III.1.65.6, III.1.70.5, emphasis mine).

The point, to which we shall later return, is that neither the causal transaction among existing things, nor the existents themselves, explains their existence as such.

- 50 God is in all things; not, indeed, as part of their essence, nor as an accident; but as an agent is present to that upon which it works...Now since God is very being by His own essence, created being must be His proper effect; as to ignite is the proper effect of fire. Now God causes this effect in things not only when they first begin to be, but as long as they are preserved in being; as light is caused in the air by the sun as long as the air remains illuminated. Therefore as long as a thing has being, God must be present to it, according to its mode of being. But being is innermost in each thing and most fundamentally inherent in all things since it is formal in respect of everything found in a thing, as was shown above (Q.7,A.1). Hence it must be that God is in all things, and innermostly (*intime*) (Aquinas, *ST*, I.8.1).
- 51 Just as it is incidental to Paley's "nature" that its designer is Trinity, it appears to be a matter of indifference to Paley's contemporary disciples in the so-called Intelligent Design school whether the designer be God or one of Francis Crick's space aliens. Needless to say, if your conception of the God-world relation is such that God can be replaced by a space alien without loss, there is probably something wrong with both. See Behe (1996), pp. 248–249.
- 52 Also every animated being has its *sensorium*; that is, a certain portion of space, within which perception and volition are exerted. This sphere may be enlarged to an indefinite extent; may comprehend the universe; and, being so imagined, may serve to furnish us with as good a notion as we are capable of forming, of the immensity of the Divine Nature, i.e., of a Being, infinite as well in essence as in power yet nevertheless a person...The great *energies* of nature are known to us only by their effects. The substances which produce them are as much concealed from our senses as the divine essence itself. *Gravitation*, though constantly present, though constantly exerting its influence, though everywhere around us, near us, and within us; though diffused throughout all space, and penetrating the texture of all bodies with which we are acquainted, depends, if upon a fluid, upon a fluid which, though powerful and universal in its operation, is no object of sense to us; if upon any other kind of substance or action, upon a substance and action from which we

receive no distinguishable impressions. Is it then to be wondered at, that it should, in some measure, be the same with the Divine Nature? (Paley 1854: 230–231)

- 53 Though Paley makes no reference to this remark in Newton's *General Scholium*, Paley's concluding arguments are the most overtly Newtonian in the *Natural Theology*.
- 54 Paley's treatment of these attributes, which gives the appearance of being written in haste, is no more satisfying than his longer treatments of "personality" and "goodness." For instance, his brief treatment of omnipotence and omnipresence shows no awareness of analogical difference; in this it looks suspiciously like Newton's. Eternity, he regards as a mere "negative idea" denoting that the contriver existed before the contrivance.
- 55 See Ratzinger (1990), pp. 439–454 and Spaemann (2007), pp. 17–33.
- 56 See Ps.-Dionysius, *Div. Nom.*, I.593c–I.596a, IV.697a, V.817d, V.824a–V.824b, V.825c.
- 57 Augustine makes this point with respect to divine goodness (*De Trin.*, VII.5.10).
- 58 With respect to "divine mind," see Ps.-Dionysius, *Div. Nom.*, VII.868d–VII.869c.

I have said already that the divine Wisdom is the source, the cause, the substance, the perfection, the protector, and the goal of Wisdom itself, of mind, of reason, and of all sense perception. How then, is it that God who is more than wise, is praised as wisdom, mind, word, and a knower?...But...we must interpret the things of God in a way that befits God, and when we talk of God as being without mind and without perception, this is to be taken in the sense of what he has in superabundance and not as a defect. Hence we attribute the absence of reason to him because he is above reason, we attribute lack of perfection to him because he is above and before perfection, and we posit intangible and invisible darkness of that Light which is unapproachable because it so far exceeds the visible light. The divine Mind, therefore, takes in all things in a total knowledge which is transcendent...The divine Mind does not acquire the knowledge of things from things. Rather, of itself and in itself it precontains and comprehends the awareness and understanding and being of everything in terms of their cause. This is not a knowledge of each specific class. What is here is a single embracing causality which knows and contains all things...So too the divine Wisdom knows all things by knowing itself. Uniquely it knows and produces all things by its oneness... Consequently, God does not possess a private knowledge of himself and a separate knowledge of all the creatures in common. The universal Cause, by knowing itself, can hardly be ignorant of the things which proceed from it and of which it is the source. This, then, is how God knows all things, not by understanding things, but by understanding himself.

- 59 See Augustine, *De Trin.*, V.5.6–V.11.12, VII.1.2–VII.2.3:

Therefore the Father Himself is wisdom, and the Son is in such way called the wisdom of the Father, as He is called the light of the Father; that is, that in the same manner as light from light, so we are to understand wisdom of wisdom, and yet both one wisdom; and therefore also one essence, since, in God, to be, is the same is to be wise. For what to be wise is to wisdom, and to be able is to power, and to be eternal is to eternity, and to be just to justice, and to be great to greatness, that being itself is to essence. And since in the Divine simplicity, to be wise is nothing else than to be, therefore wisdom there is the same as essence...Therefore the Father and the Son together are one essence, and one greatness, and one truth, and one wisdom. But the Father and Son both together are not one Word, because together are not one Son.

- 60 Spaemann (2007) attempts to restore an adequate conception of "the person" at the anthropological level.
- 61 Goodness is thus analogically predicated of creatures and God in this sense: creatures are good "like God" in being infinitely different from God, being dependent, and received as gift from one who is independent and generative. We will develop this theme more extensively in Part III.

- 62 The name “One” means that God is uniquely all things through the transcendence of one unity and that he is the cause of all without ever departing from that oneness...The One cause of all things is not one of the many things in the world but actually precedes oneness and multiplicity and indeed defines oneness and multiplicity. For multiplicity cannot exist without some participation in the One (Ps.-Dionysius, *Div. Nom.*, XIII.977c–XIII.977d).
- 63 See, e.g., Aristotle, *Metaph.*, XII.
- 64 And, in truth, it must be said too that the very cause of the universe in the beautiful, good superabundance of his benign yearning for all is also carried outside of himself in the loving care he has for everything. He is, as it were, beguiled by goodness, by love, and by yearning and is enticed away from his transcendent dwelling place and comes to abide within all things, and he does so by virtue of his supernatural and ecstatic capacity to remain, nevertheless, within himself (Ps.-Dionysius, *Div. Nom.*, IV.712a–IV.712b).
- 65 Gould suggests the possibility that Paley might have had the role of inspiring in Darwin aspects of his theory which he would attribute to Malthus, though it remains an unverified possibility.
- 66 See also Paley (1854), p. 286 and Gould (1990).
- 67 For a powerful contemporary critique of theodicy and the metaphysical presuppositions underlying it, see Hart (2005).
- 68 Traditional theology has long since looked with suspicion on any ontology that credits evil with the advent and maintenance of the natural world. This was the basis of Augustine’s opposition to the Manichees and of Maximus Confessor’s correction of Origenism. See Augustine, *Conf.*, VII; *De Civ.*, XIV; Maximus Confessor, *Amb.* 7, 1069d.
- 69 See Balthasar (2000), pp. 89–188.
- 70 Augustine had a keen sense of the pitfalls of “reactive virtue,” which lives off what it opposes. Commenting on the pleasure he took from his feeling of pity for others, he writes,

Only in the impossible event of good-will being malevolent, could a man who is truly and sincerely filled with pity desire that there should be miserable people for him to pity. There is a kind of compassionate sorrow that is good, but there is no kind that we should rejoice to feel. And thus do you act, Lord God, for You love souls with a greater and deeper purity than we can, and are more incorruptibly compassionate because no sorrow can reach to wound You (*Conf.*, III.2).

Though I consider these essays somewhat primitive now, I have attempted to deal with Darwin and Malthus in a political rather than a biological context. One only need read Malthus or Darwin’s *Descent of Man* to see how closely related the two are. See Hanby (2003), pp. 168–178 and Hanby (2005), pp. 117–144.

- 71 This is the metaphysics and theology presupposed by Depew and Weber’s own definition of naturalism.

We take the term naturalism to mean not only that supernatural and immaterial entities [!] cannot explain events and processes but that the purely natural processes and laws that do explain them do not point to anything beyond themselves (1997: 147).

- 72 Emphasis original.
- 73 This may seem an odd accusation given God’s necessity in Paley’s treatment of nature, and Paley’s arguments from utility and pleasure for divine goodness would suggest that he did not regard divine intervention as violent. Yet, in an Aristotelian sense, the artificial imposition of a form upon matter is violent inasmuch as this form is contrary to the nature of that which it informs. (See Aristotle, *Nicomachean Ethics*, III.i.1110a1 and Aquinas,

Contra Gent., I.19.) As we have seen, Paley's "laws" have precisely this relation to the things governed by them, and in a moral context, Paley had no trouble regarding that relation as a violent one. Asking in his *Principles of Moral and Political Philosophy*, "what we mean when we say a man is obliged to do a thing," Paley says, "A man is said to be obliged 'when he is urged by a violent motive resulting from the command of another'" (1827: 44).

- 74 Cf. Chapter I, note 20. Notice in the definition of naturalism given by Depew and Weber, all of the theological and metaphysical elements that are constitutive of naturalism: the dualism of materiality and immateriality, the juxtaposition of natural and supernatural forces, and the appeal to an internal pure nature and an extrinsic "beyond."
- 75 It is even legitimate to set off the natural and the supernatural negatively—"Supernaturale est quidquid non perinet ad naturum aut constitutive aut exigitive." The fundamental question, as Balthasar notes, is whether in doing so one delineates the distinction on the basis of a prior definition of nature, which only begs the question and arrogates to itself, in violation of the distinction, the prerogative to determine the conditions under which grace is allowed to appear, or whether one prescind from the one graced order to distinguish the natural from the supernatural on the basis of a prior theologically adequate doctrine of God, which can only be given through God's self-disclosure. Opting for one of the two approaches profoundly alters the meaning of this traditional maxim (Balthasar 1992: 276). What I shall eventually affirm and have already hinted at here, following Balthasar, De Lubac, Ratzinger, and indeed Cyril of Alexandria and the Fathers, is that the proper form and paradigm for the distinction is Christological. It is here, first and foremost, that "the true and deepest unity between God and creature could only be guaranteed by effecting a clean *conceptual* separation of God and creature" (1992: 272). This is precisely the demand of a coherent doctrine of creation and precisely why Christology and Trinitarian doctrine cannot be adventitious to the meaning of creation. Paley, needless to say, fails in every respect of this.
- 76 "In other words, 'reason' will always be a form of theological thinking, while faith can with a clear conscience indulge in a bit of pure philosophizing" (Balthasar 1992: 280).
- 77 In 2006, I participated in a debate with Intelligent Design (ID) advocate Michael Behe, giving a paper entitled "Much Ado about Nothing: Metaphysics and the Misleading Debate between Intelligent Design and Neo-Darwinian Biology." In it, I argued much as I have here, that the attempt to declare itself a science was misguided since pure science does not exist and that the apparent disagreement between Darwinism and ID was betrayed by a much more basic agreement at the ontological level. As evidence of this, I suggested that the knowledge gleaned from ID, if it were true, would add nothing to our theology or to our understanding of nature, which would remain exactly as it is described by mechanistic biology. Though the positive position that I sketched in that paper looks primitive in retrospect, my criticisms of ID remain essentially unchanged.
- 78 In *The Theology of Karl Barth*, Balthasar notes that "The problem of natural theology also is completely peripheral in Catholic theology: it scarcely even touches on the main dogmatic tractates" (1992: 62, n. 2). See also, pp. 269–270, where Balthasar distinguished between "'natural theology' in the modern sense of the term, i.e., a theology of *natura pura*" which later "managed to develop into a full system detached from its theological presuppositions, and on that basis took on a life of its own," and "a natural theology in the sense of a theology of the natural realm within the concrete world order as it actually presents itself." The latter is "as old as theology itself."
- 79 See Depew and Weber (1997), p. 160.

- 80 Newman's differences with Archbishop Cullen over the structure and *ethos* of the new Catholic University of Ireland (now University College Dublin) are well-publicized. Whereas Cullen wanted a clerical university fashioned after a seminary which would protect young Irishmen from the contagion of modernism, Newman insisted on the relative autonomy of the sciences. However, he knew that such autonomy depended upon theology.

What Theology gives, it has a right to take. If we would not be beguiled by dreams, if we would ascertain facts as they are, then, granting Theology is a real science, we cannot exclude it, and still call ourselves philosophers. I have asserted nothing as yet to the pre-eminent dignity of Religious Truth; I only say, if there be Religious Truth at all, we cannot shut our eyes to it without prejudice of every kind, physical, metaphysical, historical, and moral; for it bears upon all truth. And thus I answer the objection with which I opened this Discourse. I supposed the question put to me by a philosopher of the day, "Why cannot you go your way, and let us go ours?" I answer, in the name of the Science of Religion, "When Newton can dispense with the metaphysician, then you may dispense with us" (Newman 1947: 326–332).

Newman undoubtedly held a different and more comprehensive conception of reason than that to which Depew and Weber subscribe, one not unlike the view presupposed and advocated in this book, but to dismiss it as mere fideism is either uncomprehending, or misleading, or both.

- 81 For instance, when Gould says that "Darwin had just overturned a system that provided the philosophical basis of human comfort for millennia," he displays a twofold ignorance. The first has to do with the negligible place of "natural theology" and the argument from design within theological thought and history, the second to do with the very nature and order of the life of faith, not to mention the countless people down the centuries whose faith led them to embrace extreme suffering and *discomfort*. It may be convenient for Gould to accept Paley's contention that acceptance of the conclusions of "natural" theology is the only reliable grounds for the acceptance of "revealed" theology, since the latter can then be discredited along with the former, but these categories and the understandings of faith and reason presupposed by them do not have the place and meaning within theology or within the life of faith itself that Gould assigns to them. It is simply not true, therefore, that arguments such as Paley's represent "the philosophical basis of human comfort for millennia" (Gould 2002: 136).

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Darwin the Theologian

Our proposal to view Darwin as a “theologian” is warranted by three distinct kinds of reason, none of which has much to do with the question of Darwin’s sometimes tortured religious consciousness or the obscure content of his heterodox religious beliefs.¹ Darwin could have proffered his “long argument” with the most avowedly atheistic intentions and our arguments would still apply, just as they apply to the likes of Richard Dawkins, E.O. Wilson, or Daniel Dennett, evangelists all for the “new atheism.”² Rather, the claim that science generally and evolutionary biology particularly are constitutively and inexorably related to metaphysics and theology is, first, a philosophical claim about the inner necessities of reason in relation to being, the formal parameters of which were set out in Chapter I. It is, second, a theological claim about the nature of reality as creation, an understanding which we cannot help but presuppose in advancing our critique but which we will fully elaborate in Part III. Finally, it is a historical claim which we began to spell out in preceding chapters about the development of modern science and the Darwinian tradition.

The substance of this tripartite claim amounts to this, though of course much remains to be explained: conceptions of God and nature are always mutually correlative, and this correlation is not optional because of how both the world and reason—which is part of the world—are. Each presupposes and entails the other and makes the other possible. This does not only mean that Darwinism, in spite of pledges of theological neutrality from some quarters, continues to propose and enforce a particular view of God. One senses that most Darwinian theorists are more than happy to acknowledge this. Even Stephen Jay Gould’s dubious offer of nonoverlapping magisteria, which is little more than a shallow recapitulation of the fact-value distinction and its implications, contradicts and rescinds itself by determining the boundaries of the theological magisterium (confining it, predictably, to the realm of values) and declaring the sort of “God” science might be able to countenance. Rather, the point is that it is only with the aid of a certain (malign and incoherent) notion of

God held as a matter of curious faith—if only faith that “this” is what God must be if he were to exist—that a Darwinian understanding of nature was and is thinkable.

It should be stated from the outset that the claim that Darwinian evolution constitutes a kind of theology in disguise does not necessarily entail a corresponding denial of its integrity as science in the manner sometimes alleged by “creationists,” and it should not be taken as warrant for *a priori* dismissal of Darwinism as science by the theologically minded.³ This conclusion follows only if one denies these constitutive relations and clings to the specious notion of a “pure science” uncontaminated by metaphysics and theology, a commitment ironically held in common by Darwinians and “creationists” alike. Yet neither should these qualifiers be interpreted as a *nihil obstat* for Darwinism, as if the quality of Darwinian *science* were indifferent to the quality of Darwinian metaphysics and theology. Darwinian science is not indifferent to the quality of its metaphysical and theological commitments, both for theological reasons, which we will eventually explore, and for philosophical reasons, which need not be repeated. I shall argue, in fact, that at least one but by no means the only persistent problem of Darwinian coherence, namely, accounting for the identity and unity—and thus the lived lives—of the organism, stems partly from its defective metaphysical and theological foundations.

This claim does not violate the “legitimate autonomy” of the sciences, properly understood. We have already denied, in Chapter 1, that scientific conclusions follow simply from theological premises or that theological conclusions can simply be inferred from scientific or empirical starting points. We have no interest, therefore, in pronouncing on biological data *qua* biological or declaring Darwinism simply true or false (assuming it is possible to identify the “essence” of Darwinism among the many competing Darwinisms now on offer). I will argue on the basis of creation here, but especially in Part III, that the doctrine of creation and evolutionary theory are *not* strict rivals, in spite of the latter’s theological character, and that there is actually a sense in which theology is indifferent to the truth of Darwinian theory. We have already rejected both *a priori* “concordism” and *a priori* “discordism” between creation and evolution and between theology and science more generally.⁴ And we reject all attempts to conflate the mechanisms of evolutionary development with God’s creative activity or to fuse theology and the natural sciences into some sort of hybrid, as in the so-called “theistic evolution” in vogue a generation ago.⁵ The *doctrine* of creation is no more an alternative explanation to natural science for this or that feature of the world than the *act* of creation is an alternative to natural processes. Creation is not a strict rival to evolution for the same ontological reasons that it is not simply a theoretical complement to it.⁶ God and the world do not belong to the same order. To think otherwise is already to be quite lost in theological confusion.

A theological critique of Darwinism must remain *theological*. It must be, in the first instance, a critique of the theology that Darwinism invariably presupposes and inevitably tends to become, though even this requires further clarification. This is not the formal objection that there is a theological dimension to Darwinian biology; this, as we have seen, is inevitable, and we will argue in Part III that a true theology is necessary to preserve the scientific character of science. The problem is the theological and metaphysical content of Darwinian theory and the way in which this is concealed by Darwinian self-understanding. Darwinism’s failure to acknowledge its constitutive

relation to metaphysics and theology leads its proponents to elevate Darwinian biology to the position of first philosophy, whether by aggressively promoting the “Darwinization of everything” after the fashion of Dawkins and company, or somewhat more subtly, by an agnosticism which cannot entertain as true or rational anything beyond the confines of its own finite parameters and thus cannot integrate scientific activity within a more comprehensive order of reason.⁷ As a consequence, Darwinian biology harbors within itself dubious theological and metaphysical judgments, while Darwinian theorists exonerate themselves from acknowledging those judgments, much less from subjecting them to critical examination.

These totalizing judgments profoundly distort the meaning of “God” and “creation” and thus postpone indefinitely any real engagement with the claims of theology. But this is only half the problem. Because notions of God and nature are correlative, these theological and metaphysical distortions bring about both a dangerous diminution of the world and a falsification of Darwinism’s own nature, character, and coherence as science. What Daniel Dennett calls the “universal acid” of Darwinism is so potent, in fact, that even Darwinism itself seems unable to withstand its corrosive effects (1995: 61). Consequently, Darwinism will prove to be, in the strict sense, *incredible*. This is in spite of the probability that the Darwinian theses of descent with modification and natural selection are substantially correct as empirical descriptions. To say that Darwinism is incredible is therefore not to say that it is false. Rather, Darwinism is unbelievable and therefore unbelieved, even by those who profess it religiously, because its most basic ontological judgments are contradicted by the very act of articulating the theory and because the theory itself is more *truism* than true.

The salvation of whatever truth there is in Darwinism depends upon there being more things in heaven and on earth than are dreamt of in Darwinian theory, a fact necessarily affirmed in our elementary experience of the world and thus in scientific practice. Darwinism’s failure to account for this is the source of its numerous self-contradictions that would be embarrassing had the claim and criterion of truth not already been exchanged for that of pragmatic success.⁸ That Darwinian theorists are evidently not embarrassed is evidence either that this exchange is all but complete or that they do not adequately know themselves and the nature of their own theory. Such, at any rate, is the argument of this chapter.

We will attempt to make good on this argument in the following way. In the first section, we will consider how Paley’s conflation of nature and artifice “sets the agenda” for Darwinian biology, supplying the latter’s defining problem, its view of the organism, the concept of creation which it seeks to overcome, and the “God” it refuses to believe in. As a consequence, Darwinism shares Paley’s (Newtonian) ontological and theological assumptions, albeit often in negative form, and indeed Darwin brings Paley’s natural theology and his conflation of nature and art to their logical conclusions by collapsing the order of being into the order of history. In the second section, we will shift our attention from the theological dimension of Darwinian natural theology to the natural dimension of this unity, showing how this terminates the organism itself as the subject of its own being and the subject matter of evolutionary science. This sets evolutionary science on a trajectory which will conclude in the “modern synthesis” and bring it into conflict with a resurgent developmentalism that

seeks to recover the organism for biology (the subject of Chapter 6). But this is only the beginning of Darwinism's philosophical problems. The reduction of nature to art and of being to history is contradicted not only by the lived lives of organisms but by the structure of cognition, and it results in an incoherent concept of causality and change that threatens to reduce Darwinism to a tautology. We will therefore argue in the final section not only that Darwinism is unbelievable and unbelieved but that it never asked us to believe much of anything in the first place.

Paley's Long Shadow: The Providence of the Tangled Bank

The suggestion that there is a theological dimension to Darwinian theory and a religious dimension to the Darwinian movement is not novel or idiosyncratic. It has been said that "the only universe in which natural selection could work was the universe Darwin inherited and then stole from the natural theologians" (Cannon 1961: cited in Brooke 2003: 197). And even now, the question of the residually theological character of evolutionary theory seems to be lying just beneath the surface of the contest between predominantly nomothetic and panadaptationist treatments of evolutionary theory and more contingent, historicist variants. Simon Conway Morris has called Richard Dawkins "arguably England's most pious atheist" (2003: 314), and he is not alone in criticizing Dawkins for remaining *too theological* or in recognizing a residual theology in panadaptationism more generally (Dawkins 1995: 95).⁹ Depew and Weber (1997) have hinted likewise that some of the most recalcitrant tensions of the current synthesis, for instance, the reluctance to decouple micro- and macroevolution or to relinquish panadaptationism, stem from theological assumptions deep within the Darwinian tradition.¹⁰ These assumptions go to Darwinism's historical roots. Abigail Lustig and Stephen Jay Gould are among the numerous commentators to have noted Darwin's debts to William Paley, and both note the peculiar way in which disputes within the Darwinian guild mimic theological disputes.¹¹ Lustig notes how evolutionary biologists form a canon and cast out heretics, and Stephen Jay Gould writes similarly and unashamedly of modern evolutionary "orthodoxy" (2002: 93–169). In no other scientific discipline is it so necessary to demonstrate such fealty to its patron.¹²

This orthodoxy speaks to the sociological dimension of Darwinian religiosity, which has been present from the very first. Darwin's friend T.H. Huxley coined the term Darwinism as a banner to march under within Darwin's own lifetime and with his approval (Desmond and Moore 1991: 491). Francis Galton, Darwin's cousin and protégé and one of the fathers of modern eugenics, joined with Huxley in calling for a new "scientific priesthood" to replace the old clerical establishment (1991: 665).¹³ Howard Kaye was therefore correct in his assessment of why evolutionary science "quickly passes over into myth despite the avowed materialism or reductionism of its leading theorists" (1986: 157). Clerics of the new priesthood have always sought not simply to "explain natural phenomena, they seek to validate and justify this natural order, thereby providing social guidance and a 'cosmic sanction' for human ethics and social policies" (157–158). The evangelical quality of contemporary Darwinism is not an accidental appendage. "Darwinism" is and

always has been “social Darwinism,” even if not of the strictly Spencerean variety.¹⁴ We should hardly expect less from a “theory of everything.”

Nevertheless, it should be clear by now that the term “Darwinian theology” is intended to signal something more philosophically basic than the evangelical fervor of Darwinian theorists, the guild processes for the achievement of theoretical orthodoxy, the quasi-religious status of Darwinism in contemporary culture, or even the frequent and alarming endeavor of Darwinian theorists to appoint themselves priests and arbiters of the mysteries and meaning of life.¹⁵ Rather, it is intended to indicate a set of basic ontological and theological judgments which Darwinism presupposed in its historical origins and continues to enforce in the “modern synthesis” with Mendelian genetics, judgments which determine in advance the meaning of “God” and “creation,” but also—in deleterious ways—the meaning of nature. We will begin to unearth these judgments in this section and criticize them in the sections which follow. But if we are correct, then Darwinism in its present form is less of an alternative *to* theology than an alternative theology, and all the more so the more that it remains blind to its own irreducibly theological character.

Science’s relation to metaphysics and theology obtains as a matter of epistemic and ontological principle, though it takes different contingent forms as a matter of historical accident. Charles Darwin’s *historical* relation to metaphysics and theology is shaped by the fact that *On The Origin of Species* is crafted in no small measure as a reaction to the notion that species had been “independently created,” and particularly to Paley’s *Natural Theology*, which Darwin had virtually committed to memory in earlier days.¹⁶ “I do not think I hardly ever admired a book more than Paley’s *Natural Theology*,” Darwin confessed to his friend John Lubbock on the eve of the publication of the *Origin*. “I could almost formerly have said it by heart” (Darwin 1887: 219).¹⁷

This is not to deny the *Origin* its broader, scientific purposes or to suggest that Paley was its only influence or target. Darwin’s early strike against the distinction between species and varieties was a blow against Linnaean classification; Paley never demonstrated much interest in such questions. Darwin’s frequent assaults upon the view, “that each species has been independently created,” read like a recitation from Buffon rather than Paley (1991: 407).¹⁸ Darwin acknowledges the difficulties that the “Cambrian explosion” presents for his theory and concedes that “the most eminent paleontologists, namely, Cuvier, Agassiz, Barrande, Pictet, Falconer, E. Forbes, &c., and all our greatest geologists, as Lyell, Murchison, Sedgwick &c., maintained the immutability of species” (275).

But Linnaeus, Buffon, Cuvier, and Agassiz were pious naturalists, not natural theologians, and were content to rest upon this conviction in order to get on with their primary interest of classification.¹⁹ Paley, by contrast, was not a taxonomist. Rather, he was concerned to explain the various forms of “adaptation,” and Darwin was to follow him in this preoccupation.²⁰ Paley, we saw, had effectively thrown down a challenge, and his solution to it still held considerable sway within the halls of Oxford and Cambridge in spite of the scorn incurred by the infamous *Bridgewater Treatises*, when Darwin had his famous Malthusian insight in 1838.

No natural law comparable to, or derivable from, other genuine natural laws, [Paley] tacitly claimed, would ever be found to explain organic function and adaptedness,

including the coadaptedness of parts to one another and the ecological fittingness of organisms to their niches (Depew and Weber 1997: 102).

Darwin set out to meet this challenge. And yet, just as Marx retains the image of Hegel in attempting to overthrow him, the implicit theology of Darwin's theory is determined to a great extent by what it appears to reject.²¹ So true is this in Darwin's case that Stephen Jay Gould, who portrays the *Origin* as a response to the *Natural Theology* and who notes a number of correspondences between the two texts, can say that Darwin "inverts" Paley's explanation (2002: 119).²² We already noted in Chapter 4 how Darwin simply inverts, but does not strictly refute, the aesthetics of Paley's "happy world," how he "almost delights" in the reign of terror unleashed by natural selection.²³ It should be noted, though, that Darwin does not always abide by Gould's advice to avoid drawing ethical conclusions from nature.²⁴

It is the transmutation of species that is typically reckoned to be most upsetting of traditional sensibilities. Darwin himself thought this was the fundamental issue, writing to Asa Gray in 1863, that "I care much about Natural Selection; but that seems to me utterly unimportant compared to the question of Creation or Modification" (Barlow 1958: 260). It is difficult to imagine, a century and a half beyond the publication of the *Origin*, the difficulty there must have been in accepting the notion. Neither Lyell nor Herschel could ever quite reconcile themselves to it. We can protest in retrospect that Christianity might have adopted some version of Augustine's *rationes seminales* to accommodate a pre-Darwinian, more Lamarckian conception of evolution, and we might complain that the popular theology of pious naturalists inverted by Darwin lacked doctrinal and metaphysical rigor. Nevertheless, it must be conceded that "the traditional teaching of Christian theology was an invitation to conceive of the world as being at present such as it had been since its creation" (Gilson 1984: 32). And the revolutionary implications of transformism were not "merely religious." The notion had long been associated with French radicalism; fellow Philosophical Radicals in Britain had already seized upon the notion as offering scientific legitimacy for their political goals. Darwin and his Whiggish friends were discomfited by the radical political aims associated with earlier versions of transformism. And yet under Huxley's new banner of "Darwinism," "evolution"—a word which Darwin himself did not employ until the sixth and final edition of the *Origin*—nevertheless became the rallying cry for a broadly liberal and anticlerical reform movement within Darwin's own lifetime.²⁵

Transmutation, scandalous though it was, was not original to Darwin. Buffon, admitting reluctantly that there were not precisely defined species, had been brought to the precipice of transmutation only to turn back. Lamarck had embraced it, infamously from the point of view of later British functionalists, attributing to organisms an inner tendency toward complexity.²⁶ Geoffroy would follow suit, adding common descent to Lamarck's transmutation, as would Darwin's Edinburgh mentor, Robert Grant. All of these varieties of transformism were variations of evolution in the old sense. They accorded some version of archetypal form logical and temporal priority over adaptive function (unlike Cuvier whose functionalism precluded evolution!).²⁷ This sort of transformism was still amenable to a theological twist, which it frequently received from the immanentism of continental *Naturphilosophie*,

from Romantic biology, and in England by the Coleridge-inspired anatomist, Richard Owen. All of these had their effect on Darwin.²⁸

It was no less difficult to distill an “essence” of Darwinism in Darwin’s immediate aftermath, as the “Darwinism” enthusiastically promoted by Huxley and others as the standard for the new scientific clerisy was mingled with the progressive evolution of Herbert Spencer in Britain and the developmentalism of Ernst Haeckel in Germany, each of which stressed emphases—progressivism and formalism—that are arguably peripheral to Darwin’s thought.²⁹ This, combined with the reluctance of many prominent naturalists of the period to accept natural selection as the chief motor of evolutionary change, has led Peter Bowler, most prominently, to question whether there ever was a Darwinian revolution, or alternatively, whether the revolution in thought that manifestly occurred in the latter half of the nineteenth century was really Darwinian (1993: 21–56).³⁰

It is not our task to resolve this question as a matter of historiography. If there was not a true Darwinian revolution, and Darwinism was merely “a convenient symbol of the new independence claimed by scientists,” then that only underscores our contentions about Darwinism’s extra-scientific cultural and ideological functions (Bowler 1993: 24). If there was a real Darwinian revolution, or if Darwin justly deserves credit for it, then the foregoing is sufficient to show that it consists not, in the first instance, in the transmutation of species. This notion, which became broadly if reluctantly accepted, did not originate with Darwin; nor was he its sole champion. Rather, the revolution, if it occurred, consists in the mechanism that Darwin provided to explain that transformation without apparent recourse to theology or to “occult qualities” subsequently derided as “vitalism.” The real Darwinian revolution consists in Darwin’s “substitution of natural selection for God as the creative agent” in evolutionary change (Gould 2002: 119, 127).

It is well-known that Darwin arrives at this mechanism with the assistance of devices borrowed from the burgeoning and very British discipline of political economy. These devices are the positive checks on population from Malthus’ *An Essay on the Principle of Population* and the invisible hand of Adam Smith’s *The Wealth of Nations*. Their union reflects a marriage between Malthusian pessimism and Smithean optimism already effected in the second-generation Malthusianism of dissenting Whigs such as the Wedgwoods, Darwins, and Lyells.³¹ In a candid passage at the outset of the *Origin*, Darwin refers to his theory as “applying the doctrine of Malthus to the whole animal and vegetable kingdoms” (1991: 3), and Gould goes so far as to say that “the theory of natural selection is, in essence, Adam Smith’s economics transferred to nature” (2002: 122).³²

The theory is elegantly simple.³³ Organisms manifestly vary from individual to individual and thus from generation to generation. Possible variations are not restrained in principle by any fixed inner norm but only by a history of inheritance and the platform of support provided by the organism’s immediate environment. Like Malthus’ positive checks, natural selection, then, “acts” on organisms that reproduce exponentially amidst scarce resources, “preserving” only those organisms whose variegated traits allow them to attain a survival advantage, properly at the expense of their closest kin but metaphorically with respect to their external conditions. Those traits which prove adaptive secure a niche within Milne-Edwards’ “physiological

division of labor,” an economy of sorts within the body while the organism as a whole secures a niche within an ecological division of labor. The niche which an organism occupies relative to its kin is thus analogous to the place occupied by competing firms in a competitive marketplace, whose dynamic equilibrium is thereby preserved in a manner analogous to the balance established in a market between supply and demand.³⁴ These survivors, then, pass their adaptive traits with subsequent modification to future generations. Add to the stress of this economy the gradual extinction of disadvantaged forms and, given world enough and time (or as Gould puts it, “Time, just time!”), the result is eventually branching *taxa* and the appearance of distinct, divergent species (Gould 2002: 94).

Darwin’s well-known debts to the political economists do raise obvious and legitimate questions about whether capitalist theory and evolutionary biology are in ideological collusion and even deeper questions about their mutual complicity in promoting and enforcing a reductive anthropology.³⁵ Nevertheless, my point in calling attention to these debts is not to reduce Darwinism to a political ideology or to suggest that Darwin’s model of nature is invalidated in advance because it is derived from the sphere of commerce. Darwinian fundamentalists like Dennett would make just the opposite claim, that the applicability of natural selection algorithms to both spheres of life is an indication that natural selection is ontologically basic. The deeper significance of Darwin’s debts to capitalism lies in the fact that political-economic theory serves as a medium whereby Darwin could bring biology within the purview of the coveted Newtonian paradigm, which governed not only the dynamics of how closed systems, irrespective of type, were supposed to behave but the standards determining what would count in Victorian Britain as legitimate scientific explanation. He was thus able to attain scientific legitimacy by the canons of respectability then in force and was able to inch biology away, if only incrementally, from its residually theological past variously represented by the likes of Paley, Owen, and others.

Depew and Weber argue for the Newtonian character of Darwin’s own Darwinism as a facet of a broader argument about the general relation between natural selection and systems dynamics and their mutual evolution. The argument is controversial for a number of reasons having to do with Darwin’s biography, ambiguities internal to his *corpus*, and because of ongoing disputes over the “essence” of Darwinism. Richards and Sloan point to the influence of Humboldt and the continental *Naturphilosophie* upon the young Darwin, influences which persist in Darwin’s thought after (or alongside) the Malthusian elements and the inheritance from natural theology. They argue that these varied influences conspire to produce a conception of “nature” that is not reducible to mechanism (Sloan 2001: 251–269; Richards 2002: 514–554).³⁶ Then there is the received view from within biology, championed most famously by Ernst Mayr, that

Darwinism has come into its own in direct proportion as it has distanced itself from the works and pomps of physicists and has instead reaffirmed its connection with the long tradition of natural history (Depew and Weber 1997: 2).³⁷

Mayr’s position exemplifies a long-standing tension within Darwinian biology over whether transmutation or natural selection constitutes its conceptual center, and how

one answers this question seems to go a long way toward how one even imagines the practice of theorizing in a Darwinian mode.

So long as one is not forced to regard so-called “nomothetic” and “idiographic” evolution as mutually exclusive alternatives, then objections such as Mayr’s do not negate the nuanced thesis of Depew and Weber. Similarly, Richards and Sloan provide a salutary corrective to contemporary reconstructions of Darwin more motivated by the current battle for Darwinism’s soul than by strict historiography, but they do not present a problem for our thesis. To the contrary, we wish to show how Darwin purports to provide a transcendental mechanism *for history*, thereby eliminating the dichotomy between history and physics (or metaphysics), on the one hand, and why his mechanistic conception of nature *requires* the complement provided by Romantic influences, on the other.

Depew and Weber do not appear to grasp the full implications of their important thesis. Though political economy is typically regarded as the instrument with which Darwin overturns Paley, in mediating a Newtonian ontology it also effects an even deeper *continuity* with Paley’s conception of nature, pressing it—I shall argue—to its logical conclusions. *Darwin can “invert” Paley, substituting the invisible hand of natural selection for the invisible hand of the contriving “God” because he has inherited from Paley “adaptation” as the defining problem of biology and with it, the metaphysical and theological presuppositions underwriting that problem.* Disputes between “functionalists” and “formalists” had preceded the triumph of evolutionary theory, and the dichotomy would survive it. Paley exemplifies the former position, while Lamarck and Agassiz represent the latter. Yet, according to Gould it was Paley’s functionalism above all which would elevate the explanation of adaptation to “the primary problem of evolution” (2002: 118).³⁸ We have seen that Paley’s own Newtonian ontological commitments, which necessitate and justify the conflation of nature and artifice, are the precondition for this. It is little wonder then that to the attentive eye, *On the Origin of Species* reads as something of a running commentary on the *Natural Theology*. Darwin’s *opus* mirrors its predecessor in numerous ways both obvious and subtle.

While the problem of adaptation itself is Darwin’s most obvious debt to Paley, Darwin evidently thought numerous other examples and problems which Paley had sought to explain in the *Natural Theology* were formidable enough to warrant a reply.³⁹ The physiological and “ecological” divisions of labor which we just saw are Paley’s internal and external relations under another name. The symmetry of animal form, the nature and origin of “instincts,” defined by Darwin in terms almost identical to Paley; the famous example of the eye, which Darwin, like Paley, compares to a telescope; and the “problem” of beauty, which Darwin “utilizes” for sexual selection, are among the more notable examples.⁴⁰ As a counterpoint to Paley’s amazement at the aptness with which the waterfowl’s webbed foot performs its function, Darwin employs an argument from in-utility, which would become a generally important weapon in his arsenal of arguments against design.⁴¹ Whereas inheritance from a specifically different parent somewhere in the distant past can account for the persistence of such adaptively neutral features, they defy explanation in an argument like Paley’s which stresses strict functionality. So Darwin invokes the example of upland geese whose webbed feet provide the animal no discernible service and

attributes these characters to an ancient, aquatic ancestor. Mistletoe, marsupials, and woodpeckers are among the many puzzling creatures making an appearance in both texts (Paley 1854: 136; Darwin 1991: 135).

Darwin's methodology and logic often mirror Paley's, even in the process of subverting him. Like Paley, Darwin will "rely upon comparison and extrapolation from artificial to natural," a move which we can now anticipate will be warranted—like the problem of adaptation itself—by the *a priori* conflation of nature and artifice (Gould 2002: 119). Paley, we saw, proceeds by arguing analogously from the machine to the organism, while Darwin extrapolates from the artificial selection of breeders to natural selection.⁴² "Both rely on the central argument that a common *mechanism* works much more powerfully in nature" (2002: 119).⁴³ Though Darwin himself never refers to natural selection as a "mechanism" in the way that his later disciples will, he nevertheless betrays a mechanistic conception of causality in repeatedly treating natural selection as a Newtonian *vera causa* positioned logically, if not temporally, prior to its result, a tendency repeated in subsequent literature. Gould's own rhetoric echoes this when he repeatedly describes natural selection as a "creative agent" (127).⁴⁴

It was for want of such a *vera causa* that Paley had dismissed "principles of design" or "tendencies of order" as "a mere substitution of words, for reasons, namely causes" (1854: 42). Darwin, ironically, will turn this accusation against natural theology:

He who believes in separate and innumerable acts of creation may say that in these cases it has pleased the Creator to cause a being of one type to take the place of one belonging to another type: but this seems to me only re-stating the fact in a dignified language (1991: 135).⁴⁵

Darwin himself may not be entirely invulnerable to the charge, and it was indeed because natural selection failed to qualify as a Newtonian *vera causa* that three denizens of the British scientific establishment, William Whewell, John Stuart Mill, and the astronomer John Herschel, rejected Darwin's theory.

Darwin never specifies the meaning of these "independent acts of creation" much less treats them with any metaphysical or theological rigor; Owen had complained about this in his review of the *Origin*.⁴⁶ Perhaps Darwin is not really culpable for this. These terms had been established by convention, and the pious naturalists responsible for them had not really examined the notion either. Two things are clear, however. The first is that Darwin, like Paley before him, regards these special acts of creation as incompatible with natural processes. Darwin indicates this in his letter to Gray, with its stark alternatives—*Creation or modification*—though his formulation of these alternatives betrays a world of unspoken metaphysical and theological speculation which reduces creation to a "miracle" violating the integrity of nature (1991: 305).⁴⁷ The second is that Darwin is intent on making these "special acts of creation" irrelevant to natural and biological explanation, a point he makes explicitly in *The Descent of Man*.⁴⁸

Received wisdom therefore has it that Darwin's "theological" debts to Paley and the tradition of natural theology are entirely negative. (This is perhaps why evolutionary biology even now seems so consumed with fighting a rearguard action against

“creationists.”) By positing natural selection as the mechanism which accounts for the diversity of forms, so the story goes, Darwin liberates the biological world as a purely natural realm, transparent to purely rational explanation which can then be subjected to experimental verification.⁴⁹

However, there are enough contrary indications in Darwin’s corpus and in his biography for Robert Young to suggest that Darwin was self-consciously engaged in a species of natural theology that involved a “grander view of the Creator” than that supplied by Paley (Young 1983: 10). There are Darwin’s many “artfully, disingenuously vague” references to the Creator and his autobiographical confession of belief “in a First Cause having an intelligent mind in some degree analogous to that of man” (Barlow 1958: 92–93).⁵⁰ Subsequent hagiography has regarded these as mere window dressing, but they date from the period when he was writing the *Origin*. There is the fact that Darwin “had collapsed the traditional role of the creating and sustaining deity of traditional theism” into the constellation of meanings attributed to “nature” (Sloan 2001: 265). We shall have more to say about this.

Even so, let us assume that received wisdom is substantially correct and that the point of these “artfully, disingenuously vague” references to the “Creator” is the opposite of what they sometimes appear to be, that the point is not the affirmation of God but the “purification of science from this element which is foreign to its essence” (Gilson 1984: 59).⁵¹ Let us assume, in other words, that Darwin is more concerned to refute Paley and other creationists than to supply a more theologically adequate conception of divinity.

That still leaves the received wisdom with three problems. The first is that it presumes a flawed account of “rational explanation” (and thus reason itself), one which conceals science’s constitutive relationship to metaphysics and theology and the extent to which it has substituted a functional and pragmatic conception of truth for an ontological one. We will have more to say about this later on and in Chapter 9. The second problem is that by the time Darwin finishes off Paley’s God, the real theological damage had already been done. The third is that Darwin never really finished off Paley’s God.

Paley’s theology and his natural philosophy were correlative. Conceiving of organisms as artifacts, he transformed creation into manufacture, conceiving of God not as the interior source of the creature’s act of being, but as an extrinsic object within the positivity of being reduced to brute facticity, who imposes his designs on matter whose “essential” characteristic is to lack it. The organism, we saw, ceased to be a *per se unum* and becomes instead a “cluster of contrivances,” while God becomes an object juxtaposed to the world and in competition with it. This is evidenced by the fact that Paley, no less than his opponents, regarded supernatural “design” and “natural explanations” as mutually exclusive alternatives.

This essentially Newtonian theology provided the metaphysical warrant for elevating “adaptation” to the defining problem of biology, a problem which we described as accounting for the second-order fit between “biological insides and environmental outsides” in a thoroughly accidental “universe” to which nothing properly belongs, in which nothing is ever actually at home, and in which there are in fact no proper things (Gould 2002: 121). We have seen that Darwin takes over this problem from Paley, and like Paley, divines an external mechanism to solve it. We shall see in the next

section that he takes over Paley's understanding of the organism as well. Darwin is therefore profoundly dependent upon natural theology for his own conception of nature, even as it acts as a persistent foil for his theory.⁵² Paley's theological extrinsicism supplies metaphysical warrant, on the one hand, for converting nature to artifice, for adopting a nominalist stance, and for reformulating causality as a transaction of power between externally and indifferently related entities. It also makes relation to God accidental to the being of a thing and knowledge of God adventitious to the knowledge of nature, thus warranting its own dismissal, on the other. *In assuming Paley's metaphysical positivism, in taking over Paley's conception of the organism as a "cluster of contrivances," and in taking up the problem of adaptation as the central problem requiring a naturalistic explanation, Darwin makes Paley's extrinsicist metaphysics his own and makes it endemic to Darwinian evolution as such.* That Darwin's and Paley's view of nature concur on what God is matters much more than the fact that Paley affirms this view of God and Darwin rejects it. We are therefore justified in regarding the decision by Darwin to further the conflation of nature and artifice and to accept adaptation as the fundamental problem of biology as a fateful *theological* decision. This fateful decision continues to frame the perpetually unedifying debate between evangelical neo-Darwinians, "intelligent designers," and "creationists," though they might well be arguing over the number of chromosomes that can dance on the head of a pin for all its relevance to a coherent theology of creation.

Indeed, I wish to suggest that Darwin's overthrow of Paley inadvertently and simultaneously brings to its logical conclusion *both* the British tradition of natural philosophy *and* the underlying ontology of the seventeenth-century conflation of nature and art. Because the conflation of nature and art eliminated self-transcending form, we proposed in Chapter 3 that it entailed the reduction of the order of being to the order of history, conceived in the image of Newtonian space and the new mechanical causality as a linear series of "nows" extrinsic and contiguous to each other and following densely upon one another in close succession.⁵³ It took time to realize this, of course, and Darwin finally brings this implication fully to bear on biology. But well prior to Darwin, there came a new awareness of human nature and society as artifacts produced in this way through the course of history. It is crucial to see that this is not simply a matter of attaching a new importance to history; rather, it is a new understanding of what time and history *are*. And it quickly gave rise to a new understanding of divine providence. Vico, attempting perhaps to counter the voluntarism and constructivism of Hobbes, was the first to use "providence" to denote the historical process "by which 'the age of Gods, of heroes, and of men' follow from each other." He described "at length the slow process by which man created his social nature out of his initial brutish existence" (Funkenstein 1986: 281). With this concept of providence, Vico would inaugurate a form of "transcendental historicism," sometimes known as "cunning of reason" or "cunning of history" arguments, which would persist through Marx. All such arguments seek to unveil the secret logic governing a progressive, if sometimes dialectical, history. Their theological effect, when rendered in theological terms, was to transform "providence" from a dimly known, "transcendent premise or promise" into a transcendental logic for history, an immanent mechanism that derived unintended beneficences—and progressive development—from heterogeneous and even deleterious pursuits. This

concept of providence was largely abstracted from the concerns of traditional dogmatics such as Christology, Trinitarian doctrine, ecclesiology, and the sacraments. These were now confined to an a-rational realm of so-called “revealed religion.” It could, therefore, be translated into a purely secular idiom for secular ends without loss of substance. It was on these terms, abstracted from the ecclesial memory of the church or from the discipline of Trinitarian and Christological reflection, that “theodicy” was thus born as a “scientific” complement to a newly mechanized universe and a unitarian God of force.⁵⁴

Darwin’s historicism, derived in part from Lyell’s *Principles of Geology*, is often contrasted with the a-historicism of the “independent creation” professed by pious naturalists and natural theologians. This contrast overlooks the fact that natural theology had already historicized “design” in this way. As John Milbank writes,

a whole important chapter of “natural theology,” constantly re-written all the way from Derham in the seventeenth century to Sumner in the nineteenth, concerned the demonstration of design not just in the natural world but also in the social order (1990: 38).

Malthus himself belonged to this tradition. His checks on population fell within his larger theodical enterprise and provided not only the mechanism whereby equilibrium was secured between a thrifty and virtuous population and its food supply but the mechanism whereby God awakens mind from matter, man from beasts, and kindles ceaseless striving.⁵⁵

Theodicy thus helped give birth to political economy, a fact which takes on new and interesting light if we follow Milbank’s advice, read Malthus back to front, and see theodicy as his central aim.⁵⁶ Paley himself was influenced by this variation of natural theology.⁵⁷ We noted in Chapter 4 how he alludes to Smith’s “invisible hand” and Malthusian theodicy to justify divine benevolence, now largely equated with utility, and it is possible that Paley himself was a source of Darwin’s Malthusian insight (1854: 252–291).⁵⁸ It is now commonplace to read the progression from natural theology to political economy as a process of increasing demystification, in which the dismal science slowly emancipates itself from the superfluous theological presuppositions which helped birth it. This is sheer remystification, however, that conceals the theological prehistory and latent theological presuppositions of the discipline under the guise of autonomous rationalism. For as Milbank argues,

in truth there was no point at which a theological or metaphysical thesis got translated into a scientific or empirical one, no Bachelardian “epistemological break”. The only change was a relatively trivial one, from ascribing design to a transcendent God, to ascribing it to an immanent nature (1990: 39).

If Darwin was able to effect a “*substitution* of natural selection for God as creative agent” by “applying the doctrine of Malthus to the whole animal and vegetable kingdoms,” this is perhaps because he first presupposes the “God” of natural theology, in its historicist form, and then dispenses with him by renaming him nature (Darwin 1991: 3; Gould 2002: 127).⁵⁹ The 1842 and 1844 sketches of his incipient theory lend credence to this claim. They suggest that as a historical matter, Darwin was even

more firmly entrenched in this trajectory of natural theology, more self-consciously theological, and held an even more overtly theological conception of selection than is necessary for my argument.⁶⁰ Mine is a metaphysical and theological argument about the logic of his theory, not a historical argument about his development or an inquiry into his religious or psychological motivations.

It is true that over time Darwin muted his appeals to an “intentional and selecting nature,” especially in the wake of criticism following the first edition of the *Origin* “that he had smuggled in an intentional efficient cause by personifying nature in the act of ‘natural selection’” (Sloan 2001: 266). But Phillip Sloan has definitively shown that Darwin’s attempt in later editions of the *Origin* to dismiss such appeals as mere metaphor do not do justice to the constellation of meanings concentrated in such turns of phrase or the complex labor performed by them. For even in his later works, the Humboldtian and Malthusian amalgam “nature” performs the work heretofore attributed to the deity of natural theology: undergirding Darwin’s epistemological realism, grounding a materialism by turns vital and mechanical, underwriting an anthropomorphic analysis of conscious phenomena in animals, serving as a basis of moral order, evoking the “sense of sublimity” with which he famously concludes the *Origin*—and, I would add, staving off the nihilistic implications of his most basic ontological commitments (2001: 265–269).⁶¹

Darwin’s debts to Paley and the British tradition of theology are thus significantly more complex than is suggested by the idea that Darwin simply overturns Paley. On closer inspection, even this idea turns out not to be so simple. Even if Darwin’s debts to Paley were merely negative, the mere fact that Darwinism’s reactionary stance toward this tradition would suffice to keep it alive within the Darwinian conception of nature and to ensure that Darwinism would perpetually project this theology for itself as its own inverse image. But Paley’s extrinsicist theology is not just the alter ego of Darwinian nature, it is in many ways its father. If this theology is dubious, then we must question the legitimacy of its offspring.

Summing Up So Many Contrivances: A Critique of Darwinian Naturalism

Just as we would be wrong to assume that Paley’s theological influence is merely negative, we would also be wrong to regard Paley’s theological influence as *merely* theological and therefore something that can be discarded as extraneous to Darwinian science. For we have seen that every notion of God has entailed within it a metaphysics and a corresponding conception of nature. In Paley’s case, that correlation was particularly strong. His conception of the organism as a cluster of contrivances was underwritten by a positivism which afforded the illusion of replacing metaphysics with mechanics and by his notion of a finite God extrinsic to nature, a notion, incidentally, which warrants its own dismissal. Accordingly, I hope to show that Paley’s theology not only forms Darwin’s implicit assumptions about the nature of God, it goes a long way in determining the meaning of Darwinian *nature*. Paley will help determine what Darwin *sees*—or wants to see—in looking at living beings.⁶² In this section, I will argue that the defects in this theology, moreover, issue in a corresponding

defect in this vision. They require Darwin and especially his disciples to attempt to deny the obvious, the reality of intrinsically meaningful, teleological wholes whose unity cannot be reduced to an organized aggregation of parts. The “universal acid” of Darwinism thus perennially threatens to dissolve the organisms that are ostensibly the objects of Darwinian science and Darwinism itself along with them. The subsequent history of Darwinian biology will bear this out.

In claiming that Darwin’s conception of nature is “defective,” I mean that it is inadequate both to living organisms as dramatic centers of action and identity persisting across time and to our perception and lived experience of the natural world as an intelligible whole comprised of intelligible wholes. This experience is mediated in every instance by our bodily existence and its permeability to a world that always ingresses upon it. I mean to say, therefore, that Darwinism is inadequate not just to “experience” falsely conceived as the provenance of a Cartesian *res cogitans*, hermetically and epistemically sealed off from its own extended body and “external” world, but rather that it is inadequate to the world in itself, the world which produces us and of which we and our knowledge are an inextricable part. Darwinism as first philosophy can never “add up” to the world we cannot help living in as the beings we are, which is to say that Darwinism fails to “add up” to us (or any other living being), whatever the truth of descent with modification and however many episodes from an inaccessible past can be made out to accord with natural selection. I am aware that a great deal of Darwinian theory, like modern scientific method more generally, is predicated upon the assumption that such naïve experience is inherently false. This is reflected in the eliminativist tendency of contemporary Darwinians to regard concepts such as “us” as merely “folk” notions. Inasmuch as perception and experience are themselves the product of nature, an account of nature which either fails to do them justice or is forced to relegate them to the status of “useful fiction” is *ipso facto* inadequate to the point of being incoherent.⁶³ As we saw in Chapter 2, any truly comprehensive theory of nature has to include its own conditions of possibility. Such claims can invite the charge of a kind of naïve realism for failing to heed to the Cartesian and Kantian abyss between the thinking subject and the external world. As a theologian, I confess my delight at the thought of being faulted by naturalists for being too much of a realist about nature. I can only reply at this stage that the claim is fundamentally ontological, not epistemological, and proceed to make my case.

The difficulty in making my case is compounded by the fact that the standards by which it is likely to be assessed are generated by the very metaphysical presuppositions responsible for the contested conception of nature in the first place. The charge of “naïve realism,” which presupposes the Cartesian elevation of epistemology over metaphysics and its prior sundering of cognitive, bodily, and worldly existence, exemplifies this difficulty. Something similar is at work in the case of Darwinism. In order then to evaluate the adequacy of Darwin’s conception of nature, we must evaluate how the ontological assumptions mediated to Darwin by Paley and the political economists inform not *only* Darwin’s conception of nature but how they also inform the notions of truth, knowledge, and explanation which establish both the subject matter of Darwinian biology and the criteria for what will henceforth count as knowledge of biology.

We have seen that Darwin can only *invert* Paley’s explanation of adaptation because he largely *accepts* Paley’s conflation of nature and artifice. It was Paley’s “artificial”

conception of nature, with deep roots in Newtonian mechanics, that had made adaptation the central problem of biology in the first place and determined in advance that the explanation of a “natural” being supply an external artificer or mechanism imposing an “accidental” form on so many prior indifferent parts. This role was fulfilled in Paley’s explanation by the invisible hand of God, and it is the role played in Darwin’s by the invisible hand of natural selection. Like Paley, Darwin must therefore stress this accidental character of the parts and their interrelation in order to underscore the necessity of the *external* mechanism, the *vera causa* which explains “how the innumerable species inhabiting this world could have been so modified, so as to acquire that perfection of structure and coadaptation which justly excites our admiration,” though in point of fact, Darwin explains nothing of the kind (1991: 2).⁶⁴ Here, then, we should note another amendment to the received wisdom that Darwin simply rejects or *overturms* Paley. Those aspects of Darwin’s thought typically regarded as refutations of design, such as the argument from in-utility or the merely relative perfection of organic form, are not at all discontinuous with the real thrust of Paley’s innovation. Rather, they serve only to *deepen* the “accidental” and “artificial” conception of nature authorizing explanations in this form. So after noting “the inexactness and imperfection of the optical machine and the image on the retina,” Darwin, scarcely concealing his own delight, writes,

One might say that nature has taken delight in accumulating contradictions in order to remove all foundation from the theory of a pre-existing harmony between the external and internal worlds (155).

Darwin’s appropriations from political economy further aid and abet his destruction of this “preexisting harmony.” For they allow him, like Newton, to grant ontological (if not temporal) primacy to a counterfactual world which never actually exists, a world of discrete singulars in unreal conditions of “inertial” isolation, and then to premise the actual world upon the counterfactual. For Newton, this counterfactual tendency was that of bodies in motion or at rest that were then deflected from that tendency by impressed force that is accidental to them. For Darwin, the inertial bent is the Malthusian tendency of organisms to reproduce exponentially until deterred by scarcity.⁶⁵ This results in a second, related kind of counterfactual primacy: the reification of possibility in the form of “copious variation” which we can only ever postulate, which then becomes the backdrop against which natural selection acts.⁶⁶

In all systems conceived this way, basic entities are *ontologically* alone, even if they only ever exist amidst the myriad “relations” delineated by Paley. Mutual order is an “artifact,” the secondary and accidental aggregation “built up,” to use one of Darwin’s favorite expressions, by extrinsic “forces” acting upon these singularities in accordance with extrinsic laws, which is more or less how Darwin *defines* “Nature” even if it is not always how he uses the term.⁶⁷ Darwin admits that natural selection does not induce variation, and he tips his hat to the formalism of Cuvier and Richard Owen, acknowledging “Unity of Type” as one of the two “great laws” responsible for the formation of organic beings (1991: 158).⁶⁸ Yet, in what Gould calls a “fateful” decision “to construct a functionalist theory based on adaptation as primary”—a decision, Gould adds, which was “faithful to Paley”—Darwin subordinates this law to

the still higher law of the Conditions of Existence (and hence natural selection) (Gould 2002: 251, 253).⁶⁹ Order is thus equally consequent upon the singular and equally artificial whether the order in question is the coadaptation of parts to whole or of the whole to its world.

Only these singulars, the so-called “Darwinian individuals” are real, though it remains a matter of controversy just what these individuals are.⁷⁰ Universals are merely classificatory schemata. In other words, Darwin is both a positivist and a nominalist (Mayr 1991: 26–34, 48–67).⁷¹ These are not accidental features of his thought; rather they are endemic to a mechanistic ontology. As we saw in Paley’s case, positivist indifference to being as act makes it possible to abstract from the “single actuality” of concrete things and their world to a counterfactual world of inertial singularities, which assumes ontological precedence over the “forms” which are then understood to be composed of them. Because these individuals are ontologically basic, Darwin assumes that species—mistakenly from an Aristotelian point of view⁷²—are fundamentally a matter of taxonomy, of criteria by which to organize living beings into groups (whether *taxa* are divided into sets or classes is important but a secondary concern for our purposes).⁷³ This assumption underlies the most obvious instance of Darwin’s nominalism, his proposal to treat “species in the same manner as those naturalists treat genera, who admit that *genera* are merely artificial combinations made for the sake of convenience” (1991: 405). Once species are merely nominal, it is not variation which requires an account but specific coherence.⁷⁴

Darwin’s (disputed) “species nominalism” indicates another crucial point where superficial disagreement with Paley is belied by deeper ontological agreement.⁷⁵ Darwin is rightly credited with introducing the deep timescales of Lyell’s geology into the evolutionary process—they are essential to his gradualism—whereas Paley ridicules those who, dispensing with eternity, have nothing but time. These timescales and this nominalism both are essential to the genealogical conception of species emerging in Darwin’s thought and to the “phylogenetic turn” of subsequent evolutionary biology. In its metaphysical meaning, this conflates the orders of being and history, a fact reflected in Darwin’s definition of nature as simply “the aggregate action and product of many natural laws,” and of laws as “the sequence of events as ascertained by us” (1991: 60). The difficulty, if not the impossibility, of successfully achieving this reduction is reflected in the conflicted ambitions inherent in this definition and in Darwinism itself: the tension between the attempt to give a “transcendental explanation” for history in the form of law and the need to equate this law with the “sequence of events.” The crucial point I wish to suggest, however, is that the conflation of being and history follows logically from the prior conflation of nature and artifice, even though Paley himself never saw this logic through to its end. Unlike “things existing by nature” in the Aristotelian sense, artifacts do not have an ontological identity that transcends and precedes the coordinated interaction of their parts and the end result of their piece by piece assembly. As we saw in Chapter 3, this had profound consequences for what it would henceforth mean to know or to explain such entities, as knowledge becomes identical to power in the form of experimental repeatability, predictive success, or successful manipulation. As organisms become artifacts, their ontological identity becomes identical to the sum of their antecedent causes and the coordinated interaction of parts. Once the fusion of *téchné* and *logos* reduces truth to

factum (the made), it is only a matter of time before knowledge of an object becomes identical with knowledge of the history of its construction.

This attempted conflation of being and history underlies the various “populational” notions of species now prevalent within that wing of the modern synthesis, exemplified by Ernst Mayr, which emphasizes Darwinism’s character as natural history.⁷⁶ (Darwinians taking the “gene’s eye view,” while generally concurring in a populational definition of species, are typically less vexed about this problem since actual organisms are somewhat incidental to the real subject matter of evolution anyway.) On this view, “the arrangement of groups within each class, in due subordination and relation to each other, must be strictly genealogical in order to be natural” (Darwin 1991: 351).⁷⁷ This is then taken to provide a Darwinian basis for the later view, pioneered chiefly by Theodosius Dobzhansky in the late 1930s and since articulated by Mayr, that species are reproductively isolated populations—though there are now a number of historical species’ concepts and taxonomical lineages flourishing that do not require interbreeding as a criterion of membership. Such notions, it is thought, obviate the need to identify species by their possession of common “essential” characteristics, and in so doing, further frees the category of species (and evolutionary biology more generally) from dependence upon transcendental metaphysical ideas.⁷⁸ The perceived need either to deny the reality of species at all or to choose between “thinking of species as entities held together by reproductive links and entities defined by a fixed set of characteristics” has since become known as the “species problem.” And while adherents to the synthesis until now have largely accepted populational ideas of whatever variation over what Mayr pejoratively terms “essentialist” or “typological” definitions of species, the problem of what, if anything, a species actually is on strictly biological terms can hardly be said to have been definitively resolved.⁷⁹

Mayr attributes “population thinking” to Darwin himself (1991: 26–34). Depew and Weber contend that this is anachronistic, and that Darwin, while laying the groundwork for the later notion, was never able to shake the effects of the nominalism demanded by his ontology (1997: 128–129, 299–328). They seem to concur that a genealogical or populational definition of species represents a “realist” alternative to an ultimately arbitrary nominalism, and David Stamos, who has written extensively about the species problem, generally agrees.⁸⁰ While I am dubious of the move by Stamos and other proponents of Darwinian “species realism” to distance Darwin from his apparent species nominalism by making it merely a stratagem to defeat creationists, I do not otherwise quarrel with their exegesis of Darwin’s somewhat vague and equivocal uses of the term or deny that he provides strong ground for a populational conception (Stamos 2003: 63–69). My objection, rather, is that both the question of nominalism as posed and the solutions offered to it are themselves the expression of the ontology made possible by nominalism itself: by the denial of the ontological primacy of form, the correlative reconception of causality as force, and the subsequent separation of thought from the world. Once these moves have been made, the question of species becomes the question of species *concepts* and their internal coherence, and the question of “species realism” becomes the question of whether there are things or entities “out there” to serve as “referents” of these concepts. Resolution of this question, then, requires the establishment of “criteria of reality,” which can then be empirically or experimentally verified (2003: 10–18). Formally

speaking, this exemplifies a prejudice latent within the “rediscovery of metaphysics” by contemporary philosophy of science which we briefly considered in Chapter 1, namely, that there is an ontologically neutral method upon whose basis an ontology can then be chosen. Yet, as we have seen, this assumption is already the expression of a mechanistic ontology more deeply held than any that can subsequently be decided upon, one in which a sheer, external matter remains essentially outside of meaning, making a true *adaequatio rei ad intellectum* permanently impossible. This, in brief, is a nominalist formulation of the problem of nominalism.⁸¹ And it is why I take the various proposed forms of so-called “species realism” not as an alternative to nominalism but as an exemplification of it. Whether Darwin ever arrived at the new “realist” conception of species is therefore really beside the point. It is considerably more important how nominalism inheres even in this incipient realism and how this is exemplified in the *a priori* shift from an ontological to a functional conception of truth and explanation that gives cognitive expression to this mechanistic ontology.

We have already devoted considerable attention to this shift prior to Darwin, a shift aptly summed up in Hans Jonas’ slogan that modern knowledge of nature is “a ‘know-how’ and not a ‘know-what’” (2001e: 204). We may quibble with this description and suggest, with Leon Kass, that mechanical “know-how” of an organism is at best limited and at worst misleading, since it is purchased by abstracting the relevant feature of the organism—its genomic structure, for instance—from the only place where it is ever actually encountered: life as lived by teleological wholes in the actual world (2002: 277–297). There can only be mechanism because there are first things, *beings*, which are irreducible to mechanism, and no mechanical description of, say, a bird in flight, ever suffices as a complete account of *how* a bird flies. (We will develop this point more fully in later chapters.) Even so, Jonas’ description suffices for present purposes, and numerous thinkers have offered similar assessments for a variety of reasons. Michael Rea has argued that the methods of the empirical sciences are incapable of discovering intrinsic modal or sortal properties, so that on strictly naturalistic terms, it becomes impossible to justifiably regard sortal properties, “properties that appear to correspond to sorts, or kinds, of object...like *being an electron, being a horse, being a lump of cells, being a statue*, and so on,” as intrinsic to the things in question (11). In Chapter 3, we saw Henry Veatch reach a similar verdict as he argued that the “relating logic” of modern philosophy and science is “unable to say what anything is” and indeed makes the very question unintelligible (1969: 26–41, 106–144). We have already considered the extent to which modern science from Bacon onward is premised upon the renunciation of the “what is” question, and we need not look far within the Darwinian camp to find evidence for the suggestion that the meaning of truth has been circumscribed to pragmatic success. “The big questions,” says Steve Jones, “are the questions you can answer. Any question you can’t is by definition tiny and uninteresting” (Dawkins 1995: 95).

Let us assume, for the moment, that difficulty in saying *what* anything is constitutes a problem. Rea charitably locates this problem in naturalism’s methodological commitments rather than its ontology, if only to spare naturalists the embarrassing self-contradiction of owning up to the fact that they have an ontology. Veatch does not really address the source of the problem. But we have seen as both a historical and a conceptual matter that nominalism generates epistemological problems precisely

because it is first a metaphysical problem.⁸² Nominalists cannot answer the “what is” question, because in denying reality to being, form, cause, and relation, they have already emptied reality of anything corresponding to that question. What Rea and Veatch both see, albeit differently, is that in denying “absolute things” or “individuals” the reality of the forms and relations whereby they are a “something,” nominalists deny them the substantial and existential reality whereby they are individuals, thereby effectively answering the “what is” question in the negative. One great irony, then, of the nominalist elevation of the individuals is their utterly equivocal character; this is the basis for replacing form with formalism and for the fact that the “laws” or “algorithms” are utterly indifferent to the things allegedly governed by them. This formalism justifies the omnivorous extension of these laws not only across all phylogenetic divisions but across the dividing line between the animate and the inanimate and into the world of culture and ideas. Universal Darwinism is made possible, in part, by its indifference to a universe of actual things with actual natures and histories.

It may seem that we have ventured far away from the “species problem” and further still Paley’s influence over Darwin’s view of nature. But I wish to suggest that we cannot understand the full significance of Darwin’s answer to the “species problem”—and it makes little difference whether he is a full-fledged population thinker or which of the various historicist notions of species one finally opts for—without first understanding what the question of species can finally mean within the fundamental ontological assumptions of Darwinian theory. And I maintain further that the “species problem” opens a window onto fundamental problems plaguing not only the Darwinian conception of nature but the internal coherence of Darwinian theory, problems which are largely a function of the metaphysical and theological assumptions mediated to Darwin through Paley and the political economists.

Let us then return to Darwin’s “genealogical” predecessor to the current “population” definition of species. As previously noted, population and essentialist or typological thinking are typically regarded as mutually exclusive alternatives.⁸³ Few commentators seem to allow that one might be able to reject a historicist understanding of species or advance an alternative notion *without* denying descent with modification. But why should this be? Why should *genealogy* determine *identity* and genealogical links receive priority over (say) “essential” analogous characters, unless one has already, for reasons of pragmatic or “philosophical” preference, conflated “what a thing is” with “how it works,” elevated *factum* over *ens*, and committed *a priori* to the proposition that ontological identity is equal to the sum of a thing’s interacting parts and the history of accidental antecedent causes which produced it?⁸⁴ Why should genealogy determine the *identity* of species, that is, unless one has really *already* made an ontological judgment, prior to the science, to collapse being into history and thus dispense with any substantive notion of ontological identity altogether? The question imposes itself even more forcefully if classifications “are merely artificial combinations made for the sake of convenience,” for why then should we regard genealogy as any more “natural” than typology and not simply as more convenient with respect to ends established outside the confines of the science? Such appears to be the anxiety of “species monists” who reject “species pluralism” as leading to nominalism.⁸⁵

Their anxiety is warranted. For what this analysis reveals is that contrary to Mayr, modern species are *all* nominal. Unlike Aristotle's notion of species as the form, *logos*, or *ratio* of a thing—a "definition expressing essence"—they do not and are in fact incapable of saying *what* their members are. Rather, modern species are mere "species concepts," categories which organize their members taxonomically for the sake of reconstructing phylogenetic histories and the mechanisms which produced them. That these "species concepts" may be "realist" in the sense that they happen to designate and organize true historical lineages is beside the point. Modern species are functional entities, organizing members of a class, not ontological entities expressing an intrinsic nature common to those members. For this reason, modern species express the presupposed ontological judgment that species members have no ontological identity in excess to this history. They remain nominal, because they presuppose that there is nothing really in the species members designated by the universals predicated of them.

All of this lies behind the confused notion of "species change," which has come to be rather sloppily equated with transmutation. A strict sense of species changing was an impossibility on Aristotelian terms, not because the order of generation prohibited as a matter of principle a being of one form from eventually begetting a being of another form—Aristotle allowed for substantial change, after all—but for two more basic reasons. First, what Darwinians typically call "change" is not really change at all. It is merely the difference between two objects, not the transformation of a single object. Confusion over this point underlies some fundamental problems at the heart of Darwinian theory that we will address in due course. Second, it makes no sense in classical terms to say that "species" change because form or species in its primary sense is the very "whatness" or identity of a thing as a proper whole, a *per se unum*.⁸⁶ To say that species change would be tantamount to saying that a thing is and is not itself, in other words, a violation of the principle of noncontradiction. The sloppy equation of "species change" and transmutation is often taken as an indication of Darwinian modernity's embrace of Heraclitian flux over the ancient preference for Parmenidian stasis. (Dewey celebrated this point.)⁸⁷ In fact, I shall later argue that change presents a peculiar problem for Darwin, and that Aristotle is, comparatively speaking, the true thinker of change. We do better to take this confused notion as indication of just how far the substantial identity, unity, and interiority of living things has been hollowed out by modern biology. Modern conceptions of species, united in their tacit nominalism in spite of their apparent diversity, correspond to what Charles de Koninck called a "hollow universe" (1960).⁸⁸ If then Darwin succeeds where others failed in explaining the transmutation of species and its causes, a questionable proposition perhaps but one to which my argument is finally indifferent, it is not least because he succeeds in determining and enforcing the criteria by which the success of his explanations and those of his descendants would be judged.

What this really portends is a profound transformation of the very subject matter of biology and, thus, the meaning of biology as a science.⁸⁹ The significance of this transvaluation is easily overlooked now that evolution has so thoroughly insinuated itself as *the* biological question.⁹⁰ An analogy with Newton helps us to understand it better. Newton's great achievements were partly due to his success in effectively converting motion to stasis, treating it as a *state* qualitatively indistinguishable from

its opposite. The precondition for this achievement, once again, was his departure from the metaphysics of act, and with it, the *actual* world. The *dunamis* of Aristotle's natural motion, which outwardly manifests in the activity of change the inner reality of what it is to be a "this-something"—as when the acorn in the dirt matures into a tree—was replaced by a state to which the moved bodies themselves are indifferent, as when an acorn is kicked across the sidewalk or through the air.⁹¹ The acorn may well behave in mathematically predictable ways, but the context and even the acorn itself are indifferent to its motion and can be replaced by other variables—a ball, a stone, or a bird—with the relevant mathematical properties. So far as motion as such is concerned, these properties are the only relevant differences between the acorn's motion and that of a falling stone or a flying bird. The change in location says nothing about what it means to be an acorn, or, even, from the acorn's "point of view," the difference between being in motion and being at rest, save insofar as it is affected by impressed force. Numerous commentators have thus recognized that Newtonian motion is not really motion at all, but rather "a compact series' of instantaneous moments or events following 'densely' one upon the other," and moreover that "Newton's *Principia* is not so much concerned with motion *qua* motion as with the forces that change the state of motion" (Veatch 1969: 262; Oliver 2005: 168).⁹²

Something similar, I would suggest, is true of Darwinian biology.⁹³ Like Paley before him, Darwin exhibits virtually no interest in the difference between the animate and the inanimate, and it is surely significant that some of his more ardent disciples, flaunting *their* nominalism, have been more explicit than Darwin ever was both about effacing any essential difference between nature and artifice—with Dawkins even calling himself and his cohorts "neo-Paleyists or perhaps 'transformed Paleyists'" (1998: 16).⁹⁴ Much as Newton famously declined in the *General Scholium* to specify the essence or causes of gravity, contenting himself with its measurement,⁹⁵ Darwin appears to find the question of life irrelevant to the study of biology:

It is no valid objection that science as yet throws no light on the far higher problem of the essence or origin of life. Who can explain what is the essence of the attraction of gravity? No one now objects to following out the results consequent upon this unknown element of attraction... (1991: 401).⁹⁶

The remark attests to how much the subject matter of biology has changed even in the interim between Paley and Darwin. Paley, for all his faults, still retains a kind of interest in organisms "for their own sake" inasmuch their "irreducibly complex" features warrant his design inference. So, we find Paley posing the sort of questions—how a bird knows to care for its offspring, for instance—that later generations of biologists would merely find quaint. Though Darwin does address similar phenomena and is routinely praised by Gould and others for the mountains of facts and observations he adduces in support of his theory, comparatively less reflection is spent on the significance of the question for which these facts are the answer. Though Darwin is like Paley, a positivist who shows little interest in the difference between the animate and the inanimate, his use of evidence suggests that he is interested in organisms not *as such*, but only insofar as they can plausibly be accounted for by natural selection or alternatively, insofar as their imperfections and inefficiencies testify to this historical

process of trial and error.⁹⁷ This is precisely the point of his rather anthropomorphic comparison of human mental faculties and emotions and those of lower animals in *The Descent of Man*, for example. It is not to *understand* these *as such*, but to “show that there is no fundamental difference between man and the higher mammals in their mental faculties” and thus to bring the former within his genealogical system of nature by showing how it might be “built up” from the latter (Darwin 1959: 67). It is surely telling that the word “evolution” does not even appear until the sixth edition of the *Origin*, after Darwin had acquiesced in the fusion of his theory with the architectonic social philosophy of Herbert Spencer (Gilson 1984: 49–60). Much as force and not motion *per se* was the true subject matter of Newtonian physics; it is the evolutionary process and its mechanisms, not life or living things *per se*, that are the real subject matter of Darwin’s biology.⁹⁸ This reflects the new pragmatic conception of reason and its “relating logic” which we saw in Chapter 3. And, of course, this determines what problems will henceforth need resolving, what counts as an explanation, and even what counts as a properly scientific question. As a consequence, “the organism as a real entity, existing in its own right, has virtually no place in contemporary biological theory” (Webster and Goodwin 2006: 100).⁹⁹

With Darwin’s conflation of nature and art, being and history, the living organism begins to disappear as the subject matter of biological science. This disappearance is matched by another, more fateful, vanishing act: the disappearance of the organism as the subject of its own being and action.¹⁰⁰ This disappearance is never total, partly because it is never really possible in principle to dispense with the “what knowledge” corresponding to teleological wholes that lies at the foundation of inquiry. We shall explain this in more detail further on, but it means that Darwinian biology inevitably proposes an authoritative answer to a question in which it feigns no interest. It does so, predictably, by reducing the “what” to the “how,” by equating the identity and unity of its subjects, the unity of a mechanical aggregate, with the sum of its interacting component parts, and the history of causes which produced it. This logic is endemic to the ontology of Darwinian biology and is thus operative long before we arrive at Richard Dawkins’ notorious description of persons as “gigantic lumbering robots” who are the mere epiphenomena of their genes (1976: 19). We find a milder, more sober instance in Gould, who offers up a definition of the organism’s substantial identity which is ultimately no less reductive: “the immediate form of an organism can be meaningfully parsed into three major contributions of current adaptation, current constraint, and historical inheritance” (2002: 259). Examples could be compounded.¹⁰¹ All lack any principled and articulated sense of the substantial identity of the organism as an *unum per se*: a whole which, though depending upon the material interactions of its parts, transcends them as their subject. Lacking, in other words, is the self-transcending unity and interiority which for Aristotle distinguished “things existing by nature” from artifacts.¹⁰² The hollow universe of mechanistic materialism is populated with equally hollow organisms.

These are not deviations from some purer Darwinism. This is Paley’s inheritance continuing to manifest itself in the “transformed Paleyism” of Darwin and his contemporary descendants. In Chapter 4, we saw how Paley rejects “internal principles of order,” conceiving the living organism instead as a “cluster of contrivances” (1854: 109). The result was to make each natural thing stand in an external and artificial relation to its own form. Darwin echoes this view, describing the organism as the

“summing up of many contrivances” (1991: 405–406). He frequently seems to vacillate, even on whether the organism or its traits are the so-called “unit of selection,” giving the impression that an organism is simply an organized collection of traits, as in the example of the upland geese with webbed feet (135). It is true, as we have noted, that Darwin was influenced by Cuvier, Owen, and von Baer and that he does acknowledge what has subsequently been called “structural constraint” (Gould 2002: 251–341). He insists that while the causes of variation are unknown, they are not random, and he acknowledges the “correlated variation” whereby

the whole organization is so tied together during its growth and development, that when slight variations in one part occur, and are accumulated through natural selection, other parts become modified (Darwin 1991: 100, 108).

