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Earliest Italy

An Overview of the Italian Paleolithic and Mesolithic

Margherita Mussi

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An Overview of the Italian Paleolithic and Mesolithic

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For Silvio and Luisa Mussi,

my parents

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Foreword

The richness of the Italian Paleolithic has never been doubted; neither has the environmental diversity of a country that stretches from the Alps almost to Africa. What instead has been lacking is a study that truly puts the richness and the diversity together. Now we have, in this magnificent overview by Margherita Mussi, the marriage of archaeological Paleolithic data with the detail of the paleoenvironmental framework. Moreover, for the first time since Raymond Vaufrey's 1928 book *Le Paléolithique italien*, the full sweep of the period is presented. The value of this book as a meticulous and comprehensive survey of all the pre-Neolithic archaeology of one country will establish its place in the Paleolithic canon.

There will undoubtedly be some surprises for readers who have not closely followed recent work in the Italian Paleolithic. The quality of the Lower Paleolithic open sites excavated to the highest standards now provides one of the best examples of early hominid land use anywhere in Europe. Italy's Neanderthals emerge as some of the most enigmatic—and clever—peoples, adapted to terrains that defeated their northern contemporaries. Such resolute existence in the changing circumstances of climate and resources stands as a marked contrast to the slender traces of the Earliest Upper Paleolithic throughout the country. The Italian data confirm the view that if such blades and bone tools are indicative of the arrival of anatomically modern humans, then an assumption of immediate advantage is hard to sustain. Instead, and in line with the chronological overlap elsewhere in Europe between Neanderthals and Moderns, we must finally abandon the simplistic concepts of progress and instead turn to a fuller appreciation of society and environment for an explanation. This hiatus emphasizes the Gravettian fluorescence that followed with art and status burials. The evidence that Mussi draws together provides us with a systematic insight into the complexities of interaction prior to the last glacial maximum. Finally, I applaud her decision to break the Holocene boundary and end her overview with the Mesolithic. If ever an international conference was needed to bring Europe into line with the rest of global prehistoric studies by abolishing the term Mesolithic, then this book points to the country where it should be held.

Beyond these surprises, Mussi's overview of the Italian Paleolithic adds to the international project to explain rather than just describe the patterns in our data. As fellow members of the coordinating committee of the European Science Foundation's network on the Paleolithic occupation of Europe, we were able to piece together with other colleagues the long-term trajectories of change and unravel the processes involved in colonization and adaptation. Many times in our discussions, the Italian data served to remind us of the diverse skills and competence of the earliest occupants of the continent. The case was compelling for several reasons. Italy forms one of those rare natural units for the study of small-scale mobile populations. The Alps, with or without ice sheets, provide a barrier while to the east and west geographical bottlenecks occur. The sea rose and fell but peninsula status was always maintained. Within Italy tectonic events have produced, as Mussi describes, a set of finely differentiated mosaics of topography, resources, and vegetation. Compared to the broad, flat sweep of the mammoth-steppe to the north of the Alps, the ecological opportunities for hominids in Italy were always very different. The scale is therefore right for tracking and explaining successive solutions to climatic change and the affordances of the landscape. It is also right for interregional comparison in what Luis Raposo, another ESF network member, has identified as the three Mediterranean peninsulas—Iberia, Italy, and Greece. The contrasted Paleolithic prehistories in these three regions can in turn be contrasted with North Africa, the Levant, and northern and central Europe. Here then lies the opportunity to finally dispel the idea that a homogenous Paleolithic world existed, one which was driven solely by resources and efficient calorie intake. Instead, the picture both within regions (such as Italy) and between them is one of diversity. While we must be careful not to mimic the contemporary European call for "strength through diversity," at the same time we see in works such as Mussi's the importance of detailed intraregional surveys. Only these can correct the misrepresentation of Paleolithic society as simple and similar wherever common types of stone tools were made.

It is appropriate that at the start of the millennium we have a book by Margherita Mussi that puts the Italian Paleolithic record firmly at center stage. No longer will it be possible to claim difficulties of language or the barrier of Laplacian typology to incorporating this crucial evidence into our understanding of the deep-time past. The timing, direction, and pattern of colonization of Italy impinges on our wider understanding of these processes at a European and Asian scale. The occupancy of the country remains a major avenue for future research. Was it like the "now-you-see-it, now-you-don't'' volcanic island of Isola Ferdinandea which came and went off Sicily in 18311 An ebb and flow governed by cyclical climatic effects? Or did hominids possess the skills and societies from 600,000 years ago when the settlement evidence is widespread to make this Mediterranean country one of Europe's long-term refugia?

Such questions are the lifeblood of future Paleolithic work; in order to answer them, we need firm foundations. In Margherita Mussi's overview we have both.

CLIVE GAMBLE
University of Southampton
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Preface

My colleagues and friends know how utterly fascinated I am by Italy, whether because it happens to be my country, or just because it is Italy, that little stretch of land of great contrasts and immense culture. Not surprisingly, in the next chapters my focus is on Italy, an ever-changing stage on which the ebbs and flows of prehistoric human population are scrutinized.

This avowed bias, however, is not without any scientific basis. The Italian peninsula is situated in an interesting geographical position, severed as it is from the rest of Europe by a major natural barrier, the Alps, while the sea comprises the rest of its natural frontiers. This sense of seclusion is properly expressed in the language: the countries of Europe and the rest of the world are either *Oltremare,* ‘‘over the sea” or *Oltralpe,* “over the Alps.” However, the seclusion is not a strict one. Even ruling out journeys across the seas (which scarcely happened during the periods in which I am interested), narrower or wider natural passages were always open to population movements between the southernmost extensions of the Alps and the shores of the Mediterranean. As a consequence, the Italian territory is both well-defined in a geographical sense and continuously open to communication. Of additional value are the sharp altitudinal gradient of most of the territory (Italy is basically made up of high mountain ranges in the middle of the Mediterranean) and the peculiar island environments of Sicily and Sardinia. Examples of most types of natural environment that develop at middle latitudes are available within short distances. Therefore, Italy is an ideal case study for many topics in the study of human evolution.

However, I would not have started the project of attracting wider attention to Italian prehistory without much encouragement from ‘‘over the Alps” and ‘‘over the sea.”I would first mention Olga Soffer, David W. Frayer, and F. C. Clark Howell. Ofer Bar-Yosef was, in himself, an example of how to link together the Old World and the New World. The idea developed during the years following a joint research project in Abruzzo with David Lubell, while climbing the mountains of central Italy and endlessly discussing circum-Mediterranean problems. I started writing this book when the Network of the European Scientific Foundation, “The

Paleolithic Occupation of Europe," was established and I became involved in an ongoing capacity. While I cannot mention everybody who participated, I would like to mention that the chairman was Gerard Bosinski and that my colleagues in the Standing Committee were Catherine Farizy, Clive Gamble, Lars Larsson, Nicholas Praslov, Luis Raposo, Manuel Santonja, and Alain Tuffreau. The friendly and stimulating atmosphere of the meetings will not be forgotten by the participants, thanks to a great extent to Wil Roebroeks, who was the Secretary of the Network. His energy and enthusiasm never failed throughout the years. This book would certainly have been different without those exciting meetings. Later, on the other side of the Atlantic, Jacques Cinq-Mars generously shared with me his vast knowledge of Beringia and northern steppes, helping me to put the Mediterranean environment into a wider Eurasian perspective.

I am also indebted to the colleagues who work at institutions closer to me in space (namely, in Rome), both in archaeology and in the environmental sciences. I would mention countless discussions with Anna Paola Anzidei, Antonia Arnoldus-Huyzendveld, Lucia Caloi, Patrizia Gioia, Carlo Giraudi, Maria Rita Palombo, Daniela Zampetti, and with Rita Melis, too, within easy reach in Sardinia, and who introduced me to the complex environment of that most beautiful island.

To write a book in English was also an interesting challenge in itself. It is not just a matter of vocabulary, grammar, and the like. The structure of English is quite different from the sumptuous phrasing of my native tongues. English is sharp and clear-cut, and any hidden doubt or inconsistency quickly becomes self-evident. I enjoyed it. However, my manuscript had to go through much editing and polishing, for which I am indebted to David Lube11 for a preliminary draft and to Angus Quinlan for a full-scale revision. At this point, I also mention L. R. Owen's *Dictionary of Prehistoric Archaeology* The copy presented to me by Nicolas Conard was an invaluable gift that helped me with the tables and chapters.

Some technicalities had to be solved, however. *Alces alces* is called "elk" in Europe and "moose" in North America, where "elk''is the common name of *Cervus canadensis,* which is close, in turn, to *Cervus elaphus,* the European red deer. I stuck to the European style but often quoted the scientific name to avoid misunderstanding. *Equus hydruntinus,* the little horse of the steppe environment, is often mistakenly referred to as "wild ass" in the literature. It is an equid, not an asinid, and I call it "hydruntine horse" (Italian: *cavallo idruntino)* as opposed to *Equus caballus,* the common horse. Lithic industry is even more problematic: because of the widespread use of the so-called "Laplace system" in the Italian record, information and counts of the *débitage* are often omitted. I also had to adapt this typological method, translating it, so to speak, into a type list for a wider audience, When making references to absolute dates, I chose to quote in full the radiocarbon dates, and to round the other ones, usually related to earlier periods and much less precise. I consistently made use of uncalibrated radiocarbon dates, quoted as "bp",and a full discussion of BP/bp dates is provided in Chapter 7. In the Bibliographic references, it will be noted that in Italian, as well as in French titles, the use of capitalization is rather restricted when compared to the English style. Furthermore, sometimes publishers are not mentioned. This is when I made use of informal but widely circulated booklets (such as guides to scientific excursions during congresses, and the like) which do not always comply to formal bibliographic rules.

Credit must be given to Lucio Narisi (drawing) and to Filiberto Scarpelli (photography) for much of the final elaboration of illustrations, and for producing them in an electronic format. They each always met my endless demands with good humor, patience, and real expertise. Several colleagues also provided original illustrations that greatly enhanced the final quality of the book. For drawings and photos, I wish to thank Anna Paola Anzidei, Pierre Bolduc, Jacques Cinq-Mars, Vincenzo Formicola, Patrizia Gioia, David Lubell, Stefania Marroni, Maria Palombo, Massimo Parotto, and Marcello Piperno, Shawn Biondi, Ivana Fiore, Riccardo Manni, Esmeralda Remotti, and Antonio Tagliacozzo all helped in different ways in preparing and assembling figures. Then, when everything seemed finished to me, the manuscript was further revised by the editorial staff at Kluwer Academic/Plenum Publishers. I wish to thank them for all of their patience and work, which greatly enhanced the final result.

I also wish to express my gratitude to Ahmed, my husband, and to Flaminia and Roble, our daughter and son, who lovingly supported me during the months I spent doing research and then sitting in front of the computer. They made my task easier. Last, but not least, Italian culture being so deeply rooted in family values, I dedicate this book to the memory of my parents, Silvio and Luisa Mussi, my Italian root and my root from *Oltralpe.*

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Acknowledgments

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Contents

Chapter 1

The Land and the Scientists

1.1. THE GEOGRAPHY OF ITALY

Italy might well be, in the poet's words, "the land where the orange tree blossoms;" nonetheless, in a geographical view, this Mediterranean peninsula is rooted in central Europe (Bethemont and Pelletier 1983). In fact, while in the south, Sicily reaches 37°N, the latitude of Algeria, Tunisia, and Syria, to the north, at a distance of 1,100 km, it extends up to the Alps to 47°N, culminating at 4,810 m asl with Mont Blanc, the highest peak of Europe. The unique characteristics of this mountainous stretch of land in the center of a marine basin are better expressed by numbers: within an area of 300,000 km^2, there are 125,000 km^2 of hills, and 100,000 km^2 of mountains, encircled by some 9,000 km of marine coasts. A few more words are better spent to illustrate this geographical paradox.

1.1.1. A Brief Description

Italy lies in a zone of extreme tectonic activity. At a recent level, this is reflected by the earthquakes that, unfortunately, often affect it and by the volcanoes, including active ones, that make up part of the landscape. At a geological scale, this is reflected by the orogeny of the Alps and the Apennines, which started during the Tertiary (Fig. 1.1).

The Alps, the major mountain range of Europe, extend as an arc from Passo di Cadibona, near Savona in the west, to Passo di Vrata, near Fiume in the east, and beyond the frontiers of Italy. Additional ranges develop eastwards toward the Danube. While most of the mountains east and south of the main watershed are Italian territory, other parts of the Alps belong to France, Switzerland, Austria, and Slovenia.

There is a natural connection between France and Italy, just south of the Alps and along the coast of the Riviera. At the opposite end of the Alpine arc, there is also a relatively easy passage from the Danube to the Adriatic coast, via the upper-basin of the Sava River. The central part of the chain, however, a formidable obstacle to the movement of human groups and individuals, does not seem to have been negotiated before comparatively late prehistoric times. The majestic

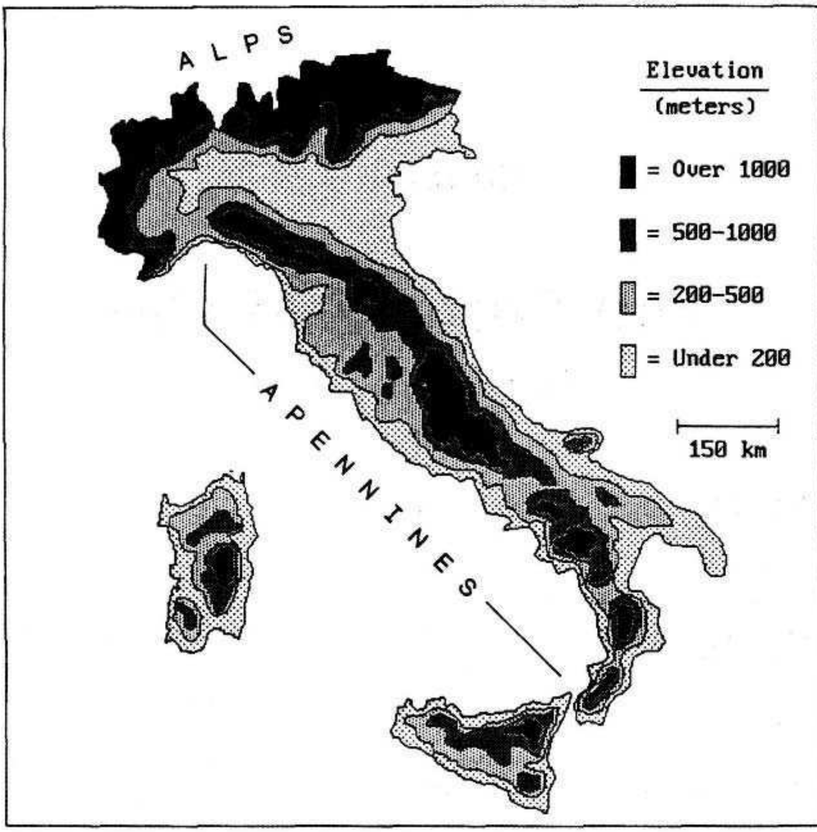

Figure 1.1. Italy. Sketch-map of elevations.

mountains, with many peaks above 3,000 and 4,000 m asl, effectively cut off Italy from the central part of Europe during most of the Quaternary.

The Apennines, the backbone of the peninsula, split it into a western or Tyrrhenian side and an eastern, or Adriatic, one. In the north, they begin at Passo di Cadibona, which is also the extreme extension of the Alps. To the south, they extend through Calabria to Sicily, where they continue, if differently oriented, with the Monti Peloritani, the Nebrodi, and the Madonie. The peaks of the Apennines from Liguria to Sicily are in the range of 2,000 m, the highest peak being located in the central part and in Abruzzo: the Corno Grande of the Gran Sasso, 2,914 m asl. The highest mountain outside the Alps, however, is a volcano: Etna in Sicily, which is active and the largest European volcano, with an altitude of 3,263 m.

The Apennines typically develop as parallel ranges in a northwestern to southeastern direction. It is relatively difficult to cross them straight from west to east, and the passes are between 700 and 1,000 m asl. Alternatively, some of the prehistoric movement took advantage of the prevailing and more or less north-south direction of valleys. While certainly an obstacle, the Apennines were never as impenetrable as the Alps.

Glaciers still cover 114 km^2 of the Alps but are very broken up, numbering nearly one thousand. In the Apennines, there is only the residual Calderone glacier on the Gran Sasso, which, only due to a particularly protected position, has not melted.

The rivers are conditioned by the sharp morphology and the many mountains. The longest, which is the Po, is in the trench between the Alps and the Apennines, reaching 652 km in length. Of the other rivers, only the Adige and the Tiber exceed 400 km in length, while the remaining ones are in the range of 200 km or less (Fig. 1.2). Due to the contrasted relief and the accentuated slope gradient over relatively short distances, many are quite rapid-flowing—the Po being the most notable exception, with a rather slow and even course. The rivers rising in the Alps are fed by melting snow, being low in winter and high in summer. In the northern Apennines, the regime of rivers is based on both rainfall and melting snow, with high evaporation rates in summer. Farther south, part of the rivers rise in the snow-covered mountains and have high levels after melting. However, summer aridity and evaporation are much more intensely felt, and there are marked seasonal fluctuations. In the same areas, smaller streams totally dry up in summer.

In a land of many mountains and of short rivers, alluvial plains cannot be extensive: they cover just 70,000 km^2, approximately one-fourth of the surface. Of this, 71 percent is accounted for by the wide and flat Po valley. If one adds the plains which are a natural continuation of the Po valley both to the north *(pianura venero-friulana)* and to the south *(pianura emiliano-romagnola),* it is quite clear that a flat landscape is a rarity outside this part of Italy (i.e., in most of the peninsula) and in the islands as well. The low-elevation limestone plateaus of southern Apulia, which are affected by extensive karstic phenomena, can be added to the short list of flatlands.

Many lakes found in the Alps are related to a morphology shaped by glaciers of the past. The largest, the lake of Garda in the pre-Alps, has a surface of 370 km^2, while in the Alps, there is also a belt of lakelets clustering between 1,800 and 2,800 m asl. In central Italy, most lakes are located in tectonic depressions, such as the now drained lake Fucino, or in the craters of inactive volcanoes. Coastal lakes also occur, often with brackish waters, as better exemplified in Sardinia. As a general rule, not many bodies of fresh water are located in the south.

The peninsula and Sicily split in two the Mediterranean, creating a western and an eastern basin. The Mediterranean is also known by different names following further subdivisions. West of Italy, the Tyrrhenian sea is an open and deep basin, with a bottom that rapidly plunges to minus 500 m, and reaches minus 3,371 m. Surface temperatures do not vary much during the year (25ºC to 14ºC), and tides are very limited. The Ionian sea to the south has similar characteristics and is the deepest part of the Mediterranean, down to minus 4,901 m. The Adriatic sea, which waters the eastern shores of the peninsula, is quite different. It is, on average, 200 km wide and less than 200 m deep over most of its area. It could be termed a large gulf instead of a sea. Surface temperatures seasonally vary from 22°C to 9°C.

Figure 1.2. Italy. Sketch-map of rivers.

Most of the present vegetation is man-made or man-modified, as Italy has been densely settled for thousands of years by peoples practicing agriculture. Deforestation was started in the late prehistory. The establishment of an urbanized way of life led to further modifications, including extensive land reclamation by Roman times and, since the Late Middle Ages in central and southern Italy, a thriving economy based on immense transhumance flocks and herds that had a strong impact on mountain and flatland environments. The normal vegetation at low altitudes would probably be a mixed evergreen oak forest. Beech forests still grow above 1000 m asl and would spread extensively if allowed to do so. They are replaced higher up by conifers, while grasslands at altitude are only to be found on the highest Alpine ranges.

1.1.2. Climate

The westerly airstreams that characterize the southern area of the temperate zone pass the latitude of Italy. They greatly influence its climate and convey most of the precipitation. Their effect, however, is contrasted in the north in winter by cold masses from northern and eastern Europe, and in the south in summer by the tropical high pressures that become established all over the Mediterranean.

As a rule, there are overall increasing temperatures and decreasing precipitation from north to south. But latitude is not enough to characterize the climate. The latitudinal gradient in temperature is enhanced in the north and contrasted in the south by altitude, as mountains are never far away from the temperate or warm coastal areas. A rugged topography is also important as far as precipitation is concerned: mountain ranges intercept air masses, including wet air masses, and rain and snow are not evenly distributed on either side of the mountains. As Italy is effectively split longitudinally by the Apennines, both a north–south and a west-east gradient exist. Precipitation is, on average, more than 2,000 mm per year on the Alps, only 700 mm on parts of Sicily, and c. 800 mm on the Tyrrhenian slopes compared to about 700 mm on the Adriatic side (Bethemont and Pelletier 1983). However, it is over 3,400 mm in the Riviera di Levante and on the Tyrrhenian coast, where the humid air masses from the west are blocked by the Apennine arc. Alternatively, in sheltered parts that happen to be "in the shadow" with respect to rain, such as the Tavoliere plain in Apulia, less than 500 mm per year are the rule.

To simplify, the Alps and pre-Alps experience cold winters with snow, and cool and moderately rainy summers. A semicontinental climate characterizes the Po valley, a trench between the Alps and Apennines, which traps in winter the cold and continental air masses from the north and east: winter and summer temperatures are much contrasted, with overall dry summers. In central Italy, much of the precipitation concentrates in spring and autumn, with the summer drought interrupted by storms, particularly in Tuscany and Latium. All over the peninsula, contrasted summer–winter temperatures are characteristics of the Apennine ranges, on which snow falls in winter irrespective of the latitude; snow is similarly a winter feature on the mountains in the islands. Contrasted seasonal temperatures are also experienced, if on a more reduced scale, on the eastern side of the peninsula, since the vicinity of the narrow Adriatic does not totally overcome the influence of the continental land mass of the Balkans. The western side of Italy fully benefits from the mitigating effect of the deeper and wider Tyrrhenian sea, and enjoys a more pleasant climate of Mediterranean type; it also intercepts more of the precipitation brought by the westerlies. In the south, a hotter and drier climate prevails; rains fall in winter, while in summer the tropical high pressures that cover the whole Mediterranean basin cause accentuated dryness.

This general pattern is subject to many exceptions, one of which results from cyclic or erratic irregularities in precipitation, coupled with heat waves and cold spells. Another is the result of peculiar regional characteristics, such as the altitude of Etna, which in winter allows for a persistent snow cover at a north African latitude; or the mitigating influence of large bodies of water, such as the lakes of the pre-Alps, whose shores, in view of the snow-capped Alps, enjoy a particularly mild climate.

The overall result is the lack of any extensive zonation and a patchy environment over short distances.

1.2. OUTLINE OF THE HISTORY OF ARCHAEOLOGICAL RESEARCH

The current status of whatever field of research is embedded in the history of studies. Paleolithic and Mesolithic archaeology are no exception. The development of modern archaeology in Italy is better understood in a historical perspective.

1.2.1. Precursors: Luigi Pigorini and the Formal Recognition of a New Science

Classic antiquity is in the beginning of many things in Italy. It is not always understood, however, that some interest for what would have been recognized a couple of millennia later as the Paleolithic, namely, the Lower Paleolithic, was displayed by the Emperor Augustus. The Roman historian Suetonius mentions that in his villa on the island of Capri, the emperor collected *immanium belluarum ferarumque membra praegrandia, quae dicuntur gigantum ossa, et arma Heroum* (Life of Augustus, 72); that is, Augustus gave instructions for recovering from somewhere on the island "very large bones of enormous animals and raptors, which are commonly said to be bones of giants, and weapons of heroes." The Acheulean site of Capri was rediscovered in the early twentieth century (see below and Chapter 3).

But not everybody was enlightened. For many centuries, flint implements with a pointed shape were believed to be the tip of lighting bolts—the *ceraunia*e—and were collected for their supposed magic virtues. Michele Mercati (1541-1593) had a different view. As Superintendent of the Botanical Gardens in the Vatican, he prepared a catalogue of the minerals, fossils, and ethnographic and prehistoric curios in the collections of Pope Clement VIII. Using for the fist time a comparative method and examining the items that had been brought from Asia and America to the court, he came to the conclusion that the *ceraunia*e had been produced by flint percussion before the time in which iron was used "for the foolishness of war:" "for the most ancient men pieces of flint had the function of knives" *(antiquissimis hominum segnienta silicum pro cultellis fuere)*. His *Methalloteca Vaticana,* however, was only published in 1717, after which belief in the *ceraunia*e was progressively dismissed.

In 1713, a Sicilian botanist, Father Cupani, also illustrated in his *Pamphiton Siculum* a flint implement, but there is no evidence that he recognized it as man-made. Giambattista Vico (1668–1744) should also be mentioned, as he maintained that humanity had evolved through three phases, the first of which preceded the invention of agriculture. The first steps toward a real understanding of prehistory, however, were only made after the publication in 1833 of the third volume of Charles Lyell's *Principles of Geology* This is the foundation of modern

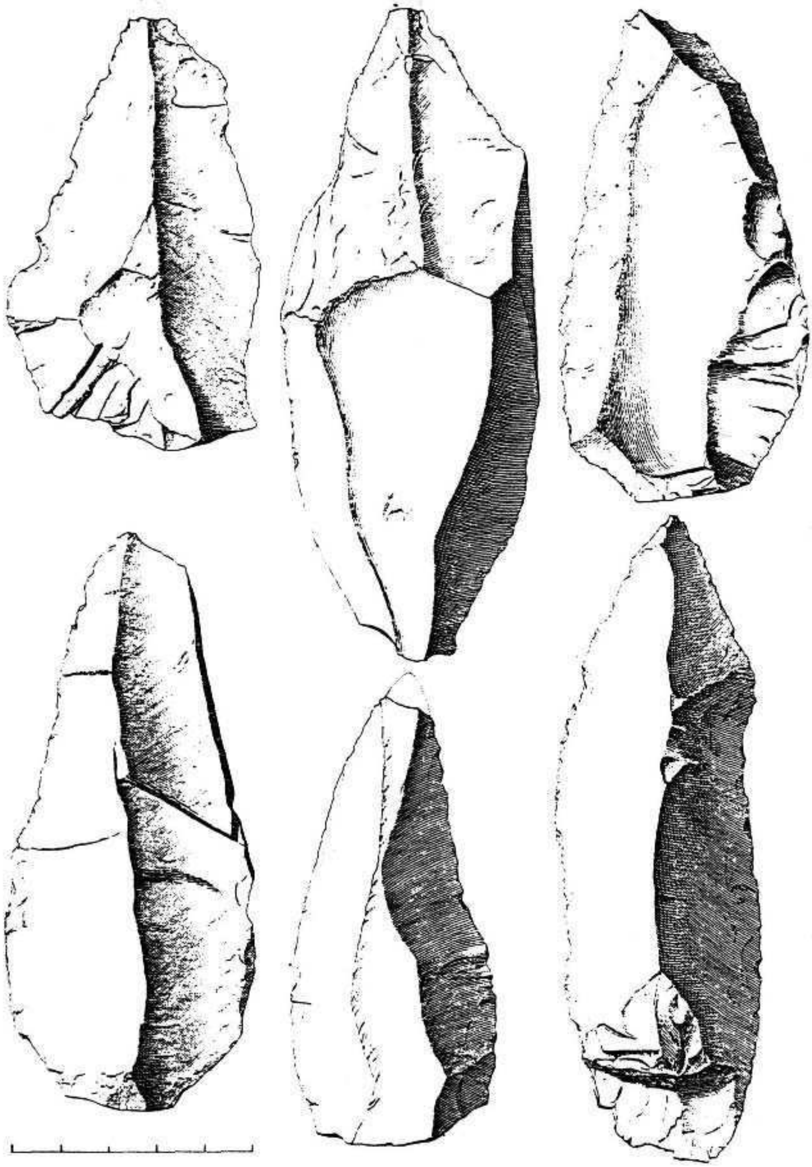

Figure 1.3. Grotta di S. Teodoro. The lithic industry, as illustrated by F. Anca in 1867 (scale in cm).

geology, with the assumption that phenomena of the past have the same origin as modern ones and that causes other than the Deluge must be looked for to explain extinct animals and early archaeological remains.

By then, a new interest for the most remote past was already felt by people with curious and open minds. Stanislas Bonfils was excavating in the Balzi Rossi Caves, close to the frontier with France. His finds are now at the Musée Municipal of Menton. L. Ceselli was surveying the outskirts of Rome. His collections have been preserved to the present and include a human femur, collected in 1846, near Ponte Mammolo, together with extinct fauna and flint implements that he recognized as man-modified. The femur of Ponte Mammolo is one of the earliest so far known in Italy (see 3.1.3 and 3.1.4). J. Boucher de Crèvecoeur de Perthes, who was later to become the founder of Paleolithic archaeology with his studies in the Somme valley of northern France, also traveled in Italy in 1810. He collected flint implements in a cave of Palo on the coast next to Rome.

By the middle of the nineteenth century, there was an acceleration in research. Prince Florestan of Monaco emptied the Grotta di Florestano at the Balzi Rossi, and sent the collections to Paris (where the latter ones were unfortunately lost). A. Salvagnoli Marchetti, L. Ceselli, and the geologist G. Scarabelli all gave evidence of "weapons of stone" from different parts of central and northern Italy. H. Falconer and F. Anca explored Sicilian caves and recognized that the flint implements discovered there had been knapped by prehistoric people (Fig. 1.3).

Further impetus was given to research following the translation into Italian of Darwin's *Origin of Species* by L. Salimbeni and G. Canestrini in 1864. It is not by chance that the book was first published in Modena, Rome only became the capital in 1870, after the Italian army entered into the city, which was ruled by the Pope. In the 1860s, the Vatican was still actively contesting the diffusion of evolutionary theories.

After the unification of Italy, a great impulse toward the organization of prehistoric research was provided by Luigi Pigorini, who started his career at the Regio Museo di Antichita in Parma. In 1870, he was called by the central government to the *Direzione generale dei musei e scavi di antichità*. The following year, 1871, was marked by the Fifth International Congress of Prehistoric Anthropology and Archaeology, held in Bologna. A large exhibit of the then extant prehistoric finds made all over Italy was prepared. A large section was devoted to the earliest lithic tools. In Bologna, L. Pigorini initiated the project of a national museum for prehistory for the capital. Eventually established in Rome in 1876, it is presently the Museo Nazionale Preistorico ed Etnografico "Luigi Pigorini." The *Bullettino di Paletnologia Italiana,* which is still in existence, was jointly founded in 1875 by L. Pigorini and by G. Chierici, the term *Paletnologia* (Paleoethnology) having been officially adopted for prehistory during a scientific meeting at La Spezia in 1865. In 1877, a chair of *Paletnologia* was established at the Universita di Roma "La Sapienza," and Pigorini became the first professor of this new science.

1.2.2. The Great Debates on the Earliest Peopling of Italy

If Pigorini was a great administrator and scientific organizer, it is also recognized that, as much as possible, he was centralizing prehistoric research—to the point, after A. Guidi (1988), of not allowing chairs of *Paletnologia* outside the capital. The ideas of this powerful scientist had an impact on prehistoric studies that was difficult to overcome.

The existence of an early phase of the Paleolithic had been accepted at the turn of the century, after G. De Lorenzo had proven the conteniporaneity of lithic implements with extinct pachyderms in the district of the Vulture volcano. A few years later, I. Cerio also rediscovered the existence of handaxes on the island of Capri. The relatively detailed publication, around the time of the First World War, of the excavations in the Balzi Rossi caves by the team headed by Prince Albert I of Monaco also made clear the existence of the Mousterian, accompanied by extinct animal species, as well as of later industries. But Pigorini maintained throughout his life that there was no such thing as an Italian Upper Paleolithic—a late Mousterian being directly followed, in his interpretation, by the Neolithic. U. Antonielli, his successor at the Museo Nazionale Preistorico Etnografico, when presented with the female statuette discovered at Savignano in 1925, still claimed that it could not be earlier than Neolithic, even when confronted with mounting evidence of a different age (see Chapter 6).

The *Scuola Romana* (i.e., the "Roman School") of Pigorini and his followers was soon rivaled by the *Scuola fiorentina,* headed in Florence by A. Mochi. This second group of scholars, which included both G. A. Blanc and his son A. C. Blanc, as well as P. Graziosi and others, was much more interested than the *Scuola Romana* in natural sciences. They created in 1927 the Istituto Italiano di Paleontologia Umana, clearly inspired by the Institut de Paleontologie Humaine founded in Paris by Prince Albert I of Monaco, which had an important role in promoting a better understanding of the Italian Paleolithic and of paleoenvironmental studies.

The excavation of Gr. Romanelli, started by E. Regalia and P. E. Stasi in 1904, and continued by G. A. Blanc after 1914, was reported by the latter at the first meeting of the *Istituto* in 1927. It ended three years later as a magisterial publication in the proceedings. The existence of an Italian Upper Paleolithic during cold climatic phases was soundly established, even if not many sites were known, and the age of radiometric chronology was still to come.

By then, another problem was hotly debated: the geographical provenance of modern humans. The relative proximity of northern Africa to southern Europe had not gone unnoticed, when the existence of a Glacial Age affecting life in Europe became fully appreciated. At the beginning of the twentieth century, R. Verneau reconstructed the face of two skeletons from Gr. dei Fanciulli (*Gr. del Enfants* of the French literature) in such a way that he interpreted them as "Negroids," while the Abbe Breuil maintained an African origin for his Aurignacian. The assumed African characteristics of female representations were also mentioned again and again by various archaeologist. In 1907, G. Schweinfurth positively suggested a link between Sicily and Tunisia during the Paleolithic. In 1909, P. Pallary also introduced the term "Iberomaurusian" for Algerian assemblages, suggesting connections with the Iberian peninsula. R. Battaglia, in the early 1920s, following the study of a collection from Riparo di Termini Imerese in Sicily, came to the conclusion that what was by then known as the "Grimaldian" (after the excavations in the caves of the Balzi Rossi di Grimaldi) was closely linked to the Capsian of northern Africa.

In the political atmosphere of the following years, and while papers on Paleolithic studies happened to be published in a journal entitled *Razza e Civiltà* (*Race and Civilization*), an African origin for an Italian population must have been felt by some a quite embarrassing hypothesis. In 1937, G. Patroni, in his monograph *La Preistoria,* also described the people of the then colonies as the remnants of the

Figure 1.4. Italy. Regional boundaries.

Paleolithic, which had been "won in the race" with more advanced peoples. Luckily enough, however, the debate over the possible connections with Africa continued on scientific basis. R. Vaufrey, in two major monographs on Italy and on the Mediterranean islands, published in France in 1928 and 1929, came to the conclusion that there were no trans-Mediterranean connections. In the late 1930s, A. C. Blanc also described the many similarities between Italian and European assemblages, and went into detail about the route followed to pass south of the Alps.

1.2.3. More Recent Trends

P. Graziosi also started in the 1930s his studies on Paleolithic art, which eventually led to the creation of a "Mediterranean Province" linking Italy to southern

France and eastern Spain (see Chapter 7). This was another line of evidence pointing to the peopling of Italy from over the Alps. However, it was also the beginning of a kind of isolationism in the Paleolithic studies of Italy: Italy was not part of the mainstream Magdalenian world; Italy was "different."

Such a trend became stronger after the adoption in the 1960s of the so-called "Laplace system" for the typological analysis of Upper Paleolithic assemblages (see Chapters 5, 6, and 7). The opposite should have actually happened, as G. Laplace was eager to connect by a general framework sites all over Europe and the Mediterranean. As a matter of fact, however, the only country in which this method was widely adopted and nearly uniformly utilized was Italy. The Italian archaeologists expressed a different view on typology than most of their European colleagues, who adopted type-lists developed by F. Bordes and his school, reducing contacts with them.

It must also be stressed that, while geographically limited, Italy has a relatively large population of nearly 60 million inhabitants and a long tradition of scientific institutions. The many little states that were in existence from the Middle Ages and the Renaissance onwards were competing not only economically and politically but also culturally. Universities were founded in all of them, often short distances from each other, starting with Bologna, the earliest European university, which was opened not much later than the Cairo one, and is now approaching its first millennium of existence. The many universities were retained after the unification of Italy in the nineteenth century. New ones were founded, in part to compensate for the dearth of such institution in the south, which, having long been united under the Kingdom of Naples, had a different situation and was less endowed. When, after Pigorini's times, prehistory started to be taught outside Rome, several universities established chairs.

Archaeologists, including prehistorians, are not just found in universities: more work in the regionally based Soprintendenze archeologiche who control excavations and other research on behalf of the Ministero dei Beni Culturali e Ambientali. Trained prehistorians are also to be found at the Consiglio Nazionale delle Ricerche and at the thriving *musei civici,* municipal museums, that are time-honored institutions, especially in northern and central Italy. Not surprisingly, more journals partially or entirely devoted to prehistory were founded before or mostly after the *Bullettino di Paletnologia Italiana.* As a consequence, there is a relatively large and comprehensive scientific community that regularly meets at national congresses and publishes in Italian, and in Italian journals.

Language is a mounting problem in the era of the "global village." Just as Italian archaeologists are satisfied communicating among themselves in their native tongue, foreign scientists do not often make the effort of crossing the linguistic barrier—to the point that the venerable *Le paléolitliique italien* of Vaufrey, written in French, albeit some seventy years ago, still happens to be quoted as a general reference book on the Italian Paleolithic. This general problem, on the top of the assumed or real peculiarities of the record, and the different typological system for the Upper Paleolithic, progressively led to some problems in communication.

Italian "isolationism," however, must be treated in a relative, not an absolute way. After all, the Sixth International Congress of the Union Internationale des Sciences Prehistoriques et Protohistoriques (UISPP) was held in Rome in 1962. In more recent years, new research in specific fields, such as the earliest settlement of Europe or the colonization of mountain environments, as well as discoveries of well-preserved human remains, placed the Italian record at the center of attention once more. This also became evident after Forli was chosen for the Eighth International Congress of UISPP in 1996. In the following chapters, we will add our own contribution to the general circulation of ideas and information.

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Chapter 2

The Earliest Settlement

2.1. INTRODUCTION

2.1.1. Modern a Traditional Dating Methods in Italian Archaeology

Before the development of radiometric and other direct and indirect dating techniques, such as electron spin resonance (ESR), thermoluminescence, and paleomagnetism, Lower Paleolithic sites in Italy, as in the rest of Europe, were dated by geologic or faunal correlations with the established sequence of Alpine glaciations. Stylistic or technological aspects of the lithic complexes were also used as chronological indicators. In the last two decades, however, new dating techniques coupled with research begun by C. Emiliani, have shown that the whole paleoenvironmental reconstruction was wrong, or at least highly biased, and that climatic fluctuations of the remote past were much more complex than expected. To further complicate the problem, it is now evident that lithic industries do not neatly "evolve" from more archaic to more refined ones, and that raw material availability and local activities, in addition to a host of other factors, cause previously unsuspected variability in lithic assemblages.

Following Emiliani's pioneering research in the 1950s, N. J. Shackleton and others have shown that the ratio of O^{16} and O^{18} fluctuated cyclically during the last two million years, and more markedly so after the onset of truly glacial climatic oscillations (Shackleton 1967; Shackleton and Opdyke 1973). The lighter O^{16} isotope is normally present in a higher percentage in vapor and precipitation, and when climate deteriorates, it is "trapped" to a larger extent in ice deposits. There is consequently an imbalance in the O^{16}/O^{18} ratio, with oceanic waters including a relatively higher amount of O^{18}. Analysis of long records of isotope rates—for instance, drilling arctic fossil ice, or foraminifera deposits on marine floors—leads to the knowledge of their fluctuations, which are linked to the amount of ice present on the earth at a stated time and, indirectly, to the climate.

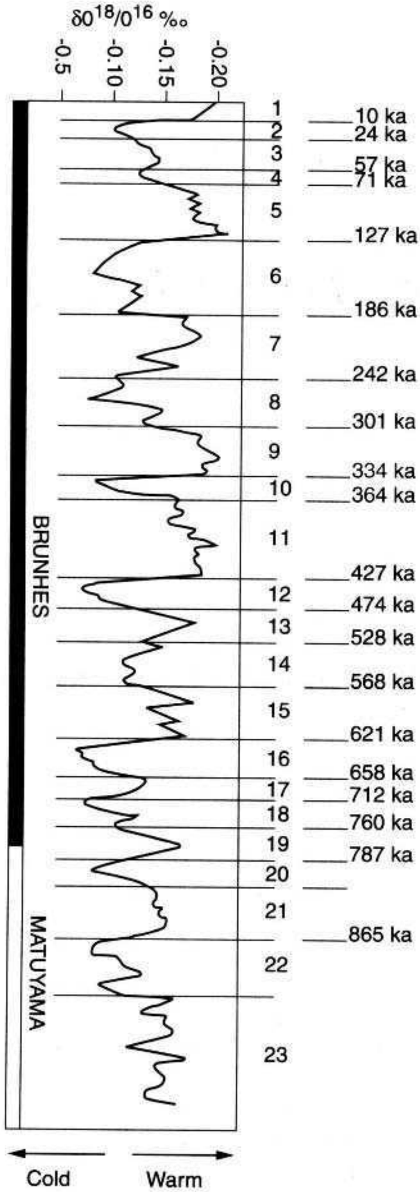

Figure 2.1. Isotopic stages, based on Equatorial Pacific core V28-238 (Shackleton and Opdyke 1973). with estimated ages for boundaries after Bassinot *et al.*(1994).

Some twenty interglacial–glacial cycles, each approximately 100 ka in duration, are known to have occurred during the Quaternary After a recent proposal by International Quaternary Association (INQUA), its beginnings are correlated with a fixed part of the reference section of Vrica in Italy and also begins on the paleomagnetic timescale with the Olduvai/Matuyama reversal boundary either at c. 1.66 million years before present (Labeyrie 1984; Vergnaud Grazzini *et al.* 1990) or at c. 1.79 years before present after a new assessment (Bassinot *et al.* 1994). Each isotopic "stage" (OIS) was given a number, with even numbers related to cold climatic phases, and odd numbers to mild phases (Fig. 2.1). We are presently in OIS 1, an interglacial stage, the previous interglacial being OIS 5. More precisely, the maximum warming was during "substage 5e" (OIS 5e), as stages are further subdivided into substages with the addition of letters.

It is often difficult to fit old reports into this chronological frame. It is particularly difficult when geologists and archaeologists still refer to glaciations such as "Mindel" or "Riss," which are known to be the palimpsest of several glaciations. Absolute dates are of great assistance, but they are not always available and are sometimes inconsistent. Italy is to some extent privileged, as many volcanoes were active during the Quaternary (see 2.1.2), and their effusive products offer excellent dating opportunities. The archaeological evidence discussed in this chapter refers to the earliest sites, prior to stage 9 (i.e., sites older than approximately 330 ka), after the revised chronology of Bassinot *et al.* (1994) (Fig. 2.1). We concentrate on those that have at least some geological, paleontological, absolute, or other dating evidence. We only occasionally discuss uncontrolled surface collections, which sometimes allowed the accumulation of large series of "archaic" implements. Sicilian sites, however, are discussed in some detail, even if the research methods are of very low standard, as they have been mentioned as evidence of a possible direct link between Africa and Europe.

2.1.2. The Paleogeography of Italy during the Lower and Early Middle Pleistocene, and Flora and Fauna

The landmass of Italy was formed comparatively recently. During most of the Miocene, up to some seven million years ago, the Alps were already in existence but the peninsula was just a shallow sea. At the end of the Miocene, the Apennines, which are the backbone of the peninsula and continue into Sicily, started to emerge. It is as if a gigantic spread out cloth was bent, pushed toward the north-northeast into an arched shape. The eastern edge of the Apennines experienced compressive tectonics, that is, an alternation of deepened basins and uplifted areas. The western edge (i.e., the rear of the movement), experienced distensive tectonic that later led to the formation of fluvio-lacustrine basins (Cremaschi and Chiesa 1992; see Fig. 2.2).

During the Middle Pliocene, when bipedal hominids with well-developed brains were roaming the savannahs of East Africa, and during the late Pliocene, when some of them started to modify stones into what we call "tools," a large part of the present Italian peninsula was still under water (Fig. 2.3) (D'Ambrosi 1969). The emerged land was an elongated, narrow peninsula protruding from present Liguria and surrounded by islands. Tuscany and parts of southern Italy were archipelagos. The Po plain in northern Italy, and presently the largest flat area, was a gulf of the sea with some sandy islets (Gasperi *et al.* 1990). The Apennines were far from having reached their present height; the landscape was rather hilly and gently undulating, with many elongated lake basins between the Apennine ridges.

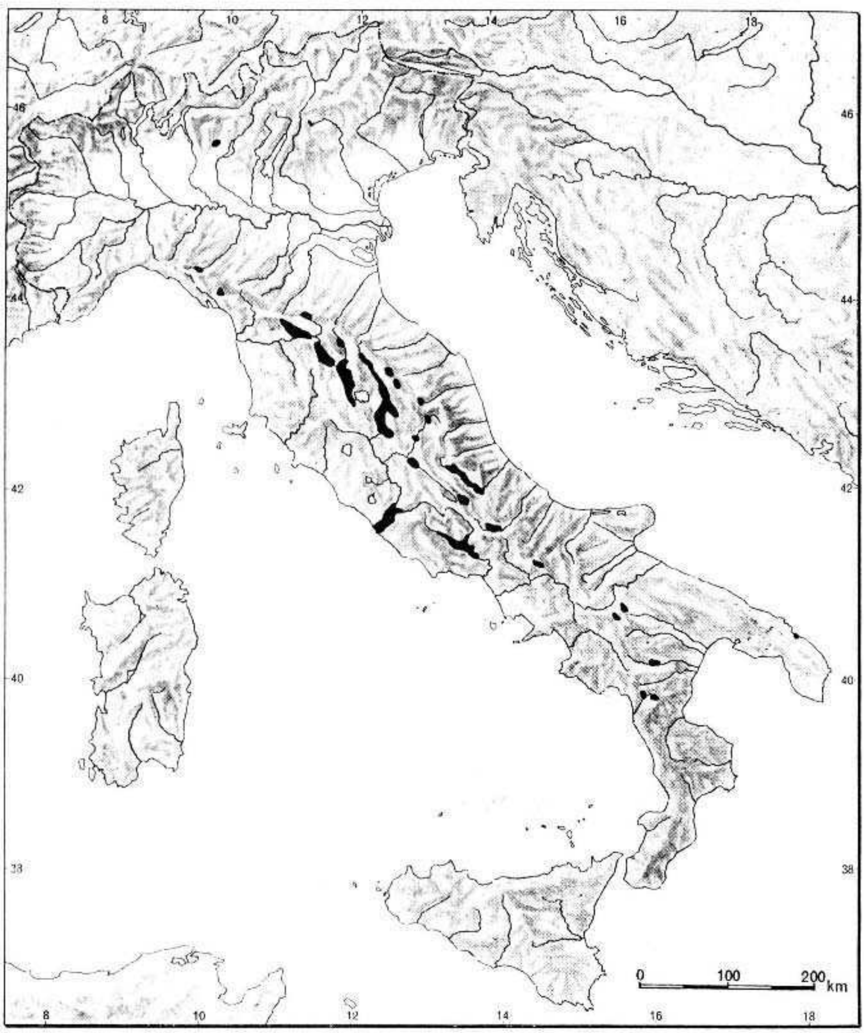

Figure 2.2. The major Plio-Pleistocene fluvio-lacustrine basins (after Desio 1973,with modifications).

The rivers, however, carrying alluvial sediments derived from the erosion of the mountains, started to build up coastal plains. The climate was warmer and moister than today.

Approximately one million years ago (i,e., still during Lower Pleistocene times), there was renewed uplifting of the Apennines, the amplitude of which was eventually more than one thousand meters. The landscape became more rugged. Lake basins were disrupted and drained by rivers, while streams carried heavier, coarser loads of sediments and deposited them in the lowlands. The sea was consequently retreating from the Po valley, with the gulf progressively closing.

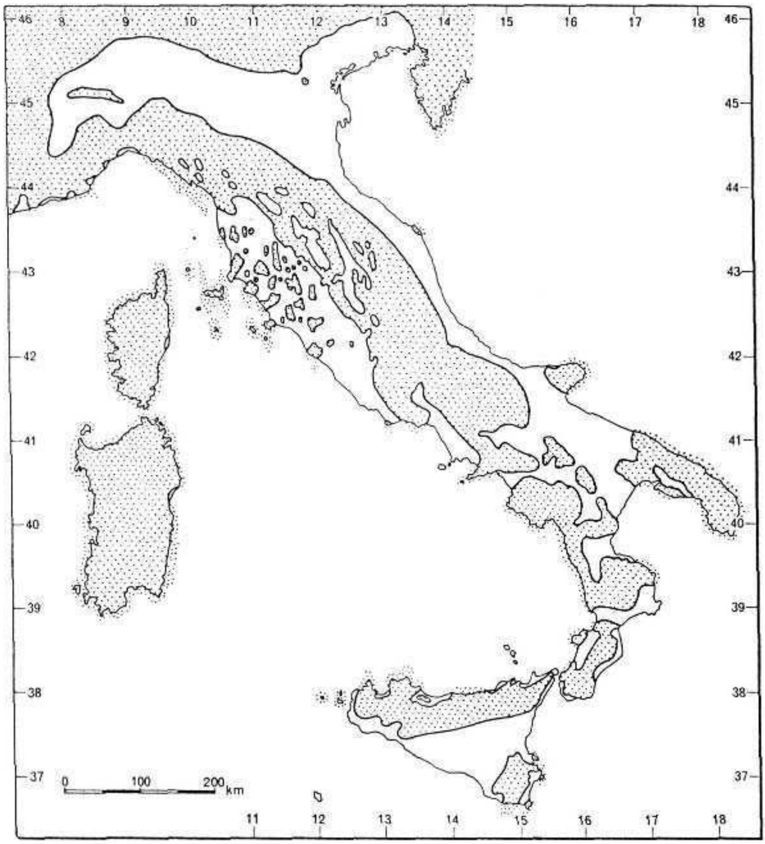

Figure 2.3. Italy during the Pliocene. The emerged areas are dotted (after Desio 1973).

Circulation between the upper and the lower Adriatic, however, might have been reduced for some time by the partial emersion of the Gargato–Dalmatian sill, which linked northern Apulia, then an island, with the Balkans (Malatesta and Zarlenga 1986). Later, southern Apulia, which had been an archipelago, became part of the peninsula and the Adriatic Sea was for the first time effectively isolated from the Tyrrhenian Sea (Malatesta 1985).

This tectonic activity continued during the early Middle Pleistocene. The geographic changes previously described proceeded over a larger scale even if there was a much more fractioned and locally differentiated tectonic evolution. The various islands of Calabria merged into a less discontinuous stretch of land (Caloi *et al.* 1989).

Volcanic activity accompanied tectonic activity. Volcanoes were active on the Tyrrhenian side of the peninsula and in the islands, while further east, there was only the Vulture (Fig. 2.4). Some, like Tolfa, started in the late Pliocene, but most were erupting lava, lapilli, and other products during the Lower and Middle Pleistocene and sometimes continued during the Upper Pleistocene and to the present.

Figure 2.4. Pleistocene volcanoes. Location map (source: Malatesta 1985).

Etna, for instance, the largest European volcano, started around 700 ka with underwater eruptions and contributed conspicuously to building up of Eastern Sicily. Vesuvius, however, only came into existence much later (i.e., c. 25,000 years ago), and was not part of the landscape during most of the Paleolithic (Malatesta 1985).

A Mediterranean-type climate and vegetation were already established (Suc 1984; Vergnaud Grazzini *et al.* 1990). In the Lower Pliocene, moist and warm climatic conditions prevailed during most of the year, and by 2.8 million years ago, the summer drought became stable. In the early Lower Pleistocene Mediterranean vegetation zones were established, with steppe-like extensions and restricted forests. The botanical assemblages were progressively impoverished. The Taxodiacee (*Taxodium, Sequoia,* and *Sciadopitys*), for instance, became extinct (Paganelli 1984), but several late Pliocene species, such as *Carya, Pterocarya,* *Platycarya, Zelkova, Lirodendron, Magnolia, Liquidambar,* and *Nyssa,* survived longer, some of them even into the Late Pleistocene (Accorsi 1985).

In the early Quaternary, there was no substantial climatic cooling. Temperature fluctuations became increasingly marked later on, with the onset of glacial–interglacial cycles. The first geological evidence of glaciation on the southern fringe of the Alps is dated to 22 (c. 800 ka) at the very end of the Lower Pleistocene (Cremaschi and Chiesa 1992).

While Lower Pleistocene faunas were quite archaic, notably, including mastodonts, in the Middle Pleistocene, there were massive immigrations of new species from Asia, resulting in more modern assemblages (Caloi *et al.* 1986). By then, two different phyletic lines of elephants were present: *Elephas* of wooded environments, and *Mammuthus* of open environments. Bovids included *Bos primigenius* and *Bison schoetensacki;* the hippo species was possibly already *Hippopotamus ainphibius* and the rhino, *Stephanorhinus heniitoechus.* Cervids, such as *Cervus elaphus acoronatus,* a fallow deer, and megacerids, were also found. There were different species of equids, while the wild boar (*Sus scrofa*) and a *Macaca* are also mentioned. Carnivores included canids—already found in the Lower Pleistocene, *Ursus deningeri,* which had evolved locally, and some hyenas, lions, and leopards.

The faunal assemblages through time became increasingly similar to the ones we see today in African savannahs (Sala 1977). To get the picture, we have only to substitute antelope and gazelle with deer, zebra with horse and donkey, warthog with wild boar, and jackal with wolf. The most substantial difference was in the landscape: plains are of a very limited extension in Italy, mostly close to the coast. Faunal assemblages with large pachyderms lasted into part of the Upper Pleistocene.

2.2. THE TIME AND THE WAY

2.2.1. The Date and Characteristics of the Earliest Archaeological Record

Lower Paleolithic site preservation is a major problem. Only truly exceptional circumstances allowed some sites to escape destruction, then to be studied by professional archaeologists and be dated reliably. Therefore, it is worth describing briefly some reasonably well-preserved early Italian sites (see Fig. 2.5). Their dates are the basis for further discussion.

2.2.1.1. Monte Poggiolo (Romagna)

Monte Poggiolo, situated between Bologna and Rimini, is claimed to be the earliest known Italian site (Antoniazzi *et al.* 1984, 1988, 1993; Peretto 1992). It is at an altitude of 200 m asl, some 40 km away from the modern Adriatic shores. It is assumed that when people settled there for the first time, they were living closer to the'coast of the Po gulf (see 2.1.2). On that spot, the sands of the shoreline

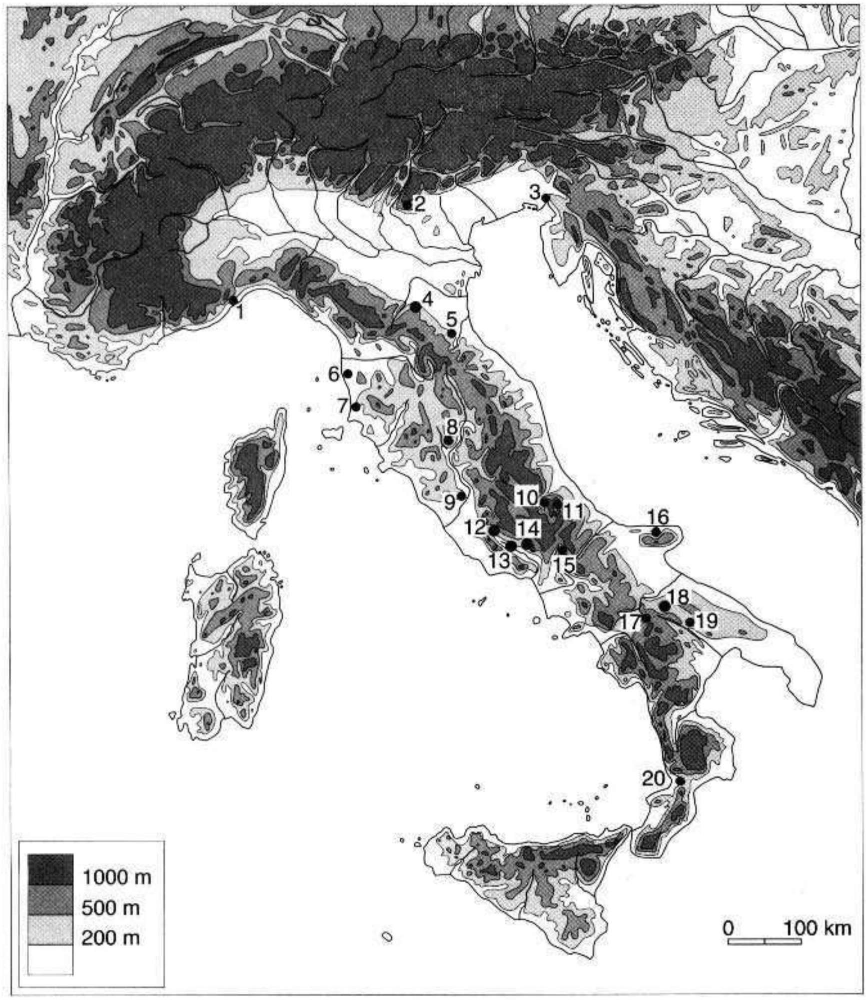

Figure 2.5. Location of the earliest archaeological sites. **1:** Gr. del Colombo; 2: Monte Gazzo; 3: Visogliano; 4: Cave Chiuse d'Idice, Cave S.A.F.R.A.; 5: Monte Poggiolo; 6: Collinaia; 7: Bibbona; 8: Monte Peglia; 9: Valchetta Cartoni; 10: Le Svolte; 11: Valle Giumentina; 12: Fontana Ranuccio, Colle Marino; 13: Cava Pompi, Castro dei Volsci; 14: Arce, Fontana Liri; 15: lsernia La Pineta; 16: Foce del Torrente Romandato; 17: Atella; 18: Venosa Loreto, Venosa Notarchirico; 19: Irsina Costa del Forgione; 20: Casella di Maida.

(*Sabbie Gialle*) were replaced by gravel mixed with sand, interpreted as the remains of the delta of a small river. They were deposited on top of marine clays, the *Argille Azzurre*.

The limited amount of preserved pollen suggests a cool and even cold climate, with NAP (Nonarboreal pollen) dominant and including steppe elements. *Pinus* and *Abies* are the best represented trees. The presence of a terrestrial gas-

Table 2.1. Monte Poggiolo. Inventory of the Lithic Tools of the Surface Collection. [a,b]

Type list	n	%
Single scraper	35	17.2
Double scraper	1	0.4
Transverse scraper	5	2.3
Abrupt retouched scraper	2	0.9
Scraper with bifacial retouch	2	0.9
Endscraper	22	10.0
Burin	2	0.9
Naturally backed knife	149	–
Raclette	2	0.9
Notch	67	30.4
Denticulate	55	25.0
Retouched flake	16	7.3
End-notched flake	5	2.2
Rabot	1	0.4
Chopper/Chopping tool	225	–
Miscellaneous	2	0.9
Total	594	99.7
Handaxes	2	
Polyhedrons	2	
Discoids	1	
Utilized pebbles	4	
Tested pebbles	605	
TOTAL	1208	

[a]Naturally backed tools, choppers, and chopping tools are not included when frequencies are calculared.
[b]Source: Bisi *et al.* (1992).

tropod, *Cocholdina laminata,* which is now a mountain species, also points to a rather cold climate.

The date of the archaeological site is not easily determined. The *terminus post quem* are the underlyng *Argille Azzurre,* which, on several lines of evidence, date to 1.4–1.3 million years ago. The deltaic deposit in which the archaeological remains are included was found to have remnants of reversed paleomagnetism in a single level (lev. 107), the other levels being too much altered by subsequent pedogenesis to be determined with any confidence. The deposit is therefore said to be pre-Matuyama (i.e., > 730 ka) after the chronology in use when the research was completed. This would be > 780 after the revised chronological scale of Bassinot *et al.* (1994).

The *Sabbie Gialle,* a part of whose deposition is supposedly correlated to the gravel deposit, are better dated, if at some distance from Monte Poggiolo itself. Their malacological content has been used to hypothesize a date of not later than 1.2–1.1 million years for the base. Paleomagnetic investigations have located higher up in the stratigraphic sequence the Jaramillo episode of normal polarity, which happened c. one million years ago, and then the Matuyama–Brunhes boundary. A date between 0.73 and 1.3 million years was accordingly proposed by Antoniazzi *et al.* (1993).

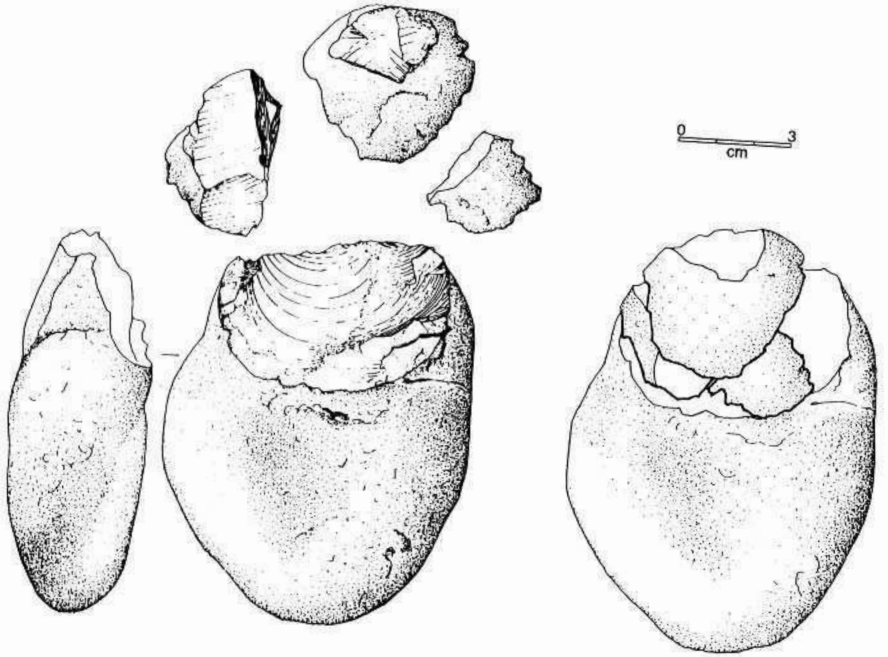

Figure 2.6. Monte Poggiolo. Refitting core and flakes from the excavated area (source: Antoniazzi *et al.* 1993).

The *Sabbie Gialle* have also been dated by ESR, on quartzite grains heated by exposure to sun. At two different locations, they were found to be 720 ± 210 ka old, and 1,290 ± 530 ka old, respectively (Yokoyama *et al.* 1992).

All these lines of evidence have been used to suggest a date of one million years for the first human settlement (Peretto 1992).

No fauna was preserved. Some 4,000 lithic implements, fresh or slightly patinated, were retrieved by surface collection. They are quite small in size, as flint pebbles usually less than 10 cm long were used. Most of the flake tools are notches and denticulates (Table 2.1). The assemblage also includes a variety of chopping tools, a few polyhedrons and handaxes, as well as hundreds of pebbles from which only a single flake was detached.

Excavations in a restricted area to a depth of 4 m below datum yielded a further 1166 flake implements and 153 core implements, mostly from the upper part of the stratigraphic sequence. Only twelve were retouched tools (five scrapers and seven denticulates), while no clear-cut distinction was possible between cores and chopping tools. About two-thirds of the flakes are totally or partially cortical, with plain or cortical butts, and the cores usually have just one striking platform. The numerous refittings indicated that most of the activities on this peculiar spot were related to expedient knapping of the locally available pebbles (Fig. 2.6).

Other sites with a similar industry, and in the same general setting, have been located in the area but not investigated.

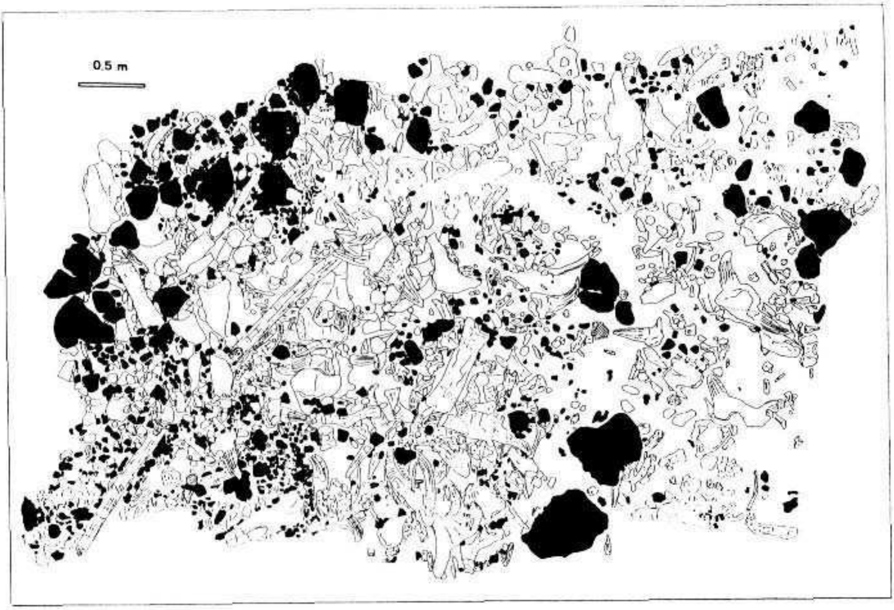

Figure 2.7. Isernia La Pineta. The accumulation of bones and lithic tools that makes up the paleosurface of Sett. I t.3a (after Giusberti *et al.* 1991). Rocks are in black.

2.2.1.2. Isernia La Pineta (Molise)

Isernia La Pineta is located further south, more or less in the center of the peninsula (Bahain 1993; Coltorti *et al.* 1982; Cremaschi and Peretto 1988a; Giusberti and Peretto 1991; Peretto 1991, 1994; Peretto *et al.* 1983). So far, approximately 300 m^2 have been excavated and four archaeological layers investigated. These are believed to be close in time to each other. Excavations were first undertaken in two different but nearby areas (called *settori,* or sectors). In sector I, there are two archaeological layers-t.3c, the earliest, followed by t.3a. In sector II there is only one layer, also named t.3a, which is the most recent one. Therefore, from the earliest to the latest, we have Sett. I t.3c, Sett. I t.3a, Sett. II t.3a. A further archaeological horizon, t.3 S10, was later discovered in a stratigraphic position intermediate within the levels already known (Anconetani *et* al. 1992).

The most spectacular part of the site is Sett. I t.3a, an astonishing accumulation of faunal remains and lithic implements (Fig. 2.7): over c. 24 m^2, where the concentration is highest, 1,256 lithic implements and 722 bones were found. The latter are substantial parts of a minimum of two bears, four elephants, eighteen rhinos, twenty-one bison, and some deer (Giusberti *et al.* 1991).

The deposits between the archaeological layers are devoid of remains except for some rolled artifacts and bones that are believed to have been eroded from sites upstream. The archaeological deposit extends with varying density over an estimated area of more than 30,000 m^2.

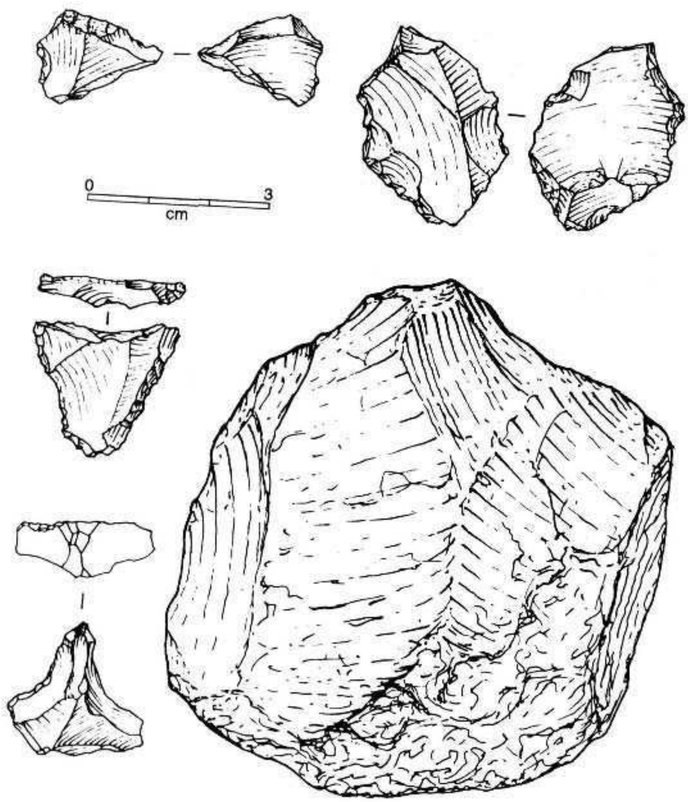

Figure 2.8. Isernia La Pineta. Flint flake implements from t.3 S10, and limestone chopping tool from t.3a (source: Anconetani *et al.* 1992).

During the Lower Pleistocene, the Isernia Basin was filled by one of the many lakes related to the Apennine tectonics (see 2.1.2). The present landscape, which is quite rugged, with mountains rising to 1,400 m, is different from the one in which Paleolithic human groups lived. In the Middle Pleistocene, renewed tectonic movements connected with volcanism caused a considerable increase in gradient and the disruption of the basin, which was then drained by streams depositing coarse sediments. The archaeological levels are sandwiched between the latest episodes of lacustrine sedimentation and the earliest fluvial deposits. "Sett.I t.3a" was actually established on a mud flat deposited by the nearby stream, which was possibly not yet consolidated, as can be seen from large bones in a rather vertical position. This archaeological level was then buried by another fluvial deposit, a high-energy one of debris flow type, directed from northeast to southwest. This is also the direction of many bones, such as tusks and elephant long bones, which are accordingly assumed to have been disturbed and reoriented. The time interval between the occupation layers is believed to have been quite short.

Table 2.2. Isernia La Pineta. The Lithic Assemblage of Sett. II t.3a. [a]

Type list	n	%
Scraper	52	4.0
Endscraper	92	7.1
Borer	641	49.5
Notch	76	5.9
Denticulate	423	32.6
Miscellaneous	12	0.9
Total	1,296	100.0
Flakes	1.529	
Debris	1,664	
Cores	100	
TOTAL	4,589	

[a]Source Ferrari et al (1991).

Not including micromammals, the following animal taxa were found mostly in “Sett.I t.3a,” the richest in remains but without significant differences between one archaeological layer and the next: *Panthera leo* (a single tooth), *Ursus* cfr. *deningeri, Elephas antiquus, Stephanorhin us hemitoechus, Hippopotamus amphibius, Sus scrofa, Megaceros* sp., *Dama* sp., Cervidae, *Bison sclioetensacki, Hemitragus* cfr. *bonali,* and *Lepus* sp. Several rodents were also recognized: *Pliomys episcopalis, P. lenki, P.* cfr. *lenki, Clethrionomys* sp., *Microtus arvalis-agrestis, M. brecciensis, Pitynys* sp., and *Arvicola mosbachensis* a junior synonym of *Arvicola terrestris cantiana* (see Roebroeks and Van Kolfschoten 1994 for a discussion of the taxonomic implications). There are also some aquatic birds and remains of tortoise. In “Sett. I t.3a,” bison is the dominant taxon, followed by rhino and elephant.

The animal assemblage points to an open environment such as a steppe or a grassland with some trees. Pollen analysis of a sample from the paleosurface, “Sett. I t.3a,” included 80 percent NAP with Gratnineae being dominant. The few arboreal pollen are from *Alnus, Salix* cfr. *populus, Platanus, Pinus, Cedrus,* and oak (Accorsi 1985) (Fig. 2.17).

More than 10,000 lithic implements have been collected during excavations. The industry is quite similar in the three layers except for the lack of pebble tools in “Sett. II t.3a,” where there is also a very limited amount of bone. The raw material was available next to the site. The flint is mostly of poor quality and splits along natural fissures. Many of the implements are accordingly difficult to recognize, and it cannot be determined whether they are broken or naturally split. Limestone pebbles, also easily available, were used for chopping tools.

A detailed description of the industry of “Sett. II t.3a” is available (Ferrari *et al.* 1991). Unifacial and bifacial chopping tools, frequently found in the other levels, were not discovered; here, there were only flake implements. Butts are plain and inclined, and there is no standardization in the choice of the part of the tool further modified by secondary retouch. Many tools (40 percent) are on nucleiform

Figure 2.9. Venosa Basin. The evolution of the landscape (after Soprintendenza Speciale al Museo Nazionale Preistorico Etnografico "L. Pigorini" 1991).

supports (i.e., exhausted cores and plaquettes, and fragments of them). Not considering occasional retouch, nearly half of tools are classified as borers (Table 2.2).

The absolute date of the archaeological deposit has been determined using a number of methods. K/Ar analyses of sanidine crystals found in the alluvial deposit covering "Sett. I t.3a" (i.e., in a redeposited position) give a date of 736 ± 4 ka. Other samples, taken from correlated deposits stratigraphically overlying the Paleolithic level, were consistently dated to 680 ± 6 ka and 730 ± 7 ka. Higher up in the sequence, the results are in the range of 500 ka.

Seven samples of elephant, rhino, and bear teeth from the archaeological layer were dated by amino acid racemization and found to be 550 ± 140 ka old with a mean value of 545 ka. Five teeth of elephant, rhino, and bison were dated by ESR to between 150 and 100 ka.

Recently, however, a sanidine crystal from a layer capping the archaeological deposits was found to be 605 ± 10 ka years old by Ar/Ar analysis (Coltorti *et al.* 2000), supporting a later chronology for this site (see 2.5.1 for a discussion).

2.2.1.3. Venosa (Basilicata)

Venosa is located in southern Italy within the Apennines. The Venosa Basin is a late Pliocene depositional surface, eroded during the Lower Pleistocene by local streams into a long and narrow valley 100 m deep (Lefevre *et al.* 1993b; Piperno 1999; Piperno *et al.* 1998; Soprintendenza Speciale al Museo Nazionale Preistorico Etnografico "L. Pigorini" 1991) (Fig. 2.9). At the transition between Lower and Middle Pleistocene the effusive activity of M. Vulture, a volcano some 20 km

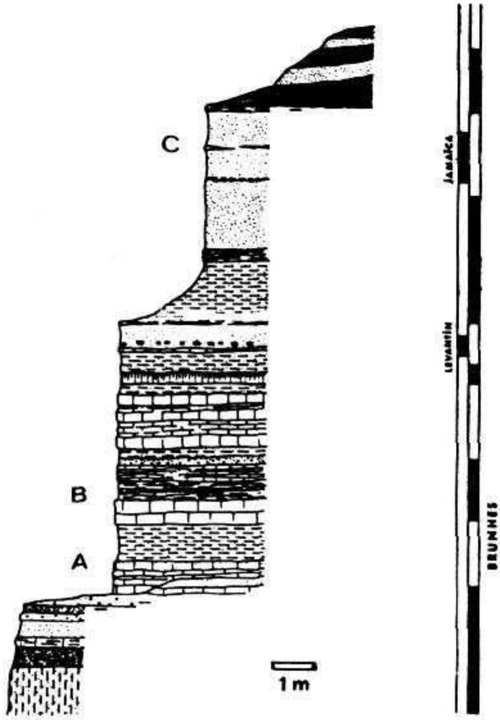

Figure 2.10. Venosa-Loreto. The upper part of the stratigraphic sequence (source: Barral and Simone 1983).

distant, produced large amounts of detritus that the streams were unable to carry away; thus, the hydrogeological balance was much altered. As a consequence, while the volcanic activity continued, shallow lakes and marshes developed over an area of approximately 50 x 3 km. The depression was progressively filled up by 30–50m of sediments. The latter were eventually eroded after new tectonic activity during the Upper Pleistocene and are now found as terraced remnants.

There are several important sites in the Venosa basin. We consider here the sequences found in two nearby localities, Loreto and Notarchirico, which were excavated at different times by different teams. After a recent revision of the stratigraphy of the whole basin, the sequence of Loreto is later than the sequence of Notarchirico (Piperno 1999).