He cites the apparent correlation between whiteness, blue eyes, and deafness in cats as evidence as well as the difference “between the outer and inner flowers in some *Compositous* and *Umbelliferous* plants” (109). Still one searches the *Origin* in vain for any attempt—or even much interest—for a principle of this correlation, how the *correlata* can be more than parts that are essentially external to each other.¹⁰³

Darwin nevertheless made the “fateful decision” to subordinate the great law, “Unity of Type,” to external conditions. Gould offers this rationale for Darwin’s apparent lack of curiosity in even a truncated “internalism.”

[A]ny exception of his trio of necessary properties for variation (copious, small in extent, and undirected) would compromise the exclusive power of natural selection by granting a role to “internal” principles of variation in the direction of evolutionary change. Any exception, in short, would represent a law of variation acting not only as a source of raw material, but also as a subsidiary to natural selection among sources of change (Gould 2002: 333).

Consequently, Darwin dismisses many of these correlations as merely apparent, proposing instead that they are “simply due to inheritance,” and he is confident that all “may more or less be completely mastered by natural selection” (1991: 110, 108). “Unity of Type,” then, finally amounts to little more than “past episodes of ordinary adaptation and natural selection, subsequently inherited by numerous descendents” (Gould 2002: 255). Perhaps the clearest evidence that the Darwinian organism is a “natureless” artifact artificially related to its own form comes from the two-volume work of 1868, *Variation of Animals and Plants under Domestication*.

I have spoken of selection as the paramount power, yet its action absolutely depends on what we in our ignorance call spontaneous or accidental variability. Let an architect be compelled to build an edifice with uncut stones, fallen from a precipice. The shape of each fragment may be called accidental; yet the shape of each has been determined by the force of gravity, the nature of the rock, and the slope of the precipice—events and circumstances, all of which depend on natural laws; but there is no relation between these laws and the purpose for which each fragment is used by the builder. In the same manner *the variations of each creature are determined by fixed and immutable laws; but these bear no relation to the living structure which is slowly built up through the power of selection, whether this be natural or artificial selection.*

If our architect succeeded in rearing a noble edifice, using the rough wedge-shaped fragments for the arches, the longer stones for the lintels and so forth, we should admire his skill even in a higher degree than if he had used stones shaped for some purpose. So it is with selection, whether applied by man or by nature; for though variability is indispensably necessary, yet, when we look at some highly complex and excellently adapted organism, variability sinks to a quite subordinate position in importance in comparison with selection, in the same manner as the shape of each fragment by our supposed architect is unimportant in comparison with his skill (Darwin 1868: 348–349 cited in Gould 2002: 341).¹⁰⁴

Darwin clearly conceives of the organism as an artifact, the accidental “summing up of many contrivances,” “built up” as it were, from natural selection (1991: 405–406). We have seen, however, that the unity of an organism differs profoundly from that of an artifact. An organism, to put it in traditional terms, is an *unum per se*, while an artifact is only an *unum per accidens*. The difference is evidenced in those activities of metabolism, respiration, generation, self-movement, and growth emphasized by Aristotle. It is evidenced in the fact that the organism, in Kant’s words, appears as cause and effect of itself, with its parts developing not simply for the sake of each other but by means of each other. And it is evidenced most simply in the fact that organisms “have the property of maintaining themselves in being while their elements change; hence they are not reducible to the sum of their elements” (Webster and Goodwin 2006: 126).¹⁰⁵ An artifact, by contrast, does none of these things because its parts are *essentially* external to each other and its unity is thus not intrinsic to it.¹⁰⁶ Whereas the unity of an organism ontologically precedes its development, so that its development is the development *of* an organism such as an embryo or an oak tree, the unity of an artifact resides primarily in the mind of its maker and only comes about in the thing itself as the end result of a process of manufacture.

We can sum this up by saying that an artifact is not the subject of its own being and does not therefore possess itself in the way a living thing does. And we can illustrate the distinction by invoking the question posed in Thomas Nagel’s famous essay, “What is it like to be a bat?” It even makes sense to ask what it is like to be a plant or the 1-mm-long roundworm *Caenorhabditis elegans* (*C. elegans*). After all, even a *C. elegans* has a certain unity and transcends itself in appetitive relation to its “world” of ambient bacteria. Even though *C. elegans* are somewhat unique in the fact that each possesses an identical number of cells (935), *this C. elegans* can never *be that C. elegans*, in more than a functional or formalistic sense for “purposes” other than “its own.” But it makes no sense to ask what it is like to be a car. “Being a car,” says Robert Spaemann, “is not *like* anything,” because a car does not *exist* in other than a purely logical sense” (2007: 30).¹⁰⁷ Why? Because an artifact such as a car is not a subject of its own being an end; its form and purposes are accidental and extrinsic to its matter. An organism, by contrast, has or rather *is* its own project, and this is because its being is incommunicably proper to it. An organism, however primitive, thus possesses an interiority that an artifact lacks.

The mechanistic conflation of nature and art empties the world of this interiority, which is to say once again that it empties the world of its own being and makes it essentially *instrumental*. Darwin and his later disciples, who perfect this reduction and bring it to term, lack any principled means of accounting for the self-transcending

unity and interiority of living things, though this will prove to be of little import for the subsequent development of the tradition. The ontology that makes it impossible to account for the interiority of life, by making the mechanisms of the evolutionary process and not the organism the principal subject matter of evolutionary biology, makes it unnecessary as well.

Darwin's conception of the organism as artifact contradicts everything that we—and *he*—cannot help knowing about organisms from elementary experience. It contradicts the “objective” form of experience from which science takes its start, that of an intelligible whole comprised of intelligible wholes. And it contradicts our “subjective” experience of ourselves *as a substantial unity—a corpore et anima unus*, if you will—self-transcending centers of dramatic action capable of receiving and penetrating the world.¹⁰⁸ This subjective form of experience is inseparable from the fact of our being living bodies who have *always already* received the world into ourselves and who thus inhabit a kind of “preexisting harmony.”¹⁰⁹ The reductive materialist, who harbors his Cartesian dualistic antithesis within himself by exempting his own act of theorizing from his reductions, lives by suppressing the fundamental character of life in the body (Jonas 2001c: 17–18).¹¹⁰

Because Darwin's conception of the organism is contrary to what we know and what our every action affirms to be true, Darwin and his followers consistently fail to abide by the restrictions inherent in their own ontological commitments. Darwin can hardly write three words without smuggling the despised teleology back into his conception of the organism. His acolytes will eventually fare no better.¹¹¹ As J.B.S. Haldane famously remarked, “Teleology is like a mistress to a biologist: he cannot live without her but he's unwilling to be seen with her in public.”¹¹² I maintain, with Gilson and Spaemann, that this is a matter of philosophical necessity. Teleology is a “philosophical inevitability and, consequently, a constant of biophilosophy or philosophy of life” (Gilson 1984: xix).¹¹³ Aristotle made a similar point in criticizing the mechanists in his own age, noting that Empedocles “finds himself constrained to speak of the ratio as constituting the essence and nature of real things” (*Parts of Animals*, I.1, 642a in Gilson 1984: 105).

Form and finality are basic to our apprehension of entities and are thus intrinsic to any coherent notion of causality. It is therefore impossible to conceive even the most positivistic notion of efficient causality, as Leibniz recognized, without an implicit affirmation of teleology. D.C. Schindler explains:

[E]ven analysis carried out strictly in the terms of mechanistic causality nevertheless has to isolate causes and effects, removing them from a literally endless continuum of possibly significant facts. Such an isolation cannot occur without some reference to final causality, since causes stand out as causes only in relation to the relevant effect that they are taken to produce. If we eliminated even this minimalistic teleology, we would simply have no understanding whatsoever (2010: 22–23).

If this is true, then form and finality cannot be exorcised but only repressed until, in good Freudian fashion, they reappear in other forms.

Though causality does become unintelligible after Hume, this is very difficult to accept, and Darwin, who is liberal in granting causal efficacy, was unable to do so. The

viability of natural selection depends upon the ability to distinguish and isolate causes and effects from this endless continuum, and this capacity, in turn, presupposes the ontological primacy of intelligible *things*. We must understand this in order to understand the nature of teleology in its Aristotelian formulation, why it is destined to be simultaneously misunderstood and presupposed by Darwin, and just what the attempted rejection of teleology is really the rejection *of*. The instances of Darwin's recourse to teleological language are too numerous to catalog.¹¹⁴ Darwin excuses himself for this and for personifying nature, insisting that "everyone knows what is meant and implied by such metaphorical expressions," but this self-exoneration belies the real work this language performs in Darwin's theory and evades at least two deeper problems inherent in the attempt to reduce teleology to function (1991: 60). Recall that Aristotle distinguishes between two senses of "for the sake of which": "(a) the end to achieve which and (b) the being in whose interest anything is done" (*De Anima*, 415b20–415b23). As Timothy Lenoir, Jonathan Lear, and many others have noted, there is a great deal of modern confusion surrounding the meaning of teleology.¹¹⁵ Darwin is by no means exempt from this. Because he followed his mechanist and empiricist forebears in regarding matter as positive, inert stuff that is defined precisely by its *exclusion* of meaning and reason, he had no choice but to follow them in regarding final causality extrinsically and dualistically, reducing it to a rather crude form of intentionality.¹¹⁶ Yet, Aristotle's second sense of "for the sake of which" indicates that teleology, in its simplest and most subtle sense, simply affirms "the basic ontological reality of forms, combined with the idea that natural forms characteristically develop from potentiality to actuality" (Lear 1988: 40).¹¹⁷ Lear's remark here is instructive for three reasons. First, it indicates how Aristotle's conception of form is dependent upon his conception of *act* (*energia*) in relation to potency (*dunamis*). The importance of this point will soon become evident. Second, it indicates that teleology in this latter, most basic sense is simply another name for the unity and primacy of natural things constituted through form, a unity not really reducible to an assemblage of the systems comprising it. Third, to say that form is ontologically basic is to say that it lies at the root of things, that the world of intelligible things is the source of our theories about them and not the other way around. Now what does this all mean and why is it important?

Every possible object of perception is necessarily perceived as a "something" or a "what."¹¹⁸ This means that form is a constitutive principle of every object of perception, or conversely, that the very *act* of perception necessarily acknowledges the ontological primacy of form which is self-transcending precisely insofar as it really "communicates itself" to the perceiver, precisely insofar, in other words, as the world really is the source of our knowledge of it and not the other way around.¹¹⁹ This indicates why teleology is a philosophical necessity and why evolutionary biologists continually answer the "what is" question while forswearing it. One cannot circumvent this necessity by redefining organisms as "self-organizing totalities" or by pushing the real units of reality to a subphenomenal, "atomic" level after the fashion of Empedocles or Dawkins.¹²⁰ Even the most elemental part conceivable is still perceived as a "something," a "what," an "indivisible" whole distinguishable from everything else by its own specific "nature."¹²¹ To recognize the primacy of form in perception is to acknowledge in the very act of perception an implicit reference to the transcendental

attributes of being—unity, truth, goodness—with the depth of that reference “intensifying,” so to speak, in proportion to an increase in the interiority and intelligibility of the object. To perceive a stone as such, in distinction from the infinity of things which forms its background and context, is to perceive something that is at once “one” and “true” to the nature of stone (something which as one and true is therefore good). And yet, precisely because a stone is an aggregate, lacking both the organization of an artifact and integration and interiority of a living thing, the notion of a “good” stone or a “true stone” is less necessary for distinguishing a stone from a tree than is the notion of a good watch for distinguishing it from a mere piece of jewelry or a whole man for distinguishing between a healthy man and a sick one.¹²²

While the most basic sense of teleology implicated in elemental acts of perception is distinct from Aristotle’s first sense of “for the sake of,” it is not finally separate from it. This is due to the fact that movers and moved—in the *act* of moving—comprise “a single actuality of both alike” (*Physics*, 202a18–202a19). As we have seen, a mechanical ontology makes the inertial singular, denuded of any intrinsic meaning, ontologically basic. This transforms the very meaning of causality into a relation between two distinct events in which no communication of form or being or meaning takes place, making the actual order a secondary consequence of mechanisms operating on the primary counterfactual order. A cause, in a theme variably repeated from Galileo to Hume, is now simply “that at whose presence the effect always follows and at whose absence it disappears” (Galilei, *Opere* IV, 216 cited in Burt 1954: 100–101). Once Hume demolishes the connection between antecedent and consequent, causality will be reduced to the sequence of events ascertainable through repeated experiment.

Recall Aristotle’s example of the builder. His activity as cause was only actually realized in and with the effect: he *is causing* the house only *as* the house *is being built* (*Physics*, 201a15–202a37).¹²³ Something analogous is true of living things. Imagined as abstract nouns—or as mere variables, say *x*, holding a place within a formal system—they can always be analytically separated and imagined abstractly as somehow prior or external to their world. This, we have seen, is the ontological precondition for the primacy of adaptation. But the concrete existence of an *actually living* being, who is a “this-something” in every case, is at every moment characterized by an actual web of relations, dare we say, “a preexisting”—though by no means static—“harmony between the external and internal worlds,” without which it could not *be* in any sense. When we accord primacy to being as *act* and recognize its transitive character, it alters the meaning of the boundary or limit distinguishing an organism and the world that encompasses it on every side (thus also altering the meaning of place). In the *actual living* of an organism’s life, “biological insides and environmental outsides” are not two contiguous, but externally related realms, otherwise separated by an abyss and requiring some mechanism as a *tertium quid* to account for their artificial “interaction” or “relation” in Paley’s sense (Gould 2002: 161). Rather, inasmuch as they are *in act—being, doing, living*—they comprise a single actuality, maintaining distinction without separation. Teleology in this sense simply affirms the primacy of actual living things and the fact that they always already have the world as their essential presupposition. To deny teleology then is to deny the actual world or to exchange it for a counterfactual abstraction. The frustrated attempt to transform and supplant teleology is a subset of modernity’s metaphysical decision to give possibility ontological priority over actuality.

Darwin is a teleologist of necessity insofar as “Darwinian individuals” are objects of perception, or, indeed, insofar as they are anything at all. Yet, Darwin’s teleology significantly exceeds this minimal necessity. In point of fact, both Aristotelian senses are evident in Darwin’s frequent recourse to teleological forms of language. In contrast to Aristotle, however, Darwin attempts a typically modern course in first dismantling the “single actuality” of the world—or the preexisting harmony between the external and internal worlds (1991: 155)—in order to reconstruct it as the secondary consequence of extrinsically imposed “force.” This is how both the internal parts of a thing and its relation to the world are “built up.” (Here, the various forms of Paley’s “relations” return in Darwin less systematically under different guises.)¹²⁴ Darwin’s captivity to this mechanical conception is betrayed throughout the text of the *Origin* by his habitual manner of treating natural selection as if it were the “subject” of its own causal agency. “Natural selection *acts*,” it is often said, though it remains for us to consider the work performed by this “careless wording” (Mahner and Bunge 1997: 367). Even though the logic of his theory exemplifies these mechanical assumptions, his explanatory forms just as frequently betray the inescapable ontological priority of this “single actuality”—contradicting, perhaps, his admission that natural selection does not induce variation (Darwin 1991: 59)—by making it appear as if organisms were inherently, rather than accidentally, related to their worlds. He frequently writes, for instance, as if eyes were really “for” seeing, though it is strictly impossible on the basis of his ontology to say that anything is *for* anything else, or even that there are *things* for whom other things such as eyes might be.¹²⁵

One might excuse Darwin in such instances by arguing that all such apparent teleological descriptions are translatable without remainder into merely functional ones.¹²⁶ Strictly speaking, eyes are not “for” seeing light and certainly do not develop in time with that end “in view.” Rather, out of infinite possibilities (such as Empedocles’ man-faced ox progeny) these merely “happen” to see what happens, happily, to be an illuminated world. Yet, one cannot eliminate Aristotle’s first sense of teleology, “the end to achieve which” without encountering immediate problems with respect to Aristotle’s second sense of teleology, “the being in whose interest anything is done.” Not only are eyes not “for the sake” of seeing a visible world (or minds for knowing an intelligible one), they cannot even be “for the sake of” the organism who incidentally happens to benefit from seeing. For in a world of functions only, the organism can *have no sake*, except perhaps in an incidental, arbitrary, and finally inconsequential sense.¹²⁷ A world without sakes is finally a world without organisms. For a world of functions only is an utterly accidental world of parts outside of parts that are the parts of no real wholes, a notion that is almost as difficult to think as it is impossible to believe.¹²⁸ Though this has not stopped people from trying.

Darwin can hardly be faulted for failing to see through to the nihilistic conclusions of his own ontology, and I will suggest that those Humboldtian Romantic elements in Darwin’s thought emphasized by Richards serve to soften and obscure these conclusions. One is tempted to call them a source of “comfort and solace,” though there were moments when Darwin himself seemed to take little comfort from them (Gould 2002: 121).¹²⁹ This might be a minor vice were it not for where it leads. Contemporary opponents of so-called group selection, denying that species may count as Darwinian individuals and seeming to recognize these implications, have

argued that species preservation is but the happy, accidental outcome of natural selection operating on whatever such individuals happen to be.¹³⁰ Organisms, genes, and phenotypic traits have all emerged as candidates. And proponents of genetic reductionism, half-recognizing the implications of this logic and the problem presented by the organism, attempt to obviate it and hasten the convertibility to algorithmic function by making “the gene” (or genomic patterns statistically arrayed in populations) the real unit of selection, at the price of rendering the organism incidental to the real evolution occurring “behind its back” and undermining its own intelligibility as an explanation.¹³¹

One need not look far, as a consequence, to find neo-Darwinians radicalizing the old distinction between primary and secondary qualities and asserting with increasing aggressiveness that freedom, belief, and other phenomena betokening even a restricted sense of “sake” are ultimately useful fictions thrown up by functions, though it is unclear what “useful” can even mean in this scheme. For if the denial of teleology ultimately entails the denial that the living organism has a “sake,” then its living too and the “interest” embodied in the very fact that it endeavors, sometimes under great strain, to continue doing so can be but happenstance, the epiphenomenal appearance thrown up by so many algorithmic functions operating on a world in which the distinction between living and nonliving, like every other distinction, is finally meaningless. In other words, teleology cannot be translated without remainder into mechanistic function (or functionless effect) without at the same time depriving evolutionary theory of the animating principle which, in its positivism, it continues to assert: “the struggle for life” (Darwin 1991: 46). This is because teleology cannot be reduced to function or effect without depriving biology of its very subject matter: organisms that are the subjects of their own being, for the sake of which they grow and act in characteristic ways. It is this “sake” which gives rise to the possibility of struggle in the first place.¹³²

Faced, then, with the dilemma of fundamentally modifying the theory or giving up the world to save it, these theorists choose the latter, relegating the living things that we see, and the persons that we think we are, to the antiquated realm of “folk biology.”¹³³ The answer, then, that a thoroughgoing Darwinian would have to give to the question Darwinism rejects but cannot avoid—*what is the organism?*—would finally be “nothing,” if it were only possible to really be a thoroughgoing Darwinian.

Darwin himself was not. It is true that in conflating being and history, he brings to term Paley’s reduction of nature to artifice with its correlative conversion of truth to function. He urges that

we contemplate every complex structure and instinct as the summing up of many contrivances, each useful to its possessor, in the same way as any great mechanical invention is the summing up of the labour, the experience, the reason, and even the blunders of numerous workmen (Darwin 1991: 406).

Yet, he also takes recourse to living teleological wholes in order to advance this reduction. Darwin approvingly cites “the illustrious Humboldt” whose example of *la mas racional* mule “combats the system of animated machines, better perhaps than all the arguments of speculative philosophy” (1959: 81).¹³⁴ This is not merely Romantic

enthusiasm; the point serves to establish genealogical precursors and affinities for human mental powers.¹³⁵ But otherwise it is not well integrated into his thought, either biologically or philosophically. Darwin's recourse to teleological wholes is therefore more fundamentally a matter of epistemic and ontological necessity than philosophical principle, and he takes it often in spite of himself.¹³⁶ He is thus in the awkward position of affirming in practice what his theory would deny and denying in theory what his practice affirms, of paradoxically failing to see what he cannot help but see, of presupposing the interiority and unity of living organisms, and yet being prohibited by his ontological commitments from rendering an account of them. Darwinian biology is predicated upon a denial of the obvious which, as obvious, will not be denied.

The Incredible Darwin

One could hardly ask for better evidence of Darwinism's incredibility than Darwin's own failure to be a thoroughgoing Darwinian. Darwin's nominalism, aided and abetted by a theological extrinsicism, is at the root of this failure. It leads him, like Newton, Paley, and even Ockham, to abstract from the "single-actuality" of what was once the cosmos to a counterfactual world of inertial singulars indifferently related to each other and then to reconstruct the whole as a mechanical aggregation of those singulars brought about by extrinsic pressures or forces. This abstraction from actuality to absolute individuals simultaneously empties reality of its interiority and deprives universals of any ontological foothold. This mechanistic ontology is apparent in Darwin's tendency, when he is not under the spell of Humboldt, to regard the organism as an accidental aggregation of traits, "the summing up of many contrivances," and in the corresponding notion of causality embedded in his descriptions of natural selection, about which we shall soon have more to say. This nominalism is inherent in his notion of species, irrespective of whether we take him at his word that species are "merely artificial combinations made for the sake of convenience" or emphasize his incipient historical and populational understanding (Darwin 1991: 405).

An obvious question arises for all constructs premising the actual upon the counterfactual. Is it really possible, after taking leave of one's senses and the actual world, to recover it again by "adding together" the abstracted parts? Can such an account ever attain to the intelligible wholes, given in our elementary experience of the world, that elicit inquiry in the first place? Certainly Aristotle thought not, which is why he thought mathematics, which abstracts from actual physical bodies of various kinds, inadequate to the phenomenon of motion (*Physics*, II.193b33–II.193b5).¹³⁷ The history of modern philosophy and science, heir to the "residual estate" of Cartesian dualism and oscillating between philosophical idealism and scientific materialism, suggests he was right (Jonas 2001c: 20).¹³⁸

The inevitable consequence of premising the actual world of experience on a more basic counterfactual world lurking ontologically "behind" it is, to put it in Whiteheadian terms, the "bifurcation" of nature into primary and secondary reality: "of substance and function (or 'epiphenomenon') in the case of materialism, of consciousness and appearance in the case of idealism" (Jonas 2001c: 17).¹³⁹ This ultimate result is

eliminativist accounts of the “real world” that are always less than we cannot help knowing it to be, in which both the psychophysical unity that is the subject of that experience and the intelligible wholes that are its object are relegated to an illusory “folk” status.

There is a clear analog to this in Darwin. The mechanistic ontology which he inherited from Paley and the tradition of British functionalism leads him to view the living organism as the accidental aggregation of parts outside of parts. Already when we pushed this view to its logical conclusion, we saw that the “universal acid” of Darwinism begins to dissolve the very subject and presupposition of Darwinian theory: living unities who have a *stake* in being. We are reminded here of Michael Rea’s argument that naturalism and empiricism are unable to account for sortal properties and are thus forced, if they wish to be philosophically coherent, to relinquish both materialism and realism about material objects. There is a strong movement within contemporary neo-Darwinism to do just that, to regard organic wholes, as well as ostensibly purposeful and meaningful action, as the epiphenomenal by-product of their biochemical bases whose intelligibility is somehow exempted from its dependence upon perception and form.¹⁴⁰

Now one might object that this criticism condemns Darwin for the sins of his children. Clearly Darwin was not a professed reductionist in the contemporary sense—neither the cell nor the gene had not been invented yet at the time of his writing—and I have already noted Robert Richards’ argument that Darwin was as much a Romantic as a mechanist and Sloan’s complementary point that Darwin packs a whole constellation of meanings, some Humboldtian and others Malthusian, into his understanding of “nature” (Richards 2002: 514–554).¹⁴¹ Later forms of reductionism are nevertheless the legitimate, even inevitable outworking of Darwin’s ontology, as we shall see in Chapter 6, because Darwin cannot concede any ontological status to form (“Unity of Type”) without thereby dethroning natural selection from its explanatory pride of place and implicitly reintroducing an order of being distinct from history. If Darwin himself failed to be a thoroughgoing Darwinian in this sense, it is perhaps because he was blind to a basic, unarticulated ambiguity deep in the heart of his thought. It is this that makes Darwinism incredible.

One might object further that this criticism ignores the antireductionism now in vogue through much of evolutionary biology and the philosophy of science, which makes even contemporary genetic reductionism, not to say Darwin himself, less “greedy” than I make it out to be. One could look to the lack of a one–one or even a one–many relationship between genotypes and phenotypes, or to the fact that “fitness,” understood as a biological property, “supervenes” on an indefinite and perhaps even infinite number of physical states.¹⁴² Elliott Sober claims, in fact, that “all biological properties supervene on physical properties” (1993: 73 cited in Stamos 2003).¹⁴³ And these properties seem to be truly emergent. They introduce new causal factors which begin to “‘take control’ of a certain domain of phenomena, with the result that there appear new laws and even new kinds of laws, which apply to the domain in question” (Bohm 1957: 53). These factors and laws are not *simply* reducible to the laws governing their subvenient bases.¹⁴⁴ One could even call upon the controversial idea provoked by these emergent properties, the idea of “top-down” causation that one finds in some quarters of neuropsychology and philosophy of

science, whereby the supervenient or emergent property is able to exert causal influence upon its base.¹⁴⁵ Something like this is surely entailed in the admission that *meaning*, say the death of a loved one, can be the cause of a physiological response. And one could invoke the definition of the organism as a “self-organizing totality” in the systems biological perspective, which we will consider in Chapter 6, to argue that Darwinism can abide a nonreductive understanding of the organism. Indeed, even Dawkins denies the existence of the sort of “baby-eating” reductionists really who would *simply* reduce complex biological phenomena to physics (1996: 13).¹⁴⁶

My point, however, is not that evolutionary biology is *simply* so reductively mechanistic that it relinquishes its grip on the real world. It is rather that because the real world will not relinquish *its* grip on thought, a curious, almost paradoxical, result ensues. On the one hand, these various antireductionisms remain ontologically materialistic, which means that they continue to retain conceptions of matter, generated by dualism, which make intelligibility essentially extrinsic to what is ontologically basic. This is inscribed from the very outset into the dualisms between “supervenient” (formal) properties and their “physical” bases and between “top-down causes” such as ideas or psychological states and their neural bases. And it forces the insoluble question of how seemingly incommensurable “macrostates” are a function of their “microstates” and how a higher level formal qualitative phenomenon such as an idea can exert causal influence upon such “purely physical” phenomena as hemodynamical changes and electrical signals in the brain. This ontology gives rise to the widespread suspicion that top-down causation is, in the technical parlance of Craver and Bechtel, “spooky” (2006). Even the most varied and complex of the “self-organizing totalities” conceived within this ontology are essentially reductionistic, because each makes the “real” organism less than our elementary experience of them, less than it is to itself, less than our experience of ourselves. Just as we saw earlier a nominalist rejection of nominalism in connection with the species problem, so here with “emergent” theories of the organism we see a reductionist form of antireductionism.¹⁴⁷

And yet, on the other hand, precisely because “intelligible species” are experientially basic, the fully reductionist implications of this ontology are impossible to realize. Because form and finality are inherent in intelligibility—both from the side of the subject and the object—Darwin and his contemporary followers are *less* reductionist than the logic of their theory requires them to be, while this same philosophical necessity makes these various “antireductionisms” inherently *more* reductionist than they aspire to be. This is because it is simply impossible to *live* as if these ontological commitments were true. The very act of thinking affirms the contrary.

Because the obvious by its very nature *cannot* actually be denied, we have seen that Darwin betrays his own theory at every turn by taking recourse to teleological wholes. There is thus a strange sort of theoretical schizophrenia stalking virtually every page of *The Origin*. Stephen R.L. Clark (1999) rightly maintains that Darwin is more vigorous than any thinker hitherto in carrying forward into the biological world the Enlightenment rejection of formal and final causality and the thoroughly accidental world of Newtonian physics. And yet we have seen that he can scarcely write three words, whether of the optimizing “gaze” of natural selection or the features of organisms themselves, without smuggling the banished teleology back into his

biology. This is not a matter of mere metaphorical license, as Darwin and his defenders both like to maintain. It is ontological necessity.¹⁴⁸

Darwin and his descendants lack the metaphysical means to overcome the bifurcation of nature because they lack an ontological conception of form, even though they never really do without it in practice. It is thus endemic to Darwinism to reduce nature to one pole of this old dualism because Darwinian theory of all kinds, even when it presupposes a post-Newtonian dynamical background, is predicated upon a conception of matter that is essentially external and thus essentially prior to and outside of intelligibility. This means that intelligibility and truth must always be reducible, as a matter of principle, to the unintelligibility and untruth upon which they are premised.¹⁴⁹ Not only then must the intelligibility of a thing be extrinsic to the thing in question, but our experience of this intelligibility must be explained on the basis of something more basic that falls outside it. As we saw in Chapter 3, when intelligibility ceases to be ontologically basic, truth is reduced to a matter of logical coherence, on the one hand, and experimental verification of empirical observation, on the other. That is to say that truth has already given way to pragmatic success.

Darwinian reductionism of every stripe comes to grief at the living organism, and, in particular, at the human person, whether we consider the phenomenon of life from the first person vantage point or from the side of the manifest world.¹⁵⁰ Two centuries of evolutionary biology have failed to yield an adequate account of the organism, adequate to the phenomenon of life as lived. This failure is not as a matter of incomplete research but of a faulty ontology.¹⁵¹ The formal and existential identity characteristic of a *per se unum*, and of life as lived, will remain forever “more” than any account of the organism given by orthodox Darwinism because it is ontologically incapable of regarding the intelligibility which is experientially basic as ontologically basic.¹⁵² Even the most sophisticated treatments of the organism, forged in *rapprochement* with systems biology, still assume that the intelligibility of the phenomenal organism is a function of something more basic, even if that something is a certain pregiven systemic complexity.¹⁵³ These, then, are the fundamental options to which evolutionary biology is presently confined: either the “more” that is the organism’s unity, interiority, and intelligibility is dismissed as nonevidentiary and, therefore, effectively unreal, so it ends up being relegated to “folk” status as in genetic reductionism, or its explanation is endlessly deferred, in which case it is also nonevidentiary. Dennett and Dawkins may be correct in saying that there are really no greedy, or baby-eating reductionists, but greedy and generous reductionists alike assume that if there is to be a final accounting of form and intelligibility it will be a matter of acquiring the “bridge laws” necessary to connect supervenient properties to their material bases.

Darwinism is thus incredible because Darwinians violate the ontological premises of their own theory in the very *act* of articulating it. They are able to navigate untroubled around this embarrassing contradiction because these same ontological premises lead the Darwinian theorist to abstract himself temporarily from the world of his theorizing, and because they warrant his replacing an ontological conception of truth (*what is*) with a functional conception of truth (*what works*). But even here, we are entitled to have our doubts. When we examine these ontological judgments a bit more closely, we see that the universal acid of Darwinism begins to eat away at two

additional claims that are central to Darwinian theory: that Darwinism actually explains evolutionary *change*, and that natural selection is the principal *agent* of that change. Indeed, closer inspection reveals not only that Darwinism is unbelievable, it does not actually ask us to believe much of anything.

In a seminal lecture given in 1909, John Dewey celebrated this eclipse of ontological truth. He welcomed the Darwinization of philosophy and culture, hailing Darwin for bringing about a thorough “transfer of interest from the permanent to the changing” that would forever relegate the *philosophia perennis* and its questions of ultimacy to a naïve past (Dewey 1979: 308). No doubt there is a certain descriptive truth to this. The question of truth in its classical form *has* largely ceased to be asked, thanks in no small measure to the aggressive Darwinization of everything. And it is certainly true that indefinite variation and the transmutation of species were revolutionary developments in a strict biological sense. Even Darwin’s most sympathetic contemporaries and friends, men like Herschel and Lyell, thought that variation had to be constrained by an inner norm.

For all this trumpeting about Darwin as the prophet of change, change remains a mostly unanalyzed concept in Darwin’s thought, a kind of rhetorical placeholder for a phenomenon whose meaning is assumed to be self-evident. Yet, I wish to suggest a basic sense in which Darwin is *less* cognizant of change than Aristotle and even methodologically incapable of accounting for or even seeing change as such.¹⁵⁴

To dispense with the primacy of the *actual* world in Aristotle’s sense is to relinquish the ontological primacy of *act* which Aristotle had tried to express in his notions of *dunamis* and *energia*. It is thus to dispense with the *act* which integrates things into the prior actuality of the world at the same time as it distinguishes them from it. The reduction of being from act to brute facticity, like the abstraction of the builder building from that of the house coming to be, is tantamount to *stilling of the world*. It reduces the ungraspable vitality of *dunamis* and *energia* to an infinitesimal series of measurable *states*, as in the case of Newtonian motion.¹⁵⁵ This alters the meaning of change from a kind of actuality proper to an entity—the mysterious actuality of potential *qua* potential in Aristotle’s terms—to a measured difference between states. Newtonian motion, for instance, is not concerned with the act of moving but is merely the measured difference between a dense series of static points. So too for Darwin, “the Newton of a blade of grass,”¹⁵⁶ change does not refer to the *act* of *changing*, but to the measured difference between variations or aggregates of variations. And once Darwinism reduces being to history and initiates the phylogenetic turn, change ceases to be a matter of different states *within* an organism, but refers to the difference *between* organisms.

The problem here is not the oft-cited fact that Darwin was ignorant of the mechanisms of variation and heredity; the point holds equally whether one is observing morphological differences between finches in the Galápagos or calculating the frequency of genetic distributions against the null hypothesis of the Hardy–Weinberg equilibrium. Nor is it the problem of “saltation,” the question of dramatic “leaps” in evolutionary change which some see as an intolerable consequence of Gould’s and Eldridge’s theory of “punctuated equilibrium” and a challenge to Darwinian gradualism. I am in no position to make scientific judgments about the empirical data, but I am content to accept Gould’s claim that Darwin’s own gradualism makes

adequate provision for “mode and tempo” in rates of evolutionary change (Gould 2002: 146). The Darwinian commitment to gradualism and the anxiety over saltationism do indicate a fundamental aspect of the underlying problem, however: the assumption that effects are wholly reducible as a matter of principle to the causes or the aggregates of causes which produce them.¹⁵⁷ We shall have more to say about this assumption in Part III. Making these steps incremental, it is thought, eliminates any novelty that cannot be accounted for by its antecedents and makes change “manageable.” Change is simply the measurable difference, phenotypic or genotypic, between an ancestral form and its descendant(s). Neither the dramatic shift in mechanics from Newtonian and Laplacean determinism to the indeterminism inspired by Maxwell and Boltzmann nor even the advent of quantum mechanics alters this basic conception of change or the basic structure of this expectation, as evidenced by a statistical and genetic notion of natural selection in R.A. Fisher that increased the all-sufficiency of the mechanism. It simply changes the units of analysis from “force” to “energy” and alters the computational method and background.¹⁵⁸

The real problem is both logical and metaphysical. There is a basic logical confusion in the Darwinian conception of change. Change requires a subject—it is always *something* that changes, after all—but *eliding change from the transformation of an entity to the difference between entities eliminates the subject of change*. The confused notion of “species change,” therefore, casts “species” in the role of the changing subject, but this only muddies the waters further since either species are not existent things (the nominalist form of Darwinian nominalism) or they are simply an abstraction from the members who compose them (the historicist form of Darwinian nominalism), in which case “change” reduces back to the difference between entities. The logical dimension of the problem is the offspring of the metaphysical dimension. Because Darwin, like Newton, operates within the ambit of a positivism which takes for granted the brute facticity of being, Darwin, like Newton, lacks any conception of *act*. Change, like motion, is effectively reduced to stasis. Evolutionary “change” is thus not the act, event, or even the cause of *changing*. Rather, accounting for “change” becomes a matter of bookkeeping, of tallying differences in a catalog of morphological or genetic variations against the backdrop of a null hypothesis held to be at least momentarily stable.

Once change ceases to be regarded as a certain species of *act* and becomes a matter of bookkeeping, it ceases to be necessary to account for *differing* as such, that activity which makes every effect existentially different from and infinitely other to its cause while remaining analogically similar to it. Accounting for novelty, then, becomes, quite literally, a matter of accounting, not of explaining what makes a thing or its states genuinely and irreducibly *new*. For all the talk of so-called “Darwinian individuals,” Darwinism’s interest in the “individual” mirrors Newton’s inertial singular in that actual individuals become altogether unimportant. Indeed, the novelty whereby things are “individuated” is positively suppressed.¹⁵⁹

The Darwinian individual never attains to a “this-something” in Aristotle’s sense. The prohibition against “typological” thinking evacuates the organism of the self-transcending form necessary for it to properly be a “something,” while the suppression of change obscures the existential novelty which makes it a “this.” Just as it is natural selection and not the organism that is the subject matter of Darwinian biology,

difference and change are not really important as such, but only insofar as they can be related to their antecedents, on the one hand, and insofar as they provide an adaptive advantage and thus “raw material” for natural selection, on the other (Gould 2002: 140). As Dawkins puts it,

An individual body seems discrete enough while it lasts, but alas, how long is that? Each individual is unique. You cannot get evolution by selecting between entities when there is only one copy of each entity! (1976: 34)

Dawkins’ well-known solution is to locate the real units of selection “behind the backs of actual organisms” in the genes themselves, where the problem of individual novelty is lessened by the Weismannian barrier isolating the germ line from the somatic line. We will examine this sort of solution more closely in Chapter 6 as we treat the modern synthesis. Dawkins’ example is instructive, however, because it illustrates both the present difficulty and the impossibility of being a Darwinian naturalist. Aristotle anticipated this difficulty in his critique of pre-Socratic “naturalists,” noting how they merely transfer the characteristics of form and substance to whatever they regard as ontologically basic.¹⁶⁰ Dawkins’ reduction of the organism to a “survival machine” for its genes fits the bill exactly. He then says that a “DNA molecule could theoretically live on in the *form* of copies of itself for a hundred million years” and extols “the near-immortality of the gene, in the *form* of copies” (1976: 35).¹⁶¹ This appears to be one of those instances where metaphors in scientific explanation perform a significant metaphysical labor. “Indeed, whenever there is a deficit between theoretical reach and empirical support the difference is usually made up by invoking ontology to do the missing work” (Depew and Weber 1997: 374).

In Dawkins’ case, this work is simultaneously constructive and obfuscating. Dawkins transfers the characteristics of Aristotle’s “substance” to the genes. He curiously echoes Aristotle as “form” secures ontological, and not merely nominal identity or sameness between what are in fact distinctly different material objects: molecules housed in an infinite number of different organisms.¹⁶² So “form” performs the covert work of granting to DNA an “essence,” denied to organisms themselves, transcending its particular material instances, even though it has no independent “Platonic” existence outside those instances.¹⁶³ (This becomes truer the more one adheres to the code-script metaphor.)¹⁶⁴ Yet, Dawkins’ “Aristotelianism” lacks the complement of a Thomistic *actus essendi*. He regards “individuation” negatively, save for its function of supplying raw material to selection. Individuation is merely the consequence of “shuffling” (Dawkins 1976: 16–18) or, as Jacques Monod would have it, a failure of replicative fidelity—a *mistake* (1974: 160–180). The incomprehensibility of Socrates as such is a barrier to evolutionary understanding. (After all, there is only “one copy” of Socrates (Dawkins 1976: 34).) So “living on” performs the work of obscuring the infinite *existential* difference that obtains between the replicator and its “product” in the only place they have actual concrete existence, namely, in the organisms whose genes they are.¹⁶⁵

The metaphysical issue at stake in all this can be obscured by the conflict over whether the gene, the organism, the group, or some combination thereof constitutes the true “level of selection,” and whether the conflict can be mitigated to a certain

extent by avoiding what Sober and Wilson call the “the averaging fallacy,” which conflates individual and group fitness.¹⁶⁶ As Richard Lewontin puts it,

The issue is not an analytic one as the word “fallacy” implies, but a metaphysical one about causal reality. If one continues to insist that the gene is what “really” matters, or profess a complete lack of interest in material mediation in computing outcomes, then there is no fallacy. Once again the angel of reality seems to have abandoned us (2001: 338).¹⁶⁷

There is indeed a metaphysical question about causal reality at the heart of evolutionary theory. And it raises trouble for Darwinian pretensions to have “explained” evolutionary change. Thus far, these explanations appear to depend upon the reduction of change to stasis. This invites the question of whether and in what sense natural selection can be said to be its principal agent.

Like all mechanistic sciences, Darwinism is predicated upon taking leave of this “angel of reality.” This is reflected in its reduction of being to facticity, in its ensuing nominalism, and in the virtual disappearance of the organism as the subject of evolutionary biology. There is a deep logical relation between these metaphysical judgments and modernity’s mechanistic conception of efficient causality as a transaction of energy or force between entities. We have seen that the elevation of mechanistic causality to ontological primacy erased Aristotle’s distinction between *per se* causality, which assumed the priority of actual things acting in accordance with their natures, and incidental causality. As all causality becomes incidental, an effect is what simply *follows* from a cause (typically in time). Since, as Hume first argued, this notion is strictly unintelligible, only isolation of the phenomena through repeated experiment suffices to establish that relationship as a “certainty.”¹⁶⁸

Herschel’s *A Preliminary Discourse on the Study of Natural Philosophy* had given canonical expression to this understanding in Darwin’s own time. “Whenever any phenomenon presents itself for explanation,” writes Herschel, “we naturally seek...to refer it to some one of those real causes which experience has shown to exist and to be efficacious in producing similar results” (cited in Depew and Weber 1997: 66).¹⁶⁹ Herschel would reinforce the prevalent Victorian sense that viable scientific explanations are those which provide such *verae causae*. In natural selection, Darwin thought he had found just this kind of explanation.

We have already discussed how this inherent relation between mechanistic ontology and nominalism is apparent in *The Origin*. Darwin’s nominalism is evident in his notion of species, irrespective of whether we take him at his word that species are “merely artificial combinations made for the sake of convenience” or emphasize his incipient historical understanding (1991: 405). Darwin’s mechanistic ontology is apparent both in his tendency to regard the organism as an accidental aggregation of traits, “the summing up of many contrivances,” and in the corresponding notion of causality embedded in his descriptions of natural selection (406). Natural selection is routinely said to be a “power” that “acts,” “seizes,” “works,” “scrutinizes,” “improves,” “modifies,” “preserves,” “rejects,” “masters,” and “favors,” expressions as current today as they were in the nineteenth century (33, 47, 59, 62, 62, 63, 92, 108, 112, 117, 348, 363, 376, 381, 391, 392). Gould carries on in this vein, for

example, in his frequent descriptions of natural selection as a “creative force” or “agent” (2002: 61, 98, 125, 127, 137–155). The importance of these expressions consists not in their anthropomorphic character or their suggestion of intentionality, and we can concede that Darwin meant them metaphorically. Their true significance consists in the fact that these formulations reflect a mechanical conception of efficient causality by making natural selection the subject of its own agency and by placing it ontologically, if not temporally, prior to its effects. We will return to this point momentarily.

Let us first pause to recall the conflicted ambition at the heart of Darwinian theory: to reduce being *to* history while simultaneously providing a transcendental logic or a mechanism for the outworking *of* history. Both have deep roots in the tradition of natural theology. As a transcendental logic for the outworking of history, natural selection is a universal “process” or a “mechanism” thereof. Yet, we are entitled to ask why natural selection should be exempt from Darwin’s own nominalism. This is not to deny the presence of so-called “selection pressures”—“magnitudes the alteration of which is systematically related to the probability that a population will change in various different ways” (Lewens 2010: 315). Rather, it is to ask what justifies our regarding these disparate factors and events in the lives of genes, beetles, bluefish, viruses, trees, human beings, and all possible life-forms in distant galaxies as the outworking of a single process? Why is “natural selection” like species themselves, not merely an “artificial combination made for the sake of convenience” (Darwin 1991: 405)?

Such seems to be the gist of John Herschel’s dismissal of natural selection as the “law of higgledy-piggledy,” a criticism that wounded Darwin deeply (Depew and Weber 1997: 148–150).¹⁷⁰ Depew and Weber, recognizing the problem, attempt to turn necessity into a virtue by arguing that the looseness in a system regarded as a limitation by a Newtonian worldview becomes part of a deeper statistical pattern in the dynamics systems developed since the probability revolution of the late nineteenth century. Natural selection can survive Herschel’s criticism, they claim, “because it is not a single force but a single *name* for a vast number of different causal transactions sharing an analogous structure” (1997: 155). They do not tell us why this “analogous structure” is any less nominal than so-called analogous characters in “typological essentialism.”

The persistent ascription of agency to natural selection is not incidental to Darwinism, however, and we are misled as to its import by the recourse its defenders take to metaphorical license. The real significance of these formulations, and one reason why they are supposed to represent a real advancement in *explanation* over Paley or quasi-Aristotelian alternatives, is that they depict natural selection as a *cause* of evolutionary change—hence the constant descriptions as a “force” or a “mechanism.” This is why natural selection is continually placed “prior” to its effects, because the only permissible model of causation within Darwinism’s ontological commitments is one of production by an external motor cause, which demands this placement. Many have resisted this line of criticism on grounds that natural selection, strictly speaking, does not “create” anything, but works negatively, as it were, by subtraction. Within the context of undirected variability and incremental steps, it still seems possible to say, as Gould does, that natural selection’s “focal action of differential

preservation and death could be construed as the primary cause for imparting direction to the process of evolutionary change” (2002: 140). Here again, natural selection is the subject of the action.

This misses the more basic philosophical point. If indeed natural selection is merely “differential survival,” as it is now commonly defined, if it is not a single mechanism but merely a single *name* for a multitude of nominally similar but disparate events scattered throughout time, then natural selection is not a cause at all but rather a mere name unifying the disparate *effect* of those events.¹⁷¹ Richard Lewontin seems to glimpse this when he calls genic selectionism a bookkeeping trick that confuses causes and effects (2001: 335).¹⁷² But if this criticism applies to natural selection *as such*, Darwin becomes susceptible to Paley’s criticism of the “internalists,” a criticism which he, in turn, had advanced against natural theology: we “think that we give an explanation when we only re-state a fact” (Darwin 1991: 402). I do not attach the same opprobrium to this criticism that Darwin and Paley did because I do not equate *verum* and *factum* or think that we understand a thing simply by knowing its history and the mechanisms of its construction. As I will argue in Part III, a more comprehensive “restating of the fact” is essential if we are to recover an adequate understanding of the phenomenon of life.

The real problem with natural selection is not that it “restates a fact,” but that the fact it restates seems finally to be “whatever happens.” Though “whatever happens” happens by definition and is therefore a great way to win every argument in advance, it hardly counts as an “explanation.” This is why evolution can occur more or less as Darwinism describes it and the theory can still be substantially wrong, not because it is false but because it is more *truism* than true. “Any cause of differential survival and reproduction, even when it has nothing to do with the struggle for existence, will result in some evolution, just not adaptive evolution” (Lewontin 2001: 56).

This claim is not exactly equivalent to the claim, advanced and partially recanted by Karl Popper, that natural selection is not testable and thus merely metaphysical (1978: 339–355).¹⁷³ I do not deny that there are a great many instances where the fastest jackrabbit or the giraffe with the longest neck *do* prosper over their kin and do survive to leave similarly equipped offspring, and that this leaves an effect on the genetic makeup of the subsequent population. I am also aware of the experiments of Richard Lenski, James Bull, and others that purport to demonstrate selective adaptation in the accelerated timescales of bacteria and bacteriophages, and there are many similar examples.¹⁷⁴ The claim, rather, is that natural selection is premised upon a “metaphysical exceptionalism” that exempts it from Darwinism’s constitutive nominalism. This exceptionalism, which permits natural selection to stand as a universal, then aids and abets its reification as a causal “agent,” a reification which substitutes effects for causes while trading upon a notion of causality which is strictly unintelligible. This reified agent does no “positive” work, and the analogy, the simultaneous similarity and difference between causes and effects upon which causality itself depends, cannot be accounted for on the notion of causality which it presupposes and expresses.

For all of these reasons—and here we *do* come closer to Popper—*every* significant evolutionary event can be reconstructed as an instance of natural selection,

irrespective of what is finally taken to be the “unit of selection” and in spite of our inability to determine which features comprising that unit were “adaptively neutral” in the concrete circumstances characterizing the lives of organisms past.¹⁷⁵ This explains what arguably remains, in spite of protests to the contrary, the tautological character of Darwinian “fitness”—that survival explains fitness and fitness explains survival.¹⁷⁶ It also accounts for the persistence of those “just-so” stories so fiercely criticized by Gould and Lewontin, in which the existence of phenotypic traits (or genotypic sequences) is accounted for by means of speculative tales reconstructing the adaptive advantage they just “must have” afforded.¹⁷⁷ Yet, it is not an explanation to say that some things live and others die; besides, we knew that already. Darwinism, if it is to fulfill its inherent ambition to be a theory of everything, must be able to account in every instance for *why* some things live and others die, in principle if not in fact. The whole “tangled bank” of living things must be exhaustively accounted for by Darwinian factors (Darwin 1991: 408). And it is no explanation at all simply to contrast what exists with reified counterfactual possibilities, with a population of “man-faced ox progeny” which, sadly, did not make it (Aristotle, *Physics*, II.8.198b30–II.8.198b35).

One might object that these criticisms trade on simplifying Darwin’s concept of natural selection, not to mention those variations on this theme forged against the more sophisticated dynamical and computational background of the neo-Darwinian synthesis. Perhaps this is true, in which case Darwinians could forestall these criticisms by answering some very simple questions: which species do *not* owe their existence to natural selection’s gracious hand and how would we ever know it? Of course, if Darwinism *can* answer these questions, then natural selection is dethroned as a controlling mechanism, Darwinism ceases to be a “theory of everything”—perhaps even a theory of anything—and the origin of species becomes, once again, the mystery that it always was.

Our immediate concern, however, is with another mystery, indeed the “mystery of mysteries” (Darwin 1991: 1). The mechanistic ontology and extrinsicist theology which Darwin inherited from Paley and the tradition of British functionalism not only shapes the subsequent “debate” with theology. It strongly influences what Darwin and his successors will henceforth *see*, or fail to see, when looking at living things. Converting nature to artifice, this tradition thereby emptied living things of the self-transcending unity and incommunicable interiority conferred on them by Aristotelian form and Christian *esse* and affirmed in the very fact of our thinking and acting. This is why we have maintained that Darwinism is incredible; it is contradicted by the world we cannot help living in. One tempting Darwinian solution to this problem is therefore to eliminate the world. As Darwin adds to the conflation of nature and art the conflation of being and history, the organism begins to disappear both as the subject of its own being and the subject matter of evolutionary biology. The “mystery of the missing organism” is in many respects the defining problem of the subsequent tradition which culminates in the modern synthesis. To retrieve the doctrine of creation from the clutches of Darwinian theology is not simply to recover a true doctrine of God; it is ultimately to recover this missing being as well. However, let us look first at Darwinism as it has developed ever since Darwin and see if we can discover where it went.

Notes

- 1 See Barlow (1958), pp. 85–96. See also Desmond and Moore (1991), especially pp. 280–298, 431–440, 622–637 and Brooke (2003), pp. 192–213. Brooke, like Robert Young, contends that Darwin should be viewed as reforming natural philosophy, though for reasons somewhat different from mine.
- 2 As we shall see, none are finally very good atheists or materialists. Even so, Wilson is at least candid about the religious or mythological character of his “scientific naturalism.” See Wilson (1978), p. 192. For an analysis, see Kaye (1986), pp. 95–135.
- 3 Kaye is just one of many who note the positive role played by mythic, figurative, or metaphorical language in the construction of scientific models (1986: 158–159). See, e.g., Soskice (1985), pp. 99–103. On the work performed by metaphors in neo-Darwinian theory, see Depew and Weber (1997), p. 374.
- 4 This *a priori* “concordism” is characteristic of the “Templeton Paradigm,” a term coined by Larry Chapp to describe the approach to the so-called science and religion dialogue characteristic of the Templeton Foundation and its associates (2005), pp. 364–369. This approach is characterized by an *a priori* irenicism toward the relationship between science and religion, a revisionist historiography which denies their “immemorial opposition,” and a constructive concordism between religion and science that ultimately subordinates the former to the latter.
- 5 John F. Haught offers a contemporary version of this approach that is more sophisticated than my summation of it. See Haught (2000), pp. 81–120, 165–191.
- 6 Alvin Plantinga seems to be confused on this point. See Plantinga (1998), pp. 674–697.
- 7 The object lessons on this point are too vast to cite; virtually anything from Dawkins, Dennett, or Wilson will do. See the concluding remarks of Kaye (1986), pp. 156–165.
- 8 The substitution is reflected, philosophically, in the alliance between Darwinian biology and Deweyan pragmatism.
- 9 See Moss (2004), pp. 194–195, for a criticism of Dawkins along these lines.
- 10 See Depew and Weber (1997), p. 30.
- 11 See Lustig (2004), pp. 69–83; Gould (1990), pp. 8–16; Gould (2002), pp. 116–124, 260–270; and Thomson (2005), pp. 1–20, 245–265. For additional analysis of Darwin’s debts to Paley see Webster and Goodwin (2006), pp. 99–134. We will be drawing on Webster and Goodwin as we proceed. For more on Darwin’s metaphysical inheritance from Paley, see Cornell (1987), pp. 381–412 and Ospovat (1981).
- 12 The well-publicized dispute between Dawkins and Gould is only a recent and most famous contest for the “soul” of Darwinism, with the latter’s massive tome, *The Structure of Evolutionary Theory* functioning partly as a personal *apologia* designed to reassure his colleagues of his adherence to the orthodoxy—his term, not mine—of the modern synthesis, even if that orthodoxy stands in need of a little *aggiornamento* (Lustig 2004: 69–83).
- 13 Huxley relished the opposition between creation and evolution and rebuffed Mivart’s attempt to reconcile it with Catholic doctrine.

If Suarez has rightly stated Catholic doctrine, then is evolution utter heresy. And such I believe it to be...Indeed, one of its greatest merits in my eyes, is the fact that it occupies a position of complete and irreconcilable antagonism to that vigorous and consistent enemy of the highest intellectual, moral, and social life of mankind—the Catholic Church (quoted in Desmond and Moore 1991: 585).

On Galton and eugenics, see Depew and Weber (1997), pp. 193–216.

- 14 The more outrageous remarks about the “careless squalid unambitious Irishman” who “multiplies like rabbits” or the “civilized races of man” who will “almost certainly exterminate, and replace, savage races throughout the world” should suffice to remind us, however, that Darwin’s own Darwinism could be “Spencerian” enough (1998: 143, 162–163). On the “social” dimension of Darwinism in Darwin’s own time, see the fascinating biography by Desmond and Moore (1991), especially pp. 550–586, 664–677.
- 15 We have already noted the “scientific priesthood” actively promoted within Darwin’s lifetime by Galton and Huxley. More recently, Richard Lewontin has also described the scientific class in clerical terms. See Lewontin (1992), pp. 3–16. This self-understanding is evident in *The Third Culture*, a collection of self-congratulatory essays edited by John Brockman, which describes this culture thus in the title page.

The third culture consists of those scientists and other thinkers in the empirical world who, through their work and expository writing, are taking the place of the traditional intellectual in rendering visible the deeper meanings of our lives, redefining who or what we are (Brockman 1995).

- 16 Darwin announces this opposition at the outset of the *Origin* (2) and subsequently refers to creation more than 50 times, usually in juxtaposition to his theory. He confirms this purpose later, recalling his motivations in writing the *Origin* in *The Descent of Man*. Apologizing that he might have overextended the power of natural selection in early editions of the *Origin* by ascribing utility to apparently “neutral” features, he says

I may be permitted to say, as some excuse, that I had two distinct objects in view; firstly, to show that each species had not been separately created, and secondly, that natural selection had been the chief agent of change... (Darwin 1998: 62).

- 17 See also, Barlow (1958), pp. 56–60.

- 18 Buffon writes,

But no, it is certain, through revelation, that all animals have equally participated in the gift of creation; that the two first members of each species, and all of the species, have come forth completely from the hands of the Creator, and we ought to believe that they were such, more or less, at creation as they today present themselves to us in their descendants (1954: 355 cited in Gilson 1984).

- 19 However, Gilson notes that Linnaeus, unlike Buffon, appeals not to revelation but to reason.

He is persuaded of the fixist position, for otherwise botany and zoology [which for him amounted to classification] would have their foundations compromised, but he does not make this a truth of faith (Gilson 1984: 37).

- 20 Hence, “Darwin’s own text owes its greatest debt, in narrative and overall rhetorical strategy, to William Paley’s *Natural Theology* of 1802...” (Lustig 2004: 70).

- 21 But evolutionary biology, perhaps more than any other science, not only is not nonepistemic-value free, but, by virtue of its descent, cannot be so. Born in theology, its goals entail the extension of an a priori metaphysical rationalism whose aim at its origin was to upset the strongest possible rational argument for the existence of God (Lustig 2004: 69–70).

- 22 Darwin blames his tendency to overstate the power of natural selection in the early editions of the *Origin* upon the influence of natural theology.

I was not, however, able to annul the influence of my former belief, then almost universal, that each species had been purposely created; and this led to my tacit assumption that every detail of structure, excepting rudiments, was of some special, though unrecognized service. Anyone with this assumption in his mind would naturally extend too far the action of natural selection, either during past or present times (Darwin 1998: 62).

23 Note the following example:

It may be difficult, but we ought to admire the savage instinctive hatred of the queen-bee, which urges her to destroy the young queens, her daughters, as soon as they are born... (Darwin 1991: 155).

There is no obvious reason to prioritize the aesthetics of scarcity and violence over that of wholeness and abundance, especially since the aesthetics of scarcity are only intelligibility against an unacknowledged teleological backdrop. Simply put, if life and the integrity of organisms were not a *good*, neither their strenuous efforts at survival nor their “terror” at the prospect of violence would be intelligible as such. On the implicit teleology of Darwinism, see Kass (2002), p. 285.

24 This advice reflects Gould’s sensibilities more than Darwin’s. Richards would certainly deny that it reflects Darwin’s view. Phillip Sloan concurs, suggesting that “nature also seems to have served Darwin as a basis for a moral order.” A case could be built from the *Descent of Man* in particular showing that Darwin was deeply concerned to find moral guidelines in the affairs of nature, since natural selection had clearly favored the civilized (and “moral”) races. Darwin’s own conception of morality was generally quite utilitarian, having itself been preserved by natural selection precisely because it served utilitarian ends. The entire appropriation of Malthus speaks to this. From Malthus to Darwin we see economic fitness becoming moral fitness becoming biological fitness. See Richards (1999), pp. 113–150. See also Sloan (2001), p. 269.

25 See Depew and Weber (1997), pp. 45–48, 61–64; Desmond and Moore (1991), pp. 31–44; and Gilson (1984), pp. 60–74.

26 See Depew and Weber (1997), pp. 45–48 and Gould (2002), pp. 170–197.

27 On the famous Cuvier–Geoffroy debate of 1830, an early and important skirmish in the protracted battle between “formalists” and “functionalists,” see Gould (2002), pp. 290–312 and Depew and Weber (1997), pp. 26–56.

28 See Richards (2002), pp. 514–554 and Sloan (2001), pp. 251–269.

29 Disentangling Darwin and Spencer helps to absolve Darwin from the sins and excesses of so-called “social Darwinism.” On the *Darwinismus* of Haeckel and its departure from Darwin, see Depew and Weber (1997), pp. 173–187 and Desmond and Moore (1991), pp. 538–543.

30 See also Bowler (2004), pp. 48–68.

31 See Depew and Weber (1997), pp. 57–84.

32 See also Schweber (1980), pp. 195–289 and Depew and Weber (1997), pp. 119–139.

33 Depew and Weber cite a well-known flowchart from Ernst Mayr which schematizes the argument:

Malthusian superfecundity+ Observed steady state of populations+ limited resources= struggle for existence

Struggle for existence+ Individual differences+ Heritability= differential survival or natural selection.

Natural Selection+ Many generations= evolution.

See Depew and Weber (1997), p. 507, n. 3 and Mayr (1977), pp. 321–327.

34 Darwin (1991), p. 85.

Adaptation toward a place in the economy of nature together with the principle of the maximum amount of life per unit area as the overall driving force make understandable why there is divergence of character: in ecological differentiation and adaptation the primary factor of divergence is functional specialization... The organisms that move into unoccupied niches will enjoy reduced competition, and hence adaptive advantage, and will shift their species to move into the same niches (Schweber 1980: 212).

- 35 See Lewontin (1992), pp. 41–83.
 36 See also Richards (1992), pp. 62–180.
 37 The thesis of Depew and Weber seems to me unassailable:

We hypothesize, however, that too exclusive a concentration on the autonomy of biology from physics can blind one to the fact that ever since Darwin, Darwinians have used dynamical models, most of which have their origin or paradigmatic application in various branches of physics, as ways of envisioning and reconceiving the process of natural selection (1997: 3).

- 38 Though so-called design arguments obviously precede Paley, it is he who appears to have given the term “adaptation” its biological currency.
 39 See Lustig (2004), pp. 69–83.
 40 For their respective treatments of instincts, see Paley (1854), pp. 170ff and Darwin (1991), pp. 194–198. With respect to the eye, see Paley (1854), pp. 13ff, 147–149 and Darwin (1991), pp. 136–139.
 41 See, e.g., Darwin (1991), pp. 377–383.
 42 Depew and Weber explain how the Darwinian tradition gave birth to the eugenics movement, partly in an attempt to deal with Fleming Jenkin’s 1867 discovery that blending inheritance in freely interbreeding populations would not have as its net result the propagation of “sport” variations with peculiar adaptive value but a regression to the mean that would eventually swamp those variations. Darwin’s attempts to cope with this problem in the fifth and sixth editions of the *Origin* are feeble, and by the time of *Descent of Man* this problem gives rise to a patently eugenical anxiety, whose practical implications would be developed by Darwin’s cousin, Francis Galton, among others. One may nevertheless ask whether the logic of eugenics is not encoded into Darwinian theory from the outset of the *Origin*, with its starting point in artificial selection. There Darwin notes that “A man preserves and breeds from an individual with some slight deviation of structure, or takes more care than usual in matching his best animals, and thus improves them.” Darwin never exempted human beings from any of the other implications of his theory, why should we think him oblivious to the possibilities of “better breeding” in this case? See Darwin (1991), p. 28; Darwin (1998), pp. 131–151; and Depew and Weber (1997), pp. 193–215.
 43 Emphasis mine.
 44 Gould is not alone in describing natural selection this way. As Robert J. Richards puts it, “No phrase comes so trippingly to the lips of contemporary biologists as ‘the mechanism of natural selection.’” Richards, as we have noted, is critical of the mechanistic interpretation, though his view of the importance of Humboldt in Darwin’s mature thought has not carried the day. See Richards (2002), pp. 514–554. For an indirect response to Richards’ claims to Humboldt’s importance, see Depew and Weber (1997), pp. 57–84.
 45 See also Darwin (1991), p. 402.
 46 See Desmond and Moore (1991), p. 490.
 47 Gilson notes the logical oddity of this.

To eliminate all “miraculous” intervention here is to eliminate the creation that, in his imprecise theological terminology, he always held as a miracle, as if it were possible to have something miraculous in an act which, because it caused nature, preceded it (Gilson 1984: 57).

- 48 Darwin is explicit about this from the outset of *On the Origin of Species* and is even more so in *The Descent of Man*. (Darwin 1998: 62). See n. 16.

- 49 We will discuss problems associated with this as we proceed. Meanwhile see Webster and Goodwin (2006), p. 111. We will consider these problems from the point of view of the developmental perspective in Chapter 6.
- 50 The second quotation is Darwin's. He refers to "the Creator" in similar terms at the conclusion of the *Origin* (Darwin 1991: 408). The term "artfully, disingenuously vague" can be found in Lustig (2004), p. 73.
- 51 This is Lustig's view.
- [T]he term either stands directly for the process of natural selection itself or refers to an ultimate Creator who has done nothing, directly, to create the eye. This latter would be not only a God who, like Paley's, binds himself to consistency with the laws of physics, but also one whose creation with regard to all life (and, by implication, to man) is confined at best to, as Darwin later says, that "one primordial form, into which life was first breathed" (Lustig 2004: 73).
- Lustig's notion of "direct creation" seems to trade on the same theological extrinsicism as Paley and Darwin, but her estimation of what God must then be for Darwin is correct.
- 52 See Lustig (2004), pp. 69–70.
- 53 This is an apt description of the *idea* of time in both Locke and Hume. (See Locke (1997), II.14.1–II.14.16; Hume (2009), I.2.2. The latter writes, "Tis a property inseparable from time, and which in a manner constitutes its essence, that each of its parts succeeds another, and that none of them, however contiguous, can ever be co-existent." On the changed meanings of time and history from a movement of potency to act granted by the actuality of eternity, to a series of discrete, externally related "nows," see Jonas (2001a), pp. 211–234; Funkenstein (1986), pp. 202–289; Harrison (1998); and Burt (2003), pp. 91–98.
- 54 "Theodicy" is an attempt to justify the divine attributes, particularly the positive attributes of goodness and justice, in the face of physical and moral evil often by "rationalizing" that evil as a moment in the realization of the good.
- 55 The characterization of medieval providence is from Funkenstein (1986), p. 205. See Malthus (1985), pp. 200–217.
- 56 By reading Malthusianism "backwards" and according priority to the theodicy, one gets a more plausible picture of the early nineteenth century epistemic shift. This new ideology allows political economy to be more widely disseminated because it is no longer primarily focused upon the "high policy" of the general well-being of the state or the universe. For this view neither poverty, nor hard work, nor consumption, were in themselves especially commendable or otherwise. However, for Malthusianism, the hard-working and the frugal are the desirable products of the system, and to a certain extent and for a certain time, they are responsible for their own betterment. (Thus Malthusianism could be readily popularized by evangelical clergymen like John Bird Sumner and Thomas Chalmers) (Milbank 1990: 44).
- 57 See Thomson (2005), pp. 232–295.
- 58 See also Paley's utilitarianism and his justification of property in Paley (2002), pp. 39–44, 63–72.
- 59 Emphasis mine.
- 60 Phillip Sloan's important work deserves to be quoted at length. Citations from the "1842 Sketch" are from Darwin (1909). Excerpts from the "1844 Draft" are taken from Glick and Kohn (1996)

In introducing his notion of "natural selection in the short pencil sketch of the theory in 1842, Darwin located 'selection' in an all-seeing being, 'infinitely more sagacious than man (not an omniscient creator),' who was able to select variations toward a specific end and "produce causes" that could attain such ends "over thousands and thousands of years." Only a few pages

deeper into the manuscript, however, this sagacious “selector” is transformed into “nature”: “Nature lets <an> animal live, till on actual proof of it is found less able to do the work required to serve the desired end, man judges solely by his eye, and knows not whether nerves, muscles, arteries, are developed in proportion to the change of external form.” But this selector nature is not itself competent to breathe the vital powers of “growth, assimilation, and reproduction” into matter. For this a “creator” was still needed.

Darwin’s metaphors were expanded and deepened in the long 230-page draft of the theory of natural selection that he composed in 1844. Darwin continued to speak in this text of a Being with penetration sufficient to perceive differences in the outer and innermost organization quite imperceptible to man, and with forethought extending over future centuries to watch with unerring care and select for any object the offspring of an organism produced under the foregoing circumstances.

This masculine-gendered, all-penetrating being is still not identified with nature in this text; it stands outside of nature as its creator. It is this being that selects from the slight variations and inner structures of organisms to bring about the “perfect” adaptation of plants and animals over “whole geological periods.” In this sense “natural selection” is a *secondary* means in the economy of nature by which the process of selection could go on adapting, nicely and wonderfully, organisms, if in ever so small a degree plastic, to diverse ends.

It is in the long manuscript of “Natural Selection” of 1856–8 that we finally encounter the collapsing of the various images of nature—as sustaining vital ground of life, as creator, and as selector—into the notion of a single wise, perceiving “nature” that has assumed all of these roles (Sloan 2001: 264–265).

- 61 This, I would argue, is the principal function of those Romantic elements of Darwin’s thought.
- 62 Webster and Goodwin make a similar point from a developmentalist point of view. See Webster and Goodwin (2006), pp. 107–111.
- 63 Darwinians frequently adhere to this principle when it suits them, namely, in their attempts to explain (away) religion, art, morality, and cultures as the products of natural selection.
- 64 See Depew and Weber (1997), p. 124. Webster and Goodwin state “Selection, being an a posteriori principle, can account only for changes (or the absence of changes) in the composition of a population of ‘given’ variant forms under specified conditions” (2006: 110).
- 65 There is no exception to the rule that every organic being naturally increases at so high a rate, that, if not destroyed, the earth would soon be covered by the progeny of a single pair (Darwin 1991: 48).

On the analogy between natural selection and gravity, see Depew and Weber (1997), pp. 85–111, 114–115.

- 66 The term “copious variation” is from Gould (2002), pp. 141ff. Dawkins exhibits this reification of possibilities when he says, “*however many ways there may be of being alive, it is certain that there are vastly more ways of being dead...*” (1996, p. 9 emphasis original).
- 67 “I mean by Nature, only the aggregate action and product of many natural laws, and by laws the sequence of events as ascertained by us” (Darwin 1991: 60). Though I disagree slightly with some features of his assessment, Sloan’s exegesis reveals a constellation of meanings in Darwin’s use of “nature,” some with immanentist or Romantic connotations acquired most likely through Humboldt. This tension between Darwin’s *definition* of the term and his multivalent *use* of the term is instructive; I take it as an indication of the impossibility of living up to the logical implications of his biological theory and his own tacit philosophy of science. See Sloan (2001), pp. 251–269.

- 68 And therefore, it cannot strictly explain “how the innumerable species inhabiting this world could have been so modified, so as to acquire that perfection of structure and coadaptation which justly excites our admiration” (Darwin 1991: 60, 158).
- 69 One glimpses Darwin’s rationale in his explanation of the phenomenon of “correlated variation,” in which

the whole organization is so tied together during its growth and development, that when slight variations in any one part occur, and are accumulated through natural selection, other parts become modified...The several parts of the body which are homologous, and which, at any early embryonic period, are identical in structure, and which are necessarily exposed to similar conditions, seem eminently liable to vary in a like manner: we see this in the right and left sides of the body varying in the same manner; in the front and hind legs, and even in the jaws and limbs, varying together, for the lower jaw is believed by some anatomists to be homologous with the limbs. These tendencies, I do not doubt, may be mastered more or less completely by natural selection; thus a family of stags once existed with an antler only on one side; and if this had been of any great use to the breed, it might probably have been rendered permanent by selection (1991: 108).

For more on Darwin’s “externalism,” see also Depew and Weber (1997), p. 115.

- 70 See Rieppel (1986), pp. 283–317.
- 71 On Darwin’s positivism, see Webster and Goodwin (2006), p. 109.
- 72 In *Metaphysics* VII.13.1038b1–VII.13.1039a23, Aristotle expressly denies that universals are substance, which he equates with form/essence-species, the intelligible whatness of a “this-something.” Jonathan Lear explains that form/essence-species is therefore neither a particular nor a universal: not a particular, because it would be unintelligible, not a universal, because it would be incapable of independent existence. “Only if something can be both a ‘what it is’ and a ‘this something’ is the ontological basicness of substance secured.” An Aristotelian species cannot therefore be a universal in the modern, taxonomical sense (Lear 1988: 273–293). Phillip Sloan puts it this way: “A species is not a collection of similar individuals, but the constant and uninterrupted renewal of those individuals which constitute it” (1976: 356–375). There seems to be a convergence on this point in what David Stamos calls the “new orthodoxy” developed by David Balme and Pierre Pellegrin, which interprets the logical and metaphysical works through the biological works.

Thus Balme concludes that in the strictly biological works *genos* and *eidōs* do not take on anything like the modern taxonomic meaning of “genus” and “species” but instead are taxonomically neutral and are normally used nontechnically to mean, respectively, kind and form (Stamos 2003: 101–113).

While I do not concede that the Aristotle of modern biologists is the “orthodox” Aristotle, the point is nevertheless interesting.

- 73 Stamos notes that a great deal of confusion has arisen in the so-called “species problem” due to the failure to distinguish between sets and classes.

In the interest of clarity, I shall use the term “class” for intensionally defined (therefore abstract) objects, whereas I shall use the term “set” for extensionally defined objects, namely collections. The members of a set, therefore, may, but need not, have common (nontrivial) properties, whereas members of a class must have common (nontrivial) properties (Stamos 2003: 21).

- 74 There is an analogy here with the question of individuation in nominalism which we saw in Chapter 3. Once forms and universals are destroyed as principles of being, “no principle of individuation is necessary to account for singulars; on the contrary, any reference structure between singulars needs justification” (Funkenstein 1986: 140).
- 75 I will address the controversy surrounding the allegation of species nominalism below.
- 76 See Depew and Weber (1997), pp. 299–328.

77 In the broader context of the passage, Darwin says this.

All the foregoing rules and aids and difficulties in classification may be explained, if I do not deceive myself, on the view that the Natural System is founded on descent with modification;—that the characters which naturalists consider showing true affinity between any two or more species, are those which have been inherited from a common parent, all true classification being genealogical;—that community of descent is the hidden bond which naturalists have been unconsciously seeking, and not some unknown plan of creation, or the enunciation of general propositions, and the mere putting together and separating objects more or less alike (Darwin 1991: 21).

78 Marjorie Grene questions whether this notion is ultimately sufficient.

This view seems to undercut the very starting-point of any biological science, including the theory of evolution. How does one tell which “individuals” (in the everyday sense) are parts of which larger “species-individuals” except by noticing some kind of likeness among some and not others? (Grene 1983: 5)

Her objection supports our crucial point that Darwinians in practice must affirm a world of meaningful, teleological wholes even in their attempts to deny them.

79 See Depew and Weber (1997), p. 303 and Stamos (2003). Ernst Mayr’s distinction between population and typological thinking in biology has become an entrenched part of neo-Darwinian orthodoxy.

80 Stamos argues:

Accordingly, I would say that on Darwin’s mature view a species is a primarily horizontal similarity complex of organisms distinguished by common descent (albeit not absolute), intermediate gradations (when applicable), but most importantly relatively constant and distinguishable characters from the viewpoint of natural selection (2003: 74).

81 Stamos proposes that we consider species “biosimilarity complexes,” in which species are constituted by things and their (internal) relations, which are themselves “real.” He intends this as a mean between essentialism and nominalism. Though his proposal is sophisticated and deserves more attention than I can give it here, I regard it as simultaneously salutary and doomed to failure as an attempt to overcome nominalism. This is for the reasons stated above. His notion of species as a relation depends upon Bertrand Russell’s distinction between internal and external relations, the former of which is “grounded in the nature of the *relata*” and the latter of which is not, such that “a change in the relation entails an intrinsic change in one of the *relata*.” (This bears some resemblance to the notion of real relation in Aristotle and Aquinas.) I question whether this notion of “intrinsic relation” can be sustained when the “intrinsic nature” of a thing is merely “emergent,” and therefore extrinsically and accidentally related to a more ontologically primary material substrate—when “what a thing is” is not ontologically basic to, well, “what a thing is.” I would suggest, in other words, that the notion depends upon a more variegated notion of causality than can be countenanced by Stamos’ ontology and ultimately upon the sort of unity and interiority that followed upon the traditional notions of *esse* and *essentia*. See Stamos (2003), pp. 289–290.

82 See Funkenstein (1986), p. 144. We have seen how nominalism contains a new conception of positive matter which is inherently outside of meaning, a notion that is carried through Descartes and Newton into the modern period. To understand further how these notions lead ineluctably to skepticism, see Gilson (1955), pp. 489–499. Once causality itself ceases to be intelligible, the only security for the veracity of impressions is rigorous experimental confirmation. For a seminal discussion of this final point, see Bernard (1957), pp. 5–57.

83 Though Depew and Weber’s interpretation of Aristotle and medieval Aristotelianism is in the main simplistic, their distinction here between constitutive and taxonomical essentialism brings clarity (1997: 35–41).

84 Philip Kitcher, who is no “creationist,” is a recent exception to all this, having advanced what he considers to be two legitimate types of species concepts: historical species which are genealogical, and structural species that are distinguished by genetic, chromosomal, or developmental similarities. Marc Ereshefsky provides an example of these *a priori* philosophical prejudices, rejecting Kitcher’s notions not because they are false, but because they fall outside the bounds of evolutionary biology.

Kitcher’s argument for the legitimacy of non-historical species concepts overlooks the theoretical reason that biologists reject such concepts. [David] Hull presents this reason in the following argument...Since the inception of evolutionary theory, species taxa have been considered evolutionary units: that is, groups of organisms capable of evolving. The evolution of such groups requires that the organisms of a species taxon be connected by hereditary relations. Hereditary relations, whether they be genetic or not, require that generations of a taxon be historically connected; otherwise information will not be transmitted. The upshot is that if species taxa, or any taxa, are to evolve, they must form historically connected entities. By allowing non-historical species concepts, Kitcher’s pluralism falls outside the domain of evolutionary biology and should be rejected (Ereshefsky 1998: 365).

85 See Ereshefsky (1998), pp. 348–368. Stamos contends that species pluralism in biology is tantamount to nominalism (2003: 352–356).

86 In *In Sent.* 2.1.4, Aquinas refers to “things which are generated by putrefaction”—worms from garbage in the ancient and medieval imagination—as an example of things “which are not generated by an agent that is similar to them in species.” This is obviously an exceptional instance for Aquinas, but an important one nonetheless. Translators Stephen Baldner and William Carroll suggest in a footnote to this passage that this removes any *a priori* obstacle to rapprochement between Thomistic metaphysics and the reality of evolution (Baldner and Carroll 1997: 85, n. 51). A great deal of work is required, of course, to carry through with this, but it is an intriguing suggestion.

87 Dewey (1979), pp. 305–313.

88 See also Veatch (1969), p. 26.

89 During the early nineteenth century the Enlightenment ideal [of a rational morphology] was challenged and eventually displaced by a different one, the ideal of a historical or developmental science (Cassirer 1950) concerned with “becoming,” and therefore with questions of “origin,” “genesis,” and “causes” (Webster and Goodwin 2006: 104).

90 This is just assumed, e.g., in Ereshefsky’s essay, cited above. In rejecting a restrictive definition of species that would confine them to interbreeding units, he writes,

This suggestion and others like it should be rejected. If we are to understand how evolution has occurred on this planet, we must study the various types of theoretically important lineages in the world. No particular type of lineage is prior in that study (1998: 354).

Note that it is the goal of understanding “*how* evolution occurred”—not what they are—that sets the criterion for what should count as species.

91 “The fulfillment of what exists potentially, in so far as it exists potentially, is motion” (Aristotle, *Physics*, III.1.201a10).

92 We discussed this in Chapter 3. In addition to Veatch, see Oliver (2005), p. 168 and Bortoft (1996), p. 64.

93 “This extreme consequence of Darwinism [that survivors are ‘sports’] squarely poses the question whether a mechanistic biology can do justice to the phenomenon of life” (Jonas 2001d: 52).