2.2.1.3.a. Venom-Loreto. A stratigraphic sequence of 30 m, including forty-two levels, was described (Baïssas 1980; Barral and Simone 1983) (Fig. 2.10). Archaeological remains were found in level 21 (A), level 18 (B), and level 3 (C). There is also a "Loreto D," which was found to be a generally disturbed layer, including reworked Late Acheulean handaxes, many of which were also collected from the surface (see Chapter 3).

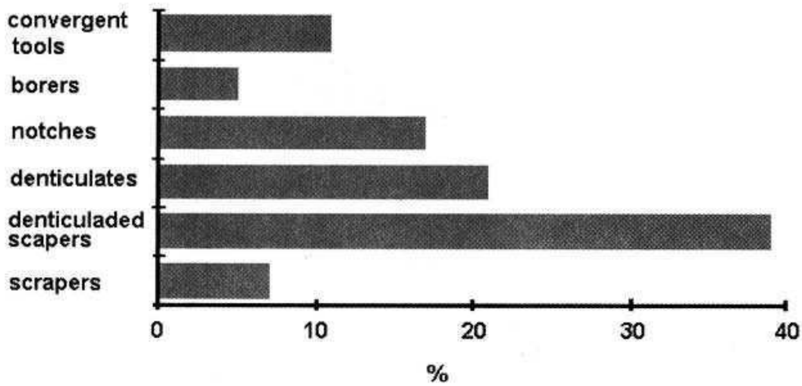

Figure 2.11. Venosa-Loreto. Inventory of flake tools (after Crovetto 1993).

According to Balssas (1980), there is an excellent paleomagnetic sequence. The Matuyama–Brunhes boundary was located in level 38–37, the Levantin event in level 9-8, and the Jamaica event in level 4-2. The paleomagnetic sequence, coupled with a sequence of eight cold episodes alternating with milder episodes, worked out through sedimentological analysis, allowed him to correlate levels 21-19, and therefore the A occupation layer, with OIS 13. The climate was warm, and the settlement was on a beach later submerged by the rising lake level.

A temperate environment characterizes the overlying levels 18–17 (which include occupation layer B). By then, the lake had receded and the area was a mixture of sand and mud. This part of the sequence is equated with OIS 11. Occupation layer B is poorly known from an archaeological point of view, as most of the research concentrated on layer A, 40 to 60 cm thick, which was excavated over 25 m^2. Layer B is said to have yelded an industry similar to the one in A, but less abundant, and includes the remains of horse, elephant, and bovids.

Occupation layer C is correlated with the Jamaica event, some 200,000 years old, and is not further considered in this chapter.

The faunal remains are abundant, if very fragmented. In a preliminary study of the fauna M.-F. Bonifay (1977) recognized several archaic (i.e., Villafranchian) species, but subsequent revision ruled out their presence (Alberdi *et al.* 1988; Angelelli *et al.* 1978; Caloi and Palombo 1979, 1980). The many horse remains are now identified as belonging to *Equus* aff. *süssenborensis* and *E. altidens*. The bovids are a small-sized *Bos primigenius*-females probably dominate in the sample-and an archaic bison (i.e., Bison sclioetensacki cfr. *vuigtstedtensis)*. There is a canid with many affinities with jackal. Hippos, elephants, several rhinos, many deer, and a few bears are also present. The equid association is relatively archaic and would indicate an early Middle Pleistocene date. This is in contrast with an attribution to OIS 13 or 11, and with a date in the range of 500 to 450 ka that is almost identical to Fontana Ranuccio (see below) with a much more modern faunas. Furthermore, the bison is less evolved at Loreto than at Isernia La Pineta, while the rhinoceros is relatively primitive. An age of 500-550 ka, favored by the

Figure 2.12. Venosa-Notarchirico. The "Elephant area" (after Piperno 1999).

overall revision of the stratigraphy of Venosa (Piperno 1999), is in better agreement with the biochronology.

The lithic industry is abundant and includes much flaking debris, which would indicate that stone knapping was performed locally. However, after the study of a large sample of the lithic assemblage, the flake implements (Fig. 2.11) have no cortex, or a very limited amount of cortex, suggesting that at least the initial knapping activity was performed elsewhere—even if not necessarily very far away (Crovetto 1991; 1993). Flake implements are mostly of flint, often of poor quality, and the single amygdaloid handaxe is also of flint, while unifacial chopping tools were flaked from limestone or siliceous limestone pebbles.

2.2.1.3.b. Venosa-Notarchirico. In this area, more than 500 m^2 have been excavated (Belli et al. 1991; Cassoli et al. 1993; Lefevre et al. 1993a; Piperno 1992, 1999; Piperno et al. 1990, 1998; Soprintendenza Speciale al Museo Nazionale Preistorico Etnografico "L. Pigorini" 1991). Twelve archaeological levels were found in a stratigraphic sequence of 7 m, each separated from the other by 10 to 100 cm of sterile deposit. Some are undisturbed dwelling surfaces, close to a body of water, while in others the archaeological remains have been reworked and transported by natural agents. Both faunal remains and industry are found at varying densities. The diaphysis of a hunian femur was found in level α (i.e., the uppermost one).

An interesting area at the top of level ß, excavated over 6 x 4 m and called "Elephant area," yelded eighty-four animal remains and forty-two lithic implements, including handaxes, choppers, and a few flake tools. Bones include thirty-

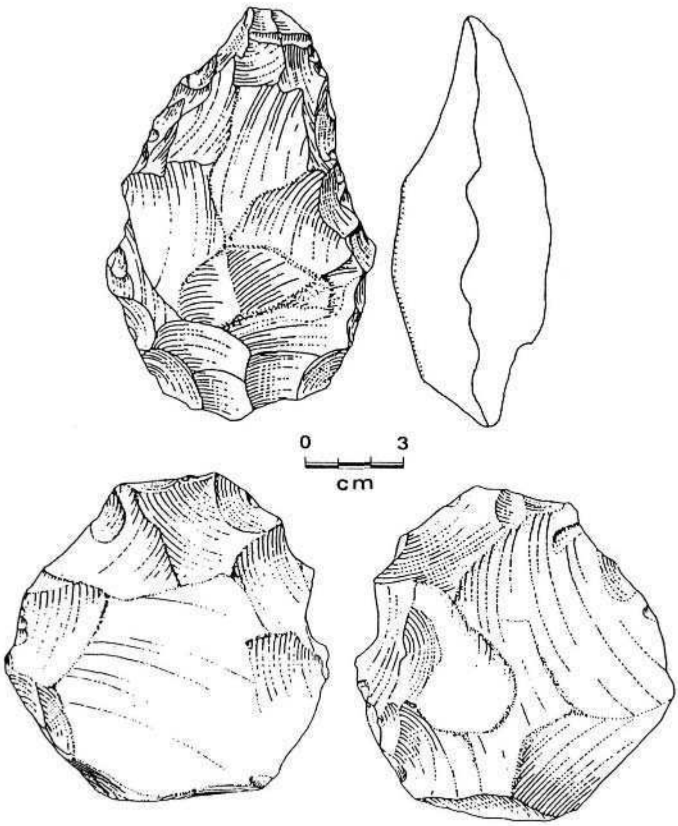

Figure 2.13. Venosa-Notarchirico.Lithic tools of level B (source: Belli *et al,* 1991).

eight remains definitely belonging to *Elephas antiquus,* fourteen fragments probably of the same species, nineteen remains of cervids, and thirteen indeterminable (Fig. 2.12).

Most of the remains are related to the skull of a subadult elephant, probably male, with the base in an upright position, partly destroyed by modern tilling. It seems that the mandible was artificially separated from the skull and displaced. Other parts of the skeleton are expected to lie buried outside the excavated area. The lithic implements are quite concentrated and the site is interpreted as a butchering area.

In general, in the various levels, most of the bone remains belong to *Elephas antiquus* and cervids (*Dama clactoniana, Cervus elaphus, Megaceros solilhacus*), followed by *Bos primigenius* and *Bison sclioetensacki.* Rhinoceros and wild boar remains are very scarce. Leporids, tortoises, and aquatic birds were also found.

Pollen samples were examined from the upper part of the sequence, between level C and level α. The environment was an open one, with a very limited amount of trees. The micromammals of underlying level E1 points to a climate cooler than

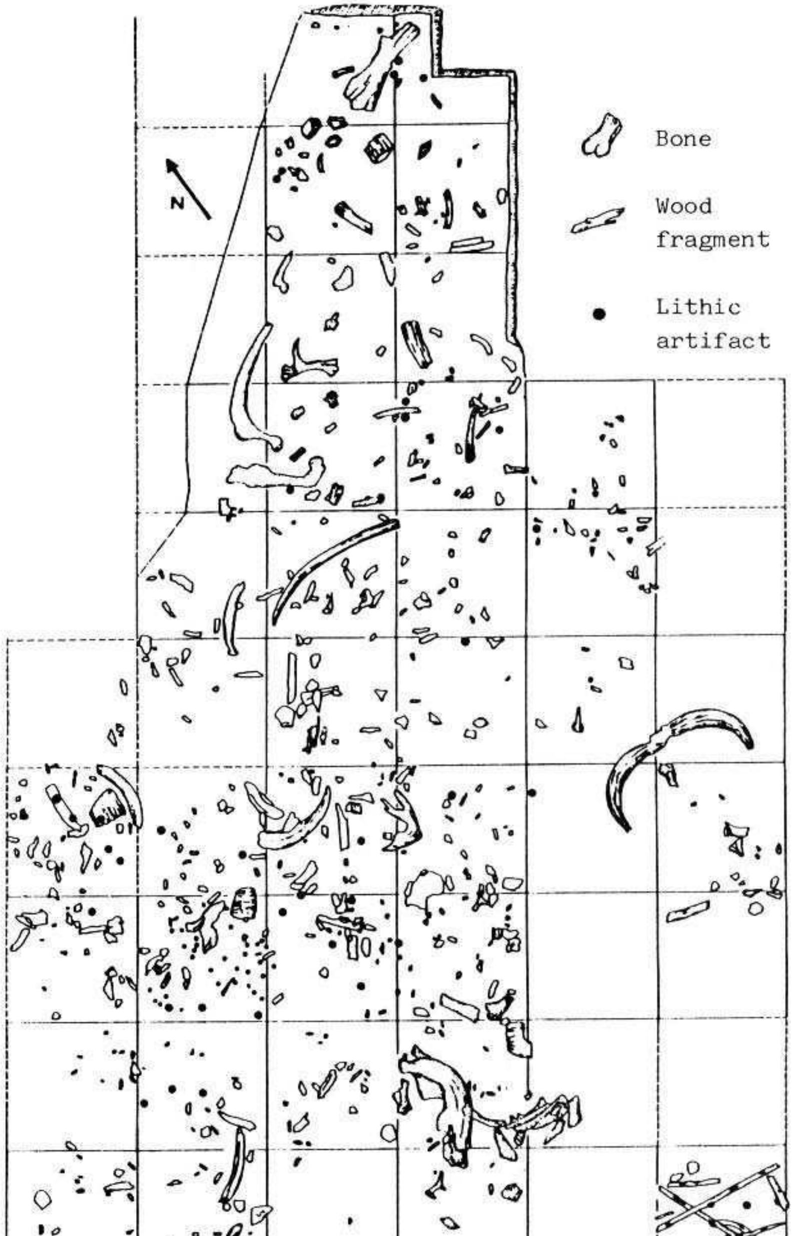

Figure 2.14. Fontana Ranuccio. The excavated area. Grid in meters (source: Gatti 1993).

today. Remains of *Arvicola cantiana* were discovered in layer E1 and between C and B.

Preliminary analysis suggests that lithic technology and typology are rather similar in levels A, B, C, D, F, G, and H. Pebble tools of limestone and siliceous limestone are predominant: mostly chopping tools, and some rabots and thick endscrapers as well. Many pebbles are just broken. There are a few flint and quartzite handaxes, mostly amygdaloid, rather thick and with sinuous edges (Fig. 2.13). Flake tools, limited in number, are usually quite small. Butts are plain and wide, In contrast, in levels α, E, and E1, retouched and unretouched flakes are predominant, and flint is the most frequent raw material. The associated pebble tools are of limestone. So far, handaxes have not been found in these levels.

Absolute dating was attempted using several methods. A level of pyroclastic sands capping the whole archaeological sequence was dated by thermoluminescence (TL) on quartz crystals to 260 ± 40 ka. The human bone found 15 cm above level α was dated by U/Th, U/Pa, and Pa/Th. The resulting average date is 359 + 154/-97 ka. *A Bos primgenius* tooth from level α was dated by isoleucine epimerization and an indirect calibration was made, using faunal remains from Isernia La Pineta. The resulting date of 500 ka has an error of ± 25–30 percent. ESR dates have also been measured on teeth from levels α and E, giving dates in the range of 160–260 ka, and 250–400 ka respectively. A pyroclastic level, overlying one of the lowermost layers (i.e., level F) was dated by TL on quartz crystals to 753 ± 60 ka, while other dating techniques suggest an age of approximately 640 ± 40 ka.

While the different methods of dating have given discrepant results, there is little doubt that the sequence of Notarchirico is of early Middle Pleistocene age, and that the fauna points to a chronology intermediate between Isernia La Pineta (previously discussed) and Fontana Ranuccio (see below).

2.2.1.4. Fontana Ranuccio (Latium)

Fontana Ranuccio is another open-air site in the inner part of the peninsula, about 60 km southeast of Rome, excavated over c. 60 m^2 (Fig. 2.14). The human settlement was close to what seems to have been the abandoned meander of a river. Fontana Ranuccio lies in a volcanic area and there are volcanic deposits at the site, permitting use of K/Ar dating (Biddittu *et al.* 1979; Biddittu and Segre 1982a; Gatti 1993; Segre and Ascenzi 1984; Segre *et al.* 1987). The only archaeological level was found to be 458 ± 5.7 ka old. This date is bracketed by a determination of 366 ± 4.5 ka higher up in the stratigraphic sequence, and by 487 ± 7.5 ka at a lower level. Caloi and Palombo (1986), in a thorough review of faunas from Latium, correlate the faunal assemblage (which points to a temperate and rather open environment) with OIS 11. There are, as usual, large pachyderms, horse, deer, and a few carnivores.

The following species were identified: *Efephas antiquus, Stephanorhinus hemitoechus, Hippopotamus* cfr. *amphibius, Sus scrofa ferus, Bos primigenius, Bison* sp., *Equus* cfr. *mosbachensis, Cervus elaphus, Dama clactoniana, Megaceros* cfr. *verticornis, Capreolus capreolus, Ursus deningeri, Panthera Ieo spelaea, Cuon*

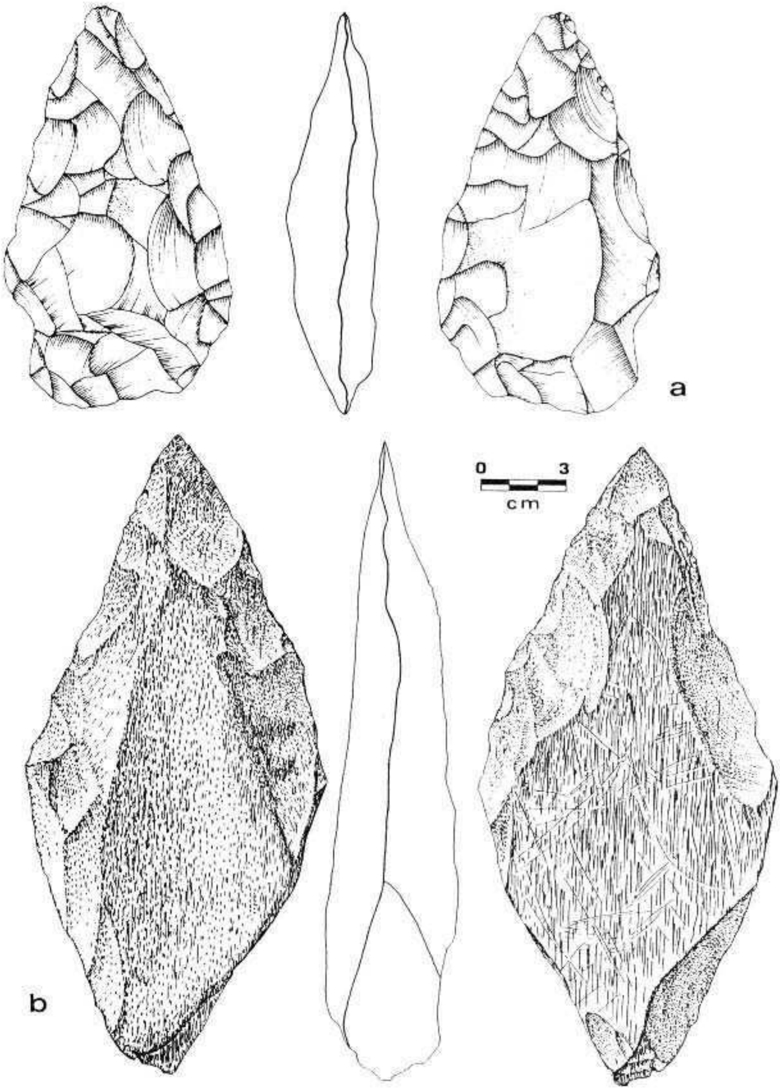

Figure 2.15. Fontana Ranuccio. Stone (a) and bone (b) handaxes (source: Gatti 1993).

cfr. *alpinus*. There were also some beavers and hares, aquatic birds, and a few human teeth.

The lithic industry is not abundant. The flake tools are quite small. Flint and lava were used as raw material. Side scrapers, transverse scrapers, double scrapers, convergent scrapers, déjeté scrapers, inverse scrapers, notches and denticulates are found. A minimum of five handaxes, a chopping tool, and a centripetal core are mentioned (Fig. 2.15).

Flaked bones were also found and reported as tools, such as handaxes and choppers. They were supposedly the result of the scarcity of good lithic raw material (see 2.3.3).

2.2.2. Human Remains

The paleoanthropological record is pitifully poor compared with animal bone accumulations. We have already noted a femur shaft at Venosa-Notarchirico and a few teeth at Fontana Ranuccio. We can now add part of a mandible and an isolated tooth from Visogliano, a karstic depression in northeastern Italy that was occasionally frequented by human beings during the Middle Pleistocene, somewhere between 700 and 300 ka (Cattani *et al.* 1991; Tozzi 1992); and three other fragments (ulna, tibia, parietal bone) from Cava Pompi near Pofi, south of Rome, where, after some geological correlations, an archaeological layer was described as underlying a lava flow c. 400 ka old (Biddittu and Segre 1978; Piperno *et al.* 1984). More recently, an archaic-looking calvarium was discovered at Ceprano, in the same general area as Pofi (Ascenzi *et al.* 1996). Correlations have been established with archaeological sites, but it should be stressed that no lithic remains were found at the find spot. The date of the calvarium is far from assessed, even if a great antiquity was suggested, in accordance with its archaic-looking morphology.

Not surprisingly when faced with this scanty record, reference is made either to *Homo erectus* or to the European Anteneandertalians, according to the opinions of the various physical anthropologists.

2.2.3. The Hypothesis of Direct Contacts with Northern Africa: Archaeology, Paleontology, Paleogeography, and the Sicilian Sites

The question of direct relationships between Sicily and Africa during the Paleolithic and, consequently, a southern origin for the earliest peopling of Italy has long been a controversial one. In 1929, R. Vaufrey, having examined the Sicilian faunas, excluded any contact across the Mediterranean. In 1975, M.-H. Alimen, following a different line of evidence, concluded in favor of such a possibility as far as late Acheulean was concerned (see 3.3.1): she considered the distribution of flake cleavers as well as the limited depth of the sea between Africa and Europe and the possible emersion of discontinuous land bridges during glacial periods.

Meanwhile, starting in the late 1960s and continuing up to the present, there have been more and more reports of typologically archaic lithic industries, often including chopping tools, from two separate areas: the surroundings of Agrigento on the southwestern coast, and of Catania on the eastern one (Segre *et al.* 1982, with comprehensive references; see Broglio *et al.* 1992 for an update). Only surface collections are known. Unfortunately, almost all of them come from amateur archaeologists and are uncontrolled. One collector even claimed that human bones and mammoth remains had been found at Mandrascava. His findings were reported in a major international exhibition (Laboratoire de Prehistoire du Musée de 1'Homme 1981), but were later found to be just wishful thinking (Piperno 1992).

So far, no "early''industry has been excavated. Reference is made to collections from "high terraces" of supposedly great antiquity, but an early date for the industries is not proven due to both the tectonic instability of the area and the possibility that people dwelt on such surfaces only long after they had first become available to settlement.

To further complicate matters, the published collections sometimes include tools that, given their typology, could well be later and Upper Paleolithic in date (see Chapters 5 and 7 for human settlement in Sicily during the Upper Paleolithic). Tusa (1992) also stressed that archaic-looking lithic tools are found associated with potsherds at some much later prehistoric sites of Holocene date-much more so when it happens, as is the rule in some areas, that quartzite, limestone, and lava are the available raw materials. Then, last but not least, we just ignore the effects of isolation on Paleolithic human groups, as communication with the rest of the world would have been at best rather difficult. We cannot rule out that such a critical situation could lead to unusual developments in lithics-other aspects of the cultural background not being available for investigations-and that this could result in meaningless evolutionary and comparative classifications. In summation, it is impossible at present to date the first human settlement in Sicily even though some of the lithic remains fit well into Lower Paleolithic typology.

As far as paleogeography is concerned, there is no evidence of even a discontinuous land bridge between Africa and Sicily after the Middle Pliocene, when there were immigrations of animal species. During the Middle Pleistocene, the Sicilian faunal assemblages—so far never found in association with any lithic tools—are characterized by the well-known dwarf pachyderms, and mostly by the small elephants, *Elephas mnaidriensis* and *Elephas falconeri.* As the latter is even smaller than the former (with an adult height of 1.05 m, equivalent to a large, modern dog), it has long been assumed that it also occurred later and derived from the slightly larger species. *Elephas mnaidriensis,* in turn, would have evolved from a subspecies of *Elephas antiquus* (i.e., *Elephas antiquus leonardii).*

This picture has changed in recent years, following the absolute dating of several assemblages through isoleucine epimerization (Bada and Belluomini 1985; Bada *et al.* 1991): the dates cluster into two different intervals, at 455 ± 90 ka and at 200 ± 40 ka, respectively. Both the tiny *E. falconeri* and the larger *E. mnaidriensis* are found in the earlier interval, while only the second one is in the later interval. It is now assumed that the two dwarf species are not in any phyletic relation, and that the so-called *E. mnaidriensis* of the later interval is possibly a still different species, relating to a new immigration of elephants. The species from which *E. falconeri* derived is consequently unknown, and it cannot be ruled out that a reconsideration of the problem, as well as the study of new and unpublished faunas, could lead to a new interest for African connections (T. Kotsakis personal communication 1994).

Sicily could also have been peopled from the north: the Messina strait could have been partially emerged during the early Middle Pleistocene, when animal species actually reached the island (Palombo 1985) (see 3.3.1 for further discussion). Other animal migrations happened at the boundary between lower and upper Middle Pleistocene, and during upper Middle Pleistocene. We expect that human groups would have been able to negotiate natural obstacles that did not stop other large mammals.

2.3. TECHNOLOGICAL DEVELOPMENTS

2.3.1. Trends in Lithic Technology

The earliest inhabitants of Italy were not fussy about raw materials. Limestone and poor-quality chert were readily used when available on the spot. At Visogliano, there is some use of exotic material—volcanic rocks, which are reportedly available at a distance of at least 40 km from the site (Cattani *et al.* 1991). In this case, however, the selected material had no peculiar knapping qualities and is better seen as evidence that people worried about the availability of suitable lithic material in new places and sometimes carried even poor-quality stone “just in case.”

There is some limited evidence that when suitable raw material was available, knapping sometimes took place at discrete locations: this would explain the high amount of cortical *débitage* and near absence of retouched tools from the excavated area of Monte Poggiolo. At Venosa-Loreto, and at Isernia La Pineta as well, the lack of cortex also points to preliminary flaking activities taking place outside the excavated area.

The knapping techniques used were crude. At Monte Poggiolo and Venosa-Loreto a single flake was struck from many pebbles (Antoniazzi *et al.* 1988; Crovetto 1991). The same is true at Arce and Colle Marino, south of Rome, where lithic implements were picked from deposits devoid of volcanites and, accordingly, possibly preceding the local volcanic activity (Biddittu 1972; Biddittu and Segre 1982a; Biddittu *et al.* 1979; Piperno *et al.* 1984). The latter started in the Hernican volcanic district at 700 ± 20 ka (Fornaseri 1985) (Fig. 2.16). It is not clear if only one flake was required, if the raw material was just tested, or if it was the effect of using pebbles as hammers. In fact, a bipolar flaking technique was preferred at most of the sites mentioned and also at Isernia La Pineta (Ferrari *et al.* 1991; Giusberti *et al.* 1991; Peretto 1994). It was also frequent in some of the Acheulean assemblages collected in the Atella Basin, next to Venosa, which, unfortunately, are so far rather poorly dated (Borzatti von Lowenstern and Vianello 1993). The intended core was placed on an anvil and struck from the top with a pebble so that, more often than not, a second flake, opposed to the first one, was detached by the reflected percussion waves. The bulbar face of such flakes is often longitudinally divided into two parts forming an open angle.

A different knapping technique is also described at Isernia La Pineta (Sett. II), and tentatively related to the intense exploitation of local raw material: flakes were detached from larger flakes, and the resulting by-products, also called “Janus flakes” or “Kombewa flakes,” had a double bulbar surface. Elsewhere, globular or shapeless cores are mentioned.

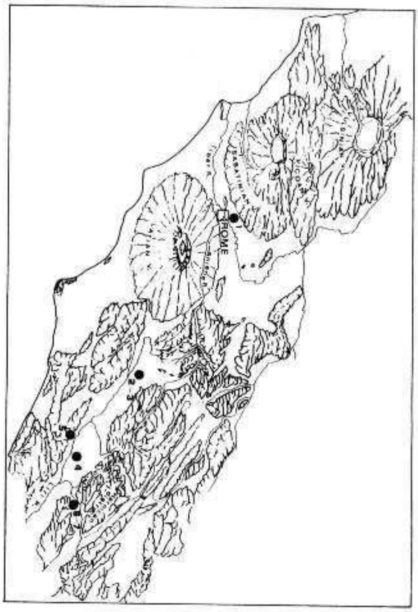

Figure 2.16. The earliest sites in the surroundings of Rome. 1: Valchetta Cartoni; 2: Fontana Ranuccio; 3: Colle Marino; 4: Cava Pompi; 5: Castro dei Volsci; 6: Arce; 7: Fontana Liri. The coast is approximately 200 km long, as the crow flies (based on an original drawing by M. Parotto, with modifications).

More organized *débitage* techniques were apparently scarcely developed. Discoidal cores (i.e., cores with centripetal flaking on a selected face or plane) are mentioned, if in small number, from the surface collection of Monte Poggiolo. A limited number (2–4 percent) of flakes with faceted or dihedral butts was noticed by Crovetto (1991; 1993) in a sample from Venosa-Loreto and from different levels of Isernia La Pineta. Discoidal cores, and flakes with faceted butts (18 percent among retouched flakes), are described at Casella di Maida, an open-air site in Calabria (Gambassini and Ronchitelli 1982). Unfortunately, only a limited part of the collection was found during regular excavations. Furthermore, there is no dating evidence, even if a date in the range of 700 to 500 ka was claimed because of the typological characteristics of the industry. Discoidal cores were also knapped by the human group that settled at Fontana Ranuccio approximately 450 ka ago and was already using handaxes (Segre *et al.* 1987).

Not surprisingly, the Levallois technique (i.e., the production of regular flakes from carefully reduced cores) is not found in any well-dated sites prior to stage 9-and possibly even later (see 3.2.1). Some scholars maintain the existence during the Lower Paleolithic of "Clactonian" industries, which included choppers and chopping tools, and flakes with a broad and inclined butt. These supposedly evolved into "Protolevalloisian" industries in which the flakes and even blades had dorsal scars related to some kind of core reduction, and unfaceted butts (Palma di Cesnola 1982; Radniilli 1977). Such industries, however, are found in reworked conditions and invariably rolled. At some sites, only a handful of implements are found, while elsewhere, larger collections are available: for instance, in the lower levels of Le Svolte and Valle Giumentina in Abruzzo, and at Foce del Torrente Romandato in Apulia. Once recovered, the lithic series are sorted according to their state of preservation, and a chronological and evolutionary sequence is worked out.

Cremaschi and Peretto (1988b), studying "Clactonian"and "Protolevalloisian" collections from northern Italy, showed that natiiral agents, and especially stream activity, sort lithic implements by size and weight. Larger ones, often with characteristics that can be easily described as "archaic," are consequently more rolled than lighter and apparently more "evolved" tools. Furthermore, since handaxes are included in several such assemblages, they maintain that the materials from Monte Gazzo, Cave Chiuse d'Idice, Cave S.A.F.R.A., and so on, are better described as Acheulean. Using geostratigraphic correlations, they date them to "an early part of the Middle Pleistocene."

2.3.2. Typological Characteristics of the Earliest Industries, Bifaces and Sampling Problems

The typology of the retouched flakes is monotonous: scrapers (most lateral), notches, denticulates (made by adjacent Clactonian notches, or by continuous retouch), occasional endscrapers, and borers. The retouch itself, when studied, is marginal and irregular, sometimes merging into a denticulate retouch. Steep and scalariform retouch, however, is found at Isernia La Pineta, Venosa-Notarchirico and Venosa-Loreto, Casella di Maida, Fontana Ranuccio, and Visogliano. It is certainly related to frequent resharpening of tools.

Core tools usually include unifacial chopping tools and a more limited amount of bifacial tools. In the publications concerning some sites, however, there is no satisfactory distinction between cores and chopping tools. This problem is further stressed in the study of the excavated material from Monte Poggiolo (Fig. 2.6): Antoniazzi *et al.* (1993) state that it was impossible to make any clear-cut distinction. A few polyhedrons and rabots are also mentioned at some locales. The evidence from Isernia La Pineta "Sett. II t.3a" suggests that chopping tools are not always to be found, even with extensive excavations. There were only scanty animal remains in this layer in contrast with the other levels, where numerous chopping tools and many bones co-occur. This is possibly the earliest evidence in Italy of differences in lithic industry being linked to differences in activities.

Handaxes so far are the only element required to define an "Acheulean" industry as such. They were definitely in use at Fontana Ranuccio by 450 ka, and earlier, in the range of 500–600 ka, at Venosa-Notarchirico. Occasional handaxes are mentioned elsewhere as "protohandaxes," including those of sites claimed to be very early, such as Monte Poggiolo. They were also found at Venosa-Loreto and, recently, in the lowermost levels of Visogliano (Piperno 1992). Taking into account the alternation of levels with and without handaxes at Venosa-Notarchirico and the limited quantity of tools found at some sites, there is a clear possibility of sampling bias leading to an overrepresentation of assemblages without handaxes: some of the so-called "Clactonian" and "Protolevalloisian" industries previously mentioned in 2.3.1 are an example. The same is probably true for the upper levels of Visogliano, which yielded a limited number of flakes and flake tools, tentatively linked by Cattani *et al.* (1991) to the "Clactonian," or even to the Tayacian of Caune de l' Arago in France. Furthermore, the evidence of Notarchirico, with "chopper assemblages" interstratified with "handaxe assemblages," also points to the fact that different sets of tools could well have been linked to specific activities.

2.3.3. Bone Flaking and Bone Tools

The use of bone as a raw material has long been a controversial issue in Lower Paleolithic archaeology, and Italy is no exception. Carnivore breakage and other natural agents such as running water loaded with sand modify bones without any human intervention. G. Haynes (1991) presents many examples of presumed bone and ivory "tools" actually resulting from gnawing, trampling, traumatic events in life, and so on. Breakage by human activity, often related to marrow consumption, also leaves scars that sometimes mimic tools. Examples of bones broken to extract marrow are found at Isernia La Pineta and Venosa-Notarchirico (see 2.3.4).

At Fontana Ranuccio, however, there is evidence that bones—mostly elephant and bovid bones—were flaked into symmetrical shapes, similar to those of stone tools (Gatti 1993) (Fig. 2.15). The finest piece is a carefully retouched handaxe 226 mm long, from a diaphysis fragment. It retains "cortex," that is part of the original bone surface. Then, there are bone flakes and some splintered bones with sets of quite regular flakes at the end or along their edges: in this case, artificial modification by humans is not the only option. Other implements, including a fragment with a smooth end, are even less clearly identifiable as tools.

Some supposed bone tools from Cava Pompi (Biddittu and Segre 1982b)—a site whose date is possibly not much dissimilar from Fontana Ranuccio (but see 2.5.1)-are less convincing: the amount of modification is minimal; furthermore, the specimens were found in a disturbed context after surface collections.

2.3.4. The Evidence of Interaction with Animals, Meat and Marrow Consumption

There is no question that stone tools are found in association with animal bones at sites such as Isernia, Venosa, Fontana Ranuccio, and so on. It is actually believed that when faunal remains are not found, this is due to poor preservation. Claims were made that the assemblage of Isernia La Pineta is conclusive proof of hunting practices (Cremaschi and Peretto 1988a; Piperno 1992) and even of selective hunting practices (Giusberti and Peretto 1991). Direct evidence of interaction between humans and animals, however, is rather restricted at this site as well as at others.

At Isernia La Pineta ("Sett.I t.3a"), the huge accumulation of bones is made mostly by elephant, rhino, and bison remains (Fig. 2.7). Elephant bones include many long bones and tusks, and a more limited amount of teeth, pelves, ribs, and vertebrae; bison bones are mostly cranial ones (namely, horns), scapulas, and iliac bones; rhinos are represented by skulls, teeth, and half mandibles (Giusberti *et al.*

1991). It is concluded that they were sorted and laid purposely on the ground. Furthermore, some remains were broken into pieces when fresh and dislocated over a restricted area (so that refitting is possible). This, too, was said to be effect of human activity.

Positive evidence, however, is rare. There are no preserved cut marks (Giusberti and Peretto 1991). Most of the bone surfaces were affected by animal trampling as well as by abrasion by water and sand in a muddy deposit. So far, artificial breakage scars have been positively detected on a dozen of the thousands of bones from the various levels. The selected elements are from bison forequarters (Anconetani *et al.* 1993). It can be assumed that marrow was looked for and consumed.

At Venosa-Loreto level A, bones are generally broken. Most are herbivore remains. Broken diaphyses sometimes have cut marks and scars left by stone tools that scratched the bone surface. The site is tentatively interpreted as a possible butchering area (Barral and Simone 1983).

In the ‘‘Elephant area” of Venosa-hotarchirico, the skull of a young elephant was turned upside down, the mandible detached and broken (Fig. 2.12). Some handaxes and choppers, as well as a few flake tools, are in direct contact with the carcass, and clearly associated with it. As noted earlier (see 2.2.1), those remains too are interpreted as indicating a probable butchering site (Piperno 1992, 1999). Some cervid and bovid bones from level *a* of this same site also display evidence of artificial fracture. Because of water transportation and weathering, however, cut marks, if any, are not preserved.

The evidence of butchering activities and, consequently, of meat and marrow consumption is sound enough. Hunting is a different matter. Occasional predation on small-sized animals is well known among modern primates (Butynski 1982). A similar pattern of activity was certainly possible for early humans. A different problem is the massive accumulations of large mammal bones documented during this early prehistoric phase, and in the following one as well (see 3.1.3). It is hard to believe that archaic humans hunted, killed, and transported back to selected spots, tens of elephants, bison, and other very large herbivores—or even just parts of them. Natural accumulation by stream activity and/or other natural agents is known at later sites and must have been the key factor in many instances. Watering areas, as known from modern occurrences, are another example of spots at which dying or dead animals are found rather frequently, especially during drought periods. Through time, “concentrations” of bones are accordingly built. Human beings were certainly taking advantage of dead or dying animals, and even possibly checking favorable spots for such bounties. At such sites, we consider them as predominantly opportunistic scavengers.

2.3.5. Fire and Fire Control

The evidence of fire at this early stage is very limited, if not frankly elusive At Isernia La Pineta, the clayish sediment was reddened over areas approximately 50 cm in diameter in Sett II In Sett I, some bones were found to have been exposed to intense heat (Peretto *et al.* 1983, Cremaschi and Peretto 1988a) Further evidence exists at Valchetta Cartoni near Rome, where a couple of rolled flakes were found below an ignimbrite layer, well-dated at 442 ± 7 ka (Blanc 1935–1937; Fornaseri 1985; Piperno *et al.* 1984): one of the two implements presented on the dorsal face scars left by tiny thermic flakes, and the flint was slightly reddened. However, this evidence is insufficient to demonstrate the control of fire by early humans and further evidence needs to be uncovered before it can proved.

2.4. CHARACTERISTICS OF THE PREFERRED ENVIRONMENTS

2.4.1. Problems in Site Preservation, the Geographical Distribution of Open-Air Sites, and an Evaluation of the Site Sample

The major paleogeographical characteristics have been outlined earlier (see 2.1.2). When early Lower Paleolithic assemblages were produced, the Italian territory was more restricted than it is currently, with a limited development of the coastal areas, and was repeatedly subjected to impressive tectonic activity. As a result, the inner and mountainous areas were affected by phases of rejuvenation of the drainage systems and, consequently, by intense erosion, while conspicuous amounts of coarse sediments were accumulated in the lowlands by river and stream activity. It is no surprise to find traces of human activity in residual fluvio-lacustrine deposits and in basins of the Apennines, as at Isernia, Venosa, Fontana Ranuccio, Cava Pompi, Arce and Colle Marino. We tentatively add to this list some sites known from surface collections and dated by direct or indirect geological correlations: Fontana Liri, in the same general setting as Arce, and possibly nearby Castro dei Volsci, which yielded limestone and sometimes quartzite industries with chopping tools (Biddittu 1972, 1974; Piperno *et al.* 1984); and the sites of the basin of Atella, close to the basin of Venosa, where many handaxes were produced, supposedly before the Vulture volcano started its activity some 520 ka ago (Borzatti von Lowenstern and Vianello 1993; Borzatti von Lowenstern *et al.* 1990).

As would be expected, sites are also located along former coastlines, inside deltaic deposits, as at Monte Poggiolo and Casella di Maida, or even Foce del Torrente Romandato. A different coastal geomorphological setting is found at Bibbona and Collinaia in Tuscany, which are on marine terraces, that is, on raised deposits left by a marine transgression preceding human settlement (Galiberti 1982; Galiberti *et al.* 1982; Sarti and Stoduti 1982). A date close to the final part of OIS 11 is suggested for both by Malatesta and Zarlenga (1988). To establish the chronology, however, much credit is given to typological aspects of the lithic industries themselves, which include chopping tools but no handaxes. Fauna was not preserved and radiometric dating was not attempted, so that the actual date of the industry is still an open question.

The apparent dichotomy in open-air site distribution, with settlements limited to inner basins and to the coasts, reflects geomorphological processes. Archaeo-

Figure 2.17. Isernia La Pineta. A reconstruction of the environment (drawing by L. R. Scarpante).

logical investigations were fruitful in those inner depressed areas where sediments of the appropriate date had been trapped and had in part escaped erosion (Fig. 2.2); other finds occurred close to river mouths, where sites were rapidly buried by alluvial deposits and consequently preserved. Precious little information is available on the human occupation that was going on in the area between the Apennines and the coast: at best, redeposited artifacts are found in river beds, as at Valchetta Cartoni near Rome. Some of the rolled “Clactonian” and loisian” assemblages are other remnants of these elusive intermediate settlements.

The available sample is subject to much bias. A few general considerations are possible. Open-air sites have been positively located at an elevation within 500 m asl. Taking into account the subsequent tectonic movements that uplifted many areas, they were not situated in mountainous areas, but instead in flat or gently undulating parts of the territory.

2.4.2. Characteristics of the Local Environment

Reconstruction of the environment was attempted at only a few sites. At open-air sites such as Monte Poggiolo, Isernia La Pineta, and Venosa-Notarchirico, the scarce pollen record points to a steppe or a grassland, with a limited amount of trees in restricted stretches of land (Fig. 2.17). This accords well with faunal assemblages that, when preserved, include large gregarious herbivores that needed extensive grazing ground. The same picture was possibly also true at Fontana Ranuccio, with large mammals but no palynological analysis. At Visogliano, the analysis performed on the few levels with preserved pollens suggests a forested environment, with mixed coniferous and broad-leaved trees (Cattani 1992). A different part of the deposit admittedly yielded micromammals which point to mountain grasslands and steppes (Bartolomei and Tozzi 1978). In any case, the scanty archaeological record of Visogliano is indicative of occasional and/or short-lived visits.

As a hypothesis based on scanty evidence, it can be suggested that open environments were favored. Bodies of water or streams almost invariably are present in the immediate vicinity, but it cannot be ruled out that this merely relates to a better preservation of sites in fluvio-lacustrine environments. Availability of good raw material does not seem to have been a prerequisite to any settlement, as limestone, quartzite, poor quality flint or chert, and so on, are the rule in the lithic industries of these sites.

2.4.3. Cave Sites Compared to Open-Air Sites, Site Extension and Patterning

The evidence from cave sites is rather restricted. Furthermore, due to poor chronological resolution, a later date for some of them cannot be ruled out. Visogliano, in Northern Italy, has already been discussed (see 2.2.1). Archaeological remains are very scarce, with the rockshelter being used only sporadically. At Grotta del Colombo, in Liguria, similarly elusive evidence of an early human occupation is found in the lowermost levels, which predate OIS 9 (Baïssas *et al.* 1986). At Monte Peglia, in the central part of the peninsula, the faunal assemblage is referred to as early Middle Pleistocene, but there is no conclusive evidence of its actual association with five stone tools collected in the immediate vicinity, one being dubious (Piperno 1972; Tagliacozzo 1992). This site, situated 800 m asl, would so far be the only one known above 500 m.

Open-air sites typically extend over large areas: at hernia, the archaeological deposit, at varying density, is known to extend over more than 30,000 m^2, while Monte Poggiolo is only one of many similar sites in the same general setting. As we assume that human groups were restricted in size, and their density quite low, large sites are better understood as the palimpsests of many different events.

A good example, if from a much later period, was found at Maccarese, in the coastal area of Rome (Arnoldus-Huyzendveld *et al.* 1993). Here, the geopedological analysis indicated that a slightly undulating landscape remained in existence, with a rather stable surface, over some 50,000 years or more. Lithic tools accumulated over time to a significant density. At Maccarese, the typological changes, from Mousterian to Early and then Late Upper Paleolithic, made it clear that many millennia had elapsed. At any of the early sites so far considered, the extreme conservativeness of lithics through time would not have allowed such an analysis. If we assume that the handful of implements found in the cave sites are indicative of a generally low rate of discard outside knapping areas or butchering sites, a significant horizontal density over large stretches of stable landscape would be attained after many repeated settlements. Large open-air sites mean, if anything, that early humans settled again and again in the same areas. It is not known if this happened cyclically, following seasonal changes in available resources.

This is not to imply that discrete entities cannot be isolated from the general framework. This is easier when alluvial deposits separate archaeological "events" of some duration in their original context as, for instance, at Venosa-Kotarchirico, whose ''Elephant Area" has been mentioned (see 2.2.1). The huge accumulation of bones and lithics at Isernia La Pineta "Sett.I t.3a" is another example. At Monte Poggiolo, refitting being possible, many implements can be directly linked to each other. They give evidence of discrete sets of activities, probably very close in time.

To summarize, site patterning is limited to overall changes in density, to knapping activity, and to the recognizable exploitation of bones or carcasses probably accumulated by natural agents.

2.5. COMMENTS

2.5.1. The Date of the First Settlement: Long or Short Chronology?

For years, it was assumed that the first settlement of Europe happened at least one million years ago, and a similar chronology has been put forward in Italy, too (Bonifay and Vandeermersch 1991; Laboratoire de Prehistoire du Musée de 1'Homme 1981; Peretto 1992). A general revision of the problem produced a different and shorter chronology in Europe as well as in Italy (Roebroeks and Van Kolfschoten 1994). This position was mitigated after the reassessment of the age of Atapuerca TD6, and consideration of the possibility that southern Europe experienced an intermittent occupation at an early stage (Roebroeks and Van Kolfschoten 1996). In this perspective, the supposed great age of some Italian sites must be reconsidered (Mussi 1995).

Monte Poggiolo was not directly dated: the date of one million years and more was put forward for the "Sabbie Gialle," then correlated with the archaeological site.

The evidence from Isernia La Pineta is sounder. However, biostratigraphical correlations are problematic: the microfauna includes *Arvicola terrestris cantzana,* an important marker that is definitely later in date at any other European site (Roebroeks and Van Kolfschoten 1994; Von Koenigswald and Van Kolfschoten 1996). Furthermore, the bison are more evolved toward modern forms than at Venosa-Loreto, supposedly 200 or 300 ka later (Caloi and Palombo 1980). There now seems to be an agreement that this site, just like the sequence of Venosa-Notarchirico, is no longer related to the Early Pleistocene and fits within the early Middle Pleistocene (Piperno 1999).

The chronology of other supposedly very early sites is much less well assessed. Monte Peglia yielded microfaunal assemblages dominated by *Mimomys blanci* and *Allophaiomys* sp., and referred to the lower Biharian (Van der Meulen 1973), but the few lithic tools were not found *in situ.* A date of > 700 ka for Arce, Fontana Liri, Colle Marino, Nocicchio, all southeast of Rome, is solely based on the lack of volcanites in the deposits—volcanic activity starting at c. 700 ka in the area, known as the Hernican volcanic district—and on regional correlations that have been modified repeatedly (Biddittu 1972; Biddittu and Segre 1982a; Riddittu *et al.* 1979; Gatti 1993; Piperno *et al.* 1984; Segre *et al.* 1987) (Fig. 2.16). Similarly, at Irsina-Costa del Forgione, one of the sites of the Venosa area, a single rolled flake was collected from the surface and correlated with a level that predates the beginning of the activity of the Vulture volcano, starting at c. 850 ka (Segre 1978).

Other sites are claimed to be in the range of 500 ka. At Cava Pompi, lithic implements, as well as human and animal bones, were collected and excavated. They are said to be stratigraphically overlain by a basalt flow of c. 400 ka (Piperno *et al.* 1984). This correlation was never documented in any detail. A previous publication considered it a rather dubious correlation, for reasons including the distance between the outcrop and the archaeological site (Biddittu and Segre 1978). Close to Venosa, in the Atella Basin, a date preceding the activity of the Vulture volcano (i.e., earlier than 500 ka) has been proposed for sites with Acheulean industry (Borzatti von Lowenstern and Vianello 1993; Borzatti von Lowenstern *et al.* 1990). Unfortunately, there is no detailed geostratigraphic study of the archaeological deposits. On the coast of Tuscany, at Bibbona and Collinaia, collected lithic assemblages were dated to OIS 11, on the basis of long- and short-distance geostratigraphic correlations (Galiberti 1982; Malatesta and Zarlenga 1988; Sarti and Stoduti 1982). The typological characteristics of the industry, devoid of handaxes, are assumed to date the deposit, but there is no independent evidence for absolute chronology.

We have already discussed the problems related to the first settlement of Sicily (see 2.2.3). Sardinia is even more problematic. The last arrival of animal species preceding the Holocene presumably occurred in the early Middle Pleistocene (Palombo 1985). The strait separating it from the continent would have been possibly reduced to some 7 km, taking into account glacio-eustatism as well as tectonic movements. In the Anglona region of northern Sardinia, lithic industries have been collected and excavated at open-air sites. They have been related to the "Clactonian," and a seriation from more "archaic" to more "evolved" has been elaborated (Martini 1992, 1999; Sondaar *et al.* 1991). Chopping tools are not mentioned. No faunal remains were found, and no radiometric dating attempted-to the point that J. F. Cherry (1990) suspects a "pre-Neolithic" (i.e., Holocene age) for this archaeological evidence. Despite this, F. Martini (1992) suggested that humans could well have reached Sardinia with the other animal species at the time of the early Middle Pleistocene immigration. The effects of extreme isolation on restricted human groups are not considered.

We do not wish to suggest that at least some Italian sites cannot he as old as claimed in the literature, but rather that their chronology is not full) ' assessed. We are satisfied, however, that a date in the range of 650 to 400 ka is reasonably supported by the evidence from Venosa-Notarchirico, Venosa-Loreto, Fontana Ranuccio, and even the minor site of Valchetta Cartoni, with Isernia La Pineta antedating all of them. We suspect that in Italy, as in the rest of Europe, an "African model" has been implicitly looked for; that is, industries with handaxes (i.e., the Acheulean) must have been preceded by industries without handaxes, mimicking the Oldovan. However, there are obvious chronological discrepancies, as the European "chopper assemblages" are later than the African or Middle Eastern Acheulean. There is also interstratification of ''chopperassemblages" and "handaxe assemblages" at Venosa-Notarchirico (see 2.3.2), and more will turn up at later sites (see 3.2.1). Furthermore, handaxes are not just "more refined choppers" of later date, as it was often implicitly assumed in the past (see, for instance, Bordes 1968). Differential use of handaxes and choppers for specific activities is a hypothesis not yet fully tested, but certainly more stimulating than the chronological seriation of assemblages.

In our opinion, the earliest Italian lithic assemblages fit the Acheulean, which is admittedly loosely defined at any place and time by handaxes only. Specialized activities, sampling bias, and lack of suitable raw material account for ''chopper only" assemblages.

So far, a "modified" short chronology for the European and Italian Paleolithic (i,e.,starting around 700 to 600 ka but accommodating intermittent earlier presence) makes better sense of the archaeological record. It is also consistent with the lack of lithic tools and of other evidence of human activity in the many Pliocene and Early Pleistocene sites in Italy with preserved faunal assemblages that have long been studied by paleontologists. An earlier phase of human settlement, in the range of one million years and similar in age to Atapuerca "Aurora Stratum" (Bermudez de Castro *et al.* 1999), is also an interesting possibility provided that good evidence turns out. If definitively proven, it would further prove that Europe was first colonized during the relatively mild glacial–interglacial cycles antedating OIS 24. Following this line of reasoning, however, the first human population of Europe would have been unable to cope with the much more marked climatic shifts that, after N.J. Shackleton (1995), started with OIS 24. The subsequent recolonization, however, documented by Isernia La Pineta, Venosa Notarchirico, and similar sites would have been more successful.

2.5.2. The Density of Human Population: Continuous or Discontinuous Settlement?

Notwithstanding the discussion in the previous section, many more reasonably dated early sites are known in Italy than in most parts of Europe. All the same, they are ridiculously few if compared to the immense amount of time involved: if the rate were the same during the rest of prehistory, we would have one or two sites for the whole Upper Paleolithic. It is only the extreme conservativeness of early Lower Paleolithic that allows us to cautiously draw a few conclusions.

We assume that human density was low, even if there is no way to make any positive evaluation. It seems that a substantial part of the available territory was explored and settled, from Visogliano in the northeast to Casella di Maida in Calabria, from Gr. de! Colombo in Liguria to Venosa in the southwest, not to inention Sicily as a slim possibility. Humans were able to cope with the very different resources offered by the Apennines and by the seashore, and certainly also by the intermediate stretches of land where site preservation is poorer. Seasonal migrations can be suspected, if not proved.

Human settlement in an area effectively isolated by the Alps and the sea could well have been discontinuous: in small and isolated populations, the balance between sexes and ages is easily affected by stochastic variations that cause great stress on reproductive capacities and on survival from one generation to the next. However, the lithic industry is not different from that of the rest of Europe, suggesting direct or indirect contacts well beyond the natural geographical boundaries. Animal species, on the other hand, change greatly during the Middle Pleistocene: more archaic Villafranchian species either become extinct or evolve locally, while many new ones enter the peninsula (Caloi *et al.* 1986). Italy was not a secluded area. The same circumstances that favored the immigration of large mammals can well have facilitated an influx of new human groups. We suspect that this process greatly enhanced the chances of survival of those groups that had already settled there, far away from more centrally located parts of Europe.

2.5.3. Glimpses into Social Organization

Direct evidence relating to social organization is nonexistent in the archaeological record. The lack of artificial patterning at dwelling sites has already been discussed (see 2.4.2). The achievements of lithic technology were effective enough to ensure survival, but quite limited all the same. T. Wynn (1979, 1981) pointed out that choppers and chopping tools, as well as the scrapers that usually accompany them, are related to a capacity in spatial organization much more limited than in modern humans, and that even symmetrical handaxes were obtained through simple logical operations. The very limited human skeletal remains so far found (see 2.2.2) apparently reflect the remains of corpses abandoned without further treatment, which is no surprise at this early stage of prehistory.

It is much easier to determine what social organization was not (i.e., certainly not that of any modern hunter–gatherers) than what it actually was. Simulations of model populations by H. M. Wobst (1974) demonstrate that the imposition of cultural rules on the mating system, even those of biologically modern humans, creates great stress, or is simply impossible, under low population densities. We expect demographic constraints to have been even more effective in this regard during the Lower Paleolithic.

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Chapter 3

Real Colonization

3.1. INTRODUCTION

The present period of normal magnetic polarity, the Brunhes period, started at c. 780 ka bp, and the beginning of the Middle Pleistocene is correlated with its onset. There is a major climatic change in the mid-Brunhes—the "mid-Brunhes climatic event" (Jansen *et al.* 1986)—with a trend toward more glacial conditions in the Northern Hemisphere. This can be seen also in the record from deep sea drilling in the Tyrrhenian Basin, starting at the base of the local "Interval l," from c. 340 ka onwards (Vergnaud Grazzini *et al.* 1990). We consider here the archaeological record from OIS 9 to 6 (i.e., starting just before that event, and ending before the last interglacial–glacial cycle, from c. 360 to c. 130 ka bp), after the timescale of Bassinot *et al.* (1994).

3.1.1. A Critical Evaluation of the Chronological Framework and Dating Methods, the Major Gaps in the Archaeological Record and Lakes and Caves

Starting with OIS 9, there are more dated sites. The main chronological problem is no longer to prove a putative considerable antiquity but to reach a finer-grained distribution in time. Good results are obtained when sites are related to a local geostratigraphic sequence, as for those of the Aurelian and Vitinian Formations near Rome, or for the loess sites of Northern Italy (see 3.1.3). In such instances, even if absolute dates are not provided, or even if they are subjected to revision, contemporaneity or sequentiality remains established.

Radiometric dates are of help, but not unambiguous: the preliminary value of some methods, the inherent inaccuracy of others—with standard deviations covering a span of 50 ka or more—and even local conditions, such as a high natural radioactivity, lead to results that more often than not are just broadly indicative. Inconsistent results are often displayed at sites dated through different systems.

However, the accumulation of data and refinement of methods progressively restrict vagaries and uncertainties. In the volcanic area of central Italy, for instance, some 5,000 km² are covered by volcanic products, and hundreds of determinations are available, chiefly obtained by K/Ar analysis. Consequently, the date of some regional markers is reasonably well established (Fornaseri 1985).

Direct or indirect absolute dating, however, is not available at all sites, either because they were found a long time ago and not revised, or for the lack of suitable materials, or also because they are not correlated to a geological sequence. This often happens with surface collections. As with earlier sites, typological and technological seriations are then elaborated, starting with collections of “rougher” materials, and finishing with the more refined and presumably later ones. Again, we will not take into account such evidence, unless there is some way to correlate it with stratigraphically established sequences. Similarly, we will not mention references to the Alpine glacial sequence and to attributions such as “Riss I” or “Riss II," still to be found in the literature.

Italy is a rather narrow peninsula, and a large part of the geomorphological and sedimentary processes is linked to sea level fluctuations either directly, along the coasts, or indirectly, through fluvial systems of limited extent. As said previously (see 1.1), the coasts develop over almost 9,000 km, while most of rivers are no more than 100 to 200 km long. Correlations with isotopic stages are appropriate and more significant than in continental parts of Europe.

However, the “marine control” of the sedimentation is a problem in itself. High stands cause aggradation and sedimentation, but a subsequent fall in sea level implies rejuvenation of river systems to reach the new base level and, consequently, considerable erosion. The process is actually rather complex, as many oscillations occur; and furthermore, tectonic activity often blurs the picture. All the same, there is a general agreement that the onset and maximum of a cold climatic phase cause first a falling and then a low sea level, and that inland extensive erosional surfaces develop. Most of the sedimentary sequences and the archaeological evidence of open-air deposits, on the contrary, are related to a rising or high sea level, and therefore almost exclusively to interglacials. As a consequence, we find several references to odd-numbered isotopic stages (i.e., to the warm ones) and very few to even stages, which have a cold climate.

The many gaps in the record can only be filled where natural ‘‘sedimentary traps” occur, such as tectonically controlled basins and caves: in both instances, the deposits are protected and not eroded by rivers linked to the changing sea level.

An example is the Venosa basin. However, in the long sequence described by P. Baissas (1980) at Venosa-Loreto, with eight alternating cold and warm climatic oscillations, archaeological remains are found only in a few levels (Fig. 2.10). The earliest archaeological layers (i.e., levels A and B) which were close to a paleolake, were discussed in the previous chapter (see 2.2.1). In the upper part of the deposit we are now dealing with, traces of human activity can only be detected in the so-called level 3, or level C (a much disturbed level, known as D, is closer to the surface). Paleomagnetism is negative and correlated with the Jamaica event, approximately 200 ka old. It would be late OIS 7, in good accordance with the climate inferred from the pedological analysis and described as “warm with a brief

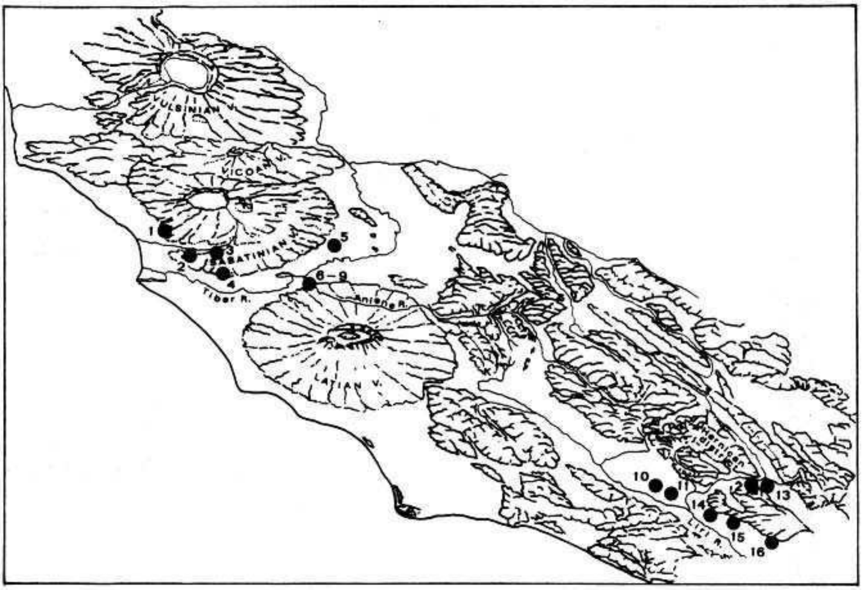


Figure 3.1. The sites in the volcanic surroundings of Rome, from OIS 9 to OIS 6. The modern city is located at the confluence of the River Aniene with the River Tiber. 1: Torre in Pietra; 2: Castel di Guido; 3: La Polledrara; 4: Malagrotta; 5: Riano; 6: Monte delle Gioie; 7: Sedia del Diavolo; 8: Casal de' Pazzi; 9: Ponte Mammolo; 10: Ceprano; 11: Lademagne; 12: Valle Radice; 13: Carnello; 14: Pontecorvo; 15: Aquino; 16: Pignataro Interamna. The coast is approximately 200 km long, as the crow flies (based on an original drawing by M. Parotto, with modifications).

cold episode" (Baissas 1980). Deposits belonging to cold phases were also recognized in the sequence but found to be devoid of any archaeological materials.

Another lake was in existence during the Middle Pleistocene in the Liri valley, or Valle Latina, between Rome and Naples, where the early site of Fontana Ranuccio is also located (see 2.2.1). It is also called "Bacino Lirino." As usual, it was a long and narrow basin, controlled by the tectonic activity of the Apennines. Lithic industries, including many handaxes, and animal bones, have been collected for more than one century, often from the surface and from quarries, and rarely from limited test pits (Biddittu 1974; Biddittu and Cassoli 1968; Piperno *et al.* 1984). Elephants, rhinos, horses, red deer, and aurochs are frequently found, but no controlled quantitative study of species frequencies is available. Caloi and Palombo (1986; 1988) tentatively correlate the sites of Aquino, Ceprano, Lademagne, Pignataro Interamna, and Pontecorvo with OIS 9, or early OIS 8 (Fig. 3.1). Therefore, it would be, again, a series of settlements basically within a warm phase, even if some worsening of the climatic conditions is suggested by "cold" bird species at Ceprano and Pontecorvo.

The overall evidence of cave occupation by humans is scarce prior to the last glacial (but see 3.2.4 for a discussion). At Grotta del Colombo in Liguria, according to sedimentological analysis, the study of micromammals and two Th^{230}/U^{234}

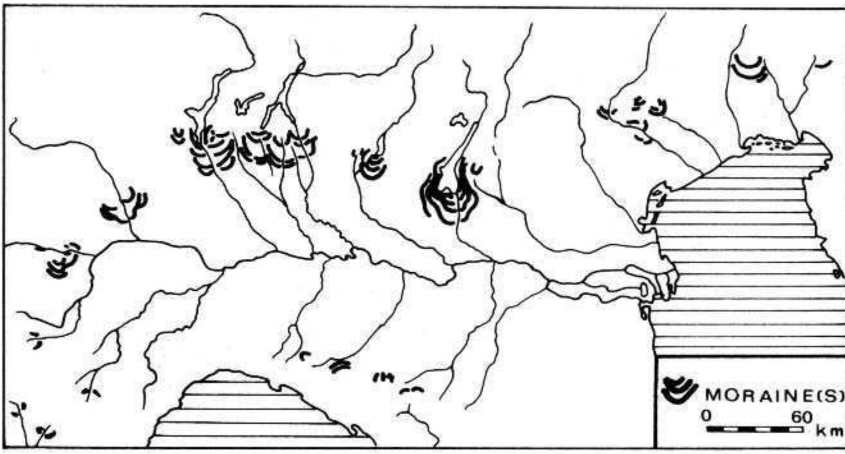


Figure 3.2. Northern Italy. The terminal moraines deposited by the major glaciers. The innermost deposits are of Würmian date, the external ones of pre-Würmian date (redrawn after Desio 1973).

dates of > 246 ka and > 252 ka on a stalagmite at a distance from the excavated area, there would be discontinuous archaeological evidence from OIS 9 to 5, including OIS 8 and 6 (Baissas *et al.* 1986; Tozzi 1965). Another cave site is Grotta del Principe, in Liguria, which is further discussed (see 3.1.3). A further cave is Riparo esterno at Grotta Paglicci (i.e., the shelter just outside Gr. Paglicci, as *riparo* means "shelter"): it yielded Acheulean tools but cannot *so* far be dated with any precision (Mezzena and Palma di Cesnola 1971; Palma di Cesnola 1982a). The micromammals suggest an open and even steppe-like environment, which fits a glacial phase (Bartolomei 1980).

The few sites listed earlier as of possible glacial date only yielded limited or even poor archaeological evidence. More information would come for the open air sites of loess environments, if we date them to OIS 8 or 6 (see 3.1.3, *Torrente Conca).* Unfortunately, bones were not preserved. We are clearly dealing with an archaeological record that is discontinuous and severely biased toward interglacial periods.

3.1.2. The Environment during the Late Middle Pleistocene

In the late Middle Pleistocene, elongated lakes were in existence, as in previous periods (Malatesta 1985) (Fig. 2.2). They were located at low elevations in the folds of the Apennines, in a more or less northwestern to southeastern direction. Human groups continued to settle on their shores (see 3.1.1). There is also definite evidence of extensive glaciations, both on the Alps and on the Apennines (Fig. 3.2). However, just as for earlier glaciations, there is no detailed chronological reconstruction of glaciers expanding and retreating over this very long time span.

Between the Alps and the Apennines, in the Po basin, loess was deposited during part of the late Middle Pleistocene (Cremaschi 1979, 1990). Loess is a very fine-grained sand transported by eolian activity: it indicates strong winds blowing over quite denuded surfaces, and a rather arid and cold climate. The loess deposits are now found as much eroded and pedogenized remnants, mostly along the margins of the Po plain and in the pre-Alps (Fig. 3.9). Their date is worked out through the study of the many archaeological sites in them, and they are currently correlated with OIS 7, after some not unambiguous radiometric determinations (see 3.1.3, *Torrente Conca*). As the evidence points to an open environment with a steppe-like vegetation that does not fit with an interglacial, an attribution either to late OIS 8, or to OIS 6, seems more appropriate.

In fact, when long palynological records are available, interglacials are marked by high amounts of tree pollens and by a forested landscape (Follieri *et al.* 1986, 1988; Paganelli 1984). The story of the vegetation cover is better understood in central Italy, as several pollen cores have been studied. The longest is from Valle di Castiglione, just north of Rome and more or less at sea level (Follieri *et al.* 1988).

At Valle di Castiglione, several phases of steppe-like and forest vegetation rather quickly alternate, starting at c. 250 ka at the bottom of the core. During the periods that can be correlated with OIS 7 and 6, the forests were never very thick, while the steppes that developed during cold phases also included some trees and were similar to those presently found in North Africa and in the Near and Middle East. The arboreal species mostly represented were *Fagus*, *Carpinus*, and *Quercus*, as well as *Abies*, but also include the archaic *Zelkova* and *Pterocarya*. As a whole, the climate seems to have been rather arid, with more rain allowing forest expansion during some periods: a notable example is phase VdC-5, which can be correlated with a late part of OIS 7; a montane forest developed because of rain during most of the year (i.e., including summer—something presently rather unusual in the Mediterranean).

Even if the climate was markedly deteriorating it was not yet as cold and arid as during the last glacial, and the mammal species did not change much. The environment was still suitable for "warm" species such as elephants, hippopotamuses, rhinoceroses, and monkeys (*Macaca sylvana*). New species included both *Dama dama* (the modern fallow deer as opposed to the archaic *Dama clactoniana*), which requires a temperate climate, and *Equus hydruntinus*, the hydruntine horse, which was smaller than the common horse and related to a much more open and steppe-like vegetation.

As a whole, human beings were living in environments not very much different than in previous phases of their settlement in the peninsula. Interglacial and glacial conditions, however, were progressively more contrasted.

3.1.3. Some Relevant Sites

Acheulean industries (i.e., lithic assemblages, including a varying percentage of handaxes), as well as assemblages devoid of handaxes, are frequently collected in open-air sites all over Italy. Cave sites have been excavated, too. Stratigraphic, chronological, and environmental characterization, however, is quite poor. The groups of sites described in this section are better understood and defined.

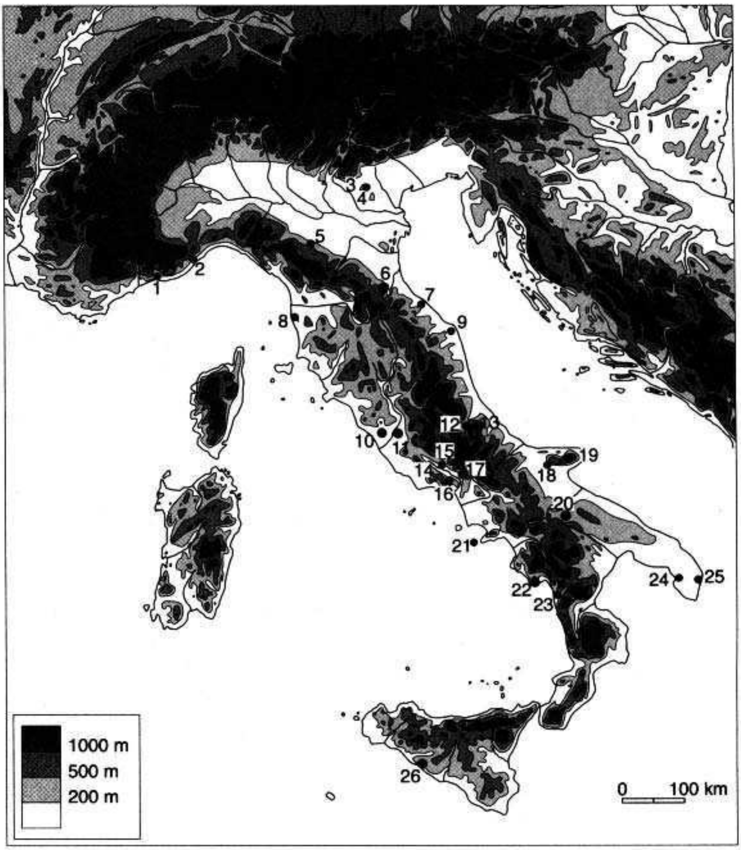


Figure 3.3. Site location, from OIS 9 to OIS 6. 1: Gr. del Principe (Gr. du Prince); 2: Gr. del Colombo; 3: Cave di Quinzano; 4: Gr. Maggiore di S. Bernardino; 5: Ghiardo; 6: Petrignone zona 5 (PT5), Castiglione zona 2 (CS2); 7: Torrente Conca; 8: Stillo; 9: Monte Conero; 10: Torre in Pietra, Castel di Guido, La Polledrara, Malagrotta; 11: Monte delle Gioie, Sedia del Diavolo, Casal de' Pazzi. Ponte Mammolo. Riano; 12: Le Svolte; 13: Valle Giumentina, La Selvotta; 14: Ceprano; 15: Carnello, Valle Radice; 16: Lademagne; 17: Aquino, Pontecorvo, Pignataro Interamna; 18: Gr. Paglicci (Rip. esterno); 19: Monte Gargano; 20: Venosa Loreto, Venosa Lichinchi; 21: Capri; 22: Gr. del Poggio, Marina di Camerota; 23: Rosaneto; 24: Gr. dell'Alto; 25: Gr. Romanelli; 26: Pergole, Contrada Maddaluso.

3.1.3.1. The Sites of the Via Aurelia (Latium)

The environs of Rome, and the capital itself, are rich in Paleolithic sites. A group clusters along the coast in the vicinity of the Roman Via Aurelia, where Lower Paleolithic finds are often mentioned. We briefly describe the major ones that are included in deposits known to outcrop in most of the hills around Rome, referred to by geologists as to the *Formazione Aurelia* or "Aurelian Formation" (Conato *et al.* 1980). They are the remains of filled lagoonal and lacustrine basins, or of ancient fluvial channels. They contain rolled fragments of volcanites known as *tufo rosso a scorie nere,* from the Sabatian or Vicoan volcanic group north of the capital, as well as of *tufo litoide* or *tufo lionato* from the Alban volcanoes south of the modern town. Sometimes the Aurelian Formation directly overlaps the volcanites, which are accordingly older: the *tufo rosso a scorie nere* is now dated to 442 ± 7 ka, while the *tufo litoide* has a date close to 366 ± 4.5 ka (Fornaseri 1985) (Fig. 3.1).

The Aurelian Formation was dated to 320-305 ka at an outcrop some 80 km northwest of Torre in Pietra (see below) by ESR on *Glycimeris* shells (Radtke *et al.* 1981). A later stage of the Formazione Aurelia was tentatively dated to 300-270 ka, based on less satisfactory determinations. As a whole, it is correlated with OIS 9 (Caloi and Palombo 1986; Caloi *et al.* 1998).

At a single site, Torre in Pietra, the levels of the Aurelian Formation are overlain by those of a second sedimentary cycle, the *Formazione di Vitinia* or "Vitinian Formation" (Fig. 3.4). It was deposited under conditions very similar to those of the Aurelian Formation and is now correlated with OIS (Arnoldus *et al.* 1991; Caloi *et al.* 1998). Several archaeological sites of Rome itself belong to the Vitinian Formation (see below).

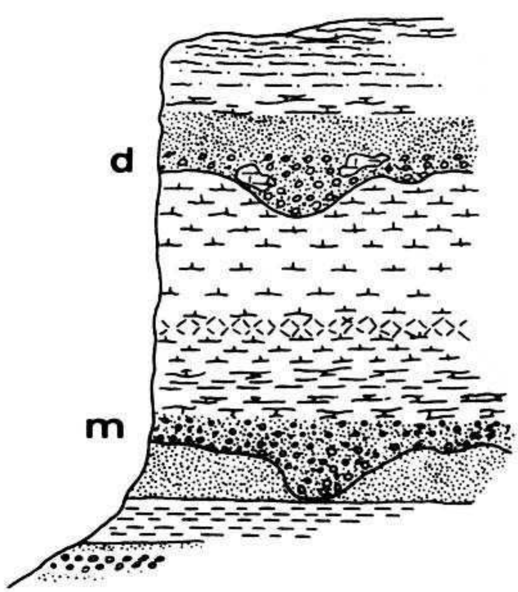


Figure 3.4. Torre in Pietra. The stratigraphic sequence: m–deposit related to the *Formazione Aurelia* (OIS 9), with Acheulean lithic industry; d–deposit related to the *Formazione di Vitinia* (OIS 7), with Middle Paleolithic industry (after Caloi *et al.* 1998. with modifications).

3.1.3.1.a. Torre in Pietra. The first handaxe was apparently collected in 1860 by Boucher de Perthes, the founding father of Paleolithic studies, who was traveling in Italy. From 1954 to 1964, the area called "Torre del Pagliaccetto," in the territory of Torre in Pietra, was excavated first by A. C. Blanc and then by L. Cardini. In total, 200 m² were dug. The local sequence starts with Calabrian marine deposits, unconformably overlain by Sicilian (i.e., Lower Pleistocene) gravels and sands (Malatesta 1978). They are interrupted by an erosion surface, followed by the series of alluvial, marshy, and brackish deposits of the Aurelian Formation.

Acheulean tools were found at the base of the series belonging to the Aurelian Formation and referred to as being from "level m." This layer includes elements of redeposited volcanic tuffs known as *tufo rosso a scorie nere* (previously discussed). It was first dated in a pioneering work by Evernden and Curtis (1965), who erroneously attributed to the Acheulean assemblage a date close to that of the volcanic elements: in fact, the archaeological layer is substantially later.

Table 3.1. Torre in Pietra: The Large Mammals and Reptiles of Levels m and d.[a]

	Level m NISP	Level d NISP
Macaca sylvana	–	1
Cervus elaphus	47	63
Capreolus capreolus	–	18
Dama dama	–	52
Megaceros cfr. giganreits	1	–
Ind. Cervids	29	116
Bos primigenius	44	81
Equus caballus	66	4
Sus scrofa	1	4
Hippoporam its amphibiiis	–	4
Elephas antiquus	19	25
Stephanorhinus hemitoechus	5	13
Ursus cfr. *spelaeus*	1	–
Ursus sp.	–	2
Panthera leo	2	–
Crocuta crocuta	–	1
Canis lupus	3	5
Vulpes vulpes	1	1
Marres cfr. *foina*	–	1
Meles meles	–	1
Casror fiber	–	1
Lepus cfr. *capensis*	1	–
Oryctolagus cuniculus	1	4
Emys orbicularis	–	100
Testudo hermanni	–	25
Total	221	522

[a]Source: Caloi and Palombo (1978).

The Acheulean level is not a living floor. Archaeological remains were collected in sediments up to 80 cm thick. Both lithic implements and bones are often rolled and abraded, and flint sometimes developed a patina of eolian origin. This layer was formed through the redeposition of eroded remnants of one or more sites. The faunal assemblage, with many horse remains (Table 3.1), points to an open environment, with some wooded areas, and to a temperate to cool climate (Caloi and Palombo 1978). The malacofauna includes northern and mountain species, relating to a climate colder than today (Durante and Settepassi 1978).

Small pebbles of limestone, siliceous limestone and flint were used to make artefacts, including handaxes (Table 3.2) (Piperno and Biddittu 1978). On flake tools, the retouch is often marginal and irregular, while most of the butts are plain or cortical. The cores are poorly standardized, none being discoidal (Fig. 3.5).

After a second erosion surface and a new gap in the sequence, a new series of fluvial and lacustrine sediments was deposited. They belong to the Vitinian Formation. Archaeological remains are found in level 4, also named “level d,” in “chaotic position” (Piperno and Biddittu 1978).