94 Should we then call the original replicator molecules “living”? Who cares?...Human suffering has been caused because too many of us cannot grasp that words are only tools for our use, and that the mere presence in the dictionary of a word like “living” does not mean it necessarily has to refer to something definite in the real world (Dawkins 1976: 18).

What, then, are living things? They are things that defy this crumbling into dust, at least for a while, by not being isolated—by taking in from their environment the wherewithal to keep life and limb together (Dennett 1995: 69).

- 95 “[I]t is enough that gravity really exists and acts according to the laws we have set forth...” (Newton: 943).
- 96 “Notwithstanding that Leibniz formerly accused Newton of introducing ‘occult qualities and miracles into philosophy’” (Darwin 1991: 401).
- 97 Significantly, Darwin emphasizes this lack of interest in life at two critical instances in the *Origin* where he utilizes his evidence to justify selection in this way, the development of the eye and of instincts. The fact that Paley had dwelt on each is an indication of Darwin’s ongoing “dialogue” with him. Of the first Darwin writes, “How a nerve comes to be sensitive to light hardly concerns us more than how life itself originated” (1991: 136). He writes similarly of the second, “I may here premise, that I have nothing to do with the origin of the mental powers, any more than I have with that of life itself” (194). Thus restricting the scope of the question, he goes on to give hypothetical accounts of how natural selection might account in each instance for the phenomenon in question. Gould considers Darwin’s argument for the evolution of the eye from a light sensitive nerve a great success, and perhaps subsequent evolutionary biology has discovered the necessary “pathways” to bolster the argument. Nevertheless, Darwin’s “Intelligent Design” opponents have a point in this instance: Darwin simply does not provide an explanation for the evolution of the eye. Instead he reconstructs a hypothetical history, passing over many difficulties in order to conclude, in a very brief space, that “the difficulty ceases to be very great in believing that natural selection may have converted the simple apparatus of an optic nerve...into an optical instrument...” a conclusion whose very form trades on an illicit ascription of causal agency to natural selection. Then without further justification, he shifts the burden of proof two pages later saying “We should be extremely cautious in concluding that an organ could not have been formed by transitional gradations of some kind” (139). Darwin’s conclusion may be true, and I have no stake in disputing it, but his argument in this instance is sophistic.
- 98 This, I would suggest, is part of the unacknowledged significance of the Darwinian shift from “inner drives” to “outer forces” discussed both by Gould and by Depew and Weber.
- 99 Moss concurs (2005: 349–363).
- 100 I take the more than accidental complicity of Darwinism in the rise of eugenics and the resurgence of the new eugenics as evidence of this (Depew and Weber 1997: 193–215).
- 101 For instance, see the definitions of “whole” and “organism” given in Mahner and Bunge (1997), pp. 24–25, 146–147. “Every concrete thing is either a system or a component of one.” “An *organism* is a biosystem (whether elementary or composite) which is not a proper subsystem of a biosystem.”
- 102 See Chapter 4, n. 33.
- 103 This is a function of Darwin’s debts to Paley, which one historian of science (Cannon 1961) has characterized as “a secular world of the version described in Christian thought.” Webster and Goodwin make a similar claim.

Since within natural theology organisms are considered to have been structured by some agency (God) they are—implicitly—conceptualized as mechanical devices; that is, as functional unities in which the only structural relations are those of spatial contiguity (Webster and Goodwin 2006: 108).

- 104 Emphasis mine. This is echoed in Darwin (1991), pp. 55–56.
- 105 Webster and Goodwin reject what they call the “German holistic” tradition that develops from German Romanticism and various strains of post-Kantian idealism. In this view, an “abstract relational concept of the ‘type’, with its possible connotation of a ‘plan’ can be

reified into a concrete 'idea' distinct from its material embodiment and can serve as an 'intellectual' cause either transcendent or immanent." Some version of this idea can be detected in thinkers as diverse as Agassiz, Claude Bernard, and von Baer, in whom "we find the reified 'type' apparently conceived as an immanent Idea or 'soul' which controls or guides organismic activity and development into 'typical' forms." The "soul" thus conceived as a "central directing agency" is then transposed by Weismann into the "germ cells" which produce their organisms as a kind of artifact, a notion which neo-Darwinians like Dawkins preserve. Thus it is alleged that the neo-Darwinism conception of the organism tacitly retains the "soul" which its proponents reject. Webster and Goodwin seem to have mistaken a "classical" understanding of soul for a Cartesian one, since it stands distinct from its material embodiment and since the matter over which it exercises its agency is both positive and inert. The Aristotelian soul is actually much more compatible with their own conception of the organism as "structures" [logoi?] which "control their elements in the sense of giving them specific properties by virtue of the relations which they are assigned in the structure" but which are not "all-powerful" and do not "constitute the elements, which have intrinsic properties and obey their own laws in addition to the laws of the structure" (Webster and Goodwin 2006: 106–107, 126). For further delineation of the Romantic and Kantian contributions to this history, see Lenoir (1989), pp. 17–53.

- 106 We have seen that the fundamental externality of matter, and therefore relations, is a defining feature of a mechanistic ontology. See Chapter 1, n. 82 and David Bohm (1986), pp. 14–15.
- 107 There is nothing, in the definitions of "life" and "organism" in Mahner and Bunge, e.g., that would allow one to say why the one question is intelligible and the other nonsense (see Mahner and Bunge (1997), pp. 139–153). Likewise Dawkins, who stresses the "artificial" character of organisms, entirely misses the significance of Nagel's point. It is not simply that we cannot "imagine" what it is like to be a bat or, alternatively, that we might be able to do so by reconstructing the bat's mode of perception through a "type of computer model...suitable for the internal representation of the changing positions of objects in three-dimensional space..." (Dawkins 1996: 21–41). It is rather, as Conor Cunningham, suggests, to demonstrate "that perspective is an ontologically rich notion," as irreducible as the act of being peculiar to each irreducible subject (2008: 120).
- 108 *Without* the body and its elementary self-experience, without this "whence" of our most general, all-encompassing extrapolation into the whole of reality, there can be no idea whatever of force and action in the world and thus of a dynamic connection of all things: no idea, in short, of any "nature" at all (Jonas 2001c: 24).
- 109 Indeed, without the body by which we are ourselves an actual part of the world and experience the nature of force and action in self-performance, our knowledge—a merely "perceptive" beholding knowledge—of the world (in that case truly "external world" with no real transition from myself to it) would really be reduced to Hume's model, viz., to sequences of contents external and indifferent to one another, regarding which there could not even arise the suspicion of inner connection, of any relation other than the spatio-temporal ones, nor the least justification in postulating it. Causality here becomes a fiction—on a psychological basis left groundless itself (Jonas 2001c: 20).
- 110 The fact of life, as the psychophysical unity which the organism exhibits, renders the separation [of idealist sciences of mind and materialist sciences of nature] illusory. The actual coincidence of inwardness and outwardness in the body compels the two ways of knowledge to define their relation otherwise than by separate subjects. Otherwise also than as complementary descriptions of the same subject from different "sides" which can eschew the question of how those abstract aspects concretely cohere in being. For such a descriptive abstention, which is

to insure metaphysical neutrality, could be maintained only on condition that the two fields of phenomena are closed on themselves at least qua phenomena and do not transcend themselves by their own contents: that either one, thus, can be described entire without drawing in the other. Yet precisely our living body constitutes the self-transcendence in either direction and thereby makes the methodological epoché founder on its rock (Jonas 2001c: 17–18).

- 111 Dawkins, for instance, simply transfers the characteristics of Aristotelian substance to the gene. See D.C. Schindler (2010), p. 35, n. 30.
 112 David Hull comments on Haldane’s remark.

Today the mistress has become a lawfully wedded wife. Biologists no longer feel obligated to apologize for their use of teleological language; they flaunt it. The only concession which they make to its disreputable past is to rename it “teleonomy” (Hull 1982: 298).

I am grateful to Annie Devlin for calling my attention to these passages. Though the term “teleonomy” has fallen out of favor, it testifies to the philosophical necessity of teleological description. There are various strategies for coping with this necessity. The first is to attempt a more adequate conception of the organism, as in the revived development and systems biology perspective. A second approach, more classically Darwinian, is to attempt to reduce teleology to function while excusing teleological description on grounds that the organic world is design-like. Teleology then becomes merely “metaphorical teleology.” Michael Ruse exemplifies this position. Lurking behind the attempt to exorcise teleology in this way is the assumption that teleological purpose is tantamount to intention, which is the by-product of a mechanistic ontology which has exorcised intelligible form from nature. Lowell Nissen, who rejects the reduction of teleological language to that of function and argues that teleology is “intentionalistic,” unwittingly exemplifies these mechanistic assumptions.

Whether or not the evidence favors an intentionalistic analysis should be assessed on its own merits. If the intentionalistic analysis is correct, the options seem to be to admit an external agent into the worldview, thereby exceeding the limits of natural science, or to exclude the literal use of teleological language from the life sciences just as it has been excluded from the physical sciences. These choices are widely regarded as so extreme and untenable that any alternative is preferable (Nissen 1997: 228).

See also pp. 71–113.

- 113 See also Gilson (1984), pp. 80–89, 120–134.
 114 For example:

A similar line of argument holds good with fruits; that a ripe strawberry or cherry is as pleasing to the eye as to the plate,—that the gaily-coloured fruit of the spindle-wood tree and the scarlet berries of the holly are beautiful objects—will be admitted by everyone. But this beauty serves merely as a guide to birds and beasts, *in order that* the fruit may be devoured and the manured seeds disseminated... (Darwin 1991: 153, emphasis mine).

For more on the persistence of teleological language in Darwin, see Young (1999), p. 42.

- 115 Contrasting Darwin with the teleomechanist tradition, Lenoir writes, “But it must be recognized that the notion of teleology held by Darwin’s contemporaries in England, and by Darwin himself, was an extremely impoverished one” (1989: 5). See also pp. 270–275. For more on the transformation from an “internal” to “external” teleology in the wake of the new positivist conception of matter, see Osler (2001), pp. 151–158.
 116 See Lear (1988), p. 40 and Lenoir (1989), pp. 1–17. For an attempt to reduce teleology to function, see Mahner and Bunge (1997), pp. 367–376.
 117 See also Sachs (1995), pp. 56–58.
 118 Aquinas understood this in the distinction between the *via compositionis vel inventionis* and the *via resolutionis*, as “rational thinking ends in intellectual thinking, following the

process of analysis..., and intellectual thinking is the beginning of rational thinking, following the process of synthesis” (*In Boeth. de Trin.*, q.6, a.1).

- 119 For a more extended description of the inherent transcendence of living things, see Jonas (2001b), pp. 83–86 and Jonas (2001f), pp. 99–107.
- 120 The phrase “self-organizing totalities” belongs to Webster and Goodwin (2006: 128). However, variations on this understanding have gained in currency in recent years (see Depew and Weber (1997), pp. 429–457 and Mahner and Bunge (1997), pp. 146–149). As noted above, Webster and Goodwin think that this definition refutes both the mechanistic atomism of the Darwinian tradition and the holism of the idealist tradition, which transposes the soul into Weismann’s germ line. This solution appears to restate the problem they seek to overcome, however, as the very notion of self-organization, implies, like Aristotle’s “thinker-thinking-thought,” a duality between the self that organizes and the self that is organized.
- 121 The fact that all existing things are composite or that the most basic element might be infinitely divisible does not affect the indivisibility of its ontological identity, which cannot be “divided” without its ceasing to be what it is.
- 122 This, incidentally, is a missing ingredient in Paley’s famous argument. His “design inference” is treated as the intellectual equivalent of a standing broad jump, whereas in reality, a great deal is presupposed both theoretically and practically for the inference even to be intelligible, e.g., the skillful use of syllogisms, familiarity with design, the habit of keeping time. For this same reason, Richard Dawkins’ famous use of monkeys banging on typewriters as an analog for natural selection preserving random genetic mutations would fail even if he weren’t guilty of smuggling design and foresight into the experiment. It takes a lot more than a sequence of characters to make “METHINKS IT IS LIKE A WEASEL” into a Shakespearean phrase (Dawkins 1996: 43–50).
- 123 See also, *De Anima*, 417b29–418a7, 425b27–426a26, 431a8. See Lear (1988), pp. 26–42, for a very clear and simple explanation.
- 124 See, e.g., Darwin (1991), pp. 53–56.
- 125 We find a primitive example in *On the Origin of Species*.

Now if it had been of an advantage to this species to have laid eggs even smaller than those now laid, so as to have deceived certain foster-parents, or, as is more probable, to have been hatched within a shorter period...then there is no difficulty in believing that a race or species might have been formed which would have laid smaller and smaller eggs (Darwin 1991: 202).

- 126 See Nissen (1997), pp. 1–28, 71–114.
- 127 Depew and Weber employ the distinction between functions and effects to purge Darwin of any remnants of “external teleology” that might have been latent in Darwin’s early tendency to

think of the production and culling of variation as a functional phenomenon, as having a “final cause”: to keep populations as perfectly adapted to their environments as Paley assumed them to be (1997: 133).

They see Darwin’s later emphases on inutility and merely relative perfection as evidence of a move away from these teleological remnants.

- 128 Once again, by “belief,” I do not mean a decision to accept certain propositions that we might otherwise reject, or even what one thinks one thinks, but rather what Aristotle means when he denies that the so-called principle of noncontradiction can really be disbelieved since it is constitutive of thinking as such and confirmed in its very act. Such arguments reveal that the protagonists do not really know the contents of their own mind, inasmuch as they deny truths that are operative in all their thinking and living. There is a good deal of this in contemporary reductionism, which would require us to deny as illusory the world we cannot help living in.

- 129 See the Letter to Graham (Darwin 1959: 285) and Desmond and Moore (1991), pp. 589–678. On Darwin’s Romanticism, see Richards (2002), pp. 514ff.
- 130 Species selection, in other words, is much like the equilibrium that results from the heterogeneous pursuit of economic agents in classical political economy.
- 131 For doubts that Dennett’s description of evolution as an algorithmic process is true or even says anything in the end, see Mahner and Bunge (1997). They object that Dennett’s algorithm makes the material substrate “irrelevant to the function of the system in question, because all that would matter is the ‘logical form of the process,’” the result being that “the most interesting aspect of evolution, namely speciation, is thus reduced to some unspecified random input into a selection, or, rather sorting algorithm” (361–362). See Dennett (1995), p. 60.
- 132 Hence for Aristotle,
- If form is the inevitable outcome of necessary processes, then form would be merely super-venient upon those necessities. Form could not supply the why; an account of the necessary interactions would supply it (Lear 1988: 38).
- 133 For two excellent examples, see the remarks of Francis Crick, to the effect that all heretofore distinctly human qualities “are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules” (1994: 3). See also the text of the statement in defense of human cloning issued by the International Academy of Humanism, whose members include Crick, Dawkins, and E.O. Wilson. The statement is quoted at length in Kass (2002), pp. 136–137.
- 134 Darwin is actually citing Humboldt’s *Personal Narrative*, English trans., vol. iii, p. 106.
- 135 In other words, Darwin’s Romantic treatment of animal faculties functions to eliminate the fundamental difference between humans and other animals so as to bring both within his genealogical historicism. This exemplifies our point that it is the evolutionary process, and not organisms *per se*, that is the subject matter of Darwinian biology (a point we will develop further in Chapter 6). This is why these Romantic elements are not rigorously integrated into his theory as a whole.
- 136 In my estimation, it is this, along with the specific role they play in advancing the cause of natural selection, that accounts for what Richards rightly notes is the persistence of “Romantic” themes, inherited from Humboldt, in his biology. Unlike Richards, I do not find it necessary to claim that Darwin was a Romantic and *not* a mechanist; rather I take him to be at once (and somewhat incoherently) both a Romantic *and* a mechanist, though the difference between the two movements, at the most basic ontological level, may not be as great as Richards seems to suppose. See Richards (2002), pp. 514–554.
- 137 See also Sachs (1995), pp. 56–58.
- 138 It follows that in the postdualistic situation there are, on principle, not one but two possibilities of monism, represented by modern materialism and modern idealism respectively: they both presuppose the ontological polarization which dualism had generated, and either takes its stand in one of the two poles, to comprehend from its vantage point the whole of reality (Jonas 2001c: 20).
- 139 See Whitehead (1920), pp. 26–48.
- 140 See Ruse and Wilson (1985), pp. 50–52 and Crick (1994).
- 141 See also Richards (1992).
- 142 Moving from philosophy of mind to molecular biology, we can clearly see this asymmetry in the supervenience of amino acids on codons. Given the codon CGU, for example, one can infer that the amino acid it will code for is arginine, but given the amino acid arginine one cannot infer that it was coded for by CGU, since CGC, CGA, CGG, AGA, and AGG also

code for arginine. Since the genetic code for living things on earth is not a law of chemistry but rather an accident of history, a “frozen accident” as Francis Crick (1968) put it, it follows that there may be other genetic codes, possibly not even carried in nucleic acids, so that the subvenient base of codons upon which arginine and all the amino acids supervene is indefinite, perhaps even infinite (Stamos 2003: 339).

- 143 On the notion of fitness as a supervenient property, see Depew and Weber (1997), pp. 471–472. This notion lends itself to the idea that fitness is a calculable propensity (518, n. 13), or rather, the notion that fitness is a calculable propensity that may be “shared” by different organisms and thus different physical bases (as in “a cockroach and a zebra both may happen to have a 0.83 probability of surviving to adulthood” (Stamos 2003: 340)), lends itself to the notion that fitness is supervenient.
- 144 Though Bohm does not use the language of “emergent phenomena,” that is clearly what he is referring to. Significantly, though he thinks that these phenomena and quantum theory each suggest a universe that is fundamentally nonmechanistic, the usual interpretations of both remain mechanistic. Overcoming mechanism, in Bohm’s view, involves the recognition of a certain priority of synthesis over analysis and of the wholeness of reality over its analytically separated parts. For another physicist’s account of “emergence,” see Laughlin (2005).
- 145 See Noble (2006), pp. 42–54, 65–67 and Murphy and Brown (2007).
- 146 Depew and Weber describe Dawkins’ reductionism this way.

Dawkins’s version of genetic reductionism leads him not only to favor the reducibility of Mendelian theory to molecular genetics but to take a reductionist view of the relation of molecular genetics to physics. He asserts that “the differential survival of replicators is a special case of a deeper, more universal physical law governing ‘the survival of the most stable.’” In saying this, Dawkins is repudiating Mayr’s “autonomy of biology”. He is not, however, arguing against the autonomy of biology from physics on grounds of methodological parsimony. His reductionism is not only about the reducibility of one theory to another. Dawkins is an entity reductionist as well, who wants to say that the entities mentioned in a more basic science are more real than those that figure in a less fundamental one. Dawkins’s effort to give genes causal efficacy depends on reifying them, that is, on treating them as distinct centers of causal power (Depew and Weber 1997: 374).

- See also Moss (2004), pp. 194–195.
- 147 The upshot of this inherent reductionism is that “the domain of the living is, in the last analysis, fundamentally irrational and therefore unintelligible” (Webster and Goodwin 2006: 130). Hans Jonas makes the same point for very different reasons (2001c: 25).
- 148 It is therefore only half true to say that Darwinism denies that there is “more” to organisms than the coordinated interaction of externally related mechanical parts. Because it is strictly impossible to think, believe, act, and live as if this were true, Darwinians cannot help affirming it even as they attempt to deny it. Though he can offer no rational account of such “warm human perceptions,” even Richard Dawkins recognizes the young girl standing in front of him as his daughter and not an assemblage of genes. There is no catalog of “bridge laws” connecting lower and higher level phenomena, genotypic base, and phenotypic expression that could ever add up to what he knows in seeing her. To disavow what he knows in this instance is ultimately to relinquish knowledge of everything else.
- 149 Though I would not wish to grant Daniel Dennett his self-appointed role as an authoritative representative of Darwinism, his work exemplifies this perfectly.
- 150 See Jonas (2001c), pp. 17–37.

- 151 There are some affinities between this point and that of Webster and Goodwin, who “question the adequacy of the evolutionary paradigm in relation to its failure to provide any satisfactory theory of the production and reproduction of biological form.” They add,

We do not believe that this failure is a result of the supposed difficulty of the problem, but rather that it is a consequence of the intrinsic inadequacy of the current system of concepts... (Webster and Goodwin 2006: 101).

- 152 See Ruse and Wilson (1985), pp. 50–52 and Crick (1994). For a devastating critique of these views see Cunningham (2008), pp. 100–140.

- 153 Consider the definition of the organism given by Depew and Weber:

An organism is an informed autocatalytic system possessing, in virtue of information stored in macromolecules, an internal organization of kinetic relationships such that it is able to maintain itself by pulling environmental resources into its own production and faithful reproduction and dissipating unusable energy to appropriate sinks (1997: 475).

Depew and Weber would undoubtedly contest my characterization of this definition, insisting that “Natural organization is not an artifact, or anything like it, but instead a manifestation of the action of energy flows in informed systems poised between order and chaos” (1997: 478). We will discuss in Chapter 6 whether “an informed autocatalytic system” is finally any less mechanistic and reductive than a more primitive artifact.

- 154 On Aristotelian terms there are important distinctions to be drawn between change as the actualization of a form and change as the acquisition of a new form, but these are not essential to the point I am trying to make.
- 155 For a criticism of how conventional forms of language, prioritizing the nominative case, reflect a vision of the whole as an aggregation of parts, see Bohm (2004), pp. 34–60 and Bortoft (1996), pp. 29–76.
- 156 Kant in the *Critique of Judgment* had argued that

[I]t is quite certain that in terms of merely mechanical principles of nature we cannot even adequately become familiar with, much less explain, organized beings and how they are internally possible. So certain is this that we may boldly state that it is absurd for human beings even to attempt it, or to hope that perhaps some day another Newton might arise who would explain to us, in terms of natural laws unordered by any intention how even a mere blade of grass is produced (1987: 282).

Depew and Weber counter that Darwin is, or aims to be, “the Newton of a blade of grass” (1997: 113–140).

- 157 I say “as a matter of principle” because while, according to Gould, e.g., “the immediate form of the organism can be meaningfully parsed into three major contributions of current adaptation, current constraint, and historical inheritance” and therefore resolved wholly into its causes, it is acknowledged that our ignorance about the specific contingent historical conditions and the infinity of causal factors affecting any given population and certain “quantum fluctuations” built into genetic variation make an exhaustive resolution of effects to causes impossible as a matter of practice (2002: 259).
- 158 That is to say, that once “change” ceases to be regarded as a certain species of act and becomes measured difference, it is only of secondary importance when it is discovered with Maxwell and others that “indeterminism” is an objective physical reality and not simply a subjective defect in knowledge—though one could argue that the “subjectivist” view of indeterminacy is instrumental in securing this notion of change and could point to instances (e.g., in Dawkins) where it continues to be rhetorically useful. Once indeterminism gains an ontological foothold, the difference is simply accounted for statistically rather than deterministically. For an illuminating account of this transition, see Depew and Weber (1997), pp. 243–273.

- 159 Richard Lewontin indicates this when he notes that “The final catalogue of ‘the’ human DNA sequence will be a mosaic of some hypothetical average person corresponding to no one” (1992: 68).
- 160 See Aristotle, *Physics*, II.1.193a20–II.1.193a28 in Sachs (1995), p. 50. I am grateful to D.C. Schindler for pointing out to me how Aristotle offers an advance critique of Dawkins. See D.C. Schindler (2010), p. 35, n. 32.
- 161 Emphasis mine.
- 162 See Aristotle, *De Anima*, II.415a25–II.415b1; *Metaph.*, VII.1033bff.
- 163 I would not be the first to accuse Dawkins and Darwinism more generally of harboring a closet “Platonism,” though I might be the first to regard it as a compliment. (See, e.g., Lewontin (2001), p. 67.) I think the fit is closer to Aristotle, but since I take the differences between Plato and Aristotle to be exaggerated, this is a minor point.
- 164 On the advent of the code-script metaphor, see Keller (1992), pp. 281–299 and Moss (2004), pp. 44–116. We will examine Moss’s devastating critique of genetic Darwinism in Chapter 6.
- 165 In fairness, Dawkins does acknowledge the fact that organisms “which he regards as vehicles for the transmission of genes, must successfully compete at the phenotypic and environmental level” (Depew and Weber 1997: 327–328). From our point of view, it would be impossible not to.
- 166 Sober and Wilson (1998). See also Okasha (2004).
- 167 Lewontin gives the following example of this so-called “fallacy,” which confuses the “work” of selection with bad luck.

A gene with no deleterious effect on its carrier, but which is present in a species that lives only in the rich soil on the sides of slumbering volcanoes, will not decrease in frequency within that species (and may even increase), but its overall prospects are dim Lewontin (2001) p. 337.

To claim that selection is operating against this gene just because the species within which it occurs lives in a risky environment is an example of what Sober and Wilson call the “averaging fallacy.” See also Sober and Lewontin (1982).

- 168 In a critique of Eliot Sober’s nuanced argument for selection as an evolutionary “force,” Tim Lewens asks “in what respect drift and selection resemble Newtonian forces,” and answers in terms similar to these: “[S]election and drift resemble forces in virtue of their taking magnitudes, the alteration of which is systematically related to the probability that a population will change in various different ways” (2010: 315).
- 169 In his autobiography, Darwin says that no two books influenced him as much as Herschel’s and Humboldt’s *Personal Narrative*, first-person testimony to the uneasy mixture of mechanism and Romanticism in his thought. See Barlow (1958), pp. 67–68.
- 170 See Desmond and Moore (1991), p. 485. Depew and Weber explain,

[W]hat Herschel meant by “higgledy-piggledy” may be glossed as follows. Rather than finding a suitably Newtonian law for biological adaptation and transmutation...what Darwin had done was push Quetelet’s social arithmetic down into the biological world and then claim that he had found in natural selection a law of nature. He had thus compounded Buckle’s error about society by reading it into nature. Not surprisingly, Darwin’s “laws” do not cover their instances with anything like the uniformity and regularity of classical Newtonian laws. Each event seems to lie at the intersection of many separate causal lines or to be a matter of pure happenstance and accident. Natural selection is used as a general idea to cover what survives sorting through this heterogeneity. But natural selection, so construed, cannot be a law, in the classical Newtonian sense, because it is not connected with its instances in an appropriately lawlike way (1997: 152).

- 171 “Natural selection in its most general form means the differential survival of entities” (Dawkins 1976: 33).

- 172 Obdurate genic selectionists will respond that, irrespective of mechanical details, all that matters in the end is which genes increase and which genes decrease. Groups, like individuals, are here today and gone tomorrow. Only the gene remains, so we need to consider only the differential production of different genes, however that may be mediated. By definition, a gene is more fit in evolution if it leaves more copies in the next generation. But this bookkeeping trick confuses causes and effects, or, rather, eliminates material causes by reifying statistical effects (Lewontin 2001: 335).
- 173 I say “partially” recanted because (a) he only changed his mind about the testability and logical status of the theory and (b) because he took the testability of natural selection to be a consequence of the manifest fact that there are exceptions to it.
- 174 See Schuster (2007), pp. 43–48.
- 175 There is also some affinity with Lewens’ argument that
- as far as metaphysics goes, demarcating the contributors to fitness (and therefore selection) is an arbitrary matter. We can choose to carve our causes narrowly or broadly, but no biological fact will settle the matter of how broad we can get before it becomes inappropriate to speak of fitness and selection.
- He therefore concludes “that there is no non-arbitrary account of the nature of selection” (Lewens 2010: 330–331).
- 176 I have already referred to the understanding of fitness as a propensity and a supervenient property, a function of macro-level states that are irreducible to the underlying states which produce them. Contemporary evolutionists are satisfied that this understanding of fitness escapes this circular logic. I am unconvinced. The “forward looking” shift in perspective now reifies a statistical probability as if it were a property of organisms, abstracting from the totality of conditions in which any organism in nature actually finds itself. In short, fitness under laboratory conditions could never equal fitness in the world. As Richard Lewontin has put it,
- The fitness at a single locus ripped from its interactive context is about as relevant to real problems of evolutionary genetics, as the study of the psychology of individuals isolated from their social context is to an understanding of man’s sociopolitical evolution. In both cases, context and interaction are not simply second-order effects to be superimposed on a primary monadic analysis. Context and interaction are of the essence (1974: 318).
- These initial parameters would seem to lend themselves to a “just-so” validation in retrospect that lends itself once again to the charge of tautology. It does not relieve suspicion when Depew and Weber say,
- [T]he fitness of an organism refers to a conjunction of real physical properties and properties of organisms. When fitness is looked at from this structural and causal point of view, it names what Darwinians have always called adaptedness (1997: 327–328, 518–519, n. 13).
- See Burian (1983), pp. 287–314 and Sober (1984), pp. 196ff.
- 177 See Gould and Lewontin (1979), pp. 581–598.

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6

The Mystery of the Missing Organism

The advent of a mechanistic ontology inaugurated the slow demise of the organism as a substance and as the incommunicable subject of its own being, what the scholastics would have called a *per se unum*. This *unum*, though a “composite” of matter and form and act and potency, was nevertheless understood to be indivisible insofar as the act of being, and thus an ontological identity, can be predicated of it. Just so far then, as an organism is a *per se unum*, its unity transcends and, thus, *ontologically* precedes the coordinated interaction of its parts as the principle and subject of their interaction, though the full manifestation of this unity in this coordinated interaction awaits the organism’s historical development and maturation.

Though the ontological groundwork for the organism’s demise was laid in the seventeenth century, we witnessed one crucial stage in its long slow death in the thought of William Paley. Paley was a positivist who took for granted being’s reduction from actuality to brute facticity. This positivism freed him of the burden of metaphysical questioning and allowed him to confine his attention to proving that God had contrived to arrange the parts of living things in a functional way. As Paley brought to term the seventeenth-century conflation of nature and artifice, transposing Aristotelian form from an interior principle of motion into an extrinsic arrangement imposed from without on parts essentially external to each other, he completed the reduction of creation to manufacture and emptied living entities of the remainder of self-transcending unity and incommunicable interiority previously conferred upon them by essence and *esse*.

The organism would not disappear all at once or without a fight, however, if in fact it ever could disappear completely. Paley’s admiration for the exquisite detail of organic “design” and his desire to vindicate the contriving God would prompt him to marvel at questions—*Why* procreation? *Why* maternal care? *Why* instincts? *Why* play? *Why* pleasure?—that would become largely passé within a generation or two.¹ Such questions nevertheless point to forms of unity and modes of being that defy Paley’s mechanistic

analysis and might have led reason to press beyond the confines of his positivism. In Blumenbach's *Bildungstrieb*, or the archetypal *urpflanze* of Goethe, continental *Naturphilosophie* would continue to stress the paradoxical unity, interiority, and dynamic actuality of organisms, even if Kant would reduce such notions to the status of mere regulative ideas governing the structure of thought and not principles which reason could affirm as being constitutive of reality. Insofar as these concepts belonged to the real and not a merely ideal or heuristic order, they continued to uphold a tacit distinction between the temporal order of becoming and a transcendental order of being. Hence, Goethe, ever concerned with the "simultaneity and successiveness" both in things and in the perceiving subject, thought his principles of morphology simultaneously upheld both evolution in the old sense and epigenesis (1989: 76–88, 219).

As we have seen, these concepts drawn from Romantic biology and the *Naturphilosophie* were among the many sources influencing Darwin's own thought, often compensating for the deficiencies in the mechanistic ontology he inherited from Newton, Paley, and the tradition of British functionalism. Alexander von Humboldt would convey to Darwin both a version of archetypal theory and a general Romantic sensibility, as would friend and later antagonist Richard Owen (Richards 2002: 511–552).² And these influences would continue to live on in modified form in Darwin's thought, for instance, in his acceptance of the "weak recapitulationism" of Von Baer's laws of development (1991: 368–369).³

Darwin's theory would nevertheless mark a watershed in the progressive disappearance of the organism, despite his stature as a "muddy boots" biologist and despite the copious quantities of empirical data which he marshaled in support of his theory. We have seen that there are many ways to interpret the continuity and discontinuity of the subsequent tradition of Darwinian biology, and these need not be mutually exclusive in principle. Stephen Jay Gould maintains that the quarrel between "formalists" and "functionalists" is the defining debate of modern biology before and after Darwin (2002: 251–341).⁴ Depew and Weber make a similar claim declaring "that we are living in a time when the central problem in theoretical biology is the integration of developmental biology with genetics and evolutionary theory" (2001: 239). I do not wish to deny either of these interpretations. I would recast them somewhat, however, in light of the philosophical exigencies which have emerged thus far in our assessment of Darwinism and say that this quarrel is a prolonged attempt to contend with the displacement of the living organism from the center of biological thought which results ultimately from the reduction of nature to art. The contest, as it has evolved over the century and a half since Darwin, is now primarily between those who would further displace the organism in the name of the gene, a paradigm shift with enormous ontological, ethical, and cultural ramifications, and the more recent attempts by developmental biologists in the morphological tradition and developmental systems biologists to restore the organism, albeit redefined in terms of systems dynamics, to the center of biological inquiry. Our task once again is not to pronounce on the scientific merit of these developments *qua* scientific but to consider them in their philosophical and theological meaning, where they will be judged as salutary but ultimately inadequate developments in need of a sounder metaphysical basis.

The disappearance of the organism from beneath the gaze of Darwinian biology has a twofold aspect: the elimination of the organism both as the subject of its own

being and as the proper subject matter of biology. We considered the metaphysical reasons for this in Chapter 5, where we argued that it is simply not possible to give a principled ontological account of the unity and interiority of the organism on terms of Darwin's mechanistic ontological assumptions. These assumptions will always compel one to deny in theory what he affirms in practice. The subsequent history of Darwinism following the "genetic turn" will bear this out.

Darwin's additions to these inherited commitments hasten this disappearance along. Darwin, as we have seen, added Lyell's sense of deep time to Paley's "cluster of contrivances," which allows him to replace Paley's contriving God with a near infinite process of historical trial and error. Darwin attempts, in short, to reduce the order of being to the order of history, a reduction already latent in the conflation of nature and art. The attempt is not entirely successful, in the first place, because it is metaphysically impossible and because this reduction is false. A transcendent order of being, form, and finality is intrinsic to the mere identification of entities and to the intelligibility *of* history. It is tacitly invoked with every use of the indicative and is presupposed in the relation between any two things or events. The attempt fails, in the second place, and indeed it contradicts itself, because Darwin is not content in fact to reduce being *to* history. His theory is also an attempt to supply a transcendental logic for the outworking *of* history. The contest which persists to this day over the "soul" and "essence" of Darwinism, whether it is primarily a species of natural history or a nomothetic discipline like physics, has its root in this conflicted ambition.

This reduction of being to history is not proprietary to Darwinism. It is arguably the defining feature of nineteenth-century thought. Hegel, Marx, and Nietzsche each progressively unfolded the implications of this primal metaphysical decision that finds its highest ontological expression in the thought of Heidegger. Joseph Cardinal Ratzinger regarded the reduction of being to history as perhaps the principal factor responsible for the eclipse of even the idea of truth (1987: 15–30). George Grant regarded this reduction as a fundamental reason why technology is the ontology of modernity, as modern conceptions of being oscillate dialectically—often under the same name of "progress"—between history as the empty space of freedom for the human making of the future and history as a process of making to which human beings are themselves subject. (Here again we see a tension between historicism and its own metaphysics.) The conflation of nature and artifice reaches its terminus with this reduction, and it is a key reason why the inner logic of Darwinian biology and the mechanistic ontology which it brings to fruition is intrinsically—that is, *ontologically*—eugenical.⁵

Darwinism's reduction of ontogeny to phylogeny brings the nineteenth-century's conflation of being and history to completion in the biological sphere. This is Darwinism's metaphysical meaning. The reduction of being to history allows Darwin to transform the various archetypes inherited from Owen and developmentalists on the continent into the "common ancestor" (Richards 2002: 526–533). This subsumption of ontogeny under phylogeny would bring about a twofold atomization of the organism corresponding to the demands of historical transmission and the assumptions of a mechanistic ontology. First, it would result in the atomization of the organism's structure so that the organism's parts or traits are treated almost as independent individuals available for selection. Second, it would result in the further

atomization of these traits into the so-called units of heredity (Webster and Goodwin 1996: 17–25). The first dimension of atomization is the logical precondition for the second, but together they contribute to the dual sense of the organism's disappearance, as a proper whole whose unity transcends and thus ontologically precedes the coordinated interaction of its parts and as the proper subject matter of evolutionary biology. The organism is now precisely identical to the coordinated interaction of those parts and the sum of historical causes which produced it. This is reflected in the definition of the organism supplied by Gould which we considered earlier: “[T]he immediate form of an organism can be...meaningfully parsed into three major contributions of current adaptation, current constraint, and historical inheritance” (2002: 259). Lenny Moss notes that “for over 2000 years, from Aristotle through the nineteenth century, the living organism within the confines of its own life span was the center of naturalistic understanding and explanation” (2004: 4). The significance of this “phylogenetic turn” is monumental, especially after the units of heredity come to be identified with the gene.

[A]s the gene and genetic program became understood to be the principal means by which adapted form is acquired, the theater of adaptation changed from that of individual life histories, that is, ontogenies, to that of populations over multiple generations, that is, phylogenies. As the genetic program moved to the explanatory center stage, the individual organism, with its own adaptive capacities, began to recede from view (4).

Moss emphasizes that this phylogenetic shift generated the need for something corresponding to the modern notion of the gene. The gene, he maintains, was thus born and existed as a kind of theoretical placeholder within this new phylogenetic paradigm before it was ever identified as a physical entity.

As the obvious etymological link with the word *genesis* suggests, the very sense of being a gene is that from out of which other things arise. The concept of the gene began not with an intention to put a name on some piece of matter but rather with the intention of referring to some unknown something, whatever that something turned out to be, which was deemed to be responsible for the transmission of biological form between generations (2).

The gene's career within evolutionary biology, Moss goes on to suggest, has been determined to a great extent by the function preassigned to it as a consequence of the theoretical needs of the “phylogenetic turn.” It is these that will ultimately drive the sort of “genetic preformationism” we encounter most ostentatiously in the work of Richard Dawkins, where the gene is both the bearer of inherited form and the agent that creates its own organism. This idea has come under enormous criticism from within biology, and we will look at its historical development, as well as some of these criticisms, a bit further on. We may ask in the meantime, however, why such a simplistic and defective understanding of the organism, as this is alleged to be, has been able to persist.

The answer, I suggest, has everything to do with how the organism disappears from beneath the view of evolutionary science, not only as the subject of its own being but as the subject matter of evolutionary biology. This is true irrespective of whether we regard evolutionary theory as primarily nomothetic or historical or whether we regard

genes, organisms, or even populations as the so-called “units of selection.” We have seen that the advent of mechanism and the concomitant evacuation of interiority brought about a “radical reconception of the basic instance of human thought, namely, the simple proposition: S is P” so that the proposition is no longer taken to explicate a subject and its accidents, but a logical function between two, extrinsically related terms (D.C. Schindler 2010: 31). This is reflected in a general shift in the subject matter of all the sciences, as science from the seventeenth century onward becomes “much more interested in the relation between things than in the *relata*” (Funkenstein 1986: 151). In Newtonian mechanics, for example, the subject matter of physics is no longer motion *per se*, much less motion as an attribute of distinct kinds of bodies, but the quantifiable forces or the system of forces governing their interaction, forces to which the “inner nature” of bodies—if they had inner natures—would be indifferent.

So too in evolutionary biology, the subject matter of the science is not principally life or living things *per se* but the evolutionary process itself and its “mechanism,” natural selection. Organisms (or other units of selection) are really only important *per accidens*, insofar as they vindicate the theory about the process. Darwin collected his volumes of empirical data for this end, and this end shaped the uses to which he put it. And it is why subsequent evolutionists were simply able to ignore or dismiss as quaint the sort of questions that enchanted Paley. There is something in this reversal of criteria that speaks to the quasi-religious status of evolutionary theory within modern culture. Inside and outside the guild of evolutionary biology, it often seems less that evolutionary theory is important because it explains living things than that a reduced understanding of living things is important because it explains and justifies evolutionary theory. The answer to our question, then, is that a simplistic and atomistic account of organisms and their development has persisted simply because organisms as such are not the point of Darwinian biology. Darwinism can make do without a coherent science or philosophy of the organism—indeed Webster and Goodwin maintain that strict Darwinism must deny the possibility of such a science!—because the point and subject matter of Darwinian theory has always been the evolutionary process itself (Webster and Goodwin 1996: 28, 32).⁶ The organism is effectively a placeholder, more or less relevant depending on what the scientist in question regards as the unit of selection and whether he is inclined in a nomothetic or idiographic direction.

The remainder of the chapter will be taken up with a consideration of this drama. In the ensuing section, we will look more closely at the fate of the organism in Darwinian biology as this tradition unfolds and as it culminates in the modern synthesis with Mendelian genetics. We will then draw upon the resurgent tradition of developmental biology to critique the view of the organism which emerges from this synthesis and its corresponding concept of inheritance, suggesting that the failure to supply an adequate account of the organism renders inheritance itself unintelligible. In the third section, we will examine the effort by a resurgent developmental biology to recover the organism and to return it to the center of its own evolution. In the final section of this chapter, we will reflect critically on the metaphysics of this effort, showing why its failure to escape a mechanistic ontology and to live up to the metaphysics implicit in the attempt leaves its noble ambition unfulfilled.

How the Gene Killed the Organism

In Chapter 5, we considered Darwin as a natural theologian and discussed why Darwinism's deepest ontological commitments—at the level of being, cause, matter, form, substance, and entity—logically conclude in the termination of the organism. Let us look a little more closely at how this is reflected in the logic of Darwinian *science*.

The tradition of British functionalism, presupposing an essentially Newtonian conception of matter and of science itself, was hostile to the “formalism” of Geoffroy and the *Naturphilosophen*. Elements of this formalist tradition nevertheless persist in Darwin and are reflected in the place he accords to “Unity of Type” as one of the great laws governing the formation of organic beings (1991: 158). The most proximate sources for this were most likely Geoffroy and Richard Owen (Gould 2002: 251–260). Though Darwin held these formalist laws to be quite subordinate to natural selection, Webster can plausibly maintain nonetheless that “Darwin and his disciples in morphology can continue employing almost exactly the same ‘typological’ concepts and methodology as their predecessors, and, consequently, being confronted by the same problems” (Webster and Goodwin 1996: 20). There is one crucial difference, however. In Darwin's hand, the very notion of “type” undergoes a profound transformation. “Darwin had struck a blow to the heart of Owen's system by substituting a flesh and blood ancestor, a concrete beastly thing, for the lovely, abstract, Platonic archetype,” though Owen himself may have inadvertently paved the way for Darwin by conceiving of his “Vertebrate Archetype” as just another particular (Gould 2002: 326).⁷

As the common ancestor replaces the archetype, genealogy becomes the sole criterion for determining whether a biological classification scheme is a real “system of nature” and for distinguishing homology, real similarities in *bauplan* across phyla, from mere analogies concocted by the powers of imagination (Darwin 1991: 355–367). The phylogenetic turn thus gives rise to a new, genealogical conception of species in which species are taken as real entities or individuals, in the form of sets extended across time and space. This conception is frequently juxtaposed to the nominalist conception of species which has equal claim to Darwinian paternity, but as we saw in Chapter 5, such ostensible “antinominalism” is in fact the highest expression of nominalism. Since individuals are not kinds, species as historically extended individuals cannot be natural kinds. Inherent, then, in the genealogical conception of species is a denial of any link between species and nature in the traditional sense, which is why, on Darwinian terms, a properly *scientific* explanation of species and their “essential” characteristics is impossible. Species are as inscrutable as Socrates; both terms are now essentially proper names. David Hull perhaps more than anyone has helped to clarify the logical structure of Darwinian theory and the meaning of Darwinian species. Hull insists,

If species are interpreted as historical entities, then particular organisms belong to a particular species because they are part of that genealogical nexus, not because they possess any essential traits. No species has an essence in this sense. Hence there is no such thing as human nature (1978: 358).⁸

On this conception of species, Webster explains, “the relation between an individual organism and a species taxon is not that of member and class but that of part and whole” (Webster and Goodwin 1996: 31).⁹ Hull writes,

Just as a heart, kidney, and lungs are included in the same organism because they are part of the ontogenetic whole, parents and their progeny are included in the same species because they are part of the same genealogical nexus, no matter how much they might differ phenotypically (1978: 335–360, emphasis mine).¹⁰

Hull’s isomorphism between species and their members and organisms and their parts is most interesting, for our purposes, less for what it says about species than for what it implies about the very meaning of the organism as a unified whole. Even if Hull does not really mean to suggest that organs belong to organisms *just as*—that is, *in the same way*—that organisms belong to species, the ostensible aptness of the comparison is telling. It attests to how the Darwinian reduction of being to history minimizes the depth and degree of integration inherent in complex organisms and to how the transmission demands of a genealogical conception of species necessitate the reconfiguration of organic unity as an accidental and artificial unity of aggregation. Gerry Webster, and the Darwinian dissenter William Bateson before him make precisely this charge. We saw in Chapter 5 how Darwin subtly alters the meaning of “change” or “variation” from the embryonic development undergone by a single individual to measured differences *between* individuals. This entails a corresponding atomization and simplification of the organism itself.

In this case, the identity of parts cannot be grounded in observations of continuity; rather it is inferred on the basis of correspondence relations. As Bateson observes, the inference involves an assumption concerning the nature of variation. The Darwinian hypothesis assumes the existence of an ancestral form, characterized by some maximum number of parts, from which the pattern characteristic of descent has arisen by successive diminution of parts. It is assumed, therefore, “that in Variation the individuality of each member of a Meristic Series is respected” such that parts in different individuals within an historical sequence can be identified; each part has “an individual and proper history.” In other words, Bateson is claiming that the methodological “atomism” which is required by the comparative method—the establishment of correspondences between individual elements—has been translated into an ontological “atomism” whereby parts actually are individuals and behave as such (Webster and Goodwin 1996: 21).¹¹

This is an important point. In its reduction of being to history, Darwinian biology claims to account *both* for specific coherence across generations *and* also variation and ultimately transmutation between generations. Both tasks, but particularly the latter, require of the organism that we be able to “chop it into many little pieces such that natural selection could favor or disfavor small differences” (Moss 2004: 20). This is not an empirically derived conclusion but an *a priori* system requirement of Darwinian theory, built into the very problem which Darwinism constructed for itself, particularly in its panadaptationist strain.¹² Finding this “unknown something” responsible for the transmission of biological form between generations and divisible into “discrete packets” available to selection became even more urgent once it was shown by Fleming

Jenkin's statistical analysis that the "blending inheritance" provisionally conceded by Darwin would result not in the survival of outlying "sports" who were fitter than their kin but in a regression to the mean (Depew and Weber 1997: 193–197). The difficulty would spur second-generation Darwinians such as Galton, Weldon, and Pearson to refound the theory of natural selection on a statistical basis, reconceiving the inertial baseline from which deviations would be measured as a statistical distribution of inherited characters and measuring the effects of natural selection against this inertial baseline.¹³ This statistical reconception, which was bred and nurtured in the bosom of the eugenics movement, was a decisive step on the path toward the molecular Darwinism of the twentieth century and a further step in the disappearance of the organism as the subject matter of evolutionary biology.

One might object that saying the inner logic of Darwinian theory demands something like the gene *a priori* overlooks the role of strong recapitulationism and the old developmentalist programs—typically regarded as antithetical to Darwinism—in eventually bringing about this concept...and their own demise.¹⁴ I am not making a historical claim that there was a straight path from Darwin, through turn-of-the-century eugenics to the immortal gene and the *allmacht* of natural selection. Nor am I disputing Depew's and Weber's story of how continental "Darwinism," mediated above all by Ernst Haeckel, "unleashed the dammed-up tradition of Geoffroyian and Lamarckian thought" fundamentally at odds with Darwin's own weak recapitulationism, "causal pluralism," and his stress upon external forces. Depew and Weber sometimes imply that more faithful adherence to these elements of Darwin's own thinking might have led to discovery of the gene without the ugly detour through eugenics.¹⁵ Perhaps this is true, though it minimizes the patently eugenical anxieties of the *Descent of Man* and the significance of the breeders' comparison at the outset of the *Origin*, and one wonders, given their masterful grasp of the interrelation between scientific theorizing and political and social conditions, whether such suggestions are motivated in part by the desire to retrieve a "pluralistic" Darwin for a pluralistic age.

Our claim, in any event, is less a claim about Darwinism's fitful historical development than a suggestion about how the inner logic of Darwinian theory "fated" that development. The conflation of ontological identity and causal history is fundamental to this logic. This conflation requires the ontological atomization of the organism to explain specific coherence and the emergence of variation as well as a "something" to perform the work of conveying the biological "theme" and its variations across generations. These theoretical demands exercise a profound *a priori* influence over the subsequent historical career of the gene when it finally emerges. The failure of Darwin's own theory of inheritance to meet these system requirements, rather than exonerating him for the sins of his reductionist descendants, is testimony to the strengths of those requirements. That Weismann's preformationism and his separation of the germ line of "reproductive information" from external influences were necessary to restore natural selection to its primacy within evolutionary theory only underscores the point (Depew and Weber 1997: 172).

The fact that the concept of the gene partly owes its existence to sources outside of orthodox Darwinism is therefore immaterial to the question of whether Darwinian theory required the gene to come eventually into being. We should

take a moment, nevertheless, to examine the historical sources for the modern gene concept a bit more closely, though we can only give this complex subject the most cursory treatment.¹⁶

Within the “formalist” pole of the formalist–functionalist dichotomy is a historic tension, concentrated in embryology, which dates at least to the eighteenth century. This is the tension between various theories of epigenesis and preformationism. According to the epigenetic view, organisms are self-manifesting, self-organizing wholes while preformationism, in its strongest form, held that

all the organisms which would and could ever be had come into existence with the creation of the world and its first creatures, as so many Russian dolls, fully formed miniatures nested and encased one inside the other (Moss 2004: 8).¹⁷

When preformationism is coupled with an evolutionary perspective, it leads to the conclusion that ontogeny recapitulates phylogeny, though there is a significant difference between the “strong recapitulation” such as one finds in Geoffroy or in Haeckel’s “biogenetic law,” which holds that ontogeny passes through adult forms of extinct ancestors, and the “weak recapitulationism” of von Baer’s laws, which originally had an antievolutionary twist and held that embryos only pass through immature stages of ancestral forms.

Each of these theoretical outlooks had its weaknesses. As Moss puts it, preformationism had difficulty accounting for hybrids resembling both parents and meeting the empirical challenge of finding the miniature forms in ova increasingly transparent to microscopic investigation, while epigenesis could not solve the problems of organic organization without appealing to forces which seemed occult to an age steeped in mechanism and materialism (2004: 9).¹⁸

Kant’s heuristic teleology offered a way around the impasse by acknowledging the necessity of a teleological (and thus epigenetic) theory of the organism as a regulative principle of reason, while at the same time necessitating the attempt, so far as possible, to explain the apparent unity and self-organization of organisms in mechanistic terms (Moss 2004: 10).¹⁹ Blumenbach had attempted to bridge the divide between teleology and mechanism with his concept of a *Bildungstrieb*, a formative force that was neither superimposed from without nor the sum of an organism’s individual parts but which “resulted from the peculiar organization of the living being as a whole” (2004: 11). The Kantian view further articulated the “action” of the *Bildungstrieb* with the notions of *Keime* and *Anlagen*. The former term translates the French “germs”; the latter can be translated as “organizational layout” or “disposition” (199–200, n. 7). Taken together, the two concepts make it possible to unify epigenesis with a kind of “weak” preformationism. Von Baer’s laws of embryonic development which Darwin cautiously accepted and co-opted for the evolutionary cause were developed within these theoretical parameters.²⁰

Cell theory originated from within these “teleomechanist” presuppositions and would eventually spell their doom, transposing the teleomechanist program “into its material reductionist antithesis,” by providing a possible physical location for the *Anlagen* and driving the real evolutionary drama toward the cytological and molecular level (Depew and Weber 1997: 176–177).²¹ The fact that certain early cell theorists such as Theodor

Schwann regarded the nucleus as the cell within the cell and development as occurring from center to periphery would lend further impetus to this tendency.

Four factors (at least) would spur these “formalist” developments toward their assimilation into the Darwinian framework in the so-called “modern synthesis” that emerged beginning in the 1930s. The first was the German appropriation of Darwin, initiated by Ernst Haeckel, which wedded Darwinism to the cause of “hard inheritance,” though this frequently meant elevating Geoffroyian or Lamarckian emphases on “Unity of Type” and the heritability of acquired characteristics over natural selection.²² The second, which occurred around 1890, was August Weismann’s apparent *refutation* of the heritability of acquired characteristics, ironically enough, in the name of advancing hard inheritance even further (Depew and Weber 1997: 172). From this he drew the further conclusion that “germ line” cells are sequestered from “somatic cells,” and thus from external influences, in early ontogeny, giving rise to the so-called Weismann barrier. This barrier is the conceptual basis for the later distinction, coined by Wilhelm Johannsen, between “genotype” and “phenotype.” While Weismann destroyed what remained of Darwin’s own pangenetic theory of inheritance and its dependence upon acquired characters to explain adaptation, he did so to make Darwinian natural selection *Allmacht*, by conjoining an even more rigorous selectionism with so-called hard inheritance. In retrospect, argue Depew and Weber, “it is Weismann who appears to have virtually refounded the Darwinian tradition by making the break with developmentalism that in the past has anachronistically been ascribed to Darwin” (1997: 189).

He did this, however, to save natural selection from the excesses of developmentalism, and especially the cryptospiritualism, in which Darwin and most self-proclaimed Darwinians were tacitly complicit to the extent that they too had theories of inheritance that relied on acquired characteristics. Here Weismann seems to have anticipated twentieth-century Darwinism. Natural selection works because germinal cells make somatic cells, which in turn make organisms. These are subject to selection pressure in competitive environments. Which germ cells will make it into the next generation, therefore, is a function of how well the bodies carrying those cells do in the struggle for existence. Adaptedness is the result of changing proportions of these cells in populations. Real evolutionary novelty, however, must await internal change in the germ cells (189).

Weismann may have offered his theory to counter developmental excesses, but it too remains a form of preformationism in which “germinal cells, make somatic cells which in turn make organisms” (Depew and Weber 1997: 189). Weismann’s prescience in anticipating twentieth-century Darwinism is diminished, Depew and Weber contend, by the fact that he takes “a developmental perspective on what are in actuality population phenomena” (1997: 190–191).²³ The importance of this point will soon become clear.

Two final developments would be necessary in order for this shift toward “population thinking” to occur. The first was the probability revolution of the nineteenth century. Fleming Jenkin’s criticism that Darwinian sports would be swamped by regression to the mean forced Darwinians to take the statistical distribution of traits in populations very seriously. Motivated by their eugenical anxieties and armed with new statistical

methods derived from French sociology, Darwin's cousin Francis Galton and his disciples Karl Pearson and Walter Weldon "turned statistical generalizations into explanatory arguments" and altered the inertial baseline from which variations would be measured, thus salvaging natural selection from Jenkin's critique (Depew and Weber 1997: 201).

The final factor was the eventual unification of Darwinian natural selection with Mendelian genetics after the rediscovery of Gregor Mendel's *Experiments on Plant Hybridization*. Moss is careful to note that Mendel "was proffering neither a universal theory of the constitution of the organism nor an account of the relationship between phenotype and genotype" (2004: 24). He did not even recognize this distinction and had no need for it; his simple preformationism was sufficient for his instrumental, practical purposes. And a number of early Mendelians—William Bateson most notably—thought Mendelian discontinuous variation precluded natural selection from being the chief motor of speciation. This objection would not be fully overcome without the subsequent discovery by Morgan that "genes" were physical entities lying on chromosomes, the development of the Hardy–Weinberg equilibrium formula as a new baseline against which to measure genetic frequencies or mutations in populations, and the clear shift to "population thinking" implied by this formula (Depew and Weber 1997: 217–242).

Weismann's distinction between germ and somatic cell lines, later expanded by Johannsen into the distinction between genotypic and phenotypic expression, secured autonomy for the emerging science of genetics from epigenetic theories of development. The contribution of Mendelism to the emerging synthesis, once it was converted by Hugo de Vries into a universal theory of the organism, was to preserve Weismann's preformationism in atomic or particulate form, effectively chopping up Kant's *Anlagen* into unit characters individually available, in principle, to natural selection. T.H. Morgan's famous discovery in his experiments on *Drosophila* that Mendelian factors such as eye color, wing shape, and sex segregated with the X chromosome not only fortified this preformationism by underwriting the conviction that Mendelian factors reside on chromosomes, it made it possible to recast the very definition of heredity as "the transmission of germinal units from one generation to the next" and to simply ignore the developmental context in which heritable traits actually appear (Sapp 1987: 50 cited in Moss 2004: 36–37).²⁴ With this development, genes become the material repository of Aristotelian form otherwise banished, and phrases such as "genes for x" begin to enter into theory.²⁵ The now pervasive metaphors of genetic "information," "blueprints," "programs," "instructions," and the like do the conceptual heavy lifting for this "Aristotelian" work (Moss 2004: 51–73).²⁶

The isolation of genetics and heredity from developmental considerations and the equation of heredity with transmission of the germ line proved consequential in at least two respects. It shifted the grounds of the debate from lineages to populations, and it shifted the baseline for measuring evolutionary stability and variation from a developmental norm associated with lineages to a mean distribution of Mendelian units within a population. This eventually led to *rapprochement* between Mendelians and the Darwinian biometricians who followed in the wake of Galton, Pearson, and Weldon.²⁷ It would also provide further impetus for the disappearance of the organism within evolutionary biology. Not only would the real evolutionary drama now take

place “behind the backs of organisms” in the germ safely sequestered behind Weismann’s barrier, it would also take place “over their heads,” so to speak, not in real *phyla* possessed of a common specific or even generic “essence” but in populations now understood as statistical aggregations of germinal units, though “the gene” still remained something of a placeholder at this point. The signal moment came with R.A. Fisher’s genetical theory of natural selection, which reconceived the equilibrium achieved by natural selection in terms analogous to Boltzmann’s statistical interpretation of the second law of thermodynamics according to which “fitness” becomes a quantity to be maximized like entropy.²⁸

This spirit of idealization and of looking below the phenomenal surface is evident in a paper Fisher published in 1922 on dominance. There he made explicit his conviction that to do evolutionary theory right, you just treat populations as arrays of genes rather than as groups of visible organisms, and should, in turn, treat arrays of genes in the same way Maxwell and Boltzmann treated large arrays of gas molecules, or, more precisely, the average velocities and energy levels of such molecules. “It is often convenient,” Fisher wrote, “to consider a natural population not so much as an aggregate of living individuals but as an aggregate of gene ratios” (Depew and Weber 1997: 246).²⁹

Fisher’s work, though monumental, was hardly the last word. His American contemporary, Sewall Wright, recognized that Fisher’s thermodynamic analogy, which attempted to render natural selection cogent against a post-Newtonian dynamical background, was only as reliable as the atomic conception of the gene that underlies it. To this Wright counterposed the possibility that “genes are tied together in adaptive bundles or complexes,” sometimes resulting in a phenomenon which he called genetic drift. In a real population of randomly interbreeding organisms, statistical arrays were likely to be distributed by stochastic or random processes, and this can produce adaptively mixed results (1997: 281). The point was not only to make the distribution of genetic ratios at least somewhat subordinate to the lived lives of those populations whose genes they are. By complicating the relation between genes and population, and thus complicating the “adaptive landscape,” Wright challenged “the notion that a law for evolution by natural selection can be written that is in any way closely analogous to the laws of physics” (Depew and Weber 1997: 284). And in this general thrust at least he has been followed by more contemporary figures such as Ernst Mayr, Stephen Jay Gould, and Richard Lewontin.

Whether or not Fisher (and subsequent disciples like Dawkins) has a legitimate claim upon the essence of Darwinism, the point of this brief and simplistic sketch is to show that what the logic of Darwinian theory suggests *must* occur, namely, the termination of the organism, indeed *does* occur in the history of evolutionary biology culminating in the modern synthesis. Ironically, the demise of the organism—the reduction of its ontological identity to descent—will end up calling the intelligibility of descent itself into question. Before Sewall Wright, Bateson and others had simply rejected a one-to-one correlation between genotype and phenotype. But in a science where development and epigenetical issues had been pushed to the margins, a science whose subject matter is not really organisms *qua* organisms but organisms as mere variables within the evolutionary process itself, a challenge to the working understanding

of the organism was not sufficient to dislodge the assumption that the paradigm of Darwinian evolution was fully adequate to account for the phenomenon of life. However, it was sufficient to open the door, eventually, for a return from exile of a developmental biology that would challenge that very assumption.

Inheritance and the Form of History

In Chapter 5, we questioned not the truth of Darwinism as such but whether and to what extent Darwinian explanations were more than tautological and whether the truth of Darwinism, therefore, amounted to more than a *truism*. We thus raised the possibility that Darwinian biology could be essentially correct in empirical particulars and wrong, or perhaps empty, on the whole—provided, that is, that Darwinism finally stakes a *claim*. These are questions which have perennially plagued Darwinism in one form or another since its inception.³⁰ Gerry Webster has argued that the ontological commitments of Darwinism commit Darwinian biology to denying the possibility of a rational science of the organism, a further reason for the disappearance of the organism within Darwinian biology (Webster and Goodwin 1996: 28–39).

Similar objections were advanced in a particularly acute form at the turn of the twentieth century by the philosopher and developmental biologist Hans Driesch, who was convinced that inheritance was sufficient neither for an adequate science of the organism nor for an adequate science of morphogenesis. Underlying Driesch's scientific concern is a more basic philosophical concern not unlike our own concern for Aristotle's "single actuality": whether an event, or more specifically an "action," is "a whole or a sum" (1908b: 157).³¹ Like Leibniz, he maintained that action conceived simply as a series of discrete incidences temporally contiguous with each other was unintelligible; however, this contiguity was subdivided, because no such instance considered solely in itself implies the next and because any relation between these instances implicates them in a prior unity to which they all belong. To be intelligible as action, the end must somehow be specified in the beginning, which is to say that action to be intelligible must be a whole, and must therefore have a form that is not just a series of instances added together but that transcends and unites them (3–122). The same must hold, he argues, for the development of an organism, and as we shall see, Driesch's proposal of entelechy as the principle of unity and order does not simply reassert the organism's unity in the face of Darwinian atomism and historicism. Rather it raises the question of whether Darwinian descent is even intelligible in the absence of this unity and so contains an implicit criticism of the entire Darwinian project of reducing being to history.³²

Such attunement to the metaphysical complexities inherent in basic notions of causality and action made Driesch extraordinarily perceptive of the limits of Darwinian theory as a causal explanation. He recognized that Darwinism was premised upon a counterfactual world and actually explained *that* counterfactual world, in effect, by reifying counterfactual possibilities into actualities.³³

In speaking, of an "explanation" of the origin of the living specific forms by natural selection one therefore confuses the sufficient reason for the non-existence of what is not, with the sufficient reason for the existence of what there is (Driesch 1908a: 262).³⁴

Darwinism lacked the resources to provide a positive explanation of morphogenesis or even heredity itself, Driesch thought, though this deficiency is obscured both by Darwinism's ontological atomism and by the metaphors of "creative force" or "mechanism," which are constantly used by Darwinism to depict natural selection as an agent. These metaphors do the conceptual heavy lifting where adequate physical or metaphysical equipment is lacking, often obscuring unresolved (and unasked) questions.³⁵ According to Moss, the advent of the gene as the solution to the problem of heredity had a similar effect.

As embryologists fractured the cell into nucleus and cytoplasm, so the life sciences fractured into a center and periphery, with genetics becoming the center and with the legacy of developmentally and organizationally oriented biology relegated to the periphery. Philosophically, it will be important to see how many central problems were banished to the margins and yet naively thought to be solved (or almost solved) in the name of the gene (Moss 2004: 31).

Those problems have now returned from the margins. The central problem, stated in metaphysical terms, is whether it is in fact possible in practice to reduce ontological identity to descent and to define species solely in terms of heredity (Webster and Goodwin 1996: 66). Marjorie Grene goes to the heart of this problem.

[T]his view seems to undercut the very starting-point of any biological science, including the theory of evolution. How does one tell which "individuals" (in the everyday sense) are parts of which larger "species-individuals" except by noticing some kind of likeness among some and not others (Grene 1983: 5)?

Driesch extends his claim about the unity of an action to the development of bodies, stating "that the behavior of my body in Nature cannot be understood by a mere combination of single events relating to extensities" (1908b: 284). Webster's denial of the possibility of reducing identity to heredity is reminiscent of Driesch. At stake in this, for Webster no less than for Driesch, is the very nature of temporal events, though it is not clear that Webster himself understands this.

A relation of descent, in strict Darwinian terms, is a relation of spatiotemporal contiguity. But this in itself is not a sufficient condition to establish heredity in its biologically relevant sense. It is insufficient for distinguishing between an offspring and an excretion, for instance. The possibility of making such a distinction presupposes a sort of unity or identity between terms of the relation which is present in the one case and absent in the other. In order to sustain this unity, one must assume some form of "essential" similarity, not in the sense of "simple sensory qualities"—a collection of "essential" traits—universally present in every empirical instance. This sort of essentialism is the by-product of an empiricism bent on denying essentialism.³⁶ What is required is something like a common *nature* which will manifest itself within a range of reasonable material variations under the appropriate internal and external conditions (Webster and Goodwin 1996: 75–80).³⁷

The argument presented here suggests that, in the practical context, there is more to descent than spatio-temporal continuity... We can accept that relations of "descent" (in the qualified sense outlined) may serve to establish that two individual organisms are members or parts

of the *same* species taxon. However, relations (of any kind) between any pairs of individuals cannot serve as the means for establishing the identity of a particular individual—in the sense of establishing to which (named) taxon that individual belongs—without begging the question. For to say that a particular individual is (can be known as being) a horse because it is descended from, is similar to, or even interbreeds with another horse is to presuppose horse and therefore to set up a potentially infinite regress (Putnam 1975 cited in Webster and Goodwin 1996: 46).

Webster therefore argues that “the evolutionary postulate” adds nothing to the traditional definition of homology. Descent, he claims, is assumed and not observed, while similarities are observed and not merely assumed. Thus, the practical definition of homology, the definition at work in taxonomic practice, remains “morphological correspondence.” The point here is not to deny descent. Rather, it is to insist that all postulates of descent necessarily presuppose morphological correspondence and can be “deconstructed” to it. Descent does not supplant morphology. It depends on it.

Here, a deeper scientific and philosophical problem comes into view. Morphological characters, whether in their genesis or their actual existence, are not mere “plastic conglomerates of miscellaneous attributes” or “frozen accidents” (Webster and Goodwin 1996: 68 quoting Bateson 1992).³⁸

There is no such thing as the pentadactyl limb or the crustacean appendage, or the chordate notochord apart from the determining Bauplans of the Vertebrata, the Crustacea and the Chordata respectively (Webster and Goodwin 1996: 49 quoting Woodger 1945: 112).

But we have seen, in Darwin’s example of the webbed footed upland geese, for instance, that Darwinism atomizes the organism in precisely this way, both analytically and ontologically. The result is that

supposedly homologous morphological elements are effectively treated as though they are individuals, analogous to the items of private property which are transmitted from original proprietor to heir in human society and each of which has its proper history (Webster and Goodwin 1996: 66).

Dobzhansky had noted that this tendency to treat morphological traits as individuals was the source of a good deal of biological confusion (1970: 65). Goodwin shows the absurd conclusions which follow from analytically reducing morphological elements to atomic units. He considers the example of a tetrapod limb with five digits, posited as a primitive ancestor for a chick forelimb with four digits.

The Darwinian belief that there is some type of inherited, material continuity of the individual elements that constitute a persisting form, such as the tetrapod limb, results in the view that the elements in the limbs of different species can be named in relation to the original digits (140).

This puts the Darwinian in the dubious position of identifying individual limbs, abstracted from the overall *bauplan* of the organism, as continuous with antecedents of a very different structure from an organism of a different *bauplan*.³⁹ Sir Gavin de

Beer summarizes the devastating consequences. The similarity in fore and hind limbs of any given species, he notes, “is not real homology, as the fore-limb and hind-limb cannot be traced back to any ancestor with a single pair of limbs.” There is evidence, in fact, that fore and hind limbs evolved independently from pectoral and pelvic fins, respectively. We are forced to conclude “that human arms, bats’ wings and the fore limbs of a horse are homologous, but human arms and legs are not.” “This,” Goodwin wryly remarks, “is not a useful result” (1996: 140–141 citing de Beer 1971).

What is required, Webster and Goodwin maintain, is an understanding of homology, and thus nature, irreducible to descent but which follows from the dynamical factors responsible for the production of form across phyla. This is because morphological elements in actual organisms are integrated into complex dynamical wholes that must develop anew and as a whole with each new generation.

[A] species *taxon* is not a continuant, for there is a hiatus between parent and offspring with respect to these empirical properties which constitute particular morphologies. There is no continuity between structures which are homologous in parent and offspring, for these structures are created anew in each individual. It is this hiatus which historical narratives evade or ignore. It is therefore somewhat misleading of Hull to refer to homologous “traits” along with species *taxa* (conceived as populations), organisms and genes as though they were all, ontologically, the same kind of thing and had the same criteria of identity. They are not and do not (Webster and Goodwin 1996: 64–65).

The upshot of these arguments is to say that without an adequate scientific and philosophical understanding of the organism and its nature that is irreducible to descent, descent itself falls into incoherence. And yet Darwinian biology, the chief advocate of descent with modification, precludes such a science and philosophy by reducing ontological identity to history. The gene, whose career has been determined to a great extent by the *a priori* theoretical demands of Darwinism, has thus far proven more hindrance than help in developing such a science and philosophy.⁴⁰ This is particularly true of the “selfish-replicator,” an updated version of the Weismannian germ popularized by Dawkins’ and his disciples, which Moss calls “the quintessence of conflationary confusion.” Dawkins’ viewpoint, Moss maintains, “does not build on the advancing elucidation of molecular biology but rather depends on an enforced ignorance of it” (Moss 2004: 194).

The genetic reductionism of neo-Darwinism, the idea that the gene “builds” its organism, depends upon those metaphors of “information,” “instructions,” and “blueprints” that we noted earlier:

the collection of chromosomes in the fertilized egg constitutes the complete set of instructions for development, determining the timing and details of the formation of the heart, the central nervous system, the immune system, and every other organ and tissue required for life (Delisi 1988: 488–493 cited in Webster and Goodwin 1996: 132).

Progress in molecular biology, however, has all but put this picture to rest. The problems begin even before the discovery in 1953 of the double-helix structure of the “master molecule” with, among other things, Barbara McClintock’s then-controversial discovery of gene transposition and the complex processes of regulation and control

which this implied (Keller 1983: 107–138). The situation has only gotten more complex and mysterious, even as things have clarified, in the decades since. There is no simple correlation of genotype to phenotype, either in a one-to-one, one-to-many, or even an always specifiable many-to-many relation because of the involvement of a variety of regulatory and biochemical factors. Geneticists have even been surprised to discover that there is little apparent correlation between the complexity of an organism and the number of genes that it has.⁴¹ The result has been a continual rethinking of what a gene in fact *is*.⁴²

In a certain sense, now that genes can be isolated and analysed biochemically in great detail by sophisticated methods, our understanding of the gene has become very concrete. At the same time, paradoxically, the concept of the gene seems to have become more general, open, and abstract. The very term gene seems to mean different things in different contexts (Portin 1993: 207).

All of this puts the “informational model” of biological specificity in great peril, such that it can only be rescued by denying that genes are the exclusive repository of biological information or expanding the definition of the gene so that it no longer plays the role that neo-Darwinism assigned to it. “But if they are not developmental genetics, by itself, has no prospect of providing an adequate model of development” (Sarkar 2006: 87).

According to Lenny Moss, this notion of the gene as a “code-script” depends upon the conflation of two of those senses of the gene referred to by Portin. Each is legitimate within certain limited, theoretical contexts, but the two senses are distinct. The first he calls Gene-P (the P stands for preformationist). “To speak of a gene for a phenotype is to speak as if, but *only* as if, it directly determines the phenotype” (Moss 2004: 45). This we do, for instance, when we speak of having a gene for blue eyes or for cystic fibrosis. In the strict sense, says Denis Noble, this way of speaking is always incorrect (2006: 9). Such references, however, do serve “merely as a kind of instrumental shorthand with some predictive utility” (Moss 2004: 45).

The condition for having a gene for blue eyes or a gene for cystic fibrosis does not entail having a specific nucleic acid sequence but rather an ability to predict, within certain contextual limits, the likelihood of some phenotypic trait. What molecular studies have revealed is that these phenotypic differences are not due to the *presence* of two qualitatively different capabilities, but rather to the *absence* of the ability to make the so-called normal protein. Accordingly, there is no specific structure for the gene for white flowers or the gene for blue eyes or the gene for many diseases because there are many structural ways to be *lacking* the usual resource. The white flower, the blue eyes, the albino skin, the cystic fibrosis lung are all highly complex results of what an organism will do in the absence of certain normal molecular structures (2004: 44–45).⁴³

Unlike Gene-P, what Moss calls Gene-D (for developmental resource) *is* defined by its molecular sequence. In and of itself, however, Gene-D is indeterminate with respect to phenotypes which can “supervene”—I use the term advisedly—upon variable genotypic bases. De Beer illustrated this with respect to eyeless mutations in *Drosophila*.

This mutant gene results in the failure of eyes to form, but normal eye morphology returns after several generations as a result of changes in other genes, despite the continuous absence of the *eyeless* gene. So we are forced to conclude that, in general, homology cannot be defined in terms of invariant gene action (Webster and Goodwin 1996: 141).

Moss maintains, therefore, that there is “no preformationist story to be had at this level.”⁴⁴ The underlying causal logic of genetic preformationism, as classically put forward in Jacques Monod’s *Chance and Necessity*, is too simple. Monod postulated a “hierarchy of crystallization processes” comparable to molecular crystallization. He describes a process in which the folding of polypeptide sequences culminates in globular proteins, which interact in turn to build cellular organelles, which then combine to produce tissues and organs. Genetic determination of this kind

requires that the structure generated at each level of the hierarchy be uniquely specified by the properties of the constituents at the lower level, so that any form is causally reducible to the primary protein structure of its constituents and hence to the historically given information of the nucleic acid sequence of DNA (Webster and Goodwin 1996: 132–133).

But Gene-D, Moss contends, is only one of a number of developmental resources whose causal status in any given instance will depend both upon contextual factors in the organism outside the DNA sequence which codetermine morphological development and even upon perspectival factors, in the framing of inquiry, which determine whether the variable in question is viewed as cause or effect.⁴⁵ In other words, “the explanatory story in which Genes-D play a role is not one of preformationism but of epigenesis” (Moss 2004: 48).

As a molecular-level developmental resource, Gene-D is ontologically on the same plane as any number of other biomolecules—proteins, RNA, oligosaccharides, and so forth—which is to say only that it warrants no causal privileging before the fact. Gene-P and Gene-D are distinctly different concepts, with distinctly different conditions of satisfaction for what it means to be a gene. They play distinctly different explanatory roles. There is nothing that is simultaneously both a Gene-D and a Gene-P (2004: 47).⁴⁶

It is beyond my competence and beyond our scope to judge these arguments on their scientific merits. Having shown in Chapter 5 how the ontology of Darwinism logically terminates in the demise of the organism as the subject of its own being and the subject matter of evolutionary biology, our purpose rather has been to give some indication of how this fate works itself out in the subsequent history of evolutionary science. This history is largely characterized by a conflict whose basic contours, Gould has shown, precede and transcend the skirmish between those two brands of natural theology we have discussed in preceding chapters, Darwinism and creationism. The conflict is over whether and to what extent the living organism is to be the subject of its own evolution and the subject of biological science. In response to Darwinism’s impoverished conception of the organism, a resurgent developmental biology has emerged in the hope that the living organism might be restored to its rightful place at the center of biological inquiry. It remains to be seen whether those hopes are warranted.

Genesis and Epigenesis: The Rise of a New Developmentalism

Darwinism's central concept of inheritance is incoherent, not because there is no genealogical relationship between phyla, but because Darwinism lacks and arguably precludes an adequate understanding of the organism. Individual morphological elements "have no persistent identity between species," though this difficulty has often been disguised by the use of common names to denote them, and genotypes do not create their phenotypes. William Bateson, who initiated this line of criticism, held that there was indeed a unity underlying meristic series in diverse species, but that this was a unity of generative process. "So what is now needed," Webster and Goodwin maintain, "is a dynamic definition of homology as generative process, not as final pattern" (1996: 143).⁴⁷

Following in the wake of Driesch, C.H. Waddington, and others, a group of related theories have emerged with just this end in view. This family of theories contains quite diverse members, as we shall see. As Depew and Weber explain, "authors sympathetic to a new evolutionary paradigm often differ among themselves about whether evolutionary causality falls more on the genealogical or ecological side of the hierarchy." They are agreed, however,

that there are autonomous dynamics at work both within and between the ecological and genealogical hierarchies and that significant evolutionary change depends in considerable measure on these dynamics rather than on the weak forms of selective sorting that Darwinians invoke (Depew and Weber 1997: 397).

The search for a theory of the organism, therefore, has become a search for the dynamics analogously at work across different kinds of autocatalytic systems.⁴⁸ Not unlike Aristotelian hypothetical necessity in at least this respect, such dynamics are not *separate* from history in the sense that the historical existence of certain substances and processes are the precondition of their operations, but once these systems have arisen, they are *distinct* from history in the sense that "they express regularities that come from certain invariant properties of their dynamic behavior" (Webster and Goodwin 1996: 152). These dynamic processes transcending phylogenetic divisions and the contingent historical flux from which they originate then become the basis of a new definition of homology (and by implication, ontological identity) irreducible to history:

Homological relationships are then defined by the similarities and differences of generative processes between [e.g.] fins and limbs, independently of lineage, allowing one to construct a rational taxonomy in terms of causal processes and their transformations (1996: 152).⁴⁹

Brian Goodwin, therefore, sets it as his task

to develop a theory of biological form that is based upon whole organisms as dynamically transforming systems that are technically described as fields. These are domains of spatial

order, defined by internal relationships, that change in time according to well-defined principles or rules (Webster and Goodwin 1996: 128).

These fields, he says, are

complex dynamic systems that spontaneously undergo symmetry-breaking cascades: globally ordered initial fields pass through a series of bifurcations to detailed local structure that reflects initial order and results in an organism with coherently organized parts (1996: 130).⁵⁰

To get a better sense of what this means, we must understand what is meant by a “symmetry-breaking cascade.” In essence, the concept of symmetry breaking is used to explain how one gets “order for free,” in Stuart Kauffman’s phrase, from stochastic fluctuations within a complex system. These fluctuations, while infinitesimal, nevertheless bifurcate possibilities within the system (e.g., in pleiotropy or gene regulation), foreclosing some and setting the boundary conditions within which subsequent processes can occur. Kauffman illustrates this concept with the simple example of a pencil miraculously balancing on its eraser end. Prior to its falling, it has what physicists describe as having a full, 360-degree symmetry. No law seems to govern which way the pencil may fall in the absence of intervening forces; however, once it falls in a given direction (e.g., north), it breaks that full 360-degree plane surface and determines subsequent possibilities.

This is a simple example of symmetry breaking, in which the underlying physical symmetry of the plane is not violated, but the broken symmetry creates a new macroscopic condition: a pencil point north, from which other specific broken symmetries may flow (Kauffman 2008: 19).

Cascading broken symmetries, that is, symmetries breaking in “succession” and in multiple “directions” at once due to the large number of components in relation within the system, amount to a more intensive channeling or contracting of possibilities, which can be represented by geometric models called phase spaces.⁵¹ On this basis, it becomes possible to develop dynamical models to simulate the generation of forms, understood in Goodwin’s terms as transformational sets, with the range of possibilities determined by the boundary conditions of the system which are in turn a function of their components. The possibilities determined by these symmetry-breaking cascades can then be conceived for the system as a whole, its components, and subcomponents. In computer simulations, Stuart Kauffman has attempted to model these dynamics as a Boolean network composed of N elements with two possible states (“on” or “off” in the case of gene expression) receiving K inputs from other elements in the system.⁵² Even in a network of 100,000 binary variables and 16 Boolean functions (AND, OR, IF, etc.), at $K=2$, the system settles down into 317 “state cycles,” so-called “attractor states”—roughly the number of cell types in multicellular organisms—which are repeated over and over again, thus ostensibly showing the emergence of a kind of spontaneously generated order.⁵³ The analogical repetition of such dynamical systems, presumably, would help explain the phenomenon of “convergence” that is of such interest to paleontologist Simon Conway Morris, the

fact that homologous structures (analogous in Darwin's sense) have evolved independently numerous times (2003: 106–228).⁵⁴ Proponents of this sort of theory, however, do not stop with the phenomenon of convergence but see vast possibilities for reconceiving the universe itself as a self-organizing system of cascading broken symmetries, with “life” itself as one of its “attractor states” rather than a statistically improbable anomaly (19–21).⁵⁵

Readers familiar with complex systems dynamics will recognize that this is a vastly simplistic summary of the relevant features of that family of theories. And readers familiar with the application of those theories within biology will know that they are amenable to very different stances toward the neo-Darwinian inheritance. Kauffman believes, for instance, that cascading broken symmetries, being stochastic and historically contingent, deepen Darwinian historicism and essentially provide the meta-theoretical dynamical backdrop which it had been seeking all along. Accordingly, Kauffman in his later thought accords natural selection a more central role than do Webster and Goodwin, who stress the fact that dynamical forms which arise in history nevertheless transcend it and are analogically applicable across historically disconnected instances (1993: 218–219).⁵⁶ This is the basis of their revised conception of homology. Kauffman does not dispute this, far from it, but whereas Kauffman sees himself as expanding the Darwinian synthesis even further; Webster and Goodwin, at least on occasion, more or less call for its abandonment.⁵⁷

Both points of view agree that defining the organism itself as a system of cascading broken symmetries hierarchically arranged situates gene action “within the context of a theory of morphogenetic fields embodying organisational principles that themselves impose important constraints on the set of forms that can be generated” (Webster and Goodwin 1996: 128). On this view, at least in Webster and Goodwin's formulation, “there is no fixed set of forms that is named by a genotype”—and thus no grounds for privileging parts of the organism such as DNA over the dynamic whole—“rather, there is a transformation set with respect to short-range order such as denticle band patterns, and long-range order as in mirror-symmetrical phenotypes, together with all their intermediates” (1996: 157). This considerably changes the burden of theory. Now the point, very broadly stated, is

not to identify simply how gene products exert their influence on development, but how any perturbation of epigenesis is likely to enter into the determination of generic features of [an epigenetic] mapping” (182).⁵⁸

When this mapping succeeds in identifying formal dynamic processes occurring across various instances, equivalences are established which

relate structures within single organisms as well as those between different species in terms of the same principles of comparison...The result is that ontogenesis and phylogenesis are completely integrated, the former providing the generative principles for understanding the logical structure, the taxonomic order, of the latter (192).

Complex systems theory of the sort variously represented by Kauffman, Webster, and Goodwin is self-avowedly antireductionist in a certain sense. “[I]ts basic unit is not a

gene but rather a cell-state defined in terms of which genes are turned on and which are turned off" (Moss 2004: 102). The random fluctuations among various factors within the overall system are sufficient to secure against determinism, on the one hand, and to ensure that the "emergent" levels of order have a certain autonomy, and thus a degree of irreducibility, with respect to lower levels, on the other. We addressed the prospect of reductionist forms of antireductionism in Chapter 5. While I am willing to concede that these theories are antireductionist in the sense of being antideterministic, and thus in denying a strict equivalence between so-called higher and lower level descriptions, I am unwilling to concede that they are antireductionist in the sense of being ontologically adequate to the reality of the objects they purport to describe.⁵⁹ We may put this unease in the form of a question: Is this relocation of "nature" to the level of dynamics, a sort of epigenetic formalism distinct from the organisms that are actually epigenetically manifest, sufficient to achieve Webster's and Goodwin's stated goal of recovering the organism? Depew and Weber, though they are generally effusive about the prospect of Kauffman's dynamical computations providing a new baseline for assessing the effects of natural selection, nevertheless concede that "calling strings and arrays of symbols 'genes'...and the combinatorial dynamical behavior induced by the relevant rules 'gene regulation' is not enough to turn this into real biology" (1997: 432).⁶⁰ Lenny Moss's assessment, at least where Kauffman is concerned, is less sanguine.

In modeling the cell-organism as a complex genetic regulatory system, Kauffman, somewhat ironically, contributes to the attempt to make the real (extragenomic) complexity of life disappear. Now surely Kauffman's model is militantly anti-genetic-reductionist in the sense that its basic unity is not a gene but rather a cell-state defined in terms of which genes are turned on and which are turned off. While the activation state of a cell's genome is considerably less reductionist than merely a focus on individual genes, the identification of the phenotype with the state of its genome—and by extension the identification of the phenotype of an organism with the genetic regulatory state of all its cells—is insidiously seductive and patently false. While the activation state of a cell's genes is inseparable from its phenotype, it by no means uniquely determines a phenotype...A pattern of gene expression, no less than individual gene expression, is only meaningful in the context of multilayered levels of organization, structure, and dynamics which are in no way reducible to patterns of gene expression (Moss 2004: 102).⁶¹

In order to proceed "as if the cell were constituted by 100,000 binary units" each receiving "input from only two other components," one must "distinguish between a great number of gene-input candidates and find some criteria by which most of these may be bracketed out and treated as if they were only background conditions" (103–104). Yet, this is not how cells and their organisms *actually* exist.

[T]he meaningfulness of any gene depends upon the complex organizational structures and compartmentalization of the cell, which determines where the protein will be located and how it will be covalently and noncovalently modified (104).

Kauffman must factor these out as genetic inputs. To factor in even the most proximate "antecedent determinants" of a gene such as proliferation

is to embark quickly on an explanatory regress in which increasingly many contingent features of cellular organization—surface-receptor binding status, the phosphorylation states of cell-surface receptors and signaling intermediaries, the presence or absence of a host of transcriptionally active effectors, as well as others—come into play (Moss 2004: 106).

Moss therefore rejects Kauffman's "global view," which begins "with formalisms at a far remove from empirical particulars," and instead provisionally casts his lot with a family of theories that seek to conceptualize the role of self-sustaining dynamics by building up "from small-scale regional processes," thus maintaining contact with "empirical wet biology" (2004: 107). This family of theories is known as Developmental Systems Theory (DST).

DST, according to its chief protagonists, is an attempt to do justice to the depth and complexity of the actual world by doing biology without the customary dichotomies between nature and nurture, genes and environment, and biology and culture (Oyama, Griffiths, and Gray 2001: 1). According to these theorists, all such dichotomies "rely on a distinction between privileged essential causes and merely supporting or interfering causes," an objection with affinities to Moss's criticism of Stuart Kauffman (Oyama, Griffiths, and Gray 2001: 1).⁶² Susan Oyama, whose 1985 *The Ontogeny of Information* is a seminal text for DST, maintains that this distinction is premised upon the tendency to separate form from matter, which is the unfortunate legacy of our Western philosophical and religious tradition (1985: 1, 10–23, 76–83).⁶³ This legacy lives on, she argues, in the prevalent notion of "genetic information," and it makes little difference whether the information metaphor is employed in a preformationist or epigenetic sense, or one of the many synthetic hybrids of the two.

Denying "that information can preexist the processes that give rise to it," and insisting that these processes, *in situ*, are concurrent at different levels, Oyama rejects the very notion of information. This is because the metaphor has as its counterpart inert matter or some other accidental background noise that is not information. She maintains that this conceptual framework frequently entices scientists across the full spectrum of evolutionary thought subtly to contradict their own observations. For instance, she notes how Jacques Monod asserts that the genome "entirely defines" protein function while at the same time admitting that the protein's three-dimensional structure has a "data content that is richer than the direct contribution made to the protein structure by the genome." Monod admits "initial conditions" within "the items of information finally enclosed in globular structure," but nevertheless insulates these conditions from the informational purity of the genome by denying that they specify it in any way (1974: 94). "But if initial conditions selected one folded structure among many possible ones," she replies, "they *do* specify it, in cooperation with the linear structure. The particular globular shape results only when particular chains fold under particular conditions" (Oyama 1985: 27).

This deep mutual codetermination of internal and external factors blurs their boundaries at every level of their "interaction"—another term with which Oyama expresses dissatisfaction—from the intracellular level to the engagement of the organism and its environs. None of this, Oyama insists, is to deny differences in the way these factors may exercise causality under certain conditions; it is simply to insist that no causality is

ever exercised outside of those conditions. “Causation is multiply contingent, and influences both select each other and determine each other’s effects” (Oyama 1985: 21). This alters the basic extrinsicism between organism and world—and between acquired and inherited form—that has been so fundamental to Darwinism. “Just as there are no preexisting representations or instructions that shape organisms from within, there are no preexisting niches or environmental problems that shape populations from without” (Oyama, Griffiths and Gray 2001: 6).⁶⁴

Oyama and the other developmental systems theorists thus concentrate their attention not on form understood as information that precedes, shapes, or imposes itself on inert matter but on systems of development comprised simultaneously of organisms and their worlds and on the *processes* of form production, processes undertaken at different levels simultaneously by matter itself, conceived as active, reactive, and self-organizing.⁶⁵ There is thus some affinity between developmental systems theorists and new structural morphologists such as Webster and Goodwin, though Oyama at least takes issue with their emphasis on “necessary and universal forms” (1985: 119). Nature, to the extent the word still applies, refers not to “an a priori mold in which reality is cast” but to *processes* that never exist outside of “ecological embeddedness” (76–81, 123–132).⁶⁶ “Development thus proceeds in ‘cascades’ of sequential inductions and ‘networks’ of multiple influences on a given induction” (130). But these networks are always historical; indeed at times they seem scarcely distinguishable from history itself:

The developmental system...does not have a final form, encoded before its starting point and realized at maturity. It has, if one focuses finely enough, as many forms as time has segments (23).

The claim of DST to be more adequate to the reality of organic life is therefore identical to its claim to represent a more absolute historicism. Whether reality thus conceived is adequate to the life of actual organisms, and whether, therefore, it is historical *enough*, is another question.

On Practicing Metaphysics Without a License

The brief sketch of some of the main currents in post-Darwinian biology is somewhat impressionistic. I readily concede that I have omitted a great number of important luminaries as well as countervailing influences within this tradition, and I am quite aware that no one, including Dawkins—his occasionally purple prose notwithstanding—*simply* holds that genes make organisms.⁶⁷ This is somewhat beside the point, however, if Oyama is correct in arguing that the evermore complex debate between preformationists and epigenesists—not to mention their “interactionist” truce—simply obscures the more basic ontological commitments held in common by each side. These commitments structure the formulation of inquiry and the setting of boundary conditions. They go a long way toward determining what counts as empirical data in the first place, and they often lead scientists to contradict themselves in different contexts.⁶⁸ Our purpose is not to judge these competing perspectives on *scientific* grounds, but to consider them in their metaphysical meaning.

Darwinism, we have argued, is preeminent among modern attempts to eliminate the distinction between the order of being and the order of history and to reduce the former to the latter. The difficulty, if not the impossibility, of this effort is demonstrated by the persistence with which the tradition has smuggled back into its deliberations forms of ontological identity irreducible to history. We saw this, for instance, in the “deconstruction” of descent into morphological correspondence. The “rational morphology” advanced by Webster, Goodwin, and others represents not simply a scientific alternative to this effort but a metaphysical alternative, though they would no doubt be reluctant to view it that way. The assertion of a dynamics of form production analogously applicable across historical instances is tantamount, philosophically speaking, to the assertion of an order of being distinct in some sense from the order of history, though to point this out is as yet to say nothing about *how* these orders may be distinct, either in these theories or in reality. The Darwinians and the rational morphologists each attempt to specify in an overarching way the relation between being and becoming. Each, therefore, practices metaphysics under another name, in other words, whatever the scientific tenability of their theories. The same is true of DST’s historicism, its vehement rejection of “preexistent” form, and its reconception of the organism as an “autocatalytic dissipative system” of a piece with the broader developmental system in which it is at home and which it helps to constitute.⁶⁹ Oyama’s call for a root-and-branch transformation of the basic concepts which mediate biological theorizing, in fact, is an inadvertent admission of the inexorable metaphysical dimension of biology, though the inadvertency serves to conceal this fact and to absolve her of a more rigorous philosophical scrutiny of her own basic metaphysical concepts, thus preserving biology’s standing as first philosophy.

As a result of its ambitions to first philosophy and its pretensions to have dispensed with the need for metaphysics, science inevitably exempts itself from its own field of inquiry. Contrary to Oyama’s thesis, it is *this* structural feature of scientific inquiry, and not the unfortunate Platonic and Aristotelian legacy, which perpetuates science’s peculiar appropriation of the subject–object division. (As we shall see, hers is a dubious reading of this legacy.) Yet, science is a human activity circumscribed within the order of being, and its form and conclusions are always mediated by the structural exigencies of being, thought, and action. As Maurice Blondel puts it in his 1893 dissertation, *L’Action*, “The positive sciences...are only the subalternate expression of an activity that envelops, sustains, and overflows them” (1984: 92–93).⁷⁰ We may, therefore, ask what these proposals amount to in metaphysical terms, whether the metaphysics variously instantiated by these theories is adequate to the goal of at least some of these theorists of returning the organism to the center of biology, and whether the metaphysics putatively affirmed in these theories is consistent with the metaphysical exigencies affirmed in action as such. We may find that we need an even more radical revision of basic concepts than Oyama has in mind.

The sciences always harbor tacit metaphysical judgments in their basic units of analysis. This is one way in which the sciences are constitutively related to metaphysics as a matter of epistemic necessity. Yet, scientific *practice*, we have maintained, continually affirms the transcendent form that it theoretically denies, and this holds as a matter of *ontological* necessity. To say this is to say further that the sciences necessarily (and thus always) presuppose and affirm a transcendent unity that

accounts for the identity and knowability of their objects, a unity which cannot be accommodated from within the ontology at the root of modern sciences. Blondel, elaborating further on the activity that “envelops, sustains, and overflows” the sciences, makes a similar point.

The positive sciences subsist only thanks to a permanent postulate. They have a continual need to admit that the intelligible or organic systems they consider are distinct from the elements they are formed of, and that synthesis and analysis are not reciprocal. For, as we saw, not knowing the whole of anything, we would not know anything of the whole if in the given phenomenon there were only a mechanical complex, and if the synthesis, constructed a priori or observed a posteriori, were not a distinct whole and a new unity. This is to say that in every scientific truth and in every known reality we must suppose, for it to be known, an internal principle of unity, a center of grouping imperceptible to the senses or to the mathematical imagination, an operation immanent to the diversity of the parts, an organic ideal, an original action that escapes positive knowledge and the moment it makes it possible... (Blondel 1984: 94).

This unity of which Blondel speaks, which encompasses both sides of the subject–object divide, is not an empirical datum but is the precondition for the apprehension of all empirical data, which, as we shall see, presents difficulties for conceiving of this unity merely as an “emergent property,” however well emergence theory may describe the order of development. This principle of unity, therefore, is not an object of science but its condition of possibility, recapitulated throughout the scientific endeavor and evidenced by the intractability of the subject–predicate form. To opt for a systemic or process-centered view of the organism over an entitative, one merely relocates the difficulty to a different plane, since the very identification of a system or process, much less its deployment as any sort of explanation, involves the analytic recognition of a unity distinct from the universe and transcending the historical flux. The attempt simply shows that the unity of “substance” and the actuality of historical becoming have been set in *a priori* opposition.⁷¹ But how, then, are we to account for the abiding unity of the organism and its contingent development in the course of its *actual* history? As Brian Goodwin puts it, “If organisms are fundamental biological entities... then there must be a systematic way of describing them as dynamically stable wholes that undergo particular types of transformation” (Webster and Goodwin 1996: 193). This is not just a question of dynamic stability but of ontological identity, even where one attempts reductively to equate unity with dynamic stability. In other words, the question of the unity of an organism is never *just* a question of dynamics, and the scientist who undertakes to account for it is never just a scientist but a philosopher who implicates himself or herself in adjudicating metaphysical principles of a most fundamental nature.

Webster, Goodwin, and Moss trace their own developmentalism in part to the work of Hans Driesch. Driesch is attractive to these later thinkers because of his call for a rational morphology based on his conception of the organism as a “harmonious equipotential system.” This is a notion with interesting dynamical implications and one factor which led him to assert that form production was irreducible either to physics or inheritance, a key warrant for claiming the autonomy of rational morphology as a science (Driesch 1908a: 118–134). Though Webster and Goodwin acknowledge

a profound intellectual debt to these aspects of Driesch's thought, they are clearly uncomfortable with his central concept of entelechy. While it may perhaps be an acceptable metaphysical postulate, "it cannot, by definition be an object of scientific knowledge since it is not an object of nature" (Webster and Goodwin 1996: 98).

Webster and Goodwin are correct in a certain sense; Driesch himself is quite insistent that entelechies are not spatially extended objects. But it also begs the question since it is precisely the meaning of "objects" and "nature" that is at issue. And it fails to take seriously why entelechy is necessary for Driesch's conception of an organic "system." While I hold no particular brief for Driesch as a biologist, his attempt to give a philosophical account of the organism consonant with the best science of his day is instructive and opens a window onto the metaphysical question of the organism's unity. This question is frequently obscured by the ontological commitments of the sciences, which prevent it from being properly raised. Driesch's concept of entelechy sheds light on the true nature and depth of the question itself. The principal issue is not simply whether the order and unity characteristic of organisms can arise "for free" in the course of contingent history but the very meaning of order, unity, and history as such.

We noted previously Driesch's argument, which extends analogously to organisms, that action must be a whole and not a sum. Its intelligibility cannot be derived from the mere contiguity of spatial and temporal "extensities" alone. It is important to be clear about what this means. This argument is not a denial that order can arise "for free" from random movements of matter, as if what were needed (and what entelechy supplied) were a motor cause spatially or temporally anterior to these movements. It is rather that wherever one "sees" order in spatial extension and temporal sequence—particularly organic order—one sees relations that are already more than spatial extension and temporal sequence.⁷² Driesch develops this argument from both an "interior" and "exterior" vantage in order to establish among the elements of givenness forms of order which are not merely extensive, and thus numerically divisible, but *intensive*. This is crucial, as we shall see; for unless and until one has accounted for both perspectives, one has not dealt with precisely what is peculiar about the phenomenon of life. Precisely because this intensive order is not a quantum and not spatiotemporally divisible, it confers upon the organism a unity or wholeness—not unlike Aquinas' *ens indivisum*—that is just so far simple and thus ontologically anterior to a unity of either aggregation or organization.⁷³ Without this simple unity, the organism's very extensivity as a temporally distended ordered aggregate and a subject of action would be unintelligible.⁷⁴ It is not finally possible to describe the organism's contingent development from one historical moment to the next as the development *of the organism* unless the organism has an indivisible actuality, and thus an abiding unity, that transcends this sequence. Even less is it possible to describe an organism's activity without this transcendent unity, since actions are distinguished from mere events by this very transcendence, by the fact that they possess a unity that spans spatial and temporal distance in virtue of which we are able to say that one instance in the series occurs "for the sake of" the next.⁷⁵ This implies that for Driesch, as for Blondel, this unity must be tacitly invoked even where it is theoretically denied.

We therefore propose to give the name intensive manifoldness to all kinds of entelechies or psychoids: there is, in fact, something "manifold" in them, but the elements of the

manifoldness are neither beside the other in space nor after the other in time. We may say that entelechy is manifold in thought but simple as a natural agent (Driesch 1908b: 138).

Entelechy confers upon the organism a wholeness that is distinct from the unity of an aggregate, a unity presupposed in any analytical or mechanical treatment of the organism but invisible to mechanical analysis. “There is nothing like ‘wholeness’ in any mechanical system except in a purely formal geometrical sense,” Driesch says.

On the contrary, it is the chief characteristic of an energetic or mechanical system that every event occurring in it is independent of the whole, and only dependent on its immediate conditions and cause (1908b: 289).

Oyama, who is distrustful of any priority of wholes over their parts—and indeed of “woolly holism” of all kinds—might well take exception to this last point. Indeed, sometimes her notion of a developmental system seems expansive enough to include the whole of time.⁷⁶ But the dependence or independence of the components of a system, while crucially important in distinguishing the animate from the artificial and as an indication of the depth of integration proper to a given system is, nevertheless, a secondary issue with respect to the kind of unity in question here.

The crucial point in distinguishing the intensive manifold from the extensivities of space and time is to distinguish a kind of unity, what in Aristotelian or Thomist terms we might call “act-fullness,” that is indivisible with respect to both extension and duration. Indeed insofar as the unity of act-fullness is the very being (*esse*) of the living thing, it can only be “defined” in this negative mode.⁷⁷ (Being is not an *ens* and, thus, has no definition; it can only be seen in its effects.) “Unity is in-division, un-fragmentation, un-brokenness (notice the negative force of the “un-” and the “in-”s) without which nothing can exist, or continue to exist, as what it is” (Walker, A. “Autour de l’unité du vivant,” an unpublished lecture). This is the source of its mysterious “sake.” “Simply by virtue of its membership in a species, an organism is given an intrinsic *conatus* towards the maintenance of its indivision” (Walker, A. “Autour de l’unité du vivant,” an unpublished lecture). This, we saw, is the unexplained premise of the “struggle for existence,” and it fundamentally distinguishes the being and unity of an organism from that of a mechanical or energetical system, though an organism obviously manifests its being in mechanical and energetical ways.

Though a typical machine-like constellation of agents, different in its arrangement along the three axes of space, cannot be divided and remain whole at the same time, yet there exists in the living organism a something which does show these two incompatible characters (Driesch 1908b: 257).

There is no *a priori* opposition here between an abiding actuality and historical development. To the contrary, it is precisely this “supratemporal” unity indivisible by duration and extension that makes the organism not just the *product* but the *subject* of its own development, thus making it possible to predicate a developmental history as the history *of* the organism in question, a history that is fully implicated, as Oyama would surely agree, in its every action.⁷⁸

The self-transcending unity of the organism denoted by entelechy is closely related to another of life's essential characteristics in its distinction from the inanimate, and that is the quality of inwardness.⁷⁹ Driesch signals this association by referring to entelechy as an *intensive* manifold, and it is absolutely integral to *action* understood "as a whole and not as a sum." As we saw, action is not just a sequence of contiguous instances but has a unity of form that spans spatial and temporal distances. The capacity for action presupposes, in turn, a being whose horizon extends beyond its point identity at any moment. In higher animals especially, this inwardness is experienced and felt to a certain degree; in human beings, who are at once more deeply integrated and more distinct from their world, it becomes an object of reflection and contemplation. Yet, Hans Jonas (following Aristotle) maintains that inwardness is incipient in metabolism as such, through which even the bacterium transcends its point identity by relating "appetitively" to its world. The greater the capacity to perceive that world and the longer the distance interposed between urge and attainment, the greater the organism's capacity to transcend itself in its relation to the world, the more intricate its organization is likely to be.

It is crucial that we be willing to suspend the mechanistic ontological assumptions which make possible the reduction of being to history if we are to understand these points. And to suspend these assumptions, we will have to go even further beyond what Driesch himself, in his ontological reticence, is willing to say. We have maintained that the ontology of modern science is premised above all upon the reduction of being from *actus* to *factum*. With this reduction, matter ceases to be regarded as potency for form—which is now accorded no ontological status at all—and becomes fully actual in its own right prior to and apart from form, which now follows "accidentally" from it. The essential characteristic of modern matter, then, whether conceived as extension, mass, or energy, is *exteriority*. Matter, as fully exterior to itself, is not receptivity *to* form as potency to act, but *excludes* form as one body excludes another in space. (Contrary to Oyama's weak philosophical history, this impenetrable facticity has little to do with inertia, which is the effect rather than the cause of this understanding.) And this essential exteriority remains even after matter ceases to be identified simply with extension and after its atoms or corpuscles cease to be indivisible. With the notion of act and its correlative notion of potency go just those notions of unity and interiority implied by Driesch's conception of an "intensive manifold." The inwardness that distinguished living things from artifacts becomes all but invisible to the eyes of biology.

This objectification of matter appears to be antianthropomorphic, but really the reverse is true. For now matter comes to be defined in terms of its transparency to our intellects and our instruments; measurability, as we have seen, belongs to its very essence. The implications of this ontology in its crudest form are quite familiar: the only "real" entities must be measurable quanta. Yet, to see the obstacle to understanding that this ontology places in our paths, we must see how it transforms the primitive meaning of form and time.

When reality is devoid of actuality and interiority, everything, including form and time, comes to be conceived in exteriorized, spatial terms. Form is reduced to a spatial distribution of elements, something closer to *morphē* than *eidōs*. It becomes a "thing" which either "produces" that distribution in the manner of a motor cause or

is “produced” by it. In either case, it is regarded as identical to that distribution, which is why DST theorists and developmental morphologists both can speak unreflectively about “form production.”⁸⁰ Time is then conceived as a linear sequence of infinitely divisible moments—time segments, in Oyama’s phrase—units of duration of measurable *extent*. Just as the “essence” of matter is now effectively equated with its measurability (and changes just insofar as our instruments and capacities for measurement change), so we might say that the “essence” of time is equated with the measurement of time (de Koninck 1960: 65–69). It is easy to see why Oyama and others, starting from these assumptions, would reject the notion of “preexistent” much less “eternal” form. For what could the “pre” in “preexistent form” even refer to in these terms except some sort of subsistent thing anterior in space or in the temporal sequence? And what could “eternal form” mean except such a thing enduring for a very long time? Oyama is right to criticize these notions and right to criticize the “genetic Platonists” insofar as they are guilty of such conceptions. But this is not what either Driesch or the Platonic–Aristotelian tradition has meant by form. This is not what form *is*.

Oyama misrepresents Aristotelian hylomorphism, confusing it with later mechanistic conceptions of artifice such as we saw in Paley. Presumably, she does so for the same reason that she conceives of time as a linear series of instants of measurable extent: her positivist conception of matter prevents her from seeing that the form–matter relation as it was traditionally understood is fundamentally an act–potency relation. This is ironic, given that she seems to be groping for an adequate notion of actuality with her insistence upon dynamic process and ecological embeddedness. This act–potency relation structures the Aristotelian understanding of time as well. The “now” for Aristotle is not an infinitely divisible slice of a linear continuum or a “time segment” comparable to an isolated unit of rectilinear motion. (Both of these presuppose the reduction of act to facticity.) Rather, it is an indivisible actuality, a boundary, if you will, by which the reality of being distinguishes a nonexistent past from a nonexistent future.⁸¹ It is this replete act-fullness and not the spatializing concepts of extent of duration that is for Aristotle both the defining “characteristic” of eternity and substance alike. To *be* actual at all is to be indivisible and, thus, to be a whole to just that extent. And it is to be implicated at one and the same time in the single actuality of the world. This is not a static concept of being opposed to the dynamic actuality of becoming. To the contrary, the *energeia* of being is the precondition for the *dunamis* of becoming and the “context” in which it occurs.

The conception of being implied by Driesch’s distinction between entelechy as an indivisible intensive manifold and an extensive manifold infinitely divisible by extent and duration is like this. The notion of being tacitly presupposed here is not inversely but *proportionally* related to historical becoming and spatial extension by virtue of its very distinction from them. This is what Driesch means when he describes entelechy not as “acting in space,” since it lacks a spatial nature, but “acting *into* space” or as “acting manifoldly without being itself manifold in space or intensity” (1908b: 250, 258). It is why entelechy cannot have a “seat,” in the genes or anywhere else, and why it makes no sense to describe form or entelechy as either “preexistent” or “emergent”: form itself is not a subsistent thing, and neither “pre” nor “post” applies to it (258–259). As Aristotle might put it, it is not *form* which emerges but *things* which emerge into being according to distinct forms.

The priority which form enjoys over matter is not a spatial, temporal, or energetic priority but an *ontological* priority, though an ontology which only recognizes spatial extension, temporal succession, and motor causality quantified in force or energy has no more way of acknowledging this priority than it has of acknowledging the interiority of living things. This ontological priority does not mean that form must be imposed on inert matter, as Oyama would have it, much less does it require an agent to do the imposing, whether in the form of an extrinsic designer God or a “central directing agency” enclosed within the genes. To the contrary, form’s ontological priority over matter is an *asymmetrical* polarity. To suggest as Driesch does that entelechy has no spatial extent or temporal duration is to suggest that it has no subsistence apart from matter, apart from the things determined by it. Thus, while form exercises an absolute priority over matter, matter exercises a relative priority over form. At a minimum, this absolute priority denotes the fact that there is no actual matter, even elemental matter or energy, which is not always already informed, always already a something.

Far from abstracting from actuality and history, entelechy thus implies a deeper immersion in them. For every attempt to get “order for free,” to accord what is incidental ontological priority over what, in Aristotle’s phrase, exists *per se*, will be belied by the fact that the elements in question in any *actual* system will be determinate entities of some kind. At a maximum, the priority of form implies that there can only ever *be* a distribution of elements within a system to the extent that the system possesses a unity and an actuality which allows it to transcend its point identity at any given instant, though “system” is an equivocal term, and there are obviously distinctions to be drawn between, say, an “extensive system” such as a climate and the “intensive system” that is the organism.⁸² An organism, which has—or *is*—a *sake*, has an “inside” that cannot simply be identified with the extensive arrangement and operation of its parts. For this reason, we have suggested, an organism exists as an indivisible unity from the very first. This is what it is for it to *be* this and to be *this*, and it is the basis for our ascribing its subsequent development to the organism itself. The organism’s unity, then, transcends its point identity at any given moment in its development and is thus irreducible to the systematic arrangement of its parts, dependent though the organism is on that arrangement. Because the unity given with its being is transcendent, it cannot simply be “emergent,” though this is not to deny that the organism’s development is an emergent phenomenon. With its current ontological assumptions, “emergence” merely recapitulates the accidental relation of form to matter characteristic of mechanism, thus effacing the difference between an organism and an artifact. Rather, the organism must be understood as a source and not merely the outcome of that arrangement. We tacitly acknowledge this when we speak in epigenetic terms and say that an organism “regulates” or “interprets” its DNA sequence or that it “deploys” its potential use in multiple ways (Moss 2005: 358).⁸³ But giving a principled account of this way of speaking requires us to acknowledge a unity and interiority invisible to the ontology of the sciences and therefore an order of being distinct, though not separate, from the historical order. Redefining organisms as processes, or as bounded systems within broader processes, merely reinforces this problem in the name of circumventing it by threatening to dissolve the organism’s being into an ocean of becoming and relocating the question of unity to

the system level. For we have seen that systems and processes can only be distinguished from everything else because they are regarded as having a determinate unity.

It is the organism's self-transcending and, thus, "supratemporal" unity that allows us to predicate the developmental changes to an organism over the course of its history as changes *of* the organism. Only its indivisible unity and its incommunicable interiority permit us to regard the organism as the subject of its own being and operations, in other words, as a *substance* in the traditional sense: a thing that stands in its own being. Without an adequate account of the unity and interiority of the organism, one can hardly be expected to give an adequate account of the depth of its integration or those seemingly teleological features whereby various systems and subsystems develop and maintain themselves in light of each other and for the good of the whole. Much less can we expect an adequate account of the lived lives of organisms as centers of dramatic action and "intention" extended across spatial and temporal distances. Without a rational account of the unity and interiority of organisms, their lived lives are destined to remain in the epiphenomenal realm of "folk biology." We shall not have succeeded, therefore, in overcoming reductionism; nor shall we have succeeded in restoring the organism to the center of biology. For we will have not yet accounted for the distinctive qualities of *being alive* that distinguish animate creatures from other "self-organizing" systems, qualities which we cannot help but know firsthand, as it were, from our own elementary experience.

If, as Oyama suggests, there are indeed as many forms as there are time segments, and if time is indeed a linear continuum of segments called instants, then on what grounds can we say that the organism early in its life is the same organism at the end of its life? How can we ascribe a history to this particular being? It is no answer to say that something of its past is carried over into its future; it is the status of the "it," which transcends past and future in our very formulation of this answer, that is in question. Depew and Weber define the organism as an "autocatalytic dissipative system," distinguished from other such self-organizing systems by the fact that it is "bounded and informed" (2001: 245). In so doing, they hope to appeal to the advocates of DST who regard organisms as processes and to retain a conception of the organism that is just "entitative enough" to give natural selection something to work on, thus salvaging Darwinism as the overarching framework of evolutionary thought. Such a definition has the obvious benefit of acknowledging that the organism is constituted in a dynamic relation to the various systems that comprise its world, and any adequate understanding of the organism must account for this important point. Yet, it is unclear how their reintroduction of the "information" banished by Oyama addresses all those questions raised by Moss's and Oyama's critique of this notion or how "boundedness" *per se* marks an improvement in our understanding of those distinctive phenomenal differences between the organic and the inorganic which we have already noted. And so we may ask whether the organism thus conceived is the *subject* of its operations or whether the organism is simply identical to its operations. Is the self-maintenance, the *conatus*, given to the organism at the moment it receives its life something that the organism does? Or are these operations merely autonomous processes which produce the organism as an epiphenomenon, at some later, unspecifiable point?

Webster and Goodwin, for their part, evince a deeper awareness of this problem. Their definition of the organism as a morphogenetic field, constituted by "initial

boundary conditions and parameter values” for determining the range of subsequent transformation sequences is in part an attempt to account for the “primary unity” within which the “spontaneously generated differences” of development occur. “The unity,” they say, “persists throughout the generative process and into the form that we recognize as a mature organism of a particular species” (Webster and Goodwin 1996: 193). I do not wish to contest their account of how genes act by “stabilizing sets of trajectories in a quantized dynamic system that leads to specific patterns of cell differentiation”; nor do I wish to contest that those developmental sequences occur in the ways that they and other scientists say they do (1996: 194). These are empirical and scientific questions that lie beyond my capabilities, and our problem, at any rate, is not an empirical or scientific problem but a problem with the metaphysics determining the relevant empirical data and their interpretation. Their description of the organism’s development as emerging “from the interaction of spontaneously generated differences that give rise to parts within a primary unity” contains a central ambiguity that bears directly on this problem. Setting aside the thicket of questions surrounding the meaning of spontaneity, we may ask whether the “spontaneously generated differences” simply *give rise* to the unity or whether they occur within it.⁸⁴ Perhaps this unity follows from the “boundary conditions” and “parameter values” established by the initial spontaneities. This would provide the warrant for identifying homologies with similar generative processes occurring across phyla. But it is difficult to see how these conditions are sufficient to sustain the unity and identity of the organism through the proliferation of these interactions as they occur across time, particularly if, as Oyama suggests, the boundary conditions themselves vary with these interactions. And if the unity of the organism is simply produced as a result of “the interaction of spontaneously generated differences,” if this unity is consequent upon those interactions and extrinsic to them, then it raises once again these questions: At what point does the organism cease to be the *product* of these interactions and become their *subject*? And how can we account for the depth of organic integration, the fact that the organism appears to be both cause and effect of itself with its parts existing “by means of each other,” unless the organism is the subject of its operations and unless these interactions do not simply produce the organism but are an achievement *of* the organism? If, on the other hand, these “spontaneously generated differences” occur within the primary unity of the organism, then developmental biology owes us a more explicit account of the ontology that warrants such a claim.

Every spring my family is visited by a pair of robins, who build their nest in one of the half-dozen or so trees adjacent to our suburban home. We take great joy in watching them. I have never caught them in the act of building their nest, which seems as if it happens miraculously overnight, but part of the fun is discovering where the nest is hidden when the robins first make their appearance. Once the nest is complete and the eggs are laid, the female, so far as I can see, rarely if ever leaves them. The pace of activity picks up once the eggs are hatched and the hungry little birds begin to poke their beaks above the rim of the nest, rapidly opening and closing them in anticipation of being fed by their mother. The male stands guard from a remote perch, or so it seems, as the female shuttles back and forth to the ground, fetching worms or insects. Sometimes as the female is dropping her catch into the mouth of one of the little birds, the male will abandon his post, drop down, and

retrieve a worm himself. I have seen the female huddled down over the nest, with wings spread like a canopy, trying to protect her young from a raging thunderstorm as the branch flips to and fro violently in the wind. I have seen her hopping along the back fence, chirping with apparent fury when one of my little boys approaches, as one of the young birds, having left the nest for the first time, skirts along the ground struggling to fly.

Life matters to these robins, not just their own but their offspring's. What is this? How are we to understand it? What does it *mean* to understand it? It is no explanation to say that such activities have been "selected for," other than to say that birds who took no provision for themselves and their young have left no record. To say that robins possess "genes for" building nests or working cooperatively may serve to specify some feature of the robin's biology without which they could not live or perform these activities—and in this, genes are essentially no different from eyes or wings or innumerable biochemical factors—but it explains neither the "how" nor the "why" of this essential characteristic of the robin's life. To say that robins undertake so great and arduous a labor to perpetuate their genes is hardly an advance upon Aristotle saying that living things pursue their share in the eternal and the divine in the manner allotted to them, not numerically but specifically (*De Anima*, 415b5ff). In some ways it says less than Aristotle, since at least he could say why immortality was desirable. To say that genes use robins to perpetuate themselves is not to explain or even redescribe the fact of the robins' life, but to do away with it. Our understanding is not furthered by altering our definition of the robin, from an artifact of its genes but as an "auto-catalytic dissipative system which is bounded and informed."

The lack of interest in such questions by evolutionary biology is an indication of how far it remains from restoring the organism to the center of the evolutionary drama. We should nevertheless regard the movement to recover the organism as a salutary response to the scientific and ontological deficiencies endemic to orthodox Darwinism and neo-Darwinism and to the inexhaustible depth and complexity of the biological world—a world in which robins really do tend to their young and human beings really do contemplate them. The "emergentism" of contemporary developmental biology is an acknowledgment of this depth and complexity, an acknowledgment that organisms are indeed more than evolutionary biology heretofore has made of them, as well as a significant step toward overcoming the ontological atomism and "stilling of the world" inherent in a mechanistic ontology. It is tempting to call it a response to the "catholicity" of reality, which propels biology beyond the debilitating confines of its own ontology. And yet, emergentism remains a form of mechanism—albeit one transformed by a more sophisticated conception of systems dynamics—trapped within the conflation of nature and artifice and unable to account adequately either for the unity and interiority of living things or for our experience of them and of being alive. We may therefore conclude that the *metaphysical* history of modern biology and its "zeal to avoid supernatural explanations"—a zeal born from modern biology's own theological origins—have left biology without the metaphysical equipment to say what it wants to say, indeed to say what, to some degree, it cannot help but say. And it has left biology with a theoretical apparatus that remains inadequate to the phenomenon of life.

I have studiously avoided any mention of creation in this chapter. I have done this both because I wanted to show how the implications of Darwinian metaphysics work

themselves out in the history of evolutionary science and because I know that the ontological and theological assumptions inherent in this science would cause any such reference to be treated with immediate suspicion as a “supernatural explanation” for the evolutionary process. The *act* of creation, in the framework of these assumptions, can only be some sort of God-of-the-gaps intervention violating the integrity and autonomy of the natural order, and the *doctrine* of creation can only be a question-begging exercise violating the integrity and autonomy of the natural sciences. Nevertheless, we have shown throughout the first two parts of this book, and throughout this chapter, that our very concept of “the natural” is—or *ought* to be—thrown into question: negatively, by the impossibility of adhering to it in practice and by the incapacity of this concept to account for its own condition of possibility, positively, by the infinite capacity of the *actual* world to surpass it. If we wish to better approximate the actual world—the world of things-*in-act*, of robins and the persons who contemplate them—then we must restore to the things of the world the unity and the interior depth of being that was taken from them in the modern conflation of nature and art, being and history, truth and utility, and knowledge and power. We must dispense with the natural theology and mechanistic ontology commenced in the seventeenth century and brought to fulfillment by Darwin and his disciples, a theology and metaphysics which continue to deform the meaning of the doctrine of creation and the stakes in its confrontation with the totalizing claims of evolutionary biology. We must distinguish the act of creation—that gratuitous gift of being that calls forth its own recipient—from a process of immanent manufacture, and we must distinguish the doctrine of creation from any mechanical explanation seeking to account for the “how” of the world. To do this, we must begin by setting aside that finite and idolatrous God simultaneously affirmed and denied by Darwinian biology and approach, at long last, the Creator God.

Notes

- 1 Such questions are no longer regarded as scientific, and “natural selection” provides no real answer to them. It merely stipulates that out of the innumerable possibilities “randomly” thrown up by nature, these possess a “survival value” and are thus passed on. Hans Driesch puts the matter thus:

Understanding then what is explained by the theory of descent with its necessary appendix, we also understand at once what is not elucidated by it: the diversities of the organism remain as unintelligible as they were, even if we know that inheritance is responsible for what is similar or equal (1908a: 253).

- 2 See also Depew and Weber (1997), pp. 57–84.
- 3 See Depew and Weber (1997), pp. 170–175.
- 4 Gould obviously does not see the formalist–functionalist dichotomy in quite the same terms that I have offered here.
- 5 Depew and Weber discuss in vivid detail how Darwinism, a fragile theory in the latter half of the nineteenth century, was nurtured within the bosom of the eugenics movement. See Depew and Weber (1997), pp. 193–216. I maintain that this is more than a historical accident, but is rather endemic to the Darwinian conception of the organism. The connection has also been noted by Morris (2003), pp. 2, 320–326 and Moss (2005), pp. 361–363.

6 See also Moss (2004):

The idea that the real focus ought not to be upon the organism and its ontogeny but rather in processes that occur over many generations, and in relation to which individual organisms are naught but pawns, is unique to the twentieth century (6).

7 See also Webster and Goodwin (1996), pp. 20, 110–116, for a contrast between Goethe and Owen.

8 See Hull (1989), pp. 79–88.

9 Webster continues,

It follows that “higher” taxa are not more inclusive classes but sets (of different sizes) of species-individuals related by common descent. Since we are now dealing with individuals, identity is a function of origin. From this perspective, the names of taxa cannot be intensionally defined since they are not the names of classes or kinds but proper names which are rigid designators. Moreover, since species taxa are individuals, they cannot figure in scientific laws. Thus on Hull’s account there can be no *scientific* explanation of the properties, including the morphological properties, which might appear to be specific of particular taxa; these are to be explained in terms of historical narrative (Webster and Goodwin 1996: 31).

10 See also Hull (1989), p. 86.

11 See Bateson (1992), p. 32. Theodosius Dobzhansky makes a similar point. “Talking about traits as though they were independent entities is responsible for much confusion in biological and especially evolutionary thought” (Dobzhansky 1970: 65).

12 This is one reason why Barbara McClintock’s groundbreaking work on gene transposition met with such resistance when she first introduced it in the 1950s. As Evelyn Fox Keller puts it, “The biggest problem was, if genetic elements were subject to a system of regulation and the control that involved their rearrangement, what meaning was left then to the notion of the gene as a fixed, unchanging unit of heredity? (1983: 144).

13 Whereas classical and neoclassical biologists assumed that offspring would closely resemble parents unless something interfered, Galton argued that it was intrinsically more probable that they would vary in ways that would slowly approximate to the normal distribution. He did this by treating the normal distribution not as a deviation from a developmental norm, but as itself a norm from which deviations are to be measured....the normal distribution and the expected regression constitute a new sort of inertial baseline from which systems might deviate under certain conditions (Depew and Weber 1997: 201).

14 The decline of strong recapitulationism and progressive evolutionism of both materialistic and vitalistic sorts, and the eventual restoration in this century of natural selection to primacy of place in evolutionary theory, is all the more significant, then, because contrary to common opinion, it was not the outcome of a confident and continuously advancing tradition stemming directly from Darwin. It was instead the product of a protracted crisis in which the long-lived evolutionary tradition that had its roots in Geoffrey and Lamarck went down to defeat (Depew and Weber 1997: 172).

On the “Platonism”—I regard it as more Aristotelian than Platonic—latent in evolutionary theory, see Monod (1974) and Moss (2004), pp. 2–3, 51–116.

15 See, e.g., Depew and Weber (1997), pp. 170–172, 194, 197, 213.

16 See Moss (2004), pp. 8–50 and Depew and Weber (1997), pp. 217–242.

17 Preformationism, in an evolutionary perspective, leads to the view that ontogeny recapitulates phylogeny, though there is a significant difference between the “strong recapitulation” such as one finds in Haeckel’s “biogenetic law,” which holds that ontogeny passes through adult forms of extinct ancestors, and the “weak recapitulationism” of von Baer’s laws, which held that embryos only pass through immature stages of ancestral forms. Darwin accepted this latter view and gave it an evolutionary interpretation which it had heretofore lacked. See Depew and Weber (1997), pp. 170–191.

- 18 See also Depew and Weber (1997), p. 177.
- 19 See Kant (1987), pp. 248–283.
- 20 See Darwin (1991), pp. 368–369. Depew and Weber maintain that “Darwin’s aim was to show that the von Baerian pattern can bear an evolutionary rather than solely the antievolutionary interpretation that Owen, Milne-Edwards, and von Baer insisted in putting on them” (1997: 138).
- 21 The developers of cell theory had something else in mind too. Their opposition to von Baer’s combination of weak recapitulationism with opposition to evolutionism made them sympathetic not only to transmutation and common descent but to strong recapitulationism as well. If a strict parallel between ontogeny and phylogeny was to be carried out, however, it would be necessary to carry the story back as far as the earliest living things that existed before the separation of plants and animals. That point of intersection was the single cell or monad. The first organisms, after all, were single celled, and all later organisms are aggregations of cell lineages, multiplying by dividing, integrating by differentiating. Perhaps the entire recapitulationist story could be plausibly retold and defended from this more basic perspective...With one more step, the teleomechanist tradition was finally transformed into its material reductionist antithesis. When one looks at the machinery of the cell, regarding organisms simply as vast assemblages of cells, one begins to suspect that the laws of physics and chemistry, the latter being no more than an application of the former, are fully adequate to explain not only the operation but also the original emergence of all organic functions and beings, for the forces operating within and between cells are none other than known physical processes that synthesize and degrade chemical and biochemical compounds. From the perspective afforded by the energy-centered physics then triumphing in Germany, the life processes of the cell are fully reducible to chemistry, and chemistry to physics (Depew and Weber 1997: 176–177).
- 22 This does not mean, of course, that every evolutionist after Darwin was a strong recapitulationist or a so-called Lamarckian. What it means is that later in the nineteenth century, the line between strong and weak recapitulation that Darwin inherited from von Baer, Owen, and Milne-Edwards was blurred in favor of former, that natural selection was subordinated in various ways to the inheritance of acquired characteristics, and that in the age of progress, new versions of the old Geoffroyian and Lamarckian evolutionary inheritance achieved, sometimes under the name of Darwinism, a respectability they had never enjoyed during and after the age of revolution (Depew and Weber 1997: 170–171).
- 23 Depew and Weber maintain that Weismann later mitigated this confusion somewhat by postulating the notion of “germinal selection.” Germinal selection pushes the scene of Malthusian competition to the cellular level. “What is good for the egg or sperm, however, might not be good for the organism. Thus, Weismann’s germinal selection raises the possibility of conflict between ‘levels of selection’” (1997: 190–191).
- 24 Moss elaborates:
- Morgan did not claim that a science of the genotype was tantamount to a science of the phenotype, and yet, in 1926 he states: “Except for the rare cases of plastid inheritance all known characters can be sufficiently accounted for by the presence of genes in the chromosomes. In a word the cytoplasm may be ignored genetically.” Unless newly tempted by particulate preformationism, Morgan’s intent was to establish the acquisition of genes and genotypes as the definition of what counts as heredity, that is, to separate by definitional fiat the inheritance of genes from the developmental context and mechanism which allow heritable traits to appear (2004: 336–337).

This is a quintessential case of the sort of mechanistic abstraction which we criticized in Chapter I, in which parts are abstracted from an *actual* whole which is then reconstructed “by addition” from the parts.

- 25 Not all saw the instrumental, tactical aspect of Morgan's mechanistic materialism. Many future developments in the history of genetics, and especially offshoots of it, may be traced back to the conceptual rather than heuristic interpretation of the gene as determinants of characters. The term "genes for"...became, notwithstanding Johannsen's reservations, a decisive factor in our genetic thinking (Moss 2004: 38 citing Falk 1995: 219–246).
- 26 See also Keller (1992), pp. 281–299.
- 27 Shifting the terms of debate to the level of populations made possible, in the first place, a resolution of the quarrel between biometricians and Mendelians. The terms of reconciliation were these: Mendelians must give up their fascination with pure lineages and their arbitrary restriction of the sources of evolutionary change to forces other than natural selection. Mendelians, who had hitherto used statistics simply in the traditional role as estimates of error, would also be asked to apply to the distribution of genotypes in a population the techniques of statistical analysis and probability pioneered by biometricians in their quest to measure continuous phenotypic variation. For their part, biometricians would have to give up their exclusive concentration on what is happening to the phenotype and, yielding their resistance to theoretical entities, would have to bring their developed use of statistical techniques to the analysis of populations of genotypes as well. Indeed, they would have to see, for the first time, what they had been doing in terms of the reformed phenotype-genotype distinction, many to many mappings between genes and observed traits were expected...Within the broad confines of this understanding, the Hardy-Weinberg equilibrium formula now began to play the role Johannsen had unsuccessfully proposed for pure lines. It was to serve as a new inertial background of expected stability against which evolutionary change was to be measured (Depew and Weber 1997: 233–234).
- 28 It will be noticed that the Fundamental Theorem...bears some remarkable resemblances to the Second Law of Thermodynamics. Both are properties of populations, or aggregates, true irrespective of the nature of the units which compose them; both are statistical laws, each requires the constant increase of a measurable quantity, in the one case the entropy of a physical system and in the other the fitness...of a biological population (Fisher 1930: 36 cited in Depew and Weber 1997).
- 29 Depew and Weber explain, citing Hodge (1992: 235):
- Fisher considers causes of change as selection and random sampling error insofar as they influence the statistical distribution of gene frequencies. A population is treated as a collection of genes, with each gene having a certain frequency because it is present in a certain proportion of individuals; and it is inquired what the statistical distribution of those gene frequencies is. Thus if that distribution is a Normal distribution, so called, as represented by a familiar bell curve, then many genes will be present in about half the individuals, while only a few will be present in either a great majority or a small minority.... Evolution on such a representation can be analyzed as change in the distribution of gene frequencies. For under Mendelian assumptions, the distribution is stable in a large population with random mating, and no mutation, selection, or migration. In this paper, Fisher did what no one had done before. He asked how such factors as dominance relations, mutation, selection and random extinction of genes in a finite population would affect the distribution; and he devised expression for the effects of various mutation rates or selection intensities and so on. He hinted at a conviction he would never give up, namely that adaptive evolution is most effectively produced in a large randomly breeding population subject to sustained natural selection of very small heritable differences (1997: 235).
- 30 Depew and Weber maintain that a "propensity interpretation of fitness" escapes the tautological charge (1997: 518–519). As I noted in Chapter 5, I remain unconvinced.
- 31 See more generally Driesch (1908b), pp. 8–34. The underlying issue, namely, the nature(s) of unity, is also behind de Koninck's analogous question, whether $1 + 1 = 1 + 1$ is the same as $1 + 1 = 2$, that is, whether two designates a unity distinct from $1 + 1$. de Koninck (1960), pp. 1–42.

32 As Driesch puts it,

[I]t is important to understand that a specific though hidden addition is made almost unconsciously to the mere statement of the hypothesis of descent as such...And this additional hypothesis must be made from the very beginning, quite irrespective of the more detailed problems of the law of transformism, in order that any sort of the so-called explanation by means of the theory of descent may be possible at all...[I]t must necessarily be assumed in every case that the steps of change, which have led the specific form *A* to become the specific form *B*, have been such only as to change in part that original form *A*. That is to say: the similarities between *A* and *B* must never have become overshadowed by their diversities (1908a: 254–255).

If I understand this conclusion correctly (which I take to be similar to that of Webster and Goodwin), it is both explosive and counterintuitive. Let us say there is a lineage of organisms descending from *A* to *Z*. In the event that the similarities between *A* and *Z* were “overshadowed by their diversities,” *Z* would have effectively ceased to have descended from *A* in any meaningful or explanatory sense even though there were a clear historical line of descent connecting *Z* to *A*. The conclusion raises an interesting question (which I also take Webster and Goodwin to be pursuing): At what point does an organism acquire a nature (or properties, or dynamics) sufficiently “its own” that it can no longer be said to have descended, as that organism, from its antecedents?

33 This follows ultimately from the positivism of Darwinism and modern science more generally, which leads to the eclipse of being as act, and thus the distinction between act and potency. Potencies are then converted into actualities in the form of “logical possibles.”

34 Driesch adds,

In denying any real explanatory value to the concept of natural selection I am far from denying the action of natural selection. On the contrary, natural selection, to some degree, is self-evident; at least as far as it simply states that what is incompatible with permanent existence cannot exist permanently, it being granted that the originating of organic individuals is not itself a guarantee of permanency (1908a: 263).

35 Now, it is clear that vague expressions such as “directs”, “controls”, or “instructs” are attempts to fill a theoretical vacuum by means of metaphor (see Woodger 1945). Moreover, in the context of discussions of organismic morphology, the use of the concept “genetic information” is equally metaphorical. Whereas in the context of molecular biology the concept of “information” has precise significance consequent upon its role in explanatory theories concerned with the production of proteins of specific structure, it has no such significance in relation to the productions of, say, thumbs, to use Hull’s example, because there is no comparable theory. In this context, to speak of “genetic information for thumbs” is merely to employ a kind of metaphorical shorthand to summarize the fact that, as regards organisms which can interbreed, there is a genetic difference between organisms which have a particular property and those which do not, and the genetic difference can be causally correlated with morphological difference. The conception and theoretical gap between explaining the structure of a protein and explaining the structure of a hand is comparable to the gap which, according to Lévi-Strauss (1969), some people remarked in Grétry’s harmony: “Between his high notes and his low you could drive a carriage” (Webster and Goodwin 1996: 83).

36 This is Webster’s charge against Ernst Mayr. See Webster and Goodwin (1996), pp. 27–30.

37 I read Webster here as attempting to rehabilitate, in terms appropriate to modern biology, something like the Aristotelian distinctions between act, potency, and hypothetical necessity.

38 Francis Crick proposed the theory of the “frozen accident” to explain the evolution of protein synthesis, its universality, and its “conservative” resistance to the production of innumerable bases, codons, and, thus, transcription errors. In very simple terms, the “accident” is conservatively “frozen,” it is hypothesized, because the codon and its anti-codon evolved together thus limiting further developmental possibilities (1968: 367–379).

39 The conclusion is that the chick has effectively preserved digits 2, 3, and 4 of the common ancestral limb, albeit greatly altered by accumulation of small changes during evolution. The most extreme example of this historical modification of a postulated ancestral pattern is to be found in the limbs of ungulates, such as the horse. Here a single digit, identified as 3, has become very large, while the others (2 and 4) are reduced to tiny elements (Webster and Goodwin 1996: 140).

40 As Brian Goodwin puts it,

Weismann's dualism saved Darwinism from inconsistency by excluding the possibility of Lamarckian inheritance, and it provided a clear rationale for studying inheritance independently of development, since embryogenesis can be reduced to the activities of genes as the primary determinants of morphogenesis (Webster and Goodwin 1996: 131).

41 One of the greatest surprises of the Human Genome Project was the discordance between the count of protein-coding-genes ([about] 24,000) and the expectations based on perceived phenotypic behavioral complexity. Only about 1% of the human genome consists of protein-coding DNA (Lynch 2007: 43 cited in Cunningham 2010: 57).

42 Portin elaborates:

[A]ll classical and neoclassical criteria for the definition of the gene fail in one or more respects...The gene is no longer a fixed point on a chromosome, defined by the *cis-trans* test and producing a single messenger RNA. Rather, most eukaryotic genes consist of split DNA sequences...Furthermore, DNA sequences are movable in certain respects, and proteins produced by a single gene are processed into their constituent parts. Moreover, in certain cases the primary transcript is edited before translation, using information from different genetic units and thereby demolishing one-to-one correspondence between gene and messenger RNA. Finally the occurrence of nested genes invalidates the simpler and earlier idea of the linear arrangement of genes in the linkage group, and gene assembly similarly confutes the idea of a simple one-to-one correspondence between the gene as the unit of transmission and of genetic function (1993: 207).

For a similar conclusion, see Wolf (2006), pp. 135–151.

43 Moss continues:

Thus far Gene-P sounds purely classical, that is, as Mendelian as opposed to molecular. But a molecular entity can be treated as a Gene-P as well. BRCA1, the gene for breast cancer, is a Gene-P, as is the gene for cystic fibrosis, even though in both cases phenotypic probabilities based on pedigrees have become supplanted by probabilities based on molecular probes. What these molecular probes do is to verify that some normal DNA sequence is absent by confirming the presence of one, out of many possible, deviations from that normal sequence that has been shown to be correlated (to a greater or lesser extent) with some phenotypic abnormality. To satisfy the conditions of being a gene for breast cancer or a gene for cystic fibrosis does not entail knowledge about the biology of healthy breasts or of healthy pulmonary function, nor is it contingent upon an ability to track the causal pathway from the absence of the normal sequence resource to the complex phenomenology of diseases. The explanatory “game” played by Gene-P is thus not confined to purely classical methods, which unfortunately has made it all the easier to conflate the meaning of the “gene” with the one I will refer to as Gene-D (2004: 45).

44 Goodwin concludes similarly, that “in general, homology cannot be defined in terms of invariant gene action” (Webster and Goodwin 1996: 142).

45 See also Robert (2004), pp. 1–23.

46 See Webster and Goodwin (1996), pp. 131–136, for their explanation of why Monod's view fails.

47 For a similar, but more expansive concept of homology, see Müller (2003), pp. 51–69.

48 Depew and Weber describe complex systems thus:

Complex systems are not just complicated systems. A snowflake is complicated, but the rules for generating it are simple. The structure of a snowflake, moreover, persists unchanged and crystalline, from the first moment of its existence until it melts, while complex systems change over time. It is true that a turbulent river rushing through the narrow channel of rapids changes over time too, but it changes chaotically. The kind of change characteristic of complex systems lies somewhere between the pure order of crystalline snowflakes and the disorder of chaotic or turbulent flow. So identified, complex systems are systems that have a large number of components that can interact simultaneously in a sufficiently rich number of parallel ways so that the system shows spontaneous self-organization and produces global, emergent structures (1997: 437).

49 See also Webster and Goodwin (1996), pp. 143–144, 192.

50 The idea was first put forward as an antidote to reductionism in physics by Phillip W. Anderson. Reductionism here, however, seems to mean deductivism. In Chapter 5, we discussed the way that contemporary antireductionism remains reductionist. See Kauffman (2008), pp. 19ff and Anderson (1972), pp. 393–396.

51 A phase space is a geometrical model that describes states of an object, a system of objects, or an ensemble (a system composed of a large number of items whose trajectories can be summed and averaged, like Maxwellian gases) in terms of a number of variables, or degrees of freedom that define it. At any instant in phase space, how things stand with the variables of an object, system or ensemble can be represented by a single point. In the course of time, this point will move, describing a trajectory in phase space (Depew and Weber 1997: 438).

52 Kauffman decided to see how far he could get making a mathematical model based on a regulatory gene that turns off a structural gene. The mathematics he chose was fitted to articulate his intuition about parallel processing. In Boolean networks...a string or array of symbols, “or digitules,” is transformed by a set of simple rules. In the model, each element of an ensemble of N elements has two possible states (on or off in the case of gene expression) and receives K inputs from other elements. Applied to hypothetical genes in a regulatory system, rules like the following might be specified: If any signal is positive, the gene will be turned on. Another might be: All signals must be positive for the gene to be turned on. Whatever the rules are, the idea is that at any instant the entire network is in a state whereby each element receives input from those elements to which it is connected and becomes active or inactive in accord with the rules that govern the system. These interactions produce the next state of the system, and so on (Depew and Weber 1997: 431).

See also Moss (2004), pp. 98–107.

53 See Moss (2004), p. 99; Depew and Weber (1997), p. 438; and Webster and Goodwin (1996), p. 205.

54 For Goodwin’s treatment of this phenomenon, see Webster and Goodwin (1996), pp. 234–240.

55 I qualify “life” because I am unwilling to concede that complex systems theory is an adequate basis for distinguishing the organic from the inorganic. To wit, see Depew and Webster (1997: 475) on the difference between an organism and an ecosystem.

56 Goodwin’s point is

not to deny that the forms taken up by organisms and their parts contribute to the stability of their life cycles in particular habitats, which is what is addressed by natural selection. It is simply to note that an analysis of this dynamic stability of life cycles can never be complete without an understanding of the generative principles that produce organisms of particular form in the first place...The objective is not to separate these different aspects of life cycles, but to unify them in a dynamic analysis that puts natural selection into its proper context—in no sense a generator of biological form, but one of the factors involved in the stabilization of form (Webster and Goodwin 1996: 221).

57 See Depew and Weber (1997), p. 398.

58 Webster and Goodwin continue:

The conclusions about gene products extend to any other variables that exert an influence on some aspect of developmental dynamics, such as change of membrane fluidity by organic solvents, change of ion flow densities by ionophores, channel blockers or magnetic fields, local changes of strain of the cytoskeleton by alteration of cell shape; and so on (1996: 182).

59 The sense in which any theory is antireductionist obviously depends upon the theorist's definition of reductionism. For Kauffman, reductionism is when

the words in the higher-level description are, in effect, shorthand for more precise lower-level descriptions. This requires that a given statement in the higher-level "language" be replaceable by a pre-stated and finite set of statements in the more fundamental language that are "jointly necessary and sufficient" for the higher-level statement. "Jointly necessary and sufficient" just means that, together these lower-level statements can be substituted for the higher-level description without altering the truth or falsity of the higher-level description (2008: 23).

60 The authors concede further that

Darwinians have to pay a steep price for Kauffman's advances. They must be prepared that in many cases natural selection cannot be expected to do all or even most of the work, that as explanatory models become more realistic natural selection ceases to be an explanation of first resort, and that when selection operates, it does so in a fairly narrow range of possibility space, since it selects among entities that are already self-organized modules and that are in the process of spontaneously forming into still higher levels of self-organization (Depew and Weber 1997: 436).

For more on Kauffman's simulations as providing a new "null hypothesis" as a background to natural selection, see pp. 440–456.

61 The irony, Moss continues, is that

Kauffman's ...contribution to the disappearance of biology in the name of the genome...is the product of what is perhaps the most sophisticated and well-elaborated challenge to the "hegemony" of the code-script (2004: 102).

62 Oyama makes an additional criticism of this kind of computer simulation, without mentioning Kauffman by name, perhaps because Kauffman too is a critic of the code-script metaphor. The criticism seems applicable to computer simulation of natural processes generally, which exhibit that mechanistic form of abstraction which we discussed in Chapter 1, albeit one whose sophistication mirrors the increased sophistication of our machines.

There is a subtle, repeated process at work here. Order in a process is perceived and formulated as descriptive rules. From these prescriptive rules are derived and imposed on a mechanical medium to allow simulation of the original process. The prescriptive rules are then projected back onto the original process as cognitive agents, programs, accounting for the original order in terms of the simulated order. The working of the original is then said to be "like" that of the imitation, and therefore due to the same kind of intentional control that created that imitation. To say it another way, order is abstracted from one system and imposed on a second, then the imposed order-as-program is abstracted from the second and projected onto the first (Oyama 1985: 62).

63 The distinction is not well considered, but that is a matter for the next section.

64 This is a point that Richard Lewontin has made throughout his career. See, e.g., Lewontin (1992), pp. 107–123. On the untenability of the distinction between acquired and inherited form, see Oyama (1985), p. 122.

65 The distinction between "system" and "process" is not entirely clear. Oyama appears to treat them synonymously, adverting to the latter when she senses the danger of reifying the former. See, e.g., Oyama (1985), p. 150.

- 66 Apart from a statement that a phenotype exists, then, the terms “natural” or “normal” have either an ethical meaning, a functional one, a statistical one, or a historical one. The ethical meaning has to do with a judgment in a nonscientific domain, the functional one with some criterion of proper workings, the statistical one with relative frequency, and the historical one is essentially an extension of the statistical one to ancestral populations (Oyama 1985: 76–81, 123–132).

Oyama’s reticence about regarding nature as “normative” in any sense other than “what happens to be the case at present” seems to be derived, in part, from extra-scientific concerns.

- 67 See Oyama on Dawkins (1995), pp. 124–128, 156–157. For a defense of Dawkins against the criticism of Gould and others, see Sterenly and Kitcher (1998), pp. 153–175. Sterenly and Kitcher maintain that Dawkins’ “replicator–vehicle” dichotomy falls within mainstream genetics, that Dawkins himself acknowledges the need for the mediation of the organism, especially in *The Extended Phenotype*, that this text successfully defends the meaningfulness of talking of “genes for x,” and that Dawkinsian genetics need not mean the eclipse of the organism. The argument trades, first, on the attempt to account (*contra* Gould) for how alleles are “visible” to natural selection; second, on acknowledging the epigenetic complexity of the genotype–phenotype relation; and finally, on disassociating Dawkinsian selection from Dawkins’ own panadaptationism. The argument nevertheless remains an *evolutionary* argument, that is, an argument about the nature of natural selection and a justification for regarding genes, in Dawkins’ sense, among the viable “units of selection.” It does not address developmental concerns in any deep sense and would likely not satisfy Darwinism’s developmentalist critics.

- 68 The situation is quite peculiar. What scientists say in some contexts is contradicted by what they say, know and do in others. It is therefore difficult to grasp what is happening without following arguments or trains of thoughts quite closely...In fact no biologist seriously limits structure to the chromosomes; they sometimes sound as if they do because they assign formative relevance only to the DNA, where the encoded representation of the phenotype (or of the instructions for building it) is thought to reside. This is the error, along with the associated idea that unless such a representation exists, development cannot be structured, and it is a pervasive and fundamental error indeed (Oyama 1985: 26).

Given the depth and pervasiveness of this “error,” Oyama argues

that much more is needed than a modification of some technical vocabulary to set our conceptual house in order, for that vocabulary is too intimately connected to the rest of our conceptions of ourselves and the world to be altered in isolation (1985: 80).

- 69 The term is from Depew and Weber (2001), pp. 239–253.
- 70 Blondel proposed a new integration of subjectivity and objectivity rooted precisely in the metaphysical exigencies which he took to be affirmed in action as such. *En route* he offered a trenchant critique of the antinomies he claimed were at the heart of the positive sciences. My reflections on the significance of Blondel were assisted by an (as yet) unpublished 2010 paper by Lesley Rice, entitled “Conceiving Conception: Examining the Origins of Life in Light of Creation.”
- 71 This perhaps explains Oyama’s persistent (and I would argue) failed attempts to avoid the reification of “systems” and processes.
- 72 This seems to be the precise sense in which Driesch sees the “action” of entelechy coextending with the “wandering” of cells to form harmonious-equipotential systems. See Driesch (1908a), pp. 151–153.
- 73 See Aquinas, *ST*, I.11.1. On the indivisibility of entelechy, see Driesch (1908b), pp. 257–258.

- 74 See Driesch (1908b), pp. 266–286. I, for my part, would wish to amend this to say not merely that Driesch discovers “forms of order which are not merely extensive,” but rather that order as such is a form of intelligible relation that is not extensive but rather like his entelechies, acts into time and space. My guess is that Driesch was prohibited from recognizing this implication both by his acceptance of a mechanistic ontology with respect to the inorganic realm (and with respect to certain subsystems within the organism) and by his desire to establish the autonomy of the organic.
- 75 I would not wish to suggest that actions are distinguished from events only in this way or that this difference should be pressed too far. As we have argued, even “events” are only intelligible in these terms.
- 76 See, e.g., Oyama (1985), pp. 22–23 and Oyama (2001), pp. 185–189.
- 77 This is because *esse* is not an *ens*, as we shall discuss in Chapter 8.
- 78 An “action” is every animal movement which depends for its specificity on the individual life history of its performer in such a manner that this specificity depends not only, as will be seen later on, on the specificity of the actual stimulus but also on the specificity of all stimuli in the past and on their effect. No animal movement is to be called an action in which this criterion is not present at least in a certain degree. In the language of subjective psychology this criterion is called “experience” (Driesch 1908b: 54).
- 79 See Jonas (2001a); Jonas (2001b); and Jonas (2001c).
- 80 See, e.g., Oyama (1985). “Form emerges in successive interactions. Far from being imposed on matter by some agent, it is a function of the reactivity of matter at many hierarchical levels, and of the responsiveness of those interactions to each other.” (22).
- 81 See Aristotle, *Physics*, V, 220a5ff. See also de Koninck (1960), pp. 64–69.
- 82 As we saw, the ancients were preoccupied with an analogous issue: what kind of unity can be ascribed to the cosmos? We will take up this question again in light of creation in Chapter 8.
- 83 The issue here is not the metaphors “interpreting” and “deploying,” any more than the metaphor of “selecting” is the central problem with the notion of natural selection. The issue consists in the fact that the organism is depicted as the subject of its genes and their development rather than the product of them.
- 84 I do not wish to suggest that chance or spontaneous interactions do not occur so much as to question the operative notion of spontaneity itself. Inasmuch as these interactions occur between actual entities with determinate characteristics, Aristotle’s argument that chance and spontaneity presuppose what is *per se* would seem to hold here.

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Part III

Creation Without Creationism

Consequently, to the truth of the primacy of action, Im Anfang war die Tat, 'in the beginning was Action,' corresponds the great affirmation of the equal primacy of truth: 'In principio erat Verbum'(In the beginning was the Word). This reign of truth is entirely outside of us; it will never be disarmed of its iron sceptre; but also this reign of truth is entirely within us, since we produce all its despotic exigencies in ourselves. Nothing, in human destiny, is tyrannical; nothing, in being, is involuntary; nothing, in truly objective knowledge, which does not come from the depths of thought, this is indeed the solution to the problem of action; and so the common knot of science, of metaphysics, and of morality is tightened. From the least of our acts, from the least of facts, it is enough to draw out what is there to be found, in order to encounter the inevitable presence, not only of an abstract first cause, but of the sole author and the true consummator of all concrete reality. Down to the last detail of the last imperceptible phenomenon, mediating action takes up the truth and the being of all that is. And it would be strange indeed to be able to explain anything apart from Him without Whom nothing has been made, without Whom all that has been made falls back into nothingness.

Maurice Blondel
L'Action

Deus Creator Omnium

Perhaps the defining characteristic of modern philosophies of nature, the very mark of their “naturalness,” is the fact that they attempt to exclude God and thus the “supernatural.” Nature is nature *because* God is absent from it. Natural and scientific explanations are natural and scientific *because* they rigorously reject any appeal to the supernatural.¹ Time and again we have seen that modern naturalism lives out of this primeval opposition, which is, of course, but a form of that constitutive relation between science, metaphysics, and theology that we have considered in detail in previous chapters.² Theologically, this follows from the world’s constitutive relation to God and the subsequent fact that no aspect of creation, including thought, falls outside of this relation. But one need not consent to this theological premise to see this conundrum as an inner necessity of reason. This necessity, we have maintained, is implicit in the indicative mood, without which we cannot think. Yet, more simply and immediately, one cannot erect a boundary between the natural and the supernatural, or distinguish for oneself a realm of “nature” separate from God without at the same time presupposing or implying some minimal conception of the God from whom “nature” is separate. This is true irrespective of whether the naturalism in question regards itself as ontological or merely methodological. As we showed in Chapter 1, there is ultimately no such thing as a methodological naturalism that is not also an ontological naturalism, and ontological naturalism, for whatever else it may be, is at bottom a bad theology that does not know itself.³ This was the warrant for our consideration of Darwin as a theologian and the disappearance of the organism from evolutionary biology as the poisoned fruit of a bad theology. The distinction between God and nature is always tacitly operative in every conception of nature, and it is always necessarily a *theological* distinction.⁴ This remains the case even when God does not appear explicitly or appears only as a foil, and it is no less true when the distinction is rendered in the negative form of atheism. Every atheism is parasitic upon the God which it rejects. Modern atheism arose in the West as a perversely “Christian”

phenomenon, and “Protestantism” atheism tends to look very different than “Catholic” atheism.⁵ Without his whiggish cartoon of broad church Anglican natural theology, for instance, the entire Richard Dawkins industry would simply disappear. Gratitude should prompt him to consider a tithe to the Church of England.

The impulse to “protect the rights of nature,” and the legitimate autonomy of scientific explanations of nature, is of course a salutary thing. The old manuals of Catholic philosophy defined “the natural as whatever pertained to nature constitutively, consecutively, or appetitively,” and the supernatural, by contrast, as what does not so pertain.⁶ Though this begs many questions, as Balthasar says, it is uncontroversially true insofar as it means that God neither enters into the definition of natural essence nor is something that the creature could give to itself or attain for itself (1992: 276). Some such distinction is imperative in the doctrine of creation itself, and though greatly aided by Aristotle, it only achieves its full force as the fruit of the Christian dispensation. This imperative acquired particular urgency in the battles that led to the formulation of Chalcedonian Christology and in the protracted debates that followed upon the triumph of the Alexandrian position in the centuries thereafter, for example, in the monophysite and monothelite controversies.⁷ As we saw in Chapter 2, Christological orthodoxy, which affirmed a unity of God and man that was nevertheless “undivided and unconfused,” was absolutely essential to bringing the biblical doctrine of creation to ontological maturity. “Protecting the rights of nature” was essential to the formation of orthodox Christology, not least because it is the reverse side of protecting God’s transcendence *of* nature which made this hitherto unimaginable union possible. God cannot enter into nature at the level of essence, as part of its “essential definition,” without simultaneously denying God’s transcendent surpassing of the world and without ultimately reducing the integrity of the creature to the status of an “appearance” (Balthasar 1988a: 55). This much is true. Without an adequate conception of this difference between God and the world, it is impossible to conceive of the divine condescension as God’s hypostatic union *with* nature. Instead, the Incarnation necessarily becomes the divine absorption *of* nature and thus an invitation, which has proved tempting more than once both inside and outside Christian tradition, to escape finitude and leave the world behind (1988a: 44–56).⁸

We have no quarrel, therefore, with the desire of modern naturalism and its militant, Darwinian variation to distinguish between God and the world or to protect the autonomy of nature. Our complaint, rather, is that Darwinian naturalism neither distinguishes sufficiently *enough* between God and the world nor protects the autonomy of nature, as evidenced both by the vexed place of the organism within Darwinian biology and by the close relationship between Darwinian biology, the early eugenicists, and the eugenics revival currently taking place under the banner of transhumanism.⁹ The assumption that nature is defined as such precisely because it simply excludes God is underwritten by a metaphysical positivism by which Darwinian naturalism declares its putative independence from metaphysics and theology. But this same positivism and extrinsicism leads Darwinism to conceive of God as a finite object or fact *within* being which is extrinsically juxtaposed to the world, on the one hand, and to empty organisms of the unity and interiority (being-in-itselfness) heretofore distinguishing organisms from artifacts, on the other. Hence, the progressive disappearance of the organism as both the subject of its own being and the subject matter of evolutionary biology.

Our concern in Part III of this book is to show how a proper understanding of creation remedies both of these errors and to restore on this basis, at least in theory, a proper understanding of the relation not just between the doctrines of creation and evolution but between the sciences, metaphysics, and theology, more generally. However, in order to show in Chapters 8 and 9 how a proper understanding of creation rescues the living organism from the endemic reductionism of Darwinian biology and Darwinian biology itself from the corrosive effects of its own universal acid, it is first necessary to disentangle a proper understanding of creation from the “tangled bank” of Darwinian theological assumptions. For the same positivism and extrinsicism that leads Darwinians to imagine God and the world as two finite objects externally juxtaposed leads them to misconceive both the act and doctrine of creation. With God and the world thus univocally conceived, the act of creation and natural processes and mechanisms are regarded as mutually exclusive agencies, while the *doctrine* of creation and evolutionary theory are regarded as mutually exclusive explanations for the construction of the artifact that is the organism. The perpetually unedifying “origins of life” debate moves entirely within the horizon of these assumptions. The Darwinians who triumphantly declare that there is no longer a living debate over creation and evolution are thus inadvertently correct, though not for the reasons they suppose. Because God is not an object within being which is extrinsically juxtaposed to the world, creation is not manufacture, an organism is not an artifact, and the artisan of Darwinian natural theology is not God. Indeed, to accept the perennial foil of Darwinian orthodoxy as “God” requires a substantial unthinking of traditional Christian theology. The act of creation, therefore, is not a mechanism in competition with natural selection or any other natural processes, and the doctrine of creation is not, strictly speaking, a rival of Darwinian evolution or any alternative scientific theory of origins. None of this is to deny that there is a real dispute between the Christian doctrine of creation and Darwinian evolutionary theory, much less to suggest some easy concordism between them. Rather, it is to insist that in order for there to *be a real* disagreement—or better, for us to understand what this disagreement is really about—we must first make a serious attempt to understand the doctrine of creation *ex nihilo* in its own terms, in its own function, and within its own proper setting, not as a freestanding cosmological theory but as an aspect of the doctrine of God.