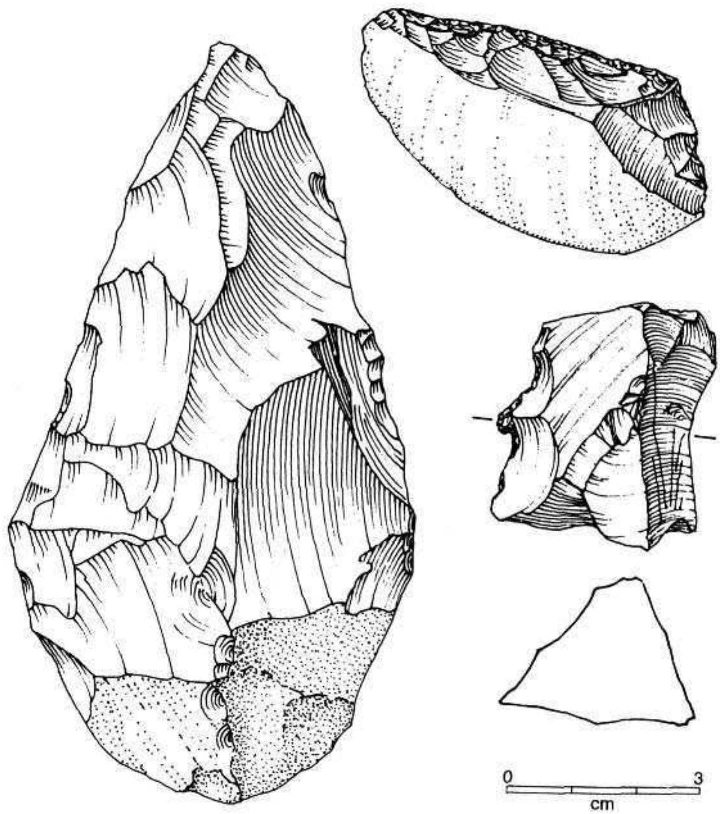


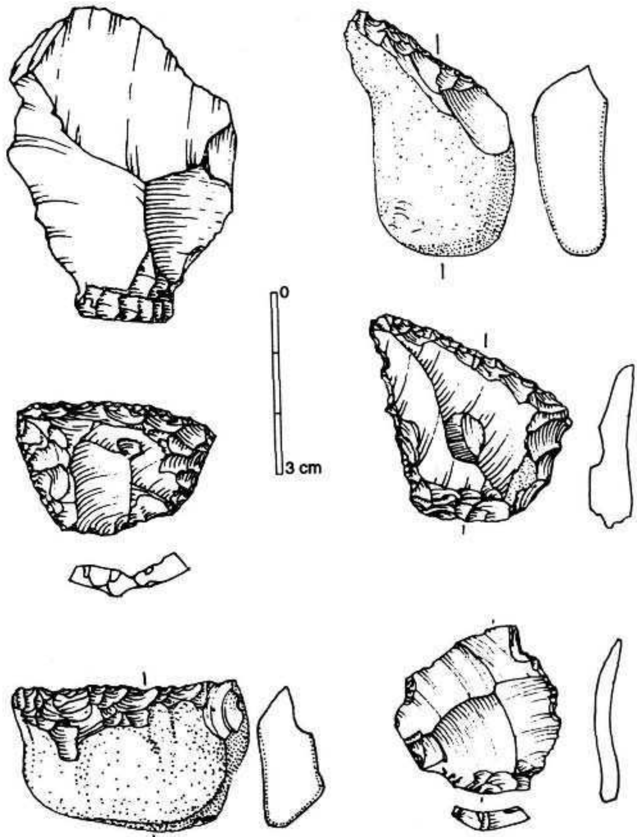
Figure 3.5. Torre in Pietra. Acheulean industry from level m (source: Piperno and Biddittu 1978).

Small pebbles were used again, as is usual on the Tyrrhenian coast of Central Italy. Scalariform retouch was identified on about 30 percent of tools. The Levallois technique was used moderately and Levallois flakes were usually left unretouched (Table 3.2). Butts are frequently either dihedral or faceted and, not surprisingly, discoidal cores are common. Finely retouched light duty chopping tools are found, some being better classified as scrapers, while there are no handaxes.

Table 3.2. Torre in Pietra: The Lithic Assemblage of Levels m and d. [a]

	Level m		Level d	
Type list	n	%	n	%
Levallois flake	1	1.01	21	6.52
Levallois point	–	–	3	0.93
Mousterian point	–	–	4	1.24
Limace	–	–	1	0.31
Single scraper	24	24.24	62	19.25
Double scraper	1	1.01	17	5.27
Convergent scraper	2	2.02	4	1.24
Dejete scraper	3	3.03	17	5.27
Transverse scraper	6	6.06	18	5.58
Scraper on ventral face	1	1.01	5	1.55
Scraper with thinned back	–	–	2	0.62
Scraper with bifacial retouch	–	–	1	0.31
Alternate retouched scraper	1	1.01	3	0.93
Endscraper	3	3.03	6	1.86
Burin	–	–	3	0.93
Borer	2	2.02	4	1.24
Truncated flake	2	2.02	6	1.86
Notch	12	12.12	24	7.45
Denticulate	10	10.10	50	15.52
Retouched flake	–	–	13	4.03
Tayac point	–	–	1	0.31
End-notched piece	–	–	2	0.62
Chopper/Chopping tool	24	24.24	34	10.55
Miscellaneous	5	5.05	9	2.79
Total	99	99.99	322	99.90
IL =		0.5		6.72
1Lty =		1.01		7.45
IF =		2.89		25.14
Ifs =		2.17		15.25
IR =		38.38		40.01
IC =		18.18		15.82
	50		–	
Flakes	112		173	
Debris	88		146	
Cores	17		92	
Strikers	–		1	
Split pebbles	11		10	
TOTAL	377		744	

[a]Source Piperno and Biddittu (1978).



Figare 3.6. Torre in Pietra. Middle Paleolithic industry from level d (source: Piperno and Biddittu 1978).

The faunal assemblage comprises more species than in level m, and relates to a more differentiated environment (Table 3.1). The number of horse bones is reduced, while *Macaca sylvana,* a little monkey, together with *Emys orbicularis,* the pond tortoise, points to a more temperate environment.

3.1.3.1.b. Castel di Guido. An extensive paleosurface with Acheulean industry has been excavated in two different, if close, areas, over some 350 m² in total (Anzidei and Sebastiani 1984; Boschian 1993; Mallegni *et al.* 1983; Radmilli 1984; Radmilli and Boschian 1996). The occupation layer was established on a gently undulating surface. Most of the archaeological remains, however, lie concentrated within an erosion channel some 20 m wide and a few meters deep. The deposit was then covered by a grey tuffitic deposit, which includes redeposited archaeological material.

Table 3.3. Castel di Guido. The Faunal Assemblage.[a]

	NISP	MNI
Cervus elaphus	132	18
Bos primigenius	2,157	57
Equus caballus	713	23
Sus cfr. *scrofa*	1	1
Elephas antiquus	1,459	8
Stephanorhinus cfr. *hundsheimensis*	1	1
Hippopotamus sp.	1	1
Panthera leo	6	1
Canis lupus	1	1
Ind. Canids	5	–
Lepus europaeus	1	1
Total	4,477	111

[a]Source: Sala and Barbi (1996).

In the excavated material, aurochs, red deer, horse, and elephant (including young or immature) are most frequently found (Table 3.3) (Sala and Barbi 1996). Five fragmentary human remains, belonging to a minimum of two individuals, were also found in a disturbed context.

Approximately 450 lithic implements were found in total during excavations. Flint, limestone, siliceous limestone, lava, and other inferior raw materials were used. Core tools mostly are monofacial and bifacial chopping tools and handaxes, with the addition of split pebbles, while flake tools are rare, most of them being denticulates. We can hypothesise that, as at La Polledrara (see below), there was a differential preservation of heavy compared to light tools. Retouched bone flakes and bone handaxes were also discovered.

3.3.3.1.c. La Polledrara. The site is currently under excavation and more than 350 m² have so far been excavated (Anzidei and Arnoldus-Huyzendveld 1992; Anzidei et al. 1988, 1989, 1995, 1999; Arnoldus-Huyzendveld and Anzidei 1993).

The deposit is a former paludal basin in an essentially flat landscape of lakes, moors and ephemeral streams. One such stream caused the local shallow paleoincision, and forming a curve gradually displaced it laterally from east to west. A concentration of large mammal bones, and of lithic industry, is found on this paleosurface (Fig. 3.7). The remains were embedded and overlain by a white limnotuffitic clay derived from reworked pyroclastic products, which filled up the basin at different times, if probably in a relatively short span. This can be seen in the diverse preservation of bones and, especially, tusks found at short distances from each other.

The stream was too weak to move large skeletal elements, which were left undisturbed and sometimes partially articulated. However, it was sufficiently strong to concentrate smaller bones in the deepest part of the basin, or to pile them up on larger remains. Over 6,000 animal bones have so far been discovered. There are the remains of a dozen or so elephants, with both immature and mature animals,

Figure 3.7. La Polledrara. Partial view of the excavated area (photo by A. P. Anzidei).

and tusks up to 3.5m long; many *Bos primigenius* remains of great size, possibly one fragment of *Bison priscus;* some remains of *Cervus elaphus* and *Equus caballus,* then, a couple of wolves, one found dead inside an elephant carcass on which it was apparently scavenging; rhinoceroses and leporidae are also documented.

Radiometric dates were obtained from aurochs teeth: a date of 450 ± 120 ka was determined by aminoacid racemization, and one of 186 ± 45 ka by ESR. The results are inconsistent because of blurring by the high natural radioactivity in the area. The fauna points to a climate milder than at Torre in Pietra level d (discussed earlier), which could be within OIS 9 or late OIS 10. The latter chronology would be in agreement with a recent reexamination of the stratigraphic position, suggesting that the site lies within a sedimentary deposit immediately antedating the Aurelian Formation (Anzidei *et al.* 1999).

Preliminary information is available on the lithic industry. Some 350 implements were recovered, two-thirds of them from the paleosurface and the rest from the tuffitic deposit that overlies it. Small flint pebbles were mainly used, and there are a few larger silicious limestone pebbles. Raw material was relatively difficult to procure because of the area's extensive volcanic deposits, which obviously do not include any flint. Pebbles were possibly picked up at an outcrop a few kilometers distant, but the flint is not of good quality and very hard, and quite difficult to knap. The implements of the paleosurface were displaced by the stream. Most are fresh but some have slightly rounded edges.

Cores make up 30 percent of the total. They are generally shapeless, centripetal, or have two striking platforms. Unretouched flakes are quite small (7–31 mm) and present in a very limited amount (12 percent), probably due to the dynamics of the paleoenvironment: the stream swept them away. Most of the tools, including scrapers and denticulates, are core tools, usually on pebbles. They often have more than one retouched edge, and multiple tools (such as side scraper/notch, and side scraper/denticulate) are frequent.

Scrapers (simple, double, convergent, transversal, *déjeté,* and on ventral face) are prevalent. There are several endscrapers, many notches and denticulates, a few burins and piercers. The numerous chopping tools have not so far been accompanied by handaxes. A few flaked bone tools, rather carefully retouched and larger in size than the lithic tools, have also been identified.

3.1.3.2. The Sites within Rome

Several sites have long been known within Rome and, more specifically, in the northeastern quadrant of the city. They are included in the middle terrace of the Aniene, a tributary of the Tiber river (Fig. 3.1). More than a century ago, lithic tools and fauna, including a human bone, were also collected on the surface of the terrace at Ponte Mammolo. Their age and actual association can only be tentatively established. There are some beautiful Levallois flakes and points, and other selected tools of Mousterian typology (Biddittu *et al.* 1987). The middle terrace of the Aniene has been recently attributed to the Vitinian Formation, the sedimentary cycle subsequent to the Aurelian Formation, which is correlated with OIS7 (Caloi *et al.* 1998).

Other stratified sites were subjected to detailed scientific inquiries. As with the sites of Via Aurelia, the archaeological deposits are significantly later than the *rufo litoide* (dated to 366 ± 4.5 ka), which is found at a lower stratigraphic level. The sites of the Vitinian Formation are also later than the deposits of the Aurelian Formation, which, in the area of Rome, are found as eroded remnants above the *rufo litoide.* Preserved archaeological layers belonging both to the Aurelian and the Vitinian Formation occur only at one of the sites of Via Aurelia (i.e., Torre in Pietra, namely, levels m and d, discussed earlier).

3.1.3.2.a. Monte delle Gioie. Monte delle Gioie was a small hill, quarried off during railway construction in the late 1930s. Stone implements and animal bones were collected in a redeposited position in a gravel layer (Piperno *et al.* 1984; Taschini 1967).

Small pebbles were used as a raw material, as is usual in the coastal area of Latium, from the Lower Paleolithic to the Mesolithic. Sixty-two formal tools were recognized, most of them simple side scrapers (Table 3.4). The edges were frequently resharpened. Quina retouch is sometimes recognizable. Remains of elephants, hippos, rhinoceroses and deer were redeposited in this gravelly layer, indicating a rather temperate environment. In the immediately overlying sands were bones of migratory arctic birds, such as *Cygnus Bewickii* and *Branta leucopsis,* possibly suggesting a subsequent cold phase.

3.1.3.2.b. Sedia del Diavolo. The quarry of Sedia del Diavolo, c. 1.5 km downstream from Monte delle Gioie, was being exploitated in the 1930s. Later, the town expanded and houses were built on the site, making it unavailable for inspection.

Table 3.4. Monte delle Gioie. The Lithic Assemblage.[a]

Type list	n
Single scraper	37
Double scraper	2
Convergent scraper	3
Dejete scraper	1
Transverse scraper	1
Scraper on ventral face	1
Scraper with bifacial retouch	1
Alternate retouched scraper	1
Endscraper	1
Naturally backed knife	1
Raclette	1
Notch	2
Denticulate	7
Chopper/chopping tool	3
Total	62
Flakes	10
Debris	30
Cores	8
TOTAL	110

[a]Source: Taschini (1967).

Lithic implements and fauna were found redeposited within a gravel deposit-level 4 of the local stratigraphic sequence (Caloi *et al.* 1980; Taschini 1967). About fifteen stone tools were found, some fresh and others rolled, most being simple side scrapers. Quina retouch was used, but the edges are blurred by intense re-sharpening. There is evidence of bipolar flaking technique. A couple of chopping tools are mentioned. Small pebbles were used, as at Monte delle Gioie.

Animal remains are mainly attributed to aurochs, but there is also a fair amount of bones of modern fallow deer, *Dama dama,* a species indicative of mild climatic conditions.

3.1.3.2.c. Casal de' Pazzi (Rebibbia). Extensive excavations have been undertaken in recent years at Casal de' Pazzi, over more than 1,200 m², located some 3 km from Sedia del Diavolo as the crow flies (Anzidei and Gioia 1992; Anzidei *et al.* 1984, 1999).

The local stratigraphic sequence is quite similar to that of the preceding sites. At Casal de' Pazzi, however, the basal *tufo Jitoide* has been extensively eroded by a torrential stream, which also dug potholes. Due to the local narrowing of the riverbed between rocks and blocks of tuff, a natural dam of a kind developed, and 2 m of alluvium were deposited upstream, where mud alternates with gravel. Many redeposited bones and lithic implements were included in this impressive natural accumulation: 2,200 animal remains and 1,700 stone tools were found during excavations (Fig. 3.8).

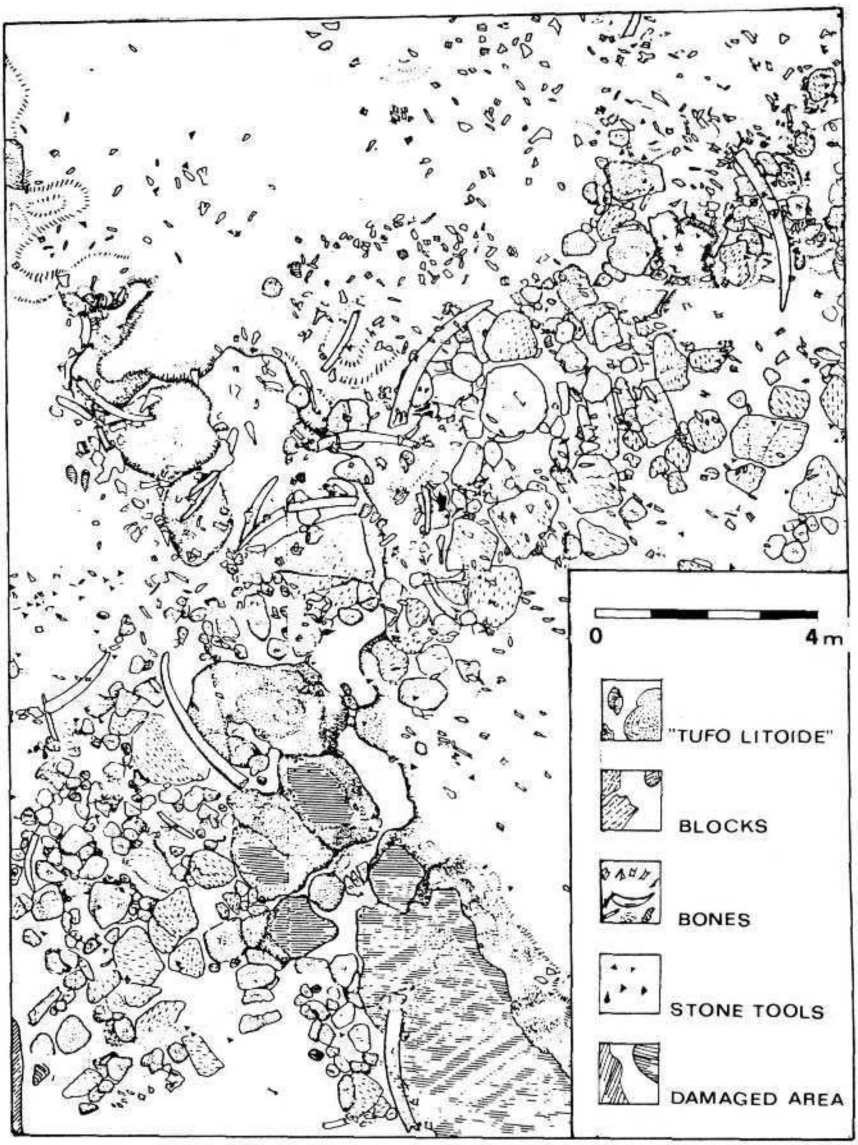


Figure 3.8. Casal de' Pazzi. Part of the excavated area (after Piperno *et al.* 1984, with modifications).

The following animal species have so far been identified: *Elephas antiquus, Stephanorhinus* sp., *Hippopotamus amphibius, Bos primigenius, Cervus elaphus, Dama* sp., *Capreolus capreolus, Crocuta crocuta,* and *Canis lupus*. Some of the many elephant tusks are over 3 m long and contributed to the formation of the dam itself. A human bone and aquatic bird remains were also found.

Table 3.5. Casal de' Pazzi. The lithic Assemblage, after the Analysis of a Representative Sample.[a]

Type list	n	%
Single scraper	49	14.87
Double scraper	20	6.04
Convergent scraper	6	1.81
Dejete scraper	15	4.55
Transverse scraper	7	2.11
Scraper on ventral face	6	1.82
Abrupt retouched scraper	2	0.60
Alternate retouched scraper	2	0.60
Endscraper	28	8.50
Burin	2	0.60
Borer	3	0.91
Atypical backed knife	1	0.30
Naturally backed knife	3	0.91
Raclette	1	0.30
Truncated piece	16	4.86
Notch	32	9.72
Denticulate	54	16.41
Retouched piece	18	5.46
Chopper/chopping tool	4	1.21
Scaled piece	6	1.82
Multiple tool	48	14.58
Miscellaneous	2	0.60
Total	329	99.79
ILty = 0		
IF = 37.33		
IFs = 35.33		
1R = 32.52		
IQ = 3.60		
Flakes	66	
Cores	34	
Modified pebbles	2	
TOTAL	431	

[a]Source Anzidei and Gioia (1992).

Only a representative sample of the lithic industry has so far been studied, part of it being fresh, and part more or less extensively rolled (Table 3.5). Small flint and chert pebbles were used, as usual. The retouch is most often scalariform and rather abrupt, and extends on two or more contiguous edges. The Levallois technique was not used, and butts are usually plain or cortical. There are a few choppers and chopping tools, and a single handaxe has also been retrieved. Cores occur in small numbers, none being discoidal or Levallois.

The technology is more similar to Torre, in Pietra level m, than to the supposedly contemporary Torre in Pietra level d. We suspect an earlier part of OIS 7, or even a preceding stage. After all, the lithic assemblage could well be substantially earlier than the deposit in which it was eventually redeposited and imbedded.

3.1.3.3. The Loess-Related Sites

More than one hundred Acheulean sites were located on the southern edge of the Po plain, on the piedmont terraces and within the loess covering them, which was accordingly dated to the late Middle Pleistocene (Cremaschi 1990; Cremaschi and Peretto 1988) (see 3.1.2) (Figs. 3.9 and 3.10). Most sites are known after surface collections only, and faunal remains are usually not preserved. Examples can be found in the area of Faenza and Forli, which has been thoroughly investigated, with more than 10,000 stone implements collected from eight surface sites, one of which is site PT5 (Fig. 3.11) (Bisi *et al.* 1983). One-forth or more of the tools include unretouched Levallois tools, while more have been retouched, often into simple scrapers. Handaxes are extremely rare and have not been found at every site; eight have been collected from five of the localities, some being fragmentary. Chopping tools occur slightly more frequently with fifty-nine specimens from six sites.

The Acheulean sites in loess deposits have been correlated with the better dated site of Torrente Conca and, accordingly, placed within OIS 7, but this requires further discussion (see below, *Torrente Conca*).

3.1.3.3.a. Ghiardo. The Ghiardo site was exposed by quarry activity over an area of 40,000 m^2 (Accorsi *et al.* 1990; Cremaschi and Christopher 1985; Cre-

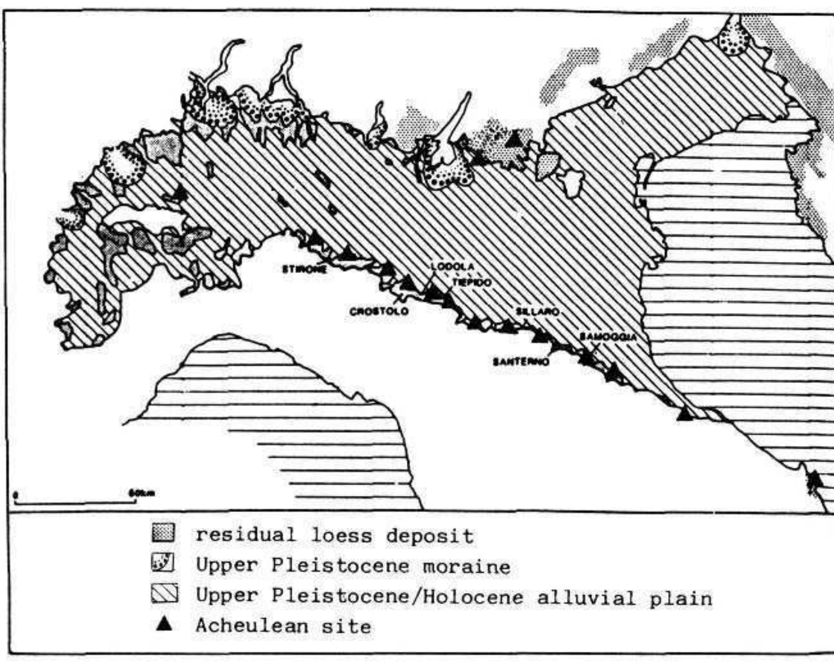


Figure 3.9. Northern Italy. Loess deposits and late Acheulean sites (source: Cremaschi and Peretto 1988).

Figure 3.10. Northern Apennine piedmont. The environment during the late Middle Pleistocene, as reconstructed by Peretto and Prati (1983) (drawing by L. R. Scarpante).

maschi and Peretto 1988). This industrial activity was closely monitored by M. Cremaschi, who plotted all the finds and eventually undertook the excavation.

Four thousand lithic implements were collected altogether, mostly unretouched flakes and cores. They were concentrated on the top of a small ridge crossing the area and buried by loess. In a restricted area, implements damaged by fire, a tiny piece of burnt bone, and some small charcoals, point to the presence of a hearth.

Some of the raw material was sought at a distance of 5 km or more, while a granite hammer stone was collected some 15 km from the site.

Pollens of *Picea, Pinus, Betula,* and Gramineae were also found. Together with eolian abrasion and frost damage on the lithic implements, they suggest cold and arid conditions.

3.1.3.3.b. Torrente Conca. This site, situated a few km inland from the holiday resort of Riccione, only yielded limited evidence of human activity: some flakes and cores, several being of Levallois technique, and a single chopping tool, most transported by water activity. However, the site is important because of the preservation of some animal and macrobotanical remains (Biondi 1983; Conri *et al.* 1982).

These were found in two small fluvio-lacustrine basins of tectonic origin. The following animals apparently ended up as carrion in the little river that entered into the possibly interconnected lakes: bears, horses, elephants, rhinos, bison, deer, megaceroses, beavers, as well as some micromammals. Logs of *Fagus sylvatica* (i.e., the beech), one of them still rooted in the ground, and of *Alnus* sp. as well, are believed to represent the local vegetation, while logs of *Abies alba* (the fir) were possibly transported from further upstream.

The filling of the two basins has been correlated with the nearby sites in loess deposits on the basis of geomorphological analysis of the area and of general technical and typological similarities in the lithics. This conclusion has been enhanced by recent dates on a rhinoceros tooth: U-Th 197 +41 -28 ka; Pa-Th 218 +70-40 ka (Yokoyama *et al.* 1992). A correlation with OIS 7 was proposed.

However, the loess environment of the many surface sites does not suggest an interglacial, since the pachyderms that died close to the lakes are not suited for a fully glacial environment. Furthermore, the standard deviations allow different interpretations. A late Middle Pleistocene age is clearly indicated, but we are not convinced that Torrente Conca is contemporary to the other open-air sites in the area. We suggest an attribution either to late OIS 8 or, most probably, OIS 6 (i.e., to glacial phases) for the loess sites. We favour the second hypothesis due to the great development of the Levallois technique, not found at sites of isotopic stage 7, such as Torre in Pietra level d (whose small pebbles, admittedly, were not particularly suited for this knapping technique). OIS 7 (i.e., the correlation with an intergalcial) remains the best approximation for the record of a wooded environment with pachyderms at Torrente Conca itself.

3.1.3.3.c. Cave di Quinzano. A long stratigraphic sequence, from the Lower Paleolithic to the Roman period, was pieced together in the quarries close to Verona in the Adige valley and on the northern edge of the Po basin. Scientific research started in the 1930s but the sequence is no longer available for reexamination.

Basically, the Middle Pleistocene levels are at the bottom of the deposits, filling a small, karstic depression. The lowermost industries are in a “Terra rossa” deposit derived from the weathering of the bedrock. It includes a limited amount of heavily patinated and rolled flakes, some retouched into scrapers (Cremaschi and Peretto 1988; Pasa 1956; Peretto 1984a). Some giant deer, bison, and red deer remains were also found.

Higher up in the stratigraphy is another level with industry. The implements are fresh and include flakes of accurate Levallois technique (some with butts *en chapeau de gendarme*) as well as a couple of handaxes. There are many bones of red deer, roe deer, bison, and elephant. A buried living floor was possibly present, if unnoticed, when the quarry was under exploitation. After a revision of the industry, the latter was correlated with the late Acheulean of the loess deposits further south.

Once again, however, the faunal assemblage does not fit into the fully glacial landscape suggested by the loess sites, while a date close to Torrente Conca and to OIS 7 is reasonable. The evidence of Cave di Quinzano strengthens the hypothesis that the late Acheulean with Levallois technique of northeastern Italy developed during both interglacial (Torrente Conca, Cave di Quinzano) and glacial phases.

A human occipital bone was found, probably from the Middle Pleistocene levels, but the precise stratigraphic position is unknown (Battaglia 1948).

3.1.3.4. Grotta del Principe (Liguria)

Gr. del Principe (*Gr. du Prince* in the French literature) is one of the Grimaldi or Balzi Rossi Caves on the Mediterranean shore, close to the border with France, and is better known for its Mousterian industries of Wurmian date. Some residual brecciated deposits—Br2, the earliest, and Brl, later in date—predate the last interglacial (Kharbouch 1990; Shen 1986).

Br2 yielded some fifty flake implements—a few of them reduced by Levallois technique—and bones of ibex, red deer, bear, and wolf, as well as hippo at the base of the deposit (De Lumley and Barral 1976; Simone 1968–1969).

An iliac human bone was also found, and dated to > 230 ka by U/Th, while two stalagmite levels of Br2 are c. 210 ka old after ESR (De Lumley 1972; Piperno *et al.* 1984). The base of the brecciated deposit was accordingly correlated with OIS 8, a cold period believed to last approximately between 280 and 240 ka (for an update of the absolute date of isotopic stages, see Williams *et al.* 1988). The other breccia, Brl, higher up in the stratigraphy, was attributed to OIS 6.

However, subsequent radiometric analysis, via several different methods, produced a range of dates that do not fit into this scheme, and a date < 200 ka is suggested for the two breccias. Br2, probably deposited more 'than 160 ka ago, includes pollens produced by a Mediterranean forest of *Pinus* and groves of oaks (*Quercus* t. *ilex* and *Quercus* t. *pedunculata*). Some *Alnus, Carpinus, Corylus, Olea, Phillyea,* and *Pistacia* pollens were also recognized. There is only 18 percent of herb pollens, mostly Ranunculaceae and Ericaceae. It is an interglacial vegetation and a correlation with final OIS 7 can be tentatively suggested. The micromammals include species of both open environments and forests.

In Brl, remains of red deer, roe deer, ibex, and wolf were found, and possibly of reindeer as well (exceptional in Italy). They would indicate a cold climate as would be expected during OIS 6. The scarce lithic industry includes choppers, chopping tools, and handaxes, as well as some scrapers.

3.1.4. The Paleoanthropological Record

When bone preservation is good, human remains are often found, if usually in small number and in a fragmentary state.

At Cave di Quinzano (discussed earlier) an occipital bone was discovered in one of the lowermost layers (see 3.1.3), while an iliac bone was found in a residual breccia of Gr. del Principe.

The finds are somewhat more concentrated in the area of Rome.

We have already mentioned the remains from Caste1 di Guido (see 3.1.3): two fragments of femur, part of a maxilla and three skull fragments, belonging to a minimum of two individuals. Other human bones were collected in sites of the Aniene middle terrace (see 3.1.3.2): a fragmented parietal bone from Casal de' Pazzi, part of a femur and a metatarsal from Sedia del Diavolo, part of a femur from Ponte Mammolo (Biddittu *et al.* 1987; Mallegni 1986; Passarello *et al.* 1984-1985).

We can add to this short list a tooth, an astragalus, and a fragmented femur from Gr. del Poggio, the date of which is discussed below (see 3.2.1) (Messeri

1975). A tooth is mentioned at Gr. dell'Alto, another site with a poorly defined chronology (Borzatti von Lowenstern 1966).

A very different find has been recently made at Altamura, near Bari, a coastal town of Apulia: a complete human skeleton was found in a deep karstic cave (Pesce Delfino and Vacca 1993). After preliminary examination, it appears that an adult male felt into a karstic shaft some 8 m deep and was never able to escape from it. He died of starvation after exploring the meanders of the underground cave system, more than 60 m from the entrance. The corpse was left undisturbed by animals or other agents, and was only slightly moved by underground running water. The skeleton was then covered by a layer of calcite concretions but was never buried by falling rocks or by the usual natural accumulation of sediments. The preservation is extremely good. Archaic characteristics have been noted, such as the projection of the supraorbital tori, and a high degree of postorbital constriction. It is assumed that the chronology predates the last interglacial. However, it is simply impossible to assess how much this individual fits the Neandertal typology before the specimen is made available for scientific examination.

3.2. THE EMERGENCE OF TECHNOLOGICAL COMPLEXITY

3.2.1. Interpreting Assemblage Diversity: Acheulean, Handaxes and Lack of Handaxes, the Full Development of the Levallois technique, and the Earliest Middle Paleolithic

A discussion of "handaxe assemblages," as compared to "chopper assemblages,"has already been presented for the earliest Italian sites (see 2.3.2). During OIS 9, there is again the same contrast within the sites of the Aurelian Formation: handaxes are found at Torre in Pietra level m, Castel di Guido, Malagrotta, but not at La Polledrara. At the latter site, as at earlier ones elsewhere (Isernia, Venosa-Loreto levels A and B), there is an association with large mammal remains. Butchering and marrow extraction from elephant and aurochs carcasses are a possibility. Different sets of activities at La Polledrara are a logical explanation, as raw material procurement cannot have been much different at nearby sites with handaxes, and the chronology is probably broadly similar. Specialized activity is also an explanation for the chopper assemblage of Venosa-Loreto level C (Chiappella 1964), which could be as late as OIS 7 (see 3.1.1).

At other sites, sampling bias is very probable and holds as a logical explanation for the lack of handaxes. A good example is Gr. del Principe, with handaxes found in the upper residual breccia, Br1, but not in the lower one, Br2. Similarly, the limited assemblages from Gr. del Colombo are said to include only flakes—even if a couple of possible handaxes were illustrated by C. Tozzi (1965: Figs. 11 and 22). At Gr. Paglicci (Riparo esterno), there are flake implements only (actually, quite a few) in lowermost level 4, and some handaxes, as well as flakes derived from the manufacture of handaxes, in the overlying level 3 (Mezzena and from the manufacture of handaxes, in the overlyng level 3 (Mezzena and Palma di Cesnola 1971).

There is also a chronological trend: handaxes disappear, or nearly disappear, from later sites, such as those of the Vitinian Formation of Rome, and those in the loess of northeastern Italy. The latter are particularly notable because they are mainly known from extensive surface collections—and core tools are overrepresented, if anything, by surface collections.

Not only do handaxes become less frequent, but also flake tools are much more standardized and varied. As an example, while following Bordes's (1961) typological list, there are twenty different types of flake tools at Torre in Pietra level m (Acheulean), thirty-seven such types in the upper part of the sequence and in level d, and forty at Casal de' Pazzi (Anzidei and Gioia 1992; Piperno and Biddittu 1978) (Tables 3.2 and 3.5 for grouped lithic types). Similarly, there are twenty-nine types at both PT5 and CS2, two large loess sites at which, furthermore, retouched flakes and blades have not been taken into account separately (Bisi *et al.* 1983). Formal points (either unretouched Levallois points or retouched Mousterian points) are also more and more part of the inventory at sites of possibly late OIS 8 age, as in the loess, or of OIS 7, as within Rome. The varied composition of the later assemblages is even more striking if we consider the repetitive lists of "scrapers, notches, and denticulates" of the Early Paleolithic (see Chapter 2).

Technological refinement is better seen in the diffusion of the Levallois technique, which is nonexistent at earlier sites where knapping methods are very crude (see 2.3.1). Single Levallois flakes, or Levallois cores, are occasionally mentioned or illustrated at sites correlated with OIS 9. At Gr. del Colombo, for instance, more than 200 flake implements were found in level 11: two are Levallois flakes, and one is an atypical Levallois blade (Tozzi 1965). On the basis of some admittedly tentative correlations with a dated stalagmite in the rear of the cave, and sedimentological and paleontological studies, the layer was determined to have been deposited during OIS 9 (Baïssas *et al.* 1986).

The Levallois technique is not found at Torre in Pietra level m (except for a fortuitous atypical Levallois flake) while the Levallois index is IL = 6.72 in level d (i.e., during OIS 7): there are typical Levallois flakes—some retouched into scrapers and denticulates—and Levallois points of first and second order. Out of ninety-two cores, none are Levallois, but twenty-nine (31.52 percent) are discoidal and often very finely reduced. Faceted or dihedral butts are found in 25 percent of the flakes.

At the "loess sites" PT5 and CS2, there are few Levallois points, but hundreds of retouched and unretouched Levallois flakes. The Levallois indexes are IL = 9.1 and Iltyp = 27.5 at PT5; IL = 9.5 and Iltyp = 30 at CS2. Faceted plus dihedral butts are in the range of 30 percent, Levallois plus discoidal cores are well above 30 percent (Fig. 3.11).

The Levallois technique is said to be well developed at Rosaneto, too, which is an open-air site of Calabria, close to the seashore (Piperno *et al.* 1984; Segre *et al.* 1982). The industry is defined as "an evolved or final Acheulean." Unfortunately only preliminary information is available. Ten percent of the flakes have faceted or dihedral butts. There are many handaxes and chopping tools, too, as well as some

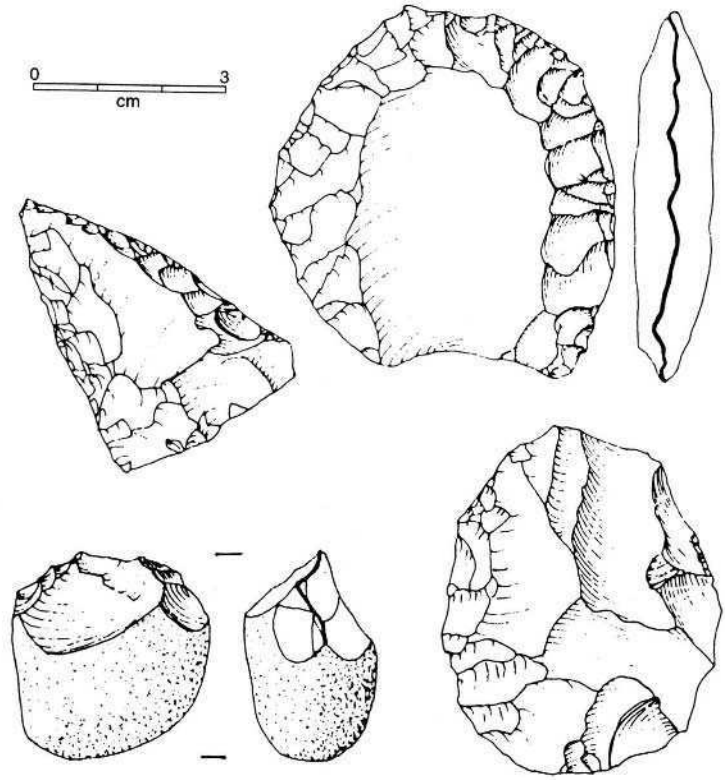


Figure 3.11. Site PT5. Lithic industry (source: Peretto and Prati 1983).

flake cleavers (see 3.3.1) (Fig. 3.12). Malatesta and Zarlenga (1988) relate Rosaneto to their "Second Middle Pleistocene cycle deposits" and to OIS 9. This early date is improbable, as Levallois technique is not known to be definitely developed at any site of this date in Italy. We suggest a correlation with a later isotopic stage.

It has long been recognized that the lithic assemblages of the Vitinian Formation are fully Middle Paleolithic—because of standardization and diversity of types, lack of handaxes, and similarities with the local Wurmian Mousterian (see Chapter 4) (Anzidei and Gioia 1992; Piperno and Biddittu 1978; Taschini 1967). The loess sites of Northern Italy are labeled as "Acheulean" because of the few handaxes sometimes found, but are clearly Middle Paleolithic in all respects. Other assemblages have been assumed to be of Wurmian date simply because their characteristics were fully Mousterian, but they could well be dated earlier.

The chronology is being reassessed at several such sites: Gr. Maggiore di S.Bernardino in Veneto (lower stratigraphic units), where the industry is very different from that of any Wurmian site of the area and includes a more limited amount of scrapers and of Levallois *débitage* (Leonardi and Broglio 1962; Peresani 1996; Peretto 1984b); dates in the range of 250 to 150 ka have been

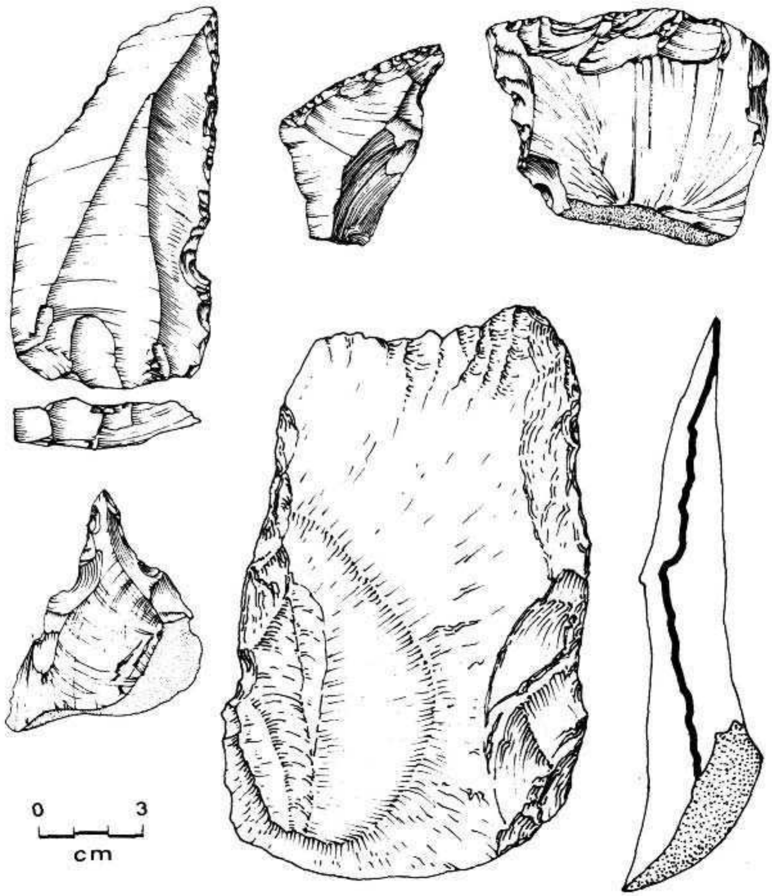


Figure 3.12. Rosaneto. Lithic industry (sources: Piperno 1974; Segre *et al.* 1982).

mentioned for levels L–G (Cassoli and Tagliacozzo 1994); Gr. dell'Alto in Apulia, with many scrapers, no Levallois technique, diminutive handaxes and unusual bifacial points (Borzatti von Löwenstern 1966; Borzatti von Löwenstern and Magaldi 1967; Palma di Cesnola 1982a); Gr. Romanelli levels G–K, in Apulia again, with scanty flake tools on limestone supports, and a handaxe as well (Piperno 1974a, 1992) (however, as the cave mouth presently opens on the cliffs at sea level, it seems that any early deposit would have been quickly eroded by an even higher sea level during OIS 5e); Riparo esterno at Gr. Paglicci, as far as the rich Quina Mousterian of level 2, overlying level *3* and its handaxes, is concerned (Palma di Cesnola 1982a): the micromammals, up to the base of level 1, are indicative of a phase preceding the last glacial; Gr. del Poggio, south of Naples, with an industry in the upper part of the sequence more and more similar to a Quina Mousterian, and a faunal assemblage said to be rather different from the Würmian assemblages, because the dominant red deer was associated to *Caprinae,* large pachyderms, lion, and leopard (Palma di Cesnola 1969; Sala 1979)

We also suspect that the admittedly limited Levallois assemblages of Carnello, Valle Radice, and other inland sites east of Rome (Segre *et al.* 1984), found with faunas that include some pachyderms and pond tortoise (*Emys orbicularis*) as well, are better understood if related to a time range preceding the Wurm the Levallois technique is poorly represented in the Wurmian industries of Latium A date closer to OIS 7 would fit them better

3.2.2. Bone Flaking and Bone Tools

Flaked bone tools are mentioned in the literature, as at the earlier Fontana Ranuccio site (see 2.3.3). Both coastal sites of the Aurelian Formation and inner sites from the former Bacino Lirino (see 3.1.1) are quoted. The latter sites have long been known, following mainly uncontrolled surface collections, and their chronology, possibly later than OIS 9, is not well understood (see 3.1.1). They include Pontecorvo and Ceprano, at which a few bone flakes, bone splinters, and rounded fragments are described as modified by human activity (Biddittu 1974; Biddittu and Cassoli 1968; Biddittu and Segre 1982). The supposed bone tools are scarcely elaborated and similar modifications are known elsewhere to be the result of natural agents (Haynes 1991).

A similar range of tools is mentioned at coastal sites, and some large pieces of bones, with artificial modifications, were recognized at La Polledrara (Anzidei *et al.* 1995). The best evidence is from Caste1 di Guido, where bone handaxes are also described. One specimen is definitely symmetrical and bifacially flaked over most of the edges (Piperno *et al.* 1984:179, Fig. 5). Other putative bone tools from this site, however, cannot be accepted as such. They include a so-called "ivory spatula,'' made either from the tip of an *Elephas antiquus* tusk (Peretto 1985) or, after a more recent determination, from the tip of an hippo incisor (Sala and Barbi 1996): it matches broken tusk tips collected at modern African water holes after fights to gain access to the wells during drought, as illustrated by Haynes (1991). A broken tusk, resharpened by use in life, has also been found at this site (Boschian 1993), and further suggests fighting elephants.

Flaked bone tools are positively present at some Acheulean sites, but not all the published evidence is sound enough to settle the matter. On cursory examination, a number of these putative bone tools can be better explained as the product of natural processes.

3.2.3. Taking Advantage of a Seasonal Ecological Niche: The Sites of the Aurelian Formation

Paleobotanical investigations have not been carried out in the Acheulean levels of the sites close to Via Aurelia However, the animal assemblages, with herds of large herbivores including horse, suggest a rather open landscape in which thickets alternated with grassy areas A general reconstruction of the landscape is also available (Anzidei and Arnoldus-Huyzendveld 1992, Anzidei *et al.* 1989, Ar-

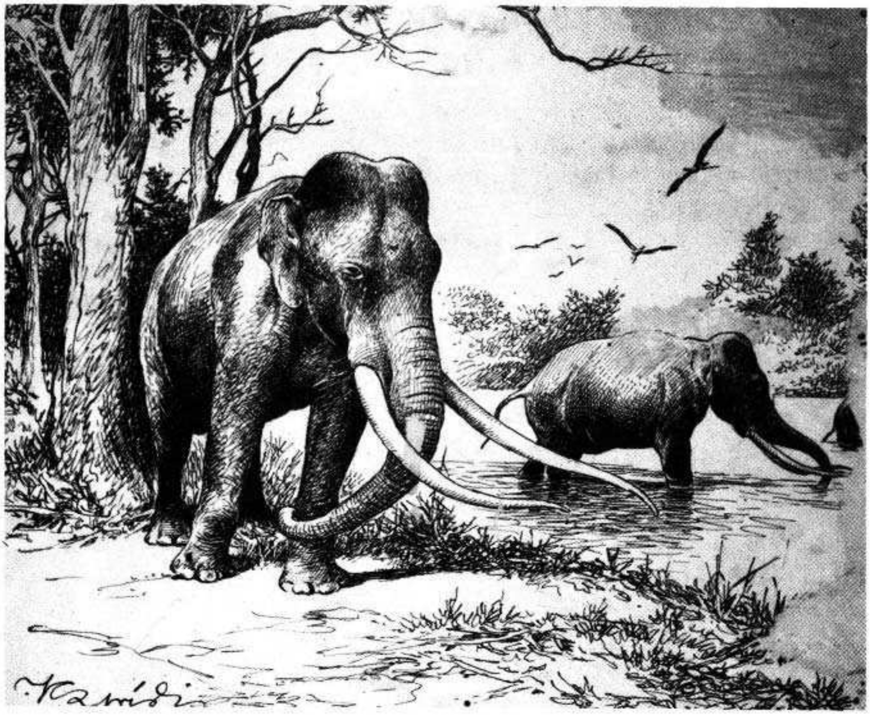


Figure 3.13. Coastal Latium. A reconstruction of the environment during OIS 9 (*"FormnzioneAurelia"*).

noldus-Huyzendveld and Anzidei 1993; Conato *et al.* 1980; Jacobacci 1978; Malatesta 1978). It was shaped by several powerful geomorphological factors, such as the rising sea level and subsequent high stand, and local volcanic activity: the rivers were depositing more sediments close to their mouths, while the Bracciano volcano added tuffitic and cineritic deposits, which were often reworked by local streams. As a consequence, the area, which was already rather flat, became characterized by small depressions, ponds, and moors filled by the activity of ephemeral meandering streams (Fig. 3.13). Muddy areas were ubiquitous and alternated with sands and other alluvial deposits, as well as with volcanic deposits. Closer to the coast, lagoons developed.

In the light of the ongoing discussion on the occupation of open as opposed to wooded environments during the Middle Pleistocene (Gamble 1986; Roebroeks *et al.* 1992), it is interesting to examine the evidence from an area with a different vegetation, i.e., the Riano lake basin.

The latter is only one of several similar bodies of water, now known to have diatomitic deposits, included in the Aurelian Formation, found north of Rome. It is the one, however, where extensive research was undertaken and detailed evidence is available (Accordi and Maccagno 1962; Ambrosetti *et al.* 1972, 1980; Bonadonna 1965; Follieri 1961–1963; Leonardi and Petronio 1974; Leonardi and Petronio 1976; Maccagno 1962).

On the evidence of the count of annual levels in varvated diatomites, the Riano lake was in existence for 15,000 to 20,000 years. It progressively shrank from an initial maximum extension of 650 x 250 m. Tuff deposits imbedded in the diatomites were dated to 225 ±60 ka by K/Ar, and to 280 ± 30 ka by fission tracks, enhancing the attribution to the Aurelian Formation, also established on the basis of geological studies and regional correlations. Animal remains were found at different levels in the basin itself, as well as in the immediate surroundings. They include well-preserved and still articulated remains of a limited range of species: two almost complete skeletons and an isolated skull of *Elephas antiquus*, fragments of *Stephanorhinus* cfr. *hemitoechus*, five complete or partial skeletons of *Cervus elaphus;* the red deer; a single skeleton of an archaic fallow deer (*Dama clactoniana*); and isolated bones (Figs. 3.14 and 3.15).

The flora is known by both pollen analysis and the study of macrobotanical remains: leaves, fruits and seeds, which were extremely well preserved. It is therefore possible to cross-check the results of different lines of investigation and obtain a direct knowledge of the local vegetation. A very dense forest of broad-leaved trees was in existence throughout the stratigraphic sequence, while the grass cover was extremely restricted. It was of oceanic temperate type below the dated tuff level, and of oceanic cool type above it, with increasing percentages of beech and fir. Tertiary relic tree species, such as *Pterocarya* and *Zelkova*, now living in some areas between the Black Sea and the Caspian Sea, were included in all levels, *Pterocarya* being much more abundant in the lower part of the sequence, in which *Vitis vinifera* (the vine) is also documented.

Interestingly, there are so far no archaeological remains from the forests of the Riano basin: a scanty series of lithic artefacts was collected only from the earthy brown tuff that closes the diatomitic series (Accordi and Maccagno 1962).

The geologically "contemporary" deposits close to Via Aurelia, to the contrary, give ample evidence of Acheulean settlement. In this latter area, the many bodies of water, from fresh to brackish, from stagnant to running, are reflected in the fauna: hippos and wild boars at several sites, beavers at Malagrotta (a minor site) (Cassoli *et al.* 1982), aquatic birds at Torre in Pietra and, again, Malagrotta. Other large herbivores are also frequent: elephants, but also rhinoceroses, aurochs, horses, deer, as well as the wolves and lions that predated them.

Anzidei *et al.* (1988) suggested that the large herds that possibly congregated close to the coast during the dry season were rather easily predated by humans: killing weak animals trapped in the mud and scavenging carcasses of dead animals were two possible options. A taphonomic study of La Polledrara (see 3.1.3) is under way. Preliminary examination of the bone remains suggest artificial breakage patterns and human activity (Anzidei *et al.* 1995).

The pattern was apparently similar at Caste1 di Guido: the pedology of the archaeological layer suggests violent but shortlived storms or rain showers, while most of the elephants that died there were either quite old or very young (Boschian 1993): that is, only the strongest and fittest animals survived. Possible cut marks were spotted on some bones. It was also recognized that some metacarpal and metapodial bones of aurochs had been artificially fractured, probably for marrow consumption (Campetti *et al.* 1989; Sala and Barbi 1996).

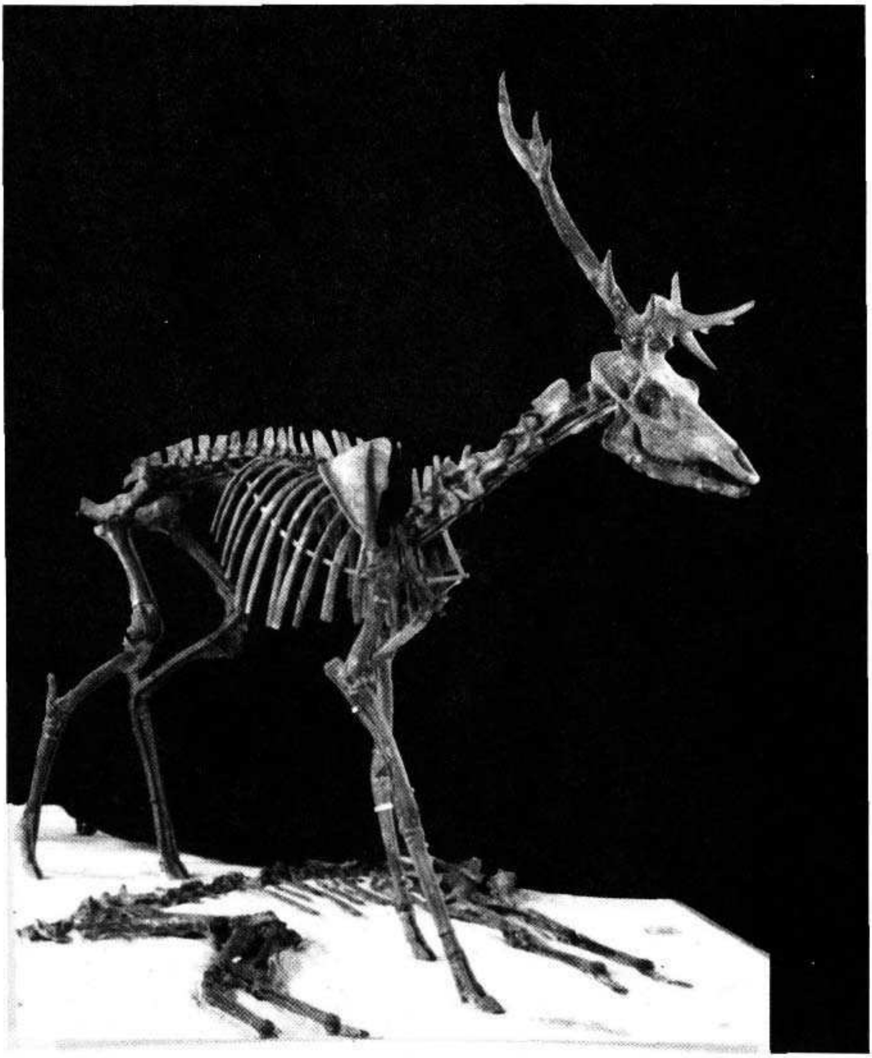


Figure 3.14. Riano. Skeletons of *Cervus elaphus rianensis* on display at the Museo di Paleontologia, Universita di Roma "La Sapienza" (photo by F. Scarpelli).

The seasonality of the sites of Via Aurelia has not been further elaborated. The peculiarities of the landscape, coupled with the characteristics of the Mediterranean climate, further enhance the relevance of Anzidei's suggestions. A marshy area would not have been attractive to herds of herbivores, and to their human and animal predators, during the winter rainy season. However, during summer, when the drought can last for some months in a row, grazing areas become more and more depleted and overgrazed. The alternative would have been either to migrate to the Apennines and upland pastures or to congregate in areas where water

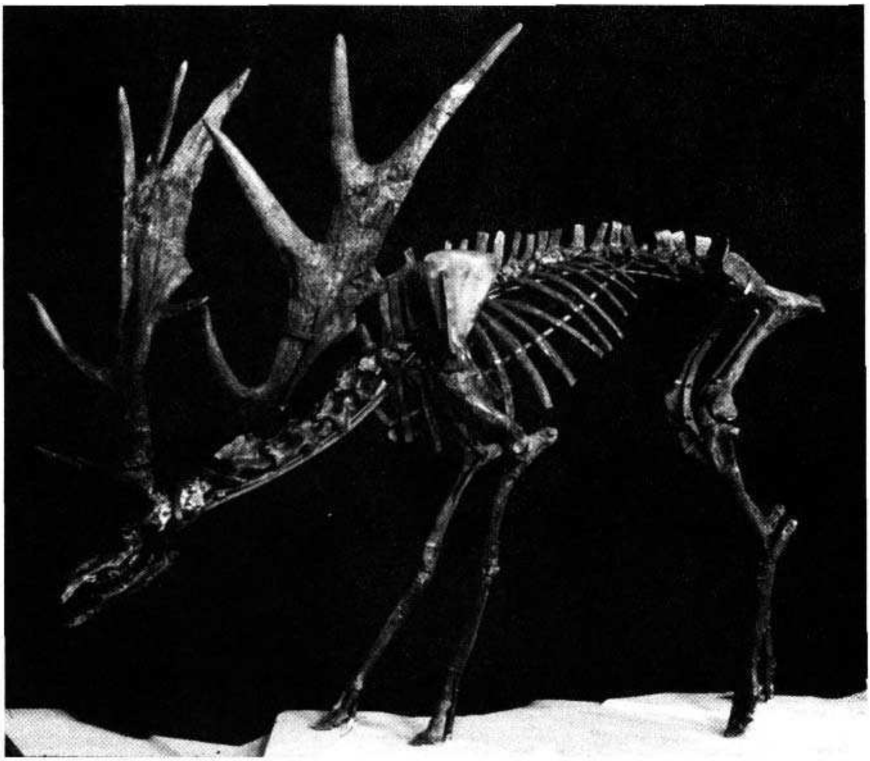


Figure 3.15. Riano. Skeleton of *Dama clactoniana,* on display at the Museo di Paleontologia, Università di Roma "La Sapienza" (photo by F. Scarpelli).

was still found and vegetation was not yet dry. The evidence from Castel di Guido possibly suggests fights among elephants at water holes, as occurs today in Africa during drought periods (see 3.2.2). In a crowded environment, the weakest animals would become an easy prey.

The numerous Acheulean sites close to the coast point to the fact that such a bounty did not escape the attention of early humans, and that their technical capacities, and group organization, were adequate to take advantage of it seasonally. The forested area farther inland, with an apparently much more restricted carrying capacity of herbivores, gives no evidence of human occupation.

3.2.4. Fire, Fireplaces, and Settling into Caves

Fire technology was definitely mastered. Charcoal and ashes are mentioned by C. Tozzi (1965) at Gr. del Colombo. "Small hearths," without further description, were recognized by Mezzena and Palma di Cesnola (1971) in level 2 of Riparo esterno at Gr. Paglicci. The bones were charred and reduced to small bits. Burnt fragments of hippo and rhino bones, as well as charcoals and ashes, sometimes forming lenses, were discovered by G. A. Blanc (1930) in levels G to K of Gr. Romanelli. A date preceding the last interglacial has been suggested for this site, but not actually proved (see 3.2.1 and 4.2.2). At another hypothetically late Middle Pleistocene site, Gr. dell'Alto, a lens of charcoal was found lying on a deposit reddened by fire action, while burnt bones are also described (Borzatti von Lowenstern 1966).

Evidence of fire is much more elusive at open-air sites. Nothing is mentioned from the archaeological layers of the Aurelian and Vitinian Formations. Slightly better information is provided by later sites. Thermoclastic damage can be seen on some lithic implements of the loess sites close to the Adriatic coast (Bisi *et al.* 1983). At Ghiardo, as mentioned earlier, positive evidence was preserved: several flakes damaged by fire, a tiny fragment of burnt bone, and some pieces of charcoal were found in a restricted area.

Poor preservation of charcoal, ashes, and bones must be assumed at least in part of the open-air sites, but questions can be raised. Is fire technology only lately acquired, as can also be seen from the evidence previously summarized (see 2.3.5) ? Or were the butchering and scavenging activities taking place in some open-air sites unrelated to cooking, heating, lighting, and repelling predators?

Large carnivore remains (lion, leopard, hyena, wolf, and bear) are invariably found in both open-air and cave sites, if in small numbers. They were denning in some of the "archaeological" caves: hyenas left coprolites at Gr. Romanelli level G (Blanc 1930:382), while cave bear was found throughout the sequence of Gr. Maggiore di S.Bernardino (Bartolomei 1960), which seems to have been a convenient place to hibernate. Fire was a definite advantage over carnivores in the competition for access to caves and also provided much needed light, and heat as well. Hearths are consistently found at such sites. As the evidence for earlier cave settlement is practically nil (see 2.2.1), we assume that caves and shelters became safe for human beings when fire was mastered (Mussi 1999). Even if a Wurmian date cannot be ruled out for part of the evidence listed here, including most probably Gr. Romanelli, there are intriguing suggestions that this happened well before the last glacial.

3.2.5. The Settled Areas

Many of the sites so far mentioned were situated near lakes, ponds, marshes and other bodies of water. More could be added to this list, such as part of the stratigraphic sequence of Le Svolte di Popoli and Valle Giumentina, on the Adriatic side of Central Italy (Radmilli 1977). The deposits at both sites were multilayered and cover a long span of time, but the excavations were undertaken many years ago and the chronology is problematic. Carnello too was close to a lake (see 3.2.1).

We have discussed the fact that lake basins are "sedimentary traps" that bias the record toward a peculiar type of environment (see 3.1.1). However, site preservation does not explain everything. Water is necessary for animals and human as well, and attracts both. At watering places, it is also easier to spot live prey or carcasses. The added evidence from the nonarchaeological sites of the Formazione Aurelia suggests that not all bodies of water were equally attractive, and that other environmental characteristics were also carefully taken into account (see 3.2.3). Thick forests were possibly avoided.

The loess sites, as well as Gr. Paglicci, give probable evidence of a much more open landscape and, accordingly, of the exploitation of a different range of resources. Settled areas were also much different in altitude: localities close to sea level have been mentioned—for example, Gr. del Colombo, the sites within Rome and along the Via Aurelia, Rosaneto. Others are in a more hilly landscape, such as Lademagne and Ceprano in the Bacino Lirino, while the Ghiardo site is one of the many on piedmont terraces at the Apennine foothill. Mountains were not an obstacle: Valle Giumentina is situated in the Apennines at 700 m asl. Nearby, Tozzi (1984) undertook research at La Selvotta, where handaxes and a flake industry were found at 800 m asl. An open-air site is situated on the top of Monte Conero at 570 m asl on the Adriatic coast (Bartolomei *et al.* 1966; Cremaschi and Peretto 1988). Other sites are located further south, on Monte Gargano, up to 500 m asl (Palma di Cesnola 1982a). We cannot expect to find sites, if any, at much higher altitudes, since only truly exceptional circumstances would have preserved them from destruction by glaciers, or other natural agents, during the several subsequent cold phases, and especially in the open.

3.3. LOWER PALEOLITHIC MARINE CROSSINGS?

Sites of late Middle Pleistocene age have been reported in the major Italian islands. We have two sets of evidence: definite Acheulean sites in areas that were not islands when first settled, and poorly defined and dated sites on islands that probably were never connected by any land bridges to the mainland.

The island of Capri belongs to the first group. Acheulean tools, including handaxes, were collected there as early as 1910 (Blanc and Cardini 1955; Piperno *et al.* 1984). Nonendemic (i.e., neither dwarf nor giant, as usual on islands) animal remains were also found in rather doubtful association. From underwater morphology, it is clear that Capri became an island, distinct from the Penisola Sorrentina (the nearby Peninsula of Sorrento) because of local tectonic activity (Fig. 3.16). The characteristics of the well-balanced faunal assemblage prove that this happened after OIS 9, and possibly after OIS 7 (Capasso Barbato and Gliozzi 1995). The Acheulean settlement was accordingly on a peninsula, not on an island, and is not evidence of marine crossing. We examine in more detail the evidence from “true” islands.

3.3.1. Flake Cleavers, Hypothetical Contacts with Africa, and the Way to Sicily

In a paper published in 1975, M. H. Alimen suggested that the geographical distribution in southern Europe of a peculiar stone tool, the flake cleaver, proved direct contacts with Africa during the late Middle Pleistocene. Flake cleavers are large, U-shaped tools resulting from the careful reduction of large cores. The distal and transversal edge is left unretouched and is produced directly by the in-

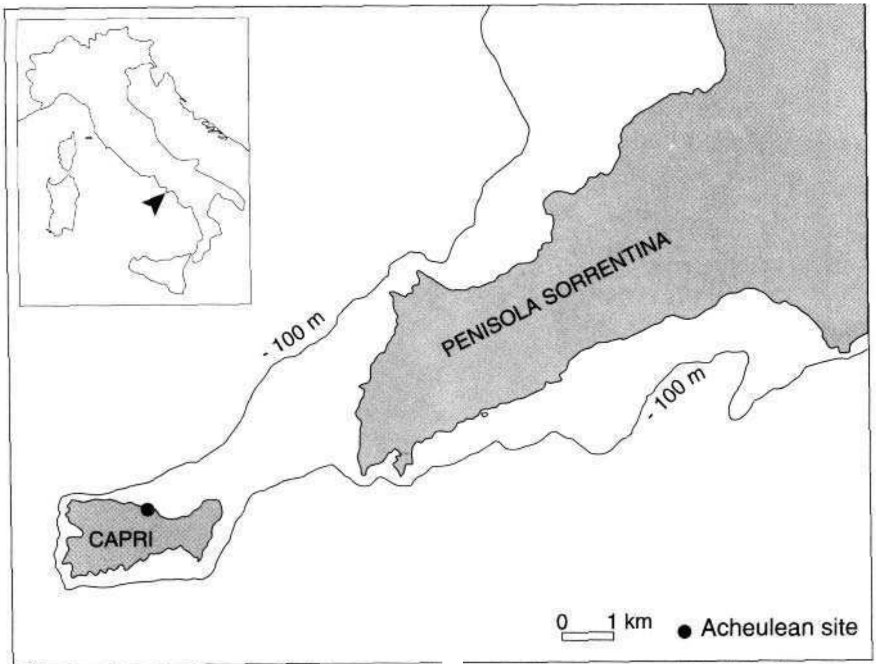


Figure 3.16. The island of Capri and the *penisola sorrentina.* A land bridge was in existence during the Middle Pleistocene.

tersection of the ventral and dorsal face when the flake is struck (Tixier 1956).They must not be confused with the apparently similar bifacial cleavers, which simply are handaxes with a blunt end (i.e., core tools). Flake cleavers are a specialized tool well known in Africa, namely, in North African Acheulean assemblages. Alimen listed the known occurrences from Spain and southwestern France and Italy, and, furthermore, suggested possible continuous or discontinuous land bridges on the evidence of current bathymetric maps and low marine stands during glacial phases.

By then, the Italian evidence was coming from two sites in southwestern Sicily, Pergole and Contrada Maddaluso, with six flake cleavers altogether and some bifacial cleavers as well (Bianchini 1973). However, the collector was the amateur archaeologist who had also claimed that archaic human bones had been found at another Sicilian site (see 2.2.3), and the place where he actually found the cleavers is not known with any certainty.

Since then, only a few more flake cleavers have been discovered, all from surface collections: two from Rosaneto in Calabria (Fig. 3.12) (Piperno 1974b), and two from Stillo in Tuscany (Sarti 1984). Another one, from Marina di Camerota in Campania (Palma di Cesnola 1982b), is probably merely a bifacial cleaver.

As discussed earlier (see 3.2.1), Rosaneto can be dated either to OIS 9 or OIS 7, while the date of Stillo is even more loosely estimated.

As far as bathymetric maps are concerned, their value is rather restricted due to the extreme tectonic instability, so much so that in July 1831, a volcanic island started to emerge south of Sicily, at 37°11'N and 12°44'E, at a place where the sea

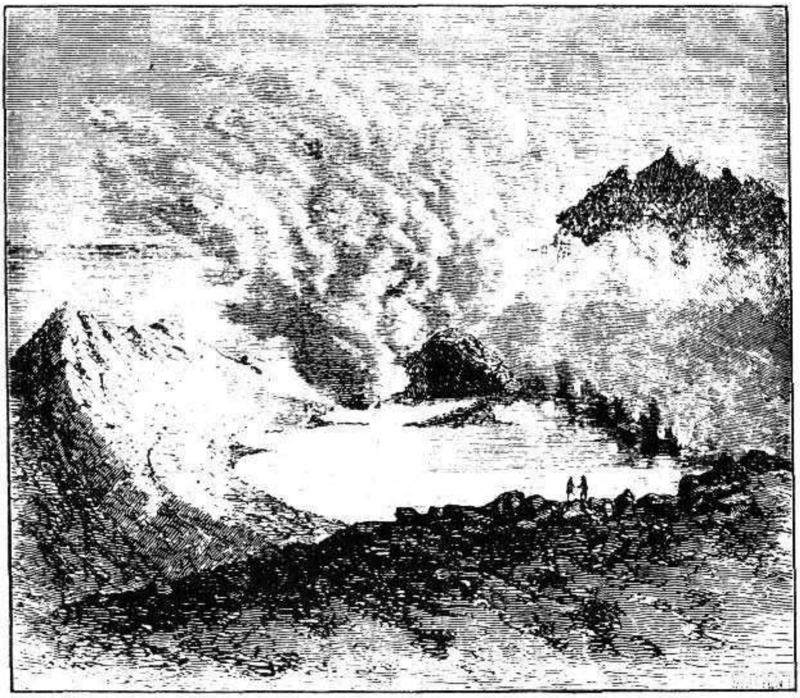


Figure 3.17. The *Isola Ferdinandea,* as seen by C. Prévost on September 29, 1831 (after Prevost 1831).

used to be some 200 m deep. Within a month it attained a perimeter of 4,800 m, and a maximum altitude of 60 m asl (Fig. 3.17) (Chiappisi 1959; Prevost 1831). Sovereignty over it was claimed by the Kingdom of Naples, by England, and by France, and it accordingly received several different names: "Isola Ferdinandea" after Ferdinando II of Borbone, who was by then the king of Naples and Sicily; "Isola Giulia" or "IleJulia" after the month during which it first appeared; "Graham Island" in the English literature, and *so* on. Notwithstanding the hot scientific and political debate, the island soon started to sink and had completely disappeared in December of that same year. It briefly reemerged in 1863, and the bottom of the sea is presently just at -8 m in the area.

The story of the Isola Ferdinandea does not counter the possibility of a land bridge, just the opposite. However, it means that maps cannot be taken at face value and that evidence of connections, if any, must be looked for after different lines of evidence.

Furthermore, in recent years, it has been suggested that flake cleavers are produced wherever quartzite and other coarse-grained materials occur in large blocks (Villa 1981). This happened well into central Europe, and previous claims of an Acheulean of African origins in the Iberian peninsula were dismissed (Santonja 1991-1992). As the Italian cleavers are usually made on quartzite, limestone, and sandstone, it is safer not to search their provenience beyond the sea. Both the

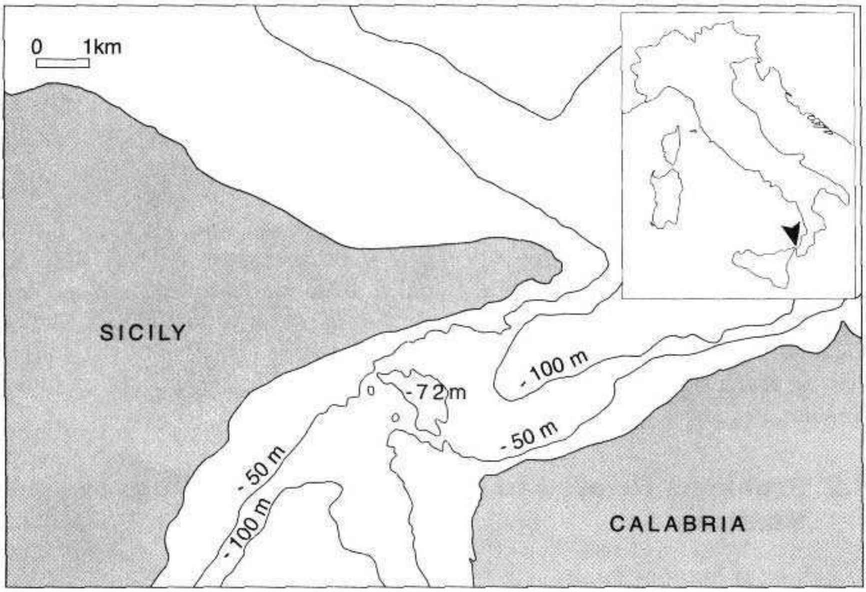


Figure 3.18. The Strait of Messina. Depth in meters (based on *Carta 138-Istituto Idrografico della Marina).*

geomorphological and the archaeological evidence put forward by Alimen to suggest direct links with Africa must be rejected.

As for passing from continental Italy to Sicily, the Messina Strait is presently no more than 3 km wide at Capo dell'Armi and only 72–130 m deep at the Sill of Peloro (Fig. 3.18). However, it is difficult and even dangerous, without appropriate means, to cross it. Tides of the Ionian and Tyrrhenian basin have opposite cycles, being simultaneously high on one side of the Sill of Peloro and low on the other. Sea waters pass through the sill and alternately flow into either basin. Therefore, the strait is submitted to exceptionally strong tidal currents. Furthermore, the edges of the strait are steep (Montenat *et al.* 1987): in Calabria, they reach an altitude of 1,500 m less than 10 kin away from the shoreline in the Aspromonte; in Sicily, the Monti Peloritani are 1,100 m high 5 km inland. The littoral plains are very reduced in Calabria, and almost nonexistent in Sicily. Important escarpments—such as the Scilla Cliff, over 300 m in height—bound the coast in many places.

Due to the present shallowness of the strait, it is often assumed in the archaeological literature that it emerged during glacial periods. This gross oversimplification does not take into account the intense tectonic activity experienced in the area. The strait is actually submitted to uplift movements, started during the Pliocene. Data from marine maps indicate a rise of some meters since the middle of the nineteenth century (Montenat *et al.* 1987).

The perenniality of the strait during the Middle Pleistocene has been sustained or rejected following different lines of evidence—geomorphology, tectonics, marine species distribution, terrestrial mammal distribution, and *so* on—and is still an open question (Barrier *et al.* 1987; Palombo 1985) (see also 5.2.3). Whether or not the strait was dry, it was certainly not that easy to leave the island or to reach it. Calabria itself, which is the link to the European continent, a rather rugged and discontinuous stretch of land, was difficult to cross: southern Calabria was actually an island at the beginning of the Middle Pleistocene, and was connected to the mainland only later on (Caloi *et al.* 1989).

Highly hypothetical contacts with Africa during an earlier part of the Pleistocene have been discussed previously (see 2.2.3). Lower and Middle Paleolithic research is still in its infancy in Sicily. There is no accurately or even reasonably dated site, and all archaic-looking material is from uncontrolled surface collections. Pending modern and problem-oriented archaeological research in Sicily and in Calabria, we do not know when human groups were first able to cross arms of the sea to reach the island—if, indeed, it was an island and not a promontory or peninsula.

3.3.2. Problems Related to Archaeological Findings in Sardinia

Sardinia is another controversial area for Paleolithic finds. We have already discussed the earliest claimed evidence (see 2.5.1). More lithic assemblages were collected at open-air sites of northern Sardinia, in an area rich in flint, if not of excellent quality (Martini 1992, 1999). The tools are scarcely retouched. They were referred to as “Evolved Clactonian” and dated to the “Riss” glacial age (i.e., to late Middle Pleistocene) after geomorphological considerations, including the height of the fluvial terrace on which they lay. Fauna is not preserved and no radiometric dating was attempted. More research is clearly needed before the question is settled.

3.4. COMMENTS

3.4.1. Comparative Evaluation of Site Density

Site density is directly related to site preservation. We do not have a detailed knowledge of the natural agents that specifically affected early archaeological occurrences. All the same, we know the conditions that enhanced their probability of being left reasonably undisturbed—such as quick burial within a lake basin—and those that destroyed or, at best, displaced them—such as, primarily, erosion. However, we cannot quantify positive and negative agents comparing pre- and post-330 ka sites. The only quantitative data refer to time and number of occurrences.