Part III of this book and this chapter, in particular, take a markedly theological turn. There is no need to apologize of course for speaking theologically in what is, after all, a work of theology. But the transition from “structural homologies,” “autocatalytic dissipative systems,” and “cascading broken symmetries” to “Trinitarian circumincession,” the “hypostatic union” of natures, and the “real distinction” may strike readers as abrupt, and to any more conversant in the former concepts than the latter, unreal. Let me therefore restate briefly our purpose and the principles animating this transition. Our chief purpose in delving into these biological details was not to make a scientific judgment about them. Rather it was, first, to consider these details in the metaphysical meaning which they always bear and which always implies some basic conception of the God–world relation and thus an implicit doctrine of God, and second, to examine how this metaphysical meaning “shows up” in the biology *qua* biological. Our purpose now in making our theology explicit is not to replace these scientific explanations or to fuse them with theology. Such expectations already

misstate, on the basis of a prior theology, both the relation between the doctrine of creation and evolutionary theory and the relation between God and the world as properly understood in the doctrine of God and creation. Rather, our purpose is to allow the doctrine of God to speak for itself, free from the distortions imposed upon it by those metaphysical and theological assumptions, to address the God–world relation which is creation on that basis, and to unfold its implications for the structure of being and life. The point of this exercise is not to “prove” creation to its detractors but to see the world through the eyes of creation, even if only momentarily. This is not just a matter of “sentiment and piety,” however (Paley 1854: 286). And apropos of our discussion in Chapter 1, this is not simply a “mind your own business” approach, though such an approach does preserve an important truth. The theology of creation and its metaphysical implications do have an immediate and interior bearing on science, as we will see in Chapter 9, but they bear on science in such a way as to preserve and indeed accentuate the abiding difference between science and theology, thus enabling each to mind its own business *well*. This, we shall see, follows directly from the doctrine of creation itself.

De Genesi ad Litteram: Creation as a Consequence of Christology

“*In principio erat Verbum.*” Thus begins the prologue to John’s Gospel, the “Christian Genesis,” as we argued in Chapter 2, from which all subsequent thought on creation, including the Christian interpretation of Genesis, will henceforth take its bearing. (Simple awareness of this would go a long way toward dispelling contemporary confusion about creation and the literal meaning of Genesis.)¹⁰ John’s prologue shows that the deep intimacy between the doctrines of God and creation goes back to the very foundation of Christian faith. It sets forth the basic parameters of both mysteries: the unity and distinction of God and his *logos*, which will ultimately make creation a matter of Trinitarian reflection, and the dependence of all things upon the *logos*, which makes reason foundational to the cosmos. This is perhaps the central reason why our attempts to premise reason, meaning, and order upon irrationality, unmeaning, and disorder always come to grief.¹¹

The doctrines of God and creation are entwined even more tightly together, however, by another of St. John’s assertions, a claim which bursts every category of ancient thought: “*et Verbum caro factum est et habitavit in nobis.*”¹² With the advent of Christ, something new appeared to thought. The announcement that the Word became flesh in the Incarnation, in what would later be understood as the hypostatic union, is the announcement of a new kind of intimacy, a new kind of relation between God and the world that was not conceivable within the thought-forms of either Greek philosophy or first-century Judaism, left unmodified. In order to accommodate this new unity between God and the world, both poles would have to undergo a transformation in thought.

Darwinian naturalism, in opposing evolution and creation, assumes a certain understanding of the God–world relationship and assumes, moreover, that this understanding is normative. Taking it for granted that God and the world are

contraries, that divine and natural agency are mutually exclusive, and that creation would therefore violate the integrity and autonomy of the natural order, Darwinians then project these assumptions back onto the Christian past. Christianity declares, by contrast, that the normative form of this relationship is announced in John's prologue, that Christ *is* the decisive union of God and the world, heaven and earth, eternity and time. To grasp the meaning of creation *ex nihilo* in its proper Christian sense, therefore, one must grasp the nature of the God–world relationship disclosed in Christ, not only because Christianity declares that Christ is the definitive form of that relationship but because Christology helped to generate the categories of thought that would ultimately make the mystery of creation intelligible.¹³ The same question at the heart of naturalism's opposition to creation, whether divine agency violates the integrity of the natural order, lies also at the heart of the early Christological controversies. If this is resolved in the Incarnation, that is because it illuminates what is decisive in *both* poles of the God–world relationship, disclosing a transcendence and otherness so radical as to be capable of an intimacy with the world more profound than any hitherto imaginable, and revealing the gift structure of being and nature itself, whose integrity is proportionally, and not inversely, related to their dependence upon their divine source.

Creation, we have said, is a function of the doctrine of God, not just as a historical accident but as a matter of principle. The doctrine of God, however, only comes to fruition as a function of Christology. And the union, in Christ, of God and the world, eternity and time, also reveals, by analogy, the full meaning and destiny of *nature*. Maximus Confessor therefore says that

of all divine mysteries, the mystery of Christ is the most significant, for it teaches us how to situate every present or future perfection of being, in every kind of intellectual investigation (*Ambigua*, 1332C in Balthasar 1988a: 209).

And *Gaudium et Spes* 22 teaches,

The truth is that only in the mystery of the incarnate word does the mystery of man take on light. Christ, the final Adam, by revelation of the mystery of the father and his love, fully reveals man to himself and make his supreme calling clear.

Our concern in this chapter is more speculative than historical, so I will not be recounting the development of orthodox Christology in any historically rigorous sense. Rather, my overall purpose in this chapter is to clarify the meaning of creation *ex nihilo* as an aspect of the doctrine of God, to which Christology is indispensable. In Chapter 8, we will take up a second aspect of creation that likewise follows from and is illuminated by the union of God and the world in the Incarnation: creation as the ontological structure of the world. In the meantime, it is necessary to consider briefly just what exigencies the Incarnation forced upon thought and the theological and metaphysical revolution which it set in motion.

There is of course a reciprocal relation, both in theory and in history, between Trinitarian and Christological doctrine. Though the effort to grapple with the implication of the confession of Christ gave rise to Trinitarian reflection, the

achievement of Trinitarian orthodoxy at the Councils of Nicaea (AD 325) and Constantinople (AD 381) was one of a number of factors giving rise to a subsequent crisis in Christology. If the Son was *homoousios* with the Father, what then of the man Jesus? All were agreed that Christ effected a union of God and man; all agreed that salvation consisted precisely in this union, in *theosis* or divinization. The crucial question was how to conceptualize this union. One possibility, according to Balthasar, has its roots deep in the religious spirit of Asia, where “the elemental groping of man towards God” culminates in a renunciation of this transitory, finite world. One can see elements of this outlook in the rigorous asceticism of early monasticism, in Neoplatonism, and most notoriously, in Gnosticism.¹⁴

Expressed in terms of this picture of things, an incarnation of God can only mean a concession, the gracious descent of God into multiplicity, in the realm of matter, in order to lead what is multiple back into unity. In the end, it is not so much a synthesis of the One and the Many as a gesture of the One toward the Many, beckoning it home into the One (Balthasar 1988a: 45).

The Son, on this view, does not so much assume human nature as overwhelm and absorb it. This was judged to be the effects of the position held by Eutyches and the monophysites. One alternative was effectively to reject an “ontological” union altogether, in favor of an “accidental extrinsic, ‘moral’ union of an ‘intellectual relationship,’ (σχέσις) between the two natures” (1988a: 212). This was the logical consequence of the Nestorian position, which rightly sought to uphold both divine transcendence and the “rights of nature.”

New ontological categories were needed in order to express this union in a way that simultaneously apprehended its profundity and protected the integrity of each pole. “The union of God and the world in Christ could not be adequately expressed simply in terms of an essentialist philosophy” (Balthasar 1988a: 212). So long as form or essence remained the highest ontological category and the fullest expression of act, as it had for the Greeks, a union of essences or natures would amount to a *tertium quid*, a new kind of nature or essence. This sort of “mixture” or confusion would compromise the integrity of both poles of this unity. The only alternative, from within these confines, was the sort of accidental or “moral” union we have already noted, in other words, no *real* unity at all. This was the joint error of Nestorius and Eutyches.

It was not simply that Eutyches had united the natures “too much” and Nestorius “too little,” but that they divided them and united them in the wrong way; they did not understand in what unity really consisted (1988a: 210).

True union with God must preserve the infinite difference between God and the world; indeed this difference must be the very form and condition of unity.¹⁵ “Unity is not the abolition of God’s distance from us, and so of his incomprehensibility; it is its highest revelation” (96).

The Council of Chalcedon circumvented Nestorius and Eutyches and set the parameters for the orthodox understanding by availing itself of nascent ontological categories formulated during the Trinitarian controversies

over a century earlier. As the Cappadocian Fathers in the wake of Nicaea turned to the novel distinction between nature (*ousia*) and person (*persona/hypostasis*) to express the coincidence of unity and distinction within the Godhead, so Chalcedon turned to this distinction to formulate the manner of the God–world union in Christ in its canonical definition of the hypostatic union: two natures united in one hypostasis, or the more familiar, two natures and one person (Ratzinger 1990: 439–454).

Balthasar likens the Church’s daring in the formulation of dogma to the assurance of a sleepwalker; “The Church coins a formula that only later on reveals all the dimensions of its meaning” (1988a: 211). So it is in this case. The dogmatic formulations of Chalcedon, which do not “define” the mystery of Christ so much as place negative boundaries around this ineffable mystery, hardly put an end to the confusion. First monophysitism and then monothelitism would enjoy a revival in a Chalcedonian guise. The central term bearing the ontological burden in this breakthrough, hypostasis/persona, would suffer its own tortured, sometimes confused career (Ratzinger 1990: 447–453).¹⁶ It would take many centuries, and the great syntheses of Maximus Confessor and Thomas Aquinas among others, for the transformation of Greek ontological categories to be completed and for the ontological import of the Christian achievement to emerge with full clarity. But a breakthrough it was, nonetheless. Joseph Ratzinger considers that the “passage from individual to person contains the whole span of the transition from antiquity to Christianity, from Platonism to faith” (2004a: 160).

Why so? As we maintained in Chapter 2, the distinction between *persona*, or hypostasis, and *natura* provided a positive, ontological basis for distinguishing a “who” from a “what,” for distinguishing between *natura* and the *bearer* of that nature. A hypostasis is, as Balthasar puts it, “the ontological subject of the ascription of an essence” (1988a: 223). Of course, Aristotle too, had identified substance as the underlying subject of predication, but since he identified substance with form, and things as substances insofar as they are identical with form, he lacked a *positive* ontological principle for the distinction between a thing’s being and its form. (The temptation is to regard the difference as a matter of “subtraction.”) Socrates, for Aristotle no less than for Plato, is an ambiguous figure. The notion of the person, by contrast, represents a certain primacy of the subject of a nature over the nature itself, a primacy which nevertheless protects the “the rights of nature” in its very distinction from its bearer.

This distinction between *persona/hypostasis* and nature permitted the second person of the Trinity to “have” both a divine and human nature, without compromising his divinity, or “mixing” the natures in a confused *tertium quid*. Of course, precisely *how* the divine *logos* possesses a human nature is, by definition, an ineffable mystery. Dogmatic formulations can do little more than set negative parameters around that.¹⁷ And precisely because it is not *ens* or essence, hypostasis itself defies definition in principle, just as Socrates does. The difference now, however, is that this is no longer due to a dearth of intelligibility and actuality or to the limitation of form by matter or act by potency. With the concept of hypostasis, especially as formulated by Maximus Confessor, “the outlines of a positive view of existence began to appear” (Balthasar 1988a: 65).

For these reasons, the hypostasis can only be described by approaching it from two directions, which mutually complement each other: from that of nature and its ever-more-narrowly circumscribing qualities that is, from the viewpoint of the being which the hypostasis “has” and from that of the act of coming to possess this nature (1988a: 225).

It would take centuries to clarify the metaphysical implications of this new principle, its relation to the inherited principles of form, act, potency, and so on, and its implication for the relationship between whole and parts. Even so, one can already see their clear outlines.

The real distinction between essence and existence is already the implied foundation of this Christology, and its concepts are moving toward this invisible point of convergence, without yet standing expressly under its normative power (215).

The distinction, as it stands, was nevertheless sufficient to preserve and in fact deepen the difference between God and the world even at the “high point” of their union, a principle of equal importance to the distinction between God and creation. The difference was preserved, from God’s side, because the distinction meant that the divine *hypostasis* could “become” human and assume a human nature without this imputing any change to his divinity, thus making it possible to conceive of a union that was at once “indivisible” and “unconfused,” and thus truly a union. From the side of the world, the nonidentity of essence and existence implied in this distinction actually secures the relative autonomy of *natura*, and thus “the man Jesus’ own active doing and willing,” with respect to the *hypostasis*.¹⁸ This is half the point in formulating the distinction in the first place. *Natura* even enjoys a certain primacy, inasmuch as it precedes, in the order of development, its own free taking over of itself.¹⁹ This, surely, is part of the significance of insisting that Mary is *Theotokos*, and that the Son, eternally begotten of the Father, was born of the Virgin Mary. The formulation of an orthodox Christology thus becomes central to formulating the distinction between God and the world required by creation.

[O]nly when Christ appeared did it become irrefutably clear that the creature is not simply pure negation with respect to God and thus, cannot be saved simply through mystical absorption in God, but rather—however much he is elevated to share in God’s being, however much he dies to the world—the creature is saved only in the express preservation and perfection of his nature (Balthasar 1988a: 208).

Yet another assumption lies buried in this one. God can be immanent within the created order; he can assume a human nature without detriment either to his divinity or his humanity precisely *because* he infinitely transcends it. God can enter into intimate union *with* the world, in other words, because of his infinite difference *from* it. The implications of this for the ontological constitution of the world itself are enormous, for it follows that being and history, time and eternity, infinity and finitude are not simple contraries in the way that contemporary naturalism, in its univocal notion of being, tacitly presupposes. However, to say this is not to resolve the paradoxes of creation, whether from the side of the world or the side of God, so much

as to introduce them again at a deeper level. For to begin to glimpse divine transcendence and the infinite plenitude of divine being only raises once again the question of how anything other than God is possible.

Trinity and Transcendence

These, then, are the first fruits of the Incarnation, metaphysically speaking. The union of God and the world in Christ discloses God's independence from, indifference to, and transcendence of the world, by which God is so other, to paraphrase Balthasar, as to be non-other. This transcendence is so profound that God is to be able to enter into union with the world, in the canonical words of St. Cyril of Alexandria, without confusion, mixture, or blending. Creation is a necessary presupposition for thinking through the implications of the Incarnation, which, in turn catalyzed the doctrine of *creatio ex nihilo* in its philosophical development.

To say that the doctrine of creation is a function of the doctrine of God is to say that its first task is to articulate and preserve this difference between God and the world. Its chief purpose, in other words, is to deny that God is a *thing* within being, even a very grand thing, which would make "being" the higher term and issue in a notion of divinity as incoherent as it is unorthodox. Insofar as the doctrine of creation is a function of the doctrine of God, it has always been a fundamentally *apophatic* or negative doctrine, insisting upon what God is *not*: not *a* being within being, not a species or a genus, not finite, not composite, not lacking in any perfection and actuality, not therefore an item either within or beyond the universe, and not *really* related, by being or necessity, to the world.²⁰ This negative moment is likewise preserved in the Christological formulations, which do not *define* the hypostasis of the Son or the union of the two natures in this hypostasis so much as to delineate what they are not: undivided and unconfused (ἀδιάρετως καὶ ἀσυγχύτως).

Such *apophatic* clarifications are not simple negations of course. Rather, they are the reverse side of the corresponding *cataphatic* assertion of God's superabundant fullness, a necessary stipulation if we are to conceive of God as "that than which none greater can be thought" and thus avoid the incoherence of subordinating God to a higher term.²¹ We might initially account for the unity of these *apophatic* and *cataphatic* dimensions by taking recourse to Nicholas of Cusa's *coincidentia oppositorum* inasmuch as the negations, by removing all trace of limit, unrealized potency, or composition characteristic of finite existing things, leave a simplicity in which "substance and accident," essence and existence, identity and distinction, and possibility and actuality are convertible with one another in the indivisible unity of infinite act. This is not the infinity of a simple magnitude in the sense that Newton seems to have imagined, nor is it simply an infinity of duration (1962: 136–137). Such "bad infinities" follow from the reduction of being from act to brute facticity. They presuppose that "being" applies univocally to God and creatures, and they remain, in the end, exalted projections of finitude.²² A being of such "infinite" dimensions would still be divisible into spatial and temporal "parts" and would thus be *a* composite, finite being after all, determined in its being with reference to space and time (rather than the reverse). An adequate conception of divine infinity, one

which altogether transcends and does not merely negate these finite distinctions, entails simplicity and indivisibility. God is what he has. His essence is his existence and is thus “everywhere entire” (Augustine, *De Civ.*, XI.5; *Conf.*, I.3).²³ Only thus can God be absolutely infinite; absolute infinity must belong to God alone, and as absolute infinity, God must be infinitely one. As the fullness of being he possesses, or rather *is*, the whole of his being in every part, place, and instance, which is to say that he transcends such dimensions altogether and to such an extent as to be whole and wholly immanent within each of them as their source and precondition. Alan of Lille famously attempted to depict this absolute infinity by characterizing God as “a circle whose center is everywhere and whose circumference is nowhere” (*Theological Rules*, n. 7 [PL 210, 627] in Bonaventure, *Itin.*, V.8). Nicholas of Cusa followed in this line by characterizing God as an infinite circle and thus also a straight line and a triangle, all the while denying (of course) that God is really any of these things (*De Doct. Ign.*, I.16.46ff.). Such simplicity and infinity also form the condition of possibility for the Eucharist, in which the whole Christ (*totus Christus*) is present to all.

What remains after these denials is certainly no thing, but it is most adamantly not *nothing*. For all beings and all becoming, all juxtaposition, qualification, and opposition necessarily presuppose Being and are predicaments of it, as it were, and neither any being nor the totality of beings explains existence as such. Indeed we saw, drawing on Erich Przywara in Chapter I, that being does not even explain itself, and thus leads of its own inner dynamism to the question of God and creation. We shall see this again soon enough. So, to speak of being as act—and God as *ipsum esse subsistens*—is not to speak of some minimally determinate remainder abstracted from existent things. Rather, it is to speak of what is maximally determinate inasmuch as it is the very actuality of things, inasmuch as nothing can be, or be this or that, except as participating in its fullness, and inasmuch as everything invokes it simply by being or being thought (Schmitz 1982: 97ff and Aquinas, *De ver.* I, 21, a.4, ad.4 m).²⁴ To speak of being, and we cannot help but speak of being in speaking of anything whatsoever, is necessarily to invoke, precisely as the actuality of a being, a unity that is not so much a number as the principle of number recapitulated in every number (Ps.-Dionysius, *Div. Nom.*, II, 649b–649c). The presupposition of being and its simple eternal qualities is not optional.

The primacy which the term “being” names, however, is not only that of the first encounter and of judgment’s final resolution. It is also the ultimate horizon within which our intelligence ranges. Our intelligence never ranges so far that it outdistances being... (Schmitz 1982: 98).²⁵

The simplicity and act-fullness of being is why the *coincidentia oppositorum* does not apply to the plenitude of divine being, as Cusanus himself makes quite clear.

Oppositions, therefore, apply only to those things that admit a greater and a lesser, and they apply in different ways, but never to the absolutely maximum, for it is above all opposition. Therefore because the absolutely maximum is absolutely and actually all that can be, and it is without opposition to such an extent that the minimum coincides with the maximum, it is above all affirmation and negation (Nicholas of Cusa, *De Doct. Ign.*, I.4.12).

What simply, infinitely, and absolutely *is* transcends all opposition, for all opposition presupposes being.²⁶ As *ipsum esse subsistens*, then, God has no opposite—not even nonbeing.²⁷ As simply one, the subsistent fullness of being, by definition, can be neither added to nor subtracted from: hence the medieval commonplace that God and the world do not make two, and that God plus the world are not more than God alone. The tradition is replete with assertions to this effect, but we would be hard-pressed to find any more beautiful or compelling than those of Dionysius the Areopagite.

Hence, with regard to the supra-essential being of God—transcendent Good transcendentally there—no lover of the truth who is above truth will seek to praise it as word or power or mind or life or being. No. It is at a total remove from every condition, movement, life, imagination, conjecture, name, discourse, thought, conception, being, rest, dwelling, unity, limit, infinity, the totality of existence. And yet, since it is the underpinning of goodness, and by merely being there is the cause of everything, to praise this divinely beneficent Providence you must turn to all of creation. It is there at the center of everything and everything has it for a destiny. It is “before all things and in it all things hold together.” Because it is there the world has come to be and exists. All things long for it. The intelligent and rational long for it by way of knowledge, the lower strata by way of perception, the remainder by way of the stirrings of being alive and in whatever fashion befits their condition. Realizing this, the theologians praise it by every name—and as the Nameless One.

But now let me speak about the Good, about that which truly is and which gives being to everything else. The God who is transcends everything by virtue of his power. He is the substantive Cause and maker of being, of subsistence, of existence, of substance, and of nature. He is the Source and measure of the ages. He is the reality beneath time and the eternity behind being. He is the time within which things happen. He is the being for whatever is. He is coming-to-be amid whatever happens. From him who is come eternity, essence and being come time, genesis, and becoming. He is the being immanent in and underlying the things which are, however they are. For God is not some kind of being. No. But in a way that is simple and indefinable he gathers into himself and anticipates every existence. So he is called “King of ages,” for in him and around him all being is and subsists. He was not. He will not be. He did not come to be. He is not in the midst of becoming. He will not come to be. No. He is not. Rather he is the essence of being for the things which have being. Not only things that are but also the essence of what they are come from him who precedes the ages. For he is the age of ages, the “predecessor of the ages” (Ps.-Dionysius, *Div. Nom.*, I, 593c–596a, V, 817c–817d).

These paradoxical evocations hint rather poetically at much that will be important in our explication of creation. They will require further specification, but already they go some distance toward clarifying some of the confusions and problems that we noted at the beginning of this chapter with respect to the meaning and intelligibility of creation as a function of the doctrine of God. Dionysius concerns himself with one such difficulty at the very outset of the *Divine Names*, namely, the very possibility of theology.

How can we speak of the divine names? How can we do this if the Transcendent surpasses all discourse and all knowledge, if it abides beyond the reach of mind and being, if it encompasses and circumscribes, embraces and anticipates all things while

itself eluding their grasp and escaping from any perception, imagination, opinion, discourse, apprehension, or understanding (*Div. Nom.*, I, 5, 593a–593b)?

The problem is destined to be misconstrued within the ontological parameters that reduce God to a fact, a hypothetical object whose existence may or may not be proven. The problem as it emerges within Denys' metaphysics is different; it is fundamentally ontological, not epistemological. So too is its solution. God does indeed elude our sense experience, not because he is a hypothetical object whose existence is uncertain but because he is not an object at all. Because he is essentially being, indeed beyond being in Denys' Neoplatonic theology, he transcends the limitations demarcating every finite *ens*. And yet precisely as transcending all things, he is also immanent within them insofar as they themselves have being, insofar as a measure of actuality and self-transcending identity is allotted to them.

All beings therefore participate in transcendent being in the fact that they are at all. This means, on the one hand, that each being is an image of transcendent being (albeit differently) "referring" by its very being to its source. This is why all names refer to God and why Denys urges an "Aristotelian" turn to creation for those who seek God.²⁸ It is also why God is tacitly invoked even in the attempts to deny him. On the other hand, God's absolute transcendence means that any similarity the creature may have to God (and thus any terms shared in common between them) is always encompassed and exceeded by an ever-greater dissimilarity (*maior dissimilitudo*).²⁹ This is why God is also "the Nameless One." We have seen that the conversion of nature to artifice and its corresponding theology brought with it a loss of this analogical understanding, but here we see that analogy, properly understood, is the ultimate metaphysical expression of the unity of the *apophatic* and *kataphatic* dimensions: the transcendent otherness of God calls forth a positive knowledge of God in a form Cusanus called "learned ignorance" (Nicholas of Cusa, *De Doct. Ign.*, I.1). It is why some of the church's most profound theology has been conducted in the evocative, with adoration as its form and goal.³⁰

The plenitude of divine being, on any adequate thought of the matter, must be free of two kinds of compulsion, "external" and "internal." The freedom from external compulsion is partly the work performed in Christian thought by the *nihil*, whose function is to remove any "external" presupposition for the exercise of God's creative freedom. The *nihil* is a very difficult notion to get one's head around, as Heidegger saw, for it is virtually impossible to think of "the nothing" without hypostasizing it into something (1998: 92–96).³¹ The various attempts by contemporary cosmologists to give a nontheological account of creation *ex nihilo*, in terms of "quantum tunneling" in a primal vacuum, for example, bear out this diagnosis.³² Yet, the difficulty in thinking of the *nihil* is really but the reverse side of difficulty in thinking of God alone as *ipsum esse subsistens*. Once the plenitude of divine being is adequately thought, once all external presuppositions for creation are removed, the being of the world is altered as well, becoming utterly gratuitous. As Kenneth Schmitz puts it, the world is, strictly speaking, "not called for" (1982: 32). Creation, then,

is not as such a remedy for some lack, but is rather an unexpected surplus that comes without prior conditions set by the recipient...Creation is to be understood as the

reception of a good not due in any way, so that there cannot be even a subject of that reception. It is absolute reception; there is not something which receives, but sheer receiving (33).

That there can be no “intrinsic” constraint upon the freedom of divine generosity follows from the fact that God’s superabundant fullness can admit no lack. As a consequence, Augustine will insist, paradoxically, that God must create freely—“that he did not create under stress of any compulsion”—and yet, at the same time and for the same reason, that God must create “naturally”: there can be no “motive” for creation beyond the sheer goodness that God is (*De Civ.*, XI.24). Insofar as creation is free, it must be “unnecessary” and “spontaneous,” a matter of gratuitous “decision.” It cannot simply follow “naturally” from the superabundance of the One as in the case of Plotinus. But an arbitrary freedom, one which is not *responsive* to the solicitations of goodness and beauty, is both unintelligible and ultimately *unfree*; for it fails to connect the act with its motive and therefore fails to show how the action is an expression of the agent’s desire. Such indeterminate spontaneity is more like a spasm than an act of volition. So while Augustine insists that God creates without stress of compulsion, he insists at the same time that God “created because his creation was good.”³³ Creation thus implies a paradoxical coincidence of volition, nature, and being in the unity of God’s simplicity. As we shall see, this is but one of the reasons why creation is necessarily a *Trinitarian* act.

The effect of removing these two sorts of presupposition is to render the transcendence of God so absolute that he is at once more distant *and* nearer than he was to the Greeks, and the productivity of divine goodness is now radicalized even beyond what we saw in Plotinus.³⁴ For goodness is now understood not simply as superabundant necessity, the One “spilling over” by nature, as it were, but as the coincidence, indeed the convertibility, of superabundant nature *and* infinite—indeed infinitely free—generosity: *bonum diffusivum sui* (Ps.-Dionysius, *Div. Nom.*, IV, 717c; Aquinas, *ST*, I.73, a.3, obj. 2). This will have enormous implications for how we understand creation from the side of created being. With all presuppositions of worldly being removed, all being and the whole of being is now utterly received from God as a gift. The removal of a recalcitrant material substrate as a presupposition of creation eliminates the Platonic ambivalence about matter. For nothing of being, or indeed nonbeing, falls outside the order of creation insofar as it is at all.

It is here that the difficulty, which the Greeks were never fully able to resolve, begins to make its appearance. We can see it already in Denys’ work, which bears a strong Neoplatonic influence and dates from the late fifth or early sixth century. It is the paradoxical difficulty of affirming an adequate notion of divine transcendence, on the one hand, and the difference between God and the world, on the other. The Areopagite alludes to it when he says simultaneously that God is “the being immanent in and underlying the things which are” and “the essence of being for the things which have being” *and* that “God is not some kind of being” but is “at a total remove from every condition, movement, life, imagination, conjecture, name, discourse, thought, conception, being, rest, dwelling, unity, limit, infinity, the totality of existence.”

The question is this. How do we conceive of the superabundant unity of divine being so as not to render the being of the world and its integrity, novelty, and freedom

as merely apparent? And conversely, how do we conceive of the integrity, novelty, and freedom of created being in a way that is adequate to their reality and yet does not deny the transcendent absoluteness of divine being? On the one hand, to affirm that God is the superabundant fullness of being, we must adhere to the traditional insistence that the world does not add to God. This, we saw, is a crucial *Christological* concern. One must adhere to it in order to formulate the hypostatic union. And yet, on the other hand, how can the world enjoy the integrity of its own being unless it is somehow “more than God”? Indeed, how can we maintain God’s absolute transcendence unless this is the case? This, too, is a Christological concern. Of course, we must understand this “more than” as *inside* of the Son’s generation from the Father. Yet, unless in becoming human the Son receives and offers a new gift to the Father, unless, that is, receptivity as such is a divine perfection not in conflict with impassibility—the Incarnation becomes unintelligible.³⁵ Balthasar goes to the heart of the problem with characteristic perspicacity. “Where can there be a place for the world if God is, after all, ‘the entire ocean of being’ (John Damascene)?” (Balthasar 1990: 262). For

wherever God’s absoluteness and nonnecessitous totality are taken seriously; it seems that the conclusion must be drawn that, to the extent creatures are, were or will be in God, they participate more in being and are more true there than in themselves (Balthasar 1988b: 546).

It should be clear that this difficulty pertains *simultaneously* to both sides of the Creator/creature divide. If it is not resolved adequately, then it becomes difficult if not impossible to avoid regarding the world as simply a fall from or diminution of a more basic unity, and it seems we must resign ourselves to the conclusion that “caused things are deficient [*deficiunt*] in their imitation of their causes” (Balthasar 1988b: 548). We see this tension even in Denys, who manifestly does *not* hold this position. He writes,

In reality there is no exact likeness between caused and cause, for the caused carry within themselves only such images of their originating sources as are possible for them, whereas the causes themselves are located in a realm transcending the caused... (Ps.-Dionysius, *Div. Nom.*, II, 645c).

Such claims safeguard an important truth to be sure—we saw this in Chapter 2—and the tradition has been right in steadfastly maintaining them as an aspect of its insistence upon divine simplicity and transcendence. Yet, if we do not specify them further, we risk condemning finitude and denying that creatures are good not simply as images of God but in their very difference *from* God, or to be more precise, we fail to account for how creatures are good, and are indeed images of the Good, precisely *in* this difference. Not only does this undermine the integrity of the world as world, but by opposing divine unity and created multiplicity we ultimately collapse the real difference between them after all (Hart 2003: 191).

Balthasar reformulates this paradox in a way that points, from God’s side, toward its Trinitarian “resolution.” In the process, he confounds one of the facile assumptions

of contemporary materialists, who often scoff at “creation” on the pretense that it puts an end to wonder and questioning.

Why in fact is there something rather than nothing? The question remains open regardless of whether one affirms or denies the existence of an absolute being. If there is no absolute being, what reason could there be that these finite ephemeral things exist in the middle of nothing, things that could never add up to the absolute as a whole or evolve into it? But, on the other hand, if there is an absolute being, and if this being is sufficient unto itself, it is almost more mysterious why there should exist something else. Only a philosophy of freedom and love can account for our existence, though not unless it also interprets the essence of finite being in terms of love (Balthasar 2004: 143).

This “philosophy of freedom and love” pertains, albeit differently, to both sides of the Creator/creature divide because an adequate conception of “the absolute” requires us to “interpret the essence of finite being” as well as divine being in terms of love. It requires us to regard the existence of the world as a matter of “pointless” generosity because God, who is the superabundant fullness of being, cannot “act for an end” otherwise lacking in creating the world. This means that created being, considered in itself, is not a means to an end. It is intrinsically and not instrumentally good. To be admitted into being is to be granted a good of one’s own, as it were.³⁶ Our task in Chapter 8 will be to spell this out and to show *how* this gratuity is visibly a part of being’s very structure.

Our concern at present is to understand how “a philosophy of freedom and love” helps us to “resolve” the paradox *ex parte dei*. It is not enough simply to insist on the utter transcendence and fullness of the divine being. The Greeks too asserted divine transcendence and claimed that God was beyond opposition.³⁷ However, because they thought the perfection and simplicity of act excluded difference and transitivity, they

never succeeded in conceiving of a production of things complete and integral not only as to their order and their form, but also as to their being; so they taxed their ingenuity to assign to them a form of production from some principle both different from themselves and other than the void (Gilson 1969: 168).³⁸

This meant, in the end, that the Greeks never succeed in thinking transcendence completely enough.

In order ultimately to secure transcendence, it is necessary to reconceive the perfection of act, its unity and indivisibility, so as to render it both “transitive” and self-contained at once, so that it *includes* infinite difference, and indeed receptivity, within infinite perfection, unity, and simplicity.³⁹ This overcomes the Greek ambivalence over difference by making possible a *positive* account both of that difference by which each existent thing differs from God and that whereby it differs from its own essence (Walker 2004: 457–479).⁴⁰ Plotinus made progress in this regard with his advance beyond the undifferentiated unity of Aristotle’s *noesis noeseos*, but the incapacity of the One to receive from *Nous*, which Plotinus takes as a mark of its perfection, is rather an index of the residual juxtaposition of unity and difference, and thus of the failure to arrive at a fully adequate notion of transcendence.

The doctrine of the Trinity reconciles unity and difference *within* the simple unity of the Godhead, transforming the very nature of act in its immanent perfection. This allows us to “resolve” our paradox without destroying its paradoxical character; for it makes it possible to conceive of the world as somehow “more than God,” precisely in virtue of its being *in* God, without this compromising the superlative fullness of divine being. This reconciliation of unity and difference is achieved through the distinction between person and essence, through which the divine *esse* itself is understood as infinite love, not simply in relation to us, but essentially, though obviously, not at the expense of understanding God’s essence in terms of other divine attributes such as mind or wisdom.⁴¹

Let us momentarily shift our attention from the historical revelation of God’s triunity in Christ and rather ask how this illuminates philosophical reflection on the meaning and structure of love. That the doctrine of the Trinity explicates St. John’s claim that God is love is a conviction with a long and noble pedigree within the Christian tradition. Of course, the tradition has not spoken with one voice on this point, and the arguments for these conclusions have varied, to be sure, depending upon the historical circumstance and polemical occasion.⁴² The crucial points, for our purposes, are how understanding the divine essence as love explicates the traditional transcendental attributes of being—unity, goodness, beauty, truth—and how love is a form of unity that *requires* difference, with the unity of *infinite* love implying *infinite* difference. Richard of St. Victor, in the twelfth century, argued that we can only predicate absolute goodness—and ultimately divinity—of God if we can predicate love essentially of God. For the fullness of being, he maintained, must by definition, include the fullness of goodness. The fullness of goodness, which is diffusive or generous by its very nature, must include the fullness of charity, absolute self-donation forever and without remainder. And the fullness of charity can only come to fruition when the lover and beloved transcend themselves and enjoy their love with a third (Richard of St. Victor, *De Trin.*, III). Richard held, along with the rest of the tradition, that it would not suffice to think of God’s love simply in reference to the world as this would imply once again a “real relation” to the world, that God “needs” the world in order to be God. A proper understanding of divinity requires an adequate conception of God’s difference from the world, beyond all opposition.⁴³ We can only think this difference from the world along with God’s “indifference” *to* the world; and only the fullness of love sufficient unto itself—which is to say, the simultaneity of free generosity, reciprocity, and delight given in the differentiation of Trinitarian *personae*—secures this freedom for thought. God is love, not first in reference to us, but in essence.

The insistence upon difference as a necessary ingredient of love has acquired more emphasis of late, as the need to defend Christianity against the charge of tritheism has waned and as modern culture’s confusion over the nature of love and its place in the order of things has increased.⁴⁴ Even so, Christian tradition has insisted in every historical period on *both* the simplicity of divine unity *and* the difference between the divine persons, denying in negative terms all accidents and all traces of composition and affirming in positive terms the identity of essence and existence in God—God *is* his attributes.⁴⁵ Richard himself insists on both points and takes a great step toward clarifying the meaning of the *persona* when he defined a divine person as “the incommunicable existence of the divine nature,” as we discussed in Chapter 2 (*De Trin.*,

IV.6). “Incommunicable existence” denotes the irreducible distinction between the persons and what is “proper” to each, while “divine nature” denotes the simple unity of the Godhead and the one nature that each of the persons is. Thus, the tradition has always maintained that the Son and Holy Spirit are all things that the Father is. In God there is one goodness, one beauty, one power, and one wisdom. These are not simply “attributes” of the one God such that each of the Trinitarian persons “partakes” of them. This would compromise divine simplicity by making each of the persons “a subject in relation to his own goodness” (Augustine, *De Trin.*, VI.5.10). Rather, these attributes are convertible with each other and with the very being of the one God, and yet each of the persons fully and completely is these attributes and this being such that each is the whole of the divine essence. One considered “alone” is not less than two together, nor the three together more than one considered singly, though this is obviously an abstraction since the Trinitarian *personae* are constituted as such in relation to each other, and there was thus never a “time” in which any of the divine persons was without the others. Because of this, the works of the Trinity *ad extra* are indivisible. And yet the tradition has insisted just as adamantly upon the irreducibility of the persons to each other, as Richard’s definition attests. There is one God: Father, Son, and Holy Spirit. The Son is all things that the Father is, and yet he is *not* the Father. Though he is adamantly insistent on the indivisibility of the divine works *ad extra*, Augustine is equally insistent on the force of this “not”:

Some persons, however, find a difficulty in this faith; when they hear that the Father is God, and the Son God, and the Holy Spirit God, and yet that this Trinity is not three Gods, but one God; and they ask how they are to understand this: especially when it is said that the Trinity works indivisibly in everything that God works, and yet that a certain voice of the Father spoke, which is not the voice of the Son; and that none except the Son was born in the flesh, and suffered, and rose again, and ascended into heaven; and that none except the Holy Spirit came in the form of a Dove (*De Trin.*, I.5.8).

How then does love make sense of this coincidence of unity and distinction? The key lies in understanding, on the one hand, what it means to say that the one divine essence is *essentially* love—though again a similar analysis could be worked out in terms of other divine predicates—and understanding, on the other hand, the nature of the persons in relation to this essence. We have already denied, with Augustine and the Fathers, that the persons participate or “partake,” of the one essence, which would give the unity of essence a certain ontological priority over the distinction of persons. Nor can it be that the persons are freestanding subjects who, then, in a subsequent ontological moment, enter into love. Rather to say that each of the persons is identical to this essence and that this essence *is* love is to say that the persons are constituted as such precisely *as* acts of self-donation, self-reception, and delight, and thus precisely in relation to one another. This is why Aquinas will refer to the *personae* as “subsistent relations” (*ST*, I.29, a.4). Joseph Ratzinger draws out the implications of this definition.

In God, person means relation. Relation, being related, is not something superadded to the person, but it *is* the person itself. In its nature, the person exists only *as* relation. Put more concretely, the first person does not generate in the sense that the act of generating

a Son is added to the already complete person, but the person *is* the deed of generating, of giving itself, of streaming itself forth. The person is identical with this act of self donation (Ratzinger 1990: 444).

The Father is eternally Father precisely *as* donating his being without remainder to the Son; the Son is Son precisely in receiving himself, which is to say in receiving this *act* of self-donation from the Father, and thus also as offering the being given in love from the Father back to the Father in an act of mutual embrace (Augustine, *De Trin.*, II.1.2). Because God is what he has and gives what he is, this mutual embrace, this *vinculum amoris*, which is, in a sense, the distance simultaneously uniting and distinguishing the Father and the Son, is no less the divine essence than the Father and the Son are, and thus wholly a third person. Thus, it is that Augustine is able to distinguish between the generation of the Son from the Father and procession of the Spirit *principaliter* from the Father but also from the Son (*De Trin.*, XV.17.29, XV.26.47, XV.27.48). And it is why he is able at one and the same time to maintain both the distinction between persons *and* their simple unity. Because each of the *personae* is identical to the essence which is love, because each is constituted as being with and for the other, and because love itself is threefold, “Each are in each, and all in each, and each in all, and all in all, and all are one” (VI.10.12).

We can specify this still further in terms of the transcendental attributes of being, showing at the same time how the perfection of divine love accounts for their convertibility. Because the Father eternally gives the whole fullness of the divine being in the generation of the Son, the Son is the perfect image of the Father, and is on this account the beauty of the Father.

For if an image perfectly fills the measure of that which it is the image, then the image is made equal to that of which it is the image, not the latter to its own image. And in respect to this image he has been named, form, I believe on account of the quality of beauty, where there is at once such great fitness, and prime equality, and prime likeness, differing in nothing, and unequal in no respect, and in no part unlike, but responding exactly to Him whose image it is (Augustine, *De Trin.*, VI.10.11).

The divine persons are “in themselves infinite” because each is identical with the one infinite essence of God. However, if each person, as “the incommunicable existence of the divine nature,” is infinite “in himself,” then the *personae* are not simply infinite in their identity with the infinite divine essence but are also in their difference from one another because this essence is love (*De Trin.*, VI.10.11–VI.10.12). For just as the Son is eternally *from* the Father, so too must he be eternally *not* the Father. Yet, the infinite difference between the Trinitarian *personae* is the form of their simple and infinite unity *as* love. The fact of this “not,” and the fact that what is given in the divine being is the *act* of self-donation itself, means that the persons are “mutually determined to each other” (VI.10.11–VI.10.12). Because this mutual determination of the Father and his image is the act of mutual self-donation and reception and because the Son as image of the Father is beauty infinitely desirable, their mutual embrace and indwelling is one of infinite delight.

Therefore that unspeakable conjunction of the Father and his image is not without fruition, without love, without joy. Therefore that love, delight, felicity or blessedness, if indeed it can be worthily expressed by any human word, is called by [Hilary], in short Use; and is the Holy Spirit in the Trinity, not begotten, but the sweetness of the begetter and begotten...For in the Trinity is the supreme source of all things, the most perfect beauty, and the most blessed delight (VI.10.11–VI.10.12).

Entailed within this *delectatio* are all the transcendental attributes of being. The reality of love as something other than a disguise for self-love (and thus ultimately power) hinges on the objectivity, the truth, of goodness. They rise and fall together. This is because the veracity of love is only guaranteed by a goodness which not only delights and satisfies desire—which it *should* if goodness is indeed objective⁴⁶—but which is objectively irreducible to that satisfaction. Love is indeed the very acknowledgment of the objective truth of goodness, which calls the lover to stand, ecstatically, outside of himself. For this to occur, the truth of goodness cannot *simply* originate in the lover and his desire, though there is obviously a sense in which a father, for instance, is the origin of his beloved child and a lover, simply as an agent, is a source of his love for the beloved.⁴⁷ Even so, a father who loves his child, rather than using his child to love himself, does not desire above all that the child be *his*. Indeed he can only really “possess” the child in love through dispossession, through making room for the child’s own proper freedom. Rather, he desires above all that the child freely *be*, and this because the child’s being is inherently good for its own sake and not simply because it pleases the father. In the same way, the objective goodness which delights and moves the lover cannot simply originate in the lover, as if this goodness derived from the fact that he loved it; rather, it must manifest itself to the lover, delighting him and eliciting his love as a response. This goodness must not only be true but beautiful. Indeed, transcendental beauty is the showing forth of goodness and truth in their unity. It is *veritatis splendor*.

The convertibility of divine love and divine being thus implicates the transcendental attributes of being in dynamic circumincession with one another inasmuch as the intentional *ecstasis* of one divine *persona* toward repose in the goodness of another is prompted by delight in the other’s beauty, and inasmuch as this very *ecstasis* acknowledges the authority of an “evidentiary” claim and therefore affirms the true.⁴⁸ It is precisely this internal gift and provocation among the Trinitarian *personae*, wherein each simultaneously gives to, seeks, and delights in the other, that allows us to say of the transcendentals what Augustine said of the *personae* themselves: “Each are in each, and all in each, and each in all, and all in all, and all are one” (*De Trin.*, VI.10.12). Dionysius makes this explicit, seeing in the unity of divine *eros* and *agape* “a capacity to effect a unity, an alliance, and a particular commingling in the Beautiful and the Good” at the productive font of being.

And, in truth, it must be said too that the very cause of the universe in the beautiful, good superabundance of his benign yearning for all is also carried outside of himself in the loving care he has for everything. He is, as it were, beguiled by goodness, by love [agape], and by yearning [eros] and is enticed away from his transcendent dwelling place and comes to abide within all things, and he does so by virtue of his supernatural and ecstatic capacity to remain, nevertheless, within himself (Ps.-Dionysius, *Div. Nom.*, IV, 712A–712B).

By explicating the divine essence as love, the doctrine of the Trinity reforms the Greek conception of act, making it at once self-contained and transitive, active and receptive, without compromising its immutable simplicity. It therefore reconciles divine simplicity and infinite difference, accounts for the paradoxical unity of volition, nature, and being, and explains the unity and convertibility of the transcendental attributes of being. In so doing, it secures God's absolute transcendence and "freedom of indifference" with respect to the world and the sheer "pointless" gratuity of the world itself. All of this represents an advance in two directions at once beyond Greek metaphysics and its ambivalence toward difference, differentiating more radically between the world and its transcendent *arche* and affirming the positive goodness of the singular with respect to its universal. Still, in order to grasp more clearly how the Christian understanding of creation overcomes this ambivalence and in order to better understand, from God's side, how there could exist something "more" than "all," it is necessary to press further the implications of this reconciliation of simplicity and difference within the unity of God.

We have insisted that this reconciliation of unity and difference is effected through the identification of the divine essence with love, a claim which presupposes that difference is a necessary ingredient of love. We should now inquire more deeply into why this is the case. Love binds and thus effects a unity by causing the lover to dwell in and abide with his beloved. Precisely in this way, love acknowledges a goodness that satisfies desire but is not exhausted in the satisfaction, and thus a truth irreducible to that desire. It is this that makes perfect love generous and responsive at once, erasing the opposition between action and reception, between being in oneself and being for another. But it also means that for the veracity of love to be preserved, a certain irreducible difference between the lover and beloved must be sustained even in their unity, indeed as the form and condition of their unity, lest ecstasy be replaced with absorption and love for the other becomes merely self-love. What is true of love is also true of knowledge in its traditional sense, as a kind of communion between knower and known.⁴⁹ There must remain a certain difference between knower and known, and the object of knowledge must maintain a certain "incommunicable" excess to knowledge even in the unity of thought and being, in order to sustain the distinction between knowledge and appearance (Balthasar 2000b: 80–107). Moreover, without this equi-primordially of unity and difference, without a certain difference and distance between the knower and known, there would be not communion but only the noncognitive simplicity of monadic self-presence (2000b: 80–107). So also the communion of love requires that the other be irreducible to me as the very condition for our union, for it is precisely the goodness of this other that the lover adores. He wants, above all, that this goodness should be, and it is precisely the objective, irreducible beauty of this otherness that provokes the lover to make a gift of himself. The infinity, indeed the infinite difference, of each of the Trinitarian *personae* is not antithetical to the unity and simplicity of love but is the very form and condition of this unity.

Thus on Balthasar's reckoning, the very possibility of understanding the divine being as love depends upon a mutual "letting be" of the divine persons which coincides with their infinite freedom of self-donation and which is distinguished according to the manner of relation, generation, filiation, and spiration, proper to each person. This mutual letting be is the Father's eternal self-giving, the Son's eternal act of

“being begotten,” and the Spirit’s own expropriation as the “we” of the Father and Son. It is dependent on the real irreducibility of the Trinitarian *personae* to each other, even the “transcendence” of each person with respect to the others, which is, at the same time, the very form of their mutual indwelling (*perichoresis*). Balthasar thus makes the daring assertion that “God is always greater than himself on the basis of his triune freedom,” without this implying that God is ever less than himself or ever less than *ipsum esse subsistens* (1992a: 258). Rather, it is because he takes the classic Trinitarian stipulation that the Son is all things the Father is save he is *not* the Father and gives the “not...an infinitely positive sense” (261). He speculates that the persons “are perfectly transparent to one another, and they possess a kind of impenetrable personal mystery,” even going so far as to say that in God “there is no end to being surprised and overwhelmed by what is essentially immeasurable” (258).

Augustinian *delectatio* helps us to understand this “surprise” in a way that does not compromise the superlative fullness of divine being. We have already discussed the convertibility of truth and beauty, love and knowledge in the simplicity of the divine *esse*, how each entails and implies the other. We have seen that *delectatio* marks the claim beauty makes on desire and is thus a crucial mediating term, both for understanding a love that is at once donative and responsive and for grasping the role of the third *persona* within the Trinitarian circumincession. We have, therefore, seen that the love and vision constitutive of God’s life as Trinity simultaneously takes the form of a free and generative self-donation and a gaze upon and desire for an infinite beauty which has always already imparted itself to, delighted, and moved the gazer. It imparts and delights precisely because it is beauty. Because it is infinite, these provocations and this bliss are without end. To say that the persons are infinite, beautiful, and intrinsically delightful to one another is therefore to say something paradoxical. If God’s self-knowledge is convertible with this love of the beautiful and coextensive with his being, and if this beauty and this being are infinite, then God’s self knowledge—while full, complete, and lacking in nothing—is nevertheless infinite. In being infinite *and* beautiful, or rather, in being infinitely beautiful and delightful, the divine being always retains something of the character of a surprise which is *not* the reverse side of a lack. This surprise, I would submit, is the condition upon which God can eternally *be* delight, the condition upon which the beauty Augustine praises in the *Confessions* can remain ever ancient *and ever new*. Without positing any lack or deficiency in God’s perfect knowledge of himself, which is to say God’s being, we may nevertheless surmise that the more God sees and loves of God, the infinitely more there is to see.

It is therefore because “the hypostatic modes of being constitute the greatest imaginable opposition to one another” that “they can mutually interpenetrate one another in the most intimate manner conceivable” (Balthasar 1992a: 259). Infinite love coincides with infinite difference. Here at last we begin to see, on God’s side, the “resolution” to the paradox of creation: how the world can have being “in its own right,” be somehow “more than God,” and be an image of divine goodness and love in its very difference from God, without any of this compromising the transcendent plenitude of the divine being. Because each of the divine persons is the divine being and because all are therefore “infinite in themselves,” they are infinite in their very difference from each other. In other words, their difference is infinite and infinitely constitutive of their paternal, filial, and pneumatic (spirated) identities. Again, this

constitutive difference cannot be the empty distance of a lack, a void to be crossed by a Herculean force of will. Like all that God has, the difference and distance internal to God is simply God himself, the third person of the Trinity, that delight of both the Father and the Son which is intrinsic to the reciprocity of their mutual indwelling. It does mean, however, that the difference internal to God is the greatest difference of all—“the greatest imaginable opposition” in Balthasar’s words. It is infinitely greater even than the difference between God and the world, if we can speak this way, and we must speak this way if indeed God lacks a “real relation” to the world as the Thomists say. In a certain sense, the difference internal to God must be, from God’s “point of view,” the only real difference, inasmuch as God’s own essence and not the world is the cause of God’s knowledge, and inasmuch as “he sees other things not in themselves, but in himself” by *being* his knowledge and knowing all the ways that his being can be participated in (Aquinas, *ST*, I, 14.5, resp).

This is the condition upon which the union God effects with the world “is not realized ‘in spite of’ our listing difference from him, but ‘in’ and ‘through’ it” (Balthasar 1988a: 96). It is why our difference from God is itself an image of God. It is why the Son, in assuming flesh, can receive and offer a new gift to the Father from inside his original generation *from* the Father. And it is why from the side of God we can regard creation *ex nihilo* as generating a real addition to being from inside of being, a difference that is even somehow “more” than God, without for all that compromising God’s transcendent otherness or the superlative fullness and simplicity of divine being. Creation can be “more than God” in the infinite beauty of the Son and the infinite delight of the Holy Spirit, because God is always “more than himself,” comprising all possibility in his infinite actuality, without ever being less than himself.⁵⁰ Thus, “the transition from infinite freedom to the creation of finite freedoms (with all this implies) need not constitute the ‘ultimate paradox’ of thought” (Balthasar 1992a: 261). “For the infinite distance between the world and God is grounded in the other, prototypical distance between God and God” (1992a: 266). It is this positive difference entailed in love and inherent in God who is ever-greater that makes it possible for God to establish and abide in a world that is not-God, replete with its own being and meaning, to receive, though he needs nothing, creation’s finite offering in the Son’s eternal self-offering to the Father, and even to accompany the world to its “wits’ end” in his kenotic descent into the dereliction and hell of Holy Saturday (Balthasar 2000a: 13). Neither ceasing to be himself nor needing to find himself, God in his freedom of self-abandonment is able to encompass and embrace, and in a sense even *constitute*, what is not God.⁵¹

What Creation Is Not

We have said that the “paradox of creation” pertains to both sides of the Creator/creature divide. From “God’s side” we have now shown, on the basis of God’s self-revelation as triune love, how it is possible for there to be something “more” than All, namely, the world. And we have suggested, on the basis of this same plenitude, that this requires us to conceive of being as gift. It still remains to be seen how the “more” of this gift is visible in the ontological structure of worldly being. That is a subject for

Chapter 8. However, now that we have clarified key aspects of the doctrine of God, articulating the difference between God and the world and showing that both Christology and Trinitarian doctrine are essential to grasping this difference, we should further clarify the act of creation in distinction from natural processes, and the doctrine of creation in its distinction from scientific forms of explanation, not least by saying what the act and doctrine of creation are *not*. This is simply to reiterate the understanding of the analogy of being, the abiding difference, disclosed in the hypostatic union of Christ—that any similarity of the creature to God, and any terms employed in common between them, is transcended by an ever-greater, and ultimately unspeakable, dissimilarity (*maior dissimilitudo*).⁵² This negative way is, therefore, entirely appropriate. If the *via negativa* is an integral aspect of the approach to divine being, then it follows that the doctrine of creation, which is a function of the doctrine of God, must also be an *apophatic* doctrine, not because of some false Kantian humility about the limits of reason but because of the *kataphatic* fullness of divine being, which remains forever in excess to what can be thought or said about it. As a matter of principle, then, the doctrine of creation aspires not to supply a “theory of everything” so much as to leave thought open to what always exceeds it and thus to insist that such a theory is neither desirable nor possible.

Modern science in its historical and metaphysical foundations harbors an extrinsicist theology and a mechanistic ontology which reduce God from *actus purus, infinite actuality, or ipsum esse subsistens*—all metaphysical designations for the act of love which is God’s triune being—to a finite object extrinsically juxtaposed to a world evacuated of the meaning and interiority of its own being, a world whose natural and existential autonomy is reduced to instrumental autonomy. This is the theological and metaphysical basis from which to imagine the *act* of creation as a kind of fabrication in competition with natural processes and forces and the doctrine of creation, now reduced to a question of *temporal* origins, as an explanation belonging to the same order as those of the natural sciences and in competition with them.⁵³

Our treatment of divine transcendence and the Trinitarian nature of the divine *actio* shows why this theology makes no discernible theological sense. Such a misunderstanding is ruled out in advance in at least two distinct ways. First, true difference *from* the world entails real transcendence *of* the world. Real transcendence of the world entails the dual stipulation that God be radically immanent *within* the world—though in a way that is “unmixed” and “unconfused”—and that God’s immanence does not compete with the world’s own integrity and processes but rather establishes them and lets them be in their very difference from him.⁵⁴ Second, we have already seen that this difference requires that all likeness of the world to God be transcended by a *maior dissimilitudo*, and that consequently all terms shared in common between them be predicated analogously, that is, in a way that is cognizant of both this likeness and this ever-greater difference. Analogy in the ontological sense is simply the form and structure of creation as disclosed in Christ. We will examine this point more thoroughly in Chapter 8. Analogy, in the grammatical or linguistic sense, is simply reason’s acknowledgment of God’s infinite otherness. It is the mirror inverse of that sense of analogy that we saw emerging in Descartes, and Newton, and Paley, which expresses likeness in a simple parallelism and which signifies that a true sense of God’s otherness to the world has already been lost. And it means that

analogies taken from design or manufacture, like Aristotle's analogy between nature and art, are apt so far as they go, but they do not go very far.

Creation, properly understood, designates this difference and rules out a mechanistic or artificial misunderstanding in at least two ways: one from God's side, the other from the side of the world. Since God is *ipsum esse subsistens*, the fullness of the self-subsistent act of being, the "act" of creation can realize no unfulfilled potentiality in God. This was the meaning of Aquinas' denial that God acts for an end in creation, considered from God's side.⁵⁵ As *actus purus* already, God therefore needs to "do" nothing further than *be* in order to cause the world. God creates, as Dionysius says, "by merely being there" (*Div. Nom.*, I, 593d). On the side of the world, creation cannot be a qualification of the world—a force, process, or something *done* to it—for the simple reason that there can be nothing, prior to that "surplus" of actuality that *is* the creature, upon which an extrinsic mechanism might act. This difference between creation and all other forms of immanent causation is the deep reason why, prior to modernity, Christian thinkers understood the analogy of fabrication or artifice to be, at best, remotely apt for understanding creation.⁵⁶ Like all other changes, these processes are "from something" to "something" and therefore presuppose being; whereas creation presupposes precisely nothing and is responsible for the total being (*totus esse*) of a thing. Creation is simply said to have occurred when anything genuinely *new* appears, which, as we shall soon see, happens to be every single existent thing whatsoever.

Denying, therefore, that creation can be some kind of action, passion, motion, or change, St. Thomas defines creation as a nonreciprocal *relation* of dependence of the effect upon the cause. This relation is a certain "letting be" on the part of God and a certain reception of being *as act*, not *by* the creature but *as* the creature. It is a receiving, as Kenneth Schmitz put it, "that comes without prior conditions set by the recipient... It is absolute reception; there is not something which receives, but sheer receiving" (1982: 33).

This means that the reception of being through the relation of creation is not a secondary and extrinsic qualification of the creature that could somehow come into conflict with the creature's "natural" integrity. Creation is of a different order altogether from all such processes and modifications. Rather, it is an intrinsic and constitutive relation through which the creature is gratuitously established *in* its integrity. As such, this relation is foundational for and recapitulated within all other relations that the creature may undergo.⁵⁷ This is essentially what Augustine meant in claiming that the transcendent God is more interior to the creature than he is to himself (*interior intimo meo et superior summon meo*) (*Conf.*, III.6.11). And it is what Aquinas means in saying that being, paradoxically common to all things and incommunicably proper to each thing, is more intimate and more interior, "than those things by which being is specified" and that God, as the giver of being, is present "in all things, and innermost" (*ST*, I.8.1).⁵⁸ The point is put with characteristic profundity by Henri de Lubac. While the analogy of a parent giving a present to a child is perhaps the best human thought can muster for expressing this profound gratuity and interiority of this gift of being,

[It nevertheless] would not adequately express, in all its force, the radical gift of being which God has given me (inevitably we fall back into this language) by creating me. For

it is a gift totally interior to me; nothing is left out of it, and nothing of myself is without it. It is incomparably more a gift than any outward, additional gifts which may later be given me by men. There is no proportion between them; as an analogy they are infinitely inadequate (de Lubac 1998: 77).⁵⁹

“As long as a thing has being,” Aquinas writes in the *Summa*, “God must be present to it, according to its mode of being” (*ST*, I.8.1, resp.). If creation is an intrinsic and constitutive gift, then the immediacy and interiority of God’s agency to the creature does not negate but rather constitutes the creature’s *own* agency as its own.⁶⁰ Natural beings and processes have their own freedom and integrity not in spite but just *because* God is immediately present to the world, indeed closer to it than it is to itself, granting it the *esse* through which it is able to be all that it is. Aquinas will therefore say that

the same effect is not attributed to a natural cause and to divine power in such a way that it is partly done by God, and partly done by the natural agent; rather, it is wholly done by both, according to a different way, just as the same effect is wholly attributed to the instrument and also wholly to the principal agent (*Contra gent.*, III.1, III.70, III.8).

All of this precludes our imagining creation as some mechanism or process interposed between God and the world, much less as some force or process that violates the world’s natural autonomy and integrity. If God creates *ex nihilo*, which is to say if God is God and if he creates at all, then he creates immediately: “*non potest aliquid esse medium inter creatum et increatum*” (Aquinas, *De ver.*, 8.17). So Aquinas will say that creation in the active sense is simply God himself with a certain rational relation to the world while creation in the passive sense is simply the world with a certain real relation to God.⁶¹ Since God is already *actus purus*, and since what is received in the gift of creation is a share in the fullness of being as *act*, all of the “action,” as it were, appears on the side of the world. Or rather, it appears *as* the world. Creation is thus not an event within the world, but the event *of* the world itself: the novel appearance—novel even to God in a certain sense—of a gratuitous “surplus” of being that is somehow not God. This, presumably, is what David Burrell means when he says that the relationship expressed by creation “makes its appearance within the world as we know it and yet does not express a difference within that world” (1986: 20).⁶² To “see creation,” then, is not to isolate empirically or experimentally some qualification of the world. It is to see the world itself more deeply and comprehensively.

If the *act* of creation and natural processes and mechanisms are not mutually exclusive alternatives, then neither are the doctrine of creation and the explanations of the natural sciences. To the contrary, we argued in Chapter I that the “legitimate autonomy” of the sciences *follows* from the doctrine of creation and the world’s irreducible difference from God. The world is really distinct from God, with its own integrity and causal processes that can and must be the subject matter of the various sciences. Just as the being of the world is not reducible to the being of God, so too are the various sciences irreducible to theology. However, just as the world’s autonomy is not truly established in hostility or indifference to God but in its intrinsic and constitutive relation to God, so too is the legitimate autonomy of the sciences realized not in illusory independence from or indifference to theology but in openness to the ground of its own possibility. The freedom of metaphysics and the sciences not to be

theology is itself theologically granted, not of course, in a juridical sense by theologians and ecclesiastics, but by the metaphysical and theological truth of the created order itself, which gives the sciences their being and subject. Our argument, therefore, is not merely an argument for the peaceful coexistence of theology and science. Science and theology always already coexist anyway *within science itself*. We have ample evidence of that. The argument, rather, is that science needs an adequate metaphysics and theology in order to be science, in order to be true to its own nature and to avoid reductively falsifying its own objects.

Now we can see more clearly the reason why. The doctrine of creation does not seek to answer the question that science, in its positivism, would pose to it. This is not a defect but a matter of positive theological principle. Admittedly, it cannot even fully answer what Heidegger regarded as the ultimate philosophical question—why something rather than nothing?—insofar as the fullness of God’s being as *ipsum esse subsistens* leads us to deny that God acts for an end in creation to obtain something otherwise lacking. The act of creation does not supply a process or a mechanism for the being of the world, a *vera causa* in the Herschelian sense. The doctrine of creation does not therefore seek to explain *how* the world came to be in any scientific sense of the word “how.” Rather, it tells us what the world *is*.⁶³ The question of creation is therefore a question of *ontological* rather than temporal origins, which means that it is a question of the ontological structure of the world not just simply in so-called Planck Time, but at every moment of its existence.⁶⁴ Simon Oliver is thus right to insist that

Creation *ex nihilo*—the doctrine that creation, at every moment is of nothing—as such privileges no *particular* temporal instant as revealing more acutely the nature of the cosmos as suspended over the *nihil* (2010: 191).

Following Aquinas, we have distinguished between creation in the active sense of God himself and creation in the passive sense of the world in its relation to God. To ask to see creation in the active sense is to ask to see that which is essentially invisible, if only because it is hypervisible. It therefore takes a negative form this side of the beatific vision.⁶⁵ We have said that seeing creation in the passive sense is not a matter of seeing some qualification of the world but a matter of seeing the world itself more deeply and comprehensively. To retrieve creation, therefore, is, on the one hand, to retrieve the doctrine of God from the idolatrous natural theology presupposed by modern science in its founding gesture and exemplified, above all, by Darwinian biology, and it is to retrieve the world from the endemic reductionism of a pervasive mechanistic ontology. Retrieving creation, then, means retrieving the ontological question suppressed by positivist science and its reduction of being from act to brute facticity. In order to achieve this, we must revisit the “paradoxes of creation,” this time from the side of the world.

Notes

- 1 A great many commentators have noted how materialism is the *de facto* religion of naturalists. For a catalog of the metaphysical commitments of orthodox neo-Darwinians, see Cunningham (2008).

- 2 Moreover, we have already noted that even atheism's dismissal of the subject of God is only apparent, that in reality it represents a form of man's concern with the question of God, a form that can express a particular passion about this question and not infrequently does (Ratzinger 2004a: 104).
- 3 This is merely to deny, once again, that the empirical, experimental, and mathematical methods of the sciences can be distinguished as scientific by their exclusion of operative metaphysical and theological principles. Since this is never the case, we do better by understanding the nature of scientific reason and abstraction and embracing the intrinsic relationship between these methods and the metaphysics and theology that they never, in fact, do without. We will take up this task in Chapter 9.
- 4 The positive definition of grace can only be given through grace itself. God must himself reveal what he is within himself. The creature cannot delimit itself in relation to this unknown reality. Nor can the creature, as a theologically understood "pure" nature, ever know wherein it specifically is different from God (Balthasar 1992: 279).
- 5 On the difference between Catholic and Protestant nihilisms, see Grant (1969), pp. 15–40.
- 6 "*Naturale est quidquid perinet ad naturam aut constitutive, aut consecutive, aut exigitive*" (Lecher 1940: II; 344 cited in Balthasar 1992: 275).
- 7 See Balthasar (1988a), pp. 44–73, 207–275.
- 8 See also Hart (2003), pp. 188–192.
- 9 This is not to deny that there are Darwinians, Theodosius Dobzhansky comes to mind, who opposed eugenics and turned their considerable intellectual resources toward refuting eugenics from within Darwinian theory. It is to point, nevertheless, to the deep resources that Darwinism has afforded to both the old and new eugenics movements, and it is to suggest that the Darwinian conception of the organism as an artifact is inherently eugenical despite the subjective dispositions of this or that scientist. See Depew and Weber (1997), pp. 193–215, 243–301.
- 10 See Ratzinger (1995), pp. 15–18.
- 11 See Ratzinger (2004b), pp. 162–183.
- 12 The Word became flesh: we have become so accustomed to this expression that we are no longer struck by that enormous divine synthesis of apparently irreconcilably divided elements, into the understanding of which the Fathers found their way step by step. This is where the genuinely new element of Christianity was, and still is, to be found: that element which seemed to the Greek mind absurd and unthinkable. What is said here does not spring from some particular culture, Semitic, for instance, or Greek, as people nowadays repeatedly and thoughtlessly assert. It runs counter to every cultural model known to us. It was just as absurd for the Jews as it was, on quite different grounds, for the Greeks, or for the Indians, or, come to that, as it is for the modern mind, for whom this synthesis of the phenomenal and religious spheres appears quite unreal and who therefore renews the attack on it with all the self-consciousness of modern rationality. What is said here is "new" because it comes from God and could only be brought about by God. It is something entirely new and strange to any and every culture, throughout history, into which we can enter in faith, and only in faith, and which opens up for us entirely new horizons of thought and life (Ratzinger 2003: 20–21).
- 13 This is neither to conflate grace and nature nor to deny the declaration of *Dei Filius* II, 3004 that natural reason can have knowledge of God as origin and in apart from faith. It is rather in the line of development proposed by Pope John Paul II in *Fides et Ratio* 80, and it will be clear once I have articulated the metaphysics of creation that I accord *greater* scope to reason than the neoscholastic perspective from which *Dei Filius* would typically be invoked.

- 14 These are not equivalent, of course. But renunciation has on occasion taken this tone in Christian practice, due in part to its relation to stoicism. See Hanby (2003), pp. 106–133.
- 15 From the moment that Chalcedon, in its sober and holy wisdom, elevated the adverbs “indivisibly” (ἀδιαιρέτως) and “unconfusedly” (ἀσυγχύτως) to a dogmatic formula, the image of a reciprocal indwelling of two distinct poles of being replaced the image of mixture. This mutual ontological presence (περχώρησις) not only preserves the being particular to each element, to the divine and the human natures, but also brings each of them to its perfection in their very difference, even enhancing that difference. Love, which is the highest level of union, only takes root in the growing independence of the lovers; the union between God and the world reveals, in the very nearness it creates between these two forms of being, the ever-greater difference between created being and the essentially incomparable God (Balthasar 1988a: 63).
- 16 See also Spaemann (2007), pp. 16–33. On the early confusion translating the Greek *hypostasis* into the Latin *persona*, see Mantello and Rigg (1996), pp. 274–278.
- 17 The cautions of Joseph Ratzinger regarding the mystery of the Trinity are applicable here.
- If the painful history of the human and Christian striving for God proves *anything*, it surely proves this: that any attempt to reduce God to the scope of our own comprehension leads to the absurd. We can only speak rightly about him if we renounce the attempt to comprehend him and let him be the incomprehended. Any doctrine of the Trinity, therefore cannot aim at being a perfect comprehension of God. It is a frontier notice, a discouraging gesture pointing over to unchartable territory. It is not a definition that confines a thing to the pigeonholes of human knowledge, nor is it a concept that would put the thing within the grasp of the human mind (Ratzinger 2004a: 171).
- 18 See Balthasar (1988a), p. 37. Maximus, as Balthasar points out, makes this point by distinguishing between the *actus primus* and *actus secundus* of an action, the former of which he ascribes to the nature and the second to the person (228). We will examine this point with respect to essence and existence in Chapter 8.
- 19 We must be careful here, and not only because, in God, *esse* and *intelligere* are identical. As Adrian Walker writes,
- Aquinas insists that distinctively human substance is *by nature* intellectual, and that full conscious activity is from one point of view just the flowering of that nature. This suggests, at the very least, that there are Thomistic grounds for holding that something anticipating full conscious activity can be present from the very first moment in which the substance exists. Can be present, that is, as “nature.” Which means, of course, that it has to be “taken over” later at the level of “freedom.” Notice, however, that, if it is taken over later freely, it can be so only in virtue of...itself. In other words: *Nature is already the beginning of the free taking over of itself.* Conscious love, then, can very well be present in us from the first moment of our existence... not in its final, developed form, but in an *incipient* form whose dynamism, already operating without our choice, is the shaping, ordering ground on which choice is, so to say, carried up into the daylight of self-consciousness (2004: 462).
- 20 Nicholas Healy questions this formulation, *not* by denying the perfect fullness of divine being which the denial of a real relation is supposed to protect, but by asking whether “receptivity” can be included among those perfections. We will return to this point. See Healy (2005), pp. 19–90.
- 21 In invoking Anselm’s phrase, I am not implying that the so-called ontological argument “proves” God’s existence. Yet, even St. Thomas, who rejects the argument on grounds that the existence of God does not follow of necessity from the idea, seems to agree that God must signify something than which none greater can be thought (Aquinas, *ST*, I.2.2, ad.2).

- 22 We might here expand upon the observations of E.A. Burtt to say that when being is reduced from act to fact, when a science of being *qua* being is no longer deemed necessary and physics ascends to the position of first philosophy, time and space necessarily become the highest metaphysical terms such that even eternity is imagined simply as the indefinite extension of them (2003: 91–98).
- 23 See also Augustine, *De Trin.*, V.1.
- 24 One will notice a resemblance between this understanding of being as maximally determinate and the notion of abstraction as the isolation of the particular from the universal given in Chapter 1. Schmitz captures this similarity nicely in the writing of St. Thomas.
- St. Thomas’ metaphysics begins with a gift, a certain plenitude. The world of things is received as manifest actuality; and the task of metaphysics is to refer everything the mind encounters—things themselves, their forms, matter, qualities, relations and movements—back to the fullness first manifest in and through the judgment that things are (Schmitz 1982: 100).
- 25 Schmitz continues, “...for nothing outdistances being; and all our intelligence can encounter has some bearing to being, or it would not bear at all” (1982: 98).
- 26 And so it is that the Preexistent is the Source and the end of all things. He is their Source, for he is their Cause. He is their end, for he is the “for the sake of whom.” He is the boundary to all things and is the unbounded infinity about them in a fashion which rises above the contradiction between finite and infinite. As was often said, he contains beforehand and created everything in a single act. He is present to all and he is everywhere, according to one and the same totality of everything. He proceeds to everything while yet remaining within himself. He is at rest and astir, is neither resting nor stirring and has neither source, nor middle nor end. He is in nothing. He is no thing. The categories of eternity and of time do not apply to him, since he transcends both and transcends whatever lies within them. Eternity itself and beings and the measures of beings and the measured world exist through him and from him (Ps.-Dionysius, *Div. Nom.*, V, 825b).
- 27 This brings us to the question of the meaning of the *nihil*, but we will address this shortly.
- 28 Like Augustine before him and Aquinas after him, whose understanding of *analogia* is at least partially predicated on Dionysius’, much of the Areopagite’s energies in subsequent sections of the treatise are devoted to delineating these differences.
- 29 Dionysius insists (and Aquinas follows him) that we cannot properly say that God is similar to things, but rather the reverse, only that the very same things are both similar and dissimilar to God (*Div. Nom.*, 912b–916b).
- 30 In the West, one thinks particularly of Augustine, Anselm, and Dionysius in this regard. To understand the demise of this sort of theology, see Balthasar (1989a), pp. 181–210.
- 31 See also Oliver (2010), pp. 181–203.
- 32 “Nothing” is defined by the cosmologist Alexander Vilenkin as a state with no classical space–time in which the basic categories of physics—space, time, energy, entropy, and so on—lose their meaning. This utterly uncaused emergence of the universe from nothing apparently accounts for the universe’s existence without reference to anything beyond the universe itself. The universe is simply a brute fact...There are good reasons for supposing that Big Bang cosmology is not equivalent to the Christian doctrine of creation *ex nihilo*. In particular, it seems that natural science cannot truly think the nihil. Scientific cosmology still operates with the Aristotelian notion that *ex nihilo, nihil fit*. The vacuum of modern particle physics which fluctuates to bring the universe to existence through so-called quantum tunneling is not “nothing,” for this “nothing” is apparently subject to fluctuation. Even attempts by mathematical physicists to identify “nothing” with the empty mathematical set fails, because as William Carroll points out, “the empty mathematical set...is subject to the principles of logic

and to the laws of quantum cosmology and, as such, cannot be identified with absolutely nothing.” Joseph Ycski puts it succinctly thus:

The alleged nothing [discussed in contemporary cosmology by Hawking and others] turns out to be a complex reality of ordering principles without which there would be no uniformity in nature and no scientific study of natural phenomena would be possible.

Contemporary cosmological speculation seems magically to reify the nihil (Oliver 2010: 182–183).

See Vilenkin cited in Worthing (1996), pp. 98–100. See also Vilenkin (1986), pp. 3560–3569 and Vilenkin (1983), pp. 2848–2855. The remark from William Carroll is from “Thomas Aquinas and Big Bang Cosmology” available at http://www2.nd.edu/Departments//Maritain/ti/carroll.htm#N_12. See also Ycski (1996), p. 272, quoted in Carroll, “Thomas Aquinas and Big Bang Cosmology.” I am grateful to Simon Oliver for introducing me to Vilenkin and for many stimulating discussions on this subject.

33 Augustine, *De Civ.*, XI.24, “*quia bonum est.*”

34 See Hart (2003), pp. 153–249.

35 Such appears to be the case, e.g., in Bruce Marshall’s stupefying claim that “the economy of salvation as such contributes *nothing* to understanding either the distinction or the unity of the divine persons” (2010: 17, emphasis mine). In his desire to preserve the legitimate distinction between the eternal processions in God and the temporal missions, Marshall exhibits a disastrous theological nominalism that makes the Incarnation of Christ utterly adventitious to the revelation of God and thus undercuts the entire basis and claim of Christian faith, at least if the *Catechism of the Catholic Church* (259) and Joseph Ratzinger are any guide. As the latter puts it,

God is as he shows himself; God does not show himself in a way in which he is not. On this assertion rests the Christian relation with God; in it is grounded the doctrine of the Trinity; indeed it *is* this doctrine (Ratzinger 2004a: 165).

It merely begs the question when Marshall interprets the teaching of the *Catechism* (259) that “the whole divine economy makes known what is proper to the divine persons and their one divine nature,” by equating “understand” with “come to know,” so that the economy somehow provides the setting for the revelation of “eternal truths about God,” revealing the bare fact of their existence, whose meaning we then somehow grasp in complete indifference to that economy. This dubious interpretation, which ironically would grant too much authority to the speculative theologian as arbiter of revelation, allows him to reassert his original premise that the economy merely tells us what God *does* but tells us nothing of who he *is*, but of course this is the very thing in question. The deeper irony of Marshall’s argument, as with all nominalisms, is that his very effort to secure the absoluteness of God *in se* profoundly compromises that absoluteness and transcendence by setting the eternal processions in tacit *opposition* to the temporal missions. Marshall, then, provides an object lesson from within Catholic theology that illuminates the central metaphysical problem of non-Catholic theology: failure to appreciate the Incarnation in its metaphysical meaning leads to a failure to grasp the transcendent otherness of God and the relation of created to divine being. I am grateful to Nicholas Healy for helping me to think through the problems of Marshall’s position. For more on receptivity as a divine perfection, see Healy (2005), pp. 91–158.

36 Aquinas will therefore hold that God

brought things into being in order that His goodness might be communicated to creatures, and be represented by them; and because His goodness could not be adequately represented by one creature alone, He produced many and diverse creatures, that what was wanting to one in the representation of the divine goodness might be supplied by another (*ST*, I.47.2).