Following traditional chronologies, human groups entered Europe more than one million years ago. The length of time considered in this chapter, from OIS 9 to OIS 6 (i.e., from c. 330 ka to c. 130 ka) is accordingly much shorter than for the earlier phase of peopling in Italy. However, we prefer a “short chronology,” possibly not much beyond 600 ka, for the first settlement of Italy (see 2.5.1). With the second option, we are left with two broadly similar spans of time, from 600 to 330 ka, and from 330 to 130 ka.

To evaluate the number of occurrences, we must deal with a large amount of surface collections. Those from the many loess sites of Northern Italy can now be safely related to the final Middle Pleistocene. The assemblages from Monte Gargano often include Levallois flakes and cores (Palma di Cesnola 1982a), which to us point to a date later than OIS 9. In the Venosa basin, handaxes of Micoquian type are often collected. A single specimen was also excavated in an undisturbed deposit at Lichinchi—an area distinct from both Loreto and Nortarchirico (Barral and Simone 1983). A rather late date in the local sequence is suggested. In the undated sequence of the Atella Basin, Acheulean assemblages, including many Levallois tools, are mentioned in a stratigraphic position overlyng the volcanic sediments, and accordingly suggest a rather late date (Borzatti von Lowenstern and Vianello 1993). Some sixty Acheulean occurrences are known in Tuscany and Umbria, most from river valleys (Galiberti 1982). Unfortunately, their date is simply unknown, even if the tiny triangular handaxes found at some localities are possibly indicative of a final Acheulean.

However, even if we can reasonably suggest that part of the handaxe assemblages collected from the surface are late in date, we cannot discriminate those that are much earlier. At the other end of our chronological slice, undated Middle Paleolithic series can actually precede the last interglacial and could well be added to our list. The resolution is quite poor.

If we compress the earliest archaeological evidence into a 200–300 ka span after a short chronology and take into account handaxe as well as chopper assemblages, "Clactonian" and "Protolevalloisian" occurrences, we are left with a number of finds not dissimilar from the post-330 ka one. Crude as it is, this evaluation does not suggest major changes in site density throughout the Middle Pleistocene.

3.4.2. Settlement, Seasonality, and the Exploitation of Different Ecological Niches

Mountain ranges were obviously cold, especially in winter, and even snow-covered, with scarce vegetation after autumn and before springtime. It is safe to assume that they were visited during the warm months of the year. Summer occupation was also considered probable for the sites clustering along Via Aurelia (see 3.2.3). Furthermore, geologists and paleontologists are aware of parts of both the Aurelian and the Vitinian Formations, that are devoid of human traces. This, too, points to a nonindiscriminate use of the environment, and maybe to some planning.

The open and steppe-like landscape surrounding the "loess sites," coupled with the lack of any recorded dwelling structures, are definitely not indicative of any winter settlement: even fire would have been extinguished by rain. Caves, such as Gr. Maggiore di S.Bernardino and Gr. Paglicci, would have been a welcome shelter.

There was also a general trend in the second half of the Middle Pleistocene toward more and more marked interglacial–glacial oscillations, while the long pollen core of Valle di Castiglione actually records several contrasted botanical assemblages (see 3.1 and 3.1.2). Dwelling in caves was becoming adaptive during progressively more severe glacial phases, and mastering fire technology was part of the process. Problem-oriented research is badly needed to test seasonality at early cave sites.

Very different environments, steppe-like as well as more wooded ones, had already been settled well before OIS 9 (see 2.4.2; Mussi 1995). The marked altitudinal gradient of the Italian territory furthermore allows for different ecological niches over short distances. We cannot even rule out that earlier mountain sites were not found just because of the vagaries of site preservation and archaeological research, and the poor chronological resolution of part of the record. To suggest that the exploitation of mountain environments only started with the late Middle Pleistocene, as discussed in 3.2.5, is just a conservative statement. All things considered, there is only slightly better evidence for seasonality during this later phase of the Early Paleolithic than before.

3.4.3. Comparing the Earlier and Later Evidence: A Long-Term and Successful Adaptation

We have stressed in the previous paragraphs that during the last part of Middle Pleistocene, from 330 to 130 ka, there is no major change in site density and in exploited resources, in comparison with the pre-330 ka record. Through time there is, however, a better mastering of the knapping technology, as well as of fire technology, with the possible beginning of a successful competition with carnivores for the utilization of caves (see also Chapter 4). There is also some positive evidence of seasonality and planned occupation of selected areas. We tentatively link part of the observed changes with the climatic deterioration that cyclically affected the environment—more markedly so after the "Brunhes event." During colder phases, fire control, cave and shelter utilization, and a greater ability in meat and marrow procurement were distinctively adaptive.

The archaeological record from Italy is possibly the richest of the European continent up to OIS 9, if not later. We have stressed that it is much discontinuous all the same, with better preservation of sites referred to interglacial periods.

It is trivial to stress that the climate enjoyed in the peninsula of Capri, or at Rosaneto, was much milder than at sites of northeastern Italy. Different environments existed during both glacials and full interglacials. This is better understood if we consider the geographical setting: Italy expands in a northwestern to southeastern direction over some 10° of latitude (i,e., from the Alps to the latitude of Northern Algeria, Tunisia, and Syria). The climatological effects of this gradient are contrasted by the ranges of mountains, which, from north to south, are parallel and within short distance of the coasts. Not surprisingly, there are nowadays popular resorts for winter skiing on the mountains of Calabria and Sicily, including the active Etna volcano, while palm and olive trees vigorously grow close to the northern Mediterranean shores and along the lakes of the pre-Alps.

In a country of great contrasts within short distances, extensive ecological zonation has never been possible, and mosaic environments prevail and prevailed. This can be seen at Valle di Castiglione: the growth of plant populations was exponential when climatic conditions changed, and many refugium areas were assumedly always in existence over short distance. Even now, the vegetation of Latium is known to be both extremely rich in species and markedly heterogeneous (Caloi *et al.* 1989). At a larger scale, as far as botany is concerned, more than half of the 11,000 species occurring in Europe are presently found in Italy, and 732 of them (i.e., 13 percent are exclusive of the Italian territory—Italy covering less than 3 percent of Europe) (Conti *et al.* 1992).

It has long been known in ecological studies that diversity is advantageous over homogeneity, and that complexity is based on heterogeneity. The richness and variety of environments over short distances were most suited to unspecialized technological equipment. It was also safer because climatological changes and natural disasters would leave unaffected areas—or limitedly affected areas—within reach. If we add that it cannot be so far totally ruled out that Sicily was a gate to immigration from Africa, it is no surprise that Italy was most successfully settled during the Middle Pleistocene and was actually a preferred part of Europe (Mussi 1995).

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Chapter 4

On Neandertals and Caves

4.1. INTRODUCTION

Middle Paleolithic lithic industries are found well before the last interglacial at Torre in Pietra level d, Sedia del Diavolo, Monte delle Gioie, and so on (see 3.2.1), and we agree with A. Tuffreau (1982; 1992), who proposed to start the Middle Paleolithic with OIS 8. The archaeological evidence for OIS 8, however, is scarce or lacking in Italy, and the record includes firmly dated sites starting with OIS 7. Except for a few handaxes in some assemblages, the earlier Middle Paleolithic industries correspond to the Mousterian of OIS 5 to 3. There is also evidence that human groups dwelt in caves and were able to use fire for domestic purposes well before the last glaciation. Furthermore, the human remains point to individuals close, or even identical, to Neandertals. However, in any of the suggested fields-lithic industry, physical anthropology, and so on—the evidence is rare, if not scanty or controversial, before OIS 5. The general picture is indefinite and blurred.

This is in sharp contrast with the last interglacial–glacial cycle—in fact, the last interglacial and the first half of the following glaciation. By then, the sites are numerous and widely distributed all over Italy. In this chapter, we focus on this phase, which is not to be opposed to the record of OIS 7 and 6: it is basically a matter of more exhaustive documentation. The archaeological record of the last glaciation is much more detailed and not prone to controversy. For the first time, it allows us to establish firmly and in detail facts that can only be tentatively suggested for earlier times.

4.1.1. Terminology of the Last Glaciation, the Current Chronological Framework, Wiirmian Stadials and Isotopic Substages, High Marine Stands and Tyrrhenian Beaches

The chronology of the last interglacial–glacial cycle is detailed in comparison to previous cycles. Recent research has rather accurately established the dates of

OIS 5 to OIS 3, which are relevant to understand changes and adaptations during the first half of the last glacial (i.e., in Europe, the Wurm glacial). After Broecker *et al.* (1968), OIS 5, which encompasses the fully interglacial Substage 5e (OIS 5e) also known as the "Eemian" by geologists, ends at 75 ka bp. The ensuing OIS 4 is a cold and short-lived phase of some 10 ka (c.75–65 ka bp), followed by the longer OIS 3, which ends at some time around 24 ka bp and includes four warmer oscillations. A very similar and accurate timescale has also been worked out after deep-sea drillings in the Tyrrhenian Sea, with an estimated date of 26 ± 3.5 ka for the end of OIS 3 (Paterne *et al.* 1986).

Problems arise when the archaeological evidence is fitted into this scheme. In fact, in the recent past, reference was made to Wurmian subdivisions such as Wurm I and Wurm II. H. De Lumley-Woodyear's synthesis (1969) of the Lower and Middle Paleolithic of the northern Mediterranean is a good example. After him—and after the chronological clues available to archaeologists in the early 1960s—the Wurm glacial phase started at about 80 ka with Wurm I, which lasted to 60 ka. It was followed by a warmer interstage (Wurm I/II), and then by the Wurm II phase, from 55 ka to 40 or 35 ka.

The Wurm I phase of the archaeologists now begins with OIS 5d at 115 ka bp, and lasts to the end of OIS 4, some 65 ka ago. Then there is the Wurm II, which is more or less equated with OIS 3 (Fig. 4.1) (Labeyrie 1984).

In fact, there is a general agreement that the early Wurm was still rather warm, even if colder oscillations occurred, while the following glacial phases were much more severe, even if a series of mild oscillations are centered on the millennia around 40 ka. As a consequence, when the fauna and other indicators point to a warm climate, the sites are usually attributed to an early glacial. They are related to a more advanced Wurm if the climate is believed to have been cold. This procedure is obviously not without the risk of circular argumentation. New and more frequent absolute dating, as well as tighter geostratigraphic correlations, will hopefully help solve the problem.

Another difficulty arises from the term "Tyrrhenian." It was first introduced in 1914 by A. Issel, who described the fossil beaches of Sardinia with *Strombus bubonius* and other molluscs now extinct in the Mediterranean. As these species are presently living on the coasts of Senegal in western Africa, they are called "Senegalese faunas" and taken as indicators of warm sea waters.

More and more raised beaches with a varying fossil fauna were localized in different parts of the Mediterranean in subsequent years and referred to several high marine stands. This eventually led to a complex and even puzzling nomenclature with terms such as Paleotyrrhenian, Eutyrrhenian, Neotyrrhenian, Neoorthotyrrhenian, and so on, being introduced. We adopt a proposal by E. Gliozzi (1987), who, following a comprehensive review of the nomenclature and a study of the deposits of the Crotone Peninsula, relates the Tyrrhenian as a whole to OIS 5. She then subdivides it into Eutyrrhenian, corresponding to OIS 5e (125 ka bp), and Neotyrrhenian, corresponding to OIS 5c and/or 5a (110–70 ka). Many more mollusc species (including *Strombus bubonius* itself) indicative of a warm climate are found in the Eutyrrhenian beaches, compared to the nian ones: a colder environment affected the later mollusc assemblages and depleted them.

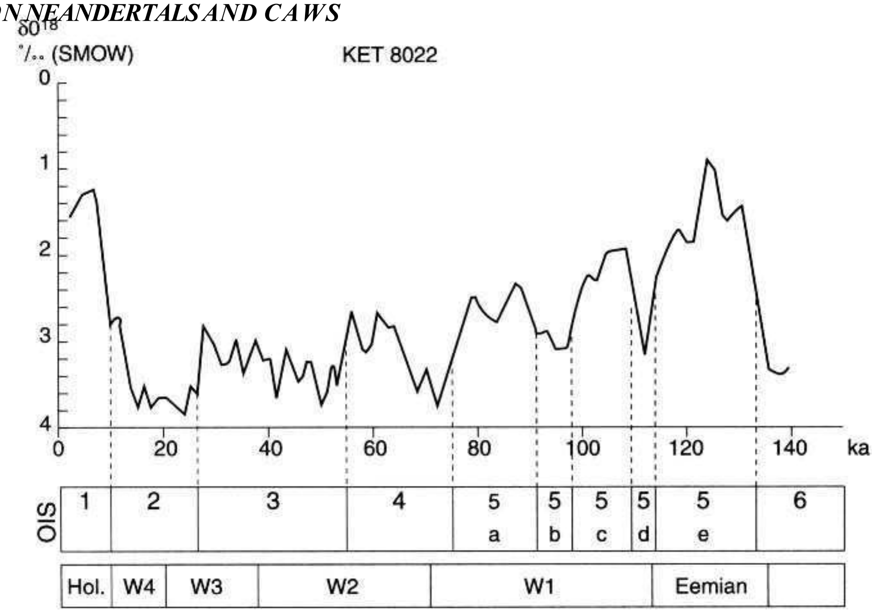

Figure 4.1. The last interglacial–glacial cycle. A correlation of absolute chronology, isotopic stages and geological subdivisions, based on core KET 8022 (source: Labeyrie 1984, with modifications following Bassinot *et al.* 1994).

Earlier raised beaches, in which *Strombus bubonius* has not so far been found, are named Crotonian by Gliozzi and correlated with OIS 7.

In English, some attention must be given to avoid confusion between the Tyrrhenian Sea, which is the part of the Mediterranean just west of Italy *(Mare Tirreno* or *Mare Tirrenico* in Italian), and the Tyrrhenian fossil beaches *(spiagge tirreniane),* which have a much broader geographical extension and a well-defined chronological and ecological meaning.

4.1.2. The Main Characteristics of the Mousterian in Italy, The Pontinian Mousterian, and Possibly Earlier Assemblages

On the basis of typological analysis, most of the Mousterian industries can be classified within the framework established in France by F. Bordes (1953, 1961); that is, there are lithic assemblages with various percentages of points, scrapers, and denticulates, sometimes obtained using the Levallois technique, which are accordingly named Typical Mousterian, Denticulate Mousterian, Ferrassie or Quina Mousterian (or less specifically, Charentian Mousterian, which subsumes the latter two assemblages). Industries that could be described as Mousterian of Acheulean tradition have never been discovered. As real assemblages do not always comply to the French archetypes, expressions such as "Typical Mousterian enriched in scrapers" or "Attenuated Charentian" are frequent in the literature.

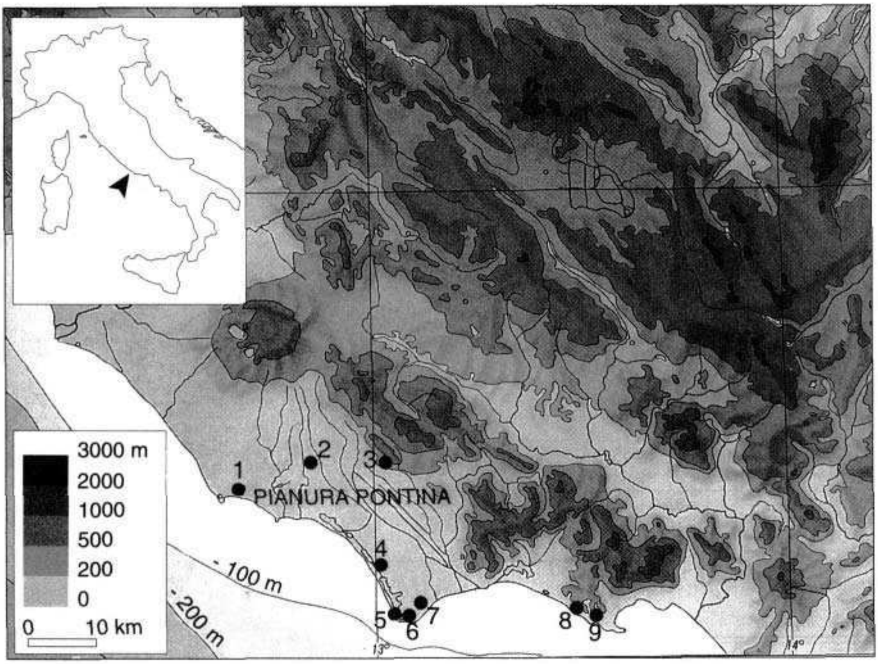

Figure 4.2. Location of Mousterian sites south of Rome. 1: Vallone Carnevale; 2: Canale delle Acque Alte, Podere La Rosa; 3: Gr. della Cava; 4: S. Andrea; 5: Gr. Breuil, Gr. Barbara; 6: Gr. del Fossellone, Gr. delle Capre; 7: Gr. Guattari; 8: Gr. dei Moscerini; 9: Gr. di S. Agostino.

Some assemblages, however, are peculiar to Italy. They have been studied at many open-air sites in the surroundings of Rome, and mostly at the caves of Monte Circeo, and in the coastal plain south of the capital (i.e., the *pianura pontina)* (Fig. 4.2). They are named Pontinian after it.

The Pontinian Mousterian is characterized at first glance by the use of good quality but tiny flint pebbles that were locally available. While early studies stressed mainly this aspect (Blanc 1937a; Blanc and Segre 1953), M. Taschini (1967, 1970, 1972, 1979) clarified the chronology and typology. For her, the Pontinian Mousterian was basically a Quina Mousterian, which had some technical peculiarities deriving from the use of the local raw material. Already in existence before the last interglacial, it was best documented during the first half of the Wurm. In contrast, C. Tozzi (1970) maintained that the Pontinian was just a technological development, deriving from the need to adapt to small pebbles, of otherwise typologically diverse Mousterian. Despite this, he retained the name.

Beginning in the late 1970s, Mousterian assemblages on small pebbles, definitely not Quina on typological grounds, started to be documented in the classic area (Mussi 1977–1982; Zampetti and Mussi 1988). They referred to a chronological phase later than the Pontinian *sensu stricto.* It was also stressed, *contra* Tozzi (1970), that the adaptation to the use of small pebbles was not sufficient to define typologically different assemblages. The new assemblages were provisionally defined as belonging to a Denticulate Mousterian, while the term "Pontinian" was retained for the Quina Mousterian on small pebbles.

In recent years, some of the Pontinian collections from cave sites have been reexamined by S. Kuhn (1990-1991a, 1990-1991b, 1995; Stiner and Kuhn 1992), who highlighted developments in knapping techniques through time and the shift from centripetal cores to single-platformed ones.

Some researchers also believe that some Mousterian industries are different from the Wurmian industries because they are older (Aspes 1984; Palma di Cesnola 1982). They have been mentioned in the previous chapter (see 3.2.1). Examples include the assemblages from Gr. Maggiore di S. Bernardino in Venetia, for which a special name (i.e., "Bernardiniano") was proposed (Leonardi and Broglio 1962), and Gr. dell'Alto in Apulia. They include carinated tools and tools with a dihedral ventral face, the so-called "Quinson tools," as well as Clactonian notches. They are small sized. At Gr. dell'Alto, there are also bifacial points—some being thick, others almost foliate. Gr. Maggiore di S. Bernardino is the only such site so far radiometrically dated, and the available preliminary information confirms that part of the industries are of pre-OIS 5 date (Cassoli and Tagliacozzo 1991).

4.1.3. Biases in the Archaeological Record

Not including sporadic finds or poorly recorded surface collections, some ninety Mousterian sites dated to the last interglacial or to the Wurm glacial are currently known in Italy. Some yielded restricted assemblages, while others are multilayered; some are open-air settlements, while most are cave sites (Fig. 4.3).

As a general rule, bones are preserved at cave sites only, in sharp contrast with earlier Paleolithic phases. This is related to the very fact that we are mainly dealing with a glacial phase: the sea level was falling—albeit with some fluctuations—and this basically meant erosion by rivers, as their base level was determined by the falling sea level. The moors, ponds, lagoons, and abandoned meanders, which are a common feature of the landscape during interglacials and high marine stands, just disappeared. Previously, they had attracted ungulates and their predators. In this low energy environment, sedimentation had been a common phenomenon, and the bones had been quickly buried and easily preserved.

Furthermore, the intra-Apenninic lakes, which had been another favored environment during the Lower Paleolithic, had also shrunk, filled by alluvium and volcanic deposits, and/or had been disrupted by tectonic activity.

During the Wurm glacial, open-air settlements were established on river terraces, in sandy coastal areas, or at the Alps piedmont in Northern Italy, where loess sedimentation occurred. None of those environments generally allowed for the preservation of organic remains, either because the latter were left exposed for too long a time on the surface or because of the aggressive chemistry of the deposits.

Animal remains—usually disarticulated and even fragmentary—are found in the alluvia of rivers such as the Po or the Arno and their tributaries. They are not connected to any human activity and were preserved because they were carried by the flood and then quickly buried by natural agents. They are of some use in environmental reconstruction.

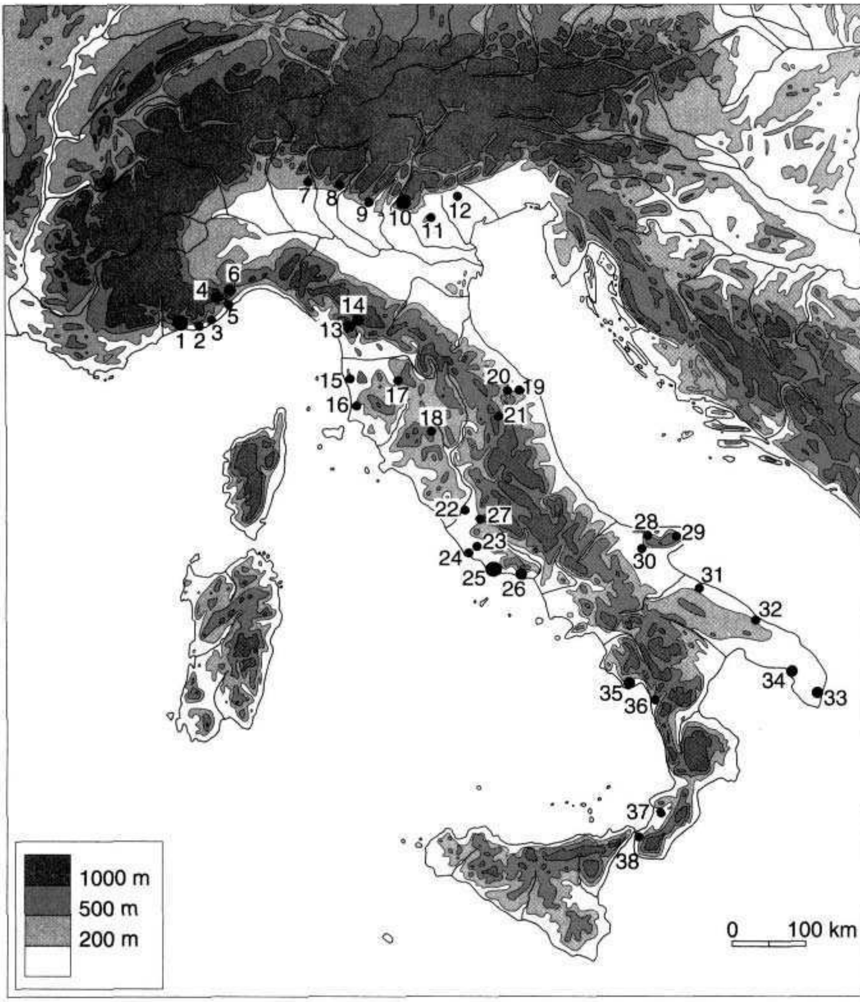

Figure 4.3. Location of archaeological, paleontological, paleobotanical and geological sites (OIS 5 to OIS 3). 1: Gr. di Grimaldi: Riparo Mochi, ex-Casino, Barma Grande, Gr. del Principe, 2: S. Francesco, 3: Madonna dell'Arma; 4: Gr. della Básura; 5: Gr. di S. Lucia; 6: Gr. delle Manie, Gr. delle Fate; 7: Bagaggera; 8: Pianico Sellere; 9: Cascina Buca del Latte; 10: Rip. di Fumane, Rip. Tagliente, Rip. Mezzena, Rip. Zampieri, Gr. di Ponte di Veia; 11: Gr. del Broion; 12: Pagnano d'Asolo; 13: Gr. del Capriolo, Buca della Iena; 14: Buca del Tasso, Gr. all'Onda; 15: Castiglioncello; 16: Botro ai Marmi; 17: Monteriggioni; 18: Gr. di Gosto; 19: Colonia Montani; 20: Erbarella; 21: Ponte di Crispiero; 22: Saccopastore; 23: Canale delle Acque Alte, Podere La Rosa; 24: Vallone Carnevale; 25: S. Andrea di Sabaudia, Gr. Breuil, Gr. Barbara, Gr. del Fossellone with Antro Obermaier, Gr. delle Capre, Gr. Guattari; 26: Gr. dei Moscerini, Gr. di S. Agostino; 27: Valle di Castiglione; 28: Ingarano; 29: Piani di S. Vito; 30: Gr. B di Spagnoli; 31: Gr. di S. Croce; 32: Gr. delle Mura; 33: Gr. Romanelli, Gr. delle Striare, Gr. di Fiume Surdo; 34: Gr. del Cavallo; Gr. M. Bernardini, Gr. di Serra Cicora, 35: Gr. La Cala, Gr. Tina, Gr. Taddeo, Riparo del Molare; 36: Gr. di Torre Nave; 37: Ianni di S. Calogero; 38: Archi.

Loess sedimentation in Northern Italy also means that at open-air sites, the artifacts produced during different phases of the Middle and Upper Paleolithic were blanketed by deposits. During excavation, they are often found as discrete associations, separated by some aeolian deposits. Site formation and preservation is different in areas at which wind-blown sediments did not occur: as the landscape remained stable, artifacts of different periods accumulated next to each other. Different periods can only be sorted out by typological seriation. The scientific information that can be gained at such sites is limited, as can be seen from the coastal area of Rome (Arnoldus-Huyzendveld *et al.* 1993).

However, during the Wurm, cave occupation became widespread for the first time, and this very fact to some extent compensates for the limited array of information from open-air sites. Part of the focus on cave sites is related to the natural characteristics of Italy, as well as to the history of archaeological research. Coastal cliffs are common and the high interglacial sea level of Isotopic Substage 5e was often responsible for the erosion or enlargement of caves due to the action of waves hitting the rocks. Accounting for the widespread tectonic instability, caves nowadays frequently occur 5–15 meters above the present sea level. As a consequence, they are easily spotted. This fact explains the relative scarcity of excavated cave sites in mountain areas since they are often located only with considerable effort.

However, even taking into account archaeological biases, Neandertals developed a remarkable ability to compete with dangerous animals such as hyenas and cave bears for the access to the highly prized, but not that frequent, natural cavities. It had never occurred on such a scale before the last glacial, even if we take into account the fact that some of the "early" caves might well have been filled by deposits or collapsed, and thus escaped detection, or have been emptied by wave action during the high stand of the last interglacial. As suggested earlier (see 3.2.4), the control of fire must have been important in this process of adaptation to a sheltered but also cold, damp, obscure, and even dangerous environment.

All the sites mentioned so far are located in peninsular Italy. The only relevant site in Sicily is Contrada Fusco of Siracusa, which was excavated in recent years over more than 1,000 m² (Basile and Chilardi 1996). The rich faunal assemblage is dated by ESR from late OIS 6 to early OIS 4 and includes hundreds of bones of elephant, hippo, bear, hyena, and otter. However, no evidence of human presence turned up. More research is badly needed in order to establish whether Sicily was ever settled by Neandertals.

4.1.4. Some Important Sites

We describe in some detail a few sites that either are a reference for other, less extensively documented sites, or have peculiar features not found elsewhere.

4.1.4.1. Riparo Tagliente

Riparo Tagliente is a large rock shelter that opens at 250 m asl in the Monti Lessini, just north of Verona (Aspes 1984; Bartolomei *et al.* 1974, 1982). There is a long stratigraphic sequence, and we deal here with the lowermost part of it, from level 31 to level 52, which overlies the bedrock (Fig. 7.5). Part of the layers were excavated over only 4 m² but a significant amount of lithic industry was found in almost every level.

On the basis of the preliminary typological analysis, scrapers are the most frequent group, while denticulates, also found in large numbers, progressively increase in frequency, likewise Upper Paleolithic types (endscrapers, burins, borers) (Table 4.1). The trend in the frequency of unretouched Levallois flakes is just the opposite.

Pollen analysis and the evidence of smaller mammal remains suggest that the environment was a wooded grassland, indicative of a dry and cool climate, when the lowermost layers were deposited. Then, intense thermoclastic activity took place, while rodents are indicative of a steppe-like landscape and an arid climate with severe winters. In levels 39-31 loess deposition prevails and trees nearly disappear. The pollen content of levels 35–31, however, suggests a thicker grass cover with some oaks and lindens. There are a few large mammal bones: two fragmentary mammoth teeth from levels 37–36, some scanty remains of roe deer, red deer, ibex, and marmot from levels 33–31.

Table 4.1. Riparo Tagliente. Inventory of the Lithic Tools of the Earliest (Levels 52-48) and Latest (Level 31) Mousterian Assemblages.[a]

Type List	Levels 52–48 n	Level 31 n
Levallois flake	37	3
Levallois point	2	–
Pseudo-Levallois point	–	1
Mousrerian point	3	8
Limace	–	1
Single scraper	30	39
Double scraper	3	1
Convergent scraper	1	1
Dejere scraper	4	2
Transverse scraper	6	4
Scraper on ventral face	2	2
Abrupt retouched scraper	–	2
Scraper with thinned back	2	1
Endscraper	–	4
Burin	1	3
Borer	1	–
Backed knife	–	1
Truncated flake/blade	2	1
Notch	1	7
Denticulate	15	33
Retouched flake/blade	–	1
Miscellaneous	5	6
Total	115	121
ILty	33.9	2.5
IR	41.3	43.1

[a]Source. Bartolomei *et al.* (1982).

The Mousterian sequence of Riparo Tagliente has been correlated to the Würm II glacial stage, and the uppermost levels to the final part of it. The loess of level 39 has been dated by TL to 54 ± 11 ka (Broglio *et al.* 1989-1990).

4.1.4.2. Grotta Guattari

Grotta Guattari is located close to present sea level at the foot of Monte Circeo, an isolated limestone promontory some 100 km south of Rome (Blanc and

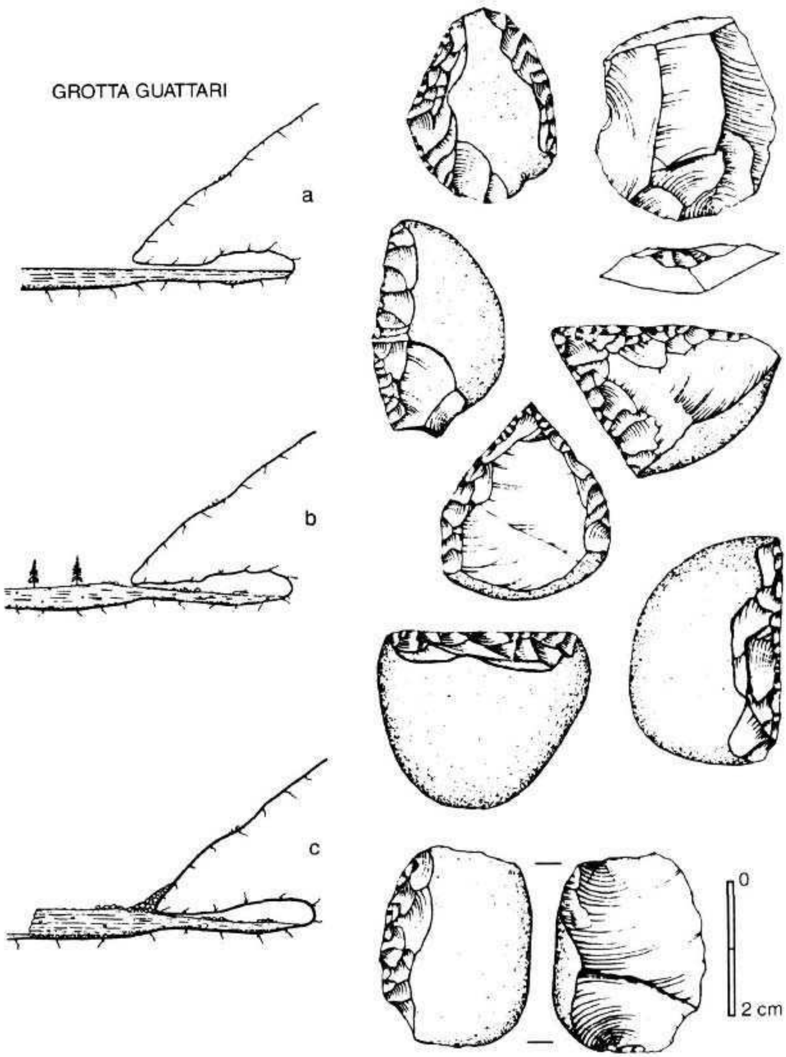

Figure 4.4. Grotta Guattari. Left: scheme of the deposition sequence during (a) the full interglacial; (b) the Wiirmian glacial period; (c) the Holocene (after Blanc 1942). Right: lithic industry from level 4 (source: Taschini 1979).

Segre 1953; Taschini 1979). Many caves of M. Circeo open on the cliffs and are exposed to the waves, since the sea rose to its present level during the Holocene: their archaeological deposits have been totally or partially destroyed. Gr. Guattari is one of the few exceptions. First, it is situated in a protected position nearly 100 m from the modern shore. Second, the entrance of the cave was closed by slope deposits well before the end of the last glaciation. The archaeological deposit was therefore intact, with the upper paleosurface exposed and undisturbed, when the cave was reopened by chance some 60 years ago (Fig. 4.4).

Trenches were dug by archaeologists at the entrance of the cave, and in the inner part as well. The stratigraphic sequence starts with a Tyrrhenian fossil beach. Then there are layers 5–1, some 3 m in thickness, which include Mousterian lithic industry (except for layer 3, which is sterile). As usual in the coastal sites of Latium from Acheulean to Mesolithic, the raw material consists of the small flint pebbles that were locally available. Typologically, the assemblage is characterized by 50–70 percent scrapers, part with the distinctive Quina retouch. Points, denticulates, and other types are consequently not frequent, but chopping tools always occur in some significant percentage (Table 4.2). The Levallois technique is rarely found. Gr. Guattari is the type-site for the Pontinian industry (see 4.1.2).

Faunal remains are quite frequent in layer 1, as well as on the exposed paleosurface, which was littered with stones and bones, and nearly devoid of artifacts. The other layers yielded less bone remains, if many more artifacts. Red deer occurs most frequently among ungulates, while spotted hyena, the most abundant carnivore, also left coprolites (Stiner 1990-1991a). Remains of cave bear, leopard, wolf, elephant, hippo, rhinoceros, fallow deer, roe deer, and aurochs were also found (Blanc and Segre 1953). The climate was apparently never really severe.

The cave is mainly known for its well-preserved Neandertal skull, supposedly found in the middle of a circle of stones (Blanc 1939; Piperno and Scichilone 1991) (see 4.1.4). Two human mandibles were also discovered, one on the floor at a distance from the skull, and the other in a breccia at the entrance.

From geological and paleontological correlations, a date corresponding to OIS 5a was proposed for the deposit (Caloi *et al.* 1989a). More recently, several ESR dates were worked out (Schwarcz *et al.* 1990–1991, 1991): a tooth collected at the surface of the Tyrrhenian beach (layer 7) comes out with an average of 57.5 ± 2.2 ka and of 69 ± 2.4 ka after two different sets of measurements. Sedimentation would have ceased in the cave at about 60 ka.

A date in the range of 60 to 70 ka—or even 80 ka, taking into account several other dates, which are from level 5, higher up in the stratigraphic sequence-cannot be retained for the beach itself. The rich assemblage of marine molluscs includes *Strombus bubonius*, the type fossil of the Eutyrrhenian. It is firmly related to OIS 5e, with a date of c. 125 ka (see 4.1.1) (Durante and Settepassi 1976–1977; Hearty *et al.* 1986). If the dates for layer 7 are to be accepted, we must admit that 50,000 years or more had elapsed between the retreat of the interglacial sea from Gr. Guattari and the beginning of the continental sedimentation in the cave.

Table 4.2. Grotta Guattari. Inventory of the Wthic Assemblage of Level 4.[a]

Type list	n	%
Levallois flake	6	2 4
Levallois point	1	0.4
Pseudo-Levallois point	2	0.8
Mousterian point	8	3.2
Single scraper	84	34.0
Double scraper	5	2.0
Convergent scraper	4	1.6
Dejete scraper	21	8.5
Transverse scraper	37	15.0
Scraper on ventral face	2	0.8
Scraper with thinned back	14	5.7
Scraper with bifacial retouch	1	0.4
Endscraper	5	2.0
Borer	6	2.4
Naturally backed knife	5	2.0
Truncated piece	1	0.4
Notch	5	2.0
Denticulate	11	4.5
Alternate retouched beak	1	0.4
Retouched tlake/blade	5	2.0
Rabot	3	1.2
Chopper/Chopping tool	17	6.9
Miscellaneous	3	1.2
Total	247	99.8
IL = 2.6		
ILty = 2.8		
IF = 15.8		
IR = 68.0		
IC = 37.6		
IQ = 6.6		
I (Q+l/2Q) = 15.5		
Flakes	76	
Debris	435	
Discoidal cores	18	
Miscellaneous cores	21	
Split pebbles	72	
TOTAL	869	

[a]Source: Taschini (1979).

4.1.4.3. Grotta del Cavallo

Gr. del Cavallo is located close to the sea on the Ionian or western side of the Salento, which is the extreme end of Apulia. The site was excavated in the 1960s and presents a complex Middle and Upper Paleolithic sequence (Fig. 4.5). Unfortunately, the lowermost sequence is only known from preliminary reports

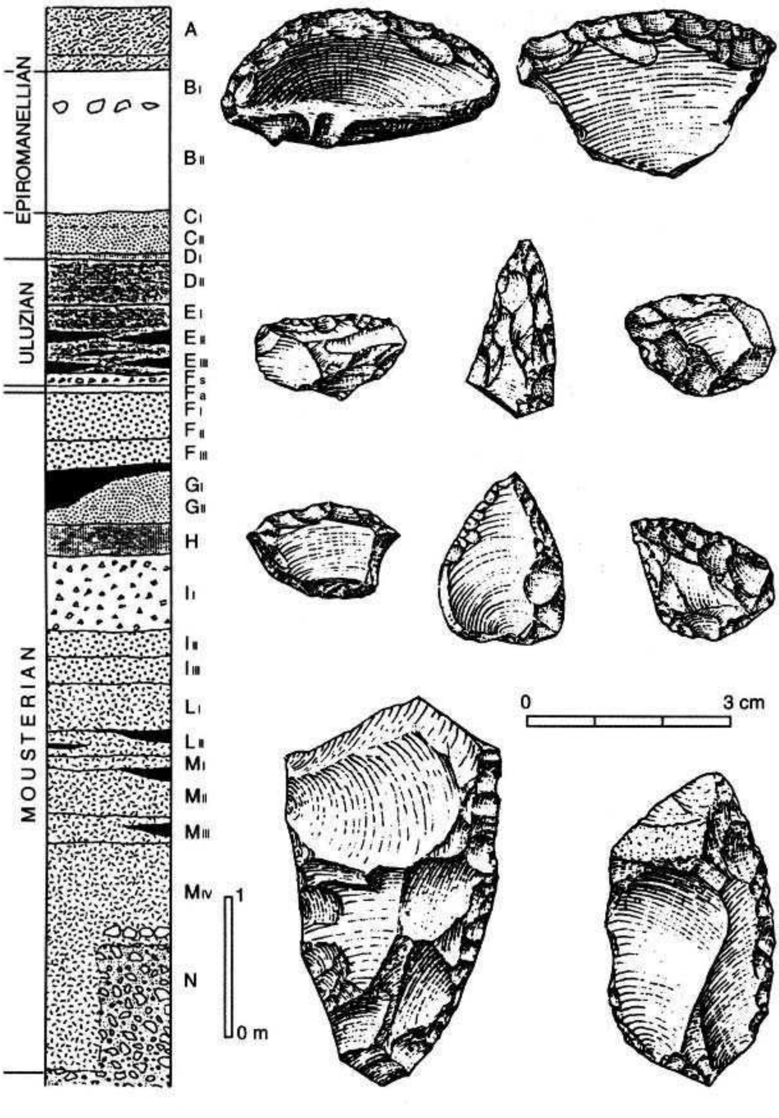

Figure 4.5. Grotta del Cavallo. Left: the stratigraphic sequence. Right: the industry of level L on shell (top row), flint and quartzite (source: Palma di Cesnola 1979).

(Bartolomei 1980; Messeri and Palma di Cesnola 1976; Palma di Cesnola 1965, 1966,1967).

At the base of the stratigraphic sequence, a Tyrrhenian concretioned and fossil beach (level N) is overlain by level M IV-III, which was deposited during a warm and arid phase of final interglacial date: we assume that it can be correlated with the later part of OIS 5. The climatic reconstruction is based on the high frequency of *Pitymyssavii* in the small fauna, in addition to rabbits and tortoises. The larger mammals are rhinoceroses, horses, red deer, and fallow deer. In an area such as the Salento, nearly devoid of any flint or similarly suited lithic resource, the industry is mostly on limestone supports and, not surprisingly, the Levallois technique was not used. The scrapers are the most common typological group, including both single-edged and convergent artifacts. Part of the tools have a dihedral, as opposed to flat, ventral face and are known as "Quinson" tools. The industry as a whole was classified as Quina Mousterian.

In levels M II-I, and then L, there is a similar assemblage, sometimes made on the thick shell of a peculiar bivalve, the *Callista chione* (see 4.3.3). The increasing frequency of horse remains is related to a more and more steppe-like environment. In the next layer, I, the industry is dominated by notches and denticulates, while scrapers are just marginally retouched. The horse, still the dominant animal species, is eventually accompanied by ibex, while red deer markedly diminishes in number: the climate is increasingly arid as well as colder (i.e., "fully glacial" by southern standards). We hypothetically relate it to OIS 4. The sedimentation is at first aeolian and then mostly thermoclastic.

Level H is a stalagmite that includes mostly fauna and is hypothetically correlated with the central Wurmian interstadial (the so-called "Würm II/III"); that would be OIS 3. In the lower part of the subsequent level F, there is at first a Mousterian of Levallois technique, with many scrapers and points, accurately retouched; then a "Final Mousterian," with up to 40 percent of notches and denticulates. Aurochs are very frequent. The upper part of layer F yielded a different industry, the Uluzzian, related to the early Upper Paleolithic (see 5.1.2).

4.1.5. The Paleoanthropological Record and the Skull Found in Gr. Guattari

Human remains, ranging from more or less complete skulls to single teeth and a few long bones, are known from a dozen or so sites, most of them caves in the central or southern part of the peninsula. The only open-air finds are from Saccopastore, now well inside Rome, and from the southern part of Calabria (i.e., Iannì di San Calogero and Archi).

Saccopastore is especially important because a minimum of two reasonably complete Neandertal skulls laid at different levels of the lower terrace of the Aniene river, an affluent of the Tiber (Blanc 1942–1946; Mussi 1988). A handful of Mousterian artifacts was found in level E a–c (i.e., at the same level, or higher up, than Saccopastore 2), which is the highest human fossil in the stratigraphic sequence (Fig. 4.6). The deposit is now dated to OIS 5 (Caloi *et al.* 1989a). Casts of leaves have also been found in level E b (i.e., above the skulls) (Tongiorgi 1939). A forest of mixed oak type, with *Quercus, Populus, Corylus avellana,* and *Carpinus/Ostrya,* developed after the human remains had been deposited in the alluvium. Similar phases of forest expansion are also known in the long pollen record of Valle di Castiglione, some 15 km east of Rome (Follieri *et al.* 1988, 1989). We assume that the forest of Saccopastore can be correlated either to the phase known as VdC-12 (110–95 ka), or to Vdc-14 (88–81 ka), which accordingly provides a minimum date for the skulls.

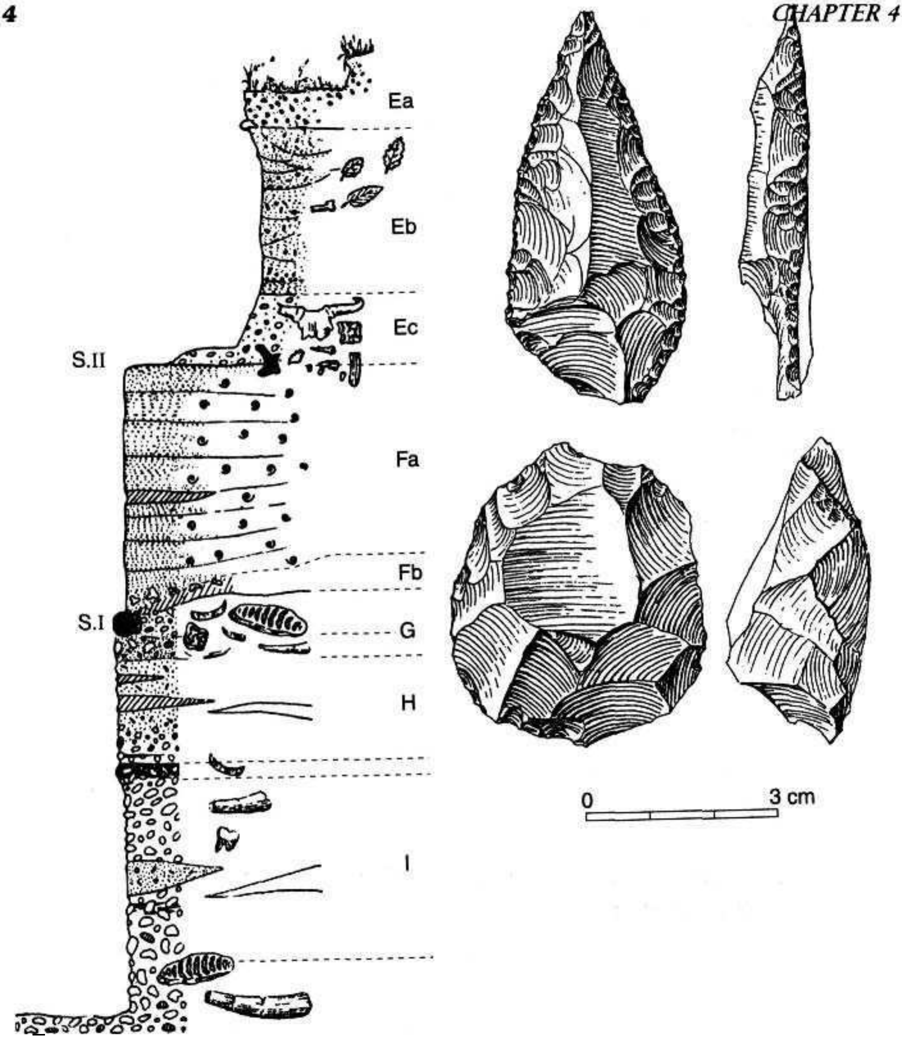

Figure 4.6. Saccopastore. Left: the stratigraphic sequence, showing the position of the skulls Saccopastore I (SI) and Saccopastore II (SII) (after Segre 1948). Right: a Mousterian point and a discoidal core from level E a–c (source: Blanc 1938-1939).

The best known Neandertal find from Italy is certainly the skull found on the surface of Gr. Guattari, well inside the cave and supposedly isolated in the middle of a circle of stones. It was manipulated by the owner of the area, Mr. Guattari, when first discovered in 1939. The next day, a trained archaeologist, A. C. Blanc, saw it lying upside down with the base exposed. However, he was able to establish that it originally rested on the left orbital region (Blanc and Segre 1953:88). As the base of the skull was broken and the opening of the foramen magnum enlarged, the hypothesis of ritual cannibalism was proposed by Blanc (1956), who also took into account the position of the remain when discovered.

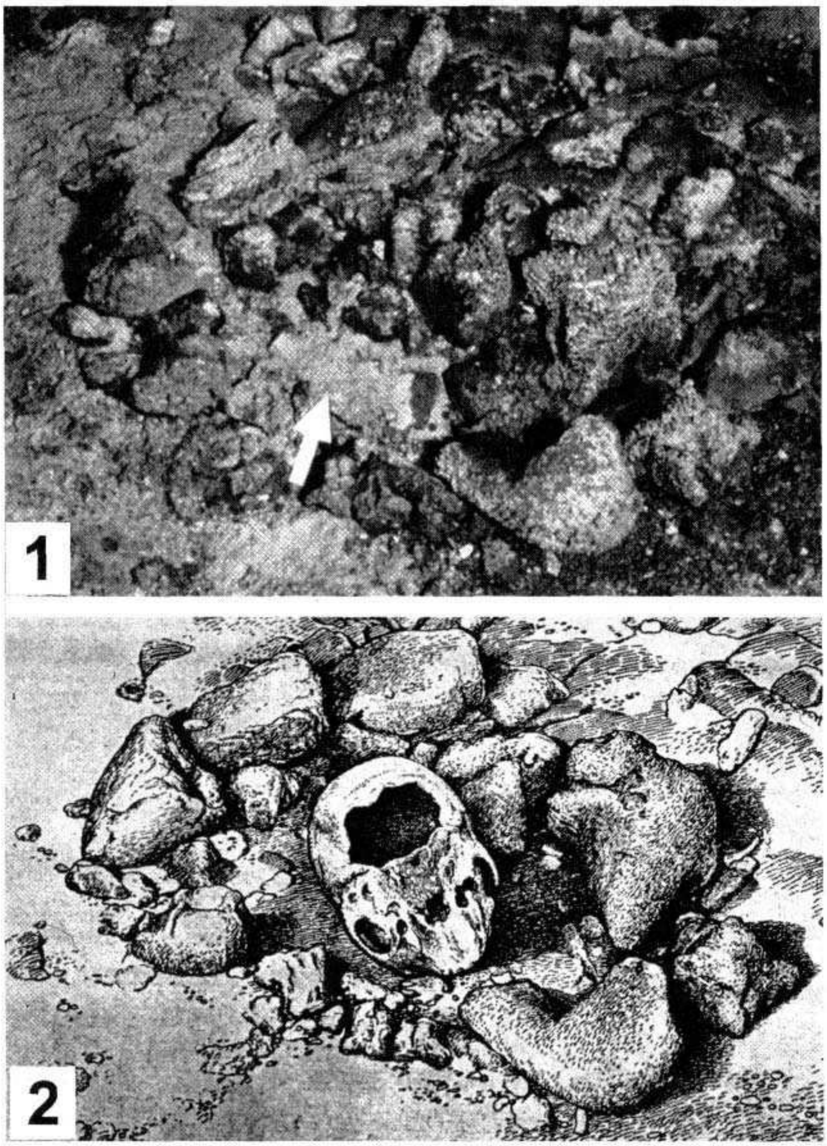

Figure 4.7. Grotta Guattari. The famous "circle of stones" surrounding a Neandertal skull. 1: after a photo taken by A. C. Blanc, when the skull had been removed 2: after a drawing published by A. C. Blanc, with the skull represented (1956). The comparison was first suggested by G. Giacobini (1990–1991).

This hypothesis was widely circulated. However, there is no trace of human-induced modification on the skull (Toth and White 1990–1991; White and Toth and the circle of stones itself is quite dubious (Giacolini 1990–1991).It actually looks like one of the many groups amongst the stones which litter the cave floor (Fig.

4.7). Furthermore, the exposed paleosurface is currently interpreted as a hyena den (Piperno and Giacobini 1990–1991; Stiner 1991). Blanc's dramatic, if fascinating, hypothesis is no longer accepted. Hyenas or other natural agents were responsible for the presence of the skull well inside the cave and for the damage at its base.

Middle Paleolithic burials have never been discovered in Italy, and human remains are usually scattered and often fragmentary. It seems that, if anything, Neandertals carefully avoided leaving corpses inside the caves they inhabited. Also in sites other than Gr. Guattari large carnivores, and especially hyenas, were held responsible for the presence of human bones (Mussi 1988) (see also 4.4.3). The fact that hyenas were much more frequent in the southern and steppe-like parts of the peninsula than in the colder and possibly locally more wooded north (see 4.2.1) could well account for the dearth or absence of paleontological evidence in this part of the peninsula.

Where reasonably complete remains have been found, they have always been classified as belonging to Neandertals. The only exceptions are some of the teeth discovered in Mousterian layers of Gr. del Cavallo and Gr. Taddeo, the latter located on the coast south of Naples. P. Messeri and A. Palma di Cesnola (1976) suggested that some belonged to Neandertals and others to modern humans, and that, accordingly, both groups had lived side by side in southern Italy. However, it is now generally accepted that an accurate diagnosis cannot be based on teeth alone. This is even more true when deciduous teeth are considered—and several teeth from Gr. del Cavallo and Gr. Taddeo are actually deciduous ones. This hypothesis can no longer be retained.

4.2. A CHANGING ENVIRONMENT

If the last interglacial–glacial cycle is only the last one of a series, it is also the first one for which there is a reasonable chronological resolution; that is, many sites—possibly the majority of them—cannot yet be fitted into a firm scheme. However, there is sufficient evidence to contrast in some detail different biotopes and different climatic phases.

4.2.1. The Temperate Beginnings of the Last Glaciation: Elephants, Hippos, Fallow Deer, and other Animals of the Grasslands, Cave-Dwelling Hyenas and Bears, and Long-Lived Forests

The climate was rather mild during the 40,000 years or so following the interglacial *sensu stricto,* that is, from c. 115 to c. 75 ka (Labeyrie 1984). This is evident in various parts of the world in the fluctuating isotopic composition of many oceanic or ice cores. They document a restricted volume of ice at high latitudes during most of OIS 5a–d.

In Italy, the late OIS 5 climate was sufficiently warm to cause, for instance, a deep pedogenetic alteration of the fossil Tyrrhenian beach, now raised at +7 m in the Balzi Rossi area (Cremaschi and Chiesa 1992). Elephants, hippos, rhinos, lions, and leopards were roaming close to the Mediterranean coast as well as in the inner part of the peninsula. This can be seen in assemblages unrelated to human activity from the alluvial deposits of Pavia near Milan—the *alluvioni pavesi*—and in the Maspino and Bucine creeks in Tuscany. They all are paleontological localities known for a long time, at which collections were often made by amateurs. They are best understood as a palimpsest of remains dating from the last interglacial onwards (Azzaroli 1978–1979; Azzaroli and Lazzeri 1977; Caloi and Palombo 1992; De Giuli 1983; Patrini 1926). Elephant and rhinoceros remains, however, can be reasonably dated to the interglacial and early glacial (i.e., OIS 5). This is also true for the hippopotamuses, mentioned only within the *alluvioni pavesi*.

The "tropical blend" of OIS 5 faunas, however, is slightly less marked than in preceding warm phases. The triad elephant–rhino–hippo is not really that frequent, even if it is found at cave sites such as Barma Grande and Madonna dell'Arma in Liguria, Gr. Guattari in Central Italy, and Gr. Romanelli in Apulia (Blanc G.A. 1930; Blanc and Segre 1953; Bulgarelli 1974; Isetti *et al.* 1962). Hippopotamus, which had been one of the characteristics of OIS 9 assemblages (Caloi *et al.* 1998) was actually the first species to disappear, possibly because lagoons and marshy areas were drastically reduced by the falling sea level and the rejuvenation of drainage systems. The little monkey, *Macaca sylvana,* still living when level d of Torre in Pietra was being deposited (see 3.1.3), is now extinct. The modern fallow deer, *Dama dama,* which populated stretches of the peninsula starting with OIS 7, is still common in some areas but will be progressively substituted by the ubiquitous red deer and even by the ibex, quickly expanding wherever open pastures and rocky areas are available.

Some of the differences in animal frequencies, however, are rather stable through time and linked to major geographical and ecological differences. An example is the many bison and few aurochs remains of the *alluvioni pavesi* and, in general, northeastern Italy (Bon *et al.* 1991; Mussi 1999; Sacchi Vialli 1954). In contrast, bison are not found in central Italy before the very end of OIS 5a or possibly the beginning of OIS 4 (Caloi and Palombo 1992).

There is an even more marked contrast in the distribution of cave bear and hyena. In northeastern Italy, the former are often represented by hundreds of specimens in caves, in which they used to hibernate, while hyenas are rare or even exceptional (Fabiani 1917–1918). In a recent inventory, *Ursus spelaeus* is listed in forty-seven deposits of Upper Pleistocene date, compared to nine deposits with hyena remains (Bon *et al.* 1991). In central and southern parts of the peninsula, bears—including the brown bear *Ursus* arcto-are the exception. Following Sala (1979, this can be related to a much more limited development of woodlands. However, *Crocuta crocuta* remains are common at several caves in this very area, and coprolites are further evidence of their use as lairs (Sala 1978). Denning sites have also been suggested on the evidence of taphonomic studies (Stiner 1990-1991a, 1994). Hyena is well adapted to an open and even steppe-like environment.

Interestingly, there is a complete overlap in bear and hyena distributions in northwestern Italy. Hyena remains, such as coprolites or even whole skeletons, are plentiful in the whole sequence of Gr. del Principe and are accompanied by cave bear, which also is very frequent in some levels (De Villeneuve *et al.* 1906-1919). Other caves of coastal Liguria, such as Gr. delle Fate, Gr. di Santa Lucia, and Gr. della Basura have yielded vast numbers of *Ursus spelaeus* bones—unaccompanied by any Mousterian tools at the latter (Giacobini and D'Errico 1985; Issel 1908; Tozzi 1962). In Tuscany, there are substantial amounts of both cave bear and hyena remains at Buca del Tasso and Buca della Iena, while at Gr. all'Onda, the bear largely predominates, and even fetuses are documented (Graziosi 1944; Pitti and Tozzi 1971; Stefanini *et al.* 1922).

The Tuscan sites are admittedly quite late and probably belong to OIS 3, while the so-called "bear cemetery" of Gr. della Basura was still accumulating some 30 ka ago. However, there is no evidence of one species replacing the other. From the sequence of Gr. del Principe it seems that both populations were thriving in the same area and occupying the same caves since an early part of OIS 5. Palynological analysis suggests a rather wooded environment at the Balzi Rossi, comprising 30–60 percent of pollen from trees, mostly coniferous (*Pinus* sp.), but also some termophilous species: *Pistacia* sp. and *Quercus* t. *coccifera,* as well as Oleaceae (Renault-Miskovsky 1972). Cichoriae and Gramineae (i.e., grass pollens) are in more limited if substantial amounts. We suspect a patchy environment of thickets alternating with clearings, possibly lasting during most of the last glacial phase in this rugged area, which allows for many botanical refugia. Even in modern times, the Riviera is well known for its mild climate, related to local favorable conditions and natural protection against cold and northern winds. This apparently allowed for the survival of steppe species side by side with forest species, while different and more extreme conditions eventually prevailed both to the east and to the south, and sorted much more strictly the animal species.

During the interglacial and early glacial, however, a forested landscape was still the rule over large parts of the territory.

In northeastern Italy (Paganelli 1984), the evidence points to a long-lived forest of mixed broad-leaved and coniferous trees, including *Pinus, Abies, Zelkova, Castanea, Carpinus, Quercus,* and *Tilia.* They are indicative of mild winters and a high amount of precipitation. In the region of Venice, the base of the local pollen diagram shows a vegetation pattern of up to 30 percent mixed oak forest (*Quercus, Ulmus, Acer, Carpinus, Populus*), plus hazel, spruce, and even some *Vitis* pollen, which are indicative of woods developing under a warm and humid climate similar to the present one (Bortolami *et al.* 1977).

The interglacial vegetation is best exemplified at Pianico Sellere, 300 m asl, near Bergamo (Casati 1968; Lona and Venzo 1957; Venzo 1955). Varvated deposits, several meters in depth, formed in a lake basin that was subsequently covered by a Würmian moraine. Macrobotanical remains accumulated, and three logs of fossil wood were radiocarbon dated to > 43 ka (R-804, R-805; R-806) (Alessio *et al.* 1978). In the lower part of the sequence *Abies, Pinus,* and *Picea* developed. Then, new taxa were added, such as *Rhododendrum ponticum, Carpinus betulus, Taxus baccata,* and *Castanea latifolia.* In the uppermost part of the deposit, the bones of a rhinoceros were also found. At Bagaggera, near Lake Como, a broadleaf cover under a sub-Mediterranean climate is suggested by pedological evidence, as well as by anthracoanalysis of a restricted botanical assemblage (Cremaschi *et a1.* 1990): *Pinus* cfr. *sylvestris, Picea/ Larix, Carpinus,* and *Corylus* were growing nearby.

Further south in the long and continuous pollen sequence of Valle di Castiglione, a few km from Rome, after phase VdC-10, with an evergreen forest of Mediterranean type that is correlated with OIS 5e, there are phases of steppe vegetation alternating with forested phases (Follieri *et al.* 1988, 1989). It gives a

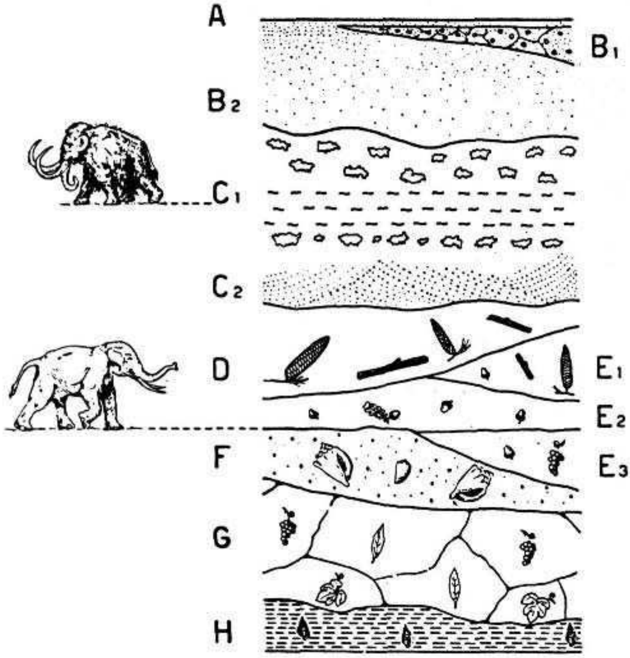

Figure 4.8. Canale delle Acque Alte. The stratigraphic sequence (after Blanc *et al.* 1957).

chronological clue to other poorly dated evidence. At Canale delle Acque Alte (formerly Canale Mussolini) some 60 km south of the modern capital, a major stratigraphic sequence was studied in the 1930s by A. C. Blanc during the digging of a drainage canal (Fig. 4.8) (Blanc 1937a, 1937b; Blanc *et al.* 1957; Caloi *et al.* 1989a). On an Eutyrrhenian beach with *Strombus bubonius* (level F), a sequence of peaty and then sandy deposits included many macrobotanical remains, such as leaves, fruits and whole trunks (Fig. 4.9) (Tongiorgi 1936). The vegetation progressively changes from temperate (*Vitis vinifera, Cornus mas, Quercus robur* etc.) (level E3), to typical of a rather cool and oceanic climate, with a firwood (*Abies alba*) in level D.

Dates of > 55 ka (Gro-1353) and of 58 ± 0.5 ka (GrN-2572) were determined by C^{14} on wood fragments from the lower part of the sequence (levels E3-E1), and must be regarded as minimum dates. The evidence fits very well into phase VdC-12 of the mentioned pollen sequence of Valle di Castiglione. In both instances, there is a mixed-oak forest at first, and then a culmination of *Abies,* which reaches the highest value of the whole sequence. Accordingly, the date of this part of the sequence of Canale delle Acque Alte would be close to 100 ka.

On the Cilento coast, south of Naples, botanical remains are not preserved. However, a rather wooded landscape, dominated by broad-leaved species, but with clearings as well, is suggested by the micromammals of Gr. La Cala level R (Bartolomei *et al.* 1975). The assemblage is made up by *Apodemus sylvaticus* (37-

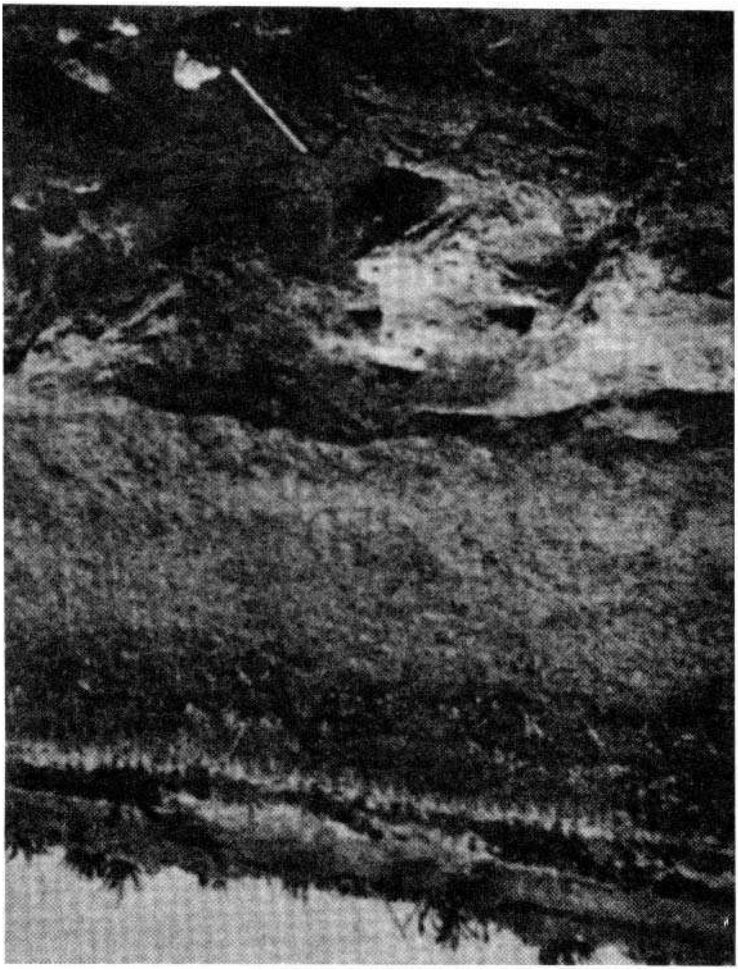

Figure 4.9. Canale delle Acque Alte. Fossil fir trunks (*Abies alba*) of Würmian age eroding from the banks after a flood (photo by A. C. Blanc).

34 percent), *Glis glis,*(34–26 percent), *Muscardinus* sp., *Eliomys* sp., and *Pitymys savii.* It is assumed that the climate was mild and arid. While radiometric dates are not available, an "early Wurm date" (i.e., possibly OIS 5) is suggested.

4.2.2. Isotopic Stage 4: A Larger Continental Platform, Loess and Other Aeolian Deposits, and a Glacial Environment in the Mediterranean

Because of the conformation of the peninsula, with restricted coastal plains, even during the full interglacial there had been only limited evidence of marine transgression in what we use to consider mainland (Fig. 4.10). But as the sea level

Figure 4.10. The paleogeography of Italy during the last interglacial (after Blanc 1942). The present coastline is dotted.

was falling, the continental platform was being enlarged. Along most of the coast, this meant the addition of a stretch of land rarely wider than 10 to 20 km, as the underwater morphology is rather steep. The rejuvenation of drainage systems ended in the erosion of alluvial deposits close to the coasts, as best exemplified next to Monte Circeo (Fig. 4.11); small gullies, shaped by stream erosion, are now submerged and filled by the high sea level. They are called "rias" by geologists.

The only consistent area to emerge was located in the Northern Adriatic—even if the land–sea boundary is not known in detail during this early part of the Wurm glacial. The Po and other rivers, such as the Adige, which are now separate, merged into a single and powerful stream, building up a large delta. Deep drillings in what is now the Northern Adriatic Sea encountered a whole range of continental to transitional sedimentary environments at a depth of more than 100 m below sea level: from a flood plain to swamps, coastal lakes, lagoons, bays (Ciabatti *et al.*

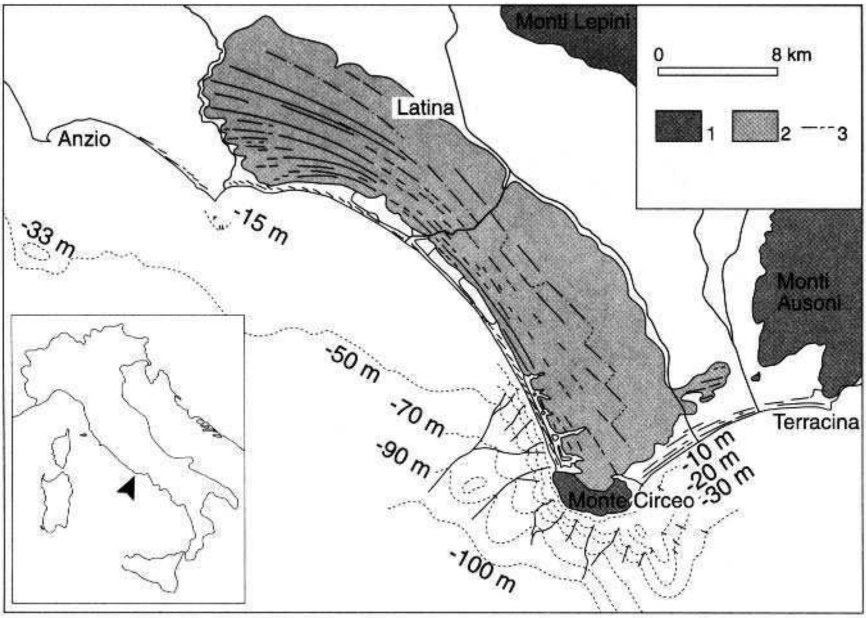

Figure 4.11. The submarine morphology around M. Circeo (dotted), which is related to subaerial erosion during the Wurmian low marine stands. 1: mountain range; 2: Wurmian fossil dunes; *3:* dune ridges (redrawn after Blanc *et al.* 1953).

1987). This odd situation–coastal deposits accumulating during a low marine stand–is the consequence of the peculiar tectonic activity experimented in the area. This part of the Adriatic basin was subsiding more quickly than the sea level was falling. As the sea bottom was becoming lower and lower, the stream deposited huge amounts of pebbles, sands, and son on, at its mouth.

Inland, namely, in the Po Valley between the pre-Alps and the Apennines, a loess cover developed, which is indicative of cold windy climate and limited vegetation cover (Cremaschi 1979, 1990a, 1990b). This deposit is polycyclic, and earlier loess deposits of final Middle Pleistocene date (i.e., antedating the last interglacial) are found on the southern side of the valley (see 3.1.2). The Wurmian loess cover extends north of the Po River and was probably deposited by southeastern winds blowing from the alluvial plain (Cremaschi 1990b). This differential distribution has been tentatively related by M.Cremaschi to a more limited Würmian glaciation, if compared to the one of OIS 6.

There is mounting evidence that the onset of climatic conditions favoring loess deposition must be correlated with early OIS 4. The climate became drier in the eastern parts of the valley, but even in the northwestern Po Valley relatively wetter conditions actually just meant frequently alternating drier–wetter phases and an open environment (Cremaschi *et al.* 1990). In the Rivoli area, the pollen diagram of the Val Sorda sequence points to a very dry and cold steppe during OIS 4, with Gramineae and Cichoriaceae dominant, and not more than 5 percent

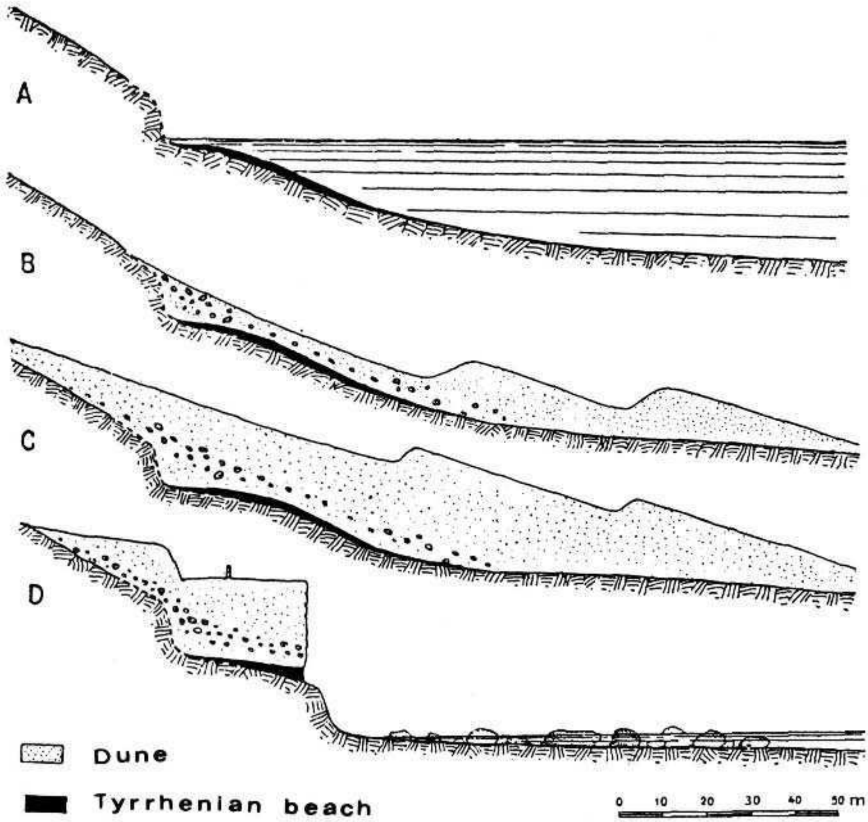

Figure 4.12. Castiglioncello (Tuscany). The evolution of the fossil dune (after Blanc 1942). A: the coast during the last interglacial; B–C: the building up of the dune during the Wurm glacial; D: the erosion of the fossil dune and beach in Holocene times.

of arboreal pollen (Accorsi *et al.* 1990). On the Adriatic side of the peninsula, the loess deposited as far south as the Marche region. At Ponte di Crispiero, a U/Th date of 48,000 ± 2,400 bp was obtained from a layer directly overlying the local loess deposit, giving a minimum age for the wind-blown sediments and some clue for the chronology (Coltorti and Dramis 1995).

From the pollen analysis carried out at cave sites of the eastern pre-Alps, it is clear that during the first Pleniglacial, the environment shifted from a steppe-like grassland with few trees, to a true steppe, and back to a steppe-like grassland again (Cattani 1990). This reconstruction is enhanced by the results of sedimentological analysis, suggesting a dry climate and an open environment (Cremaschi 1990b). Only a very limited amount of large mammal bones was preserved at most archaeological sites. Interestingly, they include two fragments of mammoth teeth at Riparo Tagliente, together with micromammals that, by and large, also fit into this reconstruction (4.1.4).

Riparo di Fumane, another of the pre-Alps cave sites, is the exception, as hundreds of animal bones were preserved and their species determined (Bartolomei *et al.* 1991-1993, 1992; Cassoli and Tagliacozzo 1991). The main species represented are red deer and roe deer, with a significant number of ibex and chamois, and some giant deer and bovids as well. Equids were not living in this rugged environment. The vegetation close to the shelter, based on the study of charcoals, included at first pine, then larch and birch, suggesting a sparsely wooded landscape.

In central and southern Italy, there is also evidence of aeolian deposits, if of a different character. They are coarser and accumulated as dunes along the coasts. They are documented, for instance, at Castiglioncello in Tuscany and in the *pianura pontina* of southern Latium, and dated to an advanced phase of the glacial on stratigraphic grounds (Figs. 4.11 and 4.12) (Blanc 1937a, 1942; Caloi *et al.* 1989a). Farther south, Mousterian industry has been collected in the fossil dunes of the Cilento coast, where many archaeological caves open. They are presently eroded by the sea and referred to a marine stand lower than today (Blanc 1940). It is of interest that one of the dunes abuts the entrance of Gr. Taddeo, which was briefly settled by humans during OIS 5 (see 4.2.4). A more detailed chronology, however, is badly needed. At Gr. Romanelli on the Adriatic coast, level G is also an accumulation of wind-borne sands (Blanc G.A. 1930). The underlying stalagmite H was dated by Th^{230}/U^{238} to < 69 ka, and the overlying one, F, to 40 ± 3ka by the same method (Fornaca-Rinaldi and Radmilli 1968). Aeolian deposits also accumulated at Gr. del Cavallo (see 4.1.4).