- 37 See Plotinus, *Enn.*, I.8.6.
- 38 See, e.g., Plotinus, *Enn.*, III.8.8–III.8.9, V.5.6.
- 39 See Healy (2005), pp. 15–90.
- 40 See Walker (2004), n. 3, p. 458, for an extended discussion of what Walker means by “singularity.” I will take this up more fully momentarily.
- 41 This is due not only to divine simplicity in which all divine attributes are convertible with the divine essence but also due to the fact that like goodness and truth, knowledge and love, reason and will mutually entail each other. This is a large part of the burden of Augustine’s so-called “psychological analogy” for the Trinity. See Augustine, *De Trin.*, VIII–IX and Hanby (2003), pp. 27–71.
- 42 Both St. Augustine and Richard of St. Victor argued that love has a “Trinitarian” structure, the former by advancing the so-called “psychological analogy” of the Trinity, the latter advancing what is sometimes called “the interpersonal analogy.” It is generally assumed that Augustine prizes the psychological analogy over the interpersonal on grounds that it is fully immanent and does not depend upon an “external” object, though elsewhere I have argued to the effect that the “psychological analogy,” properly understood, opens of its own internal logic into the “interpersonal.” I thus see no reason to oppose the two analogies to each other, though that is another argument. Aquinas, seeking to protect the integrity of revelation, denies that either is sufficient to prove the principle of the Trinity of persons, but rather works to confirm “an established principle by showing the congruity of results”—a principle established by faith. Augustine’s argument is insufficient as “proof,” he argues, “because the intellect is not in God and ourselves univocally.” Richard’s argument, essentially that the perfection of goodness entails a mutual sharing of that goodness with a “third,” he rejects because “this holds in the case of one not having perfect goodness: hence it needs to share some other’s good, in order to have the goodness of complete happiness.” This seems rather to miss the point of Richard’s argument, which is to do with the essential *generosity* of perfect goodness. Aquinas can seem to tend in that direction at times, inasmuch as he follows Aristotle in conceiving of goodness primarily as final cause to the relative exclusion of efficient causation, but this obviously sits uneasily with his Neoplatonic and Dionysian inheritance and with his affirmation of creation. See Augustine, *De Trin.*, IX; Richard of St. Victor, *De Trin.*, III; Aquinas, *ST*, I.32.1. For a brief treatment of the interrelation between these two analogies and their various historical interpretations, see Ouellet (2006), pp. 20–24.
- 43 Again, this is improperly put. See Ps.-Dionysius, *Div. Nom.*, 912b–916b.
- 44 See Scola (2005).
- 45 See, e.g., Augustine, *De Civ.*, XI.10.
- 46 This is a crucial point. I do not wish to equate love with the modern concept of altruism, a further debased form of the already debased separation of *eros* and *agape* popularized by Anders Nygren. The “altruistic” juxtaposition of love and interest severs the logical relation between love and objective truth and goodness and thus undermines any basis for speaking of the veracity of love in the first place. Indeed, one suspects that the whole purpose of the concept of “altruism,” at least as it is employed in Darwinism, is to undermine what Richard Lewontin calls “the seeming irrationality of unselfishness” (2001: 327). For a more detailed exposition on the problem of separating *eros* and *agape*, see D.C. Schindler (2006), pp. 375–399.
- 47 This point, too, is crucial. For there is a sense in which the Father as absolute origin in the Trinity, *is* the source of the being—and being desirable—of the Son. And yet, the point of insisting that the Trinitarian persons are subsistent relations is that Father and Son are *co-original*, and that the Father’s love for the Son is at one and the same time “self-love” and love of the objective goodness, beauty, and truth—the being—of another, and this in so profound and complete a way that there is only one being in which the distinction between Father and Son, lover and beloved, is preserved.

- 48 For in that Trinity is the supreme source of all things, and the most perfect beauty, and the most blessed delight. Those three, therefore, both seem to be mutually determined to each other and are in themselves infinite (Augustine, *De Trin.*, VI.10.12).
- See Hanby (2005), pp. 340–360.
- 49 See Hanby (2005), pp. 340–346. This is one way to interpret Aristotle’s theory of cognition, summed up in the famous claim that “the soul is in a way all existing things” (*De Anima*, III, 431b20).
- 50 Presumably, Nicholas of Cusa meant something like this when he equated God’s subsistent quiddity with *Posse* itself and declared it “that than which nothing can be more subsistent” (*De Apice Theoria*, 4).
- 51 By “constitute” I obviously am not suggesting that God is somehow the being of the world. I refer instead to the sense in which Christ’s dereliction from the Father constitutes for Balthasar the hell of godlessness, but this dereliction is itself only made possible for Balthasar by the positive difference inherent in God as love. See Balthasar (2000a), p. 168.
- 52 On Christ as the concrete form of the *analogia entis* in Balthasar’s thought, see Healy (2005), pp. 93–118.
- 53 Despite their apparent differences, Gould and Dawkins represent polar expressions of this single position. See Stenmark (2004), pp. 1–15.
- 54 D.L. Schindler puts it this way.

[T]he movement toward God in Christ (through the Church, by the Holy Spirit) is not something tacked on, as it were, to a space and time and matter originally constituted on their own and in abstraction from this movement. On the contrary, the movement toward God in Christ lies at the core of space, time, and matter in their original constitution, and hence in their original meaning precisely *as* space and *as* time and *as* matter (D.L. Schindler 2001: 407).

- 55 We have already noted a correlative sense of this claim, considered from the side of the world, in the “pointless” noninstrumentality—one might say following D.C. Schindler, the defenseless innocence—of created being. We will revisit this point in Chapter 8.
- 56 On the inadequacy of the “craft analogy” as an analogy for creation (despite his frequent and wholly legitimate recourse to such analogies), see Aquinas, *ST*, I.45.2.
- 57 This, it seems to me, is at least partly what Pope John Paul II meant by “original solitude” in the *Theology of the Body*. See Pope John Paul II (2006), pp. 146–153.
- 58 See Aquinas, *In Sent.*, II.d.1, q.1, a.4; *ST*, I, q.8, a.1, in Baldner and Carroll (1997), p. 85.
- 59 See also Aquinas, *ST*, I.8.1.

Now since God is very being by His own essence, created being must be his proper effect, as to ignite is the proper effect of fire. Now God causes this effect in things not only when they first begin to be, but as long as they are preserved in being; as light is caused in the air by the sun as long as the air remains illuminated. Therefore, as long as a thing has being, God must be present to it according to its mode of being. But being is innermost in each thing and most fundamentally inherent in all things since it is formal in respect of everything found in a thing, as was shown above (Q.7, A.1). Hence, it must be that God is in all things, and innermost.

- 60 Balthasar puts this very well.

It is precisely here [as the giving of *esse* grounds both act and potency] that a new kind of intimacy of God to the creature becomes clear, an intimacy that is only made possible by the distinction between God and *esse*. Allowing natures to participate in reality—God’s most proper prerogative—is not to be understood as the disintegration or diminution (on the part of the creature) of God’s being and unicity (which is how it is invariably seen outside the Christian tradition) and the essences of things must not appear as the fragmentation of reality,

in a negative sense, but must be seen positively as posited and determined by God's omnipotent freedom and therefore are grounded in the unique love of God. In what we might call the "real distinction" (circumspectly, because here we are dealing with an inexplicable mystery) God contemplated his creation with free, so to speak, stereoscopic sight, which means at the same time that God preserves for the creature this wholly new plasticity: it is precisely when the creature feels itself to be separate in being from God that it knows itself to be the most immediate object of God's love and concern; and it is precisely when its essential finitude shows it to be something quite different from God that it knows that, as a real being, it has had bestowed upon it that most extravagant gift—participation in the real being of God (Balthasar 1989a: 404).

The relevant citations from Aquinas are *De Pot.*, q.7, a.2, ad.9; *Comp. theo.*, I, c.68; *In Div. Nom.*, V, lec. I; *De Pot.*, q.3, a.7; *In Boeth. De Heb.*, lec. 2.

- 61 See Aquinas, *In Sent.*, II.1.1, a.2, ad.4 and *ST*, I.45.3, ad.1.
- 62 See Aquinas, *In Sent.*, II.1.1, a.4, resp.
- 63 See Ratzinger (1995), p. 50.
- 64 This is not to deny that creation *ex nihilo* is also creation in *tempore* but to insist that time itself is a creature and that temporal origins take their meaning from this more fundamental ontological origin.
- 65 If the foregoing arguments are correct, then even the beatific vision does not eradicate the "negative" moment, properly understood as the reverse side of a superabundant fullness.

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What the World Is

Creation *ex nihilo* is simultaneously the doctrine of God and the ontological structure of the world. That it should be both at once is partly a matter of philosophical necessity binding on any theory of nature, whether this is acknowledged or not. Conceptions of God and nature are correlative as a matter of principle. This is no less true of Darwinian naturalism than it is of Christianity. The reduction of being from act to brute facticity, and of God from *ipsum esse subsistens* to a finite object juxtaposed to and in competition with the world has its metaphysical and natural counterpart in the attempted reduction of being to history and the ontological reduction of the organism to an accidental aggregation of externally related parts.

Nevertheless, we have shown in the previous chapter that this double function of the doctrine of creation is neither *just* a matter of philosophical necessity nor a mere historical accident. It follows from a proper understanding of God as the subsistent fullness of being and of divine transcendence consequent upon this understanding. Together these preclude our thinking of creation as actualizing some potency in God and thus as some “third thing” interposed between God and the world and our imagining creation as something done to the world, a qualification of it. Creation, we have said, is a certain “letting be” of the world on the part of God and a certain interior reception of being (*esse*) on the part of the world that is already presupposed and inherent in any subsequent qualification of it. In its active sense, it refers to the essence of God himself as the pure (triune) actuality of reason, freedom, and love; in its passive sense it is simply the actuality of the world, with a certain real relation to God.

The Incarnation of the Father’s Word is the definitive revelation of God’s relation to the world. Christ is, as Balthasar put it, “the measure of nearness and distance from God; he is the *analogia entis* in concrete form” (1989a: 177). Of course, new categories of thought were needed to accommodate this nearness and distance, and in the previous chapter we considered how the Church struggled, through the Trinitarian and Christological controversies, to attain the categories necessary for conceiving of a

unity between God and the world that was unmixed and unconfused and yet disclosed the deepest meaning of both.

Immediate metaphysical implications follow from this achievement. If it is true that the indivisible fullness of God (*pleroma*) dwells in the man Jesus, if Jesus is indeed the concrete *analogia entis*, then the Incarnation is not incidental to the structure of being *qua* being, and God and world, infinity and finitude, transcendence and immanence, eternity and time, and being and history cannot be the antinomies that modern naturalism (and some other forms of theology) make them out to be. The metaphysical upshot of Maximus' resolution of the monothelite controversy and his insistence upon the "two wills" of Christ was to dissolve these antinomies and to maintain that Christ's human agency achieves its maximum integrity *as human* in indivisible unity with the person of the Son.¹ And if Christ is both God and man, if the Incarnation of the Son discloses the paradigmatic form of the God-world relationship, then this form must extend analogously to the whole of the natural order precisely *as natural*.² All things must exemplify the *analogia entis* in concrete form. And so, prescinding from Christology and the theology of creation "from above" and beginning with our treatment of the indivisible unity of the organism in Chapter 6, we have already endeavored to show, philosophically and "from below," that immanence and transcendence, time and eternity, being and history are not antinomies. An organism must be a self-transcending unity, indivisible by time and space—and thus so far "eternal"—in order to be a historical being, divisible by time and space.³ It remains to be seen of course, how as a *per se unum* the organism is also a creature, created *ex nihilo*.

All creatures are analogous to Christ, the *Analogatum princeps*, simply in virtue of their being. Thus, the same metaphysical problem latent in the Christological controversies of the patristic era, namely, understanding the God-world relation in a way that preserves the mutual integrity of divine and human agencies, extends by analogy to the whole of creation. The problem is as difficult as the solution is delicate, which is why it has reared its ugly head in numerous forms throughout the history of the Church, most notably in the Pelagian controversies that seem to present themselves in a new guise to each succeeding generation.⁴

In his commentary on Peter Lombard's *Sentences*, Aquinas takes up this problem in the context of the doctrine of creation. If God is by definition the fullness of being, and thus already fully actual in all causal transactions, how then can there be causes other than God? This is essentially the same question which we addressed in the previous chapter *ex parte dei* only posed, this time, from the side of the world: How can there be anything more than *all*? St. Thomas' answer begins to illuminate and clarify the metaphysical meaning of creation.

Now a creature is able to be the cause of things that are produced through motion and generation, either because it exerts causality over an entire species, as the sun is the cause of a man and a lion, or because it exerts causality on only one individual, as man generates man, and fire generates fire. Nevertheless, God is *also* the cause of these things, because He Himself gives being to things. Being, however, is more intimate to anything than those things by which it is specified. Hence the operation of the Creator pertains more to what is intimate in a thing than does the operation of any secondary causes. The fact, therefore, that a creature is the cause of some other creature does not preclude that God

operate immediately in all things, insofar as His power is like an intermediary that joins the power of any secondary cause with its effect. In fact, the power of a creature cannot achieve its effect except by the power of the Creator, from whom is all power, preservation of power, and order of cause to effect. For this reason...the causality of the secondary cause is rooted in the power of the primary cause (Aquinas, *In Sent.*, II.1.1, a.4, resp.).

In Chapter 7, we saw the paradox of dual agencies “resolved,” in its Christological form, through the distinction between *hypostasis/persona* and *natura*, which implied the as yet unarticulated real distinction (*distinctio realis*) between being (*esse*) and essence (*essentia*). Christian thought had in fact been converging on this distinction from two directions at once, though these are never really separate from one another. In Chapter 2, we saw how it is implicit in the doctrine of creation itself and its task of securing the transcendent plenitude of divine being. By removing all presuppositions for the exercise of divine generosity, creation renders all subsequent principles contingent, thereby insinuating a distinction between a nature, which does not entail its own existence, and the bearer of that nature, who is never simply identical with its nature.⁵ Socrates is a man but is not identical to man as such. Plato and Aristotle had of course recognized this, thus providing an indispensable *preparatio* for the Christian vision, but neither was able to supply a *positive* principle to account for the difference between Socrates and his nature. The category of hypostasis/persona and the discovery of personal being provided a positive basis for distinguishing between a nature and its bearer, whose paradoxical act of being—paradoxical because it is both prior and posterior to the way in which that being expresses itself in a nature—is the basis for its “having” that nature and for the concrete actuality of nature itself.⁶ (Thus, for Thomas, *esse* becomes the act of acts (Aquinas, *ST*, I.8.1).)

Thomas claims that God, through the giving of being, is wholly the cause of effects also produced wholly by creatures, with no confusion, commingling or blending of the two agencies (Aquinas, *Contra. Gent.*, III.1, 70, 8). In order to make this claim, he takes recourse to the real distinction, insisting that “being is more intimate to anything than those things by which it is specified.”⁷ Henri de Lubac profoundly captured the meaning of this in that remark we cited earlier, when he says of being that “it is a gift totally interior to me; nothing is left out of it, and nothing of myself is without it” (1998: 77). How is it, then, that the real distinction simultaneously secures the immediacy of God to creatures and insures at the same time that creatures are fully the authors of their own acts? This is an enormously complicated question, whose answer I hope will become clear by the conclusion of this chapter. Of course, our point in attempting to answer it is not to expound upon Aquinas *per se*, as if Thomas were the whole tradition rather than one of its principal figures, but to draw upon Aquinas in order to articulate and defend creation as such, which means also defending the terms in which this doctrine has traditionally been rendered.

This brings us to an objection that threatens to sink the ship before it ever leaves port. One might well ask what justification there is in continuing to speak in terms such as essence and existence, much less insisting on a real distinction between them, when science has seemingly rendered them obsolete and when they have all but disappeared from the lexicon of modern philosophy. I have already addressed various aspects of this question in previous chapters, so I will not rehearse those arguments

again here except to repeat or recast a few essential elements. We have just seen that Christianity arrived at the “existential” side of this distinction from two directions at once, negatively from the contingency and thus nonnecessity of the world, positively from the recognition of an act-of-existing—of “having,” in persons—that is not simply reducible to the act of “being a human being,” or a tree, or a stone, and so on but is incommunicably peculiar to being *this* person or *this* tree. The ground for the first approach, the contingency and nonnecessity of the world, and thus the fact that the world does not explain its own existence, should be fairly self-evident and uncontroversial. Evolutionary theory purports to revel in this contingency, though as we shall see, there is less to this than meets the eye. The warrant for the second line of approach, that *esse* is not just an empty facticity but an act or, rather, the act of all acts really distinct from form, is the very thing we still have to make visible. So we will defer this aspect of the question till later in the chapter. I will have more to say then about what this means.

The claim that form is ontologically basic is essentially the claim that reason—*eidos*, *logos*, or intelligibility—is internal to the heart of being as such. Precisely because form is ontologically basic, there can be no question of getting “outside” of form to prove or refute its existence on some more reliable basis, any more than there can be a question of getting outside of being to demonstrate being. Any such attempt would already presuppose and rely upon the very thing it attempted to demonstrate. This is why Aristotle says it is absurd to try to prove that nature exists (*Physics* II, 193a1). And this is the real force behind his criticism of Empedocles’ “Darwinism”: his conclusion that “nothing incidental is prior to what is *per se*,” and that “spontaneity and chance, therefore, are posterior to intelligence and nature” (198a1–199b30). The claim is not prescriptive but descriptive. It is not an argument that we *should* accept the primacy of form on account of the sheer improbability of such an “accidental universe” arising, the sort of argument that sends some Darwinians scurrying to invent multiple universes to reduce the odds to one. Rather, it is that in thinking about an accidental universe, we have *already* accepted it in practice. Empedocles’ universe, in other words, is parasitic upon the Aristotelian universe; that is, what it means to say that what is incidental is posterior to what is *per se* and that spontaneity presupposes order.⁸ Strictly speaking, and in itself, a purely incidental universe is unintelligible and thus unthinkable. One cannot even think the incidental without having already thought the *per se*, just as one cannot think efficient causality without having thought formal and final causality, because the unity of being and the primacy of form are already inscribed in the necessity of the indicative.⁹ Indeed outside of form, there is no thinking at all; the very act of thinking affirms the ontological primacy of form whatever beliefs we may think we hold to the contrary.¹⁰ The Aristotelian reply to the objection, then, is that dispensing with form and granting ontological primacy to chance and spontaneity is tantamount to disbelieving in the principle of noncontradiction. Or rather since Aristotle maintains this principle cannot really be disbelieved, the attempt merely serves to indicate the extent to which those who undertake it suffer from a want of education and a lack of self-knowledge. We have seen that Darwinian biology suffers terribly from this malady, as it violates its own ostensible ontological assumptions in a thousand different ways: in the stake that Darwinian organisms have in survival, in Darwinism’s tacit recourse to the “natural kinds” whose existence it denies, in the illicit reification of the gene by neo-Darwinism, in its pretense to have done away with metaphysics and

theology while depending upon the transcendence ostensibly excluded, in the mere claim that Darwinism is, in some sense, *true*. This is why we have maintained that there are not, and never have been, any true and thoroughgoing Darwinians, because Darwinism is, in the strict sense, incredible.

Let us then forego the impossible attempt to justify being and essence and instead attempt to see rather more deeply what their real distinction means, how it secures the mutual integrity of God and the world, and why creation is thus the ontological structure of the world and indispensable to an adequate understanding of it. We should begin by noting that Aquinas, in the passage cited earlier, is not claiming merely that creation is compatible with other forms of causality as if creation were one cause among many. The claim is much stronger:

the power of a creature cannot achieve its effect except by the power of the Creator, from whom is all power, preservation of power, and order of cause to effect. For this reason... the causality of the secondary cause is rooted in the power of the primary cause.

Creation, far from being a threat to the integrity of immanent causality, is inherent within and necessary for causality as such. Our first task, which we will undertake in the ensuing section, is to articulate and defend this claim. Establishing creation as the precondition of causality—and indeed of evolution—retrieves the God–world relation from the extrinsicism of Darwinian theology and restores creation *ex nihilo* to its proper form, not as an extrinsic cause modifying the world but as its ontological structure. If creation is the world’s ontological structure, then “seeing creation” means attending more closely to that structure, and so the second section seeks to make the novelty of creation and its *ex nihilo* structure visible phenomenologically, and in so doing, restore the world, and especially living things, to the unity and interiority of their own being evacuated by the dual conflation of being and history, and nature and art. The final section explicates the *ex nihilo* structure of being (*esse commune*) in metaphysical terms in a way that secures the world’s difference from God (and thus the integrity of each), restores the organism to the status of a *per se unum*, and binds the organism and all things into the single actuality of an intelligible cosmos.

Ever Ancient, Ever New: Creation and Causality

In order to understand why Aquinas thinks creation is necessary for there to be causality at all, let us bear two initial facts in mind. First, for Aquinas, as for Aristotle, causation is not fundamentally a transaction of force but a communication of form, a reflection of the primacy (or coprimacy) of form within his ontology (Aristotle, *Physics*, III, 202a10). Of course, Aquinas does not deny the sort of incidental causation at intersecting lines of causality that we have come to identify with transactions of force any more than Aristotle does. And I will soon argue that a proper understanding of the real distinction and of creation makes *per se* causality spontaneous for Christianity in a way that it could not be for Aristotle, deepening the “event” character of Aristotle’s conception of act while effecting a profound transformation of Aristotle’s “steady-state” cosmology. Lest we get ahead of ourselves, let it suffice at present to say that the point

in insisting upon the priority of the *per se* over the incidental is to insist that all causal agents are *actual things*—Aristotle’s “this-somethings”—acting according to their own natures, ends, and purposes even when they act *per accidens*. This is why Aquinas uses as paradigms of causality the examples of motion (by which he assuredly means natural as opposed to violent motion) and generation. So causation, whether *per se* or *per accidens*, is fundamentally an expression of a thing’s being a *this-something*. But an entity is only a *this-something* by virtue of its *being* a *this-something*, that is, by virtue of an actuality of which it is not the origin but which is nevertheless incommunicably proper to it alone and which is necessary for all other acts, including the actuality of form. So causality is equally the expression of a thing’s essence and existence, its form and *esse*, which invest each being and the whole of being with the event character of an act—though as we have seen that an act is only possible on the basis of its having already been transcended in a unity that “ties together” its temporal sequences.¹¹ Aquinas will therefore say that agency, the self-communication that is causation, is given to creatures simply in their act of being.¹² The reception of being that is creation is the reception of *act* that only ever manifests itself according to this or that *form*. To receive being is thus to be self-communicating, that is, causative, not in a secondary instance but in the very act of existing at all.¹³

Let us recall, second, what we said in the previous chapter about the active and passive senses of creation. We noted that because God is already *actus purus*, and because “creation” is not, therefore, some “third thing” interposed between God and the world, all the “action” in creation appears on the side of the world itself *as* the being of worldly beings. Creation can be said to have occurred, we noted, whenever anything genuinely *new* appears, and in Chapter 7 we went to great lengths to consider how God, who lacks nothing, could receive from the world and how the world could be “new to God” without this endangering all that is protected by the traditional refusal to ascribe to God a “real relation” to the world. The crucial point is that something genuinely new, something truly other and thus irreducible to its causal antecedents, must come continually into being in order for causality to have occurred at all. This is true even in the deterministic scheme now ostensibly superseded by post-Newtonian mechanics. (This was also the unstated *positive* insight in Hume’s skeptical demolition of causation.) This is why creation is indispensable, not as a causal mechanism interposed between cause and effect, but properly understood as the ontological structure of the effect that is the world.

We can see this first by taking an “existential” view of “effects,” considered in themselves. Insofar as a thing subsists in itself, it must possess a unity that transcends its point identity at any given instant. Thus, in Chapter 6 we said that each thing is “eternal,” or at least “supratemporal,” insofar as it is at all, a view which accords with Aristotle’s view of time as a “now,” an actuality that acts as a boundary dividing and uniting the nonexistent past and the nonexistent future.¹⁴ And yet it is precisely its *being* thus that accounts for the thing’s irreducible novelty and event-like character. For insofar as a thing’s being is proper to it alone, that being must be incommunicable and thus irreducible to its causal and historical antecedents. This is what we meant in previous chapters in saying that things possess a measure of interiority. It is more or less what Aristotle and the subsequent tradition meant by substance and is evident in the fact that Aristotelian things have a substantial identity but are not, in every respect,

identical with that identity.¹⁵ This unity and incommunicable interiority are more easily seen in the case of living things, since they are at once more integrated, both in themselves and with their world, *and* more distinct from their world than are unorganized “inert” entities such as stones.¹⁶ Indeed, it is partly this that distinguishes the animate from the inanimate: living things transcend themselves by *having* a world rather than a mere circumambient environment. Even so, the novelty inherent in the incommunicability of *my* being must pertain analogously and by degrees for every being whatsoever. Every being and all of its acts have an “event” character that is at once “simultaneous and successive,” to use Goethe’s phrase, a character that is unrepeatable and to this extent novel (1989: 219). This is due to more than the unrepeatability of each temporal instant; for the same would hold if duration were endless. However much an entity unites or combines with other things at a formal or material level, even things of an identical nature, it can never simply *be* those other things or be interchangeable with them without ceasing to be itself, except under the guise of an abstract formalism.¹⁷ There remains an infinite *existential difference* between this being and that. Pierre Duhem was thus right to connect the possibility of an infinite universe with the Christian doctrine of creation and the irreducible uniqueness of each human soul (1985: 3–136).¹⁸ Metaphysically speaking, the singularity of each human soul reflects the transformation wrought upon Aristotelian substances and Aristotelian cosmology by the discovery of *esse*. Creatures are not merely substances trying (in vain) to “catch up” with their eternal essences but are *nova* in their own right who existentially exceed those essences.¹⁹ Nor is the cosmos simply the serial actualization of potencies by beings imitating the *actus purus* but rather the *event* in which act and potency each perpetually receive their actuality in the mysterious and impenetrable entity that is the new creature.

Even though each creature is an ontological novelty, the very act of being that differentiates me from all other beings implicates me with and in them in various relations of dependence. For I come to myself in distinction from the world having always already received the world into myself in manifold ways.²⁰ This is why we attributed an event-like character both to each being *and* to being as a whole. The one always already implicates the other. My reception of the world makes possible my reception of myself, as it were, and as I discover myself I discover that I am always already preceded by the world, that I only *am* by virtue of its prior generosity to me. Thus, to elaborate slightly on our analysis in Chapter 2, the very *act* of being through which I am constitutively related to God relates me simultaneously to the single (and prior) actuality of the world, exhibiting the anterior unity of a cosmos and binding me to it.²¹ This is why being is common being (*esse commune*), and why at the same time this commonness is paradoxical. *Esse commune* has the paradoxical quality of being common to all things and most peculiar to each thing, making it simultaneously responsible for what Adrian Walker calls “personal singularity” and the ground for the unity of the cosmos.²²

Creation is thus implicated in causality because the novelty that characterizes creation is inherent in the very act structure of *esse commune*. Indeed, causality requires both of being’s paradoxical dimensions. The unity afforded by *esse commune* is necessarily presupposed and operative in every causal transaction. No actual causes occur, or could occur, in an ontological vacuum where each item, as a sort of

Leibnizian monad, was a universe unto itself. In order to be able to interact with each other, causes and effects must therefore share something in common *a priori*. (We saw this previously in discussing the incoherent notion of the “multiverse.”) The entities must belong to a common order that encompasses them both—a single actuality as Aristotle put it—which is why causality for him is not a relationship between two events but a single event with two poles. Science has at different periods proposed different candidates to perform the unifying role of this single actuality: space (absolute Newtonian space “containing the world,” “superficial” two-dimensional space of the space–time continuum, or metaphorical spaces like “design space”) or fields and domains in mathematics and systems dynamics, which function as a kind of gestalt containing and determining—or codetermining—parameters for elements within the system.²³ But all of this stops short of the essential point and thus begs the essential question. Strictly speaking, each of these is a particular *ens* and is thus incapable in principle of grounding the order shared in common with the other particulars which it contains; or rather each appears to do so because both particulars participate in a still more fundamental unity and belong to the same order in virtue of their *being* at all.²⁴ In other words, the unity afforded by space or fields (it matters not whether we understand this in realist or idealist terms) remains a second-order unity that presupposes, in typically positivist fashion, the first-order unity afforded by *esse commune*.

Yet *esse*, we said, is both common to all things and peculiar to each thing. It is therefore novel as well as common, ever new as well as ever ancient, making each thing, in a sense, a “little world” after all, occupying a “perspective” within being that will never be occupied again. The ancients glimpsed these “little worlds” in their various isomorphisms between the universal macrocosm and the human microcosm, and even now, artists and novelists who enter imaginatively and intensively into the lives of their subjects often seem to have a better insight into the novelty and intensity and incommunicability of these little worlds than scientists confined to an extensive and “superficial” view.²⁵

This existential novelty inherent in the differentiation of creatures must also be inherent in causality as such. Why so? In order for a causal transaction to occur, there must not only be a shared order of being between cause and effect; there must also be a genuine existential *difference* between them. And we have argued that this is the case, even in “replications” that are identical or virtually identical at the formal level, in cell division, for instance, or in cloning. Whatever the formal identity, the existential difference must be, properly speaking, infinite. Otherwise, the result would not be a genuine effect, distinct from and other to the cause, but merely a monistic emanation of the cause itself—one of the many children of Gaia, so to speak. Effects must represent a real novelty over and above their causes, not simply in virtue of the formal distribution of their material elements but in virtue of their being at all. So in order for there to be a genuine existential difference between causes and effects, effects must be irreducible to their antecedent causes even as they are entirely dependent upon them. This is why *per se* causes are always also spontaneous in a way that Aristotle could never quite grasp, because substantial effects are *nova* in their own right who existentially exceed their essences.

This, I suggest, is why “the power of a creature cannot achieve its effect except by the power of the Creator, from whom is all power, preservation of power, and order of cause to effect,” and why “the causality of the secondary cause is rooted in the

power of the primary cause.” It is what it means to say that God, as the source of being immediately and interiorly present to creatures, “is like an intermediary that joins the power of any secondary cause with its effect,” though to understand this “intermediary” character we will have to delve more deeply in the ensuing section into the paradoxical nature of *esse*. Creation (in its passive sense) is simply the interior reception of being that *is* the creature. *To be* a creature is to be self-communicating and thus is to be a causal agent. Yet, created being, *qua* being, is always and at every moment *ex nihilo*, not merely in its temporal origins but in its very ontological structure. This is what we meant by the paradoxical character of actuality. “Hence the non-being which things have by nature is prior in them to the being which they have from another, even if it is not prior in duration” (Aquinas, *In Sent.*, II.1.1, a.5, ad.3). This is also why Aquinas denies any difference between creation and conservation, why created effects depend upon God *and* upon their historical antecedents, and why

a single effect is wholly done by both [God and natural agents], according to a different way, just as the same effect is wholly attributed to the instrument and also wholly to the principal agent (Aquinas, *Contra Gent.*, III.1, 70, 8).

At first glance, this conclusion that effects are irreducible to their causes seems to violate the perennial axiom, *de nihilo nihil fit*, in force in very different forms from Plato through the laws of thermodynamics. The classical metaphysical tradition adds the corollary that causes must always be greater than their effects; otherwise one inverts the priority of actuality over potency, thus triggering the axiom all over again. Making the effect irreducible to its causes, furthermore, seems to undermine the notion that effects are images of their causes, thus destroying the very basis for regarding causality as communication (and intelligible) in the first place. Ps.-Dionysius offers a classical statement of both points when he says,

that the caused carry within themselves only such images of their originating sources as are possible for them, whereas the causes themselves are located in a realm transcending the caused (*Div Nom.*, 645c).

In spite of their vastly different metaphysical assumptions, moderns too have taken great pains to avoid transgressing the first axiom, though once possibility is granted ontological priority over actuality and mechanistic ontology grants parts ontological priority over wholes, the corollary is no longer taken to be entailed by it.²⁶ The laws of thermodynamics, which are concerned only with quantitative intelligibility, also attempt to adhere to this principle, by presupposing that the universe is a closed system with a fixed quantity of energy.²⁷ On this view there can be no real *ontological* novelty; “novelty” simply means a redistribution of this constant quantity of energy between potential, kinetic, and entropic states.

What does our position have to say to each of these objections, to the extent that they are objections? The objection from thermodynamics is ontic, in Heidegger’s sense, rather than ontological, not that we should expect the positivist scientist to grant this distinction. It concerns an entity or quantity within being—energy—while taking the question and structure of being as such for granted. Hans Driesch helps us

to glimpse the significance of the distinction and points us toward an answer to the objection from thermodynamics. “Energy,” Driesch says,

is a measurement and nothing else; it measures the amount of causality given off or received by a limited system in no other sense than the kilogramme or the pound measures the amount of gravitating matter (1908: 162).

Energy thus defined is but one more variation, albeit a very precise one, of the identification of matter with measurability. We already noted, in Chapter 3, the “anthropomorphic” irony of identifying reality with our measurement of it and that this already presupposes the reduction of causality to a quantum, or rather to a relation or function between quanta. We have repeatedly argued that such a truncated notion of causality is insufficient to account for phenomena in the fullness of their self-presentation. If this is true, then it follows that there will be forms of genuine novelty that are quite visible to the naked eye but are destined to remain invisible to the perspective of the thermodynamics, except *per accidens*. Driesch goes on to remark that

the law of the conservation of energy is far from being empirically true if only those natural agents which are measurable as forming work are taken into consideration... Wherever the principle fails to hold, so-called “potential energies” are postulated into which actual energy may disappear or from which it may originate (164).

The crucial point is this.

There is nothing actually stated or measured in the case of these potential energies: it is simply assumed that there must be a something representative of quite a definite amount of “ergs” in order that actual energy may not seem to arise out of nothing (164).²⁸

Now let us set aside the potential circularity of objecting that the creation of novelty violates the laws of thermodynamics when the law of the conservation of energy postulates potential energy precisely in order to preclude such novelty in the first place. The more fundamental point is that while the laws of thermodynamics trade upon the reduction of causality to a quantum or a relation between quanta, *esse*, which is not an *ens*, is not itself a quantum. The novelty of *esse* is not an event or change *within* energy, so to speak, any more than the act of creation is a change qualifying the world. *Esse* is rather the very inner, *ex nihilo* structure of energy and its transformations—the novelty *of* energy, so to speak. Like Driesch’s entelechies, it is neither spatially nor temporally divisible. Rather, precisely as spatially and temporally indivisible, it is the principle of actuality for *quanta* and *qualia* alike. It is what permits quanta *to be*. The novelty intrinsic to *esse* therefore remains invisible in principle to this sort of measurement by its very nature.

An example drawn from Driesch’s notion of entelechy provides a useful illustration of this, though the example corresponds more to the “essential” side of the real distinction. Driesch contrasts a workman who assembles a heap of bricks into a house with a workman who simply reassembles the stones into another heap. The two systems could be equivalent in the quantity of energy converted to work by the

workmen, and yet “being a house”—or rather, being *this* house—introduces a real novelty, an “intensive manifold” in Driesch’s terms marked by “an increase of diversity with regard to the distribution of elements within the system” (1908: 195). The novelty introduced by the arrangement of stones in the form of a house is not measurable in terms of ergs or joules, “about this point nothing is affirmed by any of the energetical principles, either positively or negatively,” Driesch writes (195). Yet, there is nonetheless a real novelty, conferred by its intelligible (and substantial) form, by which a house is irreducibly different from (and intelligibly more than) a heap of stones. Of course a house is an artifact; its form is imposed upon it from without. It is not truly the subject of its own being and thus lacks the interiority of a living thing. When one takes an “inside view” and considers not merely the *formal* difference between a house and a heap of stones, but the *existential* difference opened up with the advent of a new subject of being, the novelty is multiplied to infinity.

What, then, of the objection in its classical form? Our discussion of the Trinitarian reconciliation of unity and difference in the previous chapter renders the problem at the root of this objection more apparent than real. We saw previously that we are required by a coherent understanding of these doctrines to affirm *both* the transcendent fullness of the cause with its superiority to the effect *and* the genuine novelty of the effect. This is possible precisely because Trinitarian love is the coincidence of infinite unity and infinite difference. Within this understanding of infinite love, the world can come into being as something other to and even *more than* God, without violating the maxim that there can *be* no more than God, all because this “more” is transcended by that difference, internal to God, by which he can be more than himself without ever being less than himself. Nicholas of Cusa signals something like this when he argues that the highest actuality contains all possibilities, and Thomists, though they would be loathe to speak this way, imply something similar when they maintain that God knows the world by knowing himself and all the ways his being can be participated (Aquinas, *ST*, I.14.5, resp.-6, resp.). Once one acknowledges the coincidence of infinite difference and infinite unity in the Trinity, and once the apparent contradiction of affirming the transcendent superiority of the cause and the irreducible “more” of the effect is removed, the effect becomes an image of the cause—and ultimately, an image of love—precisely in its novel otherness to it. The world is a vestige or an image of God, in other words, not simply in virtue of its similarity to him but in its difference from him, in the very fact that it is *not* God.²⁹

When we raised the “paradox” of creation *ex parte dei*, it was to show a Trinitarian understanding of the divine *actio* was necessary to account positively for a world that could be other than God. Now it turns out, from the side of the world, that this Trinitarian reconciliation of difference and unity is integral not simply to creation *ex nihilo* but to causality as such. Creation *ex nihilo*, in other words, does not simply designate a moment before which was nothing and after which was the world. Rather, “*ex nihilo*” describes the ontological structure of created being as such, a structure that is necessary for there to be causality at all. In order for there to be causality, there must be real difference between cause and effect, and thus a real existential novelty of the effect with respect to the cause that no purely immanent account of causation, taking being for granted as simply “given,” is sufficient to account for. This novelty is not something “added” to a thing; rather, it is precisely what each incommunicable act of being *is*.

Let us pause briefly to clarify the implications of what we have just said for the relation between the doctrine of creation and evolutionary biology. We have insisted throughout this book that theology has no stake one way or the other in pronouncing on the *scientific* status of Darwinian theory, assuming, that is, that Darwinism actually makes a real claim and does not just redescribe a fact. Nor should biology abandon itself in search of God, as if it were the business of biology to be theology. Darwinian biology from its very inception has been far *too theological*, or at least too badly theological, and we regard the slow emancipation of developmental and systems biology from the strictures of Darwinian theory as an opening to reconsider the inherent metaphysical and theological assumptions of Darwinian biology and as a salutary if insufficient movement toward a recovery of the full truth of living things *as creatures*. And this is precisely the point. Biology is always already dealing with the world that *is* in relation to God when it conducts biology.

Our interest in biology heretofore has been mainly critical: to establish biology's constitutive relation to metaphysics and theology, to expose and criticize the latent metaphysics and theology of Darwinian biology, and to show their theoretical and biological implications. In the process, we have unearthed a great deal of philosophical confusion in the notions of transmutation and natural selection, for instance, in the jumbling of causes and effects and in the blurring of the difference between the change *of* a species and the difference *between* species. We have shown how Darwinism's latent metaphysics and theology terminate in a "pragmatic" self-contradiction and in a reductive—and thus *biologically* inadequate—gaze upon living things.³⁰ Thus, we have tried to explain why Darwinism could be false on the whole even if all the empirical evidence is on its side and even if evolution happened in more or less the manner that Darwinian biology claims. On the positive side, we have no interest in advocating "theistic evolution" or any similar hybrid in place of Darwinian biology, nor have we any interest in advancing any *a priori* concordism between theology and biology or between creation and evolution. This is not because we regard evolution *per se* as false or because we propose an alternative to Darwinian theory, but because creation and evolution belong to different orders both in theory and in reality. It is crucial that all of this be borne in mind if the following point is to be properly understood.

Once one sweeps away these confusions, once one permits the distinction, always already affirmed *in practice*, between the order of being and the order of history, and once one recognizes the infinite difference obtained between *every* cause and effect, the evolution of organisms of one species from those of another ceases to be the *theological* problem that *Darwinism* takes it to be. Once one affirms *both* the transcendent fullness of *ipsum esse subsistens* as cause *and* the irreducible difference of the world as effect, then there is no difficulty in principle in accommodating an apparently stochastic process like evolution as an expression of the freedom of worldly being within the possibilities, even the eventualities, afforded by God's actuality.³¹ I am not advancing any "theology of evolution"; I am merely reiterating that the choice presented between creation and evolution, between a divine intention for the world and the world's unfolding in its own proper freedom, is a false dilemma rooted in defective notions of God, creation, and causality.

Indeed if the preceding argument is true, creation in its proper sense turns out to be the necessary precondition for evolution and indeed for history as such, because it is

the precondition for just that novelty and difference as well as the supratemporal existence necessary for there *to be* history. Darwinism simultaneously requires and suppresses both this novelty and this transcendence. In Chapter 6, we considered the metaphysical meaning of Webster and Goodwin's arguments for real structural or dynamical homologies irreducible to descent. We saw that they were essentially arguments, like those of Driesch before them, for an order of being distinct from the order of history. We saw moreover that these orders, which can never really be dispensed with in practice, must be positively and not negatively related to one another. The indivisible transcendence of being is not juxtaposed to history as stasis to movement; rather, it is inherent in the movement of history as its very (albeit participated) actuality. Being and history are thus neither identical nor antithetical, though we have seen that acknowledging this point requires us to reconsider what history itself *is* and to reconceive it in terms other than the spatialized terms inherited from Newton.

Unless an order of being distinct from the order of history exhibits itself *in* history, a historical order of descent becomes unintelligible.³² Stephen Jay Gould's plea for Darwinians to give stronger emphasis to "constraint" distantly echoes these same concerns, though it does not appear that he himself understood this, and it does not prevent him from celebrating Darwinism's attempted historicism. I wish to make an analogous suggestion with respect to a transcendent order of creation, which confers upon the things of the world their "own indestructible, unconfused identity, both in activity and in being," *and* a historical order of development in which ontological identity manifests itself "from below" in existentially novel ways (Maximus Confessor, *Mystagogia*, I; PG91, 64D–65C cited in Balthasar 1988: 69). This is the understanding of time and eternity exhibited in the Incarnation and embedded within the Christian concept of tradition, which is not simply the static instantiation of an eternal verity or the identical repetition of a dead letter, but an eternally *living* word that is ever ancient and ever new—and thus infinitely fruitful—in each historical circumstance.³³ And it is no accident that it is only within the context of a world viewed by Judaism and Christianity as *creation*, that history, understood not simply as the eternal recurrence of the same but as the providential unfolding of creation, acquires such prominence. Creation in its passive sense *is* the world's historical unfolding in its own proper freedom, as what is ontologically first comes to temporal fruition—partly through the free taking over of itself—though we must still reflect on this with greater metaphysical specificity in the final section of this chapter.³⁴

Creation and evolution are not opposed, because the world's autonomy and its dependence upon God are proportionally, and not inversely, related. The world's autonomy is dependent upon its reception of *esse*, and only this gift is finally able to account for the novelty of effects that are irreducibly and existentially different from their antecedents and yet not uncaused. Darwin is typically hailed as an apostle of change, but the novelty inherent in change actually poses a threat to Darwinism and its self-understanding as a replacement for theology. Darwinian gradualism and its prohibition against "saltationism" are intended partly to minimize this novelty and to ensure the reducibility of descendants to progenitors, and this succeeds, or rather gives the appearance of success, only by maintaining an exterior view that effectively empties living things of their own interior being and unity. But the fundamental point is overlooked by this strategy. Unless there is *existential* "saltationism" between every parent

and offspring, unless every offspring is a self-transcending unity and an ontological *novum* irreducible to its parents, there is no descent, much less descent with modification. And this is precisely what Darwinism both presupposes and fails to account for. So we saw in Chapter 5 that Darwinian biology suppresses change and treats the production of novelty in terms analogous to the Newtonian treatment of motion: not as act or event (and thus irreducibly concrete) but as the measured difference between static points. This is one reason why Darwinism has only gotten more formalistic with the molecular revolution and the advent of population genetics and why the organism all but drops out of neo-Darwinian theory, except when it is called upon to vindicate natural selection. Left to its own devices, Darwinian theory would render all real novelty merely apparent, a matter of rearranging whatever existing bits are taken as ontologically basic. But it would then become difficult to maintain that basic tenet of Darwinian orthodoxy, namely, that all complexity emerges undirected from a prior simplicity. For without real irreducible novelty, all possibility must be precontained in some way in these most basic elements.³⁵ This, along with the impossibility of finally dispensing with an order of being distinct from history, explains why genetic Darwinism never really dispenses with its Platonic and Aristotelian dimensions but illicitly transfers all the qualities of form and substance to the immortal gene.³⁶

The Phenomenology of Creation: The Inside View

Of course, one cannot “prove” these novel differences or isolate the “hand of God” to prove his responsibility for them, as if *esse* were an *ens*, God were just an object, and creation were really just a mechanism after all. Contrary to Daniel Dennett’s absurd caricature, creation is not a skyhook—like Aphrodite restoring Paris to his bedchamber. If creation is not a qualification of the world but what the world is, then the demand to demonstrate creation is tantamount to a demand to demonstrate the world, a manifest absurdity.

Esse is not an *ens*, as we shall see, but the actuality proper to each *ens* and common to all, an actuality by virtue of which each *ens* is more than its nature. And form or essence is not an element in things which can be isolated (except mentally) as “parts of” or “truths about” a thing (Aquinas, *In Metaph.*, VII., lect. 2, 1275).³⁷ Rather, essence, as Jonathan Lear reminds us, is *what* a thing is; while *esse*, in Adrian Walker’s words, is a thing’s act of “izzing,” peculiar to itself and incommunicable, through which each thing is concretely actualized according to this or that form (2004: 467). Being and essence cannot be demonstrated, therefore, by their very nature but are rather the source and principle of every demonstration, since demonstrations of whatever kind presuppose the being and intelligibility through which we necessarily experience the world. We cannot analytically reduce the world to something more ontologically basic than being and essence, therefore, without tacitly *invoking* being and essence. Acknowledging this fact allows us to concede in theory what the *act* of cognition always affirms in practice: the world that presents itself to us in this first-order intelligibility, which Husserl calls the “only real world” (1970: 49). Acknowledging this priority of being and essence, in other words, allows us to regard what is experientially basic as ontologically basic. Charles de Koninck, Henry Veatch, and Michael Rea have each shown that within the ontology of modern science and the

“relating logic” that follows from it, it is impossible to give a principled account of so-called sortal properties, to say, as Veatch puts it, “what anything is” (1969: 26–62, 126–144).³⁸ And we have seen, in the case of Claude Bernard and Jacques Loeb, for example, that scientists have often reveled in this limitation, taking it as warrant for the Baconian equation of knowledge and power on the one hand and truth and function on the other.³⁹ Yet, we have also seen repeatedly that sortal properties remain indispensable to thought as such but especially to the life sciences. The result is the predicament of having to deny in principle what must be affirmed in practice. I will propose, by contrast, that *esse* and *essentia*, once we have properly understood them, begin to resolve this and Darwinism’s other intractable problems within both the noetic and real orders, without gutting whatever truth there may be in Darwinian theory.

Though one cannot “prove” being and essence or the novel character of *esse creatum*, one *can* approach creation by *attending* to this novel difference phenomenologically, as it were. I use this term advisedly. I think there is much to be gleaned from phenomenological analysis, and I am aware that there are (at least) two schools of thought on how to regard the phenomenological *epoché*.⁴⁰ Without weighing in on that debate, let me just say that I do not regard phenomenology as “first philosophy,” and the metaphysics I am attempting to advance here precludes the possibility of a phenomenological reduction that is not also and at the very same time a metaphysical reduction. Rather, in referring to a “phenomenological” approach, I am designating our elementary experience of the world in terms of the metaphysics which I think that experience always already exemplifies, an actuality which exhibits the unity and distinction of mind and world in advance of their artificial separation. This removes any *a priori* ground for isolating phenomenology from metaphysics and exhibits instead, in “phenomenological” experience, the priority of being as act.

This notion of “elementary experience” is extremely difficult to recover in part because our reigning mechanistic ontology is premised upon the attempt to deny it. Within this ontology, analysis is granted epistemic priority over synthesis, the counterfactual world is accorded ontological priority over the actual, analytically separated parts are given ontological priority over the wholes whose parts they are, and the simplest forms of life are regarded as the *analogatum princeps* for understanding life as such. In its Darwinian mode at least, this ontology conflates the historical and ontological orders *a priori* and consequently reduces ontological identity to causal history and systemic function.

Yet, it becomes easier to recover this experience and to see this mystery of incommunicable singularity if we simply reverse all this and treat *the person*, in Richard’s “existential” definition, as “the incommunicable existence of the rational nature” as the paradigm of all *ens*.⁴¹ This reversal is warranted by several factors in addition to the fact that it accords with the actual world that we cannot help inhabiting. The first is actually Darwinian. Darwin observed, as a consequence of the genealogical connection of living things, that the presence of certain mental and emotional faculties in human beings, far from degrading the human being, ennobled the lower species (1998: 152). On Darwinian terms, then, the “inwardness” which we know in ourselves and through which we know anything else, ought to extend by analogy to other creatures as well.⁴² Indeed, he *does* extend it to other creatures, in rather anthropomorphic terms, in *The Descent of Man*, if

only to maintain that the vast difference between humans and other animals is a matter of degree and not of kind and thus to bring the human being within his genealogical system of nature (67, 66–138). The more basic reasons for making the person paradigmatic of *ens* are metaphysical. The attempted equation of ontological identity and causal history is ultimately self-defeating. The terms of this reduction are violated with every invocation of the indicative mood. Transcendent form and identity are tacitly invoked even when they are denied; without them, history ceases to be intelligible at all (D.C. Schindler 2010: 15–44). Nominalism, as we have seen, is simply a second-order response to this primary necessity.⁴³

Once we recognize that the ontological order and the historical order are not identical, there is no reason to restrict understanding “life” or “nature” to understanding an organism’s genetic history and adaptive functions; nor is it necessary any longer to identify the paradigm of life and its intelligibility with its most primitive instances. Distinguishing the ontological from the historical order, in other words, liberates us to understand life from within the confines of what is in fact *most* immediately intelligible to us, confines that determine all of our theorizing, namely, our experience as persons. The warrant for regarding the person as the paradigm of life and analogously indeed of every *ens*, once the historicist restrictions upon ontology are removed, is the fact that the person, “through the exemplar of his psychophysical totality...represents the maximum of concrete ontological completeness known to us” (Jonas 2001c: 23). Once ontological order is freed from its historicist confinement, which is simply another way of acknowledging the irreducibility of each *ens* and species to its antecedents, then there is no reason not to regard “the concrete ontological completeness” of the person as

a completeness from which, reductively, the species of being may have to be determined by way of progressive ontological subtraction down to the minimum of bare elementary matter (instead of the complete being constructed from this basis by cumulative addition) (2001c: 23–24).

All our theorizing occurs from within this “maximum of ontological completeness,” and yet mechanistic ontology is premised on denying it any evidentiary value. The inevitable result, in the case of biological reductionism, is that the biological reductionist is necessarily forced to exempt himself and his own theorizing from his reductions, which ultimately undermines the basis of his own arguments. The reversal of perspective proposed here would save biology from this embarrassing inconsistency.⁴⁴

This “phenomenological” approach to being and to the question of creation is precisely the approach taken by Hans Urs von Balthasar, though here again it would be a mistake to regard his treatment of our primal historical experience as *merely* phenomenological. Rather, it is intended to show how that thought is always preceded by being and commenced from within experience, that thought’s primal form is therefore that of responsive wonder, and that reason is therefore structurally contemplative. Thought in its essence is a response to the provocation of being that “as such by itself ‘causes wonder,’ behaving as something to be wondered at, something striking and worthy of wonder” (Balthasar 1990: 615).

The fact that I find myself within the realm of a world and in the boundless community of other existent beings is astonishing beyond measure and cannot be exhaustively explained by any cause which derives from within the world. In surveying Western metaphysics in its entirety, we must be amazed at how little the enigma of reproduction—not only of organic natural creatures but above all of man, who is Spirit—has concerned philosophers. From the infinite prodigality of an act of generation—prodigality in the male as well as the female organism resulting in a “chance hit”—a “new” being is created which, reflecting upon its personal ego, cannot interpret itself in any way as a product of chance; for it possesses the capacity to view the world as a whole, indeed Being as a whole, from its unrepeatable perspective and thus to effect a unification of what it sees (Leibniz). Noting within (world-) Being indicates that this had the “personal” intention of producing precisely this unique and as such irreplaceable person through that game of chance; there is nothing to prove that this unique person receives a kind of necessary place through his incorporation into a (wholly hypothetical) series of monads, as a number receives its necessity within a totality of a series of numbers. I could imagine (and there is nothing to conflict with this idea) that an infinite number of “others” could have occupied this “same” place in the universe instead of me. Why it should have been me, I do not know (1990: 615).

Balthasar famously envelops this initial “surprise” of being within the primal experience of being a child, of coming to consciousness within the encompassing embrace of the mother’s smile. Remaining within this original experience, his thought proceeds to ascend by stages, as it were, from this first intersubjective encounter to the real distinction between Being and beings, pausing to consider being in its difference from beings as well as the converse, and concluding from their mutual dependence upon one another to the ever-greater difference between the world and God.⁴⁵

This starting point of the birth of a child is neither extraneous to the question nor sentimental. It is essential. Each one of us is invariably a son or a daughter, so that this concrete experience of being called into consciousness through the love of another is simultaneously historically *and* ontologically original. Balthasar’s starting point thus helps to illuminate the unity and nonidentity of being and history. The child “can awake only in paradise....” In this original awakening, each of us is as Eve, admitted into the surprise of being and coming to ourselves in the presence (and at the generous behest) of another.⁴⁶ This original encounter, precisely as personal, historical, and concrete, illustrates “from the inside” what we meant in Chapters 1 and 2 when we reiterated the Aristotelian–Thomistic claim that *actual* being, mediated by *ens*—and not merely an abstract *idea* of being—is the object of the intellect and the cause, through its self-communication, of our knowledge of it (Aquinas, *De ver.*, q.1 a.1; Aristotle, *Post. An.*, I, 71b20-72a-72b1). Though I come to myself as a surprise, I discover, from the very first, that I never exist without having already received the world into myself, a fact exemplified most profoundly and intimately in the person of my mother. Indeed, I only receive myself—and only appropriate this gift in consciousness and in freedom—as a consequence of my having already received the world along with myself.

Balthasar’s “surprising” starting point gives us an “inside view” of both the “*ex nihilo* structure” of created *esse* and its paradoxical characteristics. *Esse commune* is one and common to all, not merely in the sense of being shared or participated by each thing, much less as an accident “divided up” among them, but in the sense that

through the *actus essendi* that constitutes them beings are bound into a real (actual) and intrinsic unity with one another, a “single actuality” in Aristotle’s sense, in which I exist only through the activity of the world in me. In fact, Balthasar’s starting point shows that this actuality has always preceded one’s entry into it. And yet the “infinite prodigality” of this “chance hit” simultaneously makes visible, precisely from *within* this unity, the second paradoxical feature of *esse*, namely, that it is not only commonly participated by all things but incommunicably peculiar to each thing. It is this maximum of ontological concreteness that is the particularity of the living *ens*, along with all the ways that the activity of the world is implicated in his flourishing, that led us to characterize *esse* not as mere facticity but as the act-fullness—the “izzing”—operative in all subsequent acts that follow upon being. All of this emerges to view partly against the backdrop of the sheer gratuity and nonnecessity of my existence, the *via negativa* for arriving at the real distinction. If I exist contingently and gratuitously, if “nothing within (world-) Being indicates that this had the ‘personal’ intention of producing precisely this unique and as such irreplaceable person through that game of chance,” then existence as such cannot properly belong, of necessity, to my essence. There must be an irreducible distinction between them.⁴⁷ And inasmuch as “all other existents stand in the same relation to being as I do myself,” none can be regarded as necessary or as fully self-explanatory, and none can be thought to exhaust being or even broach it, since being is presupposed by all beings and since being “goes before” and “follows after” each of them. This observation leads Balthasar to insist on a certain primacy of being over beings, and the dependence of the latter upon the former, what we might call, in a rough paraphrase of Przywara, existence in and above essence.

It is precisely here that the nonidentity of being and essence takes on an infinitely positive dimension, exhibiting just that novelty, just that irreducible difference which we said was necessary for every causal transaction and supplying what was lacking, albeit lacking differently, in both Greek and Darwinian metaphysics. This is another important facet of Balthasar’s proposal to reflect philosophically upon procreation and why it is illuminating to return to this ancient paradigm for understanding causality as such. For here we see that “from the very outset...difference occurs primordially as positivity; the different is a ‘more’ that is affirmed, rather than a product of loss or a fall (negation)” (D.C. Schindler 2004: 38). A child is of course utterly dependent upon his parents, who quite literally *give* him to himself by giving him a “part” of themselves. Yet, a child is not simply the extension of his parents or reducible to their combination. He is a new *ens* in his own right, an irreducible *novum* over and above them, a subject of being separated from them, not simply by a different organization of his matter, but by an infinite *existential* gulf.

With the “Edenic” appearance of each child there comes into being a new “little world,” an interiority, an “in-itselfness”—in short, a *life*—that can never be fully communicable, that could never be replicated or replaced or occupied even by a materially identical other such as a clone. And if this infinite difference would obtain even between materially identical beings, it cannot be attributable solely to their matter or their form. It must instead be attributable, ultimately to their being, though the paradoxical relation of being to essence, which we will consider more fully later, does not deny matter or form their particularizing roles.⁴⁸ This incommunicable novelty of being, the fact that it is not itself an *ens* but the actuality of an *ens*, is partly

why being and life defy definition—for life is the being of living things—and partly why the ancients, seeking the unity of thought and being, had such difficulty with indefinable particulars (Aristotle, *De Anima*, II.4, 415b13). In sentient beings, this incommunicable difference comes to consciousness of itself in the form of perspective, but it is essential to see, in the case of our clones, for instance, that the irreducible singularity of perspective is a function of the more primordial singularity of being. Our clone could never wholly see *in loco personae* of his archetype because he could never *be* his archetype. If “interiority” is an ontological category that follows from the nature of *esse* and not merely a psychological category stemming from the nature of consciousness, then it must be extended by analogy and by degree to all things insofar as they have being. The result is astonishing. For it means that the “sortal properties” denied by modern naturalism—“*being* a bat” or “*being* a horse,” for instance—far from being merely nominal, are *actually* most real. And it means, furthermore, that their inaccessibility to us, their refusal to be swallowed up wholly by our measurement of them, is an index not of the imprecision of our concepts but of the solidity of their reality (Rea 2002: 8–15).

Yet, the very inaccessibility of Being, the fact that Being as such does not appear of itself, directs wonder back to the only place it *does* appear, namely, to the concrete existent who always exists as a particular something, according to an intelligible form.

Precisely by virtue of this dependence...of Being upon its explication in the existent, it is impossible to attribute to Being the responsibility for the essential forms of entities within the world (Balthasar 1990: 619).

So whereas the second aspect of the difference, after the intersubjective difference between mother and child, was the dependence of beings upon Being which we described as a priority of existence over essence, the third aspect is a priority of beings over Being, which we might characterize, again in Przywaraen fashion, as essence over and above existence. This asymmetrical but mutual dependence means that neither pole of the real distinction is sufficient to explain the being of the world and that indeed being as such does not explain itself. This then opens Balthasar’s reflection to the final difference, namely, the difference between God and the world and the dependence of *esse creatum* on *ipsum esse subsistens*, he who is essentially and absolutely. This is not a “proof” of God, but rather an opening within the heart of the creature to “see” God precisely as the invisible one.

Now, we have said all along that creation (in its passive sense) is not a qualification of the world, but simply *is* the world in its constitutive relation to God. This relation may be intimated by the fact, now made more compelling by Balthasar, that being as such is not self-explanatory. Creation thus shows itself not as an impediment to thinking but as a willingness to *see*. Creation is the sign of a more acute attentiveness to being and as the logical terminus of real wonder. Far from shutting down reason, affirming creation shows the willingness to give reason its full rein and to follow the question of being to its end, the world without end, though this requires us to alter our understanding of reason’s form. Scientific positivism, the culmination of a four-century effort to increase reason’s power by restricting its scope, suffers a dearth of wonder and is the antithesis of reason in this sense.

If creation is not something *done to* the world but is simply the world itself in all its splendor, then to “see creation” is not to see some fact about the world or to isolate some qualification of it—we have already insisted upon the manifest absurdity of trying to “prove creation” in this sense. Rather, it is to see the splendor of the world more deeply and comprehensively, issuing in a more comprehensive empiricism, so to speak. This is the avenue taken by Balthasar in his “inside view” as he approaches the real distinction through the most mundane and universal of human experiences. In making visible the paradoxical poles of this distinction, and their intrinsic opening to an “other” beyond the polarity, Balthasar brings to light what Przywara calls the “back and forth within the immanence of creatureliness itself: an immanent dynamic middle of actuality (*energia*) between dynamic possibility (*dunamis*) and inner end directedness (*entelechia*)” (Przywara: 113). Precisely because this dynamic “middle” between being and nothing does not ground itself, because each pole depends upon the other—and thus on the Wholly other—in the “composite” which they comprise, this analogy internal to the creature opens up of its own inner necessity to a still higher analogy, “as a dynamic back and forth between the above-and-beyond (a transcending immanence) and the from-above-into,” the transcendence of a divine other internal to the creature itself (Przywara: 113). Balthasar helps us to see and to make sense of the fact that each creature is, in a sense, bottomless. For at the heart of each creature, as St. Augustine realized, is a relation to God that makes the creature more than its antecedents and more than itself (*Conf.*, X.8.15, X.17.26, X.33.49).

The Metaphysics of Creation: The Outside View

This “inside view” of the mystery of being must nevertheless be complemented by a metaphysically adequate “outside view” which it itself presupposes and exhibits if we are to complete our account of creation, accommodate science, and avoid the numerous metaphysical and theological pitfalls that await on every side. Just what sort of understanding of *esse* is necessary if it is to meet all the paradoxical requirements that have been laid out for it, requirements which are ultimately inseparable from the fundamental requirement to preserve the difference of the world from God and to affirm the goodness of the world in its very difference? These conditions are difficult. Inasmuch as an adequate notion of transcendence requires us to understand *esse ipsum subsistens* as a proper name of God, we are back to the familiar problem of how there can be anything more than All. And there seems to be little difference in the end between asserting that “the all” is simply one or simply diverse. If we assert that *esse* is *simply* one, then God and the world either become two “objects” within the genus of being, or God himself becomes the being of the world. In either case, the difference is dissolved, and both God and the world are emptied of their integrity, the former by being denied his transcendence, the latter by being denied the interiority and incommunicability of its own being. But if we deny *esse* its paradoxical role of uniting *and* differentiating the world from God, either by denying *esse* its reality or by reducing it simply to a “proper accident” subsequent to substance, then it becomes impossible to give an *affirmative* account of the coincidence of universality and novelty in creatures, and creation becomes merely a pious affirmation with no bearing on the ontological structure of reality.

That is still not the worst of it. For if *esse* itself plays no role in differentiating the being of the world from the being of God, then that differentiation from God resolves into a “contraction” of a more basic unity effected simply by matter or some other potency, that is, by a lack of complete actuality. Of course, no one denies that creatures lack complete actuality, though it should be remembered that even motion or potency (*dunamis*) is a quasi-actuality, and thus, on Christian terms, an image and a participant in the perfect actuality of God. Creaturely being is nevertheless contingent, mutable, materially divisible, and distended in time; that is what it is to insist upon a real distinction between being and essence in its “negative” sense. Yet, if the world’s difference from God, *qua* difference, is *only* a lack, if this distinction *between* essence and existence is not also an image of the divine *identity* of essence and existence in Trinitarian love, and if God cannot countenance an “other” to himself in its very otherness, then it seems that God cannot be fully transcendent after all. We have set forth, from God’s side, the inter-Trinitarian conditions which make the countenance of such “otherness” possible, but we will have only succeeded in giving a positive account of this difference if we can explain, from the side of the world, how the “more” unveiled by Balthasar’s primal experience is inherent in the structure of created being as such. Only with this will we finally have grasped what it means to say that creation (in the passive sense) is the world’s unfolding in its own proper freedom.

It is little wonder that “being” has proven such a controversial question, both before and after the twentieth-century “Thomistic revival” which restored the philosophy of *esse* to the center of St. Thomas’ thought. I have no intention of adjudicating the long-standing disputes between Gilson and the so-called existentialists who stress the primacy of *esse*, those following Fabro and Geiger who stress the Neoplatonic elements in Aquinas and those Aristotelian Thomists who minimize the importance of *esse* and insist upon the priority of *essentia* and substance.⁴⁹ These are long and complex disagreements which nest a bevy of other disputed questions within them. Included among these are not only exegetical questions regarding St. Thomas’ vast *corpus*, but debates over the place of the *doctor communis* with respect to the broader tradition, the relation between grace and nature, faith and reason, theology and philosophy, and many other concerns. I simply wish to propose in outline form an interpretation of the doctrine of *esse* which meets the paradoxical demands of creation delineated earlier, an interpretation according to which both the “essentialists” and the “existentialists,” the Aristotelians and the Platonists, might, in a sense, be right.⁵⁰

We have noted numerous times now that the doctrine of creation entails a “real distinction” between essence and existence. Even so, Aquinas does not arrive at his understanding of this distinction in the first instance through Christology or by a theological deduction from the doctrine of creation. Rather, he arrives at it via a metaphysical induction from the structure of finite *ens*, though we must bear in mind the impossibility of both a pure *a priori* and a pure *a posteriori* metaphysics.⁵¹ This metaphysical induction is important, because for Thomas no less than for Balthasar, the *distinctio realis* is not simply a justification for the doctrine of creation; rather, it renders intelligible the structure of worldly reality, a structure that makes its phenomenal appearance, in the latter case, in the primal experience of the child. Already we have discussed certain paradoxes built into the notion of *esse*. Inasmuch as being is simple and complete, it is “all,” such that nothing can be added from outside

it. Literally nothing is outside *esse*. And it is this that makes the act-fullness of being “what is maximal in the thing” (Schmitz 1982: 101).⁵² Against this backdrop we begin to understand the difference between existence and that which is: “*quod diversum est esse, et id quod est.*”⁵³ That which does not exist by eternal necessity cannot *be* being; it can only *have* being by “participating” in it. This understanding grounds both Aquinas’ appropriation of the Neoplatonic notion of participation (*methexis*), which features prominently through the Thomistic corpus but required the groundbreaking studies of Fabro (1950) and Geiger (1953) to become visible to modern eyes, and the “Aristotelian” notion that *esse* is a proper accident of substance.⁵⁴ For if substances *have* being, then being inheres in substances. And Thomas is quite explicit that *ens*, not *esse*, is the subject and terminus of God’s creative act (Aquinas, *ST*, I, 45, 4 ad.1). It is created beings—*things*—which are substances, properly speaking. They stand in themselves, subsisting in their own being.

Our criticism of Darwinism over the disappearance of the organism is, in effect, a criticism of its failure to account for what is designated by substance: the self-transcending unity and interiority that is the principle and end of a being’s organization and that makes it the subject of its operations. So, I have no wish to deny the “Aristotelian” interpretation of Thomas’ doctrine of *esse* and the priority this interpretation grants to substance. The question, rather, has to do with the constitution of substance and whether the notion of a proper accident, while undoubtedly correct in a certain sense, is adequate to explain the relation of a substance to its own *esse* and to the nature of *esse* as act. What is the role of *esse* in the constitution of substances?

On the one hand, we have seen that Thomas’ insistence upon the subsistent *ens* as the terminus of creation warrants granting a certain ontological priority of substance over *esse*. Being only “is” according to various forms, and the primacy of form is reflected in the historical order in the fact that the nature of a living thing precedes the “free taking over of itself” at a subsequent point in its development. Hence the notion that substances of various natures *have* being. On the other hand, Thomas’ insistence upon *esse* as the most interior of perfections, the “actuality of all acts,” and something participated by all *ens* would seem to warrant granting a certain priority to *esse*. How are we to understand these seemingly contradictory priorities in a way that does justice to our paradoxical demands?

It is a delicate question. One temptation, insofar as *esse* is the act of acts and insofar as nothing can be added to it, is to regard all existing perfections, including *essentia*, as nothing but manifestations of *esse*. We can call this the “Neoplatonic” temptation for the sake of convenience, though this is no doubt an oversimplification. Yet, as D.C. Schindler points out, this temptation results in the familiar problem of accounting *positively* for the difference between individual substances and the *esse* in which they participate (2005: 17). *Essentia* on these terms cannot add determination to *esse*, and the proposition that essence somehow “limits” *esse* by a kind of potency is thwarted by the fact that *esse* must be the source of potency as well. “Again, if it is true, as Aquinas says, that ‘nothing can be added to *esse* from the outside, because outside of *esse* there is nothing,’ then it would seem necessary to say that it is precisely *nothing* that limits *esse*...” (17). The ultimate consequence of all this, which Carlo (1966) affirms and which Fabro (1970) rejects, is to undermine the “composite” structure of the creature, and ultimately, the “real distinction” altogether. We are left in the

familiar “Greek” position of distinguishing the participant from participated being simply in virtue of a lack, and this ultimately seems to violate the paradoxical demands necessary to uphold the integrity of creation and the transcendence of God. For if all perfections are simply the manifestations of *esse* in its fullness, then it becomes difficult to distinguish *esse creatum* from the *ipsum esse subsistens* of God, and if the world in its difference from God is simply juxtaposed to the fullness of *esse*, it suggests that God has a “real relation” to the world after all.

Fleeing from these implications, we might be tempted to the opposite “Aristotelian” extreme (again an oversimplification), “to think of essence as positive, as possessing its own perfection, to which *esse* is added as the sheer, content-poor, fact of existing” (D.C. Schindler 2005: 20). This position is not Aquinas’, and it is terribly problematic.⁵⁵ In this case, creation becomes the free addition of existence to essences already existing as so many logical possibilities in the mind of God (Balthasar 1989b: 402 and D.C. Schindler 2005: 20). Possibility is granted a tacit ontological priority over actuality, and *esse* then adds nothing but brute facticity to the intelligibility of essences. No longer a consequence of the *actus essendi* by which each thing is given to itself to be its own project, the mystery of singularity in virtue of which every existing thing differs from its essence becomes unintelligible once again. The coincidence of singularity and universality disappears into oblivion, taking the *actual* world in train.⁵⁶

These temptations derive partly from the difficulty of conceiving the mode of being proper to a principle, a difficulty that is only exacerbated by our ambient nominalism and materialism. In the face of this difficulty, it is challenging to keep oneself from imagining *esse* and essence as elements rather than principles and the composite *ens* as a *tertium quid* made up of two “things joined at the middle” (Walker 2004: 467, n. 11). Aquinas, of course, had followed Aristotle in denying *both* subsistent being *and* becoming to form as such.⁵⁷ In the first question of the *De potentia dei*, Aquinas characterizes *esse* in similar terms: “*Esse significant aliquid completum et simplex sed non subsistens.*” D.C. Schindler summarizes this stunning remark by saying,

On the one hand, being as the act of existence, is complete and simple; it is perfect...On the other hand and at the very same time, however, Aquinas also affirms here that being...doesn’t exist! (2005: 18)

Ferdinand Ulrich makes sense of this apparently contradictory statement by describing *esse* neither as the subject nor the efficient cause of the creative act, but as the “pure mediation” of God’s creative giving (Ulrich 1998: 20–26; Walker 2004: 469–470; D.C. Schindler 2005: 19–20). *Esse* is not the simple actuality of an *ens* but the actuality of all acts, “it is an actuality—reading the genitive as subjective—that *belongs* in some sense to what is other than itself, namely, the substance that it makes actual” (D.C. Schindler 2005: 19). *Esse* exercises causality as the transformatory actuality that grants to each substance its *own* act of being, but like Aristotelian form, it never exercises this agency outside of or apart from those substances (Aquinas, *Contra. Gent.*, I, 22). Adrian Walker explains it this way:

At the very moment that *esse* causes the created substance to be, it “inheres” in that substance quasi-formally, and there is never a moment when *esse* exercises its quasi-formal causality outside that inherence. *Esse*, you might say, causes not by itself being

the *creative* subject of creatures' existence, but by letting them be the *created* subjects of their own existence (2004: 470).

It is by being the created subjects of their own existence that things can be, in Kant's words, both cause and effect of themselves, even transcending themselves in the free "taking over" of their own nature in time. But how does such an interpretation stand with respect to all the paradoxical demands laid upon a metaphysics of creation? First, with respect to the transcendental unity of *esse*, this unity—this completeness and simplicity—is not opposed by the nonsubsistence of *esse* but rather secured by it; for it is this very nonsubsistence that prevents us from regarding *esse* as a "thing" parceled up among the substances that have it, and it is the very simplicity and fullness of *esse* as act that accounts for the indivisible, transcendent unity—the act-fullness—of each thing to the extent it is able to participate in it.⁵⁸ Second, not only does this nonsubsistence serve to protect the unity of *esse*; it simultaneously protects both the transcendent fullness of God and the difference between *ipsum esse subsistens* and *esse creatum*. God remains all: the fullness of subsistent being to whom nothing can be added and from whom nothing can be subtracted. All being is therefore God's, properly speaking, and being remains the source of all perfections. And yet, *esse creatum* is doubly distinguished from the *ipsum esse subsistens* of God by virtue of both its nonsubsistence and its subsequent dependence upon the beings whose being it is. *Esse creatum* is therefore God's being, Adrian Walker suggests, in the mode of being given away (472). Yet, precisely because it is given away without reserve and without loss—indeed because *esse* in its simplicity is the very act of giving itself away—it is wholly "made over" as it were, to the creature, to be the *actus essendi* incommunicably proper to each creature, who exercises this giving in turn in exercising the agency that is its act of being. God is therefore the fullness of being, the superlative perfection of actuality that is self-contained and transitive at once. He is immediately present to the world, indeed more present to the world than it is to itself—there is no "thing" interposed between God and creatures.⁵⁹ The world therefore has its being through participation in the being of God, and yet, God is not the being of the world. Moreover, neither the difference between *ipsum esse subsistens* and *esse creatum* nor the difference between *esse* and *essentia* can be regarded simply as a matter of "contraction," much less a fall. Rather, both are the positive fruit of the gift which is being itself, given by the God who is himself gift, and as such are images of the Son in these very differences. Inasmuch as essences are irreducible copinciples of substance, even in their dependence upon *esse*, they represent a real novelty with respect to *esse* without ever departing from that dependence, a "contribution" to being, if you will, from within its fullness. As D.C. Schindler puts it, "essences can have a positivity that is distinct from that of *esse* without however having that positivity except from within their sharing of *esse*" (2005: 21). To the degree that this can be extended not merely to the difference between *esse* and essence but between *esse* and the subsistent *ens*, the result in the metaphysical order is precisely that reflected "phenomenally" in Balthasar's example of the child:

the *ens* or substance is in some sense more real than *esse*, because it alone subsists, even while its reality is due wholly to the act of existence, which *is* the actuality of whatever reality it has (22).

Thus, the Christian doctrine of creation, understood not as a causal “process” but as the ontological structure of reality, once again deepens the interiority conferred on substances by Aristotelian form and resolves the Greek ambivalence over difference. Moreover, this understanding of *esse* as *simplex et completum sed non subsistens* simultaneously subsumes and resolves our earlier “Neoplatonic” and “Aristotelian” temptations. As the pure mediation of giving and the actuality of all acts, *esse* retains an absolute ontological priority in the constitution of creatures, and creatures, for their part, are in one and the same act of being perpetually receptive of their being and active. This means that “relation” is not simply a qualification of a substance “standing in itself”—a second-order qualification of a more primitive “inertial” reality—but that the very act of “standing in oneself” is the act of receiving oneself as a gift, an act through which the substance is at once granted its autonomy and constitutively related, in its very substantiality, to a prior “other.”⁶⁰ Yet, because *esse* is not subsistent since it depends “upon its explication in the existent” (and because finite *ens* are not, therefore, subsistent relations), it is necessary to grant substance a relative priority over *esse* and thus to maintain the traditional priority of substance over its operations as expressed in Thomas’ maxim, *agere sequitur esse* (Balthasar 1990: 619). In this reciprocal priority of essence and existence, however, not only does *agere sequitur esse* (action follow being), but, in a way, *esse sequitur agere* (being follows action)—not through Promethean self-creation but through the omnipotent fruitfulness of God’s creative gift (Walker 2004: 460). Thus, we see from the side of the world and in the structure of created being a “resolution” of creation’s paradox which does not remove creation’s paradoxical character.

Creation thus understood denotes not an immanent process potentially in conflict with other natural processes but the ontological structure of the world to which even the opponents of creation necessarily take tacit recourse, though we must postpone our attempt to make good on this claim until the final chapter where we will revisit our analysis of scientific reason in light of this ontological structure. Returning now to our claim earlier in this chapter that creation is not the antithesis but the precondition for evolution, I wish to suggest that this ontology not only accommodates the empirical data underlying Darwinism and its emergentist and developmentalist counterparts, as well as whatever truth there may be in those theories, but it corrects their philosophical deficiencies and internal inconsistencies by supplying what is lacking in their underlying ontology.

These deficiencies and inconsistencies stem from the conflation of nature and artifice that form the ontological basis of modern science. In the case of Darwinism, this is compounded by the attempt to conflate the temporal and ontological orders and thus to equate ontological identity with causal history and systemic function. This effort has deep historical roots in a malign natural theology—really an “artificial” theology—that confuses creation and manufacture, and the Darwinian tradition continues to project and enforce that theology even though Darwinians themselves have long since ceased to believe it. As a result of these conflations, we have seen that Darwinism lacks any principled means to account for the organism as a *per se unum*, a self-transcending unity that is the subject of its own existence, even though some such conception of the organism remains an unarticulated presupposition of Darwinian theory and even though the most reductive analyses of neo-Darwinism must tacitly take recourse

to it. Consequently, the organisms who present themselves as a unity in experience—and most notably persons—are predictably relegated to the antiquated realm of “folk biology,” and the Darwinian organism has tended to fracture into an aggregation of atomized traits and systems, eliminating in turn the “sake,” the stake in being, which is the animating presupposition for the struggle for existence in the first place.

By contrast, developmental biology, and to a certain extent developmental systems theory (DST), attempt to retrieve the organism from orthodox Darwinism by recovering a dynamic conception of form production or morphogenesis that is irreducible to history and that accounts for real homologies between and across phyla and for “emergent” properties that supervene upon lower-level material bases. We have argued that in its metaphysical meaning, this is tantamount to reasserting a distinction (though not a separation) between the ontological and historical orders. But since this is not adequately recognized, and since form is subsequently identified with a generative *process*, the organism remains identical to its system function and is treated as the accidental end product of the generative process rather than its source and subject. In the end, the organism remains an artifact and the attempt to recover the organism comes up short, an indication that developmental biology and DST remain captive to the mechanistic biology underlying Darwinism.

The ontology of creation allows for a fuller recovery of the organism without denying either descent with modification or the essential truth of emergentism and without invoking the specter of extrinsic teleology or the separate “ideal world” of freshman philosophy and Ernst Mayr’s imagination. By restoring the intelligibility and interiority of the organism, creation rescues the “Darwinian individual” from both the corrosive effects of Darwinism’s own “universal acid” and from the mechanistic ontology underlying both paradigms.

Insofar as *esse* is incommunicably proper to each thing, making each organism a “little world,” it restores the interiority that is the necessary prerequisite to its *having* a sake and *being* its own project. Insofar as *esse* is *simplex et completum*, which is to say insofar as it is the act-fullness of being, it restores to the organism a measure of indivisible unity and thus an ontological identity that transcends, and hence *ontologically* precedes, the temporal and material flux. To be in act as a living organism is to be *existentially* indivisible, to have a certain share in the simplicity of being, even if that same organism is materially and temporally divisible *ad infinitum*. It is to have a share in a “sempiternal” or supratemporal existence as the very condition of possibility for an intelligible historical existence that is at once “simultaneous and successive.” Only by granting the organism this unity of being, only by acknowledging its transcendent wholeness, is it possible to conceive of the organism as a *per se unum*. As we have argued throughout this book, only by conceiving of the organism as a *per se unum* is it possible to account for the manifold and integrated systemic development of the organism as a development *of* and *for* the organism.

And yet because there is a distinction between the order of being and the order of history, because history *is* by virtue of its participation in being, what is first in being, namely, form, can be last in the historical order of development.⁶¹ This means that it is possible to regard as truly emergent, *in the historical order*, the development of higher-level systems whose operations cannot be accounted for by the laws operating at lower levels. When *form*, *matter*, and *esse* are regarded as equi-primordial, we can

even accommodate the “surprise” that is the novel emergence of a being existing according to a “new” form for the reasons that we have already discussed: that *esse* is paradoxically proper and common, and that the intensified concreteness, event character, and constitutive relationality of *esse* give circumstances a greater role in the determination of beings according to this or that form, in *a concrete analogia entis*, than was the case for Aristotle.⁶² And yet once we acknowledge this distinction between the ontological and historical orders, we are not compelled, for all of that, to regard the emergent organism as merely the accidental end product of its own emergence but can regard it instead as its source and subject. Instead we may truly hope to return the organism to the center of its own evolution. In short, a proper understanding of creation would allow us to recoup the insights of developmentalism and emergence theory without the limitations of its current mechanistic ontology.⁶³

We must take care, however, in how we distinguish between the ontological and temporal orders. We have seen that Darwinism’s attempt to collapse these orders is of a piece with its mechanistic ontology and its accompanying nominalism. D.C. Schindler suggests that this understanding of *esse* as *simplex et completum sed non subsistens*, when properly extended to form or essence, reconciles the truths inherent in both nominalism and realism.

In the light of this analogy to existential act, we can read the determinate perfection of form as a *determining* perfection, that is, as an inherently self-donative forming principle. Thus, for example, whiteness does not subsist any more than *esse* does, but subsists only within the substance within which it inheres. But to say this does not require us to draw the nominalist conclusion that universals are therefore merely rational, as opposed to real, beings. Instead we can say that they are in some sense perfect and simple, insofar as they are in act, analogous to the *actus essendi*. And if they, again, like *esse*, do not subsist in themselves, nevertheless they do subsist: in the substances that share in them. In other words, they possess their own perfection, but as having always-already given that perfection away. Nominalism is right to deny the reality of the forms considered in themselves, and realism is right to insist that the forms nevertheless exist. Both aspects are true: humanity is “nothing” in comparison to a particular human being, but this does not invalidate the complementary affirmation that the totality of existing human beings will never fully exhaust what it means to be human, i.e., that the universal remains in some sense “higher” than the particular (D.C. Schindler 2005: 23).

When the distinction between the ontological and temporal orders is understood in light of the nonsubsistence of form and *esse*, we see clearly that it does not reproduce the “two-worlds” of freshman Platonism. This understanding does bring some much needed metaphysical clarity to the so-called species problem, however. While I do not wish to suggest that this will resolve this problem in strictly biological terms—that remains a task for biology itself—it does help to save biology from the consequences of its own philosophical transgressions. In Chapter 5, we saw that Ernst Mayr’s prohibition against so-called typological conceptions of species presupposed, first, a conception of “essence” or “typology” as either a set or a metaphysically crude Platonic form, and second, the juxtaposition and functional collapse of the orders of being and history. These assumptions, which are by no means metaphysically innocent in their own right, made it necessary to pit a genealogical conception of species against the so-called typological understanding.

Our argument, however, is that form is simply the ontological identity of an organism which is the necessary, though unacknowledged, presupposition both of the organism as a *per se unum* and any physical, chemical, or genetic analysis we might undertake of it. It follows that the notion that “species change” is not simply an illicit conflation of ontogeny and phylogeny or a confused notion of change that conflates and confuses the transformation of one thing with the difference between two things, though it is both. It is tantamount to denying the law of noncontradiction and saying that A is and is not A at the same time. By contrast, if “form” or “species” simply names the ontological identity of an organism, and if such an identity coextends with an organism’s being and is thus one, then we must say that species can be immutable, eternal even, in a very precise sense, without denying the genealogical relatedness of living things or descent with modification. Species are eternal not in the sense that they perdure as subsistent entities for an infinitely long time, but insofar as their actuality, which *is* only ever *in* historical organisms, is indivisible by time and space. It is precisely this that permits its members to transcend the temporal flux of which they are a part. And yet, precisely because these forms do not subsist outside of the individuals in which they inhere, there is no problem in understanding each species and every individual of the species as a historical novelty which first makes its appearance at a distinct moment in time. To the contrary, as we have seen, the conception of form and being as *acts* and thus events intensifies the historical concreteness of this appearance. Nor is there a problem, in principle, with understanding a species as a community of descent or with understanding an organism of a distinct form giving rise to an organism of a distinctly different form. This is particularly the case if there is an infinite existential difference between causes and effect and if form, too, is an act, and thus an event. For in this case, the historically distinct relations implicated in this act are not merely “proper accidents” of a substance, they enter constitutively into the composition of that substance.⁶⁴ This does not alter our Aristotelian conviction that form as such does not “become.” Rather, it simply underscores our contention that *things* become *according to* distinct forms under unique and particular historical circumstances that contribute to being and that are their essential conditions of possibility. There is thus no conflict in principle between the immutability of species and descent with modification and no *a priori* prohibition, on metaphysical or theological grounds, against a conception of species at once historical and ontological. To the contrary, any intelligible species concept must be both.

There is still much work to be done, of course, to think through this in terms of the metaphysical principles of form, matter, and *esse* or some modern equivalents and what they each give to the substance and event that is the living thing. But the crucial point is to see that this understanding of creation—creation not as a process for bringing forth the animate from the inanimate or one species from another but as the ontological structure of the world—does not contradict, affirm, or fuse the basic empirical or theoretical principles of evolutionary biology insofar as these are actually scientific. Rather, it establishes their ontological conditions of possibility while protecting their objects.

Creation ultimately restores these conditions not only by restoring the intelligibility, unity, and interiority of organisms but by restoring the unity and intrinsic intelligibility of the cosmos. We have seen that Darwinism’s “accidental organism” is of a piece with

the priority that Darwinism accords to the problem of “adaptation.” This problem acquires its primacy in turn from the presupposition of an accidental universe which results from the reduction of being from act to brute facticity and ultimately, from the attempt to premise meaning and order upon unmeaning and disorder, an attempt which concludes in the termination of reason itself. This is the source of the bifurcation of reality into primary and secondary qualities and the source of science’s permanent ambivalence over its own positive conception of “law.” In this accidental universe, analysis is accorded priority over synthesis and the analytically abstracted parts of reality are accorded ontological primacy over the actual whole from which they were abstracted. Darwinism thus follows in the wake of seventeenth-century science in premising the actual world upon a counterfactual world in which nothing is actually at home and to which nothing actually belongs.

The Darwinian organism is thus predicated upon the demise of the old Greek cosmos, and Darwinian science is predicated on the demise of *theoria*. Yet, even the Greek conception of the *cosmos* was not without its ambivalences. In Chapter 2, we saw that Plato, Aristotle, and Plotinus were each preoccupied in their way with the question of whether and in what sense the universe is one, and we have seen that this has provoked no small amount of controversy among contemporary commentators on Aristotle in particular. Those seemingly most averse to theology (Aristotelian or otherwise) tended to ascribe to the Aristotelian universe at worst a nominal, and at best a question-begging systemic unity, while other commentators (with no obvious theological brief) struggled with organic or political analogies in search of a unity that was real and that integrated beings into itself without trespassing on their integrity or undermining the ontological primacy and heterogeneity of form.

We maintained that the unity of the cosmos (Aristotelian or otherwise) was a function of being as act, whereby the actuality of each thing is implicated in the actuality of all others through their common relationship to the transcendent actuality of God. And yet, we also argued that the Greeks, for all their profundity, were never able to conceive of this actuality in such a way as to fully include difference—and indeed ultimately *persons*—within cosmic unity. Man may have been at home in the Aristotelian cosmos, but Socrates was never quite.

The Christian revelation resolves this tension at the theological level by reconciling difference, simplicity, and unity, and thus including transitivity within the perfection of act, in the love that distinguishes and unites the persons of the Trinity. Nonsubsistent *esse* is the fruit and image of this perfection in its very nonsubsistence (and in its relation to the principles of matter and form), in the difference which distinguishes (and dignifies) creation as *not* God. We can now see that *creatio ex nihilo* resolves these tensions at a metaphysical level as well. It is by dint of their participation in *esse commune* that beings occupy a common order of being. In other words, *esse commune* makes possible a true universe, a single order of reciprocal causality, which manifests in turn the real and not merely conceptual unity of *esse commune*. And yet, precisely because *esse commune* does not subsist but gives itself over entirely to the beings that participate in it, because every substance in consequence receives its “own” act of being that makes it more than its nature, the unity of this “single actuality” does not negate the integrity of the beings which comprise the universe by depriving them of their own *entelechia* or by reducing them to mere component parts of the cosmic

whole. We can almost say that the universe itself is *simplex et completum sed non subsistens*, and that for this very reason, there is room for a creature—the *person*—that makes its appearance with the advent of Christianity and whose continued existence as such is threatened by the prospect of Christianity's demise. As a consequence of the gift of *esse commune* in creation, the universe is truly big enough for *us*.

Thus, we understand more clearly now the conclusion of Chapter 2: that the Christian doctrine of creation *ex nihilo* brings to fulfillment the cosmological aspirations of the Greeks. And we can understand now why the "unknown God" that St. Paul declared to the Athenians is at the heart of this fulfillment (Acts 17:16–32). Though the Greek conception of being as act went a great distance toward illuminating the unity of the universe, the Greeks could not conceive of transitivity or receptivity as perfections of act. Thus, the Greeks were only ever able to conceive of difference, whether the Aristotelian difference of each thing from its form or the Plotinian difference of all things from the One, as a kind of fall or subtraction from a prior unity. There was therefore no room in Greek thought for that mysterious entity, the person, who is the incommunicable subject of his own being, and this was ultimately due to the fact that they could not adequately conceive of either the difference or the intimate union between the world and God. The Incarnation of Jesus Christ would disclose both.

Creation's fulfillment of Greek cosmological aspirations bears just as directly upon the collapse of a coherent cosmology in the scientific age by restoring the intrinsic intelligibility and the unity and interiority *of* actual things and the unity and distinction *between* actual things, both of which were evacuated with the advent of science's mechanistic ontology. By distinguishing the Christian doctrine of God from the finite god of modern science, and by disentangling the Christian doctrine of creation from its confusion with a process of manufacture, we have distinguished more radically between God and the world in order that the intimacy of their union may be brought to light. The result is a cosmos which is again one by virtue of the gifted participation of each thing and all things in the unity of God, and thus a cosmology which is comprehensive, including within its embrace both its own intelligibility and all that wherein each thing differs from God and from every other. And yet, this cosmology is nonreductive for the very same reason that it is comprehensive, because each finite thing is *intensively* infinite simply in virtue of its incommunicable being.⁶⁵ For at the heart of each thing is the mystery of being, and at the heart of the mystery of being is the mystery of God. This mystery does not lie inaccessibly behind the empirical but is manifest *in* the empirical. It presents itself to us in each human face, and analogously in the life of every organism. It shows itself wherever an interior life finds outward expression in visible and intelligible form, provided that reason takes *its* form from the creation in which it is a participant and allows things to be instead of first regarding them as matter to be worked upon. This is not a retreat to mysticism, though it is a great mystery. On the contrary, it is a step toward a more comprehensive empiricism, an empiricism capable of regarding the appearances as evidentiary and of reconciling us to the world that we cannot help living in.

The doctrine of creation therefore invites us to a more comprehensive view of reason itself, within which there is room for experimental and theoretical science but in whose light the scientific goal of exhaustive intelligibility and comprehensive command appears not only as hopeless but as *contra naturam*. For any science that proceeds on the supposition of that goal will be inadequate to being and lack adequate

knowledge of its own nature, and will therefore be destined to falsify itself and its objects. This is why science finally needs creation in order to be science, because creation performs for the sciences a service which they cannot perform for themselves. The doctrine of creation calls science to its senses in the truest sense of that phrase, thus saving the appearances, restoring science to a more comprehensive order of knowledge, and restoring knowledge itself to its true form.

Notes

1 As Balthasar puts it,

So everything Christ does is both human and superhuman at the same time; but the superhuman in his actions in no way destroys what is purely human, genuinely human. Christ has, not a “spiritual existence”, but in every way a completely human one and, as such, an existence that is divinized; in fact, the divinity of his actions finds its ultimate guarantee in the intact and undiminished authenticity of his humanity...just as far as the two wills remain themselves, unconfused, is as far as they can be united in a single activity. This unity, then, is “organic interpenetration”, and one may call it “theandric activity” on the basis of its indivisibility, or even—using his opponents’ formulation “a single activity” if one understands this as referring, not to the nature, but to the hypostasis (1988: 262).

2 There is of course a vast difference between the Incarnation, in which human nature is hypostatically united—that is, personally assumed by—the divine *Logos*—and the way that God as Creator is interiorly present to creatures as the source of their own being (not to mention our graced, sacramental participation in Christ’s union with the Father). Our claim that the Incarnation of Christ is paradigmatic of the God–world relation must therefore be taken in light of the claim that Christ *is* the concrete *analogia entis*. That is, the Incarnation is paradigmatic precisely *as analogous*, and therefore as making visible a likeness in the context of an infinite and ever-greater difference.

3 This point, which we developed in Chapter 6 with the aid of Hans Driesch, is also the principal thesis of the essay by D.C. Schindler (2010: 15–44). Schindler uses the term “supratemporal” for what I am describing here. We may also use the medieval notion of sempiternity, so long as this is taken to designate not endless duration but simple actuality.

4 See Hanby (2003), pp. 106–178.

5 It follows then, that while there is no “real distinction” in the simplicity of God, the distinction in creatures is not simply negative, but a positive image of the *identity* of essence and existence, unity and difference, in the divine being understood as triune love.

6 Robert Spaemann writes,

And here we can make a distinction between the self that sustains existence, on the one hand, and *what* it is that exists on the other. We say that someone finds life difficult, or that someone takes his or her own life, and in some stages of life we feel that simply existing is an effort. These expressions are all paradoxical. They speak of existing as an activity which subjects perform, though in order to perform any activity, a subject must first exist, while the “activity” of existing is apparently the condition for there to be a subject to exist. We would do better to say that the “what” of the subject’s existence is a “way of being.” In the case of the bat it would seem that its being is wholly swallowed up in its way of being, wholly accounted for as “living.” Human beings, on the other hand, exist by distinguishing their being from their specific ways of being, their specific “nature.” Their nature is not what they *are*, pure and simple; their nature is something that they *have*. And this “having” is their being (2007: 30–31).

We will take up further implications of this shortly, but it suggests something analogous to our earlier contention that the world is an image of the God who is love not just in virtue of its similarity to God, but in its ever-greater difference *from* God: that the unity of essence and existence in God is most profoundly reflected in creatures for whom the real *distinction* between essence and existence is greatest.

- 7 See Aquinas, *In Sent.* II.d.1, q.1, a.4 in Baldner and Carroll (trans.) (1997), p. 85 and Aquinas, *ST*, I.8.1.
- 8 It is also what it means to see that being is truth and truth is one. In the end, amid the plurality of philosophies there is only one philosophy, advertently or inadvertently held.
- 9 The point about the primacy of form and the point about the inexorability of final causality amount, in the end, to the same thing. Earlier we noted that D.C. Schindler, drawing on Robert Spaemann, makes a similar point that form and finality are inherent in intelligibility as such. See D.C. Schindler (2010), pp. 22–23.
- 10 In Chapter 5, we discussed how nominalism and idealism can only ever be a second-order response to this first-order necessity. Balthasar sums this point up well.

Without this primary distance between the ego and God, there would be no reason why the objects that display themselves within the subject should not be apprehended and interpreted as forms, external aspects, or modes of appearance in the ego, in other words, why people should not be convinced idealists also in their daily lives. In fact, they are not. Rather they adjudge external existence and value to the things they know inside of themselves, and no argument in the world can convince them that this affirmation is a merely practical one that could be superseded from a higher speculative standpoint (Balthasar 2000: 54).

- 11 The ontological priority of the event is of course a staple of Whiteheadian metaphysics, and while I find Whitehead's metaphysics helpful for bringing to light the event character of being otherwise suppressed by its reduction to bare facticity, I depart from Whitehead in identifying the principle of that act with form and *esse* and not with matter, potency, or "creativity" *per se*; an identification which derives partly from the need for a transcendent ontological identity irreducible to becoming. Thus, if this formulation bears any resemblance to Whitehead, it is not least because of Whitehead's own debts to Aristotle. See Whitehead (1969), pp. 36–39, 240–248, 397–413 and Whitehead (1955), pp. 27–33, 143–163. For a helpful comparison of Aristotle, Aquinas, and Whitehead, see D.L. Schindler (1973), pp. 161–171.
- 12 Aquinas, *Contra Gent.*, II.6.4:

Furthermore, that which belongs to a thing through itself must be in it universally; as for man to be rational and fire to tend upwards. But to enact an actuality is, through itself, proper to a being in act. Therefore, every being in act is by its nature apt to enact something existing in act.

See also *Contra Gent.*, III.1.21.

- 13 We have already noted, following Jonathan Lear and others, how a similar idea is latent in Aristotle, in the fact that the intelligibility intrinsic to things can only be actualized in being known by another, meaning that the world thus "wants" to be contemplated, so to speak.

If, in Aristotle's world, form which exists as a potentiality is in part a force toward the realization of form at the highest level of actuality, then *one ought to conceive of perceptible forms embodied in physical objects as forces directed toward the awareness of form* (Lear 1988: 109, emphasis original).

This is made more explicit in the Augustinian–Bonaventuran tradition, in which all things are a kind of *imago trinitatis*, reflecting the generation of the Word from the Father, in their very intelligibility. See Bonaventure, *Itin.*, II.5, ff.

- 14 Once again, "eternal" does not here mean "lasting a long time," but indivisibly actual.

- 15 This is evident, for instance, when Aristotle says that “Unity has many senses (as many as ‘is’ has), but the most proper and fundamental sense of both is the relation of an actuality to that of which it is the actuality” (*De Anima*, II 412b8). See also Lear (1988), pp. 273–293.
- 16 See Jonas (2001d), pp. 99–107.
- 17 We might suggest that the possibility of formalistic substitution, abstracted from *what* actually is, is what gives the appearance of strict quantitative equivalence between cause and effect.
- 18 We should bear in mind the “Hegelian” reservations we elaborated in Chapter 2: that the infinite is not properly understood as the negation of the finite and that infinity understood as boundlessness or infinite extent is still finite after all inasmuch as it is divisible. That is to say, in crediting Duhem with recognizing the historical connection between the Christian understanding of the individual soul and revisions to the Aristotelian understanding of infinity, I do not intend to endorse his interpretation of this connection as a theoretical matter. Legitimate Christian thought about infinity is not limited by Aristotle and scholasticism. See David Bentley Hart for how the notion of infinity itself was transformed by the Trinitarian reconciliation of unity and difference (2003: 187–229).
- 19 Of course, by referring to Aristotelian forms as “eternal,” I am not imputing subsistence to them. Indeed, the nonsubsistence of both *essence* and *esse* will prove crucially important later on in our argument. The characterization of Aristotelian substances as vainly attempting to “catch up” to their own essences is derived in part from passages such as the following, which depicts generation as a form of participation in eternity, not numerically but specifically.

Since no living thing is able to partake in what is eternal and divine by uninterrupted continuance (for nothing perishable can for ever remain one and the same), it tries to achieve that end in the only way possible to it, and success is possible in varying degrees; so it remains not indeed as the self-same individual but continues its existence in something like itself—not numerically but specifically one (Aristotle, *De Anima*, II, 415b5 ff.).

- 20 Jonas’ insights are very important here. See Jonas (2001b) and Jonas (2001d), pp. 64–107.
- 21 Maximus Confessor had a profound grasp of this. He writes,

God created all things with his limitless power, brought them into being, holds them there and gathers them together and sets boundaries to them; in his providence, he links them all—intellectual beings as well as sensible—to each other as he does to himself. In his might, God draws up all things that are naturally distinct from each other and binds them to himself as their cause, their origin and goal; and through the power of this relationship to him as source, he lets them also be drawn toward each other. This is the power through which every being is brought to its own indestructible, unconfused identity, both in activity and in being. No being can permanently isolate itself through its own particularity or through the drive of its nature toward some other end; rather everything remains, in its very being, bound without confusion to everything else, through the single, enduring relationship of all to their one and only source (Maximus, *Mystagogia*, I; PG 91, 64D–65C cited in Balthasar 1988: 68–69).

Balthasar sums up Maximus’ vision this way:

Here, in the end, is the inconceivable fecundity of this divine unity: on the one hand, it is the cause of the unity of all things and of their respective differences; it makes each of them an image of the divine unity and uniqueness; it is the basis of what is most personal and immediate in each of them. On the other hand, this divine unity is, in itself, the overflowing unity and root identity of these individuals, the source of their community and their loving communion. This paradox of a synthesis that unites creatures by distinguishing them and distinguishes by uniting them—a paradox that can be found throughout the whole edifice of the universe—takes its origin in the most original relation of all things: their relation to God (1988: 69–70).

- 22 See Walker (2004), pp. 458–459, n. 3.

By singularity I will mean...the unmistakable uniqueness of the person. It is a common conviction of the classical tradition of Christian thought that some principle internal to the person himself is at least a necessary condition of his having such unmistakable uniqueness. Different authors explain this principle differently, of course. One thing is clear, however: everyone in the tradition agrees that the principle of personal singularity, whatever it is, is of the metaphysical order, that is, has to do with the very being of the person, seen as irreducible to material process.

The burden of Walker's essay is

to show that personal singularity is not only not opposed to communion, but is, so to say, its "flip-side." Personal singularity, in fact, is not just bare individuality. Rather, it is something that integrates in itself the values of both the individual and the universal—while transcending the order in which their opposition exhaustively determines the field of possibilities.

We will attempt, taking the person as metaphysically paradigmatic for reasons we have already indicated, to extend this understanding analogically to the whole community of beings.

- 23 See Bohm (1957), pp. 41–47.

- 24 John Peterson indicts contemporary materialism in analogous terms.

For suppose modern philosophers are right in identifying matter or the ultimate spatial substrate with some actual thing such as *res extensa*, mass, energy, or subatomic particles. Then, to explain difference in the world, these philosophers must follow Descartes and posit as the cause of that difference something besides matter (Peterson 1999: 430).

- 25 It has long been observed that the novel gives its author a godlike power to see the inside as well as the outside of the characters he invents. Thornton Wilder's *The Bridge of San Luis Rey* exhibits this power in a way that profoundly contrasts incommunicable interiority with the objectification of science.

- 26 Indeed, Darwinian evolution, which accords ontological primacy to potentialities by reifying them as so many logical possibilities, has a great stake in denying this corollary. See, e.g., Dennett (1995), pp. 61–84.

- 27 See Driesch (1908), pp. 162–164.

- 28 The "erg" is the unit of energy and mechanical work in the centimeter-gram-second (CGS) system of units, which was current when Driesch wrote. The CGS system has since been supplanted by the International System of Units. In this system, the unit for energy and mechanical work is the joule. The conversion is 1 joule = 10,000,000 erg.

- 29 See Balthasar (1992), pp. 110–113, 286 and Balthasar (1988), pp. 81–114.

- 30 This would undermine Darwinism's explanatory power were it not for the pragmatic abandonment of truth in favor of "function." The *locus classicus* of Darwinism's renunciation of reason is of course John Dewey's *The Influence of Darwinism on Philosophy* (1979). For a succinct assessment of the significance of this pragmatic turn, see Ratzinger (2004), pp. 178–183.

- 31 If there is any *theological* import to Simon Conway Morris' work on evolutionary convergence (a point about which I remain ambivalent), it consists not in his own incipient theological speculations which accompany the work. Rather, the promise lies in his treatment of convergence *qua* evolutionary biology, which seems at least superficially compatible with more metaphysically adequate conceptions of nature, insofar as "the attractor" states upon which convergence seems to converge open the door to new reflection, on form, act, potency, and so on. See Morris (2003).

- 32 Our Christological thinking about the time–eternity relationship implies the inverse as well: that historicity as such discloses something of the transcendent order of being.

- 33 Of course, this is not to deny that what is given in tradition is *eternally* true, but only to insist that time is not the antithesis of eternity but is its moving (and thus analogous) image, such that what is eternally true does not preclude temporal “development.” This, I suggest, is what it means to say that revelation is God’s disclosure of himself, “realized by words and deeds having an inner unity” and that “Jesus perfected revelation by fulfilling it through his whole work of making Himself present and manifesting Himself...” (*Dei Verbum*, 2, 4).
- 34 See Walker (2004), pp. 460–465.
- 35 Some such conclusion is implicit in Morris’ notion of inherency, which constrains the infinite possibilities that can be imagined when the counterfactual is given ontological priority over the actual. Though this point would obviously need to be developed, one might conclude that Morris’ argument, viewed in philosophical terms, amounts to a reassertion of the actual over the possible. See Morris (2003), pp. 1–21, 69–105.
- 36 On the “Platonic” dimension of cellular chemistry, see Monod (1972), pp. 103–117.
- 37 The distinction between what is true *of* an entity and what the organism *is* is formulated by Lear (1988), p. 26.
- 38 See Rea (2002), pp. 77–127 and de Koninck (1960), pp. 1–114.
- 39 See Bernard (1957), p. 82 and Loeb (1912), pp. 3–4.
- 40 See Sokolowski (2000), pp. 198–227.
- 41 See Spaemann (2007), pp. 27–33 and Ratzinger (1990), pp. 439–454.
- 42 Stephen R.L. Clark makes a similar point, though he draws somewhat different conclusions from it than I would. See Clark (2000), p. 7. See also the remarks of Jonas (2001c), p. 57:

In the hue and cry over the indignity done to man’s metaphysical status in the doctrine of his animal descent, it was overlooked that by the same token some dignity had been restored to the realm of life as a whole. If man was the relative of animals, then animals were the relatives of man and in degrees bearers of that inwardness in which man, the most advanced of their kin, is conscious in himself.

- 43 As we have seen, Descartes inadvertently concedes this when he admits that it is “hardly possible” to shut off the deliverances of the senses. This is why the first act of the will’s freedom for Descartes is its capacity to say “no” to the world’s self-presentation, to withhold assent from perceptions that are less than clear and distinct (Descartes, *Meditations*, III, CSM II, p. 24).
- 44 Hans Jonas’ criticism of cybernetics is devastating in this regard.

[The cybernetician] himself does not come under the terms of his doctrine. He considers behavior, except his own; purposiveness, except his own; thinking, except his own. He views from without, withholding from his objects the privileges of his own reflective position. If asked why he embraces cybernetics, he would for once answer not in cybernetical terms of feedback, circular loops, and automatic control, but in terms like these: “because I think it to be true, and I am interested in truth”; or “because I think it to be useful for such and such ends, and I am interested in those ends”; or “because it is the rising fashion, and I like to keep up with the times” or whatever else may be truthfully or untruthfully answered in such cases (Jonas 2001a: 123–124).

The critique of cybernetics applies equally to evolutionary biology.

As part of the history of life’s quest to know itself, materialistic biology, its arsenal newly strengthened by cybernetics, is an attempt to apprehend life by eliminating that which affords the possibility of the attempt itself—the authentic nature of awareness and purpose. The attempt, therefore, in disowning itself as evidence of its subject matter, contradicts itself with the kind of understanding it achieves of its subject matter. In eliminating itself from the account, it makes the account incomplete, yet does not tolerate a completion that

would transcend the self-sufficiency of its principle, in virtue of which the account is closed in itself. The attempt not only leaves itself unaccounted for, and unintelligible by its own terms: even more, with the epiphenomenalist depreciation of inwardness, it invalidates its own finding by denying to thinking a basis of possible validity in an entity already completely determined in terms of the thoughtless. It is the Cretan declaring all Cretans to be liars (133–134).

Recall also, Driesch (1908), pp. 273–286.

- 45 Since our point is not to expound upon the work of Balthasar as such, but rather to draw out certain features of his treatment that help us *see* the structure of being as gift and the novelty characteristic of creation, readers may wish to consult Healy (2005), pp. 58–81 and D.C. Schindler (2004), pp. 31–60, for a more complete treatment of the fourfold distinction. I am indebted to their analyses.
- 46 The fact that it experiences Being (*Sein*) and human existence (*Dasein*) (why should it make a distinction between the two?) as the incomprehensible light of grace is the reason why it engages in play. It could not play if—like a beggar at a marriage feast—it had been allowed to come out of a cold and dark outside by the “grace” of a condescending mercy to which it had not “right”...It gives itself to play because the experience of being admitted is the very first thing which it knows in the realm of Being. It is, in so far as it is allowed to take part as an object of love. Existence is both glorious and a matter of course (Balthasar 1990: 616).
- 47 Of course whether that distinction is “real” or merely “conceptual” is a question of long-running dispute, both with respect to Thomas and more generally. I will simply take it for granted that Thomas took the distinction to be real.
- 48 There is a bit of an equivocation here in my use of the term “matter,” which I am employing in the conventional modern sense rather than in the Aristotelian sense. On these latter grounds, one might object that this equivocation obscures the fact that our clone could not be a materially identical “other” because it is the very function of “signate matter” to individuate, the “classical” Thomist position. The dilemma is thus falsely stated, so the objection would go, and there is no need for a distinct act of being to account for the existential difference. Nor could *esse* account for the formal difference between this and that, the only mode in which existential differences appear. Montague Brown maintains the latter position and redirects our attention toward the particularizing characteristics of form itself. To the first, I would reply that conceiving of signate matter alone as the sole principle of individuation reintroduces just that ambiguity over the difference between each thing and its form that it is the achievement of the Christian concept of the person to have overcome. Indeed, one wonders whether the formulation of the problem of individuation itself does not tacitly regard individuation as a subtraction from the identity conferred by form. This leads to both philosophical and ultimately theological (Christological) problems. To the second I would reply on the basis of the *esse-essentia* relation delineated below, that since *esse* does not subsist (in us) outside of the form–matter composite, its primary place in individuation does not take place outside of that composite and thus does not deny either form or matter its role in individuating the creature. If form, matter, and *esse* are not elements but principles that only “are” in and as a composite through their mutual relation to the others, then all three are involved in individuation and the question becomes one of relative priority. In this case, the real distinction and the triadic structure of the composite *ens* becomes a kind of *imago Trinitatis* and even an *imago Christi*, in the fact that the *difference* between being and essence in the creature “grows” in proportion to the unity of the creature in question. The real distinction is more pronounced, so to speak, in a human being than in a stone, because the human being is a unity, possessing and transcending its nature in a way that a stone does not. For an argument that *esse* is the ultimate principle of individuation in Aquinas, see

- Owens (1994), pp. 173–194. For an argument in response to Owens’ position, modifying it in the direction of form, see Brown (2003), pp. 167–187.
- 49 Though I have here aligned “participation” with “existentialist” Thomism over against a one-sided emphasis on Thomas as an Aristotelian, D.C. Schindler notes a tension between “existentialist” Thomism and that which emphasizes the Neoplatonic dimension. See D.C. Schindler (2005), p. 15. On the primacy of substance in Aristotle and Aquinas, see Aquinas, *In Metaph.*, VII, lect. 1245ff.
- 50 What follows owes a great deal to the “creative development” of the doctrine of *esse commune* put forth by Adrian Walker, as well as the work of D.C. Schindler and Martin Bieler. All three take their bearings from Ulrich (1998). See Walker (2004); D.C. Schindler (2005); and Bieler (2011).
- 51 Consequently, Fergus Kerr notes in the case of the so-called five-ways that the arguments already presuppose his metaphysics and theology. This is only a defect if one mistakes these proofs as an exercise in rationalist apologetics, the intellectual equivalent of a standing broad jump. Thomas, who knew no atheists and had to invent them, had something else in mind as Kerr makes clear. See Kerr (2002), pp. 56–61.
- 52 See Aquinas, *ST*, I, 4, 2, ad.3, I.II, 2, 5, ad.2 and *De Pot.*, 7, 2, ad.9.
- 53 Aquinas, *In de hebd.*, lect. 2, n. 22.
- 54 See also de Finance (1945).
- 55 See Aquinas, *In Metaph.*, 4, lect. n. 558.
- 56 See Wippel (2000), p. 123.
- 57 Now [Aristotle] says that the essence of a thing is not generated, even though it is the same as the thing generated; for it was shown above (n. 1362) that each thing is the same as its own essence. But the essence of a thing refers properly to its form. Hence individual conditions, which pertain to a form accidentally, are excluded from it...Yet it must be noted that even though it is said in the text that form comes to be in matter, this is not a proper way of speaking; for it is not a form that comes to be, but a composite. For a form is said to exist in matter, although a form does not “properly” exist, but a composite exists *by its form*. Thus the proper way of speaking is to say that a composite is generated from matter according to such and such a form (Aquinas, *In Metaph.*, VII, 7, 1420–1422, emphasis mine).
- See also Aristotle, *Metaph.*, XII.5, 1071a20.
- 58 Adrian Walker writes,
- Because the act of being does not subsist, it can be “realized” only in so many individual things, each of which in some sense “particularizes” *esse commune* into “its own” *actus essendi*. Nevertheless, the nonsubsistence of *esse* equally prevents us from conceiving of this “particularization” as a division of the actuality of being into a number of discrete ontological packets. If such a division were to occur, in fact, each being would be its own universe, rather than sharing the one universe with all other beings (2004: 473).
- 59 Aquinas, *De ver.*, 8.17, “*non potest aliquid esse medium inter creatum et increatum.*”
- 60 Michael Waldstein, premising his argument on an Aristotelian understanding which grants substance an ontological priority over *esse* (in the created order), differentiates the constitutive relation to God as origin from the constitution of the creature by God’s creative act.

This relation [to God as origin], which is a consequence of God’s creative act, proceeds from the human substance *toward the interior* of that same substance, toward the God who is *interior intimo meo*. The removal of this relation would let the creature fall into nothingness. It is in this sense an *internal and constitutive relation*. Yet it is not constitutive in the way God’s creative act is constitutive; nor is it constitutive as an intrinsic principle of the creature’s being in the way the essence or the substantial form is such a principle (Waldstein 2010: 506, emphasis original).

It is perhaps not entirely clear, in metaphysical terms, what Waldstein means when he says that “as a consequence of God’s creative act”...the relation to God as origin “proceeds from the human substance.” With this phrase, Waldstein appears to make relation to God into a “proper accident,” that is, an accident one cannot subtract without subtracting the being of the substance in question but which is nevertheless distinct from the essence. We are arguing that there is a sense in which this is true since God is not the essence or the being of the creature, but that inasmuch as relation becomes an ontologically secondary clarification of substance conceived as simply prior to its relations, it remains inadequate. (See Adrian Walker (2004) as a further indication why.) The worry here (apart from a desire to preserve fidelity to Aristotle) appears to be twofold: that failure to give ontological priority to substance over *esse*/relation would cause the finite substance to disappear in a sea of “pure actuality” and that this would erase the analogical difference separating creatures from God by making over the former, and human persons especially, into “subsistent relations” like the divine persons. This analogical difference is preserved in the understanding of *esse* as nonsubsistent and as therefore dependent upon the *ens* whose *esse* it is. Substance is constituted in and through the relation to God mediated by *esse*, and is thus relational to the core, and yet the nonsubsistence of *esse*, and its reciprocal dependence upon the *ens* which it makes possible, means that a created substance is not a subsistent relation in the way that divine persons are.

- 61 We have already noted in previous chapters the problem of regarding the form (or soul) as a “central directing agency” or imputing “backward causation” to form. This stems from a failure to grasp the ontological priority which we are according to form and a consequent reduction of causality to a transaction of force between two entities or events. On these assumptions, saying that what is temporally last is ontologically first sounds as if “the achieved end is exerting some kind of backward causal pull on the antecedent events.” “This confused idea,” writes Jonathan Lear, “arose by taking the modern notion of efficient cause and putting it at the end of a developmental process for which it was responsible.” To admit the ontological priority of form (and *esse*), is, by contrast, to fundamentally alter one’s notion of causality. To ask “how form causes” on these terms is tantamount to asking “what a thing is,” a question which the ontology of science, strictly speaking, renders unintelligible. See Lear (1988), p. 40.
- 62 This, it seems to me, is a metaphysical implication of regarding Christ as *the* concrete *analogia entis*: that the historical event of the Incarnation, precisely *as* historical event, is revelatory of the event structure of being as such, not by revealing a God who realizes himself *in* history (and thus collapses the difference and distance between the world and God) but by revealing a God whose utter transcendence and generosity can countenance the novel actuality of history, which reflects and participates in God’s transcendent actuality in its very novelty.
- 63 For instance, I can imagine recuperating Denis Noble’s beautiful image of the living organism as an emergent symphony or fugue with bidirectional causality on these ontological terms. See Noble (2006).
- 64 Balthasar seems to be hinting at such a modification in the conception of form when he writes,

Our first principle must always be the indissolubility of form, and our second the fact that such form is determined by many antecedent conditions. If form is broken down into subdivisions and auxiliary parts for the sake of explanation, this is unfortunately a sign that the true form has not been perceived as such at all. What man is in his totality cannot be “explained” in terms of the process by which he has become what he is. It makes no difference whether the attempt at “explanation” takes as its starting-point man’s evolutionary prehistory in the realm of plant and animal existence, or the hereditary history of man’s ancestors, or the conditioning forces of the cosmos, or finally, man’s own life-history, the elements of his subconscious, or the

variety of his shocks, traumas, and instinctual motives. All these dimensions produce material which is then subsumed by the form of man. And, since such material in itself consists of heterogeneous and relatively unnecessary elements, analysis can somehow extract it from the form without harm (1982: 26).

Clearly Balthasar is simultaneously including antecedent historical and ontological conditions “within” the constitution of the form while at the same time maintaining a distinction between the form and those conditions and the indissolubility and irreducibility of the former to the latter.

- 65 Intimations of this can be found in Driesch’s conception of the “intensive manifold” and the physicist David Bohm’s concept of the qualitative infinity of nature. See Driesch (1908), pp. 137ff and Bohm (1957), p. 134.

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Saving the Appearances

Once during a public dialogue on the relationship between theology and science, an accomplished astrophysicist with whom I was sharing the platform matter-of-factly announced to all in attendance, “A star is just a factory for making chemicals.” Now scientists routinely traffic in metaphors like this—think Dawkins’ “giant lumbering robots” and “survival machines,” for example—and they just as routinely distance themselves from their own metaphorical language. However, as we have seen in the case of natural selection itself, such images and turns of phrase are often called upon to bear considerable theoretical and ontological weight, which means that even bad metaphors casually chosen can be quite revealing. Bearing this in mind, I want to introduce the argument of this concluding chapter—that creation is integral to the veracity of the sciences—by asking now what I lacked the presence of mind to ask in that moment on the platform. What does it mean to say, even metaphorically, that a star is just a factory for making chemicals?

Let us think for just a moment about the star we are most familiar with, our own sun. The gravitational force exerted by our sun governs the orbit of the earth and thus determines to a large extent the quality of our atmosphere, the climate, and the cycle of seasons. The sun is jointly responsible with innumerable other factors for the fundamental conditions which make the earth hospitable, uniquely as far as we know, for an abundance of life. The light of the sun makes visible everything it touches, enabling the *self-communication* and thus the various forms of *community*, including that of predator and prey, that obtain among living things, especially diurnal animals operating by sight. The sun, thus, connects “the meanest individuals with the universe itself,” to borrow Paley’s lyrical words, “a chicken roosting on its perch, with the spheres revolving in the firmament” (1854: 169). The sun is an indispensable aspect of many of the so-called “anthropic coincidences.”

Plato, Plotinus, and the Church Fathers saw the sun as a material image of God and its light as an image of divine wisdom and truth: a constant presence that illuminates

everything it touches while remaining in itself, its light invisible, except as it is reflected by things or as it emanates from its blinding source. We could go on forever like this. The skeptic will surely reply that this is merely poetry. Very well, but then one has to say why he can dismiss *this* poetry as mere sentiment and accept the much cruder poetry of the chemical factory as truth. And he would then have to admit, in any event, that the sun is not just a factory for making chemicals but a poetry factory as well unless, that is, he wishes to say that *poetry* is just chemistry.

The image of the chemical factory, though it is merely an image, focuses attention on certain “primary” or “essential” aspects of the sun’s activity, excluding these broader dimensions of the sun’s activity from the conceptual field. So what does it mean, then, when an astrophysicist says that a star is just a factory for making chemicals? It means that is all she can *see*, which makes the astrophysicist rather like a bad poet. The only problem is that this really *is not* all that the astrophysicist sees (*strictly* speaking, she does not even see *this*); because she is a human being before she is an astrophysicist. So what it really means is that this is all she is *willing* to see. In order to regard the sun as a factory for making chemicals, the astrophysicist has to do violence to what she cannot help seeing as a human being—the sun as an intelligible whole resplendent in all its mysterious beauty and power. She must also do violence to what she can *never* see all in one go: the infinite number of ways that *this* sun is actively indispensable in sustaining the world that sustains the astrophysicist (and her speculations) during every moment of their existence.

Galileo recognized this difficulty—praised it in fact—when he commended Aristarchus and Copernicus for committing “rape on their senses” (Burt 1954: 79). The physicist does this, to good effect, it must be admitted, either by *abstracting* from experience and from the meaningful world she cannot help living in or by *denying* the reality of the world present to experience in order to get to the supposed *real world* of matter and motion or energy or fields or whatever lies behind its appearance to us. To the extent that positivist science lacks the metaphysical resources to arrive at the original whole except additively or to incorporate meaning back into its account of the world save by reducing it back to mathematical unmeaning, there is finally little difference between the two options. Whether one is a “greedy,” “baby-eating” reductionist or a generous reductionist, there remains an abyss between the aspirations of scientific cognition of the world and the intelligibility through which we necessarily cognize anything.

In the conclusion of Chapter 8, wherein we articulated the doctrine of creation in its metaphysical meaning *quoad nos*, we said that theology performs a service for the sciences without which they will ultimately falsify themselves and their objects. The positive sciences falsify themselves by becoming the very metaphysics and theology they vainly seek to supplant, on which basis they then misunderstand the nature of their own legitimate abstraction from the total actuality of *esse commune*. On the basis of this same metaphysics, they falsify their objects by making them less than they actually are—and less than we cannot help knowing them to be. That a proper theology of creation and its concomitant metaphysics are, thus, indispensable for an adequate understanding of the world—and indispensable even for science—is the positive, constructive thesis of this book which extends well beyond a mere concordism between theology and science. That this relationship to metaphysics and theology

constitutes the legitimate autonomy of the sciences rather than contradicting it, and that the sciences never in fact do without a theology and metaphysics of some kind are close corollaries of this thesis. In the course of developing these claims, and in the light of the “Darwinization of everything” proceeding apace in our culture, it has been necessary to attend to the relation between the various forms of reductionism endemic to Darwinian biology, the most resolutely theological of all contemporary sciences, and its constitutive metaphysical and theological presuppositions. It has also been necessary to clarify the doctrine of creation in its properly theological and metaphysical meaning, not least by freeing it from these distorting assumptions.

The doctrine of creation, so we have argued, does not pretend to explain how the world came to be, at least not in the Herschelian sense of supplying a mechanical *vera causa* susceptible to experimental analysis. Explanation in this sense is precluded by an adequate, and adequately *apophatic*, understanding of divine transcendence and actuality and the *ex nihilo* structure of created being. Creation, rather, tells us *what the world is*; it names the world’s basic ontological structure.¹ It follows then that to “see creation” is not to isolate some qualification of the world; it is to see the world itself more deeply and comprehensively. And if creation really is the ontological structure of the world, then it ought to be “visible” in principle to the sciences. This is not to say that it should necessarily be visible *qua* creation since this would require the sciences to cease with their own proper business and to become theology. Rather, it is to say that what creation affirms of the world must be visible according to the limited modality, the formal perspective, that determines each science as biology, physics, and so on, and that a science that is intrinsically open to the metaphysics of creation will be both better equipped to recognize and to give a principled account of what it sees and to integrate itself into a more comprehensive order of knowledge without abandoning its scientific character. Indeed, we have already encountered notions which are at least *prima facie* consistent with the ontological structure of creation in Driesch’s notion of the intensive manifold and in David Bohm’s notion of the qualitative infinity of the universe, an idea we will revisit in this chapter.² *How* this ontological structure thus manifests itself can only be properly determined from *within* the formal perspectives of the various sciences. This is what it means for the sciences to possess a legitimate autonomy. That it does so is attested not only by the logic of creation and its metaphysics but by the world itself in its phenomenal appearance to us, in the “more” that has thus far outwitted five centuries of reductive mechanistic analysis.³

If seeing creation is a matter of seeing the world, we might characterize the service that theology performs for the sciences as one of “saving the appearances.” And it should be obvious by now why the appearances need saving. Objectively speaking, the elimination of being and essence from the ontology of modern science has relegated the unity and intelligibility of the world in its self-presentation to the status of an epiphenomenon. Subjectively speaking, this betokens a crisis of reason itself. For to evacuate the world of *intrinsic* intelligibility is already to have relinquished reason as anything other than pragmatic success, or rather to have half-relinquished it, since the renunciation is contradicted by the very act of thinking and by the persistent notion of law. But a reason half relinquished can only survive in a dramatically—and dangerously—reduced form, in which knowledge is equated with power and truth

with functional utility. The crisis of reason that pervades our culture is not inversely but proportionally related to the dominance of positivist science and its ontology.⁴ Paradoxically, faith in the *Logos* is necessary to sustain faith in reason.⁵

The claim that faith is necessary for clear sight is not a novel one. From the very beginning, Christianity has always taken salvation to consist in a restoration of vision, with the *visio dei* transforming our sight of God and of all things in God.⁶ Of the Eternal Light, Dante writes,

I saw how it contains within its depths
all things bound in a single book by love
of which creation is the scattered leaves:
how substance, accident, and their relation
were fused in such a way that what I now
describe is but a glimmer of that Light
(*Paradiso* XXIII.85–90).

Although there is obviously a subjective dimension to this transformation of vision, the change in sensibilities is no more moralistic, or pious, or sentimental than a science predicated on control is an indictment of the subjective motives of any given scientist. Baconian science is no less a way of responding to phenomena, and no less a form of *a priori* regard, than a science commenced in love. Indeed, Baconian science too is a science commenced in love in the form of the *libido dominandi*. The world can only answer the questions we put to it. We pose these questions, moreover, on the basis of what interests us, that is, on the basis of desire which is in this and other ways an ingredient in all knowledge.⁷ If we change the questions we put to the world, we change the answers that it is permitted to give. Thomas Kuhn made a similar observation, albeit in very different terms, and we have seen this in the way that seventeenth-century science shifted attention from things to the formalistic laws extrinsically and indifferently governing their construction and behavior.⁸ This shift is exemplified in the way that Darwinism takes natural selection, and not organisms *per se*, as the chief subject matter of evolutionary biology. A science commenced in wonder and love rather than a science predicated on control would yield profoundly different questions and answers, and perhaps even conceive of its subject matter differently.⁹ In its very structure it would preserve the ancient priority of *theoria* over *praxis* even *within* the legitimacy of experimental praxis, because its founding gesture, which mirrors the structure of creation itself, would let the world first *be* what it is. This science would remain open to the infinitude of relations that constitute its subject in the act of its being. In short, a contemplative science with an adequate metaphysical foundation that distinguished between being and time and acknowledged intrinsic intelligibility would understand the nature of experimental science as a form of legitimate but limited abstraction from the fullness of being. It would retain its view of the whole while in the act of abstracting instead of regarding the parts of reality artificially separated by analysis as ontologically prior to the whole of it. And it would have a clearer view of its own noetic act. All of this is, of course, in direct contrast to the Baconian conception of science which continues to exercise its distant influence upon science's self-understanding. Premised upon the conviction that "the secrets of

nature reveal themselves better through the harassments supplied by the arts than in their own proper freedom,” pragmatic science eliminates nature’s “own proper freedom” by emptying natural things of their own being (Bacon 2000: I, 98).

The prospects for arriving at such a science are unlikely, to say the least. Current scientific practice is upheld by a political, economic, educational, and cultural citadel that is virtually impregnable and that bears only an incidental relation to the search for truth.¹⁰ The technological ontology upheld by this edifice is not one philosophical option among others; it is the pervasive intellectual and cultural milieu in which we moderns live, and move, and have our being. As a consequence, “we apprehend our destiny by forms of thought which are themselves the very core of that destiny” without ever recognizing the fact (Grant 1986: 32).¹¹ Merely conceiving of a science consistent with genuine *theoria* would require a profound shift in sensibilities, a *conversion* not only from the metaphysical and theological outlook tacitly embedded in the Baconian conception of science but toward a more reflective and expansive conception of truth and explanation.¹² In other words, recovering a contemplative science commenced in love would mean recovering a more comprehensive conception of reason, on whose basis it would be possible, once again, to integrate the sciences into an order of *wisdom*. To maintain that creation is indispensable for any ontologically adequate science is thus not to contend for faith *against* reason. Rather, it is to contend for reason as such against the ontological primacy of irrationality and unmeaning. It is the sciences, and above all a Darwinian science allied with pragmatism, that finally abandon reason, to the extent that this is possible. This is the inevitable consequence of denying the ontological priority of *logos* and attempting to premise meaning and order upon unmeaning and disorder.¹³

All is not lost, however. If, as we argued in Chapter 1, the truth of being imposes itself on the *act* of thinking, determining both the form of this act and its objects, then this truth remains operative in both the act and its objects in spite of the distortions inflicted upon it by our theories and our want of education or self-knowledge. This is a crucial point for the argument to follow, for it means that “saving the appearances” is partly just a matter of bringing to light the truth already operative in scientific cognition. “Saving the appearances,” therefore, means saving both the objects of science and its subjects. It means restoring the former to their inherent integrity and the latter to their full rationality so that *scientia* might be integrated once again into a comprehensive order of wisdom. If creation is the truth of the world, it is the truth of science, too.

We will now proceed to elaborate this conception of truth, briefly sketching how it is a function of the being given *ex nihilo* in creation. In the second section, we will develop this ontological conception of truth further *as* truth, unfold the more “expansive rationality” that is its subjective correlate, and, revisiting our analysis of Chapter 1, complete our critique of scientific cognition. The point is not to deny the validity of scientific abstractions but to situate them within a more adequate ontological context that is already tacitly operative even in the most reductive and mechanistic forms of analysis. It is on the basis of this ontology and this diagnosis that we shall argue, in the final section, for the rational superiority of the doctrine of creation over the theory of evolution considered in its philosophical meaning, a task which requires the development of criteria whereby the question of rational superiority might be

adjudicated. The doctrine of creation is rationally superior to the theory of evolution not because they are strict rivals offering mutually exclusive explanations for the course of natural history. We have contended throughout this book that this is not the case. Rather, the doctrine of creation is rationally superior to the theory of evolution both because it is more adequate to the fullness of reality and because, being more adequate, it is able to accommodate within its understanding of the world the truth of evolution and the possibility of theorizing about it, whereas evolutionary theory, with its reductive ontology and extrinsicist theology, can finally accommodate neither. If a science predicated on creation and commenced in love is preferable to a science predicated on the nihil and commenced in a quest for control, it is because its objective logic is truer to the logic of being and thus more adequate to the truth of a world commenced in love. If the doctrine of creation thus “saves the appearances” for the sciences, and saves truth for science, it is finally because it liberates reason from its arbitrary self-restrictions and restores it to its own fullness, which continues to show forth even now in spite of our attempts to suppress it.

Seeing Creation

In Chapters 7 and 8, we have considered the doctrine of creation in its active sense as a doctrine of God and in its passive sense as the ontological structure of the world, arguing that creation in this latter sense is “visible,” so to speak, in the world’s phenomenal appearance. A primary function of this doctrine in this first aspect was to secure and protect the transcendent actuality of God as *ipsum esse subsistens* in part by a series of *apophatic* negations which were but the reverse side of the *kataphatic* stipulations entailed in this affirmation of divine plenitude. It was as a result of this first aspect as a doctrine of God and his transcendence, fully thought for the first time only as a consequence of the hypostatic union of natures in Christ, that creation emerged to thought in its second, ontological aspect. In so doing, the doctrine of creation was able to fulfill Greek cosmological ambitions precisely because it was able to resolve the Greek ambivalence over difference, conceiving of that whereby each thing differs from its principle as a positive, surplus of being rather than a diminution of it.

The assertion of the world’s goodness was not a matter of mere biblical positivism. It is rather a matter of the inner logic of creation itself, which transformed and completed the Platonic insight that the good in its fecundity informs the world’s very structure. Disclosure of God’s transcendent fullness and aseity, his ontological discontinuity with the world, meant a corresponding contingency and novelty on the part of the world that was lacking in Greek thought. This contingency concerned not just form or essence or the contingent arrangement of atoms but being itself, and was thus a contingency that revealed the gratuity at the core of being’s very structure. We saw, therefore, that creation from the very first entailed a distinction between *esse* and *essentia* that would eventually be formalized in the so-called “real-distinction,” thereby objectively deepening the Greek conception of being as act and subjectively deepening the Greek disposition of wonder in response.

Esse commune, you will recall, has a paradoxical character. Being common to all things, *esse* binds the cosmos into a single actuality; being proper to each thing, *esse*

invests all beings with an incommunicable interiority. In this paradoxical way, *esse* ensures a cosmic unity that differs both from the unity of an aggregate and from the unity of a substance. The cosmos is a real community of being, and yet the unity of the cosmos and each thing's constitutive relation to the entire community of being does not reduce the beings comprising the cosmos to the status of "parts." It is thus *esse commune* itself—which binds creatures constitutively to God, to each other, and to the whole—that grants beings and the various sciences which study them their relative autonomy.¹⁴ Through *esse commune*, each thing was endowed with a measure of indivisible unity, a depth of incommunicable interiority and a kind of "surplus" that made the particular more than its universal, and indeed more than itself, throughout the course of its existence.¹⁵ We tried to make this surplus concretely visible in Chapter 8 through the example of the child who, as an *unum per se* and a unique subject of being, is irreducible to her parents even as she is utterly dependent upon them for her existence. The paradoxical quality of *esse* followed from its being *simplex et completum sed non subsistens*, from the fact that *esse* is, in Balthasar's words, "dependent upon its explication in the existent" (1991: 619). While *esse* is therefore "the foundation of the most interior unity of every singular and particular essence"—and, we might add, the order shared by them all—it does not have its own ground within itself (Balthasar 1989: 402). Balthasar follows Aquinas when he says, "for just as one cannot say that running runs, but rather that the runner runs,' so 'one cannot say that existence exists'" (1989: 404).¹⁶

The gift structure of *esse creatum* has its source in the God who is gift essentially. Nevertheless, being is gift not simply because it is freely given by God. Rather, because it is given by the God whose being is his *essence* and whose essence is love, being is gift in its inner structure. This is what we meant, following Ulrich, in referring to *esse* as sheer mediation. Being only *is* itself in—or rather *as*—letting *another be itself*. And in the very act of letting another be (the act by which the other is), it simultaneously binds that other into community with all other things. Thus, with Balthasar we can say (speaking improperly for a moment) that even finite being is essentially love.¹⁷ As such, it is ecstatically self-communicating—an insight latent in the priority which Greek thought accorded to *logos* itself.¹⁸ And this donative, ecstatic, communicative quality opens up within each creature a dynamic tension between an interior incommunicable depth (*esse*) pushing toward expression, but never exhausted in, an intelligible phenomenal surface (*form/essentia*). Balthasar refers to this as a tension between ground and manifestation (1982: 151–152). Przywara refers to it as "the back-and-forth within the immanence of creatureliness itself: an 'immanent dynamic middle of actuality (*energia*) between dynamic possibility (*dunamis*) and inner end-directedness (*entelechia*)'" (113).

We have argued that the metaphysics of modern science, in the interest of exhaustive intelligibility conceived as exhaustive control, tends to reduce being from act to facticity and to evacuate the world of just this interiority. "All the perversions that human freedom can inflict upon being and its qualities always aim at one thing," writes Balthasar: "the annihilation of the depth dimension of being, thanks to which being remains a mystery even, indeed, precisely in its unveiling" (2000: 16). And yet, it is just as sure that it is precisely this depth dimension and its inexhaustible fecundity which ensures that the task of the sciences is interminable, evidence, perhaps, of the "catholicity" of reality.

Without doubt the phenomenal world contains on all sides an objective order that is not imposed by man, and thus a beauty; the legitimacy of the premise is repeatedly confirmed for him that there is within Nature a greater objective ordering of things than he had previously recognized. Every theoretical science with a practical application, such as medicine or physics, lives from this perennial assumption which forever proves itself anew (Balthasar 1991: 613).

It is this “greater objective ordering” that David Bohm attempts to acknowledge in his notion of the qualitative infinity of the universe, an infinity that is both intensive with respect to the qualities, properties, and levels of things and extensive with respect to the number of “background” factors operative in their existence. This objective ordering implies the sort of cosmic unity which we have been advocating (and which Bohm himself develops in his later work), because “every real causal relationship, which operates in a finite context, has been found to be subject to contingencies arising outside the context in question,” a fact which seems to extend *ad infinitum* (Bohm 1957: 3).¹⁹ Of course, not all of these factors bear equally upon every entity or every domain of inquiry, which is why it is not necessary to know everything in order to know anything and why it is therefore possible to formulate scientific laws and theories. But the relation of these factors to all others is why no physical theory has yet proved fundamental or is ever likely to be.²⁰ For all such laws

are applicable only within limited contexts, over limited ranges of conditions and to *limited* degrees of approximation, these limits being subject to better and better determination with the aid of scientific research (1957: 133).

Exhaustive intelligibility, in other words, is ruled out by the nature of being as such. Because this dynamic interplay between essence and existence occupies a kind of “suspended middle” between fullness and nothingness, because neither pole of the “composite” *ens* grounds itself, each depends upon the other and upon the “composite” which they make to be. Being finally “fails” to provide an explanation of itself, and rightly so, for its “whylessness” is integral to its being for itself. Nothing could possibly “justify” being, and yet it is precisely this whyless mystery that provokes wonder and elicits the impossible demand for an explanation. Any positivism that relinquishes this demand and declares the question of being meaningless thus shows itself to be a reason which has arbitrarily restricted its own scope, that refuses to give heed to wonder, and willingly turns a blind eye to the mystery of phenomenal appearance that solicits its own activity. Just because being does not explain itself, this dynamic internal to the creature’s own act of being opens up to a still higher dynamic, “as a dynamic back-and-forth between the above-and-beyond (a transcending immanence) and the from-above-into,” the transcendence of the divine other internal to the creature itself (Przywara: 113).

We have reiterated throughout the past several chapters that the act of creation is not a cause among causes, and the doctrine of creation, as a matter of positive principle, does not supply a mechanism for the being of the world that satisfies scientific criteria for explaining how the world came to be. We have said instead that creation is what the world *is*, that creation is its ontological structure at every moment of its existence

such that the primordial past occupies no more privileged place than the present moment in adjudicating the question of creation. We have insisted therefore that seeing creation is not a matter of isolating some cause qualifying the world, but a matter of seeing the world itself more deeply and comprehensively. I now wish to say that one sees the gratuity of creation precisely in seeing this dynamic actuality, in the “eventing” of the world in all its fullness, in the intensified concreteness wherein the unity, intelligibility, and irreducible novelty characteristic of each thing in relation to every other mysteriously coincides. This is not to say that the various sciences will see this gratuitous surplus *as* creation; nor does it obviate the need for explicitly theological faith, hope, and charity to see it in its fullness. It is only to insist that the sciences see what creation says is there, according to the particular modality, the formal perspective that distinguishes them as physics, biology, and so on. It is only in seeing creation thus that we arrive at an account of the world that is both intelligible *and* nonreductive, and only on this basis is science itself finally justified.

Thus, the very same theological and metaphysical factors which made creation *ex nihilo* an *apophatic* doctrine also make it an *aesthetic* doctrine in the twofold sense delineated by Balthasar, which comprehends both the objective being of what appears and the act whereby we subjectively apprehend it. But what would it really mean to *see* creation, especially now when the authoritative ontology of the age has all but robbed us of our eyesight? As we have discussed, the conflation of nature and artifice brought with it not simply a new mechanistic conception of nature but a new mechanistic conception of what knowledge of nature itself consists in, a massive transvaluation which transformed the very meaning of truth. As physics supplanted metaphysics as first philosophy, truth ceased to be a matter of being (*ens*)—now reduced to the brute facticity of positive matter and its historical constellations—and was effectively equated first with the made (*factum*) and now the feasible (*faciendum*) (Ratzinger 2004a: 63). It is impossible to recuperate an intelligible, must less a lived understanding of creation from within these metaphysical assumptions; and we have thus had to expend a great deal of effort exposing and critiquing them. Recovering creation means not only restoring the incommunicable interiority and unity of *ens* each evacuated by the mechanistic turn and the relation of *ens* to the whole of *esse commune*. It means recovering both a conception of truth and a mode of knowing it that are adequate to this reality.

The triumph of action over contemplation makes this an extraordinarily tall order; for we have seen that this triumph is predicated upon the elimination of an ontological conception of truth. The ensuing vacuum leaves us without any nonfunctionalist criteria for determining the rationality of this adequation, much less for synthesizing it with the obvious gains wrought by the immense progress of theoretical and experimental science. Those Darwinists who insist that there simply is no argument between creation and evolution are thus inadvertently correct. The basic preconditions for an argument—a mutually agreed upon understanding of reason, explanation, and evidence—are lacking. Must we therefore just accept a dualism of contemplation and (technological) science if we are to have contemplation at all? Would this not return us to some version of Stephen Jay Gould’s nonoverlapping magisteria (NOMA) principle, which is inherently and theologically untenable? Would not the acceptance of such a dualism vitiate everything we have said about creation itself and about science’s constitutive relationship to metaphysics and theology?

Such a compromise is indeed untenable, but the questions raise an important point. We cannot recuperate creation and its “reasonableness” by appealing to metaphysical assumptions and rational criteria predicated upon its rejection. To recuperate the rationality of creation, we must also recuperate a more expansive conception of rationality itself, which means recuperating an ontological rather than functionalist conception of truth, whether the latter is conceived as logical coherence, experimental replicability, predictive success, or technological productivity. Each of these obviously has its utility for certain purposes and under certain conditions, but to equate this utility with the truth *of the world* is already to have robbed the world of its own being and to have eliminated its truth. This is the very essence of sophistry, as we saw in Chapter 3. In the remainder of this chapter, I will sketch, on the basis of the metaphysics of creation as we have elucidated them already, just such an ontological conception, and I will say something about the mode of rationality that is adequate to it. On this basis, I will then argue that creation is *more* rational than Darwinism (to the extent that Darwinism, as an alternative metaphysics and theology, has set itself up as a rival to creation): not because creation is antiscience or because it refutes Darwinism, but because it establishes, or rather acknowledges the conditions upon which the sciences, and even Darwinian science to the extent it actually makes a claim, might actually be true.

The World and Science in Action

If the doctrine of creation does not explain how the world came to be in any acceptable scientific sense but rather what it is, what, then, is the world? We have maintained, at bottom, that the world is a gratuitous “surplus” of being that is somehow not God, a surplus made possible by the coincidence of God’s perfect identity and his infinite surpassing of himself in the circumincession of the Trinitarian *personae*. This surplus consists not simply in the fact that the world, as the gratuitous fruit of God’s infinite freedom, can be paradoxically “more than God” without diminution of God’s impassible plenitude. Rather, there is another twofold sense to this surplus corresponding to Przywara’s double analogy. In the first instance, this surplus is integral to the structure of being as love and exhibited in the distance between interior ground and exterior manifestation characteristic of each *ens*. Balthasar confers the transcendental name of beauty on being’s visible expression for a trio of reasons: first, precisely because it is the *visible* expression of an interior depth; second, because precisely as the visible expression of *being*, it has a kind of “whyless” disinterestedness, a kind of superfluous gratuity with no point or justification beyond itself; and, third, because it is precisely this objective quality that lays a claim to our desire and attention. For these reasons, and I would add, for all the reasons we discussed in Chapter 8 in our consideration of the Trinitarian processions, beauty is indispensable for securing an ontological sense of truth. Beauty “cannot be separated from her two sisters [truth and goodness],” Balthasar insists, “without taking them along with herself in an act of mysterious vengeance” (1982: 18). The reduction of truth to function which we first considered in Chapter 3 does precisely this: it eliminates the depth dimension, the being-in-itselfness, beneath the phenomenal surface, thus transforming the surface

itself into an abstract “plane.”²¹ We will understand this depth more clearly once we have understood the import of the second aspect of this surplus, the counterpart to Przywara’s second sense of analogy. Because created being does not explain itself, that being which is most interior to each creature opens from the inside, as it were, to the transcendence of a divine other, the giver of being, internal to the creature itself. At the heart of each creature lies an enigma, as St. Augustine most profoundly realized, because at the heart of each creature is a relation to God that makes the creature more than itself. Because God as *esse ipsum subsistens* is immediately present to each creature as the source of its being, each creature is *intensively* infinite in its very finitude.²² Because every creature is, at bottom, related to God, each creature is, in a certain sense, bottomless.

To say that infinity and finitude are thus proportionally, and not inversely, correlated is to say that this intensive infinity of being is expressed and apprehended finitely in the unity of *form*, which can only ever be apprehended precisely *as* intelligible unity and, thus, as self-communicating meaning.²³ This is why Balthasar insists so adamantly on the indissolubility of form. “If form is broken down into subdivisions and auxiliary parts for the sake of explanation,” he writes, “this is unfortunately a sign that the true form has not been perceived as such at all” (Balthasar 1982: 26).²⁴

We should reiterate here that the discovery of the transformatory actuality of *esse* has transformed the Greek, or at least the Aristotelian conception of form, in conformity with its Trinitarian archetype, where infinite unity coincides with infinite difference in the form of love. (Here I would contend that the Platonic conception of form has the advantage over Aristotle.) As the visible expression of an infinite interior depth, form is simultaneously a principle of intelligibility, identity, *and* mystery at once. This transforms the very meaning of intelligibility, of truth itself, and the knowledge which apprehends it.

Modern scientific rationality is premised upon a mechanistic ontology that renders the intelligibility of things extrinsic to the things themselves. This is the metaphysical root of the ideal of exhaustive intelligibility in the form of mathematical analysis and experimental control, an ideal which remains as strong as ever in the very form (if not the aspiration) of scientific knowledge, even though it is now conceded that exhaustive intelligibility can never be attained in practice.²⁵ On this view, truth and knowledge are essentially opposed to “mystery,” which is in permanent retreat against the forward advance of science. If the view that we are advancing is true, however—and we will argue that there can only *be* truth if it *is*—then this faulty conception of knowledge is destined to remain permanently inadequate to its objects for the simple reason that it reflects and is predicated upon a faulty ontology. For if the view that we are advancing is true, then “mystery is, not transcendent, but immanent in relation to truth. On this supposition, the knowledge of a truth, far from annulling its mysteriousness, actually brings it to light” (Balthasar 2000: 131–132). Michael Polanyi makes a similar point in very different terms, attributing the capacity of a thing to reveal itself in ever new ways “to the fact that the thing observed is an aspect of reality, possessing a significance that is not exhausted by our conception of it” (1983: 32).²⁶

We saw that Balthasar insists upon the unity of beauty, goodness, and truth as a precondition for the preservation of truth in any ontological sense. This is because beauty is an index, as it were, of the “being-in-itselfness” of the object which is the

ground of truth. Mystery must inhere in truth for the very same reason.²⁷ The object's capacity to withhold itself while unveiling itself is the mark of its being a subject of incommunicable being. Balthasar refers to this as "the freedom of the object." It is an essential dimension of truth for the simple reason that reality must always exceed appearance in order to ground the distinction between reality and appearance (Balthasar 2000: 85). This is not to oppose intelligibility and mystery, once again, nor is it to suggest that nature stands "athwart the path of intellectual knowledge like some irrational thing that was totally unproportioned to it" (2000: 85).²⁸ Mystery and intelligibility are rather *proportionally* related. We must as a matter of principle affirm the "more than appearance" in order for appearances themselves to be true. This is why Balthasar conceives of truth (*ἀληθεῖα*) simultaneously as "unconcealment" *and* a veiling (206–216). It is the cognitive corollary to being as act and self-communication. And it is why he insists further that "without aesthetic knowledge, neither theoretical nor practical reason can attain their total completion": because "aesthetic knowledge" relinquishes its prior claim on the object and acknowledges instead the object's claim upon the subject and the depth of being-in-itselfness upon which this claim depends (Balthasar 1982: 152).²⁹

The doctrine of creation, in conceiving of being as love, explicates precisely this point. This is why we can say that creation saves the appearances for the sciences. By conceiving of being as the fruit of love, as gratuitous surplus of an infinite depth, creation saves the "more than appearance" upon which the truth of appearance itself depends. Balthasar explains the alternative with characteristic profundity.

If each and every thing were nothing more than an "instance of..." or a kind of algebraic "x" that could be exchanged for other entities without loss, then things would possess absolutely no intrinsic value of their own as individuals. By the same token, they would have no claim whatsoever to any sphere that might by right be reserved to them alone. Any knower who grasped the essence of the species of which they are exemplars would immediately comprehend at the same time every individual entity that fell under it: no individual could present him with any further mystery. Knowing the individual would accordingly be a matter of an endlessly repeatable application of the knowledge of the universal, in the same way that a mathematical theorem can be applied to any number of objects or a cookie cutter can be used to make as many cookies as one wants.

The object's whole essence would then consist in being an object for a subject; there could be no more question of a free self-revelation on its part. It would already always stand fully revealed, and, for the same reason fully unprotected. It would lie supine under the knower's gaze like a cutting under a microscope. It would have no personal word to speak in the event of knowledge. It would be a thing completely stripped of any rights, which the knower could dispose of at his pleasure. In a world such as this, existence would no longer have any meaning, for being would have lost the property that alone gives the possession of being its desirability, unrepeatability, and, therefore, interiority. In a world such as this, there might still be unsolved problems that knowledge had "not yet" mastered. But the essential mystery surrounding everything that exists for itself would be nonexistent. The event of knowledge would cast a cold, pitiless, shadowless light into every corner, and there would be no possibility of escaping this scorching sun. Being, stripped of mystery, would be, so to speak, prostituted (Balthasar 2000: 81).

The objects comprising the world, so we have maintained, are not mere “instances of x.” Rather, they are subjects of the act of being, constitutively related, albeit in innumerable ways, to the whole of *esse commune*. As such they are *existentially* indivisible, though they may be temporally and materially divisible *ad infinitum*. In virtue of their being-*in-act*, they possess a unity that is “simultaneous and successive” and a measure of incommunicable interiority through which their world has always already taken up residence in them in myriad ways as the presupposition of their actual existence. Indeed, we have maintained that it remains possible to conceive of nature hierarchically on the basis of the capacity of beings simultaneously to integrate themselves into and distinguish themselves from their world—this, too, is an integral dimension of the “freedom of the object”—though of course I do not intend to suggest some sort of Linnean system of classification on this basis.

If mystery and truth are indeed coextensive as a consequence of the intensive infinity of being, and if truth is indeed the adequation of the mind to being, then this intensive infinity must inform the meaning of “adequacy” and “intelligibility,” exercising an influence over both the content of this adequation and its form. This depth dimension must hold sway, furthermore, not only objectively for the objects of scientific knowledge but subjectively of the *act* of scientific cognition. Like all actualities, the act of scientific knowing must always entail infinitely more than the knower himself can account for. Edmund Husserl apprehends an aspect of this in his concept of the *lebenswelt* (1970: 103–151). Michael Polanyi captures another dimension of this in his idea of proximal and distal awareness, notions to which we will return (1983: 10). And Blondel shows how this more is both operative and affirmed in the act of cognition through his notion of “mediating action.”

All that precedes only expresses the inevitable exigencies of thought and practice. That is why it is a system of scientific relations before appearing as a chain of real truths. In thinking and in acting, we imply this immense organism of necessary relations. To lay them out before reflection is simply to unveil what we cannot help admitting in order to think, and affirming in order to act. Without always noting it distinctly, always we are inevitably brought to conceive the idea of objective existence, to posit the reality of objects conceived and ends sought, to suppose the conditions required for this reality to subsist. For, not being able to do as if it were not, we cannot not include in our action the indispensable conditions for it to be. And reciprocally, what cannot not be immanent in thought, we cannot not tend to make immanent to ourselves through practice. The circle is closed (Blondel 1984: 421).

The flaws in the aspiration to exhaustive intelligibility come into sharper focus here, in both their objective and subjective dimensions. Because an *ens* is the subject of its own being and possesses an infinite depth which remains to a certain extent incommunicable, and because each *ens* is constitutively related to this “immense organism of necessary relations,” knowledge and mystery are not opposites but coextensive. This becomes evident if we consider our knowledge of other persons or even works of art. Knowledge of this kind does not exhaust its object. Rather, it allows the object to reveal itself as a subject, which includes within its being both an incommunicable depth and those necessary relations. The more intimately we know another person, the more profoundly we attend to a work of art, the more patiently we observe the lived lives

of animals, the more inexhaustible they become, as they show themselves capable of revealing to us depths, dimensions, and connections hitherto unexpected. If, as we are arguing, knowledge and mystery are coincident as a matter of ontological principle, then this personal, prescientific knowledge is not a fanciful “folk” abstraction from a more basic mechanical reality. It is rather the primordial form of all knowledge, *from which* the exact sciences are then abstracted. We will return to this point.

If knowledge and mystery are coincident as a matter of ontological principle, then a knowledge which is adequate to this truth must grasp precisely this coincidence. This follows directly from the *analogia entis* as the ontological structure of creation. If each creature is simultaneously universal and particular and thus an incommunicable subject, if they are intensively infinite in their very finitude due to the presence of God as the most interior source of their being, then the *via negativa* that is part of any approach to God extends, by analogy, to them. This means that there must be an *apophatic* dimension to an adequate knowledge, not just of God but of the world as well. It is interesting to note, in this regard, that Driesch conceives of his entelechy as a “system of negations,” and in this he is merely following the whole Platonic tradition in denying dimensionality to *eidos*.³⁰ This *apophasis* is not a simple not-knowing, as if the negative moment were merely a problem left unsolved or as if we had determined reason’s limits in some transcendental fashion. It is not to be confused with scientific reticence to speculate beyond empirical verification, though this reticence can be recuperated within this ontology. Rather, it is a *way* of knowing, and a way that is integral to the proper knowledge of a truth—the truth of being, the truth which *is* being—which is inexhaustible and which cannot, by definition, be mastered or controlled. Knowledge that would be adequate to this truth must therefore take the form of a “learned ignorance,” to use Nicholas of Cusa’s phrase, in order to apprehend the intensive infinity of things which can only be grasped as infinite in the mode of its slipping away.³¹ Scientists have often taken the “inaccessibility” of essence as warrant for dispensing with essence altogether and for substituting a functional conception of truth for an ontological one. We saw this most clearly in Chapter 3 in the example of Bernard (1957: 82). Cusanus flips this on its head and recognizes that the unknowability of essence is integral to its truth.

Clearly, therefore, we know of the truth only that we know that it cannot be comprehended precisely as it is...Therefore, the *quiddity* of things, which is the truth of beings, is unattainable in its purity, and although, it is pursued by all philosophers, none has found it as it is. The more profoundly learned we are in this ignorance, the more closely we draw near the truth itself (Nicholas of Cusa, *De Doct. Ign.*, I.3.10).³²

The *apophatic* moment in all knowledge is the negative underside of the intensive infinity of being. The examples of our knowledge of other persons and of works of art provide some bottom-up insight into these mysteries without the necessity of recourse to the theology of creation. Scientists would readily concede this “more” that spurs them on, but there is no way from within the ontology of science to integrate the subjective wonder that motivates them into the objective structure of reality. Within this ontology, the surplus of being which grounds this coincidence of truth and mystery is likely to be grasped merely in negative form, for example, as the

unintelligibility of Socrates *qua* Socrates in the Aristotelian tradition or more perniciously, as a mere object to be worked upon as in the case of Bernard. (We see something of an amalgam of these views in genetic Darwinism.)³³ But the ultimate basis of this truth and its positive meaning are theological. We have seen that analogy is the basic form of the God–world relation. Every similarity that the creature bears to God by dint of its being is transcended by an ever-greater difference from God. The basic form of this analogy is captured in the negative theology of the Areopagite, wherein the *apophatic* negation of not-knowing is always the reverse side of a *kataphatic* affirmation of God’s ineffable fullness. If the creature is constituted as such by virtue of God’s transcendent immediacy as the interior source of his own being, then this very analogy between the world and God gives rise, as we saw above, to an “analogous analogy” within the truth of the creature itself, in the interplay between intelligible essence and incommunicable existence. The negative moment in the *via negativa* toward created being denotes not an unintelligible abyss of invisibility but an intelligible excess of hypervisibility which can only be grasped in an act whose cognitive structure is personal, poetic, and, above all, *doxological* in form.

The “highest” science, then, indeed the inner form of *all* science that would be true to being in its fullness, would be a science conceived in contemplative *adoration*, a science which possesses by dispossession and which thus does not regard its objects *a priori* as something to be controlled or exhausted. It would seek to *understand* before it seeks to engineer and would first allow nature its own proper freedom before submitting it to the “harassments of the arts” (Bacon 2000: I.98).³⁴ Only in this way can science affirm the substantial identity, incommunicable interiority, and intensive infinity denied by Baconian science and its mechanistic ontology, affirming in its cognitive structure the truth of the world in *its* ontological structure, a structure upon which scientific practice inadvertently depends.³⁵ Such a science in its primitive structure is theoretical (in the ancient sense) and thus receptive before it is active. Its first gesture, which mirrors in the order of cognition the gesture of creation itself, is to let the world *be*.

Let us reiterate that it is the operative ontology of scientific reason and not the subjective dispositions of this or that scientific researcher that is of primary importance here. We saw in Chapter 1, how, as a matter of theoretical principle, the primacy and putative neutrality of method in science already gives expression to a mechanistic ontology which reduces being from act to brute facticity. (In Chapter 3 we saw, in historical terms, that this methodology and ontology have coextended from the very first.) This in turn empties *ens* of their indivisible unity, and the interiority of their own being permits a twofold abstraction along objective and subjective lines: the analytical separation in thought of what always exists together in actuality (matter/form, wholes/parts, organisms/world, etc.) and the separation of the scientific observer from this order of actuality (and thus from his own body) in the dualistic juxtaposition with the object. This is the ontological root of that embarrassing contradiction whereby the reductionist scientist always stands outside his reductions.

Our hope in recuperating the doctrine of creation is to recuperate the order of being in its fullness and to integrate scientific knowledge (action) within a more ancient theoretical order (contemplation) on that basis. If this order is as we have portrayed it, then it must remain tacitly operative within scientific reason even now.

We insist on this point neither to deny the legitimacy of mechanical and experimental analysis nor to oppose them *simpliciter* to *theoria*. Rather, the point in restoring analysis to a sounder metaphysical basis is to overcome the endemic reductionism that is operative even in antireductionism and to provide science with a truer understanding of the nature of its own act so that its claims to “truth” are no longer vitiated by its own ontology and so that it is no longer required incoherently to exempt itself from its own field of vision. Whether the claim of truth has survived the methodical attempt to dispense with it remains an open question.