The evidence from some cave sites opening on the southern coasts help us in understanding what the environment was like in this part of the peninsula.

In the surroundings of Gr. Romanelli, the great pachyderms—elephants, hippos, rhinos—were still alive and well while level G was being formed, except that only the rhinoceros seems to have occured frequently. They were accompanied not only by many fallow deer and some aurochs, but also by representatives of an environment that was open and arid, if not cold: the horse, the rabbit and the bustards, *Otis tarda* and *Otis tetrax*. This late survival of the three large pachyderms contrasts the evidence from the part of the sequence at Gr. del Cavallo that is similarly, if tentatively, related to OIS 4. At this site, the many horses were accompanied by ibex (see 4.1.4). As Gr. del Cavallo and Gr. Romanelli are close to each other and in a comparable setting, we assume that a later part of OIS 4 is documented at Gr. del Cavallo. At Gr. Romanelli, accordingly, the sedimentation of level G had long been arrested before stalagmite F formed some 40 ka ago.

At Grotta Tina, situated next to Gr. La Cala on the Cilento coast, a positively continental climate and vegetation were inferred from the rodent assemblage of level B, which includes *Cricetus cricetus*, the hamster (Table 4.3) (Martini *et al.* 1972–1974). The pollen analysis suggests an open landscape, with some oak groves. There is no clue to the absolute chronology, but an attribution to a cold period such as OIS 4 is perfectly reasonable. Some oak in an open environment with deer and chamois—or horses and ibex, as at Gr. del Cavallo—is just what one would expect on the coasts of a glacial Mediterranean.

Table 4.3. Grotta Tina. The Faunal Assemblage of Level B.[a]

	NISP	NISP %	MNI
Cervus elaphus	79	48.8	42
Capreolus capreolus	9	5.5	8
Capra ibex	1	0.6	1
Rupicapra rupicapra	27	16.7	17
Bos/Bison	9	5.5	6
Equus hydruntinus	2	1.2	2
Canis lupus	3	1.8	3
Vulpes vulpes	17	10.5	13
Lynx sp.	3	1.8	3
Felis silvestris	7	4.3	6
Martes sp.	1	0.6	1
Ind. Carnivores	4	2.4	4
Total	162	99.7	106
Oryctolagus cuniculus	114		
Lepus europaeus	12		
TOTAL	288		

[a]Source: Martini *et al.* (1972-1974).

4.2.3. Hard Times for the Pachyderms: The Distribution of Ibex, Chamois, and other "Cold" Animals and the Limited Recovery of OIS 3

The herds of herbivores inhabiting the plains changed in accordance with a drier and colder climate. The hippopotamus soon became extinct, while the elephant disappeared from northern Italy and became increasingly rare in the central part of the peninsula (Caloi and Palombo 1992; De Lumley-Woodyear 1969).

The persistence of the latter pachyderm species in the south during this fully glacial phase is still an open question, as already discussed for Gr. Romanelli (see 4.2.2). They were also found, in association with rhinoceroses, aurochs and other mammals, at the open-air sites of Ianni di S.Calogero and Archi, both of them at the extreme tip of Calabria (Ascenzi and Segre 1971a, 1971b; Bonfiglio *et al.* 1986). While the first site is located in a sandy dune, the second one is in a fluvial deposit. Archaeological remains were not found at Archi, and are scarce and undiagnostic at Ianni di San Calogero. Both sites include fragmentary Neandertal remains and are consecutive to a Tyrrhenian raised deposit. At Archi the latter was uplifted to 90 m asl by recent tectonic activity:

At Ianni, giant deer and elephant remains of slightly dwarfed species are found in a level between the Tyrrhenian deposit and the archaeological level. In fact, it is known from different lines of evidence that southern Calabria experienced a partial or total separation from peninsular Italy during parts of the Middle and early Upper Pleistocene, and that endemic faunas consequently evolved in that peculiar environment. Neandertal human groups arrived 'after a better connection was re-established with the mainland (Caloi *et al.* 1989b). Furthermore, at

Archi, the assemblage also includes *Alca impennis,* the Great Auk, which became extinct in the nineteenth century and lived in the northern Atlantic in historic times. Its presence in the Mediterranean is an indicator of a globally lowered temperature.

All things considered, it seems that a long time had elapsed after the maximum of the interglacial, and that the large pachyderms were still alive and well in Calabria when the climate had markedly deteriorated. Elephant remains are found again at Archi in level D2, which overlies the level with a Neandertal mandible.

The rhinoceros (*Sfephanorhinus hemitoecus*), an animal of more open, drier environments, adapted with less difficulty to the changing environment. It is found more frequently, if in small numbers, not only in the south but also over larger parts of Italy, including northwestern regions.

Scarce rhino remains were discovered at two Mousterian sites from Liguria, Gr. delle Manie and San Franceso (Arobba *et al.* 1976; De Lumley-Woodyear 1969; Isetti 1961). The associations include 70 percent or more of red deer, and also equids (up to 30 percent at San Francesco, where the little hydruntine horse is possibly also present), and ibex at Gr. delle Manie. At both sites, a comparatively late date is suggested by the technological developments that characterize the lithic industry (see 4.3.6).

Rhinoceroses were also roaming in Tuscany, as evidenced by Gr. di Gosto. A date of 48 ± 4 ka by Th^{230}/U^{238} was obtained from the stalagmite concretion D, the basal level, and underlying C, a richer archaeological level (Tozzi 1974). The scarce faunal remains also include the chamois, *Rupicapra rupicapra.* From the evidence of two nearby caves, Gr. del Capriolo and Buca del Tasso, it seems that the pachyderm was able to live in an environment also suitable for roe deer, and, in the latter site, for ibex and chamois as well (Pitti and Tozzi 1971; Stefanini *et al.* 1922).

Both caves were only sporadically inhabited by human groups and the fragmentary femur of a Neandertal child from Buca del Tasso is most probably the result of carnivore activity (Cotrozzi *et al.* 1985). The industry of Gr. del Capriolo is very laminar (see 4.3.2), while the lithic artifacts of Buca del Tasso have never been properly published. Both are believed to be later than Gr. di Gosto but earlier than nearby Buca della Iena, at which a basal stalagmite was dated at < 41 ka and < 51 ka by Th^{230}/U^{238} (Fornaca Rinaldi and Radmilli 1968). The rhinoceros is still found at Buca della Iena, with many horses and red deer. *Mammuthus primigenius* (i.e., the mammoth) is also mentioned, as well as many hyena and cave bear remains (Pitti and Tozzi 1971).

Reference has already been made to ibex and chamois. The former are widely diffused, from the Balzi Rossi sites, for example Gr. del Principe "foyer" B (De Villeneuve *et al.* 1906-1919), to Riparo di Fumane in Veneto (Bartolomei *et al.* 1991- 1993), to Gr. del Cavallo level I in Apulia (see 4.1.4) and Gr. di Torre Nave level 13 in Calabria (Bulgarelli 1972). Chamois were also found at Riparo di Fumane and Gr. di Torre Nave, but usually less frequently. The bison range similarly extended to the south, including at some point Calabria (Caloi and Palombo 1992; Ronchitelli 1993). Even reindeer were mentioned at Gr. del Principe level B and at a couple of paleontological sites of northeastern Italy (Capasso Barbato *et al.* 1989): a modern reexamination of these remains would be of great interest.

Other exceptional findings are the arctic fox, Alopex *lagopus,* tentatively identified at Riparo di Fumane, and the woolly rhino, *Coelodonta antiquiratis.* A skull discovered in a slope deposit at Monte Circeo belonged to the Wurm glacial (Palmarelli and Palombo 1981), while more remains have been excavated at Ingarano in Apulia (Capasso Barbato *et al.* 1992). Some lithic tools of Levallois technique were collected several meters higher up in the stratigraphic sequence of the latter site, which is correlated with OIS 4 (Petronio *et al.* 1995).

The mammoth is definitely rare but, by and large, less unusual than the woolly rhino. Some remains have already been mentioned from Buca della Iena as well as from Riparo Tagliente (see 4.1.4), while a largely complete skeleton was discovered at Pagnano d'Asolo (see 4.3.2) (Fig. 4.16). Other remains were collected in alluvial deposits, as in the accumulations of mixed age within the *alluvioni pavesi* and at Bucine and Maspino in Tuscany (see 4.2.1). All things considered, mammoth herds were probably not that unusual during OIS 4, at least in parts of northern (Mussi in press) and central Italy. This steppe species penetrated further south, as in the *pianura ponrina,* close to Monte Circeo, where it cannot be ruled out that *Mammuthus primigenius* met the last specimens of *Elephas antiquus* (Caloi *et al.* 1989a). Mammoth remains were even discovered in southern Apulia, at Gr. Cardamone (Capasso Barbato *et al.* 1989).

As a concluding remark, a southern variant of the Mammoth Steppe described by Guthrie (1990) was established in Italy by OIS 4. While some limited rhinoceros and maybe even elephant populations survived in favorable areas, mammoths, woolly rhinos, and possibly reindeer entered a Mediterranean environment, although in limited numbers. Bison expanded their range toward the south, just like ibex and chamois, but never entirely displaced aurochs. Wild boar and fallow deer were encountered only in refugium areas, while common horses and hydruntine horses quickly took advantage of pastures stretching over much larger parts of the territory. Red deer, too, easily adapted to the changed environment.

The general trend was not significantly altered during the milder oscillations of OIS 3, as can be seen from S. Francesco, Gr. delle Manie, Riparo di Fumane, or the caves of Tuscany, which even include mammoth remains (discussed earlier). At the same time, it cannot be ruled out that the last elephant populations (*Elephas antiquus*) had not yet completely disappeared from Calabria and Apulia: the evidence from Archi (discussed earlier) and Gr. Romanelli (see 4.2.4) is comparatively late in the Wurmian sequence, even if it cannot be said exactly how late. In the environs of Monte Circeo, the fallow deer populations also briefly recovered, as can be seen in the faunal assemblage of Gr. Barbara (Caloi and Palombo 1987).

By then, the steppe-like landscape of most of the country included only a few more trees, such as pine and birch, as evidenced in the Marche region on the Adriatic coast (Calderoni *et al.* 1991). Coniferous trees and birch were similarly growing in the surroundings of Riparo di Fumane (see 4.2.2). Several weak forest expansions also occurred on the Tyrrhenian coast and are documented in the palynological sequence of Valle di Castiglione and other sites (Follieri *et al.* 1988; Follieri *et al.* 1989, 1998). However, it seems that the dynamism of vegetation experienced by this area was due to the relatively low latitude and to other favorable

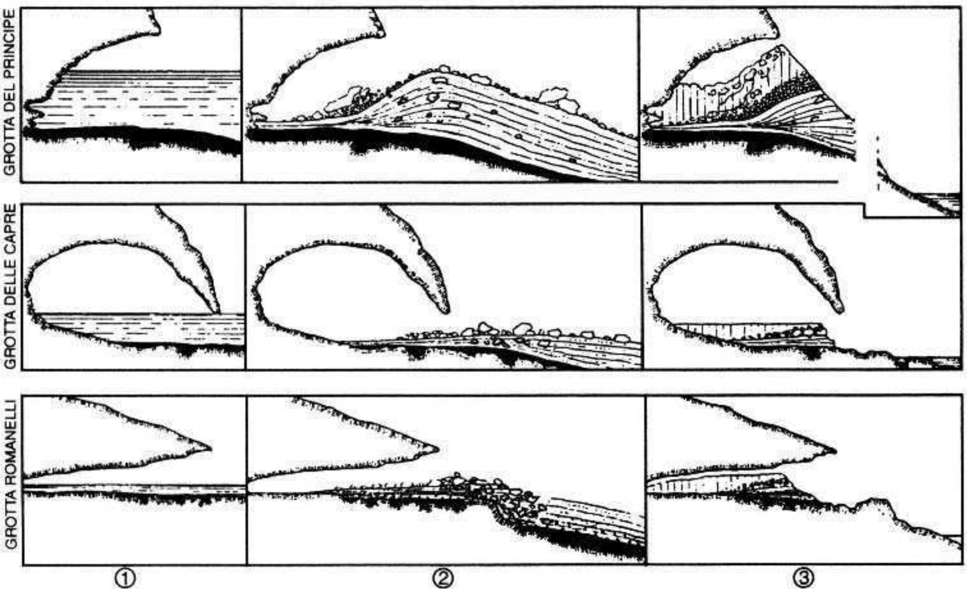

Figure 4.13. Scheme of the deposition sequence at Gr. del Principe, Gr. delle Capre, and Gr. Romanelli. 1: full interglacial; 2: Wurmian glacial period 3: Holocene (redrawn after Blanc 1942). Tyrrhenian fossil beaches are in black.

geographic characteristics, *so* that it was unparalleled at higher latitudes of Europe (Follieri *et al.* 1998).

4.2.4. Dwelling in the Open and in Previously Unoccupied Caves and the Exploitation of Forest Environment

Fossil beaches related to high stands of interglacial date, that is, the so-called "Tyrrhenian beaches" (see 4.1.1), are preserved as sand or pebble deposits on the bedrock of caves opening on cliffs. All along the coasts, human groups settled directly on the top of Tyrrhenian deposits in previously unoccupied caves that became available for dwelling after the sea level had started to fall (Fig. 4.13).

At the Balzi Rossi, in the ex-Casino open-air site, a rich Mousterian assemblage, including many chopping tools, was found in the layer overlying the fossil beach or, in places, directly over the cliff that had been eroded by wave action (Vicino 1972, 1976). Two small hearths had been lit on the rock. Whereas part of the industry is fresh, part is said to have been rolled by the waves, as the sea was still very close. The red deer is the principal component of the fauna and was accompanied by aurochs, rhinoceros, wild boar, bear, and rabbit.

A hearth was similarly lit at the entrance of nearby Barma Grande, just on the sandy surface of the fossil beach (Cardini 1938). There was a restricted assemblage of unretouched tools, and some fauna, which included *Bos primigenius*. Fires were also made on the Tyrrhenian beach inside and outside Gr. del Principe, as there is a layer of ashes developing over tens of square meters (De Villeneuve *et al.* 1906-1919). If anything, it suggests that there was no shortage of firewood in the vicinity, and, accordingly, the landscape was rather wooded. However, this lowermost part of the deposit (i.e., lower "Foyer E") is devoid of artifacts and fauna.

At Madonna dell'Arma the Tyrrhenian beach and the bottom of the cave filling was excavated over a very restricted area (Isetti *et al.* 1962). A couple of scrapers and as many chopping tools, as well as an unretouched flake, were collected just on the top of the marine sediment. The beach was dated to 95 ± 5ka by Th^{230}/U^{234} (Stearns and Thurber 1965). Accordingly, it is a Neotyrrhenian beach (see 4.1.1).

Farther south, Gr. delle Capre opens on the cliffs of Monte Circeo. The level overlying the interglacial beach deposit included some fir charcoals that we assume were produced by humans briefly settling there (Blanc and Segre 1953; Ruffo and Zarattini 1990-1991). The evidence from nearby Gr. Guattari is more extensive (Blanc 1955; Blanc and Segre 1953; Taschini 1979). Some hearths were documented during salvage excavations on the very top of the Tyrrhenian beach at the base of the local stratigraphic sequence, and in between the former coastal cliffs, at a distance of some 5 m from the modern cave entrance. Level 5, which caps them, includes a large sample of Mousterian tools as well as animal remains: horse, aurochs, red deer, roe deer, fallow deer, wolf, and hyena (coprolites). The inhabited part of the cave was close to the entrance.

More evidence is found on the Cilento coast. At Grotta Taddeo, noted earlier for its human remains (see 4.1.5), a sandy Tyrrhenian deposit was overlain by a thin layer including eighteen retouched tools (half of them of Levallois technique), four flakes, and two cores (Vigliardi 1968). The roof of the cave is very low, and a fire was lit just where there was slightly more room, as it can be seen after charcoal and burnt bones. This scanty evidence is related to one or more occasional visits. The remains of several different carnivores also indicate that humans were not often there. The red deer is by far the most common animal. The first archaeological layer of nearby Gr. del Molare, level 18, similarly overlies a Tyrrhenian deposit. Thirty-five retouched Mousterian tools and some *débitage* were also found at Gr. La Cala, level R, if in a sandy deposit unrelated to a Tyrrhenian beach. As mentioned previously (see 4.2.1), the micromammals suggest a forested environment with broad-leaved trees that we also associate with OIS 5.

At Gr. Romanelli, in Apulia, hearths are documented directly on the surface of level K, that is, the marine pebble deposit that accumulated inside the cave during the interglacial (Blanc G.A. 1930). The fauna includes pachyderm bones, as already noted (see 4.2.2), some of them burnt, but the lithic industry is very scarce. At Gr. del Cavallo, not far away from Gr. Romanelli, level M IV-III, which is the lowermost level with Mousterian industry, was also deposited on a fossil beach (see 4.1.4). The faunal remains suggest a Mediterranean environment and a warm, arid climate similar to that of today.

In a broad sense, the pedogenetic and faunal evidence, coupled with the stratigraphic position and even the location—in the open or at cave entrance—point to a temperate climate. However, the "beach sites" cannot be taken as really contemporary. First, an unknown length of time elapsed between the lowering of sea level and the human settlement. Second, some of the Tyrrhenian beaches include, as at

Table 4.4. Erbarella. Inventory of the Lithic Assemblage. [a]

Type list	n	% ess
Levallois flake	113	–
Levallois point	4	–
Retouched Levallois point	4	3.6
Pseudo-Levallois point	1	0.9
Mousterian point	5	4.5
Single scraper	60	54.1
Double scraper	9	8.1
Convergent scraper	2	1.8
Déjeté scraper	5	4.5
Transverse scraper	8	7.2
Scraper on ventral face	1	0.9
Alternate retouched scraper	1	0.9
Endscraper	1	0.9
Burin	1	0.9
Borer	1	0.9
Notch	4	3.6
Denticulate	3	2.7
Retouched flake/blade	2	–
Miscellaneous	5	4.5
Total	230	100
Flakes and debris	404	
Levallois cores	34	
Discoidal cores	15	
Miscellaneous cores	18	
TOTAL	701	

[a] Source Bisi *et al.* (1982).

Gr. Guattari, *Strombus bubonius* and others of the so-called "Senegalese" mollusc species: they can be best defined as Eutyrrhenian beach deposits, correlated with OIS 5e and the Eemian (see 4.1.1). Other Tyrrhenian beaches, such as at Madonna dell'Arma, are related to a later, Neotyrrhenian high marine stand and include a more restricted and less tropical array of species.

Evidence of early Wurmian sites is also found at a distance from the coast, if at selected spots. No archaeological material was discovered at Pianico Sellere, mentioned earlier (see 4.2.1). Human groups, however, were living in the same forested setting at Bagaggera, 260 m asl (see 4.2.1). Mousterian tools were found on the top of a well-developed soil fitting into the reconstruction put forward for OIS 5 (see 4.2.1) (Cremaschi *et al.* 1990). There is a date of 60.5 ± 7.5 ka (OXTL-750f) after TL analysis of a flint implement. The evidence points to a series of brief human settlements during OIS 5 a–c, and possibly at the beginning of the much colder OIS 4 as well, when loess also started to form and to be deposited. The flint pebbles, which could be picked up in nearby gravel, again and again seem to have attracted human groups, this raw material being rare in the region.

At Cascina Buca del Latte, on a plateau near Brescia, lithic implements were similarly collected at the base of the loess deposit associated with charcoals, suggesting a nearby forest related to a temperate and rainy climate (Cremaschi 1981).

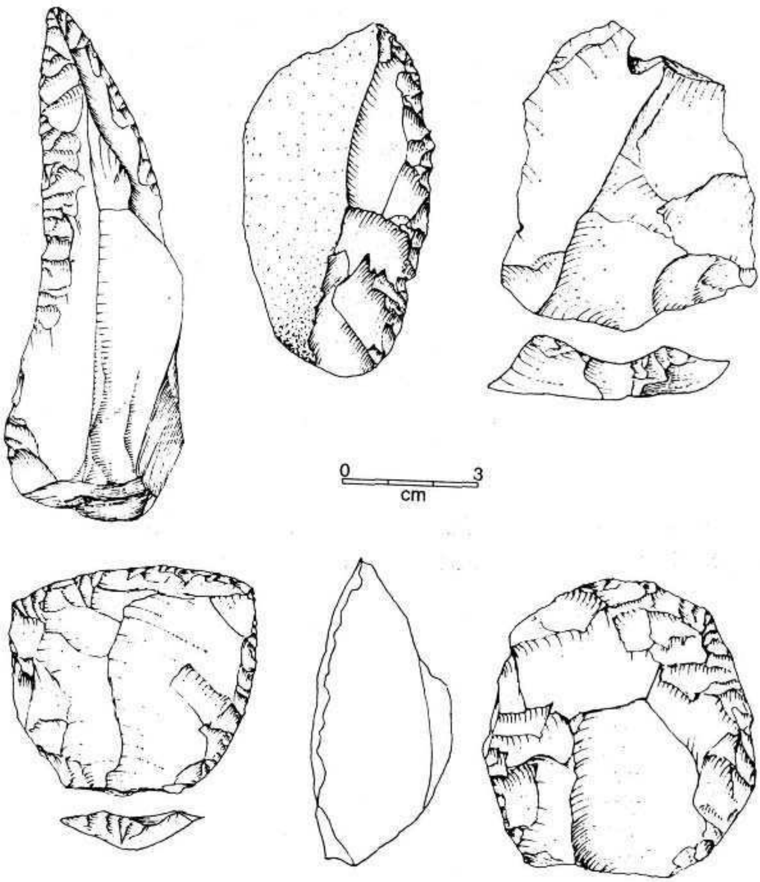

Figure 4.14. Erbarella. Lithic industry (source: Bisi *et al.* 1982).

A very restricted archaeological assemblage from the cave site of Ponte di Veia near Verona (i.e., some unretouched flakes and a few scrapers) were also dated to the interglacial, as they were found in a level with *Quercus, Carpinus* and *Salix* pollen (Durante Pasa 1949-1950; Pasa 1949–1950). Some remains of *Sus scrofa* were excavated from the same layer.

In the Marche region on the Adriatic coast, south of the Po Valley, an archaeological and depositional sequence similar to the northern one is known, and some open-air sites have been investigated (Bisi *et al.* 1982; Bocchini and Coltorti 1982; Chiesa *et al.* 1990; Peretto 1990). However, there is no direct botanical evidence, and only lithic implements were preserved.

Erbarella is a good example: it is the stratigraphic position of the industry, which is of markedly Levallois facies, that allows a chronological attribution to the interglacial (Fig. 4.14; Table 4.4). The settlement was established on a fluvial terrace believed to belong to the penultimate glacial phase–the "Riss" glacial—and the archaeological level was deeply affected by pedogenetic processes caused by the mild and moist climate, which was subsequently established. The closely related Levallois industry of Ponte di Crispiero was produced during the early Wurm, that is, after the interglacial paleosol had been truncated by erosion in the local stratigraphic sequence, and before loess deposits started to accumulate during OIS 4 (see 4.2.2). Pedological analysis of buried soils suggests that the environment was changing from still rather wooded to truly steppe-like, under a progressively drier and colder climate. The lithic assemblages of Colonia Montani, which are also of Levallois facies, were also found within a similar sequence.

Elsewhere, the evidence for human settlement away from the coastal stripe and in a relatively wooded environment is scarce but not totally lacking. At Canale delle Acque Alte, between Rome and M. Circeo, a limited number of Mousterian tools was collected in levels E1-D of the local sequence, some in association with the fir forest (Taschini 1972) (see 4.2.1).

4.2.5. Living in a Colder Climate: Caves and the Exploitation of Steppe Environment

With the onset of the full glacial, grasslands and steppes started to expand. A different environment opened to colonization by human groups, which supported large herds of herbivores. The cave sites of northeastern Italy allow us to better understand the exploitation of northern steppes (see 4.2.2). In fact, the pre-Alps, which also offer the resource of caves and flint, became a favored area. Except for Gr. del Broion, which opens in the Colli Berici, the other major caves (i.e., Riparo Mezzena, Riparo Tagliente, and Riparo di Fumane) cluster in the Monti Lessini just north of Verona. They are all located at a modest altitude of about 200–400 m asl.

While only limited archaeological remains are to be found at Gr. del Broion, which was predominantly a cave bear dwelling (Broglio 1964; Sala 1980), a long sequence of archaeological layers is known from Riparo Tagliente (see 4.1.4). Human occupation was also repeated at Riparo Mezzena, which yielded thousands of lithic implements, if much affected by trampling and other disturbance (Bartolomei *et al.* 1980). Much more will come out of Riparo di Fumane presently under excavation, and only known through preliminary publications (Bartolomei *et al.* 1991–1993, 1992; Cassoli and Tagliacozzo 1991; Cremaschi *et al.* 1986). Multilayered archaeological deposits are indicative, if anything, of human groups repeatedly occupying the caves during OIS 4 and 3. Accordingly, the colder and arid climate of the full glacial did not prevent human groups from successfully exploiting the Mammoth Steppe—just the opposite, in fact, if one considers the sharp contrast with the elusive archaeological evidence of OIS 5 in the same general area (see 4.2.4).

After the evidence of Riparo di Fumane, humans were taking advantage mostly of red and roe deer, as well as of ibex and chamois. Accordingly, in this region of Italy, the resources of the rocky areas were also regularly sought. Farther south, a different mix of animal species is found at archaeological cave sites, most of them not far from the coast and at low altitude. At Gr. di S.Agostino, just south of M. Circeo, an open environment is suggested by the faunal assemblage, which includes the hamster (*Cricetus cricetus*) (Caloi *et al.* 1989a; Tozzi 1970). While red and roe deer, as well as ibex, are very common, just as at Riparo di Fumane, substantial numbers of fallow deer as well as aurochs and wild boar are also reported. The assemblage of Gr. Tina, on the Cilento coast and south of Naples, reflects another variant of the ungulate populations that attracted humans (Martini *et al.* 1972–1974) (see 4.2.2 and Table 4.3): in this case, red deer and chamois are the most frequent herbivores.

In the stratigraphic sequence of Gr. B di Spagnoli, in Apulia, one can follow how, in southeastern Italy, horse and ibex (together with chamois) progressively took the place of fallow deer while the climate was turning colder and more arid (Guerri 1973; Sala 1978). The similar association of horse and ibex in the layers of Gr. del Cavallo, deposited during the full glacial, has already been mentioned (see 4.1.4).

Not at all the above-mentioned sites is there much evidence of direct human involvement in the accumulation of bone remains. At Gr. Tina, for instance, the lithic industry is scarce (Table 4.5). As the assemblage includes some large carnivores and lots of rabbits, often quite young, as if born there (Table 4.3), it is assumed that the cave was only occasionally visited by human groups. The same was suggested at Gr. B di Spagnoli, at which lithic tools are slightly more frequent: the many carnivore bones, most identified as belonging to hyenas, which also left coprolites, are taken as indicative of animal lairs. At the multilayered site of Gr. di S. Agostino, however, thousands of Mousterian tools were recovered during excavations. The characteristics of the bone assemblage suggest, after M. Stiner's (1994) analysis, that humans were also responsible for the accumulation of ungulate remains in the cave.

There is little doubt that the southern steppes and grasslands were just as successfully exploited as the northern ones. The problem of coping with changing resources in a changing environment was solved in both instances.

Table 4.5. Grotta Tina. The lithic assemblage.[a]

	n
Scrapers	14
Notches	1
Retouched flakes	1
Unretouched flakes	6
Scaled pieces	1
Cores	3
Total	26

[a]Source Martini *et al.* (1972-1974).

4.3. MOUSTERLAN VARIABILITY

4.3.1. Intrasite Variability and Patterning— Hearths and Lenses of Ashes

Not much is known about site patterning. For one thing, not much recognizable spatial organization can be expected before the Upper Paleolithic (Farizy 1988–1989). The problem is even more complex at cave sites, as human groups repeatedly occupying the same restricted area contributed to the disturbance of any evidence. Also, many sites are only known from early excavations, and evidence of spatial organization, if any, is likely to have been missed.

Some evidence comes from Gr. delle Mura, on the coast of Apulia, although the sea has destroyed most of the deposit. At present, the waves enter the huge, collapsed cave; consequently, only a very peripheral part of the deposit that escaped erosion was available for excavation in the 1950s and 1960s (Cornaggia Castiglioni and Palma di Cesnola 1967).

The layer with Middle Paleolithic industry (i.e., layer H) had been dug down to 10 m below present sea level when excavations were abandoned. It is a sandy deposit of aeolian origins. Some 140 Mousterian implements were found. About 110 are retouched and were described in some detail (Table 4.6). Approximately one-fourth of them are Mousterian points, to which a number of unretouched Levallois points must also be added. The many *déjeté* scrapers can probably also be counted as pointed tools. The overall frequency of points is quite unusual for any Mousterian assemblage. It could well be the effect of the marginal position of the excavated deposit.

Better information is available from Gr. delle Manie in Liguria (Arobba *et al.* 1976). The local sequence is referred to an advanced Wurmian phase (Wurm II and Wurm II/III) that we tentatively equate with OIS 4 and 3. The fauna is dominated by red deer remains (> 80 percent). The industry is generally scarcely Levallois, with a limited amount of scrapers, and many backed tools (most of which are naturally backed), notches and denticulates.

Level IV, which is related to the very end of Wurm II (i.e., probably the end of OIS 4) is different, in that the general characteristics are the same, but more extreme: the Levallois technique occurs very frequent (IL = 35.3). Scrapers are totally lacking; backed and naturally backed tools comprise 33.3 percent of the assemblage, and there are many borers. In the excavated part of the cave stone knapping was performed, as evidenced by the accumulation of lithic remains. This specialized activity would account for the unbalanced composition of the assemblage. In other parts of the cave, there are also many charcoals and burnt bones that originated in a nearby hearth or hearths.

Hearths are frequently mentioned at Mousterian sites—almost constantly at cave sites. Extensive or limited lenses of ashes, charcoals, and burnt bones are a common find (see 4.2.4). Organized and clearly patterned fireplaces, however, are so far not recorded. A possible exception was discovered at the base of level B1, in the upper part of the long stratigraphic sequence of Gr. Maggiore di San

Table 4.6. Grotta delle Mura. The Retouched Tools of the Mousterian Assemblage.[a]

Type list	n
Mousteiian point	26
Limace	2
Single scraper	25
Double scraper	11
Convergent scraper	3
Déleté scraper	30
Transverse scraper	a
Endscraper	2
Notch	2
Denticulate	1
Total	110

[a]Source: Cornaggia Castiglioni and Palma di Cesnola (1967).

Bernardino, which was deposited from OIS 7 to OIS 4 (Peresani 1996, Peretto 1984) (see 3.2.1). At the base of level B1, two shallow hollows were surrounded by stones and filled by tiny pieces of charcoal, lithic implements, and fragments of bones Many charcoal and ash lenses are found higher up in the stratigraphic sequence

Burials, which are documented in other parts of the Neandertal world, have never been found in Italy (see 4.1.5).

4.3.2. Intersite Variability: Preferred Sites and Peripheral Sites, Mountain Sites, the Evidence for Killing and Butchering Sites, and for Quarry Sites

A diversified, and more or less lengthy or repeated use of some sites compared to others can be seen at nearby caves. Good examples are Riparo Mezzena and Riparo Zanipieri, two rock shelters in northeastern Italy, located 50 m from each other. They are both of similar size (i.e., less than 10 x 10 m) and both receive a fair share of sunlight due to their orientation.

At Riparo Mezzena the archaeological deposit was 1.5-1.7 m deep, with ten or more levels rich in charcoals that yielded several thousand lithic implements (Bartolomei *et al.* 1980). Most of the retouched tools from the excavated area at the entrance of the shelter are single or, less frequently, double scrapers, and there are many marginally retouched flakes resulting from trampling. Trampling was even more severe inside the shelter: the industry was much disturbed and not worth publishing in any detail. Bone remains, while not absent, are not really well preserved either.

At Riparo Zampieri the maximum thickness of the deposit was 1.1 m (Palma di Cesnola 1961). The lithic implements are scarce and divided into three levels. Altogether, 174 retouched tools were collected, while the *débitage* is not described in much detail. The industry is typologically very close to that of Riparo Mezzena.

Some information on spatial distribution is available for the lowermost layer, level 3. A hearth was localized at the entrance, directly on the bedrock. It is described as a gray lens of ashes, 1 m in diameter and 0.15 m thick. There were a few bits of charcoal and some fragments of burnt bones. The lithic implements of this area do not include any retouched tools. A continuation of the hearth layer was found in the sloping deposit at the entrance of the cave, below huge blocks. There were charred fragments of bone and flint tools damaged by fire. Some 40 formal tools (out of 54 from the whole level 3) and about 850 unretouched flakes and blades were collected. Altogether, a dozen cores were also found in level 3. The archaeological remains were very scarce in the back part of the cave.

The occupation of Riparo Zampieri, supposedly related to that of Riparo Mezzena, was much less intense, From the evidence of level 3, the former site was mainly used for knapping activities. The few cores, and the many unretouched implements suggest that many cores were tested, roughed, and eventually taken away for future utilization.

Table 4.7. Grotta Romanelli. Inventory of the Lithic Assemblage of level G3.[a]

Type list	n	%
Limace	1	0.73
Single scraper	33	24.26
Double scraper	8	5.85
Déjeté scraper	6	4.41
Transverse scraper	19	13.97
Scraper on ventral face	2	1.47
Alternate retouched scraper	1	0.73
Endscraper	2	1.47
Borer	4	2.94
Naturally backed knife	1	0.73
Truncated piece	1	0.73
Notch	24	17.65
Denticulate	17	12.50
Retouched flake	1	0.73
Rabot	4	2.94
Chopping tool	5	3.70
Miscellaneous	7	5.14
Total	136	99.98
ILty = 0		
IR = 51.07		
IC = 25.17		
Handaxes	1	
Disks	1	
Flakes and debris	829	
Cores	30	
TOTAL	997	

[a]Source: Pipeino (1974).

Table 4.8. Grotta del Capriolo. Inventory of the Lithic Assemblage of Levels B3-B1. [a]

Type list	n	% ess
Levallois flake/blade	61	–
Levallois point	6	–
Retouched Levallois point	1	1.39
Pseudo-Levallois point	1	1.39
Mousterian point	7	9.72
Single scraper	8	11.09
Double scraper	4	5.56
Dejete scraper	2	2.78
Scraper on ventral face	3	4.17
Borer	3	4.17
Backed knife	1	1.39
Naturally backed knife	1	1.39
Notch	9	12.50
Denticulate	32	44.44
Retouched flake/blade	76	–
Total	215	99.99
ILty = 31.62		
IR = 7.90		
IF = 47.47		
1Fs = 36.70		
llam = 16.45		
Flakes	321	
Cores	5	
TOTAL	541	

[a]Source: Pitti and Tozzi (1971).

The Mousterian occupation of Gr. Romanelli has similarly been described as occasional (Piperno 1974). The scarce industry is mostly on limestone supports. It is slightly more concentrated in level G3, with 136 retouched tools. In this level, interestingly, there are many scrapers but not a single point—something rather unusual in any Mousterian assemblage (Table 4.7). Thick hearth deposits, with fauna and industry, are known at nearby caves such as Gr. delle Striare and Gr. di Fiume Surdo. However, these sites were emptied by marine erosion, and the archaeological layers are just residual. The preferred sites were apparently those that have been destroyed by natural agents.

Another site with a limited amount of implements is Gr. del Capriolo in the Alpi Apuane of Tuscany (Pitti and Tozzi 1971). From the typological and technological characteristics of the industry, it is assumed that it is comparatively late Mousterian, and that the local sequence immediately precedes the one of nearby Buca della Iena (see 4.2.3). The deposit of the small cave was about 1 m in thickness and only yielded some 500 lithic implements: 5 cores, about 300 unretouched flakes, and 200 tools. Most of the latter are either unretouched Levallois flakes, blades and points, or notches, denticulates, and retouched flakes (Table 4.8). The industry is markedly laminar, even more so in the lowermost part of the

Table 4.9. Grotta del Capriolo. The Faunal Assemblage of Levels B3-B1.[a]

	NISP
Cervus elaphus	2
Capreolus capreolus	59
Bos primigenius	1
Equus caballus	7
Sirs scrofa	11
Stephanorhinus sp.	1
Ursus sp.	10
Panthera pardus	4
Felis silvestris	2
Total	97

[a]Source: Pitti and Tozzi (1971).

deposit: Ilam (i.e., the overall percentage of retouched unretouched blades in the assemblage) ranges from 37.4 at the bottom, to 7.9 at the top of it, with a mean value of 16.45 (Fig. 4.15). The faunal assemblage is restricted and includes many carnivore remains (Table 4.9).

The lack of cores, the many blades, and the expediency of the retouched tools gives an unbalanced nature to this industry, which, unfortunately, was never fully published. It is not clear whether the raw material source was close to the site and roughed cores were taken away for future use or if a tool kit originally including only a few cores and many flakes and blades was introduced into the cave by people coming from a distance. The existing data suggest stopovers during periodical—one would say seasonal—circuits,

Repeated visits are more evident at Botro ai Marmi, an open-air site closer to the coast, known through preliminary publications (Galiberti 1972, 1974, 1977, 1984). There is evidence of cyclical processes of sedimentation, with sandy sediments alternating with scree deposits from the nearby limestone cliffs. Mousterian lithic industry is found in several layers and points to human groups returning time and again to this specific spot. Scarce deer remains were also preserved.

A seasonal pattern of occupation can also be inferred in the mountains, that is, at open-air sites at an altitude in excess of 1,000 m in the Alps and in the Apennines. Traces of human occupation have actually been discovered at up to 2,000 m asl, invariably as undated surface collections (Mussi 1992, with references). Reasons ranging from difficult access to poor preservation have so far hindered the development of archaeological research in the extensive mountain ranges. Common sense suggests summer occupation during mild climatic phases and seasonal hunting of chamois, ibex, and similarly adapted species.

The evidence for single-purpose specialized sites is scarce but not completely lacking.

A mammoth was found in an alluvial deposit of Pagnano d'Asolo, near Treviso in Veneto (Fig. 4.16). Unfortunately, this happened more than a century ago (Dal

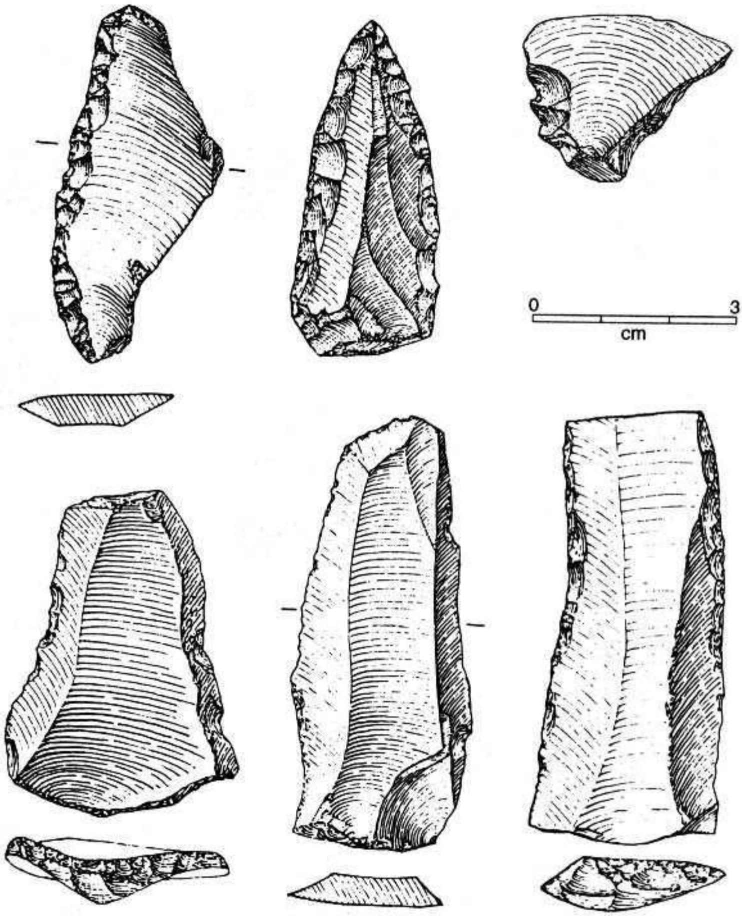

Figure 4.15. Grotta del Capriolo. Lithic industry (source: Pitti and Tozzi 1971).

Piaz 1922; Reggiani and Sala 1992). Circumstantial information is available all the same. A conspicuous part of the skeleton of an adult female was discovered, together with a few lithic tools. Levallois points and flakes have been preserved. The extant evidence points to a killing and/or butchering site.

At I Ciotti, an open-air site at a distance of 1 km from the Grimaldi caves currently under excavation, there is evidence of quarrying activity (Cremaschi *et al.* 1997). Most of the archaeological assemblage is made up by fragments and chips found over a restricted area, to which a few unretouched flakes and a single core must be added. A couple of pebbles bear impact scars related to their use as hammers in order to extract the locally available flint pebbles from the hard geological matrix. After preliminary geological and pedological analysis, an early interglacial age is suggested.

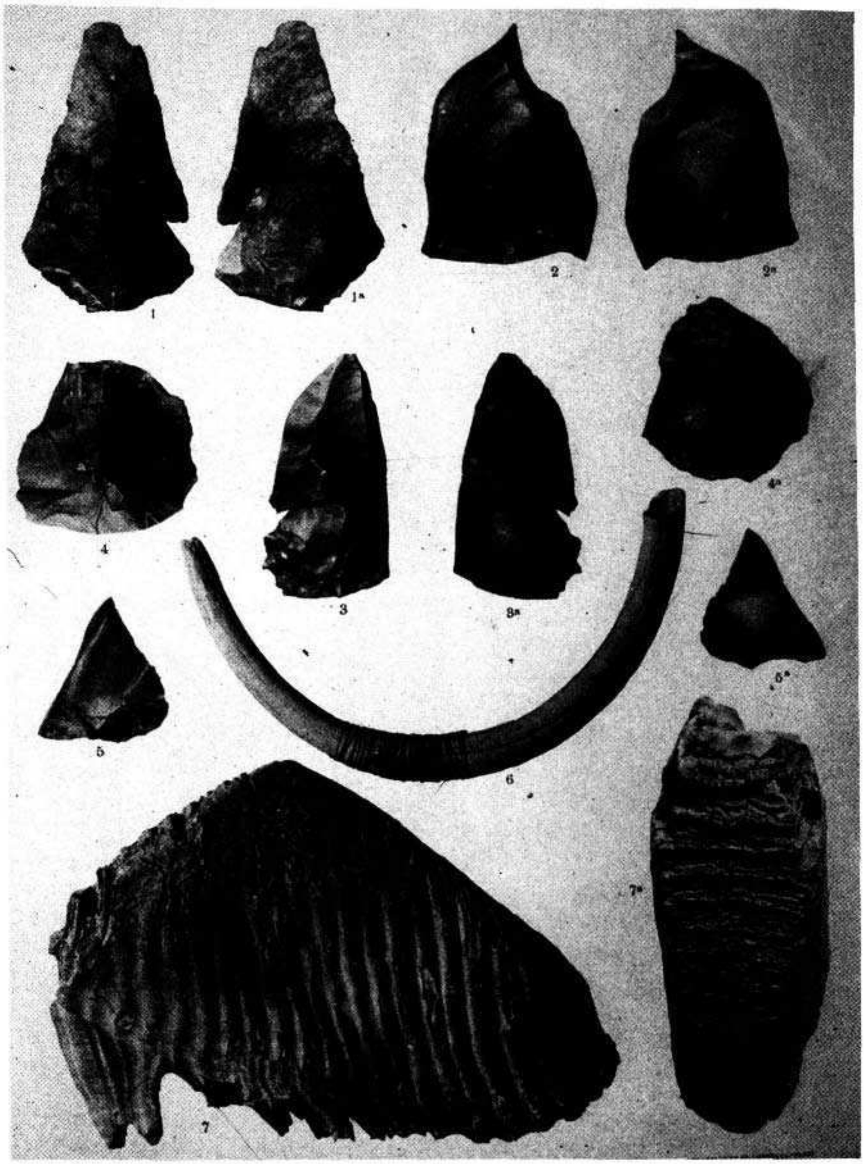

Figure 4.16. Pagnano d'Asolo. Mammoth bones and lithic implements, at different scales (after Dal Piaz 1922).

4.3.3. Procurement Strategies: Flint and Other Fine-Grained Stones

The strategies underlying the procurement of lithic raw materials so far have not been elaborated in any detail. Preliminary information is available for Liguria, an area in which there is a dearth of flint and other good quality materials (Vicino

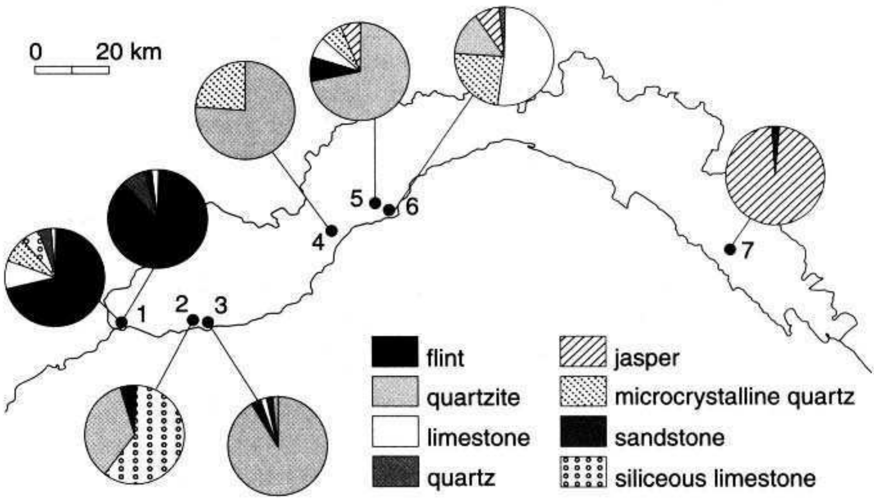

Figure 4.17. Raw materials at some Mousterian sites of Liguria (redrawn after Vicino and D'Errico 1985). 1: Balzi Rossi (ex-Casino and 1 Ciotti); 2: S.Francesco; 3: Madonna dell'Arma; 4: Gr. del Colombo; 5: Gr. delle Fate; 6: Gr. delle Manie; 7: Bargone.

and D'Errico 1985) (Fig. 4.17). In the eastern part of the region, radiolarite, also known as jasper, which is locally available at some distance from the coast, was in use. A limited supply of flint, collected further south in what is now Tuscany, was also used.

In western Liguria, quartz, quartzite, limestone, and other materials, often of poor quality, were collected in the immediate surroundings of the sites. Flint is more easily available in the westernmost areas, if not always really suitable for flaking. It is accordingly of much more frequent use at the Balzi Rossi sites, as outcrops of good quality flint occur at I Ciotti, at a distance of 1 km (Cremaschi *et al.* 1997; Riviere 1887). Evidence of Middle Paleolithic quarrying activity has been discovered at this site (see 4.3.2).

The origin of the flint used at some Mousterian cave sites of coastal Latium has also been considered by S. Kuhn (Kuhn 1991, 1995; Stiner and Kuhn 1992). He suggests that while small pebbles, available in the coastal strip, were generally used, a limited amount of flint was collected at a distance in excess of 50 km, but that this exotic material was used less and less through time. However, Kuhn never discovered the actual sources of both exotic or local flint. At another site, Gr. Barbara, it was found that most of the flint pebbles were transported from a distance of no more than 10 km, but that nearly one-quarter of the flake implements originated as blanks or retouched tools from a different and possibly more remote area (Mussi and Zampetti 1990–1991). The changing sea level must have accounted for an access to the pebble deposits, which varied greatly through time: if anything, lower marine stands, and the erosion of small gullies by the streams, made it easier to collect suitable raw material along the banks and at the mouth of the rivers (see 4.2.2) (Fig. 4.1 1).

In the Monti Lessini of Veneto, where Riparo Tagliente, Riparo di Fumane, and Riparo Mezzena are located, flint is abundant arid of good quality. Some details on the *débitage* are available for Riparo Mezzena (Bartolomei *et al.* 1980): there is a dearth of cores, namely, Levallois cores, in the assemblage. This, coupled with the scarcity of corticated flakes and blades, suggests complex reduction sequences, partially carried out at the quarry site and completed elsewhere—as also suggested by the complementary evidente of nearby Riparo Zampieri (see 4.3.2).

4.3.4. Experimentation and Innovation: The Exploitation of Different Animal Species, Shells as a Raw Material, and the Problematic Bone Tools

Innovation capacity and ingenuity is evinced from the use of animal resources. The evidence from the old find at Pagnano d'Asolo is admittedly not first rate (see 3.2.3). However, it points to the direct interaction with a mammoth, possibly killing a dying animal or scavenging a carcass. The evidence from Riparo Tagliente can also be taken into account, even if a couple of teeth in the cave are an even less satisfactory proof of a human–animal relationship (see 4.1.4). Anyhow, if not truly exceptional, mammoths were certainly not that common, at least in the central and southern portion of the peninsula (see 4.2.3) (Mussi 1999, in press). One can admit that they could also have been lumped into the general category of "elephants." However, to take an interest in the flesh of such creatures suggests that Neandertals were prompt to react to novelties and quickly adapted traditional knowledge to new needs.

A monk seal bone with cut marks, found in the coastal site of Gr. di S. Agostino (Stiner 1994), also points to an innovative approach to food procurement.

According to Cassoli and Tagliacozzo (1991), the human groups settling at Riparo di Fumane regularly hunted birds, namely ptarmigan, as well as, much more frequently, black grouse.

Shellfish did not escape attention either. Limpets were collected at Gr. di Torre Nave, undetermined species were foraged at Gr. delle Manie, while the shells of marine molluscs found at Riparo Mochi are frequently burnt (Arobba *et al.* 1976; Bulgarelli 1972; Kuhn and Stiner 1992). A different, nonalirnentary use can be seen in the remains of *Callista chione* at a minimum of nine coastal sites (Vitagliano 1984). The thick valve of this species was used as a lithic flake and regularly retouched. At Gr. dei Moscerini, both the "bulb'' (i.e., the hinge area of the shell, or umbo) and the lateral edges of the valve were first broken off, so that only the central and thickest part was retained; then, the "distal" and more or less arcuate end was retouched on the inverse (i.e., concave) face of the shell. The retouch is steep and scalariform, and the shells have been consistently shaped into scrapers that can be described as transversal-even if other types, such as points, are not totally lacking (Fig. 4.18).

This same technique is found at other sites, such as Gr. del Cavallo level L (see 4.1.4) and Gr. Mario Bernardini level D (both in Apulia), while at the ex-Casino site of Balzi Rossi, Vitagliano pinpoints a different method: either the "proximal" part of the shell was modified by a marginal and denticulate retouch, or the retouch was on a fractured margin.

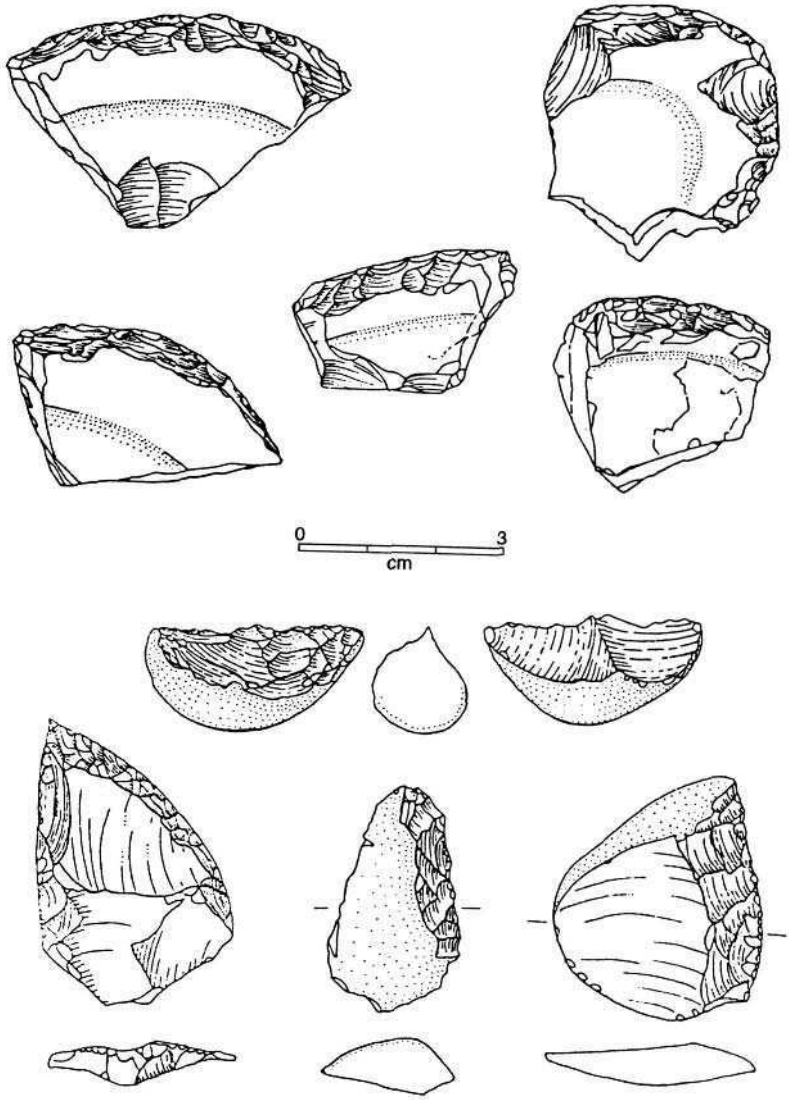

Figure 4.18. Grotta dei Moscerini. lmplements on shell support (top three rows) and on lithic support (bottom two rows) (source: Vitagliano 1984).

The number of shell tools ranges from one to one hundred at each site. They are also found in different levels, which is indicative of a repeated use of this very peculiar raw material.

Flaked bone tools, which were discovered at more than one Early Paleolithic site (see 3.2.2), are nonexistent during the Würm. The so-called Mousterian "bone buttons," or *fibulae,* were recognized in the past from a dozen cave sites in Central Europe, including eight northern Italian ones, such as Gr. delle Fate and Gr.

all'Onda. The "buttons" are symmetrical fragments of *Ursus spelaeus* perone bones or ribs, with a beveled fracture at each end. When first discovered, they were believed to have been used to hold garments together—hence, the name. While lithic tools were not found at all sites, the abundance of cave bear remains is constant. There is now ample evidence that the "Mousterian buttons" are the result of animal trampling (Giacobini 1982).

One or two polished bone points have also been mentioned but not fully illustrated at each of the following cave or rockshelter: Riparo Mochi, Gr. del Broion, Gr. M. Bernardini, Gr. di Serra Cicora (Borzatti von Lowenstern 1970; Broglio 1964; Campetti 1986; De Lumley-Woodyear 1969). Some details are available for the specimen at Gr. del Broion, which is very short and thick, while at Gr. di Serra Cicora, it is said that there are "some traces" of polishing. All of them would be in association with Mousterian industries of an advanced phase of the Wurm glacial, or even with late Mousterian industries.

Scraping and polishing a relatively soft material such as bone is completely different from shaping it by percussion (i.e., the "soft" approach is technologically and conceptually unrelated to the "hard" one, and typical of the Upper Paleolithic). The supposed Mousterian bone points are in no way the result of an evolution starting with earlier flaked bone tools. However, the documentation is poor and the evidence rather slim. As a consequence, the existence of a Mousterian bone industry of any kind is far from proved in Italy, in contrast with both earlier and subsequent periods of the Paleolithic.

4.3.5. Regional Differentiation in Earlier Industrial Assemblages

Regional differentiation has long been known. Mousterian industries described as "Typical Mousterian" are the rule in Liguria during most of the Wurm. In Veneto and all over northeastern Italy, the Levallois technique is so frequently used, and the percentage of scrapers so high, that this Typical Mousterian merges into the Ferrassie Mousterian. Other sites with Typical Mousterian industries are also located in Tuscany and in Calabria. Most of the archaeological deposits of central and southern Italy, however, yielded Quina industries: examples include the many sites of Latium known as "Pontinian" but also the caves of Campania and Apulia.

There is simply no evidence that specific industrial assemblages are in any way related to well-defined climatic phases. The typological characteristics are very stable up to the end of OIS 4 (Mussi 1992). Meanwhile, the environment was changing and turning colder, drier, windier, and providing fewer and fewer trees.

Furthermore, lithic assemblages identical or similar to the Wurmian assemblages before the last glacial phase are also well documented: the late Acheulean industries found in the loess deposits of northeastern Italy, with a frequent use of the Levallois technique and very rare bifaces, are nearly indistinguishable from the Mousterian industries of the same general area (see 3.1.3); the industry of Torre in Pietra level d is a Pontinian one, and the same is true for several assemblages of OIS 7 found at Rome; the assemblage of level 2 of Gr. Paglicci (*Riparo esterno*) is not very different from those of many later cave sites of Apulia (see 3.2.1). Regional differentiation, if anything, can be recognized well before the Wurm glacial.

Regional differentiation is also apparent from intersite diversity. If we compare northeastern Levallois industries to Pontinian industries, open-air sites as well as cave sites are recorded in both regions. In each general area, lithic industries are broadly similar, both in the open and in enclosed sites, but we suspect that they were at least in part functionally different. In contrast, the cave sites of Veneto have yielded assemblages distinctly different from those foound at cave sites of Latium, and the same is true for the industries of open-air sites of northeastern Italy compared to those of coastal Latium.

If we compare one region to the other throughout glacial and interglacial times, the main constant of Paleolithic life is the availability (or scarcity) of lithic raw material. Locally, the access to specific sources would be affected by factors such as falling sea level (exposing previously unobtainable resources) or thicker vegetation cover (which might hide flint deposits). The overall pattern, however, would be left vastly unmodified. In lithic material availability, indeed, major regional differences emerge all around Italy.

The general scarcity of good flint in Liguria has already been mentioned (see 4.3.3). It is no surprise that after H. De Lumley's review, most of the Mousterian industries of Liguria are *Moustérien typique riche en racloirs* (De Lumley-Woodyear 1969), that is, Typical Mousterian, with "more than average" scrapers. As flint was not always available, increased reduction intensity was a way to cope with the problem. At San Francesco, where good quality raw material was locally available, a different, very laminar, and very Levallois industry was found. This assemblage, late in the Mousterian sequence, is considered in detail below (see 4.3.6).

The Levallois technology is very demanding as far as raw material is concerned: size and quality are important, and only a limited number of flakes or points can be obtained from a core—and of blades as well, unless specialized flaking techniques are adopted (Boeda 1990). It is no surprise that it was commonly used at Riparo Tagliente. The availability of raw material in the immediate surroundings of this cave is best illusrrated in the upper part of the sequence, which has several Upper Paleolithic knapping areas and huge accumulations of discarded lithic elements (see 7.4.1). Because of the demands of the Levallois technique, the small pebbles available in coastal Latium were usually knapped in a different way to make full use of them: the resulting thick and narrow flakes were mostly suited to produce convex or transverse scrapers, and the Quina retouch was a useful option.

In southern Italy information on raw material distribution and availability only comes from limited areas. However, it is worth noting that while Quina assemblages (i.e., non-Levallois heavily reduced tools) usually prevail in southern Apulia where fine-grained rocks are in short supply, the use of the Levallois technique is found in the northern part of the region, such as at Piani di San Vito (an open-air site) and at Gr. B di Spagnoli (a cave site) (Guerri 1973; Sarti 1978). Both are in the area of Monte Gargano, whose high quality flint has been exploited during most of prehistory, including the Holocene. In the southernmost part of Apulia, at Gr. del Cavallo and Gr. Romanelli, tools were even knapped out of limestone and shell valves (see 4.1.4 and 4.3.2). Not surprisingly, the Levallois technique only appears in the final part of the Mousterian sequence of Gr. del Cavallo, when better raw material became available.

In conclusion, our approach is rather crude because of the lack of detailed information on both raw material sources and technical aspects of the lithic assemblages. However, the admittedly very partial evidence so far gained consistently points to a stable link between flint availability and technological, as well as typological, characteristics of the Mousterian assemblages. A more detailed review of the extant evidence also led to the conclusion that there is an overlap in the geographical distribution of sites with a high percentage of Levallois tools, and in the natural occurrence of abundant and high quality flint; while Quina and other heavily retouched assemblages cluster where fine-grained rocks are not easily available, or only occur as small pebbles (Mussi 1999).

Similar conclusions have been put forward for southwestern France: after N. Rolland's (1996) analysis, Quina industries result at different sites from the converging effects of varying circumstances, among which parsimonious lithic exploitation is prominent. In our own analysis, the quality of the local lithic sources is directly reflected in the record, as exotic raw materials are sometimes found but superior supplies were not regularly looked for at a great distance.

4.3.6. Chronological Diversification: Typological and Technological Trends in the Final Mousterian

Mousterian industries were still manufactured in Italy during what used to be called the early Wurm III (Mussi 1990), that is, after the Tyrrhenian Sea cores KET-8003 and KET-8004 analyzed by Paterne *et al.* (1986), during the alternation of warm–cold–warm oscillations centered around approximately 38 to 33 ka. A provisional date of 37 ± 3 ka by ESR for the upper part of the sequence at Gr. Breuil is in good accordance with this chronological framework (Schwarcz *et al.* 1990-1991). At several sites, there is a direct superposition of layers with early Upper Paleolithic industries, such as the Uluzzian or, more frequently, the Aurignacian (see 5.1.3).

There are some general trends in the late Mousterian (Mussi 1990). Overall, lithic assemblages tend to be less heavily retouched. Accordingly, there is an increased frequency of notches and denticulates compared to not that many scrapers—often less than 20 percent in an assemblage. The ratio of Levallois tools varies and is directly correlated to blade production. Upper Paleolithic tool types-endscrapers, burins, truncations, borers, backed tools—usually account for 5–10 percent of an assemblage.

These technological and typological developments can usually be traced within the major Mousterian provinces. In coastal Latium, the changing pattern is best exemplified by the assemblages of Gr. del Fossellone level 27ß (Table 4.10), and Gr. Barbara (Mussi and Zampetti 1990–1991; Vitagliano and Piperno 1990-1991; Zampetti and Mussi 1988). The sites presently open at sea level on the cliffs of Monte Circeo and have an Aurignacian occupation on top of the Mousterian sequence. As usual in the area, small pebbles were mostly used.

Table 4.10. Grotta del Fossellone. Inventory of the Lithic Tools of Level 27ß, after the Analysis of a Representative Sample.[a]

Type list	n	%
Levallois flake	41	4.2
Pseudo-Levallois point	4	0.4
Mousterian point	2	0.2
Single scraper	183	18.5
Double scraper	27	2.8
Convergent scraper	10	1.0
Dejete scraper	39	4.0
Transverse scraper	72	7.3
Scraper on ventral face	8	0.8
Scraper on a chopper	30	3.0
Endscraper	41	4.1
Burin	22	2.2
Borer	30	3.0
Backed knife	7	0.7
Naturally backed knife	13	1.3
Raclette	2	0.2
Truncated flake/blade	20	2.1
Notch	149	15.0
Denticulate	198	20.0
Alternate retouched beak	8	0.8
Retouched flake/blade	68	7.0
Chopper/Chopping tool	10	1.0
Miscellaneous	4	0.4
Total	988	100.0
IL = 18.65		
IR = 37.40		

[a]Source: Vitagliano and Piperno (1990–1991).

In both instances, there is only a limited number of scrapers (much more so at Gr. Barbara than at Gr. del Fossellone), and many notches and denticulates. Quina retouch is rare or even absent. Upper Paleolithic tool types, and notably some backed tools, are also found at both sites. The Levallois technique is more frequent at Gr. del Fossellone, less so at Gr. Barbara.

More information on the technological characteristics of the late Mousterian assemblages of coastal Latium is available from S. Kuhn's work (Kuhn 1991-1991a, 1990-1991b, 1995; Stiner and Kuhn 1992). Not all his conclusions can be accepted at face value, as many of the analyzed assemblages were excavated and sorted a long time ago (Mussi 1999). However, he demonstrates that there is some shift in core reduction techniques, with more platform cores, if compared to centripetal cores, in the later or "post 55 ka" part of the sequence at both Gr. di S. Agostino and Gr. Breuil.

Interestingly, scaled pieces are mentioned by S. Vitagliano and M. Piperno (1990-1991) in the uppermost part of the Mousterian sequence of Gr. del Fossellone (i.e., in levels 25–23). They are also encountered in northeastern Italy at

Table 4.11. S. Francesco. Inventory qf the Lithic Assemblage.[a,b]

Type list	n	% ess
Levallois flake	591	–
Levallois blade	572	–
Levallois point	39	–
Mousterian point	5	1.0
Single scraper	76	15.9
Double scraper	6	1.3
Dejete scraper	3	0.6
Transverse scraper	4	0.8
Scraper with thinned back	2	0.4
Endscraper	5	1.0
Burin	47	9.8
Borer	3	0.6
Backed knife	30	6.3
Naturally backed knife	321	–
Truncated flake/blade	16	3.4
Notch	165	34.5
Denticulate	106	22.1
Retouched flake/blade	10	2.1
Miscellaneous	1	0.2
Total	2.002	100.0
Ilam = 34.8		
ILty = 71.5		
IFs = 31.2		
IR = 5.4		
IRess = 18.6		
Flakes	989	
Blades	294	
Debris	2,768	
Cores		
Discoidal	64	
Levallois	29	
Prismatic	32	
Miscellaneous	101	
Total	226	
TOTAL	6,279	

[a]Source: Tavoso (1988).
[b]Naturally backed knives are not counted when ILty and IR are calculated.

Riparo Tagliente, in which there is again the superposition of an Aurignacian level over the Mousterian levels (Bartolomei *et al.* 1982). Scaled pieces are related to a bipolar knapping technique and/or to indirect percussion, and become extremely frequent in the early Upper Paleolithic (see 5.1.2).

In Liguria, the usual increase in notches and denticulates can be traced at sites such as Riparo Mochi and Arma delle Manie (see 4.3.1). More complex developments, however, were under way when the lithic assemblage found at San Francesco was been knapped.

S. Francesco is a site within the town of Sanremo, which is known from salvage collections and excavations: it is not even clear whether there was originally a rock shelter (Isetti 1961). The composition of the faunal assemblage (see 4.2.3), and the lithic technology, suggested to De Lumley a late date within the Mousterian sequence (De Lumley-Woodyear 1969). A. Tavoso (1988), who later restudied the industry, agreed with this date.

Several thousand implements were made, mostly using the pebbles quarried in the nearby river, that is, quartzite and siliceous limestone (Table 4.11). The latter is unusual, even in Liguria, but both are good for knapping, if brittle. Interestingly, cortical *débitage* is rare, one fully cortical flake each twelve cores, which means that the cores were roughed out at the quarry site.

This Middle Paleolithic industry is very Levallois (nearly half of the extant flakes/blades are Levallois) and extremely laminar. The many blades are quite regular and well done, mainly made by recurrent Levallois technique (i.e., a Levallois knapping method that allows for the production of a series of blades, struck alternatively from two opposed platforms). Some blades were struck from prismatic cores with a lateral crest, a way of producing blades that became the rule later on during the Upper Paleolithic.

More than half of the retouched tools are either notches or denticulates, which could be in part the effect of use or trampling on the brittle flakes and blades. They are accompanied by scrapers and a very characteristic group of Upper Paleolithic tools (Table 4.11).

The very laminar and very Levallois industry mentioned at Gr. del Capriolo is possibly close to this assemblage (see 4.3.2).

4.4. COMMENTS

The Neandertal colonization of Italy was a success; that is, most of the territory was explored and quite different ecological niches were occupied. The chronological framework is not sufficiently fine-grained to prove that the human presence was continuous. Outside the mountain ranges, however, traces were left in the same areas during both the mild interglacial (OIS 5) and the subsequent much colder glacial phase (OIS 4), as well as during the milder oscillations of OIS 3. There are accordingly grounds for believing that humans were successfully coping with the changing environment. The alternative would be that the local populations died off and new, and for some reason, “better adapted” human groups entered the peninsula and repopulated it–a not very convincing scenario. On the other hand, south of the Alps, the climate was never as extreme as in central or northern Europe. All things considered, it seems probable that the Neandertal settlement was uninterrupted.

The Middle Paleolithic, as can be seen from the Wurmian record, was also a period of innovations, not only in lithic technology (see 4.3.6), but also in other fields.

4.4.1. Caves and Site Preservation— Human Beings, Other Cave Dwellers, and Adaptation to Caves

The record is definitely biased toward cave dwelling. If we consider all the pre-Wurmian evidence, we are left with less than a handful of sites not in the open: Riparo di Visogliano, which is a dolina; *Riparo esterno* of Gr. Paglicci, a rock shelter; Gr. del Colombo, with scanty remains; Gr. del Principe, a useful reminder of the biases due to the high marine stands that emptied coastal caves; and Gr. Maggiore di S.Bernardino, levels L to G, which, however, on the basis of preliminary information is not very rich in remains. A pre-Wurmian date has been suggested for a few more cave sites, but has yet to be substantiated (see 3.2.1).

Taking into account biases and hypotheses, cave dwelling is the rule during the Würm, but is not well documented before it, even if positively recognized during OIS 7. It is certainly truly exceptional before OIS 8. For the first time, the extensive Wurmian record from caves provides us with detailed archaeological information on a glacial period. The caves were the perfect "sedimentary trap" during phases characterized by and large by erosion in the open. They also allowed for the preservation of bones, which is the exception in the open, even where, thanks to the deposition of wind-blown sediments, erosion was kept at bay and archaeological remains accumulated.

The falling sea level had admittedly made many caves opening on marine cliffs available for settlement, which was an encouragement to take advantage of them. However, this had happened before, apparently without resulting in widespread occupation. Furthermore, caves of suitable size and exposure are not found everywhere–not even along the coasts. Last, but not least, they were much sought after by other animal groups, and dangerous ones at that, such as cave bear, hyena, wolf, lion, and leopard–the last two species being admittedly not that common.

Bear and hyena requirements differ from human needs in that bears favor deeper caves to hibernate, while hyenas prefer caves with a low ceiling, in which humans often cannot stand upright. However, there was considerable overlap of human and animal choice, as can be seen in the many caves with a mixture of Neandertal and carnivore dwellings (4.2.1; see also Stiner 1990-1991a). The cave bear hibernates during the long winter months, while hyena maternity dens are not seasonally restricted. Timing was essential, and a considerable knowledge of animal behavior was required to take advantage of caves left unoccupied.

It is not known whether Neandertals were able to disturb other cave dwellers, actively encouraging them to vacate. It must be stressed, however, that caves attracting not just one, but several different carnivore species–the best shelters, in a way–were also the ones consistently preferred by humans (Mussi 1999). The very fact that Neandertals were regularly entering the competition for those shelters suggests that they were actively and probably aggressively confronting dangerous animals (Fig. 4.19). The control of fire, which was part of the average know-how during the Wurm, would have been a powerful tool to take control of caves, that is, since the beginning of the colonization of caves and well before OIS 5 (see also 3.2.4 and 3.4.2).

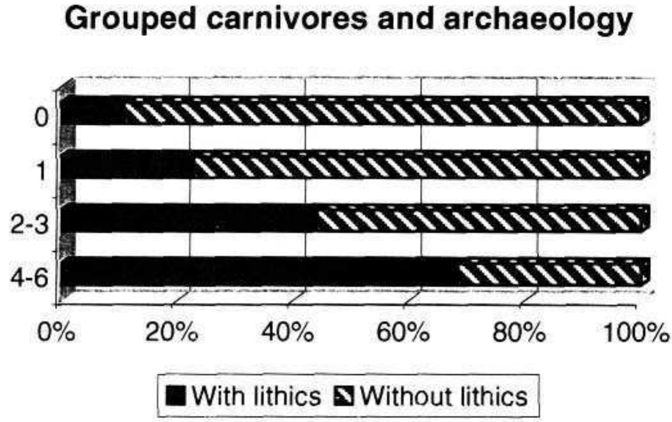

Figure 4.19. The competition for caves. Compared frequency of carnivore species at 193 paleontological and archaeological sites (OIS 7 to 3). based on presence–absence counts (after Mussi in press). The carnivores are bears (brown bears and cave bears), hyenas, wolves, lions, leopards, and lynxes.

Because cave sites are enclosed sites, the archaeological residues are much less dispersed than in the open. During fully glacial times, the harsh climate may also have encouraged people to perform inside a whole range of activities that could otherwise have been done in the open. Furthermore, fire meant light and more time for any activity during the short winter days. As a consequence, lithic tools and food must have been brought inside, and then discarded, at a higher rate than in the open. Different sedimentary dynamics must also be taken into account. They all contributed to a generally higher density of remains per cubic meter of deposit inside caves.

It cannot easily be determined whether the more visible and easily spotted Mousterian settlement is the result of a higher demographic density than in the Lower Paleolithic. As noted earlier, site preservation, namely, cave dwelling, conspicuously biases the record. When discrete occupations are documented in caves, as on the top of the Tyrrhenian fossil beaches (see 4.2.4), they consistently point to a low rate of discard and to a discreet human impact. However, settling into caves, which only occurs, if rarely, in restricted parts of the territory, would have meant a major advantage for the human groups: not just a shelter against cold, rain, snow, wind, and other natural agents, but also a protection around birth time and for young children. Denning is a behavior found among mammal species that, like humans, have helpless offspring that cannot walk soon after they have been born. To make dens, humans would have had to organize themselves in such a way as to be able to stock caves with food, fine-grained rocks, firewood, and so on, even for short stays. This in turn meant transporting supplies over distances and establishing complex lines of cooperation among adults of both sexes–a major shift from primate behavior at that, as cooperation and food-sharing is best known from the study of social carnivores, such as wolves, foxes, and the like (Mussi 1999). Fire, which allows both the lighting and heating of dark caves, and is also a great advantage in confrontation with large carnivores, would have been the essential prerequisite for this adaptation. It is probably not coincidental that the recurrent settlement of caves and the mastering of fire are both consistently recorded starting in the Middle Paleolithic.

4.4.2. The Colder the Better? Biomass Problems, Hunting, and the Consumption of Meat

A changing environment is a challenge for any human group, and Neandertals are known to have been living in Italy in colder and colder environments. There is also an understanding that “warmer” is better than “colder,” and that glacial periods are a threat. However, this approach has been challenged for northern Europe (Roebroeks *et al.* 1992) and is even more questionable in a Mediterranean environment.

During the Early Paleolithic of Italy, there is no evidence of humans settling in the dense forests that developed during interglacials (see 3.2.3). We have also reviewed the sites of final OIS 5 (i.e., of interglacial date) when the general environment was more wooded (see 4.2.4). Trees were found in dense groves at Canale delle Acque Alte, Bagaggera, and in the Marche region. The extension of woodlands, and the actual presence of human groups deep inside them, is not known in detail. If anything, Neandertals successfully extended their range to forest edges.

However, we take it for granted that grasslands have a higher carrying capacity for herbivores than woodlands. The deteriorating glacial climate, with more and more open landscapes, and more and more restricted woods and thickets of trees, favored herds of bovids, equids, cervids, caprids, and their predators as well. The sites in open environments where loess was being deposited, such as those of the Monti Lessini caves, as well as sites on coastal stretches much further south, give ample evidence that human groups were also thriving in the same general environment as herbivores (see 4.2.5).

The interest of Neandertals in new or unusual resources is evinced by their effective, if necessarily limited, interaction with mammoths (see 4.3.4). They were perfectly able to take advantage of a new species and of other impressive animals (i.e., they promptly adapted to novelties and changes). Not even seal flesh seems have escaped their attention, even if probably available even more rarely.

The consumption of meat is evidenced by the many bones with cut marks as well as those broken to extract marrow. They were found at cave sites of different periods and in different areas, from Gr. del Principe to Gr. Romanelli, from Riparo di Fumane to Gr. Barbara and Gr. di S.Agostino, and so on. Burnt bones, also commonly mentioned in archaeological records, are further evidence of meat eating. Cooking has positive effects on the digestion and assimilation of food by humans (Mussi 1999; Perlès 1977).

The extent to which Neandertals were actually hunting in Italy is debated. Recently, M. Stiner restudied some of the faunal collections from coastal Latium, some of which were excavated a long time ago (1990-1991a, 1990-1991b, 1991, 1994; Stiner and Kuhn 1992). Her work argues that the assemblages can be divided into two distinct groups: the pre-55 ka ones, and the post-55 ka ones. Before

55 ka, most of the faunal remains represent the result of scavenging, with an emphasis on head remains, while after 55 ka, they represent the remains of hunting activities. The shift from scavengers to ambush hunters would be first documented in the recently excavated Gr. Breuil, in levels that immediately postdate the 55 ka divide: prime-adult aurochs were killed, while, later on, when level 3 deposited at this same site, ibex were sought.

Stiner's conclusions are surprising—if anything, because prime-adult aurochs would have been extremely dangerous animals on which first practice a new way of acquiring meat (see Julius Caesar, *De bello gallico* VI/XXVIII, for a firsthand report on aurochs hunt, still practiced in his time by the Germans). In other parts of Europe, the archaeozoological analysis of recently excavated collections highlighted a hunting way of life during OIS 5 (La Borde, Coudoulous) and OIS 7 (Biache-Saint- Vaast) (Auguste 1992; Brugal 1999; Jaubert *et al.* 1990). The wooden throwing spears, newly discovered at Schoningen in Germany, in association with the remains of butchered horses are positive evidence that hunting was an established way of food procurement as early as 400,000 years ago (Thieme 1997), while a comparative study of faunal assemblages excavated and curated in conformity with modern standards points to hunting strategies quite similar to those of the Upper Paleolithic during OIS 5 (Gaudzinski 1996; Gaudzinski and Roebroeks 2000).

Table 4.12. The "Head-Dominated" Faunal Assemblages of Central* Italy. *General Ungulate Bone NISP Counts.[a,b]

	NISP Ungulates (bones only)	
Gr. dei Moscerini level 2	21	
Gr. dei Moscerini level 3	164	
Gr. dei Moscerini level 4	42	
Gr. dei Moscerini level 5	*226*	*hyena den*
Gr. dei Moscerini level 6	41	
Gr. Guattari level 0 (surface)	*435*	*hyena den*
Gr. Guattari level 1	*169*	*hyena den*
Gr. Guattari level 2	28	
Gr. Guattari level 4–5	26	

[a]Source: Stiner 1994, Table 4.2.
[b]Note that only a subsample (i.e., red and fallow deer bones) were used by Stiner. The NISP counts relative to red and fallow deer bones, however, were not provided.

In Stiner's view, furthermore, the prevalence of head remains in the Italian sample is related to a very marginal access to the carcasses: humans would have been the last ones in the queue, helping themselves to the leftovers of other scavengers (i.e., brain tissues). In that, the Neandertals of M. Circeo would have been at much disadvantage, even if compared to the archaic humans who lived in the Iberian peninsula nearly one million years ago: at Atapuerca-Gran Dolina, in fact, the zooarchaeological study of the recently excavated "Aurora Stratum" is indicative of primary and early access to carcasses (Diéz *et al.* 1999).

At close inspection, however, the only acceptable example of a "head-dominated" scavenging assemblage given by Stiner is the one from Gr. dei Moscerini level 3: the others are either produced by carnivores, or include only a very low number of bones (Table 4.12). Even more troubling is the fact that the "head-dominated assemblages" were all excavated and curated by a different archaeological team, and at an earlier time, too (see Mussi 1999 for a full discussion): there is detailed evidence that the collections were heavily sorted, and that "diagnostic" bones were retained. On this evidence alone, it is hard to accept that some Neandertals were marginalized scavengers, experiencing a way of life for which, in Stiner's words, "no modern human-generated analogues could be found" (Stiner and Kuhn 1992: 314). A bias in her database, which would be linked to superseded excavation and curation methods, is a much more likely explanation.

The habit of eating meat is documented in the Early Paleolithic record, and much more so at Mousterian sites, at which fire control even allowed for cooking. It is also an inescapable need at middle latitudes, where vegetable foodstuffs were not available year-round before plants were domesticated and stored. We favor the hypothesis that at least part of the animals—if not just prime-adult ones—were regularly killed by human groups. This would also be in accordance with the general behavior of carnivore mammals, who seem never to hunt only, or to scavenge only, but acquire their food in whichever way happens to be feasible—even through confrontation with other carnivores to steal their prey (Domínguez-Rodrigo 1993; Domínguez-Rodrigo 1994).

4.4.3. More Comparisons with Previous and Later Periods: Toward the Definition of a "Middle Paleolithic Package"

There is no evidence that substantial amounts of flint circulated over long distances, as happened later during the Upper Paleolithic. The scanty data from Italy suggest procurement at a local scale (see 4.3.3), in agreement with what is known elsewhere in Europe at this stage (Féblot-Augustins 1995; Turq 1993). However, some of the sites mentioned were established where good quality flint, or other raw material, outcropped. San Francesco and Bagaggera are examples, as are Vallone Carnevale, Podere La Rosa, S. Andrea di Sabaudia (Ansuini *et al.* 1990-1991; Borzatti von Lowenstern and Barsottini 1983; La Rosa 1984; Mussi 1977-1982), that is, the many open-air sites just north of Monte Circeo discovered in the area of flint pebble deposits.

If a network allowing raw material to circulate over great distances was not established, human groups made the effort to move and to settle were flint or other fine-grained stones were available. Some supplies seem also to have been prepared for future use, if on no great scale. The demanding Levallois technique and even blade production were carried out whenever possible. This is in sharp contrast with the Lower Paleolithic record, where there was no evidence for any demand on the quality of the stone that was eventually knapped (see 2.3.1). Isernia La Pineta, with so much fissured and naturally splitting flint, is an obvious example.

Scarcity of suitable stone has also been stressed. In this regard, the use of the thick *Callista chione* valves (see 4.3.4) can well be seen as comparable to the habit of knapping large chunks of bones at some of the Acheulean sites of Latium. Marine shells were just another raw material—probably when a better one was scarce or not at hand—and never gained the status of ornaments that is usual in the Upper Paleolithic.

There are also differences in the way humans were dealing with the dead. Human bones, quite scant and fragmentary, are very much related to carnivore activity (Mussi 1988). The case of the Guattari skull is obvious (see 4.1.5), but more may be added: the mandible of a Neandertal child was found in the hyena den of Antro Obermaier, which is a part of Gr. del Fossellone (Blanc 1954); at Gr. delle Fate, Buca del Tasso, and Gr. di S.Croce, there is positive evidence of carnivores gnawing human bones (Cotrozzi *et al.* 1985; Giacobini and De Lumley 1985; Segre and Cassoli 1987). At other sites, carnivores are always found, even if there is no direct evidence of their involvement.

When big cats, hyenas, or wolves were not present, as with the open-air sites, there are no archaeological remains associated with human bones: artifacts were not found at Archi, while at Saccopastore and Ianni di San Calogero, there is no direct association with the few lithic tools from the same general area. There are reasons to speculate that Neandertals were not casual about corpses: they were careful to dispose of them in the open, clearing caves, even if carnivores sometimes reintroduced them into the caves they occupied.

This is again quite different from the evidence we can gain from the Lower Paleolithic. Human remains at earlier open-air sites, such as Venosa-Notarchirico or Castel di Guido, are best understood as corpses abandoned by the human group that had settled there for a while and then left them behind. This kind of behavior is explained in the following way by traditional herders of East Africa, who face a similar problem when some of their animals die and they cannot dispose of them: “You can’t stay where there are dead animals because of the danger of hyenas and jackals and lions. You have to move” (Aman 1994:29).

The Würmian record suggests a different strategy: the dead were carried away while life possibly continued in the caves at which death had occurred. Another solution to the disposal of corpses would have been to bury the dead, for which there is no evidence in the Italian record. The general result, however, is the same in both instances: the threat of a dead body is removed, and there is no need to leave the dwelling place.

In this, as in other aspects of life, the Neandertals were in much better command of their environment than the earlier inhabitants of the Italian peninsula. If our interpretation is correct, this behavior also indirectly stresses the importance of caves, which we have noted time and again.

On the evidence of the Italian record, we suggest that the “Middle Paleolithic package” was not made just by a complex lithic technology, which included, whenever possible, the Levallois technique and allowed for the production of formal points. The “package” was also, and more importantly, characterized by changes in behavior: most notably, by the capacity to gain access to, and consistently control caves, in which a sheltered life was provided to part of the group, including children. This, in turn, meant that the adults of both sexes had to cooperate and to bring back supplies to a fixed place. At the latitude of Italy, hunting had to be performed on a regular and successful basis if food was to be consistently provided. The capacity to cook meat was probably a welcome addition to the lighting and heating also provided by fire. The benefits of eating in a sheltered area, and of cooked food, are quite evident for a species such as humans that slowly masticates and swallows small amounts of food—quite a disadvantage in comparison to the capacities of other carnivores or omnivores who quickly wolf down large chunks of meat. This is in addition to the greater security against predators and protection against rain, wind, snow, and the like. Life would have been easier not only for children but also for adults.

Even if activity in the open (for which the record is quite poor) must not be underestimated, we suspect that the ability to take advantage of a sheltered place was critically important during parts of the year and during periods of everybody's life. Access to a more protected environment certainly enhanced the reproductive chances of the Neandertals. Even if biased by an "excess" of much visible caves, so to speak, the Middle Paleolithic record might reflect a real demographic expansion. It certainly highlights a major behavioral change related to the colonization of caves and to the acquisition of a denning behavior by a primate species.

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Chapter 5

Modems versus Neandertals

5.1. INTRODUCTION

The Middle to Upper Paleolithic transition has attracted considerable scientific attention in recent years. As a consequence, monographs and volumes of proceedings are totally or partially devoted to various aspects of the problem, which encompass unparalleled changes both in the anatomy of human populations and in cultural complexity (Aitken *et al.* 1992; Cabrera Valdés 1993; Carbonell i Roura 1996; Corbey and Theunissen 1995; Farizy 1990; Hoffecker and Wolf 1988; Kozlowski 1988; Mellars 1990, 1996; Mellars and Stringer 1989; Vandermeersh 1989).

In this chapter we focus on the Italian archaeological record. The relevant lithic industries, found immediately after the Mousterian industries, are classified as belonging either to the Uluzzian or to the Aurignacian. Both are distinct from the Middle Paleolithic ones in technology and typology. The Levallois knapping technique totally disappears, while there is always a varying percentage of blades and bladelets, struck from specialized cores. Endscrapers, burins, and sometimes backed tools are part of the new assemblages, which are accordingly assigned to the Early Upper Paleolithic.

To understand the Italian Early Upper Paleolithic, however, reference must be made first to the history of archaeological studies and to G. Laplace.

5.1.1. The Search for the *Synthétotype* of Laplace, the So-Called "Protoaurignacian," Surface Collections and the Problem of Mixed Industries

In the 1950s, G. Laplace, a French archaeologist, personally examined virtually all the then known Italian Upper Paleolithic collections—as well as those from other European and North African countries. As far as the Middle/Upper Paleolithic transition is concerned, he came to the conclusion that the latter was better understood as a very slow process of typological "enrichment" starting in the Lower and Middle Paleolithic, and accelerating in the Early Upper Paleolithic (Laplace 1958–1961, 1966). This later phase is characterized by a marked polymorphism (i.e., by assemblages varying both in typology and in percentage of lithic types). The industries of this polymorphic phase belong to what Laplace calls a *synthétotpe.* "The evolved or apogeic phase of the *synthétotype* is followed by a phase of segregation of structural and typological characters, marked by the appearance of well-defined industrial complexes, relatively stable and homogeneous, whose progressive typological depletion is sometimes compensated by technical improvements leading to a high level of specialization" (Laplace 1958–1961:230, our translation).

In simpler terms, specialized "leptolithic" industries (i.e., the Aurignacian and the Gravettian) are derived from a general, unspecialized Early Upper Paleolithic. The *spthétotype* develops in different regions of the Old World through different phases, one of which includes industries named "Protoaurignacian," subsequently leading to the proper Aurignacian.

Laplace later identified the cause of the whole process as follows: The formation of the Leptolithic from the Paleolithic *sensu stricto* took place, according to the theory which we support, during a series of well differentiated phases and constituted an evolutionary trend that we have called the *process of leptolithisation.* This was the dialectical element of internal contradiction and innovation, the starter and engine of the process, which consisted in the invention of the technique of blade production (1965:30-31, our translation).

Laplace was clearly much influenced by theories put forward in other scientific fields, and he explicitly mentions, among others, the hypothesis of N. I. Vavilov about "genetic centers." However, part of his approach is also an attempt at interpreting Paleolithic archaeology through Marxist theory.

In his first inventories, Laplace was able to refer to the *synthétotype* only three Italian assemblages. The Uluzzian, discovered in 1963 at Gr. del Cavallo by A. Palma di Cesnola, was soon to be included in his major monograph of 1966. The stratigraphic position and the typological composition made it an ideal exemplification of the *synthétotype.* The industry of the disturbed upper part of the deposit, with both Uluzzian and Aurignacian tools (see 5.1.3), was readily taken as further evidence of "polygenic" Aurignacian origins, and of a local evolution of the Upper Paleolithic in southern Italy (i.e., from the Uluzzian to the Aurignacian).

More assemblages have since been identified as transitional, all of them known from surface collections. In a recent reinterpretation, P. Gioia (1990) convincingly demonstrated that they are the outcome of the mechanical mixing of Middle and Upper Paleolithic industries, sometimes with trampling as an added factor. A. Broglio (1994:45) also suggested, on the evidence from his excavations at Riparo di Fumane in Veneto, that there is no continuity between the Mousterian and the earliest Aurignacian.

Against mounting evidence that the Aurignacian is not an indigenous Italian development, and in an attempt to retain at least part of Laplace's theories, Palma di Cesnola (1982) proposed splitting in two the archaeological record subsequent to the Uluzzian: one group of assemblages including bladelets with a marginal retouch—the so-called "Dufour bladelets'-and another of those devoid of such tools. The "Protoaurignacian with Dufour bladelets" is recognized as having originated outside Italy, while the "Protoaurignacian without Dufour bladelets" would be a local development of the Uluzzian.

The convergent development, in a restricted region, of contemporaneous and typologically similar industries of different origins would be unprecedented (Mussi 1992). A statistical analysis also proved that both the supposedly different "Protoaurignacians," and the proper Aurignacian, tend to cluster in the same time span (Gheser *et al.* 1986). None of them, furthermore, is of the great antiquity suggested by the prefix "proto-"(see 5.1.4). We will not retain this term.

5.1.2. Typological and Technological Characteristics of the Uluzzian and of the Italian Aurignacian, and "Circeian," the Geographical Distribution inside and outside Italy

The Uluzzian is a scarcely laminar industry, which includes a high percentage of side scrapers, notches, and denticulates. Endscrapers are always found, although in variable percentages, some being rather thick or even carinated, while there are never many burins. The most distinctive lithic tools are the backed elements: the Uluzzian examples are mostly arch-backed and often made on a flake, but straight-backed blades are found at Gr. del Cavallo, and lunates also occur. The percentage of backed tools is extremely variable, ranging from an isolated specimens to 25 percent of a large assemblage (Gr. del Cavallo level E II-I; see 5.1.3).

Scaled piece are constantly found in great numbers in the Uluzzian, making up to 50 percent or more of an assemblage, if we count them with formal tools. It is an issue of debate whether such items, which are also found outside Italy at many Upper Paleolithic sites and during different periods, are exhausted cores, by-products of other activities, or proper tools—the different hypotheses being not mutually exclusive (Chauchat *et al.* 1985; Dewetz 1985; Le Brun-Ricalens 1989). There is consistent evidence, however, that scaled pieces are quickly produced if a flake or blade is used as the intermediate element in the indirect percussion of a bone to break it and extract the marrow, or of a piece of wood to split it (Fig. 5.1). While hypotheses about scaled pieces being by-products of other activities have never been fully tested on the Italian archaeological material, flat pebbles, with a central depression resulting from their use as strikers, have been described and illustrated at Gr. del Cavallo (Palma di Cesnola 1965, 1966) (Fig. 5.4). They match closely the *percuteurs à cupule,* known both in the archaeological record and from experimentation as the outcome of indirect percussion of bone or wood that also produces scaled pieces (Le Brun-Ricalens 1989). Scaled pieces are quite rare, if present at all, in Middle Paleolithic industries. Their frequency in the Uluzzian raises the possibility that some important changes had occurred in everyday activities after the end of the Middle Paleolithic.

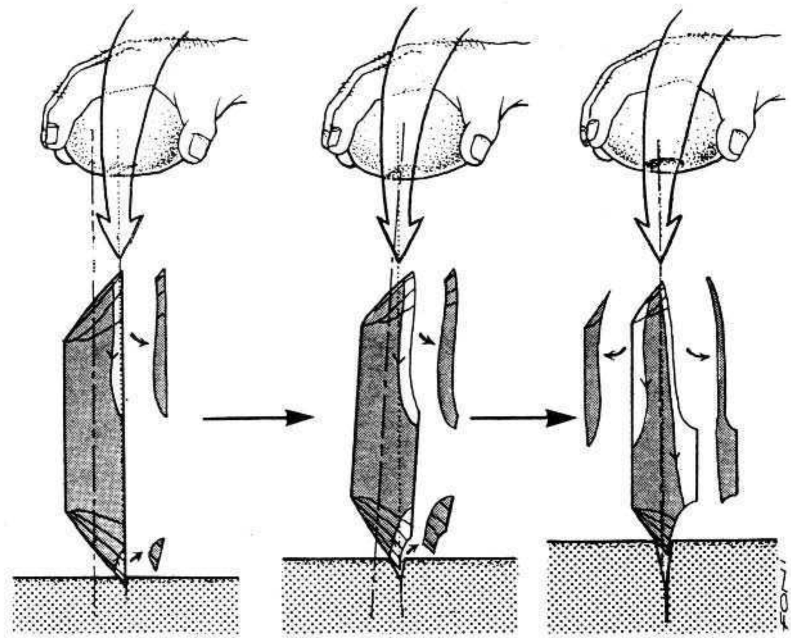

Figure 5.1. Experimental indirect percussion. The production of scaled pieces and *percuteurs à cupules* (after Le Brun-Ricalens 1989).

Scaled pieces are also frequent at some, but not at all, of the Aurignacian sites: they comprise up to 20 percent of the assemblages in areas in which Uluzzian industries are also known, while they are much less frequent elsewhere (Mussi 1990). The more characteristic lithic elements of the Aurignacian, however, are endscrapers, including the carinated and nosed varieties, accompanied by a smaller number of burins and by retouched blades. In the Italian assemblages, burins are rarely carinated, and only exceptionally is any *burin busqué* found. Sometimes the retouched blades are recognized as "Aurignacian blades" because of their peculiar and quite typical retouch, and sometimes as "strangled blades" because of their concave sides. Notches and denticulates are also common. Laterally retouched bladelets—including Dufour bladelets—also occur in great numbers at some sites during the earlier phases of the Aurignacian. A peculiar pointed bladelet, or little flake, with a mono- or bilateral retouch—sometimes a steep retouch-is characteristic of the final part of the Aurignacian sequence at Gr. di Castelcivita, but is also found in the earlier assemblage of Riparo di Fumane, and as isolated specimens at other sites (see 5.1.3).

The Aurignacian of coastal Latium presents peculiarities related to the local raw material (i.e., little pebbles). Following his excavations at Gr. del Fossellone, one of the caves opening on the cliffs of Monte Circeo, A. C. Blanc renamed it *Circeiano* (Blanc and Segre 1953). The "Circeian" is the Aurignacian equivalent of the Pontinian—the latter being the Mousterian of the same area, similarly produced on little pebbles (see 4.1.2). Except for the unusual raw material—to which lithic

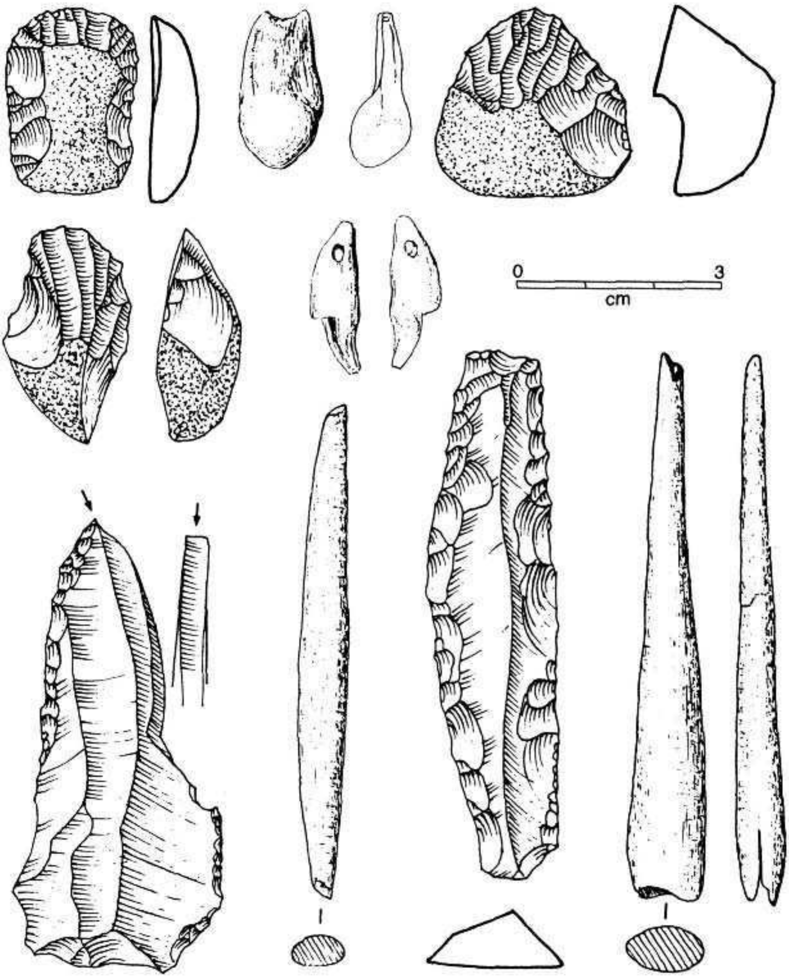

Figure 5.2. Grotta del Fossellone. The "Circeian" assemblage (source: Blanc and Segre 1953).

technology had to adapt—this is just an Aurignacian industry, which also includes split-based points (Fig. 5.2). Aurignacian assemblages made on small pebbles are also found at other sites of the area, such as Grotta Barbara and Pratica di Mare (Zampetti and Mussi 1988). The name Circeian, being of no real value, is better dismissed.

The typology of the Italian assemblages easily fits into the general framework of the Aurignacian industries, as known all over Europe. There is also a continuity in geographical distribution, better seen in the Aurignacian sites of Provence and Liguria which link Italy to France. Southern France, with early sites such as Esquicho Grapaou, La Laouza, Gr. Rainaude (Bazile 1984; Onoratini 1986)-not to mention Est, Cueva del Castillo, and other sites of Spain (Cabrera Valdes 1993)—is a suitable area of origin for the Italian Aurignacian. Alternatives are the Balkans and lower Austria, as suggested by Broglio (1994), who also considers the early Aurignacian of southern France as possibly deriving from northeastern Italy.

The present chronological resolution does not allow us to discriminate between a diffusion or movement of human groups, from east to west and south of the Alps, or from west to east. It should be emphasized, however, that the Aurignacian sites of the northwestern Balkans, adjacent to Italy, are rather poor and often late in date. In northern Bosnia, they are interpreted by Montet-White (1992:91) as resulting from "brief incursions along river valleys in order to procure raw materials." Furthermore, the country is much more rugged than the Mediterranean coastal area and does not allow for easy journeys. Broglio (1994) also stresses that peculiar bone tools, the Mladeč points, found in central Europe and in Slovenian sites, have never been discovered in Italy.

All things considered, and while the geographical origins of the Italian Aurignacian are still an open question, links with southern France are more easily established.

The Uluzzian industries can also be compared with assemblages beyond the Alps, namely, with the Chiitelperronian of central and southwestern France and northern Spain (Farizy and Schmider 1985; Harrold 1988; Lévêque 1993; Lévêque *et al.* 1993), which are also known to be earlier (Gioia 1988, 1990). Backed tools are found in both the Uluzzian and the Chiitelperronian, while the typological characteristics of the rest of the industry are broadly similar. However, there is a marked gap in the geographical distribution, as sites other than Aurignacian are not known during this period in Mediterranean France and east of the Rhône river, or in northern Italy. No continuity has been proven so far to exist between the Châtelperronian and the Uluzzian.

5.1.3. The Main Stratigraphic Sequences

Lithic industries and other archaeological remains belonging to ‘the Early Upper Paleolithic have been discovered in some fifty Italian sites (Mussi 1992). Many, however, are known through surface collections, while others only have a single level of this age. The major stratigraphic sequences are briefly described below, starting with two caves in the south of the peninsula that have a particularly complex sequence, and continuing with sites farther north (Fig. 5.3).

5.1.3.1. Grotta del Cavallo (Apulia)

The cave opens on the bay of Uluzzo, on the Ionian side of Apulia and the shores of Salento, better described as a peninsula of the Italian peninsula The important Middle Paleolithic record has been discussed in Chapter 4 (see 4.1.4) The industry found in the overlying part of the sequence is of Early Upper Paleolithic type, and named Uluzzian after the bay itself (Gioia 1988, Palma di Cesnola 1965, 1966)

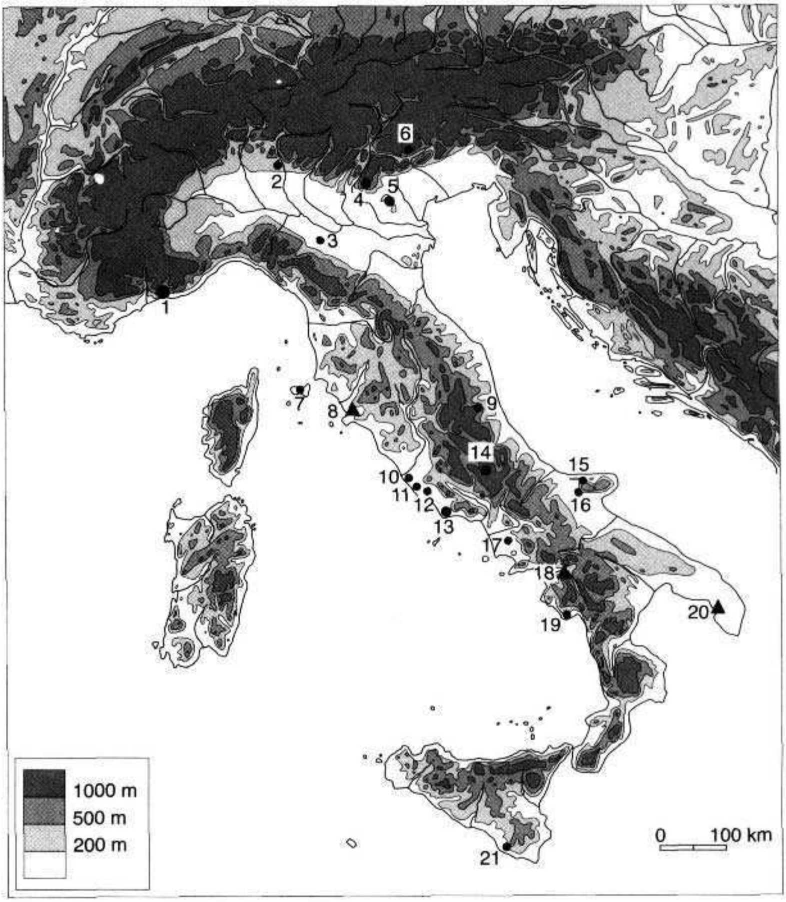

Figure 5.3. Geographical distribution of Aurignacian sites (dots). A triangle is for sites at which Uluzzian industries are also found. 1: Grimaldi or Balzi Rossi sites (Gr. dei Fanciulli, Rip. Mochi, Gr. del Caviglione, Rip. Bombrini, Barma Grande, Baousso da Torre); 2: Bagaggera; 3: Lemignano; *4:* Rip. di Fumane, Rip. Tagliente; 5: Gr. del Broion, Gr. di Paina; 6: Monte Avena; *7:* kola d' Elba; *8:* Gr. La Fabbrica; 9: Gr. Salornone; 10: Sugherone; 11: Pratica di Mare, 12: Canale delle Acque Alte; 13: Gr. del Fossellone, Gr. Barbara; 14: Pantanello, Le Macerete; 15: Localiti Caruso; 16: Gr. Paglicci; 17: Serino; 18: Gr. di Castelcivita; 19: Gr. La Cala; 20: Gr. del Cavallo, Gr. M. Bernardini, Gr. di Uluzzo, Gr. di Uluzzo C, Gr. di Serra Cicora; 21: Rip. di Fontana Nuova.

The uppermost Mousterian level, F1, possibly of interstadial age (Wurm II/III), is capped by a thin layer, Fs, with some Uluzzian tools, maybe intrusive, and then by levels E III-I and D (Fig. 4.5). While it is agreed that there is a distinctive Uluzzian industry in levels E III-I Gioia (1990) pointed to the fact that level D is much disturbed by burrows as well as by later pits and dwelling structures. In her reconstruction, the final part of the Uluzzian sequence is topped by an

Table 5.1. Grotta del Cavallo. The Large Mammals of Levels E and D.[a]

	Level E	Level D
Cervus elaphus	■	■
Bos primigenius	■	■
Equus caballus	■	■
E. hydruntinus		■
Sus scrofa	■	■
Panthera leo		■
Crocuta crocuta		■
Canis lupus	■	
Vulpes vulpes	■	■
Lepus europaeus		■
Erinaceus europaeus	■	

[a]Source: Palma di Cesnola (1966).

Aurignacian level not recognized by the excavators. The Final Uluzzian of Palma di Cesnola is accordingly recognized to be of mixed origins and split into Uluzzian and Aurignacian.

The fauna includes bovids, red deer, wild boar, equids, and carnivores (Table 5.1). In the central part of the sequence, levels E II-I, horse is by far the dominant species and is assumed to be indicative of a steppe-like vegetation, and cold and arid climate. It is less frequent in the other levels, apparently because of less extreme conditions. A pedogenetic alteration that affected level D is further evidence of a milder and moister climate, and probably of the Arcy climatic oscillation. Level E II-I is > 31 ka (R-352) old on the evidence of an early attempt at radiometric dating in the 1960s.

Most of the hundreds of tools, which include many side scrapers and denticulates, as well as endscrapers and a very few burins, were made on the locally available little slabs of chert or siliceous limestone, which are not easily knapped. Broken pieces of the thin slabs were often retouched without further modifications. Not many blades are included in the assemblage. Very distinctive arch-backed tools, often microlithic and sometimes better described as lunates, were usually made using a better material, namely, flint and jasper, collected nearby as pebbles. The highest percentage is from level E II-I: approximately 13 percent of the retouched assemblage; with the addition of backed blades, the backed tools of this level amount to one-fourth of all the retouched tools (Table 5.2; Fig. 5.4). In the other levels, the percentage of such tools is much lower.

There is a high percentage of scaled pieces, related to some kind of bipolar percussion (Gioia 1988): in level E II-I there are 409, while tools total 283. Formal tools were also made on scaled pieces, which were further retouched and modified.

Marine shells, some of them perforated, which also include tubular segments of *Dentalium*, were found in small numbers in all levels but are especially abundant in level D. Some fragmented bone points, and many lumps of pigment (ochre and limonite) were also found during excavation.

Table 5.2. *Grotta del Cavallo. Inventory of the Lithic Tools of Levels E III and E II–I.*[a]

	E III		E II-I	
Type list	n	%	n	%
Single endscraper	73	10.55	9	3.18
Double endscraper	9	1.30	2	0.70
Pointed endscraper	3	0.43	–	–
Endscraper on retouched flake/blade	21	3.03	2	0.70
Fan-shaped endscraper	38	5.49	5	1.76
Endscraper on flake	17	2.46	6	2.12
Thumbnail endscraper	3	0.43	–	–
Carinated endscraper	12	1.72	1	0.35
Thick-shouldered endscraper	1	0.14	2	0.70
Flat-shouldered endscraper	6	0.86	2	0.70
Core endscraper	2	0.29	–	–
Endscraper-truncation	2	0.29	–	–
Borer-truncation	2	0.29	–	–
Borer-endscraper	2	0.29	–	–
Borer-burin	–	–	1	0.35
Borer	4	0.57	2	0.70
Atypical borer	3	0.43	1	0.35
Straight dihedral burin	–	–	1	0.35
Dejete dihedral burin	1	0.14	–	–
Angle burin on break	4	0.57	1	0.35
Multiple dihedral burin	1	0.14	2	0.70
Transverse burin on lateral retouch	1	0.14	–	–
Backed knife	11	1.58	38	13.42
Backed blade	20	2.89	33	11.65
Truncation	21	3.03	16	5.63
Blade/flake with continuous retouch	48	6.93	33	11.65
Notch	34	4.92	23	8.12
Denticulate	46	6.65	28	9.89
Sidescraper	282	40.81	39	13.78
Raclette	6	0.86	18	6.36
Segment	2	0.29	–	–
Backed bladelet	2	0.29	5	1.76
Denticulated bladelet	1	0.14	–	–
Bladelet with inverse retouch	–	–	1	0.35
Miscellaneous	13	1.88	12	4.24
Total	691	99.83	283	99.86
Scaled pieces	292		409	
TOTAL	983		692	

[a]Source Gioia (1988)

Other caves, in which more restricted Uluzzian and Aurignacian assemblages were excavated, also open on the bay of Uluzzo, next to Gr. del Cavallo.

5.1.3.2. Gr. di Castecivita (Campania)

Gr. di Castelcivita is located in an inner part of the peninsula, south of Naples, near the Monti Alburni. At the base of the local sequence are Mousterian layers for

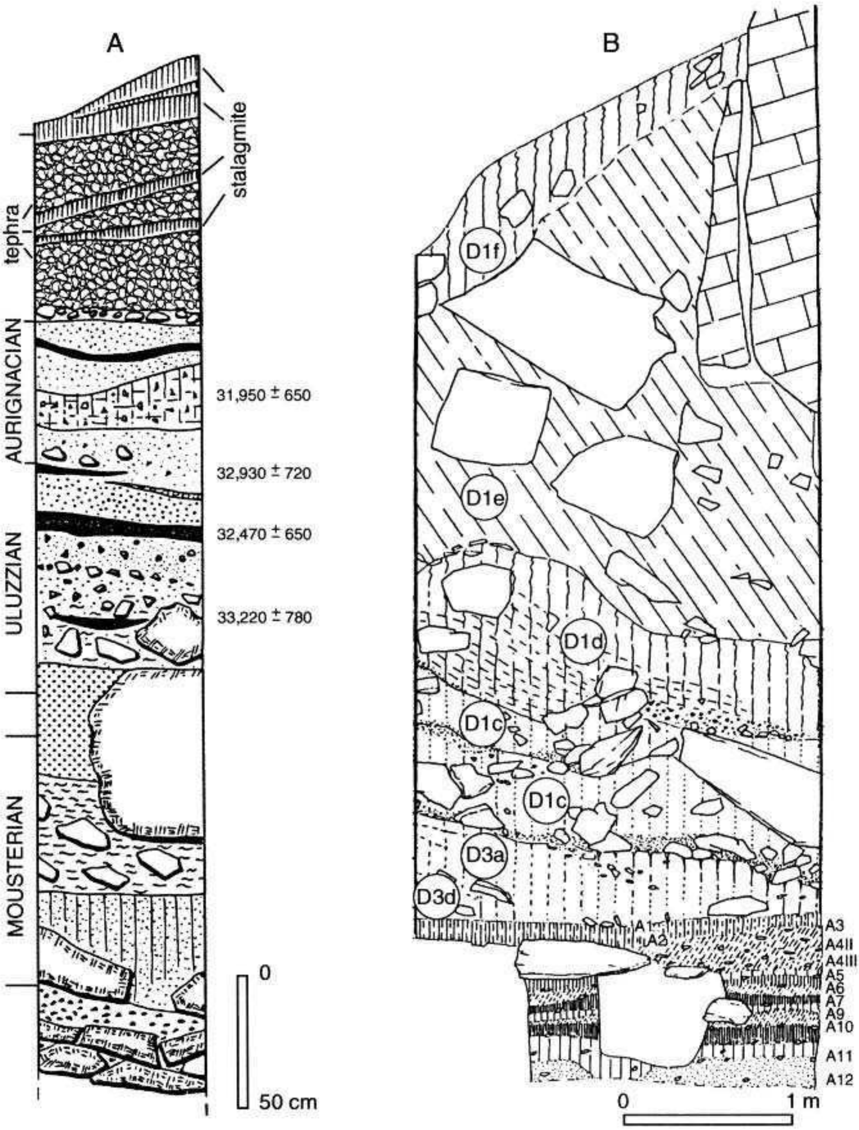

Figure 5.5. Stratigraphic sequences. A: Gr. di Cnstelcivitn; B: Riparo di Funiane (sources: Bnrtolomei *et al.* 1991–1993; Gnmbnssini 1982).

which an attribution to the Wurm II/III Interstadial—within the second half of OIS 3 in more recent chronologies—was suggested (Cioni *et al.* 1979; Gambassini 1982, 1997) (Fig. 5.5A).

The faunal assemblage includes many ungulates: deer (red deer, fallow deer, roe deer), horses, chamois and some ibex, a few bovids and wild boars. There are mostly horses in the middle part of the sequence (levels *rsa'* and *rsa'*), when deer and caprids diminish. As at Gr. del Cavallo, horses are taken as indicative of a steppe-like environment. A sequence of alternating moist–arid–moist climatic phases was suggested, starting with the interstadial and the Mousterian, and ending with stalagmites alternating with thick volcanic deposits, which at some point filled the cave. The latter deposits are devoid of any archaeological content. The intermediate arid phase is also a cold one, during which both sands and frost slabs accumulated.

On top of the Mousterian, and after a stratigraphic discontinuity, there are at first layers with Uluzzian industries (upper part of level *rsi*, levels *pie* and *rpi*, base of level *rsa*), and then deposits with Aurignacian industries (upper part of level *rsa*, levels *gic* and *ars*). The coldest climatic phase is centered on level *rpi*, but the environment was still very arid during the deposition of level *rsa* (i.e., at the end of the Uluzzian and the beginning of the Aurignacian).

The Uluzzian lithic industry is scarcely laminar, and includes 40–60 percent of scaled pieces (counted with retouched tools), sometimes also used as blanks and further modified. Notches and denticulates, followed by lateral scrapers, are very frequent, while there is a lower percentage of Upper Paleolithic tools: endscrapers, rare burins, and backed tools, including arch-backed ones. A few bone points and bone-pointed tools were also found.

Similarly, in the Aurignacian are many notches and denticulates, as well as scaled pieces, if in decreasing percentages through time. The endscrapers and burins include carinated tools, and there are retouched blades. The industry is rather laminar because there are many bladelets: Dufour bladelets, mostly with a ventral retouch, in the lower part of the Aurignacian sequence; pointed bladelets and little flakes, with a steep retouch in the upper part of it.

Several C^{14} dates were obtained by conventional methods in the 1970s (Fig. 5.5A). From top to bottom, the Aurignacian of level *gic* is dated to 31,950 ± 650 bp (F-105), while the Uluzzian has four determinations: 32,930 ± 720 bp (F-72) and 32,470 ±650 bp (F-71) in level *rsa*; > 34,000 bp (F-106) in level *rpi*, and 33,220 ± 780 bp (F-107) in pie.

More radiometric determinations have been subsequently performed by Accelerator Mass Spectrometry (AMS): the uppermost part of the Aurignacian sequence is accordingly dated to 32,390 ±490 bp (CAMS-4622); level *rpi*, with Uluzzian industry, has an age of 33,300 ± 430 bp; while the following determinations were obtained for the underlying Mousterian layers: 33,800 ± 1300 bp (GrN-13983); 39,100 ± 1300 bp (GrN-13982); 42,700 ± 900 bp (GrN-13984).

5.1.3.3. Gr. La Fabbrica (Tuscany)

This karstic cave opens on the plain west of Monti dell'Uccellina, on the coastal part of Tuscany, and was once much larger, as part of it collapsed at some

Table 5.3. Grotta LaFabbrica. The Uluzzian Lithic Assemblage of Level 2.[a]

Typelist	n	%
Endscraper on retouched flake/blade	2	1.16
Endscraper on flake	3	1.75
Carinated endscraper	9	5.25
Thick-shouldered endscraper	2	1.16
Flat-shouldered endscraper	2	1.16
Endscraper-burin	1	0.58
Borer	1	0.58
Straight dihedral burin	2	1.16
Angle dihedral burin	1	0.58
Backed knife	1	0.58
Backed blade	4	2.33
Truncated blade	4	2.33
Flake/blade with continuous retouch	4	2.33
Notch	24	14.03
Denticulate	34	19.88
Sidescraper	25	14.61
Raclette	49	28.65
Miscellaneous	3	1.75
Total	384	99.87
Flakes	2,574	
Blades	364	
Burinspalls	3	
Scaled pieces	213	
Cores	71	
TOTAL	3,609	

[a]Source Gioia (1988)

time in the past. Only a residual part of the deposit was available for excavations. Erosion followed by sedimentation was a cyclical phenomenon related to water circulation that repeatedly disturbed the archaeological sequence (Pitti *et al.* 1976).

A Mousterian deposit was followed by an Uluzzian one (level 2) and then by two levels with scanty Aurignacian industry (levels 3 and 4), capped by a deposit with some lithic tools of later Epigravettian type.

In the Uluzzian assemblage, most of the retouched tools are flakes with a marginal steep retouch, denticulates, notches, and sidescrapers (Gioia 1988). Upper Paleolithic lithic types are found in small numbers (Table 5.3). A single bone point was also discovered (Fig. 5.6).

The limited Aurignacian assemblage is made by the usual scaled pieces, hundreds of unretouched flakes and other pieces of *débitage,* and some fifty formal tools: denticulates, sidescrapers, some endscrapers, retouched blades, and Dufour bladelets.

About 3,500 bone remains were collected in total. As most are fragmented, only 10 percent—mostly teeth—were determined. Equids are dominant over the other species (Table 5.4).

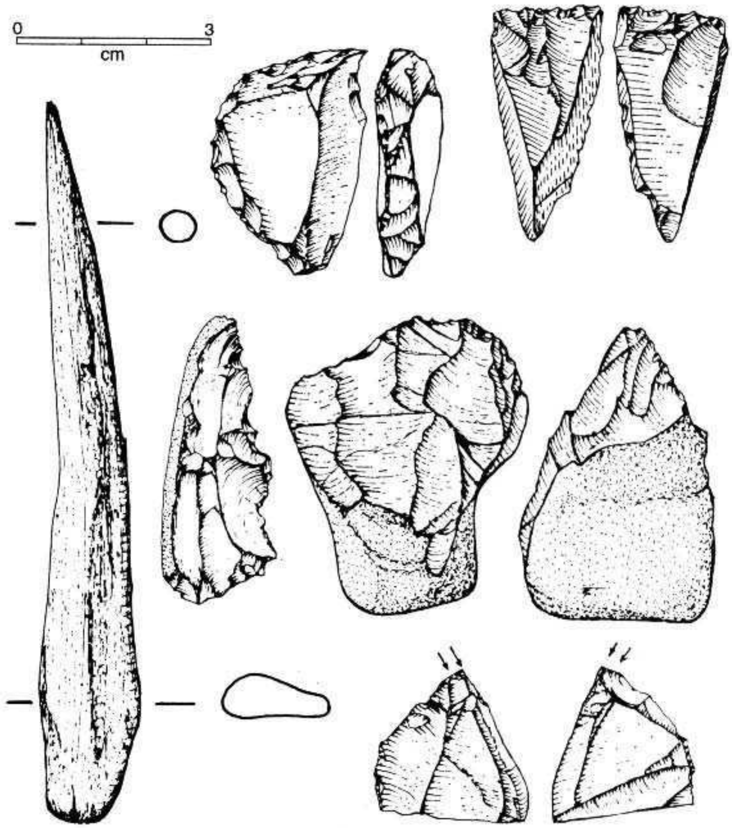

Figure 5.6. Grotta La Fabbrica. The Uluzzian assemblage from level 2 (source: Pitti *et al.* 1976).

5.1.3.4. Riparo Mochi (Liguria)

This rock shelter is part of the Grotte di Grimaldi or Grotte dei Ralzi Rossi complex, but was excavated starting in the 1930s (i.e., later than the major caves) (Fig. 6.3). Only preliminary information is available *so* far, but a revision of the sequence is underway (Kuhn and Stiner 1992).

There are Mousterian levels, capped by a pedogenized and concretioned deposit that is believed to have been formed during the Würm II/III Interstadial (De Lumley-Woodyear 1969). A few Mousterian tools were also found in the overlying H level. The Upper Paleolithic is documented in levels G and F, and possibly at the base of E, with Aurignacian industries, which in *G* include hundreds of Dufour bladelets (Laplace 1977) (Fig. 5.7). The archaeological collection from G, 60 cm thick, is much richer than that from F, 1 m thick, with much more diluted lithic remains (Table 5.5). A bone point, most probably with a split base, broken into two conjoining pieces, was found from two different sublayers, at the top of G or

Table 5.4. Grotta La Fabbnca. The Faunal Assemblage of Levels 2 and 3-4. [a]

	Level 2 (Uluzzian) NISP	Level 3-4 (Aurignacian) NISP
Cervus elaphus	8	44
Capreolus capreolus	–	3
Dama dama	–	2
Rupicapra rupicapra	–	3
Bos primigenius	–	13
Equus caballus	26	32
Equus hydruntinus	–	14
Equus sp.	30	67
Sus scrofa	–	4
Crocuta crocuta	3	19
Canis lupus	–	2
Vulpes vulpes	1	–
Total	68	203

[a] Source Pitti *et al.* (1976).

at the base of F (Kuhn and Stiner 1992). Other fragmentary bone points were also discovered in both levels, as well as *Dentalium* pieces and other perforated marine shells (Blanc 1953).

Samples from levels G and F were taken for pollen analysis (Renault-Miskovsky 1972; Vicino *et al.* 1976). In the lower levels, the amount of herb pollens is overwhelming, with only 5 percent arboreal pollen, mostly pine. The environment was quite denuded. Then a forest of *Pinus sylvestris* developed in F, while thermophilous plants such as Oleaceae, *Quercus* t. *ilex coccifera,* and *Pistacia* sp. are also documented. The establishment of an arboreal cover has been correlated with the Arcy mild oscillation. This sequence agrees well with the one proposed by De Lumley-Woodyear (1969) from the gross sedimentological characteristics.

The lower Aurignacian level, G, has been recently radiocarbon dated using an AMS system (Hedges *et al.* 1994). From top (cut 50) to bottom (cut 60), there is a rather orderly increase in age every 10 cm or so of deposit: 32,280 ± 580 bp (OxA-3588); 33,400 ± 750 bp (OxA-3589); 34,680 ± 760 bp (OxA-3590); 35,700 ± 850 bp (OxA-3591); 34,870 ± 880 bp (OxA-3592).

The Aurignacian is also documented, if less extensively, at other Balzi Rossi sites, such as Gr. dei Fanciulli, Gr. del Caviglione, Barma Grande, Baousso da Torre, the recently excavated ex-Casinò and Riparo Bombrini (Mussi 1992, for a review of the extant evidence).

5.1.3.5. Riparo di Fumane (Veneto)

Riparo di Fumane is currently under excavation; accordingly, only preliminary information is available for this major site (Bartolomei *et al.* 1991–1993, 1992; Broglio and Guerreschi 1992; Broglio *et al.* 1998; Cassoli and Tagliacozzo 1991).

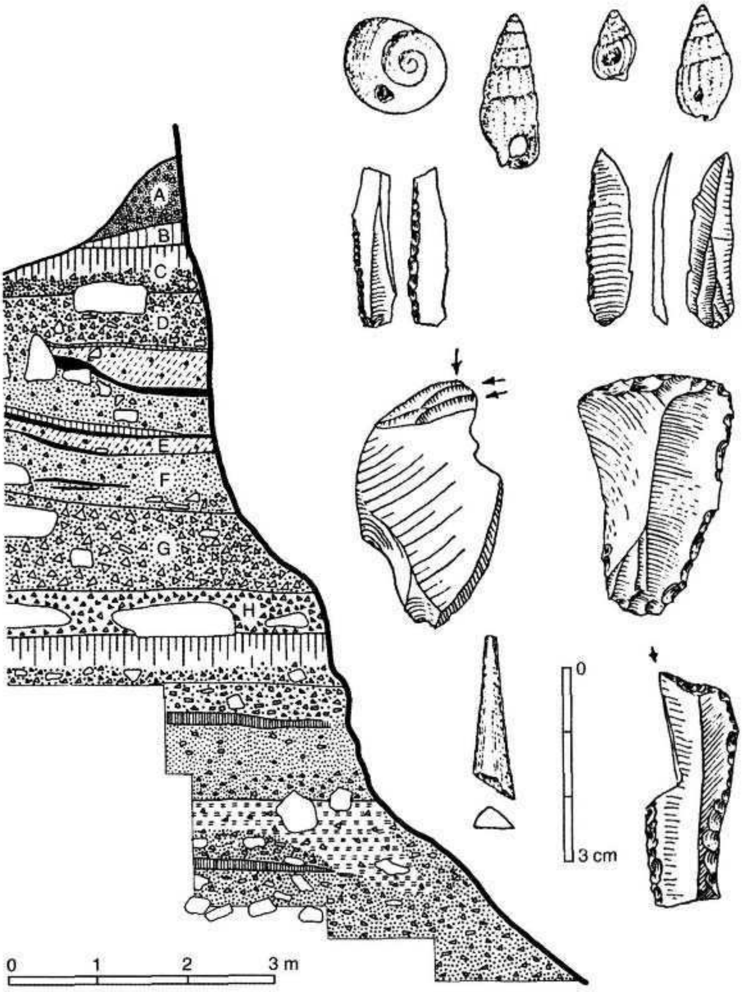

Figure 5.7. Riparo Mochi. Left: the stratigraphic sequence. Right: lithic industry, bone tool and perforated marine shells from level G (sources: Blanc 1953, De Lumley-Woodyear 1969).

The cave opens in a narrow valley of the Monti Lessini in the Pre-Alps, 350 in asl. The lower part of the deposit has long been known for its rich Mousterian assemblage, with many tools made with the Levallois knapping technique (Cremaschi *et al.* 1986). The lowermost Aurignacian is found in level A3, and then in A2-1, and in overlying levels from D7 to the base of D1c (Fig. 5.5B). Retouched tools diminish sharply in number above level D6. The Aurignacian part of the sequence is capped by a landslide accumulation of deposits, interstratified with aeolian and colluvial sediments that only include a few later Gravettian or Epigravettian implements.

Table 5.5. RiparoMochi. The Aurignacian Lithic Assemblages of Levels Levels G and F. [a]

Type list	Level G n	Level F n
Single endscraper	10	7
Endscraper on retouched flake/blade	9	8
Carinated endscraper	13	20
Flat nosed endscraper	3	10
Endscraper-burin	1	2
Borer-endscraper	1	–
Borer-burin	1	–
Borer	3	–
Dihedral burin	18	1
Burin on break	8	2
Burin on truncation	15	6
Multiple mixed burin	4	4
Truncation	17	2
Blade with continuous retouch	92	11
Retouched flake	108	15
Notch	61	9
Denticulate	45	12
Sidescraper	3	7
Truncated backed bladelet	16	–
Dufour bladelet	177	9
Point	3	1
Total	608	126
Blades and flakes	–	–
Reshatrpeningblades/flakes	38	2
Buiin spalls	25	2
Scaled pieces	3	3
Cores	20	6
Utilized /Modified pebbles	–	2
TOTAL	694	141

[a]Adapted and recalculated from Laplace (1977).

The rich Aurignacian industry is characterized mainly by endscrapers (including a few nosed and carinated ones), burins,and Dufour bladelets (Fig. 5.8).The bladelets, most frequent in the lower part of the sequence, are sometimes accompanied by pointed ones, with a bilateral steep retouch (Table 5.6).

Some twenty bone and antler tools havebeen found so far, and include some Aurignacian points with a split base. There are also ornaments: some red deer incisors, with an incision circling the root, and a rich assemblage of many species of marine shells, perforated and unperforated.

Throughout the Aurignacian, larger animal bones are identified mostly as ungulate remains (51.9 percent), accoinpanied by carnivores (11.2 percent), many birds (31.6 percent), and some leporids and rodents (2.3 percent). Deer and caprids are the most frequent herbivores (Table 5.7). The polar fox (*Alopex lagopus*), tentativelyidentified amongthe carnivores, is an exceptional find at any

Table 5.6. Riparo di Fumane. Inventory of the Earliest Aurignacian Assemblage (Levels A3-A2).[a]

Type list	n
Single endscraper	24
Shouldered endscraper	2
Nosed endscraper	1
Carinated endscraper	1
Dihedral burin	9
Burin on break	1
Burin on truncation	4
Multiple mixed burin	2
Truncation	8
Blade with continuous retouch	26
Notch/denticulate	5
Sidescraper	7
Backed bladelet	5
Truncated backed bladelet	7
Pointed backed bladelet	30
Dufour bladelet	162
Total	694
Scaled pieces	3
Bladelet cores	10
Flake cores	10
Modified pebbles	2
Antler points	1
Modified bones	2
Tooth pendants	1
Perforated ,arome shells	95
Unmodified marine shells	71

[a]Source: Bartolomei *et al.* (1992).

Italian site. The smaller mammal remains are indicative of an open environment, rather dry but only moderately cold.

Following the results of anthracoanalysis, *Larix/Picea* (i.e., conifer wood) was mostly collected to light fires throughout the sequence, from the Middle Paleolithic to the late Upper Paleolithic. Birch wood was also sometimes collected.

With twelve radiocarbon dates recently obtained by accelerator, the Aurignacian of Fumane is among the best dated (Broglio and Improta 1994-1995). From the top of the sequence to the bottom, they are as follows: D3b 31,700 +1200/-1100 bp (UtC-1775) and 32,300 ± 400 bp (UtC-2045); D6 32,300 ± 500 bp (UtC-2046); A1 31,900 ±500 bp (UtC-2049); A2 (porch) 32,100 ± 500 bp (UtC-2047), 31,600 ± 400 bp (UtC-2044), 32,800 ± 400 bp (UtC-2051), 40,000 +4000/-3000 bp (UtC-1774); A2 (cave) 36,500 ± 600 bp (UtC-2048), 36,800 +1200/-1400 (Utc-2688), 35,400 +1100/-1300 (Utc-2689), 34,200 +900/-1000 (UtC-2690).

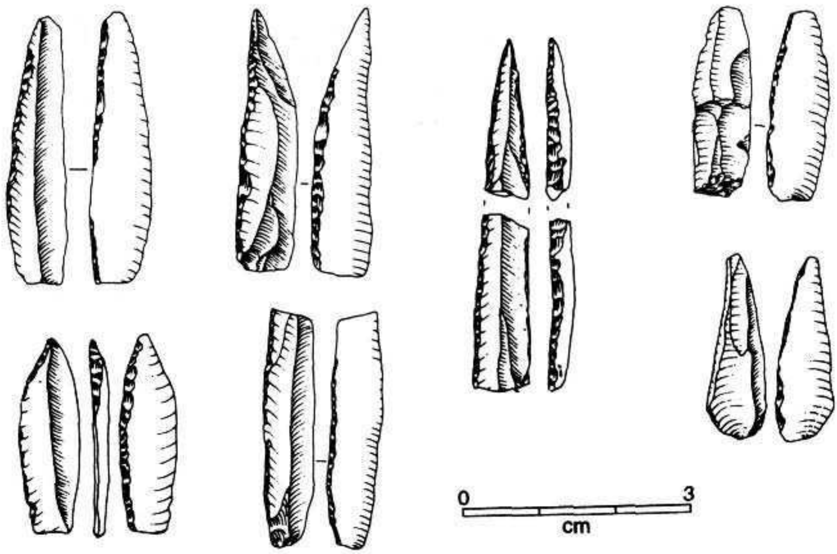

Figure 5.8. Riparo di Fumane. Dufour bladelets (source: Bartolomei *et al.* 1991-1993).

Table 5.7. Riparo di Fumane. The Large Mammals of Level A2-1.[a]

	NISP	%	MNI	%
Cervus *elaphus*	90	21.8	12	24.5
Capseolus capseolus	19	4.6	2	4.1
Megaloceros cfr. *giganreus*	26	6.3	4	8.2
Cellvid antler	15	–	–	–
Capsa ibex	215	52.2	17	34.6
Rcipicapsa supicapsa	49	11.9	10	20.4
Bos/Bison	13	3.32	4	8.2
Total	427	100.0	49	100.0
Panchem leo	1			
Lynx lynx	2			
Crocuta crocuta	9			
Canis leipus	21			
Alopex lagopus?	2			
Vulpes vulpes	9			
Alopex/Vulpes	7			
Urscis sp.	1			
Gulo gulo	1			
Mustela hesnunea	1			
Muscela nivalis	1			
Mustela pcicorius	1			
Lepra cfr. *timidus*	4			
Masmota marmota	2			
Castos fibr	1			
TOTAL	490			

[a]Source: Cassoli and Tagliacozzo (1991).

5.1.4. Problems in Absolute Dating, Limitations and New Developments in the Radiocarbon Chronology, a Relative Chronology for Italy

The time span considered is sandwiched between 30,000 and 40,000 years ago, within the maximum range of radiocarbon dating. Not surprisingly, several sites have been dated, starting in the early 1970s: Gr. del Cavallo and Gr. di Castelcivita (see 5.1.3), as well as Gr. La Cala, with a determination of 29,800 ± 870 bp (F-70) (Gambassini 1982) and Serino, an open-air site dated at 31,200 ± 650 bp (F-108) (Accorsi *et aL.* 1979). In the last few years, new determinations have been obtained, as noted earlier (see 5.1.3), for Riparo di Fumane and Riparo Mochi. Other recently dated sites are Gr. di Paina and Gr. Paglicci. At Gr. di Paina, the following dates were obtained for level 9: 38,600 +1400/-1800 bp (Utc-2695) and 37,900 ± 800 bp (Utc-2042). A small amount of archaeological material was excavated at the top of this level. At Gr. Paglicci, the upper part of the newly excavated level 24, including Aurignacian tools, was dated to 29,300 ± 600 bp, and to 34,300 ± 800 bp (Utrecht—no laboratory numbers provided) (Palma di Cesnola 1993). At Gr. La Cala, a new run of AMS dates was performed after a new part of the cave was excavated, but they gave contrasting results: 27,050 ± 850 bp (OxA-5868) for the same level previously dated at ca. 30 ka, and 29,120 ± 300 (OxA-6265), for an earlier level, whose industry has been related to the Uluzzian (Benini *et al.* 1997). The scant industry of this Uluzzian level includes both Levallois tools, and implements which would rather fit into any Aurignacian assemblage, suggesting that the established stratigraphic sequences might be disturbed (see 5.1.3). The new results are not discussed further below.

There is a chronological gap between the first and the second group of dated sites: dates in the range of 30 to 33 ka are the rule in the first group, while dates in the second group extend in time to 34–36 ka bp or earlier.

This difference can be explained as the result of excavation—or re-examination—of sites that happen to be actually earlier than those so far dated, or they are the effect of changes in dating techniques. In fact, greater dates for recently dated Early Upper Paleolithic sites are not peculiar to Italy—they are best exemplified at the Spanish site of Cueva del Castillo (Cabrera Valdés and Bernaldo de Quiros 1990). This phenomenon has caused considerable speculation (Gowlett 1994; Hahn 1993; Mercier and Valladas 1993; Schwarcz 1993).

Several factors may account for the observed shift in dates: in Hahn's (1993:64) words, "One cannot compare a car of 1950 with a car of 1990." That is, the equipment of modern laboratories allows for refinements that were simply impossible twenty or thirty years ago—and even five to ten years ago. The results obtained should be viewed in the context of the resolution of the major problem of contamination. At 35 ka, less than 1 percent of the initial C^{14} activity remains, and the contamination by as much modern carbon intrusive in the archaeological sample would decrease the resulting age by one half-life (i.e., by c. 5700 years) (Schwarcz 1993:36). The count by AMS (Accelerator Mass Spectrometry), which is now the rule for sites presumably at the limit of resolution by conventional C^{14} dating, is feasible with very small samples. Therefore, biochemical unique substances (usually collagen) can be dated with increased accuracy. In previous studies, dates were obtained using conventional beta counting and were highly susceptible to contamination.

As a consequence, recently dated sites, with a date of 35–36 ka or more, cannot be compared with sites dated several years ago that have an apparent age of 30-32 ka. The "later'' sites should be redated using modern dating systems before ruling out that they are actually earlier. While the greater dates of recently dated sites are certainly more accurate and trustworthy, we suspect that many, if not all, sites will eventually provide earlier and more accurate dates when reexamined with the technologies now available. Meanwhile, for the time span under consideration, a clear distinction must be made between C^{14} dates produced in different periods by AMS or conventional systems.

The problem is made even more complex by the available calibration curves for the period 40–30 ka (jöris and Weninger 1996). The available data point to a very complicate history of atmosphere C^{14} levels during this period. The distribution of calibrated radiocarbon dates shows long plateaus and values consistently overlap: a radiocarbon age of 32,500 bp, for instance, with a σ value typically between 500 and 2,000 years, corresponds to calibrated ages ranging between 40,000 and 35,000 before present. Similar results are also obtained when apparently earlier dates are calibrated. In the end, one is left with the irritating feeling that radiocarbon might well be of little help to date the Early Upper Paleolithic.

All things considered, at this stage of archaeological research, a relative chronology, when possible, is a safer way to assess relationships among sites. It can be worked out using the available stratigraphic sequences: Gr. del Cavallo, Gr. di Castelcivita, Gr. La Fabbrica, Riparo Mochi, Riparo di Fumane (see 5.1.3).

The Uluzzian is found at both Gr. del Cavallo and Gr. di Castelcivita, overlying Middle Paleolithic layers and at the base of the Early Upper Paleolithic sequence. It is correlated to a phase of climatic deterioration and to an increasingly colder environment, which is eventually markedly arid as well. At Gr. La Fabbrica, too, the Uluzzian settlement is contemporaneous with this cold and arid phase, based on evidence provided by the fauna. The climate was not markedly different when, at all three sites, an Aurignacian lithic industry replaced the Uluzzian one.

At Riparo di Fumane and Riparo Mochi, the Aurignacian is found above the Mousterian, without any in-between Uluzzian industry. A single, arch-backed tool was discovered in level A41 of Riparo di Fumane, at the base of the Upper Paleolithic deposit, and could be taken as indicative of some elusive Uluzzian industry (Bartolomei *et al.* 1991–1993; Broglio and Improta 1994-1995). Such tools, however, are also found in late Mousterian assemblages (Mussi 1990). At both sites, the Aurignacian is first documented in association with sedimentological, palynological, or other evidence suggesting a marked climatic deterioration and a shift toward a cold and arid environment.

At several sites, pedology, as well as other aspects of the stratigraphic sequence, point to the fact that human groups were subsequently living in a relatively temperate environment, while still making the sort of lithics that we label "Aurignacian." Gr. di Castelcivita is an exception, as the deposit is capped by thick volcanic layers, devoid of any archaeological material.

At Riparo Mochi and Riparo di Fumane, deposits that were then laid down are devoid of Aurignacian tools and related to a climatic phase that is definitely later than 30 ka, and characterized again by a markedly cold climate. This later and post-Aurignacian cold phase can also be seen at Gr. La Cala.

There are more sites at which the Aurignacian settlement can be equated with the mild phase prior to 30 ka (see also 5.1.5). Examples include Serino, an open-air site dated at 31,200 ± 650 bp (F-108) by conventional C^{14}, around which a tree cover developed, with broad-leaved species such as *Castanea, Fagus, TJia, Juglans,* and so on. (Accorsi *et al.* 1979); and Fontana Nuova in Sicily, undated, but with red deer as the dominant species accounting for well above 90 percent of the identified remains (Chilardi *et al.* 1996). It can also be safely assumed that mountain sites at c. 1,400 m asl were only established during a mild climatic phase, and during the warmer part of the year at that (see 5.3.2).

The suggested correlations accord well with the sequence from France, as summarized by Arl. Leroi-Gourhan and C. Leroyer (1983): a phase of climatic instability and deterioration, after the Hengelo-Les Cottés Interstadial, was followed by a cold and arid period, and then by the milder Arcy phase, dated between approximately 30,000 and 31,500 bp by conventional C^{14}.

In Italy, after the Interstadial, there is similarly a deteriorating phase with Uluzzian industries in some caves. Then, there is an arid and cold phase, documented at many sites, during which both Uluzzian and then Aurignacian industries are produced; then, a later mild climatic phase, during which Aurignacian industries are the only ones to be found (see also 5.3.1).

The cold–warm alternation, here recognized in a continental environment, is also established in the deep sea record, and particularly so in the Tyrrhenian Sea (Paterne *et al.* 1986). After the oxygen isotopically heavy peak 3.04, there are two isotopically light events, 3.03 and 3.01: their age, following some estimations (Paterne *et al.* 1988), is centered around 35.7 ± 1.5 ka bp and 32.7 ± 1.5 ka bp, respectively; it is comparable to the dating of a warmer episode in the Netherlands (known as Denekamp) and to other events of global relevance, such as the building of reef-complex II in New Guinea. The colder intermediate phase (i.e., isotopic event 3.02) would fit into our archaeological scheme as the cold pre-Arcy phase.

5.1.5. The Fluctuating Environment: Fauna and Flora, Pedogenesis and other Geopedological Phenomena

During the Early Upper Paleolithic (i,e., during final OIS 3) the fluctuating climate and changing environment is reflected in animal assemblages and in the palynological record.

The faunal record is unfortunately not very detailed: only at a handful of archaeological sites were bones preserved and studied in any detail, while at paleontological sites, poor chronological resolution usually does not allow any fauna to be attributed to this specific period.

Table 5.8. Selected Aurignacian Sites. Dominant Ungulates, with NISP Percentages. [a]

	Red deer	Horse	Hydr. horse	Ibex
Riparo di Fumane				▲ 47
Gr. del Fossellone	▲ 36		▲ 53	
Gr di Castelcivita		▲ 40		
Gr. La Cala levels 10–13	▲ 57			
Gr. Paglicci level 24			▲ 46	
Rip. di Fontana Nuova	▲ 93			

[a] Sources: Gr. La Cala: Benini *et al.* 1997; Sala 1983. Gr. di Castelcivita: Gambassini 1997. Rip. di Fontana Nuova: Chilardi *et al.* 1996. Gr. del Fossellone: Alhaique *et al.* 1998. Rip. di Fumane: Cassoli and Tagliacozzo 1991. Gr. Paglicci: Boscato 1994; Sala 1983.

Cave bear, as well as hyena and other carnivores, were still dwelling in caves that were also sought by humans. This is evidenced in the lowermost cuts of the excavations of Prince Albert I° of Monaco at Gr. dei Fanciulli (*Gr. des Enfants* in French). Hyenas and other carnivores are mentioned in levels I and K, in which some very typical Aurignacian tools were discovered—including some bone points with a split base (De Villeneuve *et al.* 1906–1919). The levels were unfortunately disturbed by later Gravettian burial pits; furthermore, the materials from the different cuts were not kept distinct during excavations. Cave bear populations were also thriving elsewhere in Liguria: their bone remains occur in the paleontological deposit at the base of the sequence of Gr. della Basura, with C^{14} dates of 27,000 3,000 ka (Gif-TO 83-1) and of >/= 30,000 ka (Gif-6245) (De Lumley *et al.* 1984).

Cave bear remains also occur frequently in levels of this period at archaeological sites in northern and central Italy, such as Gr. del Broion, Gr. di Paina, and Gr. Salomone (Bartolomei *et al.* 1987–1988; Radmilli 1977; Sala 1980). Hyenas, as usual, were living in a more open and arid landscape and in more southern regions. They are well documented at Gr. Paglicci in Apulia, at which remains of the little hydruntine horse, *Equus hydruntinus,* were also found in an Aurignacian level, and are further suggestive of a steppe-like environment (Boscato 1994) (Table 5.8).

Common horses, and sometimes hydruntine horses, are a feature of several Uluzzian and Aurignacian sites. They are believed to characterize the open steppes and grasslands that developed after the Würm II/III interstadial, before the more forested Arcy oscillation. Examples include Gr. La Fabbrica (Table 5.4), Gr. di Castelcivita level *rsa,* and Gr. del Cavallo.

In the caves of Monte Circeo, on the Tyrrhenian coast, a more diversified environment is possibly reflected in the varied faunal assemblages of Gr. del Fossellone level 21 (Alhaique *et al.* 1998; Blanc and Segre 1953) and Gr. Barbara (Mussi and Zampetti, unpublished data). At both sites, common horses and hydruntine horses are accompanied by red deer, bovids, ibex, as well as by fallow deer, which had become extinct in other parts of Italy. In the larger assemblage of Gr. del Fossellone, roe deer and wild boar are also documented. Hyenas, wolves, foxes, leopards, and cave bears, were also present at this site, while in the residual Aurignacian deposit of Gr. Barbara, foxes are the only carnivores so far discovered.

Table 5.9. Riparo di Fontana Nuova. The Faunal Assemblage.[a]

	NISP	%	MNI	% (Ungulates)
Cervus elaphus	464	92.6	19	90.46
Bos primigenius	19	3.8	1	4.77
Sirs scrofa	14	2.8	1	4.77
Vulpes vulpes	1	0.2	1	-
Testudo hermanni	3	0.6	1	-
Total	501	100.0	23	100.00
Human remains	4			

[a]Source: Chilardi *et al.* (1996).

Farther south, on the coast of Campania, at Gr. La Cala, the faunal remains of the Aurignacian levels suggest a similar pattern: at this site, the dominant red deer is also accompanied by substantial numbers of fallow deer, roe deer, and wild boar (Benini *et al.* 1997).

At Riparo di Fumane, equids are simply unknown (see 5.1.3). This is no surprise, taking into account the rugged environment and lack of flatland in the vicinity (Table 5.7). In the upper part of the sequence, there is trend toward more caprids and less cervids, suggestive of a colder and colder climate. The many bird species nowadays typical of alpine and arctic environments (*Lagopus mutus, Nyctea scandiaca, Montifringilla nivalis,* etc.) fit well with this reconstruction (Bartolomei *et al.* 1992; Cassoli and Tagliacozzo 1991). Loess accumulated in the shelter during part or all of the sequence and is a further indication of a cold and arid environment, with winds blowing over denuded surfaces. However, coniferous trees (*Picea/Larix*), and birch, were growing all the same in protected positions, as can be seen from the anthracoanalysis.

Equids are also completely lacking at Riparo di Fontana Nuova in Sicily (Table 5.9), but for a very different reason. Only a limited number of animal species--not including horse (*Equus caballus*)—were able to cross the Strait of Messina and colonize Sicily in the Upper Pleistocene (Chilardi *et al.* 1996). The Aurignacian occupation at this site is tentatively assigned not to the cold and arid phase previously mentioned, but to the later Arcy oscillation.

The vegetation of the open landscapes favored by equids is better known at Riparo Mochi (Renault-Miskovsky 1972; Vicino *et al.* 1976). Grass pollens--predominantly Cichoriae—are dominant by far, as the arboreal pollens make up only 5 percent: mostly pine, with some evidence of residual species of a more temperate environment—such as hazel, vine, oak, and so on—surviving in refugia.

On the western side of central Italy, at low elevation, several long pollen cores have been studied within a short distance, allowing a regional reconstruction. Considerable complexity is displayed by the vegetation of this part of Italy, confirming that it was one of the areas that allowed the survival of many tree species during the glacial phases (Follieri *et al.* 1988, 1989). Fluctuations in vegetation cover characterize the so-called "Lazio Complex," which encompasses OIS 3 (Alessio *et al.* 1986; Follieri *et al.* 1986, 1998). All the same, there is a general trend from an open woodland to a woodland-steppe, eventually followed by the development of a harsh steppe, with *Artemisia* generally dominant. The last two arboreal peaks of the Lazio Complex are tentatively correlated with the Hengelo interstadial at 38–36 ka, and with the Denekamp Complex after 32 ka—the last tree expansion occurring at 30 ka in this sequence. In between these two phases, the landscape was characterized by much more open vegetation.

This is in good accordance with the evidence gained elsewhere in Italy. While, all over the peninsula, pine is always found on rocky cliffs and elevations during the steppe expansions, the more forested phase at c. 30 ka, which is related to a milder and moister climate, is also characterized by more varied associations of trees and even by the expansion of markedly thermophilous species that had survived in refugium areas. This is seen in the pollen diagram from level F at Riparo Mochi, above level G and its steppe-like environment (see 5.1.3), and possibly at nearby Riparo Bombrini level III as well (Arobba 1984) (Fig. 6.3). In the latter site, Aurignacian industries are found overlying a Mousterian deposit, just as at Riparo Mochi (Vicino 1984).

A phase of steppe-like vegetation, followed by an increase of trees just before 30–31 ka—in a chronology established with conventional radiocarbon dates—is also seen in pollen diagrams of the area of Venice, and of the Fucino basin (Bortolami *et al.* 1977; Follieri *et al.* 1986).

The milder phase at c. 30 ka is also reflected in the pedogenetic alteration of many deposits at archaeological sites as well as at geological occurrences.

Soil development, due to a moister and more temperate climate, is clearly seen on loess deposits that had accumulated in northeastern Italy and on the fringes of the Po Valley: examples include the Val Sorda and Bagaggera sequences in the pre-Alps, and possibly Monte Avena at 1,450 m in the Alps (Accorsi *et al.*. 1990; Cremaschi *et al.* 1990; Cremaschi and Lanzinger 1992). At the last two, archaeological open-air sites, Aurignacian industries were discovered in the sediments affected by pedogenesis. The same is true within rock shelters, namely at Riparo Tagliente, 250 m as1 in the Monti Lessini: level 25, with an Aurignacian industry, is made mostly by loess, then altered by pedogenesis (Bartolomei *et al.* 1982).

A similar sequence of wind-blown deposits that subsequently changed into a typical reddish color can be seen further south: at Canale delle Acque Alte, in the Pianura Pontina south of Rome, again in the open, Aurignacian tools were collected within level B2, a sandy layer altered by pedogenesis, which was traced over a vast area (Blanc 1937; Mussi and Zampetti 1984–1987).

At Gr. del Cavallo, which is located in southern Apulia, level D, which also included an Aurignacian deposit (see 5.1.3), was similarly reddened by pedogenetic processes at its top (Messeri and Palma di Cesnola 1976).

Further evidence of a general improvement in climate just before 30 ka (in conventional C^{14} chronology) can be seen in other parts of Italy. The buried paleosoils of Valle Majelana, some 1,000 m as1 in the mountains of Abruzzo, are dated to approximately 30–33 ka (Frezzotti and Giraudi 1992; Giraudi and Mussi 1999); while on the Adriatic coast of the Marche region peat lenses similarly dated to 30–32 ka are found within stratigraphic sequences otherwise characterized by much coarser pebble deposits (Calderoni *et al.*. 1991), and slope-waste deposits underwent a complete stabilization at the foot of the slopes and in the adjacent fluvial plains (Coltorti and Dramis 1995). Aurignacian tools were also collected, albeit in small numbers, at some of the above-mentioned places.

In short, there is evidence that the Early Upper Paleolithic developed at first in open and arid landscapes, and later in more wooded environments and under a relatively mild and humid climate. This sequence is irrespective of the absolute age of the archaeological and geological sequences, which have been dated using different methods.