Let us note first that the doctrine of creation itself implies a deeper integration of contemplation and action than was conceived by the Greeks. Every concrete *ens*, as an intelligible universal and an incommunicable particular, is an ontological novelty existentially irreducible to every other *ens*, even those with which it shares a formal or essential identity. And yet, the very act which establishes the novel identity of the *ens* and differentiates it substantially from every other binds it into an antecedent order of actuality shared by every other. This is true not only of the objects of knowledge, but its subjects as well, whose *acts* of being and knowing implicate this antecedent order in their substantial identity. This antecedent order confirmed in the act of being and the mutual actuality of knower and known means that there is a priority of contemplative receptivity in all knowledge of the world, as indeed there must be if it is to be knowledge *of the world*. I can have no knowledge of any particular thing, including myself, without the myriad ways that the world has already taken up residence in me, ways including, but not limited to, my consciousness. My every action is therefore preceded, ontologically if not temporally, by an act of contemplative receptivity. And yet, the fact that each novel *ens* (and every event of knowledge) is analogous to every other and that each novelty is intensively inexhaustible in its very intelligibility means at the same time that there must be an active, creative, “poetic” dimension inherent in contemplative receptivity itself.³⁶ There is a certain truth in Vico’s formula, *verum quia factum*, and in the eidetic intentions of the phenomenologists. If the truth of being as adequation is a meeting of subject and object and therefore a gestalt that encompasses them both, then each must bring something to the encounter.³⁷ Knowledge, in a sense, must always be “made” and made anew, in order to “catch up” with what the object itself gives out of its inexhaustible depth.³⁸ There is, thus, on the one hand, a unity of contemplation and action within the priority of contemplation itself, and, on the other hand, a priority of contemplative receptivity inherent in action itself, irrespective of whether this is acknowledged or not.

The crucial point is that this “poetic” unity of contemplation and action has an ontological basis, and this is important for several reasons. First, it warrants personal and poetic knowledge, what we might call “knowledge in the evocative” *as* knowledge, not merely *in addition to* the knowledge gained by the experimental sciences (though I would obviously wish to maintain a distinction between poetry, prayer, and technology) but as intrinsic to it. This is an implication of the reconciliation of *mythos* and *logos* effected by Christianity, and now seen ontologically in the structure of being and knowledge as such, and one reason why *mythos* has proved itself time and again to be an ineradicable and indispensable feature of science. (One need only think of the various primitive, counterfactual states of nature posited alike by evolutionary and political theory or the conceptual heavy lifting done in scientific theory by metaphors.)³⁹ Second,

this unity of contemplation and action also warrants and indeed *demand*s the experimental abstractions of the sciences, while fundamentally altering the conventional understanding of scientific reason which precludes their reintegration into a more comprehensive conception of reason. By giving an ontological basis to the unity of contemplation and action—and by rescuing this unity from its *technological* distortion—creation rescues the world from the reductive tyranny that follows from equating the ontological identity of things with the antecedent causes which produced them, the coordinated interaction of their parts, or, worse, how we measure and manipulate them.

To understand more clearly and concretely what I mean by this unity of contemplation and action and how it differs from the modern reduction of contemplation *to* action, we must revisit the question of experimental abstraction in the sciences in the light of the ontology of creation which we are claiming is the underlying basis of this unity. We have already hinted in Chapter I that the true nature of experimental abstraction, and the place of the experimenter within a more comprehensive ontological order, is obscured by the mechanistic ontology within which the experimental method was historically conceived. This ontology, as we have said many times now, reduces being from act to brute facticity, emptying entities of their unity, interiority, and actuality, making the *positiva* of externalized quanta the basic unit of reality, and rendering all relations within and between entities accidental and extrinsic. This transforms all existential unities into aggregate unities and is the ontological basis for the equation of intelligibility and control and the *production* of knowledge through experiment.⁴⁰ The modern neologism “technology” captures this unprecedented coincidence of knowing and making. But it would never have been possible for the knowledge of nature to become *essentially* technological had not science already imagined nature itself in artificial terms.

The reduction of being from act to facticity and the consequent reimagination of the universe as an aggregation of parts outside of parts has a corresponding effect on how scientific abstraction itself is cognized. The reduction eliminates any ontological basis for Aquinas’ distinction between abstraction and separation, two forms of judgment corresponding to essence and *esse*.⁴¹ By “abstraction,” Thomas had meant the distinction in thought of what is united in being, whole/parts, matter/form, and so on, while “separation” had meant the distinction in thought of what exists separately. “[I]t is clear that in this second operation the intellect cannot truthfully abstract what is united in reality, because the abstraction would signify a separation with regard to the very being of the thing” (Aquinas, *In Boeth. de Trin.*, V.3, resp.) With the elimination of the act of being, and thus *constitutive* relations, distinction as such effectively becomes separation after the manner of Cartesian geometry. Lines, as Descartes conceived them, enabled clarity and distinctness because their “pure abstract externality” establishes a limit that externalizes the relation between falls on either side of it, allowing each to be known in itself without any admixture of the other.⁴² With the relation between part and whole or part and part now externalized (because what is extrinsic *per se* is now ontologically basic), the *act* of distinguishing between entities, say x and non-x, becomes an act of simple division, so that each can be regarded as unaffected in its inner nature by its relation to the other. And, of course, this is due most fundamentally to the fact that neither actually *has* an inner nature any longer that is not a compounding of surfaces. Thus, D.L. Schindler says,

The limit of *x* is conceived in terms of an *original indifference, hence closure*, of *x* toward what (non-*x*) lies beyond or transcends *x*. Such indifference thus implicitly denies that what lies beyond or transcends this limit makes a pertinent difference to *x* already *from inside* *x*'s abstract limit *as x* (2011: 396).

Since indifference implies that what lies beyond *x* makes no pertinent difference to *x* in itself, the relation of *x* to non-*x*—and the reconstruction of entities thus subjected to this sort of analysis—becomes a matter of “the external addition of more *x*'s” (397).

This conception of experimental method, as we saw in Chapter 1, is but the subjective or cognitive expression of a mechanistic ontology that determines in advance how its objects are allowed to manifest themselves. With the suppression of that act of being which simultaneously establishes *x* in its substantial identity and binds it into constitutive relation to non-*x*, analytically separated parts which are ontologically external to each other acquire ontological priority over the actual wholes from which they were abstracted; wholeness itself is reconceived as a unity of aggregation; and form becomes an accidental by-product “supervening” upon its material base. This is why early modern science was able to premise the actual world upon the counterfactual world separated through analysis, and it is why the world reconstructed through synthesis never arrives at the actual whole from which the original abstraction was taken: the world that impresses itself on our consciousness as a unity comprised of intelligible unities.⁴³

Such reconstructions are destined to eliminate the distinguishing mark of living things.

That inward depth of life that opens in perception cannot be found on or between the extended surfaces in bodies, and when we cut bodies open, all we find on *their* insides are more outsides (Sachs 2004: 4–5).

This ontological exteriority is also the ontological basis of that interminable distinction between so-called primary and secondary qualities that permeates the various forms of mechanistic science and underlies the Darwinian compulsion to relegate organisms and their lived lives to the antiquated realm of folk biology. This, in brief, is why the appearances need saving.

In offering this critique of mechanistic analysis we are not primarily proposing an alternative method for theoretical and experimental abstraction in the sciences. Rather, we are proposing a better understanding of what the theoretical and experimental abstractions of the sciences actually *are* by considering them in the light of a more adequate ontology and by considering how even now the sciences tacitly affirm this ontology in spite of themselves. Through the act of being which it receives interiorly from God, every *ens* is constituted in a unique existential identity *and* in an infinity of relations to the community of beings (*esse commune*), apart from which it never *actually* exists. Substantial identity, interiority, and relationality are proportionally, not inversely, related. The more profoundly a thing “possesses” its own being, the more integral its unity and the deeper its interiority, the more profound is its capacity to transcend itself in relation to what is other: in self-movement, respiration, metabolism, sensation, knowledge, love, and prayer. Ontologically speaking, this

makes each thing more than itself, for each thing is related in its very depths, and established in those depths, to what is other than itself.

If it is indeed the *act* of being which is ultimately responsible for these determinations, then this act fundamentally determines the nature of limit itself. When subordinated to the *actus essendi*, the limit which distinguishes *x* from non-*x* no longer simply externally *divides* them after the manner of a Cartesian line. Rather, the limit between *x* and non-*x* simultaneously distinguishes *and* unites them, like an Aristotelian boundary, in the single actuality of *esse commune* which precedes them and which is affirmed in their own act of being.⁴⁴ Something like this is implicit, it seems to me, in Blondel's notion of mediating action. We saw in Chapter I that this conception of limit applies not only to the objects of science but to the distinction *between* sciences and in their constitutive and inexorable relation to metaphysics and theology. Their distinction *from* metaphysics and theology is a function of their relation *to* metaphysics and theology such that each is always already "inside" the other as the condition of possibility for their remaining distinct. We have tried to exemplify this understanding not just formally but materially in our treatment of the relation between the doctrine of creation and evolutionary biology.

This conception of being as act fundamentally alters our understanding of theoretical and experimental abstractions in the sciences, both from the side of the object and from the side of the subject. First, if beings in their very substantiality are constitutively related to what is other than themselves, then abstraction is never merely an extrapolation from the particular to the general, as in the false *a posteriority* of empiricism and the innumerable formalisms that follow from a nominalist ontology.⁴⁵ To the contrary, it is more fundamentally the isolation or the distinction *of the particular* from the infinity of relations that characterize its *actual* existence, its being-*in-act*. This, D.L. Schindler reminds us, is the literal meaning of abstraction (*abstrahere*), to pull from, drag away, take out, or exclude (2011: 386, n. 7). David Bohm implied a similar understanding in his argument for the qualitative infinity of nature.

We see, then, that the existence of reciprocal relationships of things implies that each "thing" existing in nature makes some contribution to what the universe as a whole is, a contribution that cannot be reduced completely, perfectly, and unconditionally, to the effects of any specific set or sets of other things with which it is in reciprocal interconnection. And, vice versa, this also means evidently that no given thing can have a complete autonomy in its mode of being, since its characteristics must depend on its relationships with other things. The notion of a thing is thus seen to be an abstraction, in which it is *conceptually* separated from its infinite background and substructure. Actually, however, a thing does not and could not exist apart from the context from which it has thus been conceptually abstracted. And therefore the world is not made by putting together the various "things" in it, but, rather, these things are only approximately what we find on analysis in certain contexts and under suitable conditions (Bohm 1957: 146).⁴⁶

If the object is simultaneously distinct from *and* united to the whole community of beings through *esse commune*, and if this distinction and unity precedes its artificial separation through analysis, the same thing is no less true of the knowing subject, whose acts of being, living, and knowing implicate him in that same actuality. As we have said before, this cobelonging to the order of *esse commune* is the precondition of

our ability to talk of objects at all. And there is an abstraction from this actuality to the particular on the side of the subject similar to the one which we saw on the side of the object. Let us consider some of the things which are mundanely included and affirmed in Blondel's "immense organism of necessary relations" (1984: 421). As I write this, I am sitting in place at a table in the library, upheld by the chair and floor and encompassed by four walls which are themselves encompassed by the campus and city and upheld by the *terra firma*. I am quite unconsciously bombarded by only God knows how many waves, particles, and signals passing through the air from the atmosphere and from artificial sources. I am breathing the ambient air and metabolizing my breakfast, both quite unconsciously, and each of these activities as well as my acts of attention and thought require the operation of complex neural and physiological processes. I am looking at my computer screen with the aid of natural and artificial light, and I am drawing unreflexively from layer upon layer of physical and mental habit and acquired skill. There is the sense perception necessary for me to hear the dull hum of the air conditioning, touch the chair, feel the keys on the keyboard, or see the screen. There is the complex muscle memory that allows me to type or to speak. There are the (debatable) linguistic and philosophical competencies built up over the course of generations and over the course of my own life history which allow me both to recognize objects under an intelligible and communicable form and to organize my thoughts into some semblance of an argument. These are just some of the activities and entities that comprise Husserl's *lebenswelt*, which is the precondition and ground of all my theorizing.⁴⁷ Some of this is present to me in an all-at-once sort of way in the act of perception; some of it intrudes upon my consciousness as a distraction from my efforts to think through this argument; some of it I am aware of only secondarily, through a deliberate act of attention; and by far, most of it must recede into that region which Polanyi calls "tacit awareness" in order for me to focus attention on the task at hand. But all of this, and indeed much more than this, is tacitly affirmed in my *act* of thinking as the "indispensible condition for it to be" (421). All of it remains operative in my actual existence irrespective of whether it is the object of my attention, and some of it remains operative, in varying degrees of importance, in the concentrated act by which I focus my attention upon intelligible wholes abstracted from this greater actuality. All subsequent abstractions, all further refinement of particulars, will proceed on the basis of this reality and my original all-at-once grasp of it in understanding. But even understanding and attention themselves are abstractions in the sense that they are the "stereoscopic" grasp of unities within the all-at-once unity of consciousness, which can never grasp the whole of the unity which makes consciousness itself possible—a knowledge of wholes, to paraphrase Augustine, which is never wholly knowing.⁴⁸ Such abstraction is necessitated by the fact that inhabiting *esse commune* is like stepping into a Baroque church. It presents itself as an overwhelming unity that is impossible to take in all in one go. This is why Aquinas says that thinking begins and ends in *intellectus* (*nous*), by way of discursive reasoning (*ratio*), and another reason why the science of being *qua* being lies in one way at the beginning of all other sciences and another way at the end while remaining operative throughout.

"The chief thing lost sight of in an exclusive application of analysis," wrote Goethe, "is that all analysis presupposes synthesis" (1989: 239). All our "mechanistic" attempts to grant analysis noetic priority over synthesis and parts ontological priority over

wholes are betrayed by the fact that it is only tacit awareness of the whole transcending the parts (and belonging to a still more comprehensive whole) that allows us to regard the parts *as* parts. That is to say that these attempts are ultimately betrayed by the simplex character of *esse commune* in both of its paradoxical dimensions. We have already encountered this principle, at a formal level, at numerous points and in various forms throughout this book: in D.C. Schindler's and Robert Spaemann's contention that form and finality are necessary for intelligibility, in Driesch's contention that action is only intelligible as a whole rather than a sum, and in the failure of Darwinism, diagnosed so devastatingly by Webster and Goodwin, to free its genealogical conception of species from its reference to natural kinds irreducible to history. All of this points to a fact that Michael Polanyi articulates with impeccable clarity: that mechanistic analysis is never *simply* mechanistic. Just as the spatiotemporal contiguity of parts is insufficient to specify the nature of their interrelation in a living being, so too the "impersonal" terms of physics and chemistry alone (which reduce to relations of spatiotemporal contiguity) are not enough to specify even machine-like functions, say those of genetics, on the side of the object. These require "regulatory" or "operational" principles that can only be grasped in "gestalt-like" terms (Polanyi 1974: 340–346 and Polanyi 1983: 29–54).⁴⁹ They depend upon maintaining their tacit reference to form as an indivisible whole. It is only thus by retaining *a priori*, tacit knowledge of the whole in its form or gestalt that the analytically separated parts and their physicochemical relations are even intelligible.

For in order that we may formalize the relations that constitute a comprehensive entity, for example, the relations that constitute a frog, this entity, i.e., the frog, must be first identified by tacit knowing, and, indeed, the meaning of a mathematical theory of a frog lies in its continued bearing on the tacitly known frog" (Polanyi 1983: 20–21).

In Chapter 8, we distinguished between the ontological and historical orders in order to free the principal insight of emergence theory from its residual dependence upon a mechanistic ontology. This insight, namely, is the existence within organisms of higher levels of reality which depend upon but are not specified or controlled by lower levels and can indeed turn and exert "downward causation" over those levels (Noble 2006: 42–54).⁵⁰ This freed us to regard the organism as a *per se unum* and as the subject of its own emergence rather than its accidental by-product, while requiring us, at the same time, to acknowledge the organism's dependence upon its own historical development. Only if we can speak thus of the organism as the subject of its activity can we speak coherently of the lived lives of animals.⁵¹

What I wish to point out now is that this relation between levels, and ultimately between the parts of the organism and the whole whose parts they are, is mirrored in the noetic order in the relation between a "distal" attention to the form of the whole and the "proximal" attention to parts abstracted from this whole and continually bearing a tacit relation to it. Or as Polanyi puts it, "what is comprehended has the same structure as the act that comprehends it" (1983: 55).⁵² Attending to the particular parts as such requires us to "disattend" from the form or gestalt of the whole, but understanding those parts in relation to the whole requires a tacit "indwelling" of the whole. An "unbridled lucidity" with respect to the parts "can

destroy our understanding of complex matters” by losing its grip on the constitutive relation to the whole that is irreducible to those parts (10–21).

Experimental and mechanical analyses are perfectly legitimate, even necessitated, by the distinction between the ontological order of being and the historical order of development and by the intensive infinity of *entis*, which ensures that analysis of a comprehensive, complex entity can be carried out virtually *ad infinitum*. Properly understood, such abstractions are highly focused instances of the unity of contemplation and action. But in order for these abstractions to be properly understood, we must acknowledge the priority of contemplative receptivity to form and its constitutive relations *within* action. And to understand this, we must see that the abstraction which distinguishes x from non-x can never be a matter of what D.L. Schindler calls simple or absolute closure, whether from the side of the object, the side of the subject, or in the distinction between the various branches of knowledge: as if x in its actual existence and substantial identity really were indifferent to non-x or if its relation to non-x could simply be “added in” later on. Reality and the entities comprising it can never be simply built up by adding analytically separated parts, even in thought. The assumption that it can is betrayed at a deep level by our necessary starting point and our necessary recourse to form, by the reciprocal relations indicated by Bohm, and by the way that *esse commune* must be presupposed even to think or speak of x and non-x as belonging to the same order. Abstraction is always rather a matter of “relational closure because and insofar as things themselves are a matter of relational closure” (Schindler 2011: 429).

How “relational closure” appears in each of the sciences, and how each of the sciences would proceed in its analyses while keeping its objects inherently open to the relations constituting them, including, most basically, their constitutive relation to God, is—needless to say—a profoundly difficult matter. This can only be determined by each of the sciences through its own formal perspective and as it contemplates its own history and its own constitutive relation to philosophy and theology. As an example, one could look to Adolph Portmann’s semantic theory of animal form, which does not deny functionalist, evolutionary explanations so much as it denies that these explanations exhaust the scope of the scientific question.⁵³ One might look to the developmental and morphological traditions we discussed in Chapter 6, to Barbara McClintock’s “holistic” approach to genetics, or to Bohm’s own physics as examples.

Suffice it to say that neither the ontology of creation nor this conception of scientific abstraction precludes the self-manifestation of nature in its mechanical aspects or the efficacy of mechanical analysis. Indeed, Bohm himself insists

that none of the really well-founded conclusions that can be obtained with the aid of the assumption of a finite number of qualities in nature can possibly be lost if we assume instead that the number of such qualities is infinite, and at the same time recognize the role of contexts, conditions, and degrees of approximation (1957: 135).

Paley was thus correct, in a sense, that creation “neither alters our measures nor regulates our conduct” (1854: 286). But it profoundly alters our understanding of *what* we measure and of what the *act of measuring* itself *is*. All we really stand to lose in this “gestalt switch” is the reductionist illusion of exhaustive intelligibility, the

recalcitrant dualism that leads the reductionist to exempt himself illicitly from his own reductions, and the shabby materialism, the mere residue of this dualism, which would undermine the veracity of science itself. But we stand to gain so much more. For we stand to liberate the sciences from the arbitrary restrictions of scope and method imposed by its metaphysical dogmatism, restrictions which prevent the work of a Goethe, Driesch, Portmann, or Bohm from being regarded as serious science. We stand to regain the wonder suppressed by a hegemonic positivism, and we stand to reintegrate the sciences into a more comprehensive conception of reason and a metaphysical and theological framework more adequate to the reality we cannot help living in than those frameworks which the sciences necessarily presuppose in their attempts to escape them.

The Structure of Theological Revolutions: The Rational Superiority of Creation

As theory, evolutionary biology and the Christian doctrine of creation *ex nihilo* belong to different orders of explanation, just as the *act* of creation and natural mechanisms belong to different orders, ontologically speaking. Creation and evolution, therefore, are not strict rivals, and theology has no stake in either affirming or denying evolutionary theory *per se*, in contesting the physical data employed in its defense, or in proffering some hybrid—theistic evolution, for instance—to bring about a desired *rapprochement* between science and religion or to make technological civilization safe for theology.

They *become* rivals, however, when evolutionary biology, denying its constitutive relation to metaphysics and theology and attempting to establish its rightful autonomy outside of that relation, *becomes* metaphysics and theology. The problem here is not, or at least not primarily, that evolutionary biology has overstepped its bounds, as if the difficulty could be solved by retreating back behind the borders of Gould's NOMA principle. The relation of science to metaphysics and theology, it hardly bears repeating, is constitutive and inexorable, intrinsic rather than extrinsic. Thus, the problem is not that there is a metaphysical and theological dimension to Darwinism. This cannot be expunged. Rather, the problem is the *specific* metaphysical and theological content of Darwinian theology and the natural sciences more generally, the same idolatrous extrinsicism which gives rise to the fiction of NOMA in the first place and prevents the integration of the sciences into a more comprehensive order of reason. We can refer to this in a kind of shorthand way by the usual names of materialism and naturalism, but I hope we have cast new light on the metaphysical and theological meaning of these concepts throughout the course of this book.

This disintegration of reason has led, in turn, to the disintegration of our conception of reality, which is to say that the problems endemic to Darwinism and to modern scientific naturalism concern not just the doctrine of God but the philosophy of nature and the subjectivities formed under their tutelage. Darwinian biology, which aspires of its very nature to be a theory of everything, is incapable and to a certain extent uninterested in accounting for its own truth, for the lived lives of the organisms that are its subject matter, or for their phenomenal appearance to us, which is relegated by

its ontology to the epiphenomenal realm of “folk biology” even as it is the necessary presupposition for the “struggle for existence” and the starting point of biological inquiry. If the doctrine of creation is rationally superior to Darwinian biology, as I shall argue it is, it is not because theology and science—or creation and evolution—are opposed in principle. Rather, it is because creation can account for the truth of the world in which there are actually living organisms *and whatever truth there might be in Darwinism*, better than Darwinism itself can. Of course this requires us to adopt a more comprehensive notion of “accounting” and of the phenomena for which accounting is needed. Joe Sachs summarizes this point well in his introduction to Aristotle’s *De Anima*.

There are then two major ways to go in thinking about everything there is. The way adopted for the most part in recent centuries, not in practice but in the most approved kinds of theory, has been to posit a picture of the world that excludes souls, and to try to cope somehow with the wreckage. The other way, seen more clearly by Aristotle than by most thinkers, is to realize that the world must be so constituted in the first place that soul and the activities of life are genuine possibilities within it (2004: 7).

We have seen that the doctrine of creation, in its passive sense, is an account of the world’s ontological constitution that secures both its intelligibility and its spontaneity. Creation so understood is rationally superior to Darwinism because it saves the appearances *for* Darwinism by offering an account of the world that is both comprehensive and nonreductive, a world large enough to include Darwinian theorizing. In saving the appearances for biology and the sciences, creation saves the “more than appearance” inherent within appearance itself, a “more” upon which the truth of appearance depends and which the scientific quest assumes in practice. By insisting upon the intelligibility and interiority of form and *esse*, creation saves the truth of the biological world as an order of inherently intelligible and thus meaningful living wholes, subjects of being, who are irreducible to the sum of their parts, their antecedent causes, and indeed to any true account we can give of them. By insisting thus that order and intelligibility are ontologically prior to unmeaning and disorder, creation saves the condition of possibility for truth as such to be more than mere logical coherence or pragmatic, functional success.⁵⁴

Roughly half a century ago, Thomas Kuhn brought to the world’s attention not only the indispensability of paradigms or traditions of inquiry in the history of science but the profound difficulty in adjudicating the conflict between competing traditions or paradigms. Incommensurability is not primarily a problem of *translation*, as Donald Davidson assumes in his famous objection to the very idea of a “conceptual scheme” (1985: 129–144).⁵⁵ While Parts I and II of this book show the difficulty in thinking that terms such as “God,” “being,” “cause,” “entity,” “truth,” “order,” and “explanation” can be transferred between paradigms without loss of meaning, our contention that form and *esse* hold ontological and epistemic primacy and are thus tacitly operative in any conceptual scheme would relegate translational disagreements to second-order status. The truth of being imposes itself on the act of thought in spite of the quality of our thought about it.

The real difficulty in Kuhn's analysis stems from the incommensurability of background assumptions, problems, and standards, which makes it difficult to agree on what the disagreement is about or even to formulate a common subject matter as the basis of disagreement. This is apparent, for instance, in the fact that Bacon opposed Aristotle in part by reformulating the very nature and purpose of science and the criteria by which its success would be judged. "The proponents of competing paradigms are always at least slightly at cross-purposes," Kuhn writes, "Neither side will grant all the non-empirical assumptions that the other needs in order to make its case" (1970: 148). We have seen this to be the case also in Darwinism's long war against "creationism." Formulating its understanding of creation on the basis of its own ontological and theological assumptions, and getting considerable help from forms of modern "natural theology" which share those assumptions, Darwinians typically regard creation and evolution as mutually exclusive alternatives and judge the latter as wanting for failing to supply the sort of mechanisms they think they have discovered. Kuhn maintains, as we have, that something tantamount to a conversion by one or more of the antagonists is a precondition for the possibility of genuine disagreement. In order for those who scoffed at the general theory of relativity and its notion of "curved" space to make the transition to Einstein's universe, for instance,

the whole conceptual web whose strands are space, time, matter, force, and so on, had to be shifted and laid down again on nature whole. Only men who had together undergone or failed to undergo that transformation would be able to discover precisely what they agreed or disagreed about (149).

Alasdair MacIntyre, building upon Kuhn, elaborates further upon this difficulty.

[T]hose who do in fact judge only from within one such tradition or standpoint, from the point of view of one particular conceptual scheme, and who also when presented with the problems of incommensurability insist on understanding these as problems of translatability into their own language, their own conceptual idiom, the facts of incommensurability will become or remain invisible. They will have rendered themselves unaware of the radical particularities and partialities of their own standpoint. It will also inevitably appear to such persons that when they judge some statement or theory or whatever true, they can be doing no other than appealing to the fundamental criteria by which assertions are warranted within their own scheme...Hence it will be immensely plausible, either implicitly or explicitly, to identify truth with warranted assertability. And it will make no sense from this point of view to conjecture that one's scheme of concepts and beliefs could be in some way as a whole in error, both because the very idea of an alternative conceptual scheme makes no sense, and because, since it is only in terms of that scheme that errors are identified, the notion of the scheme itself being in error, the notion of an overall error could never find application (MacIntyre 1990: 121).

The problem to which MacIntyre avers is more or less what George Grant meant in writing of the difficulty of thinking outside of the prevailing technological ontology: "we apprehend our destiny by forms of thought which are themselves the very core of that destiny" (1986: 32).⁵⁶ And yet, the very *act* of thinking, including Darwinian thinking, presupposes and presses for a normativity beyond the confines of warranted

assertability or logical coherence within a theory (a fact accounted for, in Thomistic terms, by the recognition that being is the first object of the intellect, and by “mediating action” in Blondel). This is evident in the way that the reductionist, viewing his subjects from without, exempts from his reductions the knowledge which he has of himself from within, considering “behavior, except his own; purposiveness, except his own; thinking, except his own” (Jonas 2001a: 123–124). Viewing his objects from without, he withholds from them “the privileges of his own reflective position” (2001a: 124). And yet if asked *why* he is a reductionist, invariably he will answer not that he is compelled by his DNA or “that there might be many little Dawkinses” but that he thinks it useful, or good, or even true (Clark 2000: 11).

Anyone who believes it is possible to judge between the claims of rival paradigms, therefore, “will have to understand truth in a particular way” (MacIntyre 1990: 121). Inasmuch as such a belief is constitutive of thought, such an understanding will already be tacitly operative in the very *act* by which one thinks, irrespective of what one thinks he believes. This is implicit in Aristotle’s principle of noncontradiction, in Przywara’s “meta-ontics,” which we considered in Chapter 1, and in Blondel’s exigencies of action. In its very nature as act, thinking affirms the objectivity of a “synthesis” prior to and outside of thinking.⁵⁷ Adjudicating between paradigms requires the acknowledgment of an additional corollary to this exigency, namely, that

there is...some reality, identifiable from within that particular scheme of concepts and beliefs, about which it is nonetheless impossible from within that same scheme to speak coherently and thus truly. Hence in judging of truth and falsity there is always some ineliminable reference beyond the scheme within which those judgments are made and beyond the criteria which provide the warrants for assertability within that scheme (121–122).

The act of theorizing as such, in other words, requires a metaphysics of *esse* and an ontological conception of truth, “a conception of *what is*” that is, as a matter of principle, “more and other” than the measurable or what appears to be the case from the vantage of any particular conceptual scheme and the criteria for warranted assertability within that scheme (122).

This metaphysics is, of course, the very thing which Darwinian biology and its doctrinaire materialism effectively deny, or attempt to deny, since some residual commitment to the truth of *esse* and to *esse* as truth, is not optional. The truth of being will continually reassert itself even if our theories obscure it and our action will affirm this truth in some measure in spite of itself.⁵⁸ We have seen this with respect to the ontological priority of form. We have also seen that a want of theoretical “self-knowledge,” the failure of a theory to understand itself, can blind its proponents to the fact, and that people will expend a great amount of intellectual energy in the effort to remain blind. Tamlar Sommers and Alex Rosenberg advance their “nice nihilism” against Daniel Dennett and in Darwin’s name, for example, not because it is *true*—their commitment to this nihilism precludes this possibility—but because the admission of truth or any intrinsic goods would compromise the hegemony of Darwinian theory (2003: 653–668). This is the very epitome of that sophistry

we diagnosed in Chapter 3, a sophistry not primarily of subjective intent but of metaphysical logic, the inevitable accompaniment to Darwinism's nominalist ontology. Sadly, this form of argumentation is all too common among Darwinian theorists.⁵⁹ Perhaps this is why they rarely engage the claims of theology in terms and concepts other than those formulated from within their own tradition—because from the metaphysical vantage point of Darwinian positivism, there *are* no other terms—and why they do not seem to regard Darwinism's myriad exercises in circular logic, its explanatory failures, and its philosophical inconsistencies as constituting an epistemological crisis. Such things only matter where there is seriousness about the truth as the in-itselfness of things, and this is precluded in advance by Darwinian ontology, a fact which has sometimes been seen as cause for celebration.⁶⁰

It is no accident that "history" fully emerges as a category of thought from within Christianity. The Incarnation and the doctrine of creation intensify concreteness beyond anything conceivable in Greek thought, not at the expense of eternity but in direct proportion to the share that history has in eternity. So while there is a profound disagreement between Christianity and Darwinism over what history and time *are*, Christianity is at least Darwinism's equal in reminding us that we are historical beings. All thought does indeed emerge from within a historical tradition of inquiry, but this does not mean that being as such is collapsed wholesale into history or that thought as such is destined to remain imprisoned within those historical frameworks, condemned to groping its way about by means of function and feasibility, and unable to attain to a truth which transcends them by which to adjudicate between them. Indeed, we have seen that the truth of being, and being as truth, imposes itself on the very structure and act of thought as such in the form of the indicative mood. Following Kuhn, MacIntyre further elaborates the criteria by which a paradigm operating within the ontological limitations of history can be regarded as rationally superior to its rivals. A paradigm or theory can be judged as rationally superior to its rivals, often in retrospect, by its

ability to identify, to explain, and to transcend their limitations and defects, while preserving from them everything that survives dialectical questioning in a way which those rivals are unable from their philosophical resources to provide any counterpart (MacIntyre 1988: 172).

A rationally superior paradigm or theory, to put it simply, is a more comprehensive theory. It can accommodate the truth of its rival's theses and explain its rival's failures from philosophical resources that the rival theory lacks.⁶¹ Kuhn adds to these criteria the stipulation that "claims of this sort are particularly likely to succeed if the new paradigm displays a quantitative precision strikingly better than its older competitor" (1970: 153–154). Since our argument is partly an argument *against* the reduction of the world to quanta and *for* the qualitative infinity of being, this criterion obviously cannot apply to all knowledge in every instance, nor can it apply, by definition, to a comprehensive understanding of a whole whose unity is by nature irreducible to quantity. So, it cannot apply to our claim to have fulfilled the criterion of a fuller and more comprehensive account. Once being is restored to its proper nature as act, and the actual world is accorded a certain primacy over parts abstracted by analysis, and

once it is seen that this ontological structure is mirrored in the structure of the cognitive act by which we abstract, “we can see...how an unbridled lucidity can destroy our understanding of complex matters” (Polanyi 1983: 18). As Wittgenstein asked, is not an indistinct concept often what we need (1953: §71)? Nevertheless, we can claim for our account a greater *philosophical* precision with respect to notions such as being, cause, form, entity, and so forth—even as this precision sometimes comes in a negative mode—as well as a greater theological precision with respect to the meaning of divine transcendence and infinity and its analogical reflection in the intensive infinity of finite *entia*. We can explain more precisely on this basis why science’s founding goal of exhaustive intelligibility, and the Darwinian aspiration to be a theory of everything, is neither desirable nor possible. And these metaphysical affirmations permit us to explain why science may achieve an ever-greater “quantitative precision” in its analyses without, for all that, ever reaching the bottom of the phenomena thus analyzed.

Kuhn, writing more as a philosophical historian describing how scientific revolutions *have happened* than as a speculative philosopher describing how, in principle, the rational adjudication of rival theories *should* occur, notes that “the claim to have solved crisis-provoking problems is...rarely sufficient by itself,” and adds a criterion, especially appealing in mathematics, which MacIntyre omits.

These are the arguments, rarely made entirely explicit, that appeal to the individual’s sense of the appropriate or the aesthetic—the new theory is said to be “neater”, “more suitable,” or “simpler” than the old (Kuhn 1970: 155).⁶²

I wish to maintain that the doctrine of creation fulfills the first criterion of comprehensive explanation not least *by* fulfilling this second, aesthetic criterion, and that Darwinism ultimately fails for the same reason. I do not mean simply that the doctrine of creation is more beautiful and therefore more compelling than Darwinian evolution, though of course it is, and the importance of this is not to be minimized since we have seen that Darwinian metaphysics too has an aesthetic dimension. Rather, I mean to say that the doctrine of creation requires us to integrate beauty, the manifestation in external and intelligible form of an interior depth of incommunicable being, into the truth of the world as something other than the accidental and epiphenomenal by-product of meaningless and thus ultimately nonsensical functionality.⁶³ By insisting upon both the intrinsic intelligibility and the qualitative infinity of the world, that is, the ontological priority of form or *logos* and the gratuity of *esse*, the doctrine of creation recuperates, in one and the same stroke, both the interiority of the world as having being-in-itself and for its own sake (which is the condition of our making true statements about it) *and* the elementary experience of it which compels our philosophical and scientific inquiry in the first place.

Let us be a little more precise about the “rational vindication” of creation. Now we have maintained that the doctrine of creation and Darwin’s theory of evolution are not rivals in the strict sense. As theory, they belong to different orders, and we have no interest in contesting descent with modification, the transmutation of species or natural selection as scientific or biological claims *per se*. We are perfectly willing to concede that the empirical data are what they appear to be. Our positive interest has

been to explicate the doctrine of creation as a doctrine of God, on the one hand, and the ontological structure of the world, on the other, and thus to give proper names to that which any science, approaching the world with its eyes open, must necessarily see. Our negative interest has been in criticizing the metaphysics and theology latent within Darwinian biology and natural science more generally, presuppositions which do impinge upon Darwinism's philosophical coherence and its explanatory power as science and blind it, so we have argued, to what it cannot help seeing. So, we have had reason to doubt whether Darwinism, in advancing the transmutation of species, has a coherent conception of causality, species, or change. We have had reason to suspect that Darwinism's attempted conflation of being and history undermines the substantial identity of living organisms that permits them to be the subject of their processes and actions rather than the consequence of them. This is one of the reasons why the organism has all but disappeared from beneath the Darwinian gaze and why evolution is thought to occur fundamentally either behind their backs, as it were, at the genetic level or above their heads, so to speak, at the level of populations. We have argued further that the absence of any account of the organism's substantial unity in Darwinian thought threatens to undermine the very intelligibility of inheritance and descent. And we have raised the suspicion that natural selection confuses causes with effects and have thus cast doubt on whether it really offers an explanation at all or merely redescribes "whatever happens." Even so, because creation and evolution belong to different orders of reality and explanation, it is finally a matter of theological indifference whether evolution, even Darwinian evolution, has occurred or not. Once one readmits a distinction between the order of being and the order of history, once one says that "x *is*" and thus transcends the linear historical flux, then all bets are off, and it is no contradiction to affirm the "fixity" of species and the transmutation of species at the same time.

The fact that Darwinism cannot escape the imperative of the indicative and, thus, cannot avoid taking recourse to an order of being distinct from the order of history raises the more troubling question of whether Darwinism is, strictly speaking, incredible, and thus whether there ever has been or *can be* a real thoroughgoing Darwinian. There are, as we have seen, myriad forms in which this problem raises its ugly head. It can be seen in the fact that Darwinians continue to assert that Darwinian theory is in some sense *true*, though the very ontology of Darwinian biology, contravened at every step by the Darwinian who momentarily exempts himself and his activity from it, undermines the very possibility of truth. Primary qualities, no less than secondary qualities, science no less than morality, must be illusions fobbed off on us by our genes, the very fobbing off of which must be an illusion fobbed off on us by—what?⁶⁴ Thus goes Darwinism when carried to its logical conclusion: endless fobbing with no fobber.

The question of whether Darwinian biology explains evolution is a serious one. But Darwinian biology will not have explained evolution until it can explain the possibility and truth of Darwinism itself, and this it cannot do. The still more serious question beneath these is whether anyone cares, that is, whether truth and its beauty have relinquished their claim upon the pragmatic Darwinian soul.⁶⁵ This is the question that is ultimately raised by Darwinism's endemic and self-contradictory reductionism, which leaves the Darwinian a bit like Hume, shuddering and setting his philosophy

aside as he stumps off to the pub at the end of the day, denying in theory what it affirms in practice, unable or unwilling to see what he cannot help but see. To the first two criteria for rational adjudication, we could therefore add a third, which perhaps only restates the principle of noncontradiction: if it is impossible to *live* as if your theory were true, it probably is not.

We have shown that, from the vantage of creation and its ontology, it is possible not only to diagnose these intractable problems as the by-product of a self-contradictory ontology but to preserve whatever might be true of Darwinian biology, not least by rescuing the concept of truth itself from the corrosive effects of Darwinism's universal acid and from all this endless fobbing. For we have shown that nothing is really lost in supposing that the order of being really is gift in its very structure, that it is distinct from and immanent within the order of history, that it is inherently intelligible, beautiful, and good. To the contrary, this is the condition upon which organisms are the irreducible subjects of their own being and can therefore have a *sake*. It is, thus, the precondition of that substantial identity that Darwinism undermines, the novelty which Darwinism purports to explain, the fecundity that Darwinism merely takes for granted, and the struggle for existence which is thought to ensue. By supposing that being is gratuitous and that *logos* is ontologically prior to unmeaning, we can imagine a science that is true to its own nature and to its objects because it is conscious of the principled impossibility of exhausting them. We can imagine mechanical analysis flourishing without reductionist (and eugenicist) fantasies. And we can conceive of many more things in heaven and on earth than are dreamt of in Darwinian theory. For instance, we can conceive of life as the being of living things, and thus manifest in biochemical regularities and somatic integration, and yet irreducible to biochemical analysis, which always abstracts from the actual living whole. We can conceive of a form of organic unity that is more than a unity of organization and aggregation. We can imagine a form of biological science in which understanding organisms is not simply a matter of reducing them to the average genotypic profile of their populations, or reducing the semantic aspects of animal form and the lived lives of organisms to just-so stories of functional utility. We can, therefore, imagine that living things are objectively beautiful, that is to say meaningful in themselves and to us, and not merely the accidental but useful by-product of their survival value. And we may dare even to believe that human beings are...well, human. Theology saves the appearances for Darwinism in this way, by making adequacy to the world that we cannot help living in a criterion of rationality.

The doctrine of creation is thus rationally superior to Darwinian science not because it refutes Darwinism but because it secures the actual world for Darwinism and for science by securing the conditions in which Darwinism might still yet be true, assuming that Darwinism does indeed stake a claim to truth. To ask Darwinians and other scientists to acknowledge creation is not to ask biologists or physicists to give up on science; it is to ask them to relinquish their bad theology in exchange for a better one, and thus to reintegrate their science within a more comprehensive conception of reason and an order of wisdom. It is to ask them to be better biologists and scientists, to be more rigorously and comprehensively empirical, more agnostic and pluralistic about causes, less dogmatic, and more adequate both to the nature of the act of scientific cognition and to its objects. It is to ask them to find intellectually rigorous and principled ways to integrate

within scientific understanding what, as human beings, they already know deep down: that the sun is not just a factory for making chemicals, and that a human being is not simply an autocatalytic dissipative system, a puddle of genes, or a survival machine.

This is why the doctrine of creation is rationally superior to Darwinian biology even though it is not strictly a rival of Darwinian biology: because it can accommodate the inexhaustible truth of the *actual* world, including the truth of Darwinism, whereas Darwinism can finally accommodate neither, even if all the empirical evidence in the world were to point in its favor. The doctrine of creation is rationally superior to Darwinism not because it supplies the mechanism for the unfolding of biological history—for God is not a mechanism and the world is not a machine—but because it fulfills the ultimate criteria for rational superiority epitomized in that old German proverb passed down by Balthasar, “*Wer mehr Wahrheit sieht, hat mehr recht*” (1987: 15).⁶⁶ Roughly translated: “Whoever sees the most wins.”

Notes

- 1 Joseph Ratzinger makes this point as well as offering insights into how the book of Genesis should be read theologically and in light of its Christological fulfillment. See Ratzinger (1986), p. 50.
- 2 Of course neither Driesch nor Bohm contends for the Christian doctrine of creation *ex nihilo*. Both may well reject it for all I know. This is only to say that what creation affirms of the ontological structure of reality shows up, as it were, in these concepts.
- 3 See Bohm (1957), pp. 1–67. For Bohm’s account of how the usual interpretation of quantum theory remains a form of indeterministic mechanism, see pp. 69–103.
- 4 For a profound analysis of this crisis and its “pragmatic” nature, see D.C. Schindler (2008), pp. 1–39.
- 5 *Fides et Ratio*, it should be noted, is addressed less to the contemporary crisis of faith than the crisis of reason, though of course the two go hand in hand. See, e.g., *Fides et Ratio*, 5, 45–48. See also Ratzinger (2004b), pp. 183–193.
- 6 This conviction is widely and universally affirmed across the tradition. I do not mean to suggest, of course, that the *visio dei* is fully available to us in this life, though I do wish to suggest that the eyes of faith, to borrow Rousselot’s term, afford an anticipation of it that transforms vision even now.

The selfsame being may, therefore, belong to the natural order of our experience and to the supernatural order of grace, and as we have repeatedly said, inner grace does not present us with new objects of knowledge, but illuminates a new aspect of some object already known (Rousselot 1990: 33).

This is another reason why our vision necessarily remains provisional, though I do not wish to suggest, for reasons that will become obvious, that even eschatological vision eliminates the essential mystery of being. See Hanby (2005).

- 7 If desire is fundamentally responsive, however, then disordered desire already betokens a failure of vision.
- 8 Thomas Kuhn makes a similar point.

We have already seen several reasons why the proponents of competing paradigms must fail to make complete contact with each other’s viewpoints...In the first place, proponents of competing paradigms will often disagree about the list of problems that any candidate for paradigm must resolve. Their standards or their definitions are not the same. Must a theory of

motion explain the cause of the attractive forces between particles of matter or may it simply note the existence of such forces? Newton's dynamics was widely rejected because, unlike both Aristotle's and Descartes's theories, it implied the latter answer to the question. When Newton's theory had been accepted, a question was therefore banished from science (1970: 148).

- 9 Among the many examples, see Bacon 2000, praef., I, 3, 4, 56, 73, 96, 110, II, 1, 4.
 10 Richard Lewontin is candid and critical of the inextricable relationship between scientific and commercial interests. See Lewontin (1992), pp. 41–57. Gregory Stock, on the other hand, is just candid. Advocating for new germ line technologies that would allow us to “build better human beings,” he writes, “We have spent billions to unravel our biology, not out of idle curiosity, but in hopes of bettering our lives. We are not about to turn away from this” (Stock 2002: 14). Some lives, it seems, stand to be “bettered” more than others.

And there are fortunes to be made as well. Craig Venter not only made an enormous contribution to medical science by speeding up genome sequencing, he went from an NIH research salary to a net worth of more than \$100 million in a few years (2002: 47).

- 11 For further discussion of how technology is the ontology of the age and its relation to the demise of *theoria*, see Grant (1969), pp. 15–40.
 12 See, especially, Bacon (2000), I, 81.
 13 I thus regard our efforts here as an attempt to respond to Pope Benedict's call for a more comprehensive conception of reason. The Pope's assessment of the role of evolution in bringing about a contraction of reason—a contraction which it ceaselessly contradicts—is interesting.

The question is whether reason, or rationality, stands at the beginning of all things and is grounded in the basis of all things or not. The question is whether reality originated on the basis of chance and necessity...and thus, from what is irrational; that is, whether reason, being a chance by-product of irrationality and floating on an ocean of irrationality, is ultimately just as meaningless; or whether the principle that represents the fundamental conviction of Christian faith and of its philosophy remains true: “In principio erat Verbum”—at the beginning of all things stands the creative power of reason. Now as then, Christian faith represents the choice in favor of the priority of reason and rationality. This ultimate question... can no longer be decided by arguments from natural science, and even philosophical thought reaches its limit here. In that sense, there is no ultimate demonstration that the basic choice involved in Christianity is correct. Yet, can reason really renounce its claim to the priority of what is rational over the irrational, the claim that Logos is at the ultimate origin of things, without abolishing itself? The explanatory model presented by Popper, which reappears in different variations in the various accounts of the “basic philosophy”, shows that reason cannot do other than to think of irrationality according to its own standards, that is, those of reason (solving problems, learning methods!), *so that it implicitly reintroduces the primacy of reason, which has just been denied*. Even today, by reason of its choosing to assert the primacy of reason, Christianity remains “enlightened”, and I think that any enlightenment that cancels this choice must, contrary to all appearances, mean, not an evolution, but an involution, a shrinking, of enlightenment (Ratzinger 2004b: 181–182).

- 14 As Bohm puts it, nature and its laws, with its many-to-one and one-to-many causal correspondences, are such that

there exist relatively autonomous contexts that can be studied separately to some degree of approximation, without our first having to learn everything about everything with perfect precision... However, since the natural laws imply some kind of interconnection of all aspects of the world, as well as their approximate autonomy, this means that wider studies carried out in broader domains or in wider contexts permit a demonstration of the relationships between

the various branches, domains, and levels in a given science, and between the various different sciences, as well as a penetration to new domains not hitherto known or investigated (1957: 32–33).

- 15 The implications for the relation between knowledge and its objects are immediate, and in Bohm’s case, remarkably consistent with what we argue here.

[T]he reciprocal relationships between all things then imply that no given thing can be exactly and in all respects the kind of thing that is defined by any specified conceptual abstraction. Instead, it is always something more than this, and, at least in some respects, something different (Bohm 1957: 154).

- 16 The relevant citations from St. Thomas are *De pot.*, q.7, a.2, ad.9; *Comp. theo.*, 1.68; *In De div. nom.*, 5.1; *De pot.*, q.3, a.7; *In Boeth. De Heb.*, lec. 2.

- 17 See Balthasar (2004), p. 143. Defending this claim against the charge that this would convert the human person into a subsistent relation and thereby eliminate the ontological difference between God and the world was the burden of Adrian Walker’s essay which we drew on so extensively in Chapter 8.

If, in fact, communion can only be the result of our conscious acts of love, and cannot be seen as somehow constituting consciousness itself, then such acts can no longer be strictly necessary for the integrity of our being. They become, at best, supererogatory “extras.” But if conscious acts of love are just extrinsic add-ons, they are not even acts of love, for there is no love without the grateful acknowledgment that relation to the beloved is not a mere option, subject to human velleity, but is the foundation of one’s very existence. In a word, if we cannot maintain that personal singularity is somehow constituted communally even for us, then we are bound to say that our finite being, as such, is inescapably “ontologically selfish,” and that redemption into the Trinitarian agape is a redemption from the human condition, and not of it (Walker 2004: 459–460).

- 18 See, e.g., Plotinus, *Enn.*, III.8, V.3. See also Pope Benedict XVI’s *Caritas in Veritate*: “Truth, in fact, is *logos* which creates *dia-logos*, and hence communication and communion” (3). In previous chapters, we have discussed the ways that “dia-logos” is implicit in the Greek conception of *logos* itself.

- 19 For Bohm’s later treatment of unity, see Bohm (1980). In suggesting that Bohm was grappling for a conception of unity like that implied by the doctrine of creation, I do not mean to suggest either that Bohm adhered to this doctrine or that I fully endorse his conception of unity and implicate order.

- 20 We have seen, however, that [the prospect of a fundamental theory] does not very well fit the experimental facts that are available up to the present. For further progress in physics has shown that all the various purely quantitative theories that were at different times thought to be the fundamental ones are actually approximations to still deeper and more general theories containing qualitatively new types of basic entities that are related by correspondingly new types of laws. Moreover, the possibility will always be open that, as has so often happened already, future experimental results may show the need for still further changes of a far-reaching character in our basic theories. As a result, there is no conceivable way of proving that the laws of the various levels of qualitative changes are *completely* and *perfectly* reducible to those of any given quantitative theory, however fundamental that theory may seem to be (Bohm 1957: 66).

We might suggest an analogous process in biology, as the inadequacies of orthodox neo-Darwinism as a “fundamental theory” have opened the door to a revival of developmentalism.

- 21 See Husserl’s discussion of Helmholtz’ “plane-beings” (1970: 119).

- 22 See Augustine, *Conf.*, 10.8.15, 10.17.26, 10.3.49.

- 23 This is to distinguish a proper conception of intensive infinity from a “postmodern” infinity in which intelligibility is forever deferred by an infinity which shatters its

- phenomenal appearances. This is because the postmodern infinite, in its many variations from Heidegger to Derrida, is premised upon the ontological priority of unmeaning or irrationality, which it dialectically opposes. In this it is but the reverse side of the “exhaustive intelligibility” sought by the sciences and shares the same basic ontological foundation, which is to say that the postmodern infinite is not, properly speaking, infinite insofar as it remains really (and dialectically) related to the finite.
- 24 This has immediate implications for the relation between being and function similar to what we have already discussed. Balthasar continues, “What man is in his totality cannot be ‘explained’ in terms of the process by which he came to be what he is” (GL I: 26).
- 25 In its goal of exhaustive intelligibility, there is perhaps a residual affinity between modern science and Aristotle, despite vast disagreement over what this intelligibility consists in or the means for arriving at it.
- 26 Polanyi continues, “To trust that a thing we know is real is, in this sense, to feel that it has the independence and power for manifesting itself in yet unthought of ways in the future” (1983: 32).
- 27 [O]nly the apprehension of the expressive form in the thing can give it that depth-dimension between its ground and manifestation which, as the real locus of beauty, now opens up the ontological locus of being, and frees the striver, allowing him to achieve the spiritual distance that makes a beauty rich in form desirable in its being-in-itself (and not only in its being for me), and only thus worth striving after... The quality of “being-in-itself” which belongs to the beautiful, the demand the beautiful makes to be allowed to be what it is, the demand, therefore, that we renounce our attempts to control or manipulate it, in order to be able to be happy enjoying it; all of this is, in the natural realm, the foundation and foreshadowing of what in the realm of revelation and grace will be the attitude of faith (Balthasar, *GL*, I: 152–153).
- 28 Balthasar continues,
- Such an agnosticism is contradicted by the astonishing possibility of applying abstract laws to the phenomena and even, within certain limits, of deduction a priori. It is contradicted, too, by the undeniable fact of a certain progress in scientific research. Yet it is just as clear that reality, not merely by reason of some accidental circumstance, but by reason of an intrinsic necessity, must always remain richer than any cognition of it and that the truth of even the lowest level of being contains a richness that so utterly eludes exhaustive investigation that it can continue to engage inquirers until the end of time yet never ends up as a heap of unmysterious, completely surveyable facts (2000: 85).
- 29 He continues,
- If *verum* lacks the splendor which for Thomas is the distinctive mark of the beautiful, then the knowledge of truth remains both pragmatic and formalistic. The only concern of such knowledge will then merely be the verification of correct laws and facts, whether the latter are laws of being or laws of thoughts, categories and ideas. But if the *bonum* lacks that *voluptas* which for Augustine is the mark of beauty, the relationship to the good remains both utilitarian and hedonistic: in this case the good will involve merely the satisfaction by means of some value or object (Balthasar, *GL*, I: 152).
- 30 I fully see how difficult it is to say anything positive about entelechy without contradicting other statements regarding it. I say once more that there is nothing at all to be “imagined” in a picture-like manner about entelechy: the non-spatial can never be realized by our imagination in spatial images. It may be hard on us, but so it is. And at the same time we must always bear in mind that in dealing with entelechy we are not dealing with anything physical, or absolute, or metaphysical: we are analyzing an agent at work in nature. We know concerning this factor that it cannot be spatial in any sense, that it has no seat in space; in one word, that it “is” not in spatial nature but only acts with regard to spatial nature... In fact the characteristics of entelechy form only a complicated system of negations so far, and little more (Driesch 1908: 259–260).

- 31 “Because the infinite escapes all proportion, the infinite as infinite is unknown” (Nicholas of Cusa, *De Doct. Ign.*, I.1.3).
- 32 Maximus Confessor makes a similar point in *Ad Thalassium*, 60, 80.
- 33 Organisms suffer a similar fate in genetic Darwinism because “the life-span of chromosomal material is one generation,” and thus too short to be a unit of selection. See Dawkins (1976), pp. 21–45.
- 34 In his posthumanist manifesto, biotech entrepreneur Gregory Stock writes,

Over the last hundred years, the trajectory of the life sciences traces a clear shift from description to understanding to manipulation. At the close of the nineteenth century, describing new biological attributes or species was still a good Ph.D. project for a student. This changed during the twentieth century, and such observations became largely a means for understanding the workings of biology. That too is now changing, and in the first half of the twenty-first century, biological understanding will likely become less an end in itself than a means to manipulate biology. In one century, we have moved from observing to understanding to engineering (2002: 7).

Stock is half right. The trajectory from understanding to engineering is not simply a function of recent successes in the biotechnology sector. Rather, this trajectory has been inscribed into our understanding of nature and the understanding of nature since the seventeenth century.

- 35 Once again, this may seem like an odd prescription, given the pervasiveness of the myth that modern science expelled man from the center of the cosmos. To the contrary, we have argued that modern science is *more* anthropocentric, or perhaps more perversely anthropocentric (because premised upon a defective anthropology) than ancient *theoria*. (Bacon’s belief that his new science provided a remedy for the Fall is scarcely given its due import here.)
- 36 This too, I would argue, is an analogical reflection of the Trinitarian archetype, in which generativity and receptivity, unity, identity, and novelty, always coexist in eternal generation of the Son from the Father. In this case, we may suggest that the “fallenness” of modern science consists not simply in its equation of knowing and doing, nor in the fact that it replicates Adam’s gesture in seeking to “be like God” (Gen 2:3), but rather that it seeks to create and to be like God in a paternal rather than a filial mode, though the coeternity of Father and Son means that there is no real paternity without filiality.
- 37 For a profound account of truth as gestalt, see D.C. Schindler (2004).
- 38 Robert Miner has argued that the connection between knowing and making is not *per se* problematic, that “making” (or doing: John 3:21) truth need not be equated with “making up” truth. One reason for this is that the connection between knowing and making had already been effected by orthodox theologies of creation as God’s knowledge of creation “extends as far as his causality extends” (Aquinas, *ST*, I.14.11), which is not merely to the form or the universal, but to the entire being (*esse*) of each singular, such that God has knowledge of singulars otherwise inaccessible to us. Inasmuch as God’s gratuitous generation of *esse* from nothing is the precondition for all created agency (see, *In Sent.*, II.d.1, q.1, a.4)—and I have contended that creation in this sense is necessary for the difference intrinsic to all causality—then a space is open to see in the apprehension of truth space a genuinely creative human contribution, irreducible to *techné*—ancient or modern—which nevertheless does not violate the priority which should be accorded to the receptive, contemplative “moment” within the creature’s being and knowledge, does not fail to presuppose (and thus imitate) nature, and thus does not deny the “being-in-itselfness” of the object. Indeed, D.C. Schindler contends for something along these lines, in very different terms, in his development of Balthasar’s conception of truth as *gestalt*. For Miner, then, the problem is not that secular modernity, paradigmatically represented by Bacon,

- Descartes, and Hobbes, connects knowing and making, but rather that “its particular mode of connecting the two ultimately serves to deny the dignity of making itself” because they “engage in the willful detachment of human ratio from divine ratio...preserving the constructive character of reason while severing construction with connection to recollection and illumination.” See Miner (2004), pp. xv, 3, 127. See also D.C. Schindler (2004), pp. 163–254, esp. 245–250.
- 39 In previous chapters, we have noted how science often invokes metaphors to perform conceptual heavy lifting where the physics and metaphysics are lacking. Here I mean to call attention to the way that metaphor is intrinsic to theoretical language at a more basic level. See Soskice (1985), pp. 97–117.
- 40 See Grant (1986), pp. 12–34 and D.L. Schindler (2011), pp. 383–429.
- 41 See, *In Boeth. de Trin.*, V.3, resp.
- 42 See D.L. Schindler (2011), pp. 396–397. See Descartes, *Discourse on the Method*, CSM I, 121, AT VI, 21; *Principles of Philosophy*, I, 45–46, CSM I, 207–208, AT VIII A, 22.
- 43 Because synthesis on this ontological basis can only proceed additively and can never arrive back at the original whole, it is an insufficient reply to the problem simply to regard the abstraction as “disciplinary” or merely “methodological.” The decisive ontological move will have already been made in the original conception of the abstracted part and in the act of abstraction itself.
- Note, then, that it is irrelevant whether the researcher here, in conceiving the limit characteristic of abstraction to be a matter of simple closure, understands this closure in a (would-be) purely disciplinary sense that would anticipate an eventual releasing of that closure in another context. The crucial question, rather, bears on how one conceives “eventual releasing of closure.” The crucial question, in other words, is whether, in his merely strategic abstraction of an entity, the researcher takes it to be open *here and now*, *from within its very limit as abstracted*, to a “more” *implying an order other than that of the entity itself*, and whether this “more” thus *makes a “difference” to the entity already in its nature as abstracted, even if the abstraction is only for disciplinary purposes*. Failing this, we are left with what will be merely a swinging back and forth of reduction and dualism in the relation between the abstractions characteristic of the various disciplines (D.L. Schindler 2011: 399–400).
- 44 In previous chapters we have analyzed Aristotle’s understanding of act and its effect on the notion of boundary or limit, particularly with respect to place, sensation, and time. In all three cases, whether the terms distinguished by the limit are the contained and containing body (place), the percipient sense and its object (sensation), or past and future (time), the boundary is that through which the two poles are fused and distinguished in a single actuality. Of course, this reflects the pride of place which the act–potency distinction holds within Aristotelian metaphysics.
- 45 For a quintessential example of abstraction conceived in nominalist terms, see Locke (2004), II.11.9.
- 46 Left unqualified, this too risks reductionism, not in the ordinary nominalist and mechanistic sense of reduction to an aggregation of parts, but rather in the opposite direction, that of dissolving the ontological identity of the multitude of beings into that of the whole. (This problem becomes evident in his later work on the implicate order.) Bohm attempts to address this problem here with the notion of relative autonomy, but it is an open question whether this is sufficient to safeguard both the unity of the whole and the ontological identity of individuals within it. One may suggest, as indeed D.L. Schindler has done, that Bohm lacks an adequate conception of *esse* which would clarify this problem (1982: 315–327).

- 47 See Husserl (1970), pp. 103–174 and Sokolowski (2000), pp. 146–155.
- 48 Does that which knows itself in part, not know itself in part? But it is absurd to say, that it does not as a whole know what it knows. I do not say, it knows wholly; but what it knows, it knows as a whole knows. When therefore it knows anything about itself, which it can only know as a whole, it knows itself as a whole (Augustine, *De Trin.*, X.4.6).

- 49 See especially Polanyi (1983), p. 39.

Physics and chemistry, on the other hand, include no knowledge of the operational principles of machines. Hence a complete physical and chemical topography of an object would not tell us whether it is a machine, and if so, how it works, and for what purpose. Physical and chemical investigations of a machine are meaningless, unless undertaken with a bearing on the previously established operational principles of the machine.

- 50 But the hierarchic structure of the higher forms of life necessitates the assumption of further processes of emergence. If each higher level is to control the boundary conditions left open to it by the operations of the next lower level, this implies that these boundary conditions are in fact left open by the operations going on at the lower level. In other words, no level can gain control over its own boundary conditions and hence cannot bring into existence a higher level, the operations of which would consist in controlling those boundary conditions. Thus the logical structure of hierarchy implies that a higher level can come into existence only through a process not manifest in the lower level, a process which thus qualifies as an emergence (Polanyi 1983: 45).

- 51 Joe Sachs offers several Aristotelian arguments for why, “in order to speak truly of animals, we must speak of them in the language of soul” (2004: 16). One of these (influenced also by Leibniz) is from the unity of perception, which can be found “nowhere in the complexity of parts external to parts; it can only belong to something that is one and simple” (12), to a kind of unity, in other words, that mechanism as such cannot account for. Another is from the self-motion of animals.

The necessary structure of any self-mover is AB, where B is an organized body capable of acting as a whole, and A is the higher being-at-work of the perceiving, and hence imagining and desiring, soul, which can initiate motion.

Again a mechanistic sort of explanation fails, and the recognition of that failure requires the discovery of a more adequate kind of explanation. One of Aristotle’s objections to the claim that the soul is just a subtle body, already and always in motion, is that it cannot explain why the animal brings itself to rest (406b22–406b24; *Physics* 255a6–255a9). A billiard ball can make another billiard ball move, but it cannot make it stop at an intended place. That is just what self-motion means, though: the power to initiate a particular motion to an intended goal. And that is what we observe in animals...Many post-Cartesian philosophers decide that, in the world of bodies, all motion is completely determined for all eternity, so that our sense of being able to originate our own motion by choice must be illusory. Again, as with perception, the choice of a certain kind of explanation has led some people to declare that the thing that was to be explained is impossible. Immanuel Kant, to save the possibility of human freedom, locates its source in a supersensible world, since the world of experience must be an inflexible realm in which everything is determined. But the world I experience does not come laden with Cartesian and Kantian assumptions, and in it every bird and every ant refutes the claim of causal determinism by starting and stopping itself (Sachs 2004: 18).

Determinism, as David Bohm points out, is not essential to mechanism, but Sachs’ point about the inadequacy of mechanistic explanation of action remains, as does another crucial aspect of his argument that is similar to ours: that the explanation fails, in part, because it fails to be adequate to experience. See Sachs (2004), pp. 4–22.

52 Polanyi continues,

The relation of a comprehensive entity to its particulars was then seen to be the relation between two levels of reality the higher one controlling the marginal conditions left indeterminate by the principles governing the lower one (1983: 55).

53 See, e.g., Portmann (1967), pp. 202–221. Portmann proposes a “semantic” theory of animal form, in which animal form and form production are analyzed on the assumption that such form is “intended” for communication and is correlative to the interior lives of animals. Of course Portmann does not deny functionalist and evolutionary explanations, only that such explanations exhaust, or even adequately approach, the intelligibility of animal life.

54 As Hans Jonas writes, “Apart from the ontological difficulty, there is a logical absurdity involved in epiphenomenalism in that it denies itself the status of an argument by depriving any argument of that status” (2001b: 129).

55 Our ontological response to this problem concurs with Davidson’s conclusion that total failure of intelligibility is unintelligible, and the claim that form and *esse* remain operative in all theoretical formulations precludes our thinking of the relation of paradigm to world in dualistic terms as one of scheme to uninterpreted content. This, Davidson rightly stresses, is a residual dogma from empiricism.

56 Grant continues,

The result of this is that when we are deliberating in any practical situation our judgment acts rather like a mirror, which throws back the very metaphysic of the technology which we are supposed to be deliberating about in detail (1986: 32–33).

57 See n. 39.

58 For a catalog of the metaphysical commitments of orthodox neo-Darwinians, see Cunningham (2008).

59 In Chapter 5, we saw an analogous form of argumentation in Marc Ereshefsky’s opposition to Kitcher’s pluralistic concept of “species” not because it is false but because it falls outside the bounds of evolutionary biology. See Ereshefsky (1998), p. 365. For further analysis of this widespread tactic, see Cunningham (2008), pp. 106 ff.

60 As Stephen R.L. Clark puts it, “If Darwinism is substantially correct we cannot long be thinking that the Truth is itself worth knowing, nor that we have much chance, by whatever methods, of discovering it” (2000: 17). See the previously cited essay by John Dewey for a celebration of the demise of this concern. Dewey (1979), pp. 305–313.

61 See MacIntyre (1990), pp. 118–120. The mounds of evidence which Darwin marshaled against the notion of “special creation”—the resemblances between similar species, the geographic isolation of variations, the arguments from inutility and redundant organs, and so on—can all be seen as attempting to fulfill these criteria, though I would not wish to suggest that Darwin subscribed to MacIntyre’s philosophy of science. Nor would I wish to suggest that Darwin was successful by these criteria, since the concept of “creation” which Darwin took as his foil was a projection of his own theory, rooted in a theological extrinsicism which he shared with his opponents, and was not really creation at all.

62 Kuhn’s remark here is reminiscent of the scholastic appeal to *convenientia*.

63 We have seen that mechanical function only succeeds by reference to *things* irreducible to mechanism. The problem with mechanistic ontology is that it ultimately eliminates the “sake” in the light of which functionality makes sense.

64 See Wilson and Ruse (1989), pp. 50–52 and Sommers and Rosenberg (2003), pp. 653–668.

- 65 The sophistry of Dawkins and the New Atheists marching under the Darwinian banner lead one to wonder. See David Bentley Hart's review of the New Atheism in *First Things*: "Believe it or Not," at <http://www.firstthings.com/article/2010/04/believe-it-or-not>.
- 66 "Whoever sees more of the truth is more profoundly right."

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Epilogue

Evolution of the Last Men

And what if we do not want to see? Desire is an ineradicable ingredient in all vision. This is a consequence of the subjective entailment of memory and will in intellect, the objective entailment of beauty and goodness in truth, and the contemplative structure of reason itself, the fact that thought is—ontologically speaking—a *response* to the prior self-communication of being. Christianity has thus always maintained, along with Plato and the whole classical tradition, that implicit desire for truth, beauty, and goodness—for God—is a constitutive dimension of human existence, its defining mark, the very core of the *imago dei*. “All men by nature desire to know,” wrote Aristotle (*Metaph.*, I.1, 980a1). And St. Augustine, as usual, puts the matter most powerfully: “You have made us for yourself, O Lord, and our hearts are restless till they rest in thee” (*Conf.*, I.1).

Darwinism’s most daunting challenge to the truth of Christianity lies not in its claim to have replaced the hand of God with natural selection or to have superseded the doctrine of creation as theory. We have seen that Darwinian theology never really reaches creation and that creation can coexist with, and is indeed the precondition for, whatever evolution may turn out to be. Rather, Darwinism’s greatest challenge to the truth of Christianity is its living affront to the conviction that the desire for truth lies deep within us and the active role it plays in extinguishing it. “Man has always lost his way,” wrote Chesterton.

But in the bleak and blinding hail of skepticism to which he has now so long been subjected, he has begun for the first time to be chilled, not merely in his hopes, but in his desires (Chesterton 1994: 53).

The “universal acid” of Darwinism has a positive stake in killing off those desires and, thus, eliminating what is most human in us, lest they reveal that there is more in heaven and on earth than is dreamt of in Darwinian theory. So, under the tutelage of

Darwinism, modern man has not only lost his way, he “has lost his address,” and it is none too clear that he any longer has much interest in finding it (1994: 53).

Every age gets the atheism it deserves. The late nineteenth century gave us Nietzsche, who joyfully announced the Death of God and then shuddered at its profundity. The “Darwinian century” has given us Nietzsche’s last men: Dewey, reveling in the death of all the great human questions; Simpson, confusing education with ignorance and urging us to ignore without first bothering to learn the answers that our ancestors gave to them; and Dawkins, who evidently has trouble distinguishing thinking from advertising.¹ These are three of the more prominent examples, but the number of the last man is legion. “His race is as ineradicable as the flea-beetle,” Nietzsche wrote; “the last man lives longest” (Nietzsche 1966: 17). The fact that Dawkins’ philosophical and theological arguments are so atrocious, not to put too fine a point on it, and that he and his ilk are so brazenly *uninterested* in whether the God that consumes them is even God, leads one to doubt whether they have ever convinced anyone who was not already desperate to have their opinions confirmed by the authority of “science.” And it leads one to wonder whether the religious and sociological purpose of Darwinism is not merely to provide “a source of solace and comfort”—a tepid “intellectual fulfillment”—to the sort of atheists who simply cannot be bothered (Dawkins 1996: 6).

Despite persistently opposing his theory to “special creation,” Darwin nevertheless declined to be the Dawkins of the nineteenth century.² (He left that job to Huxley.) This would no doubt lead more intellectually sober Darwinians to draw a distinction between Darwinian “science” and Darwinian “ideology” and to conclude that there is merely an accidental relation between the limited aims and tentative conclusions of this science and the ontological stupefaction which it apparently induces in those caught up in delusions of Darwinian grandeur. They have a point. Certainly there are better and worse versions of Darwinian science. Certainly there are many evolutionary biologists who are simply unconcerned with cosmic questions or theological polemics. Certainly there are many who have managed to reconcile their Darwinism with personal fideism and piety, though this is more the logical conclusion of Darwinism than its antithesis, and even Dawkins—*especially* Dawkins—is not immune from it. Certainly Darwinism has spawned serious men and women of formidable intellect with considerably greater gravity than many of its self-appointed prophets. Theodosius Dobzhansky, Richard Lewontin, and Barbara McClintock all come to mind. But Dobzhansky was a “Russian” (Ukrainian) and an Orthodox Christian who emigrated to America in the 1920s, all of which makes Whiggish banality almost an ontological impossibility, and even he never quite managed to succeed in integrating these poles into a coherent vision of reality.³ Lewontin is a Marxist as well as a Darwinian. Whatever else that means—besides an earnest and flawed sense of justice—it means a keen capacity for seeing through and deeply questioning Darwinism’s most basic philosophical commitments.⁴ And McClintock was a maverick in her own right who had to spend many years toiling in relative obscurity for what she saw, though in her desire to account for it, she was driven to the East in search of that mystery exiled from the West.⁵ The fact that Darwin himself declined to think deeply about the theology he so consistently opposed suggests that such cases are more the exception than the rule. Nevertheless, the principle cause of this stupefaction is not moral turpitude or subjective motive but ontology.

Darwinism is the culmination of the “artificial” ontology commenced with the birth of modern science, an ontology which reduces being to history, organisms to artifacts, and truth to function. It is an ontology that unmakes our capacity to see and to think, replacing both with technique, so that “the creature itself grows unintelligible” (*Gaudium et Spes* 1965: 36). Dewey celebrated this fact, and Gregory Stock exemplifies it perfectly in his posthumanist manifesto.

Over the past hundred years, the trajectory of the life sciences traces a clear shift from description to understanding to manipulation...In the first half of the twenty-first century biological understanding will likely become less an end in itself than a means to manipulate biology. In one century, we have moved from observing to understanding to engineering (Stock 2002: 7).

I rather doubt that Stock actually means to say that biology is no longer concerned to understand organisms, but of course this is exactly what we have seen: the contemporary life sciences can scarcely *see* the phenomenon of life as lived. This is because the trajectory from understanding to engineering is not simply the result of the empirical and experimental successes of modern biology. It has been inscribed into our understanding of nature since the seventeenth century. The ontological reduction of nature to art was thus always already biotechnology waiting to realize itself, which means that modern science at its core is *ontologically eugenical*. This is in spite of the fact that science itself has helped give the lie to the racist fantasies that temporarily discredited eugenics and the fact that there are many decent people working within science and within the Darwinian tradition, people such as Dobzhansky and Lewontin, who have forthrightly opposed eugenical practice. Eugenics follows as a matter of course from the reduction of being to *instrumentum* and the conflation of knowing and making, which comes, as Stock’s remarks attest, with a built-in inducement *not* to think and to remain ontologically unserious.

Thanks in no small measure then to the Darwinization of everything, we now live in a *culture* that is ontologically unserious, in which the last men openly fantasize of engineering the last men, “seizing control of our own evolution,” altering the basic genetic constitution of ourselves and our posterity and of thus completing, once and for all, “the triumph of art over nature” (Stock 2002: 2; Bacon 2000: I.117). Not all Darwinians indulge these posthumanist and transhumanist fantasies—most probably do not—and many of these fantasies, thank God, will prove to be merely fantastic. But they are not foreign to the essence of Darwinism; indeed, they are a tacit imperative of “this view of life” that no Victorian sentimentalism, and apparently not even unspeakable atrocities once committed in their name, will long succeed in staving off.⁶ “Breeders habitually speak of an animal’s organization as something plastic, which they can model almost as they please,” says Darwin at the outset of his great project (1991: 22). Within a generation that sentiment would be applied to us. It matters little that the breeders are now quasi-independent contractors answering to market demand rather than agents of the state and its master race fantasies. And fantastic or not, it is already the case and more so every day that we know how to do things to ourselves and to our descendants that we do not know how, or do not much want, to think about. Mere moralism, Stock rightly insists, will be impotent against this fate,

which already means we are not so much its masters but its servants.⁷ “We have spent billions to unravel our biology, not out of idle curiosity, but in the hope of bettering our lives. We are not about to turn away from this” (Stock 2002: 13).

Thus, we see what is most deeply at stake in the endeavor to recover creation, and a cosmos large enough to include *us*, is the future of the *humanum*. Joseph Ratzinger poses our choice in the starkest possible terms.

For each of the two alternatives of thought that we have described there is an alternative way of living. The fundamental Christian attitude is one of humility, a humility of being, not a merely moralistic one: being as receiving, accepting oneself as created and dependent on “love”. In contrast to this Christian humility, which acknowledges existence, is a strangely different kind, a humility that despises existence: in themselves humans are nothing, naked apes, particularly aggressive rats, though perhaps we can still make something of them...The doctrine of creation is, therefore, included within the doctrine of redemption. The doctrine of redemption is based on the doctrine of creation, on an irrevocable Yes to creation. The fundamental opposition set up by modernity between loving and making turns out to be identical with the opposition between trusting being and doubting being (the forgetting of being, the refusal of being) (Ratzinger 1995: 99–100).

There is not much reason for optimism that we will opt for the more human course. In our culture’s desperation to erase the memory of God, we do it the only way we can—by eradicating the traces of his image within ourselves. The challenge of Darwinism, as the culmination of the technological ontology of modern science and the authoritative *mythos* of technological culture, is that after a while it renders the image unrecognizable. Inasmuch as this is already the case, there is probably not much we can *do*, and certainly not much a mere *book* can do, to prevent our Darwinian culture from meeting its self-appointed fate. And yet, though there may be little reason for optimism, there is true reason for hope. The God who “reveals man to himself” in Christ “and makes his supreme calling clear” does not offer a “source of solace and comfort”—contrary to Gould—save through crucifixion: “*Ecce homo*” (John 19:5). But precisely in *this* image of the love that made us is revealed the deepest truth of ourselves and of the world, and this truth opens a window onto a horizon where neither utility, nor function, nor success, nor failure, nor fate—technological, Darwinian, or otherwise—has the last word. And if these are not the last word, then they need not be the only word, even now, though we walk through the valley of the shadow of death and indeed revel in the shadow, unable or unwilling to step out into the light. Inasmuch as contemplation is also action, inasmuch as the Word at the Beginning remains nearer to us than we are to ourselves, though we sink into the pit, inasmuch as this Word is also Act and this act is also Love, simply *knowing* this truth *is* doing something. And thus the truth shall set you free.

Notes

- 1 Richard Dawkins’ atheism has become a cleverly marketed cottage industry spawning t-shirts, bumper stickers, and an advertising campaign, partially funded by Dawkins himself, to display atheist slogans on London bus adverts. (In a quintessential example of Dawkins’

“memes”, a similar campaign has since popped up in Washington, DC, and elsewhere.) In London’s *The Guardian*, Dawkins is quoted as saying, “This campaign to put alternative slogans on London buses will make people think—and thinking is anathema to religion.” See the October 21, 2008 edition of *The Guardian*. <http://www.guardian.co.uk/commentsfree/2008/oct/21/religion-advertising>.

- 2 See Desmond and Moore (1991), pp. 622–637.
- 3 See Dobzhansky (1971), especially his discussion of Teilhard, pp. 319–348.
- 4 See, e.g., Lewontin (1997). Though even Lewontin is not immune from the kind of dogmatism we have described in these pages.

We take the side of science in spite of the patent absurdity of some of its constructs, in spite of its failure to fulfill many of its extravagant promises...in spite of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a prior commitment to materialism...Moreover that materialism is absolute, for we cannot allow a Divine foot in the door (Lewontin 1997, cited in Cunningham 2007: 106).

- 5 See Keller (1983), pp. 197–207.
- 6 See Keller (1992) for an account of how Nazi atrocities temporarily discredited international eugenics programs which were then reborn under another name.
- 7 The last man “makes everything small,” including his own soul (Nietzsche 1966: 17). Even the glory of traditional martyrdom is denied him it seems; his is a death by a thousand bureaucratic paper cuts. One might therefore think him incapable of great goodness or great wickedness. But Stock draws upon a kind of emerging systems theory, in a curious inversion of eighteenth- and nineteenth-century theodicy, to show us how such ominous results may arise as an unintended consequence of isolated heterogeneous pursuits.

[T]he reshaping of human genetics and biology does not hinge on some cadre of demonic researchers hidden away in Argentina trying to pick up where Hitler left off. The coming possibilities will be the inadvertent spinoff of mainstream research that virtually everyone supports... Researchers and clinicians working on in-vitro fertilization (IVF) don’t think much about future human evolution, but nonetheless are building a foundation of expertise in conceiving, handling, testing, and implanting human embryos, and this will one day be the basis for the manipulation of the human species (Stock 2002: 5).

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