5.1.6. On Humans and Volcanoes: The Final Part of the Early Upper Paleolithic in Italy

Active seismic and volcanic activity characterize Italy throughout the Quaternary and have been frequently mentioned in the preceding chapters, mainly as an important means of dating. In the Early Upper Paleolithic, however, the chronology is sufficiently fine-grained to start evaluating the impact of these episodes on human life and activities.

Major volcanic events took place around 35 to 30 ka ago in south-central Italy. At that time, tectonic activity was centered in Campania and in the modern Neapolitan area. The most spectacular eruption took place in the Phlegrean Fields and led to the production of the so-called Campanian Ignimbrite. This was the largest eruption documented in the Mediterranean region during the last 200,000 years (Barberi *et al.* 1978; Narcisi and Vezzoli 1999).

The Campanian Ignimbrite typically consists of pumice and lithic fragments in an ashy matrix that presently outcrops in the vicinity of the Gulf of Naples over an area of c. 500 km^2 (Barberi *et al.* 1978; Rosi *et al.* 1983; *Thunell et al.* 1979). This, however, is only a fraction of rhe original estimated extension over a minimum of 7,000–8,000 km^2: most of the deposit was then either buried below later alluvial or volcanic sediments, or eroded. Some 30,000 years ago, it formed a continuous cover, whose thickness ranged from 0.8m to 50–60m.

This enormous volcanic blanket was spread out as a single flow unit, from a caldera 12 km in diameter, centered on the present gulf of Pozzuoli, next to Naples. After the eruption, the caldera collapsed and the sea filled part of it. The extension of the pyroclastic flow was controlled by the limestone hills bordering the Campanian plain, and it generally did not spread to an altitude above 500 m, except along narrow valleys up to 900 m asl. It is found up to 130 km from the coast. A magma volume of 80 km^3 was erupted before the caldera collapsed (Rosi *et al.* 1983).

Another important aspect of the eruption affected the atmosphere with the formation of probably both a Plinian eruption column and high-altitude clouds of ash (Cornell *et al.* 1983). A Plinian-type eruption can produce a convective column 25–30 km high, or more. The ensuing ash deposit, distributed over a much wider area than the ignimbrite, has been correlated with the so-called Y-5 tephra layer documented in piston cores of the eastern Mediterranean as far as Cyprus and over 1,500 km from its source (Fig. 5.9). The calculated volume of this ash layer is two orders of magnitude greater than Mount St. Helens 1980 ashfall in North America. Adding the estimated volume of the ash to the ignimbrite, the composite volume of the eruption exceeds 150 km3. A minimum of 14,000,000 km^2 of land and sea were affected, not to mention the consequence of a reduced insolation all over the Earth.

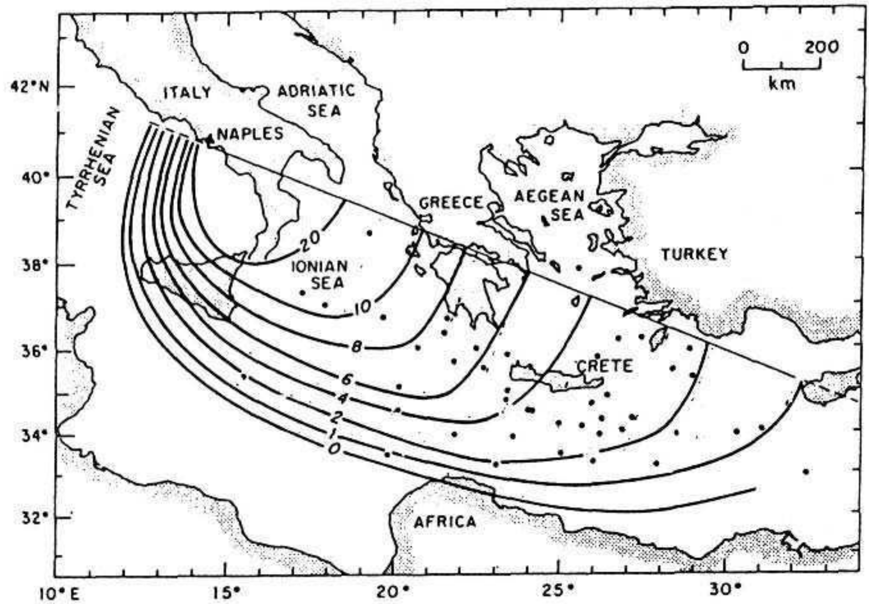

Figure 5.9. Isopach map of the Y-5 ash layer derived from piston cores of the eastern Mediterranean. The isopachs, which indicate the thickness of the ash deposit, are in centimeters (adapted afte Cornell *et al.* 1983).

It should be stressed, however, that a single event, in geological terms, is not necessarily instantaneous. Inland, a pumice-fall deposit directly underlies the Campanian Ignimbrite, while the evidence from deep sea cores indicates that the eruption had two phases (Thunell *et al.* 1979). Paterne *et al.* (1986) also suggest a different correlation for the Campanian Ignimbrite (i.e.,with the C-10 ash layer in the Tyrrhenian Sea, and with the Y-3 tephra in the eastern Mediterranean). They indicate a K/Ar age of 33.5 ± 1.5 ka for this volcanic event, while the Y-5 tephra would be related to another great eruption of Campania, the Citara eruption of the island of Ischia, at about 40 ka bp. Other important eruptions at Ischia happened around 29 ka and around 33 ka according to K/Ar dates.

New and more accurate dating of some sixty samples of Campanian Ignimbrite in peninsular Italy, however, clearly indicates that this volcanic event happened at 36.2 ±0.4 ka and is probably correlated with the widespread Y5 ash (Deino *et al.* 1992; Narcisi 1996). This was derived from using the single-crystal, laser-fusion Ar^{40}/Ar^{39} dating technique. It is worth comparing these accurate results with the dates obtained previously by radiocarbon analysis: the many dates obtained with this more usual technique, starting in the 1970s, range from > 40 to 28 ka, often with huge standard deviations. The central values have a mean of c. 29 ka (i.e.,approximately 20 percent younger). It is worth remembering the discrepancies caused by different dating techniques when comparing the geological Ar^{40}/Ar^{39} dates, and the archaeological radiocarbon dates. The dates should better be compared with calibrated C^{14} dates.

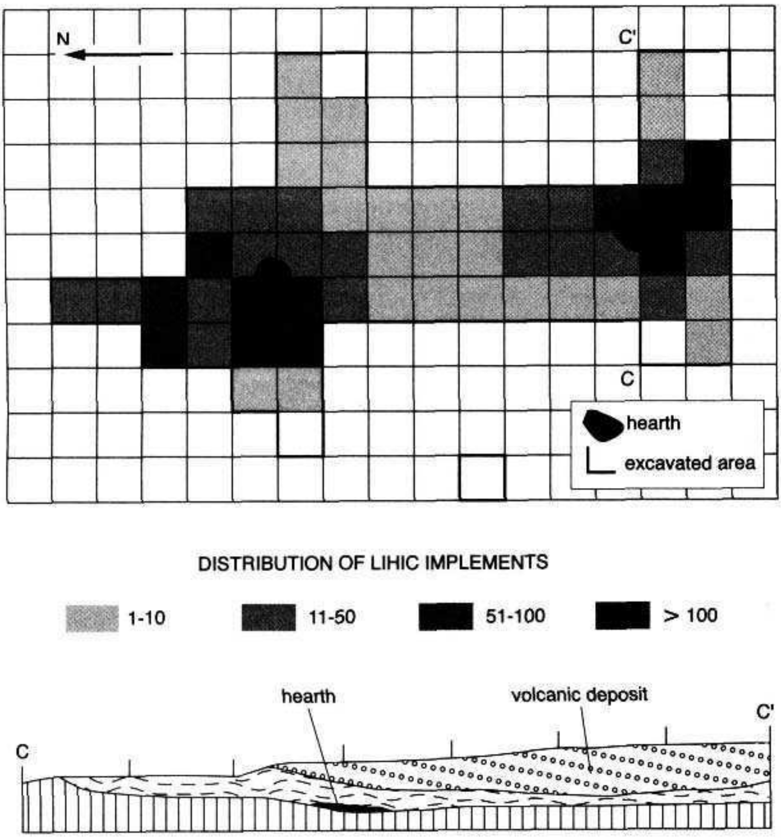

Figure 5.10. The open-air site of Serino. Grid in meters (redrawn after Accorsi *et al.* 1979).

From an archaeological perspective, whatever the correct correlation between continental and marine volcanic deposits, it is quite evident that the development of the Early Upper Paleolithic of south-central Italy was potentially affected by one or more major eruptions. Volcanic deposits are actually found at several sites, all of them in connection with Aurignacian industries.

The open-air site of Serino in Campania was covered by some 3 m of volcanic deposits, with a pumice layer at the base (Accorsi *et al.* 1979). The pumice and ashes have a subhorizontal direction and apparently filled the small marshy or lacustrine depression in which a campsite had once been established (see 5.2.1) (Fig. 5.10). At Gr. di Castelcivita, the final part of the sequence with an Aurignacian industry, is capped by 0.8 m of volcanic pumice alternating with stalagmitic concretions (see 5.1.3) (Fig. 5.5A), and volcanic deposits are also mentioned in connection with the Aurignacian layer found at Gr. La Cala, on the coast south of Salerno (Gambassini 1982, 1997). At Gr. Paglicci, a cave beyond the Apennines opening at the foot of Monte Gargano and facing more or less westward, lenses of volcanic ashes were found at the base of Gravettian level 23, just overlying level 24, with a limited series of Aurignacian implements (Palma di Cesnola 1993). A preliminary attribution to the Campanian Ignimbrite was put forward (Cremaschi and Chiesa 1992). Volcanic deposits were also recognized at nearby Localita Caruso, a dolina in which lithic implements, including Aurignacian tools, were collected (Palma di Cesnola 1989). Farther south, at Gr. del Cavallo C level , is a sterile volcanic ash of undetermined origin (Palma di Cesnola 1964) which also caps an Aurignacian deposit at the top of level D (see 5.1.3) (Fig. 4.5).

Pyroclastic deposits are reported in the mountains of Abruzzo, in central Italy, up to 1,700 m asl (Frezzotti and Giraudi 1990, 1992). Interestingly, soils developed on this peculiar parent material, tentatively correlated with the Campanian Ignimbrite, between approximately 36 and 30 ka ago (Frezzotti and Narcisi 1996). They are further evidence of widespread pedogenesis developing prior to 30 ka (see 5.1.5). The soils were then buried under slope deposits, as erosion was active again when the climate deteriorated after 30 ka and the vegetation cover diminished. In Abruzzo, archaeological material has not yet been discovered in direct association with the volcanic ash. Tephra deposits correlated with the Campanian Ignimbrite eruption were located as far as the Marche region, beyond the Apennines and on the Adriatic side of the peninsula (Chiesa *et al.* 1990).

Eruptions that modified the landscape, blanketing streams and springs while covering other landmarks, destroying the vegetation and directly or indirectly making the herbivores disappear, filling caves and capping flint outcrops, certainly had a disruptive effect on the sparse human population. A more comprehensive evaluation of these effects is given in the conclusion (see 5.4.2).

5.1.7. Paleoanthropological Evidence

Human remains are only exceptionally found at Italian Early Upper Paleolithic sites. The inventory is quite short: two deciduous molars from level E III of Gr. del Cavallo (Messeri and Palma di Cesnola 1976) (i.e., associated to Uluzzian industries); a deciduous incisor from level III at Riparo Bombrini (Formicola 1989); a deciduous incisor from level A2 of Riparo di Fumane (Bartolomei *et al.* 1992); a maxillary fragment and part of a human scapula from Gr. del Fossellone (Mallegni and Segre-Naldini 1992); and five bone remains from Riparo di Fontana Nuova in Sicily (Chilardi *et al.* 1996), including two tiny cranial fragments, two teeth, and a talus. The specimens from the last four sites were associated with Aurignacian industries, which were redeposited and mixed with Mousterian industries as far as the maxilla of Gr. del Fossellone is concerned.

The characteristics of the remains found in Aurignacian levels fall within the range of variability of modern humans. In the report on the Uluzzian sequence of Gr. del Cavallo, P. Messeri, and A. Palma di Cesnola (1976) maintain that one of the teeth was of modern type, and the other, 15 cm higher up in the stratigraphic sequence, of Neandertal type. Loose teeth, however, and much more so deciduous teeth, are not enough to prove or disprove the survival of a Neandertal population in Italy after the main Wurm II/III Interstadial. Following more recent research, the latest Neandertals of Italy are exemplified by the remains from Buca della Iena and Gr. Breuil, and were found in association with Mousterian industries that are 40 to 35 ka old (Cotrozzi *et al.* 1985; Manzi and Passarello 1995).

The teeth of Riparo di Fontana Nuova, Gr. del Fossellone, Riparo Bombrini, as well as one of the specimens of Gr. del Cavallo, are worn. V. Formicola (1989) points out that the wear pattern of the specimen from Riparo Bombrini is indicative of nonalimentary tooth use even during infancy, possibly related to the holding and pulling of fibrous material. Toothpick probing over a long period of time was suggested for the M2 tooth of Riparo di Fontana Nuova, on which a deep interproximal groove is present at the cernento-enamel junction.

5.2. EXPLORING AND EXPLOITING

5.2.1. Intrasite Complexity and Intersite Differentiation: Dwelling Structures, Mobile Shelters, and Quarry Sites

Intrasite complexity can be seen in areas of specialized activities and in dwelling structures. However, such evidence is simply not reported or described in the few Uluzzian cave sites. Hearths are only mentioned at Gr. del Cavallo (Palma di Cesnola 1965).

Intersite differentiation can be tentatively suggested at the Uluzzian sites of the eponymous bay: while Gr. del Cavallo was quite obviously a preferred cave and repeatedly occupied over some length of time, at two other nearby sites, opening on the same stretch of coast, Gr. di Uluzzo and Gr. di Uluzzo C, only limited numbers of Uluzzian tools were discovered (Borzatti von Lowenstern 1963, 1964, 1965). However, the settlement system around the bay was probably rather complex and cannot be summarized simply as a major site surrounded by satellite sites of a kind, as two other caves must also be taken into account: Gr. di Serra Cicora and Gr. M. Bernardini (Borzatti von Lowenstern 1970; Spennato 1981). While the deposit of the former is apparently quite disturbed, the same sequence of Uluzzian and Aurignacian, if less well represented, was found in the second one following a recent reexamination (Gioia 1990).

The evidence for site differentiation is much better where Aurignacian settlements were investigated. Formal dwelling structures were discovered and recorded at a couple of them. At Riparo di Fumane, some possible postholes were described in levels A3-A1 (Bartolomei *et al.* 1992). They are 7–13 cm in diameter and 20 cm deep. Shallow depressions of various shapes and dimensions were also discovered, some of the larger ones with evidence of the lighting of fires in them—charcoals from coniferous trees and, rarely, birch were recognized. One hearth, S10, was also surrounded by irregular slabs of limestone, while retouched bladelets and points, as well as bladelet cores, were concentrated in this same area. A similar concentration of tools and cores was also noticed next to the cave wall.

At the Aurignacian open-air site of Serino, not far from Naples, two hearths were encountered in the excavated area at a distance of 7–8m from each other

(Accorsi *et al.* 1979) (Fig. 5.10). They comprise an accumulation of charcoal and ashes up to 10 cm deep in the center of what could well have been a small natural depression. The results of anthracoanalysis suggest that rather small branches, or just twigs, 1–3 cm in diameter were collected, and remains of fungi suggest that the wood was already decaying. Firewood was provided by different trees: coniferous trees (including pine), birch, and undetermined broad-leaved trees.

One hearth is circular and 1 m in diameter, the other oval in shape and 90 x 70 cm in size. A block of volcanic rock, with pitting marks suggestive of use as an anvil, was found near the oval hearth. There is a concentration of lithics next to each hearth—to the west of the round hearth, and to the south of the oval one—but no animal bones were preserved. The general distribution of the archaeological material is suggestive of two dwelling structures, possibly with differently oriented openings. The site was situated next to a small body of water with a fluctuating level: at some time it submerged the remains of the camp and covered it with a mud layer. Then, the whole area was eventually blanketed by thick volcanic deposits (see 5.1.6).

Distinct concentrations of implements were also excavated at another open-air site, Monte Avena, 1,450 m asl in the Eastern Alps (Cremaschi and Lanzinger 1992; Lanzinger 1984; Lanzinger and Cremaschi 1988). The local morphology allowed for the preservation of the site, which is on the rather flat top of a mountain, subsequently surrounded, but not covered, by ice expansion at the Glacial Maximum. Flint occurs locally and was extracted from a little rocky cliff, or just collected from the scree at its foot. Next to the rock wall, flint slabs and blocks were selected and tested (Fig. 5.11A). A short distance away, in concentrations B and C, the raw material was tested and roughed out, and cores—or even more usually, just “precores”-were prepared. A concentration of implements and debris with thermoclastic alteration suggests the presence of a fire, while bones are not preserved. Hundreds of implements were collected, with retouched tools accounting for only a fraction of them (i.e., 3 percent of the total).

Monte Avena was a quarry site and apparently not much more than flint extraction and preparation for future use was taking place here. At Sugherone, another Aurignacian open-air site, known from controlled collections and located in the outskirts of Rome, almost 20 percent of the 800 implements on which preliminary analysis is available are retouched tools, while cores number over 100 (P. Gioia personal commumunication 1995). In contrast to Monte Avena, a much wider range of activities is implied by this balanced assemblage.

A great amount of unretouched flakes and cores, and other by-products of knapping activities, are also reported at some Uluzzian sites. This is best seen in the assemblage of level 2 at Gr. La Fabbrica (see 5.1.3) (Fig. 5.6), where a total of 3,522 implements were found (Pitti *et al.* 1976), of which 163 are retouched tools, that is, less than 5 percent of the total, which is quite similar to Monte Avena (Table 5.3). The available raw material, however, is of poor quality and is mostly jasper pebbles with many inclusions, though some flint, quartzite, and even some limestone, is present. Quartz was used to produce 20 percent of the unretouched flakes, but not as many retouched tools.

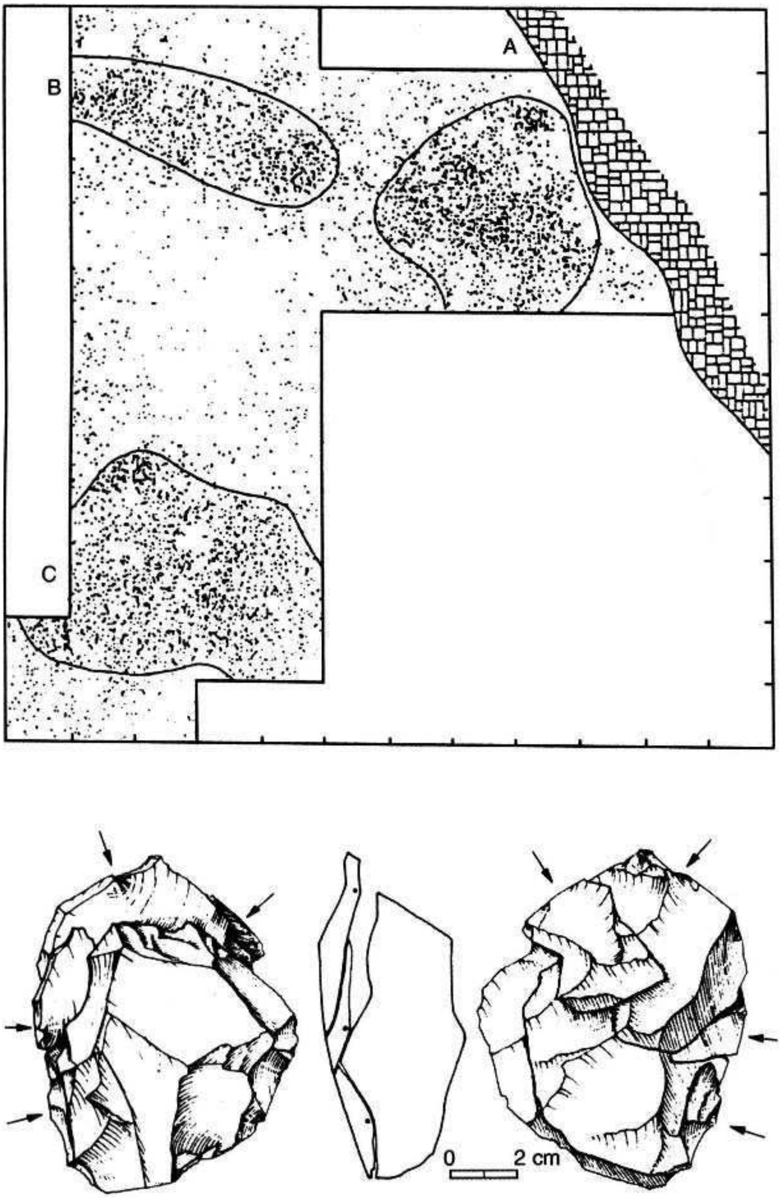

Figure 5.11. Monte Avena. Top: the horizontal distribution of implements at the quarry site, with concentrations A, B, and C (grid in meters) (after Broglio and Guerreschi 1992). Bottom: the refitting of a core (after Lanzinger 1984).

While the sites just described yielded large archaeological collections, at others extensive excavations unearthed only a handful of implements. Examples include Gr. del Broion in the eastern pre-Alps and Gr. Salomone in central Italy.

Both are cave sites: at the first one, in levels G and H, related to the Early Upper Paleolithic, a thick broken bone point, another fragmented bone tool, and a burin were found (Aspes 1984); at the second one, an Aurignacian bone point with a split base and a handful of flint implements were recovered (Radmilli 1977). The same is also true of Gr. di Paina, as level 9 only included a few flakes and a couple of bone point fragments (Bartolomei *et al.* 1983–1984, 1987–1988). However, as only a residual part of the deposit was available for excavations, it cannot be ruled out that, at this site, the Aurignacian deposit was once much more extensive and also richer in remains.

Not surprisingly, all three caves with scanty archaeological materials, suggestive of only occasional and brief stopovers by human groups heading elsewhere, are most notable for the numerous remains of cave bear (see 5.1.5). They are very different from sites such as Riparo di Fumane (discussed earlier), or Gr. del Fossellone level 21 (Blanc and Segre 1953). Both sites are rich in archaeological material, which also includes bone tools and ornaments, and the dwelling structures recorded at the recently excavated Riparo di Fumane are indicative of a preferred site and of recurrent occupation.

The retouched tool inventory, however, is very different at each of them: at Riparo di Fumane, the c. 1,200 formal tools include a majority of retouched--"Dufour"—bladelets, with some pointed bladelets as well (Table 5.6; Fig. 5.8); those microlithic tools (which are probably better understood as hafted elements of composite tools used in hunting activities) amount to c. 60 percent of the total in the uppermost levels and more than 80 percent in the lowermost levels. At Gr. del Fossellone, Laplace's (1966) inventory notes that of the c. 1,400 retouched tools, nearly 900 are endscrapers—mainly carinated endscrapers—while the combined number of retouched blades and lateral scrapers is over 300. The hypothesis that only a restricted number of activities was performed at this specific site can be put forward. We suspect that these were quite different from activities going on at Riparo di Fumane.

5.2.2. The Exploitation of Local Resources, the Planning of Seasonal Movements, and the Exploration of Mountainous Areas

The availability of flint and other suitable stone in the vicinity was probably relevant when people decided to settle in caves opening where raw material happened to be abundant (e.g., Gr. La Fabbrica and Riparo di Fumane). However, the search for this specific resource is more evident at open-air sites where the decision to settle down for a while was not biased by other major interests, such as the rare commodity of a naturally occurring shelter. We can take for granted that it was the outcropping flint that attracted people to the top of Monte Avena, where a specialized quarry site was established (see 5.2.1). This is also probably the case at Bagaggera in the pre-Alps, at which the nearby deposit of flint pebbles, infrequent in the area, attracted the attention of human groups both in the early Wurm and later on, when Aurignacian lithic tools were made (Cremaschi *et al.* 1990). Another possible Aurignacian quarry site has been located at Lemignano, in the southern part of the Po Valley (Ghiretti *et al.* 1989). It has also long been known

Table 5.10. Serino. Inventory of the Lithic Assemblage. [a]

Type list	n
Single endscraper	4
Endscraper on retouched flake/blade	2
Carinated endscraper	5
Borer	4
Dihedral burin	4
Burin on break	1
Truncation	17
Blade with continuous retouch	5
Bladelet with continuous retouch	14
Retouched flake	101
Notch	7
Denticulate	7
Point	3
Total	174
Flakes and debris	2,358
Resharpening blades/ flakes	35
Scaled pieces	43
Cores	10
TOTAL	2.620

[a]Adapted and recalculated from Accorsi *et al.* (1979).

that the Early Upper Paleolithic of the Balzi Rossi caves is quite distinct from the local Middle Paleolithic in that much better raw material was sought, giving circumstantial evidence of more complex procurement strategies (De Villeneuve *et al.* 1906–1919; Kuhn and Stiner 1992; Riviere 1887).

Human groups with Aurignacian tools, however, also developed strategies for gaining some independence from natural constraints, such as raw material availability. At Monte Avena, the “precores” tested and roughed out, and the many cores, as well as the lack of evidence for much of the subsequent phases of flint reduction, suggest that supplies of cores and/or blanks were prepared for future use and taken away to less well-endowed areas (Fig. 5.11). Sites with a dearth of cores, and/or with an excess of flakes and blades, would be the counterpart of quarry sites. Serino is probably such a site: out of 2,619 implements, only 10 are cores (Table 5.10) (Accorsi *et al.* 1979). There are only 35 resharpening flakes, further supporting the hypothesis that most of the lithics in the excavated area came in already knapped.

This is clearly seen at Riparo di Fontana Nuova in Sicily: approximately half of the implements were made using the Monte Iudica flint, which outcrops at some 100 km to the north (Fig. 5.12); this subassemblage includes a substantial group of unretouched blades that were introduced as blanks into the rock shelter (Chilardi *et al.* 1996). Also, the locally available Amerillo flint is mostly found as scarcely corticated cores and flakes, indicating that pebbles and slabs were first roughed out at some place in the open, probably on the spot where they were collected (Fig. 5.13).

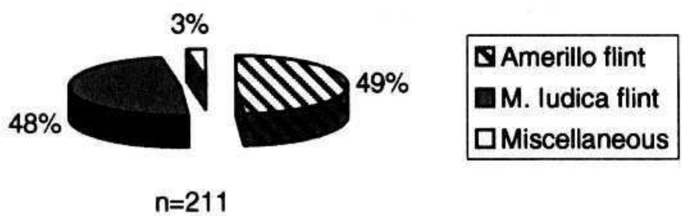

Figure 5.12. Riparo di Fontana Nuova. The use of local Amerillo flint, and of exotic Monte Iudica flint, for knapped lithic implements.

As a general observation, this farsighted approach to the natural characteristics of an area is indicative of a detailed knowledge of the environment, and of carefully planned journeys. Seasonal availability was also taken into account, as can be seen at mountain sites: flint could not have been located and extracted under a thick blanket of snow, which is the rule at 1,450 m asl, as at Monte Avena, during modern winters. If anything, snow is expected to have lasted longer under glacial conditions. Following the discovery of Pantanello and other open-air sites at elevations between 1,300 m and 1,600 m asl in the Apennines (Lubell and Mussi 1995; Mussi in press), Monte Avena is no longer the only known evidence of seasonal exploitation of mountains by Aurignacian groups. Flint is abundant a few kilometers from Pantanello, but not at the site itself. Sparse Aurignacian tools and cores have actually been collected at the nearby flint outcrop of Le Macerete and at more than 1,450 m asl. A small lake or marshland was probably in existence when people settled in the rather protected little intramontane basin of Pantanello, and the general setting is reminiscent of Serino. The extant evidence is suggestive of hunting trips to the mountains during the good season and of quarry activity going on as well, to produce new sets of tools.

Sites complementary to those in the highlands are found at sea level. This is the case of Gr. del Fossellone, where the mortality curves of the hunted red deer and hydruntine horse point to human presence from autumn to spring, but mostly so in winter (Alhaique *et al.* 1998).

5.2.3. Island Sites: Elba and Sicily Compared

An interest for a wide range of environments, which were carefully explored even at the expense of considerable effort, can also be seen in island sites.

Upper Paleolithic tools, including distinct Aurignacian tools, have long been known to occur at several places on the island of Elba, some 10 km off Tuscany's shore (Zecchini 1967). Elba, however, was not an island at the glacial maximum, and most probably not even at about 30 ka: the *Canale di Piombino,* which is the arm of the sea that divides it from the mainland, is no more than 40 m deep. Elba, during most of the last glacial, was merely the central and mountainous part of a much wider peninsula, which at some time was extended to include even the now distinct islet of Pianosa (Bossio *et al.* 1986).

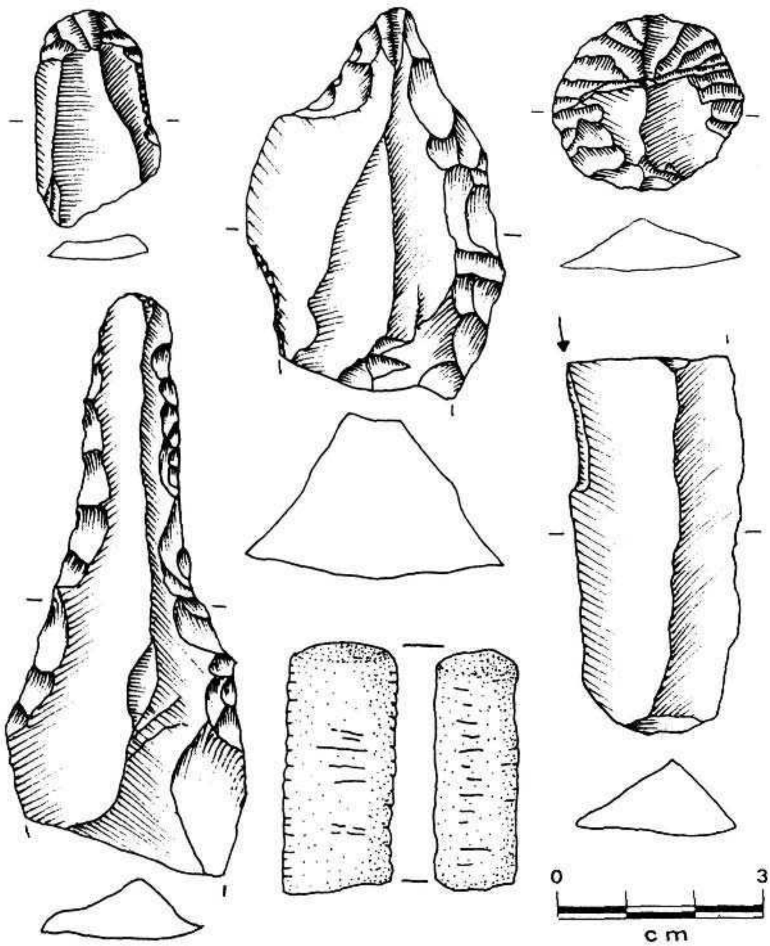

Figure 5.13. Riparo di Fontana Nuova. Lithic industry and notched limestone concretion (source: Gioia 1988).

In Sicily we have, during the Early Upper Paleolithic, the first secure site (i.e., Riparo di Fontana Nuova in the southernmost part of the island), at which Aurignacian tools were discovered (Chilardi *et al.* 1996) (Fig. 5.13) (see also 2.2.3 and 3.3.1).

At the end of the Pleistocene, humans and a few mammal species, including red deer, aurochs, and wild boar, as well as some carnivores, were able to cross the narrow Strait of Messina and its treacherous currents—known in the literature since Antiquity as the mythical Charybdis, which drowned the sailors who had escaped the perils of the Scylla Reef. The definitive colonization of the great island, which is clearly visible from Calabria, happened in the final Paleolithic (see 7.2.7), but the archaeological evidence of Riparo di Fontana Nuova proves that an attempt was made earlier.

The problem of the continuous existence during the Pleistocene, or not, of the strait that divides Sicily from Calabria has been amply debated following different lines of evidence: tectonics, sedimentology, paleogeography, paleontology, and so on (Barrier *et al.* 1987). While the Strait of Messina at its narrowest is presently just 3 km wide and 72–130 m deep, and was seemingly exposed by low marine stands during glacial phases (Fig. 3.18), a mounting body of evidence suggests that the area never emerged at the glacial maximum--much less so 30–35 ka ago. The present shallowness is a recent feature, as the strait is submitted to uplift movements that started during the Pliocene. Data from marine maps indicate a rise of some meters since the middle of the nineteenth century. At Bocale and Capo dell'Armi, south of Reggio on the Calabrian side, marine shells now found at 80 m asl were radiocarbon dated to 33,200 2,300 bp and 33,200 ± 2,730 bp, respectively, while at Archi, just in front of Messina, a cold marine fauna, similarly 70 m asl, was dated to 25,800 ± 1170 bp (Fontes *et al.* 1987).

The strait is also a kind of unique “sanctuary” of Atlantic organisms within the Mediterranean (Barrier 1987; Fredj and Giaccone 1987). These Atlantic populations probably penetrated into the Mediterranean during cold Pleistocene periods. The hydrodynamic properties of the strait, with violent currents favoring the oxygenation of the waters, reproduce an Atlantic-type environment. This allowed the survival of this peculiar flora and fauna to the present, and further implies that the strait remained submerged during the low stands of the Pleistocene sea subsequent to their formation.

Paleontologists, however, are uneasy with the total lack of a land bridge, as they maintain that the mammalian fauna of final Pleistocene age is varied and balanced enough, with no trace of endemism, and could not have ended up all together on the island by chance as the result of a hazardous crossing of the strait (Bonfiglio and Kotsakis 1987). No alternative and positive evidence of a land bridge, however, has ever been given.

In a highly unstable area, at which emersion was going on, while sea level was certainly lower than today, it is arguable that the strait was at some time markedly more restricted than today. After all, one wonders what the paleogeography was when the marine deposits of Bocale and Capo dell’kmi had started to be uplifted, and while they were standing just above sea level. A discontinuous land bridge of reefs over a shorter distance than today is an alternative scenario, which would account for both positions: the continuous existence of a restricted arm of the sea, with a relatively easy way for the mammals to cross it.

A tricky and even dangerous passage, acting as a filter of mammalian species, would, however, always have existed between mainland and island, accounting for the restricted array of mammals that reached Sicily. Those species that never made the journey include common horse, ibex, chamois, and wolf. Their absence from Sicily in the final Pleistocene cannot be related only to climatic factors. Modern humans, on the other hand, can certainly be numbered among the species that negotiated their way through an arm of the sea.

5.3. ULUZZIAN AND AURIGNACIAN COMPARED

5.3.1. Contemporaneity or Succession of Uluzzian and Aurignacian?

There is no interstratification of layers with different lithic industries. Where both Uluzzian and Aurignacian industries are found on the same site, the deposit with the Aurignacian consistently overlies the part of the stratigraphic sequence with the Uluzzian. This can be seen at Gr. del Cavallo, Gr. di Castelcivita, Gr. La Fabbrica (see 5.1.3), and probably at Gr. M. Bernardini as well (Gioia 1987, 1988). While there is no major stratified Uluzzian site that is not capped by a deposit with Aurignacian industry, Aurignacian industries are also found at sites without any Uluzzian. Several important Aurignacian sequences were in fact localized directly above Mousterian deposits, at sites devoid of any Uluzzian industry. Interestingly, this is the case all over northern Italy, from Liguria to Veneto. The Uluzzian, in other words, is limited to the central and southern part of the peninsula.

A more detailed pattern emerges if the evidence is fitted into a chronological framework, as noted earlier, covering a deteriorating climatic phase, followed by a cold and arid phase, and then by the milder Arcy oscillation (see 5.1.4).

While the climate was deteriorating, Uluzzian industries were first produced in southern parts of Italy, both in Campania (Gr. di Castelcivita) and in Apulia (Gr. del Cavallo). In northern Italy, the final part of the Middle Paleolithic sequence is yet undated at Riparo Mochi, S. Francesco di Sanremo, Arma delle Manie, and Riparo Tagliente (see 4.3.6). Accordingly, there is a distinct possibility that Mousterian tools were still manufactured in the north, while Uluzzian tools were produced in the south.

Then, during the following cold and arid phase, Aurignacian industries are found for the first time in Liguria (Riparo Mochi) and in Veneto as well (Riparo di Fumane). The Aurignacian of Latium could be of approximately the same age (Mussi 1990; Zampetti and Mussi 1988). In Campania, the Uluzzian is still the rule, but Aurignacian industries eventually appear (Gr. di Castelcivita level *rsa*, and then levels *gic* and *ars*). In Apulia, the Uluzzian persists longer, given the evidence of Gr. del Cavallo (level E II-I): the Aurignacian is rather elusive and immediately predates the Arcy oscillation.

During the following milder Arcy oscillation, the Aurignacian is the only industry to be found, from Liguria (Riparo Mochi level F) to Veneto (Riparo Tagliente) to Campania (Serino) and possibly Sicily (Fontana Nuova).

This general pattern is not substantially modified if, instead of the previous overall correlations, we take into account the new accelerator dates of Riparo Mochi and Riparo di Fumane at face value, as indicating a greater antiquity with estimates of a date close to, or in excess of, 35 ka. In this case, the Aurignacian would be found in northern Italy even earlier. The general development in southern Italy, however, would remain just the same. The major difference is that in the first hypothesis, the Uluzzian is contemporary to the northern final Mousterian, while in the second, it is contemporary to the northern early Aurignacian.

5.3.2. Uluzzian, Aurignacian, and Late Mousterian: The Possible Origins of the Uluzzian and the Aurignacian

The general characteristics of the late Mousterian have already been mentioned (see 4.3.6). They include a high percentage of notches and denticulates, and sometimes a significant amount of Upper Paleolithic lithic types, such as endscrapers, burins and backed tools.

This suggests that as far as lithic typology is concerned, some developments typical of the Upper Paleolithic were already under way in the final Middle Paleolithic. On the Upper Paleolithic side, the best candidate for typological continuity with the Mousterian is the Uluzzian, which always includes high percentages of sidescrapers, notches and denticulates, and backed tools as well. However, it has long been stressed that an industry actually transitional between the Mousterian and the Uluzzian is so far simply unknown (Gioia 1987).

The difficulty of spotting *bona fide* transitional industries is not peculiar to Italy, and is actually the rule all over Europe. On the other hand, it is no surprise that innovations, if found to be useful and adequate, will spread quickly enough to seem instantaneous in an archaeological perspective. Of course, a sequence of industries progressively less and less Mousterian, and more and more Uluzzian, would be extremely satisfying for the sake of an elegant demonstration of continuity. However, it is doubtful that human groups would conveniently wait hundreds of years, or more, before fully adopting new solutions. In the archaeological record, changes are usually recognized as such when already fully established.

The differences between the Mousterian and the Aurignacian are much more marked. If anything, the Aurignacian industries are "more Upper Paleolithic" than the Uluzzian. They are characterized by more endscrapers, burins, borers, truncations, and so on, and by a well-developed blade and bladelet technology. Some late Mousterian assemblages are actually quite laminar, but this is usually the result of the extensive use of the Levallois technique, not found anymore in the Italian Upper Paleolithic. Furthermore, the bone industry, which is virtually nonexistent in the Middle Paleolithic, is quite sophisticated in the Aurignacian (see 4.3.4 and 5.3.3).

A clue to understanding the development of the early Upper Paleolithic in Italy is given by the geographical distribution of sites and by the chronological sequence of the industries in the various regions. The Aurignacian is soon established in the north in connection with the Aurignacian settlement of Provence and of the rest of Western Europe, while in the *cul-de-sac* of southern Italy, the Uluzzian locally develops in continuity with the previous Mousterian. Later, the Uluzzian disappears, while Aurignacian industries are found all over the peninsula and even in Sicily (see also 5.4.1).

5.3.3. Technical Achievements, Microliths and Composite Tools, and Bone and Antler Tools

Specialized microlithic tools are found in both the Uluzzian and the Aurignacian assemblages, if with quite different characteristics.

Backed tools, while always present, are not that frequent in the Uluzzian except at Gr. del Cavallo, and mostly so at Gr. del Cavallo level E II-I (Table 5.2). The lithic series from this level includes some 20 arch-backed tools, 1.5 to 4 cm in length, with a continuous or discontinuous dorsal retouch. Some are better described as geometric microliths and as lunates. Interestingly, good quality flint, or jasper, was selected to manufacture them, while the locally available little slabs of chert, of inferior quality, were generally used for other tools, including endscrapers.

Dufour bladelets, and other marginally retouched bladelets, have long been known at some Aurignacian sites, starting with Riparo Mochi level G (Fig. 5.7). They have also been found in more recent excavations at Gr. di Castelcivita and Riparo di Fumane (Table 5.6; Fig. 5.8). At both caves, as well as at Gr. La Cala and at Serino, pointed bladelets and/or points on tiny flakes were also found. The retouch is mono- or bilateral, continuous or partial, and ranges from marginal to steep. Some pointed backed bladelets, accordingly, were also produced.

Both the Uluzzian lunates and arch-backed points, and the Aurignacian pointed bladelets, were most probably hafted projectile points, or parts of composite projectile points, although the shafts have long decayed. There is no physical evidence of them except for use–wear pattern recognized on the bladelets of Riparo di Fumane (Broglio *et al.* 1998). This would suggest that wood or reed was used. Bone and antler tools, however, have a chance of being preserved, and have actually been found. Most could have been just projectile points.

Not much has been discovered at Uluzzian sites: one point at Gr. La Fabbrica (Fig. 5.6), five points and pointed items at Gr. di Castelcivita, four more broken specimens from the various layers of Gr. del Cavallo (Fig. 5.4). They are all small-sized and rather thick, with a more or less circular cross-section.

The record is quite different at Aurignacian sites, if not at all of them: even taking into account differential bone preservation, it is quite rich at some sites, nonexistent at others.

Bone and antler tools, most of them points, were relatively common at the Balzi Rossi sites (Blanc 1953; Cardini 1930; De Villeneuve *et al.* 1906–1919; Kuhn and Stiner 1992; Riviere 1887; Vicino 1984). They include bone points with a split base, which are typical of the Aurignacian I and were positively recognized at Gr. dei Fanciulli, Barma Grande, Gr. del Caviglione, and Riparo Mochi.

Not many more sites have yielded any bone tools: consistent assemblages were found only at Riparo di Fumane in Veneto, and at Grotta del Fossellone and Grotta Barbara at Monte Circeo (Bartolomei *et al.* 1992; Blanc and Segre 1953; Mussi and Zampetti unpublished data; Zampetti and Mussi 1988). Points with a split base were discovered at the two first sites, while the base of the nine bone points from Grotta Barbara was not preserved. Three more fragmented and pointed items were discovered at Gr. La Cala, farther south (Benini *et al.* 1997).

At other sites of northern and central Italy, the archaeological record is quite poor but also includes a few bone tools: a thick point from Gr. del Broion, some fragmented items from Grotta di Paina (i.e., from the part of the cave known as Grottina Azzurra), and a complete point with a split base at Grotta Salomone (Aspes 1984; Bartolomei *et al.* 1983–1984; Radmilli 1977). One of the fragments from Gr. di Paina is rather flat and could also be part of a similar point.

At other sites with an adequate Aurignacian record and sufficient preservation of animal bones, such tools were not discovered. This is best exemplified by Grotta La Fabbrica and Grotta di Castelcivita.

5.3.4. Ornaments and Symbolic Activity

The evidence for symbolic activity, expressed by ornaments, aesthetic remains and the like, is not extensive. Works of art have not been discovered in association with Uluzzian industries, and they are extremely scanty in the Aurignacian. A few items with a simple pattern of small incisions or parallel notches have so far been reported, namely, two bird bones from Riparo Bombrini, an herbivore rib from Riparo di Fumane, and a natural limestone concretion from Riparo di Fontana Nuova (Fig. 5.13).

Ochre and other pigments can be taken as indicative of some ornamentation on long decayed items—provided that they are not simply the remains of practical activities such has hide curing and working. They have been recorded at recent excavations of Aurignacian sites such as Riparo Bombrini and Grotta Barbara, but also in the Uluzzian layers of Grotta del Cavallo and of nearby Grotta M. Bernardini.

Perforated and unperforated marine shells, most of them *Dentalium*, were also discovered at Gr. del Cavallo: just a few in levels E III and E II-I, quite a lot in level D, with seventeen different species (Palma di Cesnola 1966). Because of the unknown extent of the contamination with Aurignacian materials, however, it cannot be said to what extent they were actually related to the Uluzzian.

Marine shells, often perforated, have also been found at the Balzi Rossi sites, as can be seen from the extant information for Gr. dei Fanciulli, Riparo Mochi, and Riparo Bombrini (Blanc 1953; De Villeneuve *et al.* 1906–1919; Vicino 1984). At Monte Circeo, while the marine shells of Gr. Barbara are not perforated, ornaments of a more varied nature have been found nearby at Grotta del Fossellone: antler and steatite pendants, as well as perforated fox and deer canines (Blanc and Segre 1953; Mussi 1988–1989). The steatite pendants, which mimic deer canines, are indicative of limited drilling capacities: the attempted perforation was definitely not a successful one. At the sites of this period in Italy, perforations were often accomplished by cutting, scratching, and eventually pushing a pointed tool through the shell or the root of the tooth.

While the above-mentioned caves open on the present coast, more than 500 marine shells were also found at the inland site of Riparo di Fumane (Bartolomei *et al.* 1991–1993, 1992). They were assigned to some thirty different species, but most of them are specimens of *Homalopoma sanguineum*. Approximately half the shells were perforated. The ornaments also include a couple of deer incisors, with a groove circling their root, suggesting a different way of fastening them. Interestingly, a single perforated *Homalopoma sanguineum* was also discovered at another inland Aurignacian site, i.e., at Gr. di Castelcivita, south of Naples (Gambassini 1997).

5.4. COMMENTS

It is widely understood that the Early Upper Paleolithic industries, which are found after the last Middle Paleolithic ones, are directly or indirectly linked with the appearance of modern humans and the disappearance of the Neandertals. As previously discussed (see 5.1.7), however, the paleoanthropological record is even less satisfactory in Italy than elsewhere in Europe. Conclusions on the peopling of the peninsula, and of Sicily, at this prehistoric turning point must be drawn from different lines of evidence.

5.4.1. Intruders and Aboriginal Settlers: Possible Scenarios for Populating Italy

Some thirty years after the excavations at Grotta del Cavallo and the discovery of the Uluzzian, there is still a marked imbalance in the number of Aurignacian compared to Uluzzian sites: the former sites outnumber the latter by 5:1 or more (Mussi 1992). Uluzzian sites are not only few in number but they are also known, so far, from only part of the peninsula, south of the Po plain and the Apennine range that borders it.

The more frequent Aurignacian sites have a different and wider geographical distribution all over Italy. They are concentrated on the Tyrrhenian coast, starting with Liguria, the natural gate connecting Italy with the rest of Western Europe.

In chronological terms, the earliest Aurignacian sites are the northern ones, while later on they are also found more and more to the south (see 5.3.1). The Uluzzian pattern is the reverse in that the geographical distribution shrinks, and at around 31 to 30 ka Aurignacian industries are the rule everywhere. Lithic industries are not human groups, but they are *made* by human groups: if anything, Aurignacian tools were gaining momentum, or becoming more and more fashionable, while the reverse is true for Uluzzian tools. Even admitting a historical bias against the Uluzzian, which was recognized later, it is highly improbable that this picture will be completely changed in the future.

The broader distribution of the Aurignacian includes mountain ranges and Sicily. It can be assumed that Monte Avena, 1,450 m asl in the Alps, and Pantanello, at a similar altitude in the Apennines, were settled during the milder Arcy oscillation. They are related to a recolonization of regions abandoned by human groups at the onset of fully glacial conditions, approximately not later than early OIS 4. The mountains were abandoned again after 30 ka, but this early expansion into empty areas can be compared to the later and more successful one after the Glacial Maximum (see Chapter 7). It is also evident that the Aurignacian industries were related to human groups moving into depopulated areas. The Aurignacian of Fontana Nuova in Sicily points to a similar pattern of human groups entering a new territory.

Raw material procurement strategies further suggest that human groups making Aurignacian industries were more mobile and/or linked to more distant regions (see 5.2.1). The only specialized quarry sites are Aurignacian, and good quality flint was carried distances up to 100 km. The marine shells of Riparo di Fumane and Gr. di Castelcivita are a further clue to journeys or to direct and indirect contacts over a long distance. The urge toward unknown territories, their riches and their dangers, must be seen as part of the general cultural background. Furthermore, while Aurignacian tools were usually made from good quality flint, even when that required some effort and searching at a distance, there is no evidence that the groups who made the Uluzzian tools ever looked beyond the locally available raw materials, even if they were of poor quality.

While the Italian record does not allow us to discriminate between the diffusion of new ideas and the actual arrival of new people, the evidence so far discussed points to "Aurignacian" groups as more dynamic than "Uluzzian" groups and also more numerous and prone to move into new territories. They are also more innovative and, so to speak, more "international" in their lithics than the inhabitants of the south.

There is a distinct possibility that the Middle/Upper Paleolithic transition in the Italian peninsula was similar to that recently outlined for the Iberian peninsula (Vega Toscano 1990, 1993; Zilhâo 1993), that is, modern humans entered from the north, bringing with them what we call "Upper Paleolithic" tools and technology, while some Neandertals persisted in the south.

The Italian scheme, however, if anything, would be less extreme. While Mousterian industries were still produced in the Iberian peninsula after 30 ka, in Italy the full Upper Paleolithic (i.e., the Aurignacian) is found everywhere by 31 ka. The Uluzzian, furthermore, while acting in Italy as the backward industrial complex, is much more innovative than the final Mousterian of southern Spain and Portugal.

In Italy, there is also some possibility of interaction between the Aurignacian and the Uluzzian, between the "progressive" and the "conservative," maybe between modern humans and Neandertals. This would account for the high percentage of scaled pieces in Aurignacian industries discovered only in the regions where the Uluzzian is also found (Mussi 1990). If we link scaled pieces to the splitting and working of relatively soft organic materials and consider the dearth of bone industry in the Uluzzian, and in the Aurignacian assemblages of those southern sites as well, the scaled pieces could well be related to woodworking and carving (see also 5.1.2).

In this untested but testable scenario, modern humans, coming from the north and from more steppe-like areas, enter a territory characterized by many refugium areas with thickets and woods. They interact with the last Neandertal groups which, in the south, develop the Uluzzian industries, with both Middle and Upper Paleolithic characteristics. Later, Aurignacian lithic technology and typology is introduced and accepted everywhere, while the modern humans, more mobile and possibly in a phase of demographic expansion, enter into new regions. The superior Uluzzian ability in woodworking is readily integrated into the technical background of the Aurignacian groups wherever they enter into direct contact with them.

5.4.2. Living in an Underpopulated World, Paleodemographic and Geographic Constraints, and the Disappearance of Human Groups from Italy

Even lumping together the Uluzzian and the Aurignacian, there are not many Early Upper Paleolithic sites, and the major ones, indicating repeated and/or lengthy settlements, total not more than a handful. The time span is of 3–4 millennia. It could prove to be even longer if, redating all these sites, some, and not all of them, will eventually be found to be markedly earlier than other sites. Population density, if difficult to estimate with any accuracy, must have been extremely low.

For the sparse local groups, some of the most dramatic problems were quite different from those experienced by the modern overpopulated world, namely, to avoid imbalances between the number of women and men, and among age classes that frequently occur in restricted populations, and to secure the reproduction of the local band from one generation to the next. The finding of suitable spouses was a major difficulty for everybody and would have been even more problematic if some rules were followed in matching two individuals—even simple rules such as avoiding close blood ties or an exceedingly different age (Wobst 1974).

To be able to make arrangements with other, even distant groups, and exchange or just acquire spouses was perhaps part of Upper Paleolithic adaptive behavior. In a very sparsely populated territory, this would allow some groups to slowly expand, incorporating and assimilating people of different origins. Such a scenario would not be in contrast with the archaeological record, and with the Aurignacian progressively replacing, or supplanting, the Uluzzian.

If paleodemographic constraints were always overwhelming, they probably became even more so after the Aurignacian groups had expanded into new and unoccupied territories, sometimes quite difficult to reach. This further stretched traditional ways of keeping in contact over long distances (see also 6.5.3). If we add the catastrophic volcanic event that literally destroyed thousands of square km and a large part of what is now Campania, just in the middle of the geographical distribution of Aurignacian sites (see 5.1.6), it is no surprise that the whole human settlement was at some point severely affected. From being underpopulated, Italy became empty, or nearly so. Even more so considering the side effects over much larger areas, such as the clouds of ash in the atmosphere during weeks or months, and reduced insolation.

A similar event occurred on a more restricted scale in the middle Rhine Valley at the end of the Pleistocene. It is accordingly known with finer chronological resolution. At c. 11,000 bp (13,000 BP in a calibrated chronology), the Laacher See volcano exploded (Bosinski 1992; Gaudzinski *et al.* 1995). Five km^3 of lava erupted, and a caldera 2 km in diameter was formed. Many archaeological remains were buried beneath up to 8 m of pumice and other volcanic products. The area was then deserted for some 1,000 years.

As a matter of fact, several Aurignacian sites in Italy are capped by volcanic deposits, while Aurignacian industries have never been found over them. Pedological alteration and soil formation at the top of tephra accumulations suggest that the explosion(s) happened before the Arcy oscillations—or at least before the end of it. Some of the Aurignacian sites correlated with that same oscillation, out of the devastated area, could be later. In central Italy, some human groups probably perished, while others were able to flee and resettle elsewhere. Animal life was similarly affected. The colonization of Sicily could simply have resulted from the search for safer territories, but the poor chronological resolution does not allow certitude on this point.

The dispersed and stranded human population never recovered properly and eventually became extinct—in Sicily as in continental Italy. There is a marked hiatus in the archaeological record between 30 ka and 26 or 25 ka in conventional radiocarbon chronologies (see Chapter 6). The disruptive effects of that major cataclysm lasted up to the much later recolonization of the empty peninsula by groups with a Gravettian industry.

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Chapter 6

Fullu Equipped Hunter-Gatherers

6.1. INTRODUCTION

Industrial assemblages that have been labeled "Gravettian" appear in different areas of Europe around 28,000 bp (Djindjian *et al.* 1999; Hahn 1995; Mellars *et al.* 1987; Otte 1985; Rigaud and Simek 1990; Roebroeks *et al.* 2000; Valoch 1986-1987). They include various percentages of endscrapers, burins, and other typically Upper Paleolithic tools, but are mainly characterized by a knapping technique based on the use of specialized blade cores with opposed platforms. The resulting blades and bladelets were used to prepare the straight-backed Gravette and Microgravette points.

Beginning with the Gravettian, the archaeological record becomes more comprehensive in Italy, due to a more extensive array of material found, such as works of art and burials. There is also a better understanding of the characteristics of the environment. In fact, the Glacial Maximum, centered around c. 18,000 bp, is a major concern for paleoenvironmental studies, and many research projects have led to global reconstruction that fits the contemporary evidence from several Italian locations and sites.

The human settlement, however, is as scattered as previous occupations. We examine below the characteristics of the Gravettian and subsequent Early Epigravettian, between approximately 25,000 and 16,000 years bp.

6.1.1. West European and Italian Environments

The Mediterranean, a closed sea, is connected to the Atlantic Ocean by the narrow Straits of Gibraltar, and is divided by the Straits of Sicily into a cooler western basin and a warmer eastern basin. Italy stands just in the middle, but is basically part of the western basin—much more *so* after the northern part of the Adriatic sea had emerged, due to the falling sea level (see below).

The general characteristics of the Mediterranean, and of Italy, around the Glacial Maximum are reasonably well known (Newell *et al.* 1981; Thiede 1978; Thunell 1979). The surface temperature of the sea on the western coasts of Italy was between 13° and 19°C in summer (presently 22-24°C), and between 7° and 13°C in winter (modern average 13–15°C). Summer temperatures, therefore, diminished more than winter temperatures. Winds were stronger, especially in summer. The thermic gradient due to a cooler western basin produced in winter a high-pressure bridge between the Iberian Peninsula and the Maghreb. The cyclonic depressions from the Atlantic, which bring winter rains to Italy (the summer is mostly dry outside the mountain ranges) deviated farther south. The emersion of the Gulf of Gabes, on the Tunisian coast opposite Sicily, also caused a more marked continentality. Pollen analyses in this area indicate an arid or semi-arid environment, with a few trees at the Glacial maximum (Rognon 1981).

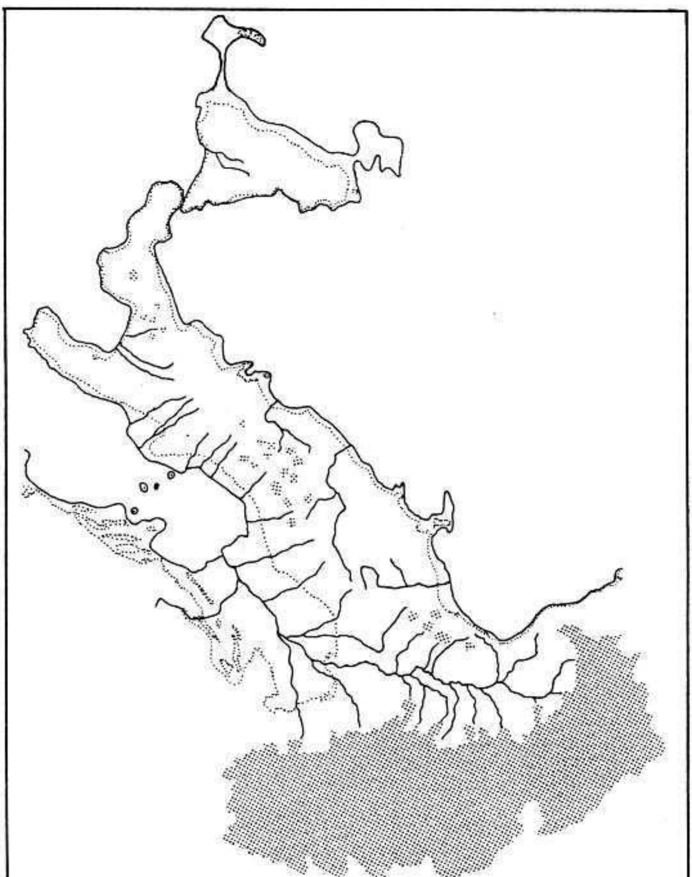

Figure 6.1. Italy at the Glacial Maximum. Glaciated areas are hatched, modern coastlines dotted (after Mussi 1990).

Table 6.1. Selected Gravettian Sites. Dominant Ungulates, with NISP Percentages When Available.[a]

	Aurochs	Red deer	Horse	Ibex
Gr. dei Fanciulli level F		▲		▲
Gr. delle Arene Candide				▲ 68
Gr. La Cala level Q		▲ 86		
Gr. La Cala level GB		▲ 75		
Gr. La Calanca		▲ 67		
Gr. Paglicci levels 18–20			▲ 34	▲ 40
Gr. Paglicci level 21				▲ 54
Gr. Paglicci levels 22–23	▲ 33			

[a]Sources: Gr. delle Arene Candide: Cassoli and Tagliacozzo 1994. Gr. La. Calla: Boscnto *et al.,* 1997, Salsa 1983. Gr. La Calanca: Sala. 1983. Gr. dei Fancinilli: De Villeneuve *et al.,* 1906-1919. Gr. Pagliacci: Boscaro 1994, Sala 1983.

In northeastern Italy, continentality was enhanced by the emersion of the northern Adriatic Sea (Fig. 6.1). Loess was being deposited along the margins of the Po Valley, and steppe-like environments prevailed (Cremaschi 1990). Restricted wooded areas were found near the bottom of the valley itself (Bortolami *et al.* 1977; Paganelli 1984). Glaciated areas developed along the whole Apennine chain—the backbone of the peninsula—down to Calabria, while in central Italy, the level of perennial snow was at some points down to about 1,700 m asl (Malatesta 1985). On the Tyrrhenian, or western, side of the peninsula, open environments dominated by Cichoriae came into existence in Liguria, close to France (Renault-Miskovsky 1972). The frequency of pollen from thermophilous trees indicates that this protected region also had peculiar microclimates and was a refugium for Mediterranean species. In northern and central Latium, a dry-steppe environment with dominant Artemisia was prevalent (Alessio *et al.* 1986; Bonatti 1970; Frank 1969).

Farther south, rodent assemblages found in archaeological deposits are typical of quite monotonous open grasslands that are slightly more humid along the southern than the northern Adriatic coast (Bartolomei 1980). The western part of the peninsula was slightly more temperate, and wooded areas were more widespread.

Not surprisingly, mammal assemblages are dominated by red deer, equids (*Equus caballus,* sometimes accompanied by *E. hydruntinus*), bovids (aurochs and, less often, bison) (Table 6.1). In rocky environments, even in the south and at sea level, ibex are often found in significant numbers, indicating a dry and cool climate with an open environment. Chamois, less frequent, are a marker of a really cold climate, while roe deer belongs to wooded areas. Wild boar survived in refugium areas in the south, while elk lived in the north. Fallow deer are generally believed to have become extinct around this time (but see 7.1.3). Reindeer are found in limited numbers in some layers of the Grimaldi Caves (and are actually quite rare in adjoining Provence), while the mammoth was a truly exceptional sight, since its remains are known only at a single Upper Paleolithic site (see 6.3.1). Saiga antelope, polar fox, and most probably woolly rhino were not available to prehistoric hunters. The environment was markedly more arid, and certainly colder than today, but never as extreme as it was north of the Alps.

The lowering of sea level progressively enlarged the peninsula and the islands. The island of Elba, for instance, was a peninsula (see 5.2.3), while Sicily extended farther south and west, including Malta. The gradient of the sea floor, however, is quite steep along most of the coasts: a depth of 100 m is usually reached within 10 to 20 km. The really dramatic change happened in the northern Adriatic Sea, which is quite shallow. The paleogeography of the area is not easily reconstructed because of seismic instability and also the thick underwater alluvial deposits of the Po, Adige, and other minor rivers. However, it is generally accepted that a step in the sea floor, just south of the present town of Ancona, reflects the limits of the maximum emersion (D'Ambrosi 1969; Pasa 1953). The northern Adriatic Sea was transformed into a wide plain, 300 x 150 km in extent, linking Italy to the Balkans (see 7.2.3) (Fig. 7.14). Farther south, there was a narrowing of the sea between the islets of Pelagosa and Cazza.

The problem of the emersion of the Strait of Messina has already been discussed in Chapter 5 (see 5.2.3), where it was shown that current research indicates this was an area of extreme tectonic instability, with evidence for high magnitude vertical movements within a few millennia (Barrier *et al.* 1987; Montenat *et al.* 1987). The present shallow depth of the strait (-72 m) is probably quite recent; it was deeper at the Glacial Maximum. A very peculiar remnant aquatic flora and local underwater depositional processes testify to an uninterrupted immersion of the area of the strait.

6.1.2. The Paleoanthropological Record, the Date of the Grimaldi Burials as Related to the History of Paleolithic Archaeology, Dating Problems, Consequences of Sampling Bias

Italy and Moravia are the two regions of Europe with a good paleoanthropological record for this period. So far, sixteen burials have been found in Italy, comprising the remains of twenty adults or adolescents and a single fetus or newborn child (Table 6.2) (Coppola 1992; Coppola and Vacca 1995; Mussi *et al.* 1989; Mezzena and Palma di Cesnola 1989–1990).

Table 6.2. Liguria (top) and Apulia (bottom). Inventory of the Gravettian Burials. [a,b]

	Single burials	Double burials	Triple burials	Tot. A	Tot. B
Gr. dei Fanciulli	1	1		2	3
Gr. del Caviglione	1			1	1
Barma Grande	3		1	4	6
Gr. di Baoussu da Torre	3			3	3
Gr. Arene Candide	1			1	1
Gr. Paglicci	2			2	2
Gr. S.Maria Agnano	1	1		2	3
Gr. delle Veneri		1		1	2
Total				16	21

[a]After Mussi (2000).
[b]Total A: total number of burials Total B: total number of buried individuals.

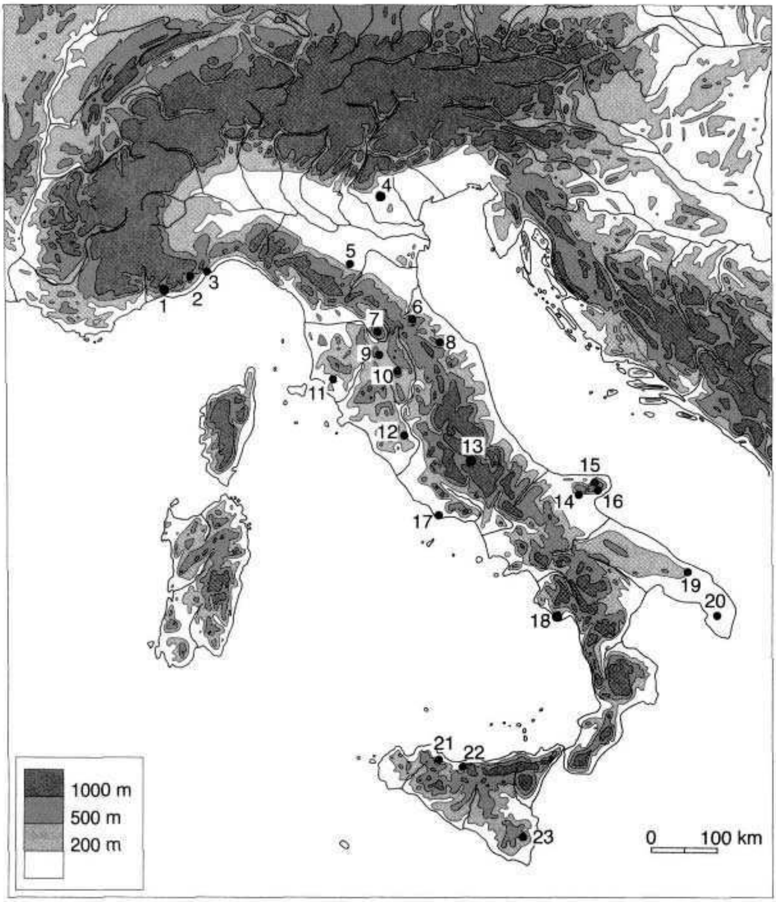

Figure 6.2. Location of sites at (or close to) the Late Glacial Maximum (LGM), including the dubious Sicilian sites. 1: Grimaldi or Balzi Rossi sites (Gr. dei Fanciulli, Rip. Mochi, Gr. del Caviglione, Barma Grande, Baousso da Torre, Gr. del Principe); 2: Arma dello Stefanin; 3: Gr. delle Arene Candide, 4: Gr. del Broion, Gr. di Trene, Gr. di Paina; 5: Savignano; 6: Fornace San Damiano; 7: Laterina; *8:* Ponte di Pietra; 9: Monte Longo (or Monte San Savino); 10: Trasimeno; 11: Gavorrano; 12: Rip. del Sambuco; 13: Gr. C. Tronci, Rip. Maurizio; 14: Gr. Paglicci; 15: Vico del Gargano; 16: Foresta Umbra, 17: Rip. La Calozza; 18: Cala delle Ossa, Gr. La Cala, Gr. La Calanca; 19: Gr. di *S.* Maria di Agnano; 20: Gr. delle Veneri; 21: Gr. Niscemi; 22: Rip. del Castello; 23: Canicattini.

While a few of these burials have radiocarbon dates, the date of the others is derived from their associated lithic assemblages. The directly or indirectly reasonably well-dated evidence includes (1) the double burial of Gr. dei Fanciulli level H (sometimes erroneously quoted as belonging to "Negroids," on the basis of an old and spurious reconstruction of the facial skeleton); (2) the overlying burial of level G; (3) the individual of Gr. delle Arene Candide, found below the "5th hearth;" (4) all the evidence from Apulia (i.e., from Gr. Paglicci levels 21d and 21B, Gr. delle Veneri, and Gr. S. Maria di Agnano) (Fig. 6.2).

The date of other burials, all of them from the Grimaldi or Balzi Rossi caves, relies on the very close similarities in anthropological characteristics, rituals, and burial goods with other, better dated individuals, especially those of Gr. dei Fanciulli and Gr. delle Arene Candide. All the individuals belong to fully modern *Homo sapiens.* Their chronological range is from more than 25,000 to 20,000 or possibly 22,000 bp (i.e., the beginning of human settlement after a hiatus in the archaeological record) (see 6.2.2). However, the remains from the Grimaldi caves have often been ignored, even in recent years, or are still cited as coming from Aurignacian levels (De Lumley 1984), with consequences for the current controversy on the origins of modern humans. This attribution derives, in part, from the fact that Aurignacian layers, sometimes reworked by the digging of burial pits, are present in the caves. But mostly it derives from the history of Paleolithic studies.

Many of the burials were found at the end of the nineteenth century either by archaeologists such as E. Riviere or by nonprofessionals. Following this, the team of Prince Albert I of Monaco, including professionals such as L. De Villeneuve and M. Boule, worked in several of the caves, among them Gr. dei Fanciulli, where the burials related to levels H and G were excavated. While this resulted in improved excavation and publication, the then current theories led to the labeling of most of the Upper Paleolithic as "Aurignacian" (De Villeneuve *et al.* 1906–1919). Later, in France, H. Breuil distinguished more clearly between Châtelperronian, Aurignacian, and Gravettian, but it was D. Peyrony who, in the 1930s, eventually organized the French Upper Paleolithic in a way not much dissimilar from today.

Meanwhile, the Grimaldi caves had been almost completely emptied of any archaeological deposits, and no one cared to reexamine the collections, poorly stored in many different museums. As a result, the label "Aurignacian" continued to be uncritically used in the literature. Much later, G. Onoratini and A. Palma di Cesnola independently restudied the industries of Gr. dei Fanciulli in the Musée d'Anthropologie Prehistorique de Monaco (Onoratini and Da Silva 1978; Palma di Cesnola 1976). Both demonstrated beyond any doubt that the burials belonged to Gravettian deposits. This eventually led to a revision of the whole problem, and to the burials of Barrna Grande, Gr. del Caviglione, and Baousso da Torre being attributed to the Gravettian or Early Epigravettian (Mussi 1986a). Further research in the last few years restricts the attribution to the Gravettian.

Even if the number of human skeletons is large compared to the rest of Western Europe, where they are almost completely lacking for this period, the twenty-one individuals from the Italian caves are most probably a biased sample. The lack of infants and the predominance of males can be explained by social selection. The discovery of a fetus or newborn child at S. Maria di Agnano with an adult female, recently dated at 24,410 ± 320 (Gif-9247) (Vacca and Coppola 1993), suggests that poor preservation of slender bones does not fully account for the observed evidence. We have suggested elsewhere (Mussi 1990) that the extreme height of some individuals from the Grirnaldi caves could also be nonrandom: it is a characteristic of the males only-180-190 cm for adult males in a recent evaluation (Churchill *et al.* 2000; Formicola 1991), while the females are shorter. It seems, therefore, that while some very tall males were selected for ceremonial burial in caves, most people died and were disposed of in a different and less conspicuous way.

6.2. ARCHAEOLOGICAL EVIDENCE INSIDE AND OUTSIDE THE PENINSULA

6.2.1. Some Major Sites

Research has focused on cave sites where preservation is usually better. Several of them also include earlier archaeological deposits and have been quoted or described in the previous chapters. At multilayered sites, we accordingly concentrate on the evidence related to a Gravettian/Early Epigravettian occupation.

6.2.1.1. The Grimaldi or Balzi Rossi Caves (Liguria)

Most, or maybe all, the caves that open in Balzi Rossi cliffs at the boundary between France and the Italian peninsula were settled during the period under consideration (Fig. 6.3). However, as they were mostly excavated during the pioneering age of Paleolithic archaeology, not much of the evidence is of any use for scientific purposes. As far as the Upper Paleolithic is concerned, the richest site probably was Barma Grande, but the Upper Paleolithic record from this cave is nearly lost (Bolduc *et al.* 1996). The research has been better directed only at a couple of sites, Gr. dei Fanciulli and Riparo Mochi.

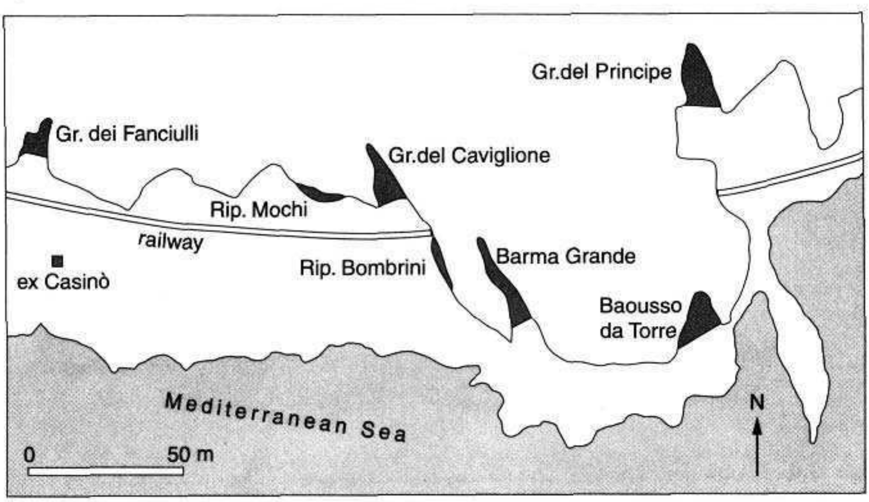

Figure 6.3. The Grirnaldi or Balzi Rossi sites.

6.2.1.1.a. Grotta dei Fanciulli (or Grotte des Enfants). This site was excavated by E. Riviere and then by the team of Prince Albert I of Monaco (De Villeneuve *et al.* 1906–1919; Riviere 1887). The deposit was divided into foyers or "hearths," equivalent to thick layers. The stratigraphic sequence as well as the origin of the assemblages are known in some detail (Fig. 6.4).

At the bottom there are layers with scarce Mousterian industry, excavated in the 1920s and 1930s, and then levels K and I, with a small amount of Aurignacian tools. Level H includes the earliest Gravettian tools, unfortunately mixed with materials from the underlying deposit. Some are broad and rather thick blades, retouched along most of their margins, pointed at one, or, more often, both ends, called "Arenian points," and also found with later industries of the region. A double burial was dug from the bottom of level H–to which it belongs–into level I.

The preserved collection of 221 tools from the overlying level *G* was defined as a Gravettian (or Perigordian) Vc (i.e., with Noailles burins) by G. Onoratini and J. Da Silva (1978) (Table 6.3). The faunal assemblage is devoid of really cold species: different deer were recognized (roe deer, red deer, and possibly fallow deer), as well as ibex, a bovid, and hares, while carnivores are represented by leopards and foxes. The corpse of an adult man was buried excavating a pit from this level into level H: the inhumation is accordingly related to level G.

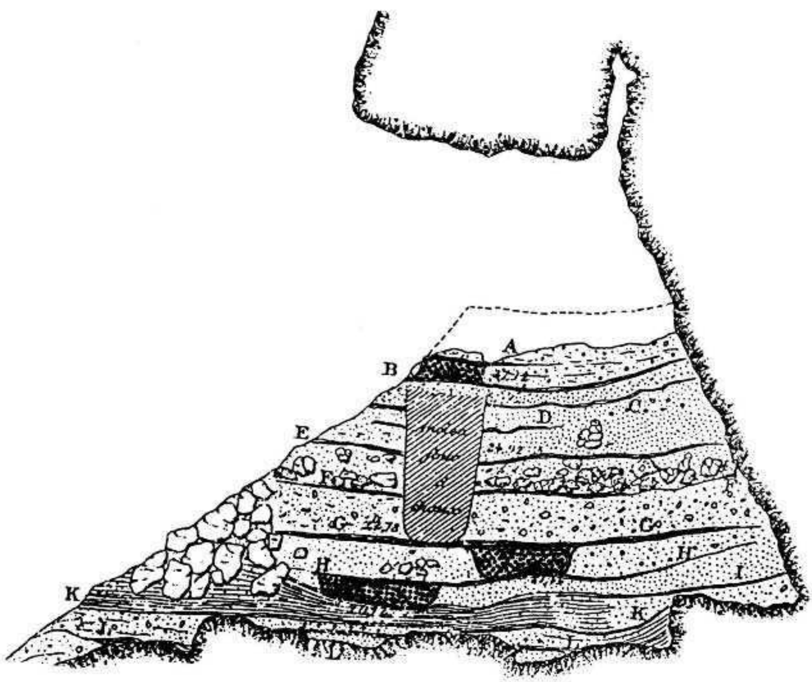

Figure 6.4. Grotta dei Fanciulli. The stratigraphic sequence. The double burial of level C was discovered by E. Riviere in a different part of the deposit. Note that the burial pits are stratigraphically related to the levels directly overlying them (source: De Villeneuve *et al.* 1906-1919).

Table 6.3. Grotta dei Fanciulli. Inventory of the Lithic Tools of Levels G and F.[a]

Type list	Level G n	Level F n
Single endscraper	23	12
Double endscraper	2	2
Endscraper on retouched blade	10	10
Fan-shaped endscraper	4	3
Endscraper on flake	7	-
Thumbnail endscraper	11	-
Carinated endscraper	-	1
Endscraper-burin	4	1
Endscraper-truncation	7	2
Borer-truncation	-	1
Borer-endscraper	-	1
Borer	2	1
Atypical borer	-	1
Dihedral burin	21	1
Angle burin on break	7	2
Multiple dihedral burin	2	-
Busked burin	1	-
Burin on truncation	23	4
Multiple burin on truncation	1	-
Multiple mixed burin	6	2
Noailles burin	5	-
Gravette point	2	5
Microgravette	3	6
Atypical shouldered point	5	3
Truncation	10	2
Blade with continuous retouch, one edge	8	10
Blade with continuous retouch, two edges	3	7
Notch	9	16
Sidescraper	11	1
Truncated bladelet	1	1
Backed bladelet	7	3
Truncated backed bladelet	3	-
Pointed blade	14	14
Miscellaneous	9	5
Total	221	117
1G =	25.79	23.93
IB=	29.86	7.69

[a]After Onoratini and Da Silva (1978).

The industry of level F presently includes slightly more than 100 tools and was termed “Arenian” by Onoratini and Da Silva (1978) (Table 6.3). After A. Palma di Cesnola (1979), it belongs instead to a late phase of the Early Epigravettian. Ibex is the most frequent species, accompanied by red deer, possibly fallow deer, as well as some horses and wild boars. A single bone was identified as belonging to *Equus hydruntinus,* the little hydruntine horse, and another one, exceptionally, to *Rangifer tarandus,* the reindeer, rarely if ever found in Italy outside the Balzi Rossi. A bovid, as well as wolf, bear, and hare remains are also mentioned.

Table 6.4 . Riparo Mochi. Inventory of the Lithic Assemblages of Levels D (Excluding f. 3.6) and C. [a]

Type list	Level D (f-f 3.5) n	Level C n
Single endscraper	39	15
Double endscraper	3	3
Endscraper on retouched flake/blade	59	12
Circular endscraper	-	5
Carinated endscraper	14	-
Flat nosed endscraper	13	5
Endscraper-burin	10	1
Endscraper-truncation	2	-
Borer-endscraper	1	-
Borer-burin	1	-
Borer	2	1
Dihedral burin	56	15
Burin on break	21	6
Burin on truncation	50	17
Multiple mixed burin	51	6
Noailles burin	24	-
Burin-truncation	1	1
Graverte point	24	5
Atypical Gravette point	4	1
Microgravette	193	3
Shouldered point	13	2
Shouldered blade	5	-
Backed blade	12	3
Truncated backed blade	-	3
Truncation	16	5
Blade/bladelet with continuous retouch	122	41
Retouched flake	26	23
Notch	40	18
Denticulate	30	22
Sidescraper	16	13
Triangle	1	-
Backed bladelet	42	2
Truncated backed bladelet	8	3
Point	8	3
Total	907	231
Blades and flakes	not rep.	not rep.
Resharpening blades/flakes	81	16
Burin spalls	79	6
Scaled pieces	9	1
Cores	118	60
Utilized/Modified pebbles	6	8

[a]Adapted and recalculated from Laplace (1977).

6.2.1.1.b. Riparo Mochi . This rock shelter was located less than 100 m east of Gr. dei Fanciulli, and it is not clear whether it was a preferred spot or just a marginal area (Fig. 6.3). In fact, as it escaped attention during the early phase of research and was first excavated by A. C. Blanc in 1938, it is now a kind of reference site, even though it is only known from preliminary publications (Blanc 1938; 1953; Laplace 1977; Renault-Miskovsky 1972; Vicino *et al.* 1976).

At the bottom of the stratigraphic sequence are Mousterian and Aurignacian layers (see 5.1.3) (Fig. 5.7), and then level D, 1.65m thick, which is of cryoclastic origins. The pollen analysis suggests an open and steppe-like landscape, dominated by Cichoriae, with just a few trees. Interestingly, they include Oleaceae and *Quercus ilex* (i.e., termophilous Mediterranean species). Apparently, the area was a refugium that allowed them to survive the rigors of glacial times. Ibex, red deer, and marmot were living in the surroundings of the cave. Shellfish—such as *Mytilus* sp. and *Patella* sp.-were collected, while other marine shells, such as *Cyclope neritea,* as well as fossil ones, were perforated to be used as ornaments. Ochre fragments were noticed.

Ash and charcoal accumulations are indicative of recurrent human occupation of the rock shelter. The industry is abundant, even considering the depth of the deposit, which, furthermore, was excavated over a vast area: approximately 850 retouched lithic implements (contrasted with a few fragments of bone tools) (Table 6.4). Burins outnumber endscrapers and include forty-four Noailles burins, while most of the c. 300 backed tools are microlithic.

On the top of level D, level C is another cryoclastic level. It is presently approximately 50 cm in thickness, but some residual deposits on the rock shelter walls suggest that 1.5m of extra deposit was eroded by running water. The animal species—including shellfish—are similar to those of level D. The industry is much scarcer: some 200 tools were recognized in the preliminary publications (Table 6.4). This industry has been variously described as final Gravettian (Laplace 1977), Early Epigravettian (Palma di Cesnola 1979), or Protoarenian (Onoratini and Da Silva 1978) by different scholars, and the inferred date varies accordingly from 22,000 to 20,000 years bp.

6.2.1.2. Grotta La Cala (Campania)

The cave opens in the cliffs of the Cilento coast, south of Kaples (Bartolomei 1975, 1980; Bartolomei *et al.* 1975; Palma di Cesnola 1971; Sala 1983). As at other sites, the stratigraphic sequence starts with Mousterian and Aurignacian layers. In the inner part of the cave, after a stratigraphic discontinuity, Gravettian industries are found in a thin layer within a stalagmite—stalagmite B—and then in level Q, 40–70 cm in thickness. More recently, Gravettian layers, correlated with the lower part (i.e., stalagmite ß) of the sequence, have also been excavated at the entrance of the cave (Benini *et al.* 1997; Boscato *et al.* 1997). They have been labeled "GB."

While, not surprisingly, the remains found in ß are scarce, 2,400 lithic tools are described from level Q (Fig. 6.5). Burins are overwhelming, with more than 900 (*sensu* Laplace: see 6.2.3) compared to some 200 endscrapers. Burins on a truncation occur most frequently and include a handful of Noailles burins. There are less than 200 backed tools, often broken, and usually small-sized (Table 6.5). The faunal assemblage is dominated by red deer, which account for 75–90 percent of the identified bones in the various sublevels (Table 6.1; Fig. 6.13).

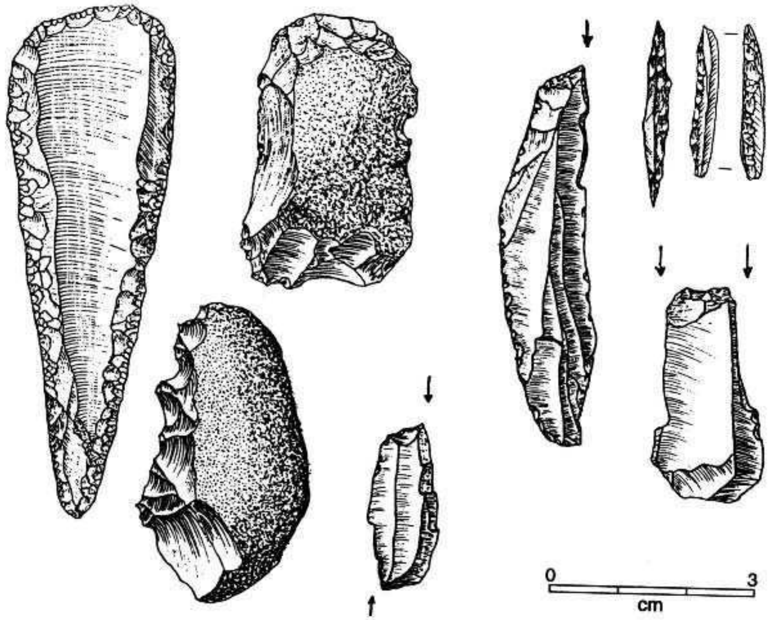

Figure 6.5. Grotta La Cala. Lithic tools from level QIV (source: Palma di Cesnola 1971).

Table 6.5. Grotta La Cala. Inventory of the Lithic Tools of Level Q.[a,b]

Type list	n
Endscraper	162
Endscraper-burin	22
Borer	25
Burin	403
Gravette/microgravette	159
Backed blade/bladelet	19
Truncated backed blade/bladelet	3
Fragment of backed tool	134
Truncation	68
Blade with continuous retouch	273
Notch	91
Denticulate	112
Sidescraper	329
Pointed blade	29
Total	1829

[a]Adapted and recalculated from Palma di Cesnola (1971) in order to give actual numbers of tools, as opposed to the *types primaires* of the Laplace system.

[b]Specific tool types. such as Noailles burins, are not identified as such.

Radiocarbon dates for level Q are as follows, from bottom to top: 27,400 ± 1720 bp (F-24); 28,230 ± 2,460 bp (F-23); 27,530 ± 2,360 bp (F-22). Those are conventional C14 dates. At the entrance, in the earlier level GB, AMS dates gave the following results: 26,380 ± 260 (OxA-5670) and 26,880 ± 320 (OxA- 5669).

6.2.1.3. Grotta Palicci (Apulia)

The site is in an inner position at the foot of Monte Gargano and in front of the plain of Foggia, at 100 m as1 (Fig. 7.24). It is 60 m or more deep, with a rather articulated development not found at all Italian Paleolithic caves (Fig. 6.6). Excavations were started by F. Zorzi in the early 1960s and have been continued by A. Palma di Cesnola over the past twenty years (Bartolomei 1975; Borgognini-Tarli *et al.* 1980; Boscato 1994; Martini 1975; Mezzena 1975; Mezzena and Palma di Cesnola 1989–1990; Palma di Cesnola 1975, 1978, 1988, 1993a; Sala 1983). Limited evidence of Mousterian and Aurignacian occupation has been found during recent excavations, but most of the stratigraphic sequence yielded Gravettian and later industries (see 7.1.4). The evidence is exceptional, including very abundant lithic assemblages, well-preserved animal remains, as well as burials and works of art, and a series of more than thirty radiocarbon dates only for the levels under consideration here. The latter have been subdivided as follows. from the bottom:

- Level 22 (approximately 10 cm thick) “undifferentiated” Gravettian (see 6.2.2 for a discussion).
- Level 21 (65 cm) Gravettian, with backed tools totaling c. 50 percent of the assemblage, usually small-sized, a single tanged point, and burins (mostly on a truncation) outnumbering endscrapers.
- Levels 20–19b (90 cm) Gravettian, with backed tools totaling c. 50 percent of the assemblage, many of them tiny backed and truncated elements (Fig. 6.7), and endscrapers slightly outnumbering burins.
- Levels 19a–18b (70 cm), Final Gravettian, with backed elements with a markedly oblique truncation and others being almost lunates (Fig. 6.7).
- Level 18a (30 cm), initial Early Epigravettian, with only 120 tools, 17 of which are backed.
- Level 17 (50–60 cm), Early Epigravettian, with leaf-shaped tools (see 6.2.7 for a discussion).
- Levels 16–12 (approximately 200 cm thick), Early Epigravettian, with shouldered tools, the latter occurring in a diminishing percentage through the stratigraphic sequence.
- Levels 11–10 (approximately 60 cm thick), final phase of the Early Epigravettian.

The conventional radiocarbon date of the Gravettian 1evels was established in the early 1960s as ranging from 24,720 ±420 (F-55) in level 21d, to 20,200 ± 305 in level 18b2 (Fig. 6.8). The Early Epigravettian levels were not dated except for level 10, with a date of 15,320 ± 250 (F-68). The age of the Early Epigravettian levels underlying level 10 was accordingly expected to fill the time interval of 15,000 to 20,000 years. Following more recent determinations from the Groningen,

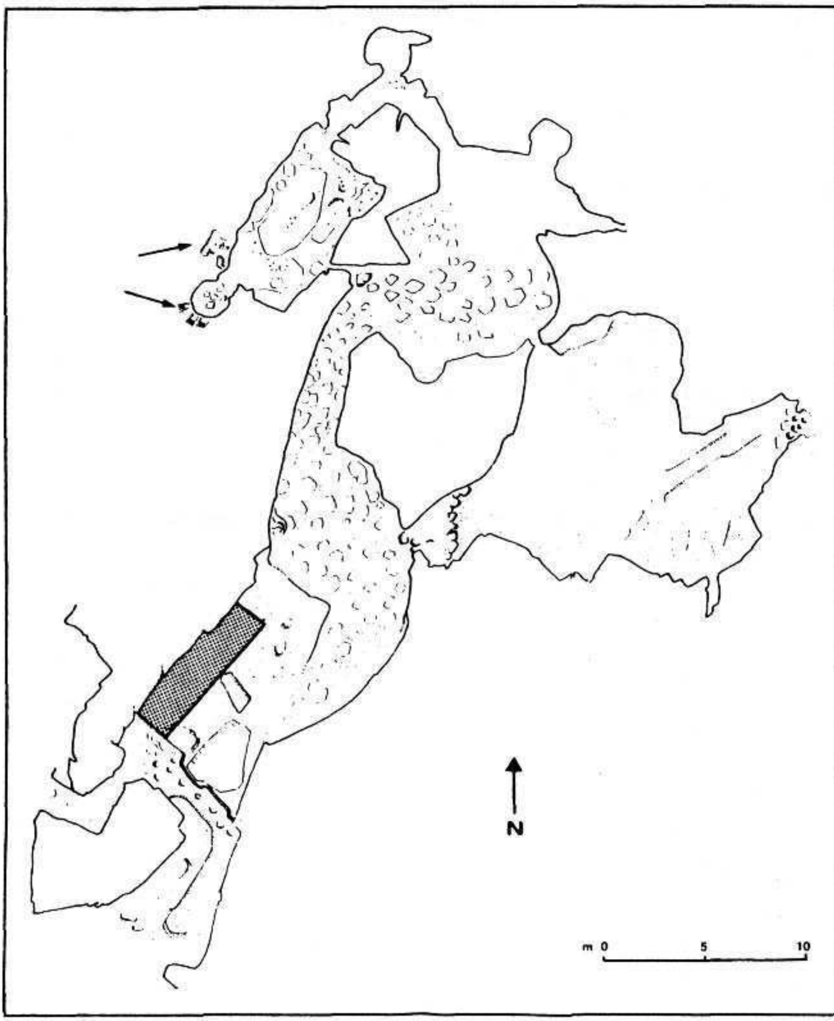

Figure 6.6. Grotta Paglicci. Plan of the cave, with the excavated area (dotted), and the painted hands and horses in the rear cave (arrows) (source: Palma di Cesnola 1988).

Utrecht, and Rome laboratories, it seems, however, that most (or possibly all) the Early Epigravettian sequence is later than 18,000 bp, leaving a time gap during which sedimentation possibly stopped or erosion removed part of the deposit (Fig. 6.8). Two more Gravettian levels have also been excavated in the deepest part of the stratigraphic sequence and recently dated as follows (Utrecht–laboratory numbers not provided): 26,800 ± 300 bp (lev. 22B); 28,300 ±400 bp (lev. 22F4); 28,100 ±400 bp (lev. 23A); 26,300 ±400 bp (lev. 23B) (Palma di Cesnola 1993b).

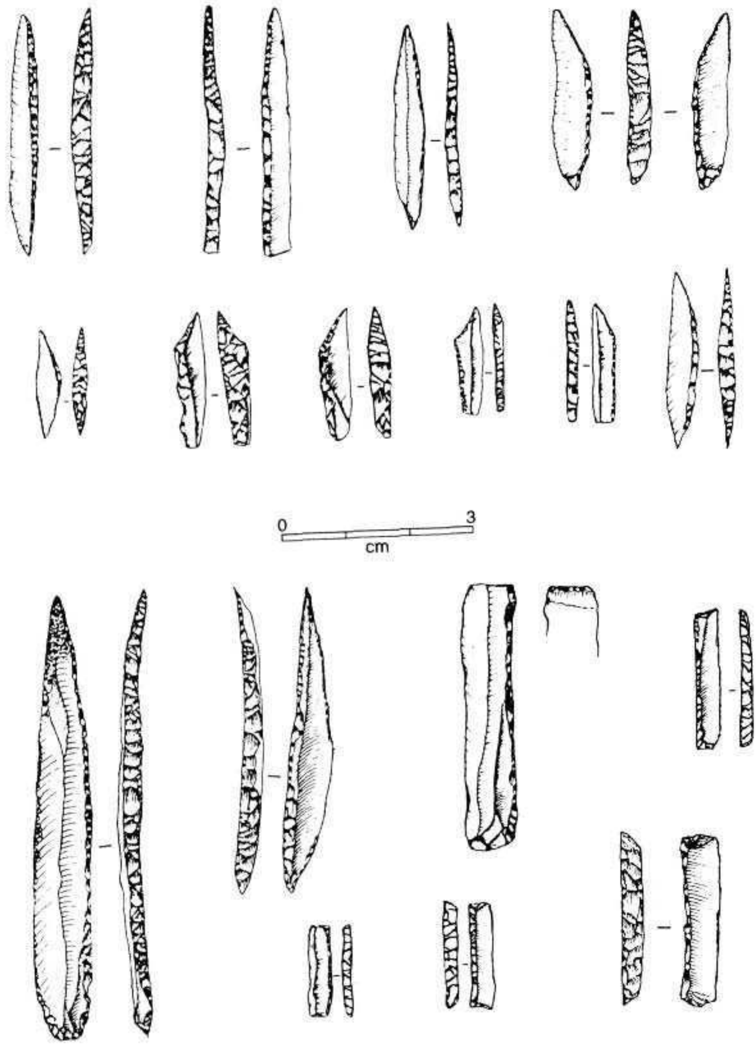

Figure 6.7. Grottn Paglicci. Backed tools from the Gravettian levels. Top rows: from levels 19-18b. Bottom rows: from level 20 (source: Palma di Cesnola 1975).

Animal species are found in varying percentages in the different levels, but not many different species are represented. The ungulates, which have been studied in more detail, are typical of open environments, with ibex—accompanied in the lower levels by charnois—and horse comprising most of the assemblage (Table 6.1; Fig. 6.9). Carnivores are rare, and include wolf, fox, lynx.

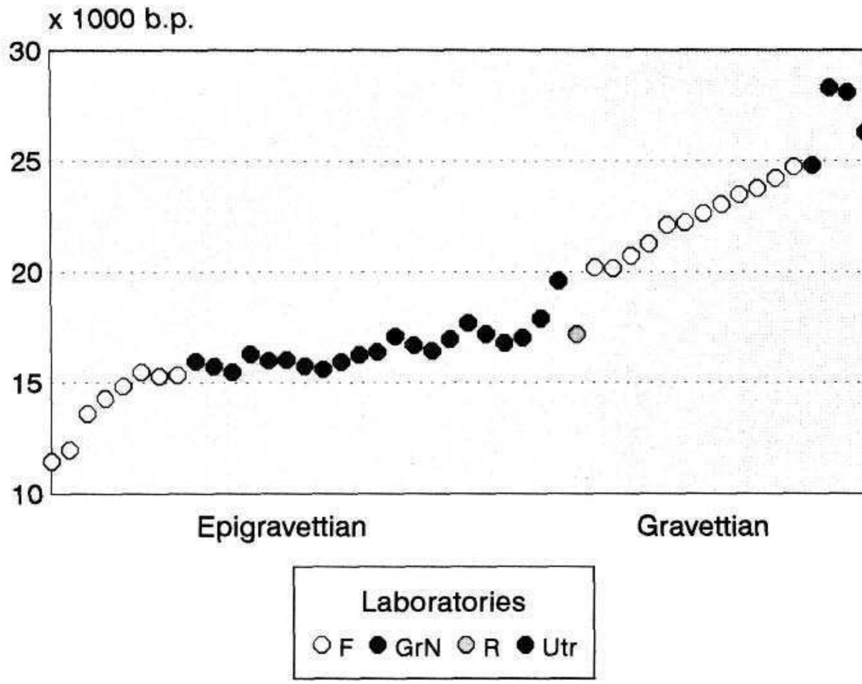

Figure 6.8. Grotta Paglicci. The central values of the C[14] dates, arranged in stratigraphical order.

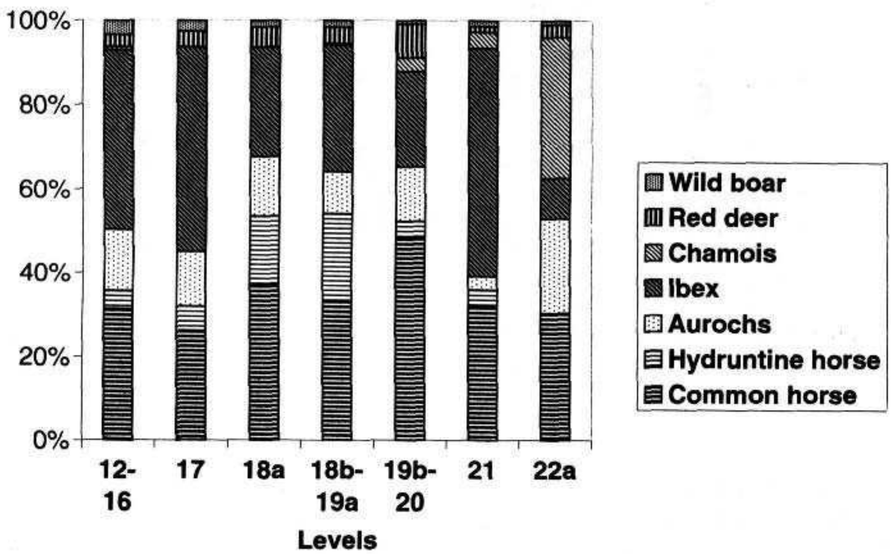

Figure 6.9. Grotta Paglicci. The ungulates of levels 22a to 12 (based on Sala 1983). Total NISP = 7,629. *Capreolus carpreolus* the roe deer, totaling four more specimens, is omitted.

6.2.2. The First Gravettian Evidence and the Hiatus in the Archaeological Record

The typological characteristics, radiocarbon dates, or stratigraphic position of a few Gravettian assemblages suggest a date in excess of 25,000 years.

At Gr. dei Fanciulli, or *Gr. des Enfants,* the oldest Gravettian deposit is layer *(foyer)* H. Onoratini and Da Silva (1978) argue that the lithic assemblage can be defined as Gravettian IV. It is typologically close to industries from Provence and, accordingly, would precede the Tursac temperate oscillation, dated to around 24,000–23,000 bp.

Farther south, Riparo del Sambuco was excavated by U. Rellini during the first decades of this century. The extant collection includes large Gravette points, Arenian points, some backed and truncated elements, and possibly a *fléchette* (Mussi and Zampetti 1985). Attribution to Gravettian IV can be neither proven nor dismissed.

In Campania at Gr. La Cala, levels Q VI–V, Q IV, and Q III-I, with a rich Gravettian Vc industry, including a few Noailtes burins, are dated to 27,400 ± 1,720 (F-24), 28,230 ± 2,460 (F-23), and 27,530 ± 2,360 (F-22), respectively. The central values are high, and the dates were quoted as evidence of an early Gravettian stage in ltaly (Otte 1985). Recent AMS dates do not support this hypothesis (see 6.2.1). Overall, inconsistencies are found in the date sequence of this site (Table 6.6).

In Veneto, at Gr. del Broion, a handful of lithic implements were found in levels E and D. Palynological analyses and correlations suggested they were deposited between 30,000 and 28,000 bp (Cattani and Renault-Miskovsky 1983-1984; Leonardi and Broglio 1962–1963). Dates of 25,250 ± 280 bp (UtC-2693) for level E and 24,700 ± 400 bp (UtC-2694) for overlying level D now point to a later age (Broglio and Improta 1994–1995).

The earliest, well-dated Gravettian evidence is found at Gr. Paglicci in Apulia, where level 21 has five radiocarbon dates ranging progressively from 23,040 ± 380 bp (F-51) to 24,720 ± 420 bp (F-55). The underlying levels 22 and 23, also with a Gravettian industry, have slightly contrasting dates in the range of 26,000-28,000 bp (see 6.2.1) (Fig. 6.8; Table 6.6).

As seen in Ckapter 5, no Aurignacian site can be dated to later than 30,000 bp, and the Uluzzian disappears even earlier. The evidence for human occupation in Italy between 30,000 and 25,000 bp is sparse and requires further comment. The new and earlier dates of c. 25,000–28,000 bp, in fact, are related to improvements in radiocarbon dating techniques, and to AMS systems: they cannot be flatly compared to the conventional 30,000 bp for the end of the Aurignacian (see 5.1.4 for a discussion of different C14 dating techniques).

In an attempt to fill the gap after the Aurignacian, the lithic industry from the lowest part of late Gravettian (i.e., Gravettian V) deposits at Riparo Mochi, Gr. La Cala, and Gr. Paglicci, has been isolated and renamed ‘‘undifferentiated Gravettian” or “Gravettian with pointed backed tools” (Palma di Cesnola and Bietti 1983). A significantly older date cannot be proven; furthermore, this questionable procedure lumps together restricted assemblages quite different from each other.

Even if some human groups were present in Italy between 30,000 and 25,000 bp, we assume that it was a very sparse and possibly intermittent occupation (Table 6.6). After 25,000 bp (in conventional radiocarbon chronology) the settlement of new human groups led to a definitive occupation of the peninsula and, later on, of Sicily.

6.2.3. Typology, Problems of Terminology, and Criticism of the "Laplace System"

Many of the problems encountered when trying to interpret the Gravettian and Epigravettian, including the chronology and the date of the earliest Gravettian, derive from the widely accepted "Laplace System."

As noted in the previous chapter (see 5.1.1), in the late 1950s, the French archaeologist Georges Laplace examined and classified most of the Italian Upper Paleolithic industries then available. Eventually, in 1966, he published his monograph, *Recherches sur l'Orgine et l'Evolution des Complexes Leptolithiques,* a landmark in the study of Italian prehistory.

Laplace's ideas are not easily synthesized. They derive from a Marxist approach, which he called *méthode dialectique* (Laplace 1964, 1966). Broadly speaking, the evolution of Upper Paleolithic lithic assemblages, more or less equated with Paleolithic cultures, follows innate or "structural" trends initiated by the invention of blade technology. The interaction between this evolution and the external constraints of a changing environment led to the production of chronologically and geographically distinct assemblages. The same pace of evolution is expected in different areas, and the system is applied all over the Mediterranean basin and western Europe.

To achieve this result, much emphasis is given to a unified typological analysis, the *typologie analyrique,* with exactly the same type list used everywhere. It is based on a very formal approach to tool morphology. For example, a type of retouch being sitnply "retouch," and a notch, simply a "notch," Laplace labels as "B9" or *burin sur retouche d'arrêt,* a Noailles burin, a *burin busqué,* or a *burin bec-de-perroquet.* On the other hand, following different morphological variations, a Noailles burin can also be termed "B4," "B5, "B6," "B7," or "B8." These are the so-called *types primaires,* or broad groups of types, and Laplace emphasizes that more detailed definitions must be elaborated, leading to *types secondaires.* However, this more specific level of inquiry is rarely attained by researchers working with the Laplace system.

It also has to be stressed that in this formalistic approach, a multiple tool such as a double endscraper, or an endscraper-burin, must be counted as two or more separate tools. Thus, when formulating the many indices that Laplace makes use of, this same tool may be counted as two endscrapers, or as an endscraper and a burin.

The philosophical basis of this system has been largely ignored by Italian researchers, who use the *typologie analytique* simply as a type list. Exceptions are also made for the sake of international communication, and a description of selected types is sometimes added in a more conventional terminology.

Table 6.6. The Main Stratigraphic Sequences at 30-20 ka. M = Many Archaeological Remains: F = Few Archaeological Remains; 0 = No Archaeological Evidence (after Mussi 2000).[a]

Years bp	Riparo Mochi		Gr. Aiene Candide		Riparo di Fumane		Grotta La Cala		Grotta Paglicci	
	Lev	C14	Lev.	C14	Lev.	C14	Lev	C14	Lev	C14
Epigr.			P8 F	19,630±250					17e M	19,600± 300
20 ka									18b2 *M*	20,200 ±305
			P9 *F*	20,470 ± 320					18b3 *M*	20,160 ± 310
Grav.	C *M*								19a *M*	20,730 ± 290
			P10 *F*						20b *M*	21,260 ± 340
22 ka			P11 *F*	Cave bear den					20ca *M*	22,220 ± 360
									20cb *M*	22,110 ± 330
									20de *M*	22,630 ± 390
Grav.			P12 *F*	23,450±220			QI *M*		21a *M*	23,040 ± 380
							QII *M*	27,530 ±2360	21h *M*	23,470 ± 370
24 ka							QIII *M*		21c M	23,750 ± 390
							QIV *M*	28,230±2460		24,210 ± 410
Grav.			P13 *O*	25,620±200			QV *M*	27,400 ± 1720	21d *M*	24,720 ± 420
				25,620±220			QVI *M*		22b *M*	24,800 ± 300
26 ka					Dld *F*		GL *?*			
							GB1 *M*	26,380 ± 260	22c *M*	
Grav.	D *M*				Dle *F*		GB2 *M*		22d *M*	
							GB3 *M*	26,880±320	22e *M*	
									22F4 *M*	28,300 ± 400
28 ka									23A *F*	28,100 ± 400
	O								230	26,300 ± 400
Aur.							AU10 *F*		23C *O*	Hyena den
							AU11 *M*		24A1	29,300±600
30ka	F *F*						AU12 *M*		24A2 *F*	
							AU13 *M*	27,050 ±850		
Aur.					D3a M			29,850 ±870		
32 ka	G50 M	32,280 ± 580			D3b M	32,300±400				

[a]Sources: Ripro Mochi Hedges *et al*. 1994; Laplace *1977*. *Gr. delle Arene Candide*. Bietti and Molari 1994; Cassoli and Tagliacozzo 1994. *Riparo di Fumanc*. Rroglio and Improta 1994-1995; Cassoli and Tagliacozzo 1994. *Gr. La Cala*. Benini *et al*.1997; Roscato *et al*. 1997. *Grotta Paglicci*. Boscato 1994; Palma di Cesnola 1988, 1993.

Innovations have also been introduced. The term "Tardigravettian," chosen by Laplace for industries later than the Gravettian, was changed into "Epigravettian," which implies a more autonomous development (Bartolomei *et al.* 1979). The chronological subphases of Early Epigravettian, Evolved Epigravettian, and Final Epigravettian have received a different and more precise definition (see also 7.1.2). Some of the subdivisions of the subphases have been changed: the "phase with *pointes à faceplane"* of the Early Epigravettisn, for instance, has disappeared.

However, specialized activities, differences in the reduction sequence, sampling bias, raw material characteristics and availability, which are causes of inter- and intrasite variability and widely taken into account by modern research, do not fit into Laplace's system and are not considered even in recent papers. Assemblages are still expected to "evolve''everywhere in the same way and at the same pace, even if regional diversification is accepted.

It is impossible to translate the description of an assemblage studied in this way into a different system. Comparisons with industries outside Italy are therefore limited, unless they have also been studied using a different approach. These difficulties can be exemplified by in the assemblages of Liguria, the coastal stretch of land in northwestern Italy, next to the border with France, where many important sites are found. Here, the industries of Gr. dei Fanciulli and nearby Riparo Mochi, studied independently by Laplacian and non-Laplacian scholars, have been given different names and have a different cultural and chronological attribution (see 6.2.1).

6.2.4. An Evaluation of the Stratigraphic Sequence of Gr. Paglicci (Apulia) as a Reference Sequence for the Whole Peninsula, with Southeastern France as an Alternative Reference Area

The most complete stratigraphic sequence for the Italian Upper Paleolithic is to be found in Apulia, at Gr. Paglicci (see 6.2.1 and 7.1.4). It ranges from the Aurignacian to the Gravettian and Epigravettian, ending at c. 11,000 bp, when the entrance was closed by falling rocks. Another stratigraphic sequence that covers most of the Upper Paleolithic is found at Gr. La Cala, on the coast south of Naples.

As a result of the detailed typological study of the lithic assemblages, coupled with a series of radiocarbon determinations, and with the expectations of the Laplace System, Gr. Paglicci has become a reference and standard not only for Apulia, but also for the whole peninsula, including Sicily. The same is true to a more limited extent for Gr. La Cala.

To establish the chronology of undated sites, comparisons with lithic assemblages of well-dated sequences are obviously very useful. However, we cannot expect that changes in typology and percentages of types observed in one or two sites of southern Italy will also occur all over the peninsula and in Sicily. This is all the more so when we consider that Gr. Paglicci is situated in a geographically marginal area and contains some very peculiar assemblages not found elsewhere (or only in Apulia itself; see 6.2.6). Therefore, to establish the date of some sites of the northwestern quarter of Italy, reference is made to sites in French Provence. Alternative explanations are also put forward to explain the observed variability.

6.2.5. The Gravettian with Noailles Burins: Europe and Italy

Among the Gravettian assemblages, the so-called Gravettian with Noailles burins, or Gravettian Vc (or Perigordian Vc) is characteristic of southwestern Europe (David 1985; Otte 1985; Schmider 1992). It is found in Provence, where it is preceded around 28,000 bp by Gravettian IV, which includes large, carefully retouched pointed blades, the "Arenian points," and a few Noailles burins (Onoratini 1982, 1983). The latter are tiny burins on a truncation (usually multiple), with notches aimed at controlling the length of the burin spalls.

There are not many Italian assemblages that can be termed "Gravettian," and even fewer with Noailles burins (Mussi 1992). These have been found at sixteen sites (at ten as single specimens), the largest concentrations being from Riparo Mochi, one of the latest excavated Grimaldi caves (forty-four specimens), and from Bilancino in Tuscany, a newly discovered site where they number more than 100 (Aranguren and Revedin 1996). All together, they number approximately 200, compared to the hundreds, or thousands, found at single French sites such as Roc de Gavaudun, Abri des Battuts, Abri Ragout, and so on (Alaux 1971; Bordes *et al.* 1964; Tixier 1958). Surprisingly, several come from open-air sites, including uncontrolled surface collections, at which these tiny tools can easily be overlooked.

Despite this, Italian assemblages with Noailles burins are quite similar to those of the rest of western Europe, and their classification as Gravettian Vc is appropriate. They are found mainly on the Tyrrhenian side of the peninsula (but see 6.2.6), down to Campania and Gr. La Cala level Q, whose radiocarbon dates with an exceedingly large standard deviation have been discussed. Bilancino is the other dated site with Noailles burins, with three determinations: 24,990 ±110 bp (Beta-93271); 24,220 ± 100 bp (Beta-93272); 25,410 ±158 bp (Beta-106549) (Aranguren and Revedin 1997). On stratigraphic ground, G. Onoratini and J. Da Silva (1978) correlate level G at Gr. dei Fanciulli and level D at nearby Riparo Mochi (both with Gravettian Vc industries), to the Tursac stage, giving a conservative estimate of their date at 24,000 to 23,000 bp.

East of Italy, in the western Balkans, Gravettian sites of comparable date are very few in number. Radiocarbon determinations in the range of 26,000–25,000 bp are quoted from Sandalja II, Velika Pecina, and Asprochaliko (Bailey and Gamble 1990). However, there were major technical problems running the radiocarbon samples from Asprochaliko, whose date is not guaranteed (Gowlett *et al.* 1987), and the assemblages are restricted.

The evidence for a Gravettian settlement in northeastern Italy (i.e., in the area adjacent to the Balkans) is extremely scarce. A Balkan origin for the human groups who made these industries cannot be substantiated. Southeastern France is a reasonable candidate for the area from which originated most, if not all, of the Gravettian found in Italy.

6.2.6. The Evidence for other Gravettian Assemblages, Including Those with Font Robert Points

The presence in Italy of a Gravettian with Font Robert points, or Gravettian Va, was claimed by A. Palma di Cesnola and A. Bietti (1983). This hypothetical variant was found in Apulia at Gr. Paglicci, where a single-tanged point was discovered in level 21 and classified as a Font Robert point (actually, an atypical one), that is, the index type of Gravettian Va (Palma di Cesnola 1975). As noted earlier (see 6.2.2), the radiocarbon dates are in the range of 25,000 to 23,000 bp. The industry includes more burins than endscrapers, and burins on a truncation are more frequent than dihedral burins; in a Gravettian Va assemblage,

cept for the lack of Noailles burins, which are found in open-air sites of the region (e.g., Foresta Umbra and Vico del Gargano; see 6.3.2), this is a Gravettian Vc industry. Furthermore, bone points similar to the *pointes d 'Isturitz,* which in France are typically associated with Gravettian Vc industries (Alaux 1971; De Sonneville-Bordes 1971), were found in levels 21b and 18b3 as well (Mezzena 1975).

Noailles burins being exceedingly rare in Italy, and the Font Robert point so far a unique occurrence, we maintain that the Gravettian V industries of Italy as a whole are not substantially different from what is usually called Gravettian Vc (Mussi 1992). The peculiarities of the assemblage found in Gr. Paglicci level 21 are best interpreted by taking into account the geographical isolation of the site in a remote area of the peninsula.

This is even more clearly seen in the industry of overlying level 20-19b, which includes a high percentage of truncated backed bladelets, some being rectangles. The other site with a similar industry is Gr. delle Veneri, on the heel of the Italian boot (Palma di Cesnola and Bietti 1983). Similar truncated tools are found in western Europe in the Gravettian Vb and also with other Gravettian V assemblages, and, later on, in the Arenian of southeastern France. They are clearly linked to specialized hafting techniques, but it cannot be determined whether or not, in southeastern Italy, they are the result of independent innovation.

The arch-backed and obliquely truncated backed elements of the overlying levels of Gr. Paglicci (19a-18b), dated around 21,000–20,000 bp, are even more peculiar, as similar armatures are not known at any other site.

6.2.7. The Early Epigravettian Compared to other European Evidence, Including Arenian and Solutrean

The Early Epigravettian begins at 20,000 bp and is currently divided into three phases (Palma di Cesnola and Bietti 1983): Initial Early Epigravettian, Early Epigravettian with leaf-shaped tools, and Early Epigravettian with shouldered tools. The first two stages are quite short, finishing around 19,000 bp.

According to Laplace, the Early Epigravettian as a whole was contemporaneous with the Solutrean. However, as the Early Epigravettian with shouldered tools is now known to finish around 16,000 bp in an uncalibrated radiocarbon chronology, it also has to be equated with part of the Magdalenian.

Only a handful of sites are representative of the first two phases. The major ones are Riparo Mochi level C and Gr. Paglicci level 18a for the Initial Early Epigravettian and Gr. delle Arene Candide (lowermost levels), and Gr. Paglicci 17 for the Early Epigravettian with leaf-shaped tools (Palnia di Cesnola and Bietti

1983). G. Onoratini and J. Da Silva (1978) disagree. In their opinion, Riparo Mochi level C is similar to the Protoarenian of Provence, which is dated to around 22,000, while level 18a of Gr. Paglicci was found during the 1960s by Zorzi, but not by A. Palma di Cesnola (1988), during more recent excavations. Therefore, the sample of Initial Early Epigravettian could well be almost nonexistent.

Another questionable aspect of the subdivision relies on the definition of leaf-shaped tools. Using Laplace's approach, leaf-shaped tools were clearly required to demonstrate parallelism with the Solutrean. However, truly leaf-shaped tools are exceedingly rare in Italy (Mussi 2000). Several of those described at sites from Liguria, Tuscany, and Latium are only tools with invasive retouch and are often quite thick. This is the case with several Arenian points, similar to those found in Provence, which would not be classified as leaf-shaped outside Italy.

The only deposit with a significant percentage of supposedly leaf-shaped tools is Gr. Paglicci level 17, where 24 out of 254 tools can be placed in this category *(sensu* Laplace). They include three quite atypical scrapers and twenty-one points, four of which are shouldered. The retouch is invasive but neither bifacial nor always covering the entire surface, and quite distinct from the regular and very flat Solutrean retouch. It is a stylistic attribute limited to pointed tools. Its importance should not be overemphasized, nor should it be expected to occur at any Italian site of the period.

Overall, to end with this rather intricate and even tricky matter, we rather prefer to compare the assemblages of northwestern Italy to the Arenian. In Provence, the armatures of such industries include *pointes à face plane* and Arenian points, rectangles and other geometric microliths, and many Gravette and Microgravette points (Onoratini 1982, 1983). The whole sequence lasts from c. 22,000 to 15,000 bp. Dates in excess of 18,000 bp, recently published for this part of the deposit (Bietti and Molari 1994), are in good accordance with the attribution of the industries to the Arenian by G. Onoratini (1983). For A. Palma di Cesnola and A. Bietti (1983), the upper layers belong instead to an Early Epigravettian with shouldered tools, which would accordingly be dated later.

Sites with Early Epigravettian shouldered tools are slightly more abundant but also cover a longer chronological period. Many of the shouldered tools are points (Fig. 6.10), others being blunt blades or bladelets. Known from contemporary settlements in France and Spain, they are evidence for hafting methods that were already in use in earlier periods, as they are also found with the Early Epigravettian with leaf-shaped tools, and in the Solutrean of western Europe as well (Onoratini 1982; Smith 1966; Straus 1992).

At Gr. Paglicci, the site where they are most common, their percentage diminishes from levels 16 to 10Shouldered points being projectile points, their varying number is linked to hafting and rehafting activities (differentially represented from one site to another), whereas many more were lost by the hunters outside caves and while hunting. We prefer not to consider their relative percentage as a chronological indicator, which is the interpretation favored by Laplacian scholars.

6.3. THE APPROACH TO A NEW TERRITORY

6.3.1. Explorers and Hunting Parties, Projectile Points and Their Distribution, the Elusive Sicilian Evidence, and the Adaptation to a Different Environment

The sites are not abundant: in total, only about fifty can be safely dated between 25,000 and 16,000 bp (Mussi 1992). Some are multilayered settlements, with thousands of implements indicating frequent reoccupation of a preferred spot. The lithic industries contain an array of tool types. If burins are added to endscrapers, then together these often account for well above 20 percent of an assemblage, with burins generally outnumbering endscrapers; backed tools range from 25 percent to 60 percent, and there are a variety of pointed blades, retouched blades and flakes, notches, and denticulates.

Industries from other sites are scarce, and a limited variety of types is displayed. Burins and particularly endscrapers are very rare or absent. Projectile points (i.e., backed tools and pointed retouched blades) overwhelm the assemblages. Other tool types are not always found; *débitage* is scarce and cores are often absent. Such restricted assemblages occur in the basal section of subsequently intensively occupied caves and shelters, or at sites that never became really popular during this part of the Paleolithic. Elusive evidence of this kind is not completely lacking at open-air sites, where it is admittedly difficult to locate.

At Riparo Mochi, the Gravettian Vc assemblage of level D is rich in retouched tools (c. 850) and includes a balanced percentage of burins, endscrapers, and backed tools (Table 6.4). However, if we consider only the lowermost cut (f 3.6, which is 10 cm thick), the small-sized assemblage is quite different (Table 6.7): backed tools (mostly pointed microliths) constitute an overwhelming majority of tools, while endscrapers and borers are barely present. Nine prismatic cores are mentioned. This is one of the supposedly “Gravettian with pointed backed tools” assemblages, isolated at the bottom of some Gravettian V sequences (see 6.2.2).

European Upper Paleolithic lithic assemblages with less than 1 percent endscrapers are quite unusual and certainly the result of a specialized set of activities. Analyses of wear traces consistently associate backed tools and, specifically, pointed backed tools, with hunting practices (Cahen and Caspar 1984). We therefore suggest that at Riparo Mochi, the first evidence for a Gravettian lithic industry was left by a group, or by successive groups, involved in a limited range of hunting activities.

Arma dello Stefanin is the only site dated around the Glacial Maximum so far known in Liguria outside the coastal stretch. It is situated in a small valley, 440 m asl, surrounded by mountains rising to 1,700 m. The relevant evidence comes from levels XVI to IX, with some hearths and a very sparse, or absent, lithic industry (Leale Anfossi 1962; Leale Anfossi and Palma di Cesnola 1972; Palma di Cesnola 1974). In level XVI there were a few implements: one backed and possibly shouldered point, a scaled piece, a small core, some unretouched flakes, and a blade. The animal remains comprise ibex, marmot, and lynx. The most elaborate

Table 6.7. Riparo Mochi. Inventory of the Lithic Assemblage of Level D, Cut f. 3.6. [a]

Type list	Level D (f 3.6) n
Endscraper on retouched flake/blade	1
Burin on truncation	3
Multiple mixed burin	1
Gravette point	7
Microgravette	84
Shouldered blade	1
Truncation	1
Retouched flake	1
Notch	2
Backed bladelet	5
Truncated backed bladelet	1
Total	107
Blades and flakes	not rep
Resharpening blades/flakes	4
Burin spalls	3
Cores	9

[a] Adapted and recalculated from Laplace (1977).

hearth was found in level XV. It was a kind of pavement of limestone and schist, covered by sparse ash and charcoal. On the top were three very large pairs of ibex horns and a few teeth, but no implements. In level IX, there was a lens 70 cm in diameter, containing charcoal from *Juniperus* sp., *Picea* sp., and *Larix* sp., and bones from ibex and red deer. A few lithic implements surrounded the hearth: six backed tools, including points and a shouldered point; a pointed retouched blade; five retouched flakes and blades; one notched and two denticulated flakes; two scaled pieces, a core, and fifteen unretouched flakes and blades.

Similar, but even more restricted evidence, was found in central Italy at Riparo La Calozza in Monte Circeo, where there was a lens of ashes with a handful of backed tools (Zampetti and Mussi 1984). However, these are undiagnostic, and we cannot rule out an attribution to a later Epigravettian. In the same region, Castel Malnome, close to Rome, is a rare example of documented short-lived activity outside a cave. Some 10,000 lithic implements were collected over a quite large, flat area. They are generally of Mousterian typology, and only two can be safely attributed to the Upper Paleolithic: a fragment of a backed and shouldered blade, and a Noailles burin (Taschini 1960-1961)

However, in the western part of Italy, sites with much more archaeological material, indicating prolonged and repeated settlements where many different sets of activities were carried out, were also excavated. The evidence from the northeastern part of the peninsula, between the Alps and the Apennines, is strikingly different, as no major campsite, or base camp, is known. Admittedly, a large part of the territory is now covered by the Holocene alluvium of the Po River, while the glacial northern Adriatic plain has long been changed into a sea. All the same, the area is one of the better surveyed, with systematic archaeological research under way in the last decades, and so the dearth of archaeological remains must have some significance.

Assemblages that closely correspond to "hunting kits" were found in two caves in the hills of the Colli Berici, that is, Grotta di Trene and Gr. di Paina (Aspes 1984; Bartolomei *et al.* 1983–1984; Broglio and Improta 1994–1995; Leonardi *et al.* 1958–1959). Both are elongated caves and the archaeological remains were only excavated in the inner part, because either the deposit at the entrance had been destroyed or it was found to be sterile.

The inventory is repetitive: at Grottina Azzurra, which is part of Gr. di Paina, level 7 yielded a dozen backed tools, including a fragmented Gravette point, a scaled piece, and a few unretouched flakes and bladelets. According to the typological characteristics and the relative chronology, this assemblage is Gravettian. A date of 20,200 ±240 BP (UtC-2697) has recently been obtained. In level 6, twelve large shouldered points, mostly broken, some microgravettes and other backed bladelets, and nine unretouched and fragmented flakes and bladelets are assigned to the Early Epigravettian, with a date quite similar: 19,430 ±150 BP (UtC-2043) and 20,120 ± 220 BP (UtC-2696) (Fig. 6.10).

An attribution to the Early Epigravettian was also put forward for the assemblage of Gr. di Trene level B, now dated to 17,640 ± 140 bp (UtC-2691) and 18,630 ± 150 (UtC-2692). It includes two burins, a dozen backed bladelets, some of which are microgravettes, a shouldered point, a leaf-shaped point, seven retouched blades, two notched flakes, and fifteen unretouched flakes and bladelets. Some of the implements were found in a reworked layer, but the leaf-shaped point was in an apparently undisturbed part of level B. It measures 59 x 26 x 15 mm, and the retouch is fully biracial. So far, it is unique and the only one in Italy that can be compared to Solutrean points, if only to the crude ones. Similar tools are also found in the local Chalcolitic, and the original excavators did not rule out the possibility that it is intrusive, even though no disturbance was observed during excavation.

Both caves were cave bear *(Ursus spelaeus)* dens. The other best represented species is *Alces alces,* which is unusual. If it were proven that humans, and not bears, killed the elk, it would be an interesting example of specialized hunting activities. Finding an isolated shouldered point, very similar to the ones from Gr. di Paina, a few km away at Castellon di Brosimo in a surface deposit, is a further indication of hunting activities taking place in the area (Bartolomei *et al.* 1987–1988).

At a few other sites in the region, the lithic assemblages are scarce, as at Trene and Paina, but do not concentrate on projectile points.

At Gr. del Broion, a dozen or so lithic implements were spread through levels E, D, and C (c. 1 m thick) in the Sala Grande (i.e., the central part of the cave): three burins, one endscraper, one borer, two large fragmented Gravette points, a few blades and flakes, and one core (Leonardi and Broglio 1962–1963). Six perforated deer canines were also found. Similarly scarce lithic implements come from the corresponding layers of another part of the cave, the Grottina delle Marmotte. Typology and chronology suggest occasional visits by people with a Gravettian lithic industry, in accordance with dates in the range of 25,000 bp (see 6.2.2). Not surprisingly, the fauna is characterized by the many remains of *Ursus spelaeus,*

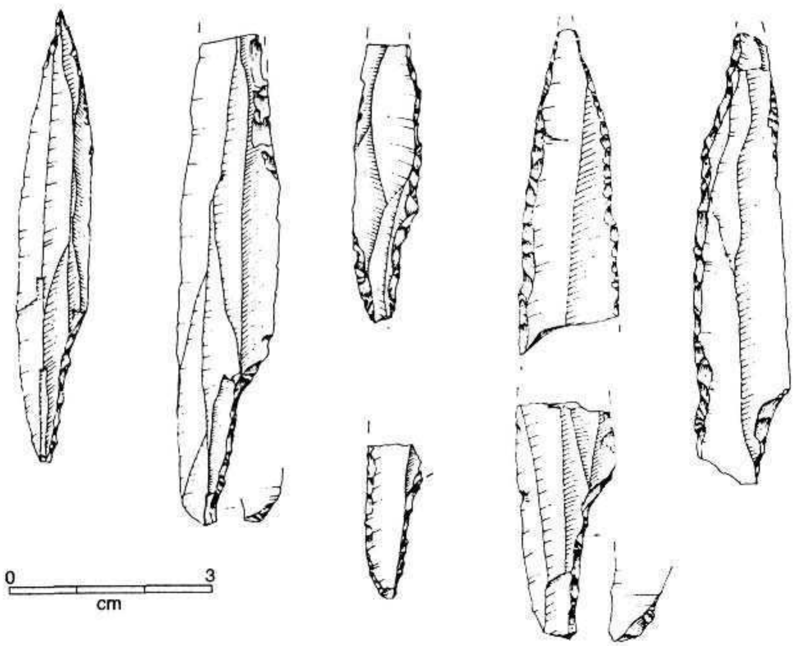

Figure 6.10. Grotta di Paina. Shouldered points (source: Bartolomei *et al.* 1987–1988).

which settled in the cave much more often than the humans. The findings at Riparo di Fumane, levels D1c and D1d, are even scarcer, although of similar date (Broglio and Guerreschi 1992).

On the southern edge of the Po basin, the only lithic industry of this period was found at Fornace di S. Damiano, on the fluvial terrace of a minor river, the Savio (Peretto and Prati 1983). Four burins, an endscraper, a truncated blade, a backed blade and a few cores were collected during quarrying. Remains of red deer and elk *(Alces alces)* were also retrieved from the alluvial deposit. Interestingly, the flint is not local and was collected from the present coast, a distance of at least 30 km. Fornace S. Damiano could well be an example of an ephemeral open-air site.

Sicily itself was possibly explored by groups leaving the lithic assemblages usually labeled as "Gravettian," or "Early Epigravettian." We discussed in Chapter 5 the difficulties of crossing the Messina Straits and the Aurignacian settlement of the island. Human groups certainly entered the island around 14,000 bp, and the area was never devoid of human occupation from then on (see 7.2.7). The archaeological evidence between 30,000 and 14,000 is at best controversial. Two assemblages from Canicattini and Gr. Niscemi were classified by Laplace (1966) as Early Epigravettian. The first was stored in the collections of the Museo Archeologico of Siracusa, but its precise provenance is unknown. The second is said to include some shouldered tools, which are not mentioned in the original publication by J. Bovio Marconi (1954-1955). None was ever dated by means other than typological seriation. More recently, in an old collection from the Final Epigravettian site of Riparo del Castello, not far from Palermo, D. Zampetti spotted some microgravettes with a basal truncation, which could well be Gravettian (Zampetti 1984–1987). If Sicily was settled at all, however, it was on a very restricted scale.

In summary, before 16,000 BP, human settlement was not homogenous over Italy. While some sites are indicative of long-term or repeated settlement, others are better interpreted as evidence of short stays by single individuals or small groups—explorers of a kind—in specific areas. A good example are the steppes of northeastern Italy, which were intermittently exploited by human groups from adjoining regions. Some of the evidence is from "poor" sites, either open-air sites or caves, where different short-lived activities were probably taking place (Gr. del Broion, Fornace S. Damiano). Elsewhere in northeastern Italy, and other parts of the peninsula as well (Mochi, Stefanin, La Calozza, Trene, Paina), the archaeological evidence was left by specialized hunting parties. The Early Epigravettian is possibly better represented than the Gravettian in this last class of sites, unless there is a sampling bias that favors the easily recognizable shouldered points. The latter are also found in poorly documented surface collections from central Italy, from Elba to Umbria to the Adriatic coast (Bravi 1951–1952; Vaufrey 1928). Sicily is possibly an area where human groups tried to settle down. The Strait of Messina was not easily crossed, and contacts with people in the peninsula were difficult. This attempt eventually proved unsuccessful.

Before 25,000 bp, however, not only Sicily or parts of the mainland but also the whole depopulated peninsula had been a territory open to explorers (Table 6.6). This can be seen from the sites of Liguria, at rhe gates of western Europe.

The hunters who stayed in Riparo Mochi and contributed to the formation of the lower part of level D were followed by groups who stayed longer, or at least more often, performing all the activities associated with life. Something similar happened at Gr. dei Fanciulli, where the first Gravettian evidence is the burial of an adolescent dug into level I. Subsequently, the grave was reopened and the corpse of an old woman interred (De Villeneuve *et al.* 1906–1919). Compared to later Gravettian mortuary evidence, both individuals have a restricted amount of goods. Both are in an unusual highly contracted position not found elsewhere. Later on, the cave was occupied by people leaving the Gravettian IV industry, and level H was formed.

The difficulties encountered by humans entering a new territory can be seen in a specific class of bone tools, the *bâtons* a *trous* or *bâtons de conmandement,* which are probably shaft straighteners. Often found in French and other European assemblages, they are usually made out of reindeer antler. Reindeer herds, however, were not living in Italy. People tried different solutions: at Gr. del Caviglione, another of the Balzi Rossi caves, in the same level as a Gravettian burial, E. Riviere (1887) found a *bâton* prepared by drilling a hole through a horse metacarpal (Fig. 6.11). At Gr. delle Arene Candide, 100 km to the east along the coast, there were four other *bâtons* in the lower burial, below the fifth "hearth" (Figs. 6.11 and 6.18). This time, elk antler was used (Cardini 1942). The results, however, were

Figure 6.11. Shaft-straighteners *(bâtons* a trous). Left: from Gr. delle Arene Candide (length: 217 rnm). Right: from Gr. del Caviglione (length: 207 mm) (sources: Graziosi 1956;Riviere 1887).

not satisfying, or the tools were no longer needed—bone points are poorly developed in Italy. Such *bâtons* are known neither in other sites farther south or east nor in later deposits.

Mammoth, too, was only exceptionally found south of the Alps at this time, *so,* not surprisingly, ivory items are almost entirely absent. The few exceptions are, once again, in Liguria: the burial at Gr. delle Arene Candide included a few ivory pendants, similar to others in some of the Barma Grande burials (Giacobini and Malerba 1995) (Fig. 6.25), while two female figurines from the Balzi Rossi caves were also carved out of a piece of ivory (Bisson and Bolduc 1994; Bolduc *et al.* 1996) (Fig. 6.19).

6.3.2. Mobile Camp Sites, Base Camps, and Flint Procurement

Both open-air and cave sites are found in the archaeological record, but site function is irrelevant in a Laplacian approach and is therefore scarcely recorded.

Seasonal open-air camp sites are present but incompletely documented. In some instances, light dwelling structures can be assumed. Monte Longo, also called Monte San Savino, is a good example (Borzatti von Lowenstern 1969; Borzatti von Lowenstern and Zei 1970; Ferrari *et al.* 1970; Istituto Italiano di Preistoria e Protostoria 1969; Laplace 1966). It is situated close to Siena, at 300 m asl. Faunal remains were not preserved, but steatite pendants were found. Thousands of lithic implements were concentrated in an area of 300 m^2. Three lenses of charcoal, 1 m in diameter and not more than 4–6 cm thick, were left on a sandy layer close to each other. The industry is referred to as "final Gravettian" (Table 6.8).

We suspect that dwelling structures once may also have been present at the vast open-air site of Ponte di Pietra in the Misa Valley, at some distance from the present Adriatic coast. However, only lithic industry and a few remains of *Equus* sp. were recorded during the excavations (Bartolomei *et al.* 1979; Broglio and Lollini 1982; Cattani 1990; Lollini 1964). The climate was continental and a steppe, with Artemisia and a few trees, developed. Radiocarbon dates of 19,940 ± 471 and 18,515 ± 618 have been cited in the literature for this site (Lollini and Silvestrini 1990). The Early Epigravettian industry includes thousands of *débitage* elements and 400 formal tools. After a preliminary description, more than one-fourth of the tools are burins, which outnumber endscrapers by more than four to one. The backed tools, numbering about one hundred, consist mostly of Gravette and microgravette points.

In neither case is it possible to determine whether the site was the single encampment of a large group or a palimpsest of more restricted occupations, possibly in subsequent years, following a traditional seasonal path in the exploitation of a wider territory. Nor can the resource(s) exploited be specified.

Additional data come from Laterina, an open-air site in the Valdarno of Tuscany, with five lithic concentrations (Cocchi 1952; Laplace 1966). The faunal remains were not preserved, as almost invariably happens in such Upper Pleistocene sites of Italy. The concentrations were 200 to 500 m from each other, but the lithic industry was unfortunately lumped together. A Gravettian Vc was identified, based on the presence of fifteen Noailles burins—the largest concentration in Italy other than Riparo Mochi and Bilancino. However, we suspect that the industry of part of the settlement was later, and related to the Arenian (Mussi 1992). Both the discrete spatial patterning and the possibly different age of the industry point to cyclic seasonal occupations.

Good quality flint, readily available nearby, was probably the reason why people came to this spot. More than 7,000 unretouched flakes and blades, frequently cortical, were collected, while there were only some seventy cores. We suggest that cores were prepared at Laterina and taken away to areas where flint, or at least good-quality flint, was lacking.

Table 6.8. Monte Longo. Inventory of the Lithic Tools.[a]

Type list	n
Simple endscraper	64
Endscraper on retouched flake/blade	121
Circular endscraper	1
Carinated endscraper	17
Shouldered endscraper	2
Denticulated endscraper	2
Double endscraper	8
Endscraper-burin	15
Endscraper-truncation	13
Borer-burin	2
Borer	9
Borer-endscraper	6
Dihedral burin	58
Burin on break	41
Burin on truncation	79
Multiple mixed burin	44
Burin with a notch-stop	3
Gravette point	6
Microgravette	33
Backed blade	2
Truncated backed blade	1
Backed fragment	64
Truncation	32
Blade with continuous retouch	296
Notch	60
Denticulate	63
Scaled piece	1
Sidescraper	58
Triangle	4
Segment	1
Backed bladelet	14
Truncated backed bladelet	13
Point	27
Total	1,160

[a]Adapted and recalculated from Laplace (1966).

Flint exploitation was also taking place at Monte Gargano, on the Adriatic coast of Apulia, both during the Paleolithic and afterwards. At Foresta Umbra and Vico del Gargano, Gravettian assemblages were selected from a larger collection of lithics retrieved from surface collections and to some extent from excavations, on the basis of typology and state of preservation (Calattini 1979; Galiberti 1974). The resulting industries include only a restricted number of backed tools, scrapers, and burins—some being large Noailles burins—and many retouched blades, retouched flakes, notches, and denticulates (Fig. 6.12). Some natural activity should not be ruled out in the production of the latter category. There are many cores, mostly prismatic blade cores, while unretouched flakes outnumber unretouched blades. Some of the illustrated cores are clearly defective and were certainly abandoned because of technical problems. The preparation of "take

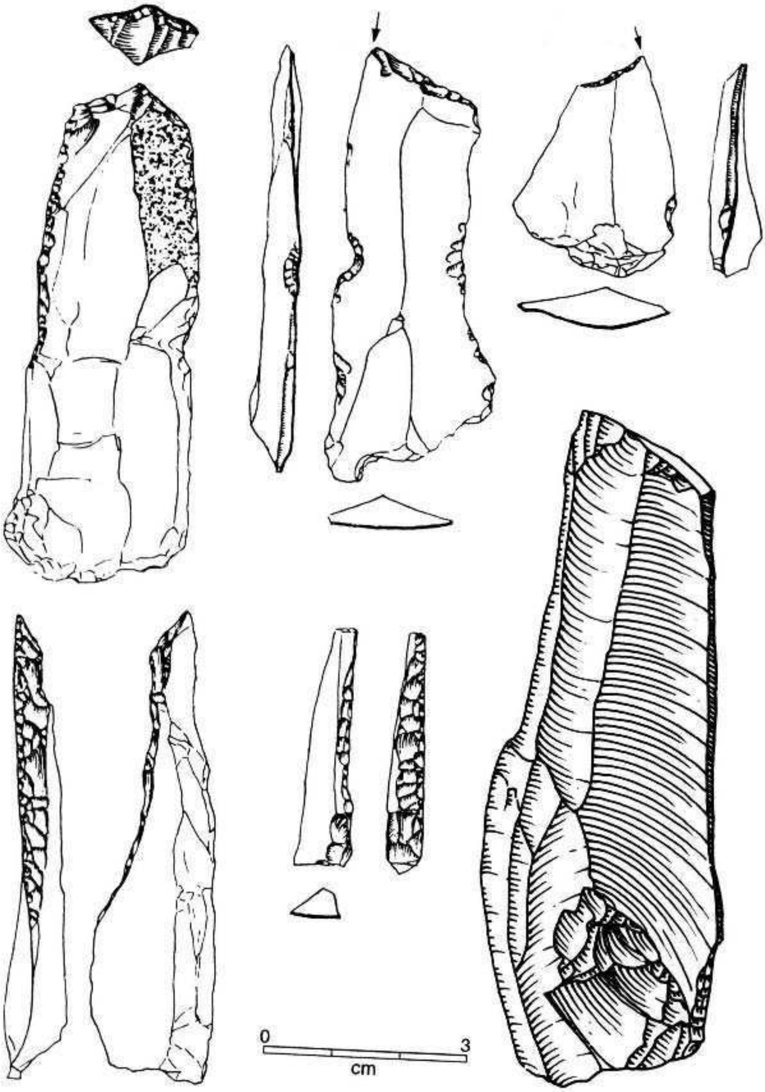

Figure 6.12. Vico del Gargano. Lithic industry from the quarry site (source: Calattini 1979).

away" blade cores is probable, even if the picture is somewhat blurred by the mixture of industries of different dates, and possibly by mechanical effects producing notches and retouched pieces.

Base camps—preferred sites seasonally reoccupied by a complete human group over a period of some length, where a wide range of everyday and even ceremonial activities took place—are the last category of sites that we will consider.

They are not easily located when research is not designed to discriminate them from sites with multiple short occupations. Caves that have yielded large lithic assemblages, and other cultural remains as well, can be cautiously considered here. Some of the Balzi Rossi caves are certainly good candidates, but most of the relevant data were lost before the date of scientific archaeology and the collections dispersed. Other possible base camps are Gr. La Cala and Gr. Paglicci.

Both sites are multilayered and have yielded thousands of lithic tools as well as limited numbers of bone tools, mostly points. Colorants were used and personal ornaments were made with shells and cervid canines. At Gr. Paglicci, there are grinding and pounding stones as well as retouchers. Gr. Paglicci, however, has a more complex record than Gr. La Cala, including painted and engraved works of mobile and parietal art, and burials and human remains in disturbed position (see 6.4).

Faunal remains are abundant but quite different in each site. The intensive occupations of Gr. La Cala and Gr. Paglicci were linked to specific hunting strategies that we discuss below. We will also consider another possible base camp, Gr. La Calanca, so far only partially published, where elaborately constructed hearths are mentioned (Vigliardi 1968).

6.3.3. Hunting Strategies, an Evaluation of the Evidence for Specialized Hunting Sites, and Shifts in Hunting Practices

In the stratigraphic sequence of Gr. La Cala, the faunal assemblages are dominated by red deer remains (Table 6.1). This is most evident in level Q, subdivided into QI to QVII, which is 40 to 70 cm thick. Micromammals are scarce, while some 6,500 ungulate remains were identified, mostly red deer remains (Sala 1983) (Fig. 6.13). A few hare and lynx bones were also found.

According to B. Sala, the faunal assemblage directly reflects the paleoenvironment, which he describes as wooded, with a rather cool and humid climate. A different interpretation is suggested by G. Barker (1975), who considers Gr. La Cala a specialized hunting site. The cave is located in a strategic position at the entrance to a small valley. In glacial times, it was the way to reach upland summer pastures from the restricted coastal plain. Prehistoric hunters living in Gr. La Cala would have preyed upon red deer herds during their seasonal migrations, which, G. Barker argues, were necessary to take advantage of pastures at different altitudes. The percentage of red deer remains would not be directly related to ecological constraints.

Gr. La Calanca, on the other side of the same valley (Fig. 6.14), is unpublished but also has a Gravettian assemblage (including Noailles burins without a notch) and a faunal assemblage dominated by red deer (Table 6.1; Fig. 6.13) (Palma di Cesnola and Bietti 1983; Sala 1983; Vigliardi 1968). Hyena, wolf, fox, badger, and hare are also mentioned. B. Sala considers the problem in a chronological perspective and suggests a date just antedating the deposition of level Q at Gr. La Cala. G. Barker considers the site another settlement of red deer hunters, connected to nearby Gr. La Cala.

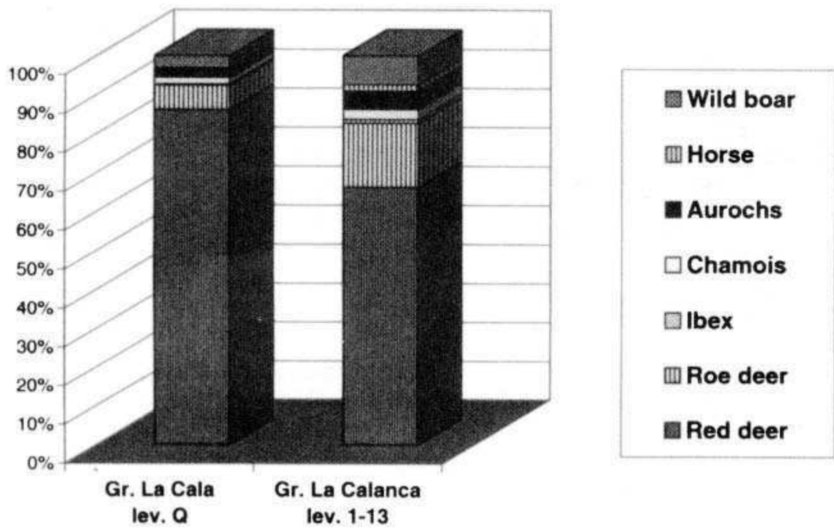

Figure 6.13. Grotta La Cala and Grotta La Calanca. The ungulate assemblages of the levels with Gravettian industry (source: Sala 1983).

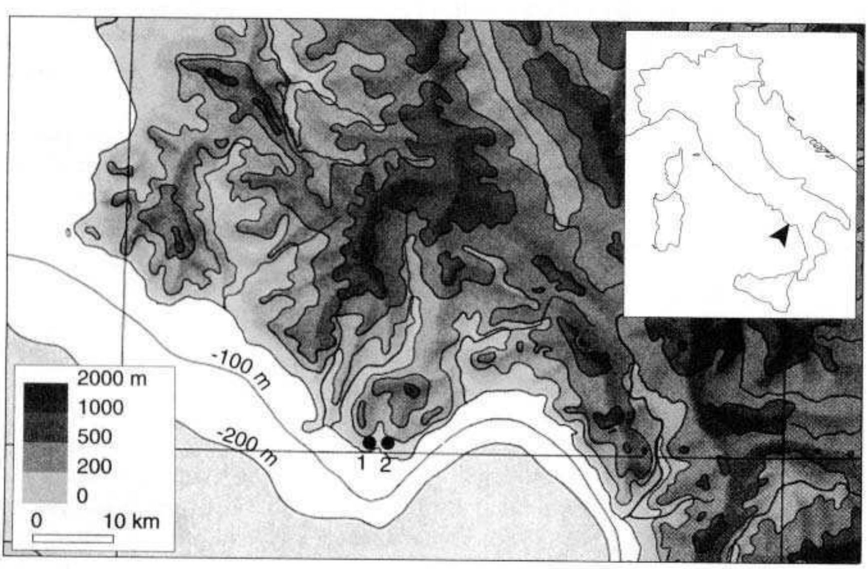

Figure 6.14. The Cilento coast with Gr. La Calanca (1) and Gr. La Cala (2).

At both sites, burins outnumber any other typological group, including end-scrapers, while backed tools (mostly points, at least at Gr. La Gala) are less than one-fourth of the assemblages (Table 6.5). On the other hand, retouched blades, denticulates, and scrapers are frequent. If G. Barker's theory were to be substantiated by further research, butchering activities as well as hide curing and other related activities would be suggested.

On the other side of the peninsula, the long Gravettian and Early Epigravettian sequence of Gr. Paglicci is characterized by a quite different faunal assemblage (Sala 1983). Large mammal species include mostly ungulates. Equids are dominant, comprising over 50 percent of the remains in some of the layers, while after horse (including both common horse and hydruntine horse) ibex is the second most common species (Table 6.1; Fig. 6.9).

The changing percentages of ungulate remains were interpreted by B. Sala as indicating different climatic oscillations: ibex is accordingly the main marker of a cold climate, while more equids are taken as an indicator of a more temperate environment. Level 22a, for example, with 33.3 percent chamois, 9.9 percent ibex and 30.4 percent horse is "the end of a rather humid and not very cold phase." A different and more satisfying interpretation can be put forward if we take into account not only the changing environment but also human and animal behavior.

Ibex and chamois do not live on plains, while hydruntine horse, common horse and aurochs avoid rocky slopes. Gr. Paglicci opens at 100 m asl, protected from the cold winds just at the boundary between the plain of Foggia and the slopes of Monte Gargano (Fig. 7.24). An altitude of 600 m is reached within a few km, while the maximum elevation of Monte Gargano is 1,056 m. Shifts in the exploitation of plains and mountain habitats would easily account for changing percentages of equids, bovids, chamois, and ibex (Fig. 6.15). There would be a more marked emphasis on plains animals in the lowermost levels, followed by a predominance of mountain hunting, then a return to resources found at lower elevations followed by a new shift to mountain resources in the last Early Epigravettian layers.

Since minimum numbers of individuals were not calculated, this reconstruction is quite hypothetical, but it does suggest that from 25,000 to 16,000 bp in a restricted area of Apulia, humans did not always exploit the same resources. This could have been due to the harshness of climate—and in this case, the exploitation of the mountain environment would be related to milder climatic oscillations. Alternatively, as humans stayed at Gr. Paglicci during the scheduled exploitation of the animal and vegetal resources of a much larger territory, more general changes in hunting and gathering strategies influenced the part of the year they spent at this favored spot, and therefore the direction in which they searched for the more easily available prey. These hypotheses are not mutually exclusive, but we favor the second one. We do not think that climatic changes were so sudden and dramatic as to provoke, by themselves, major shifts in hunting strategies. The evidence of more and more limited chamois exploitation, in contrast to the ibex exploitation, suggests that this isolated population of southern Italy was dwindling, and was not joined by animals coming from more northern areas. The opposite would be expected if major cold oscillations were affecting the climate of the region.

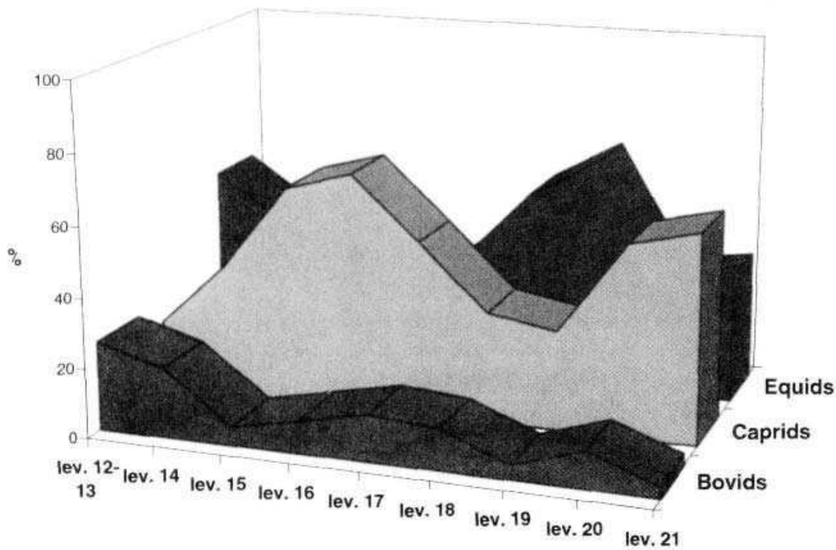

Figure 6.15. Grotta Paglicci. The compared frequencies of caprids, equids and bovids in levels 12 to 21. (source: Sala 1983).

6.4. RITUAL BEHAVIOR AND PRACTICAL CONSTRAINTS

6.4.1. Burying Only a Segment of the Society in Caves, the Evidence for Selection, Burial Practices and Burial Goods, and Long-Distance Relationships

Bias in the sample of Gravettian human skeletons was mentioned in 6.1.2 and needs more detailed analysis. The characteristics of most of the burials (i.e., sixteen inhumations with twenty-one individuals, Table 6.2) have been found to have several common features, which are the same in Liguria and in Apulia (Mussi 1986b, 1995a).

Most are single burials. However, not including the mother with her baby of S. Maria di Agnano, who both died soon before or after delivery, there are also two double and one triple burials in the record (Coppola 1992; Coppola and Vacca 1995; Mezzenn and Palma di Cesnola 1989–1990; Mussi *et al.* 1989).

In this sample, except for the fetus or newborn infant, the date at death ranges from twelve to fourteen years to an unspecified old date, most of the skeletons being sexed as male. Individuals younger than twelve years are not found, even taking into account isolated bones, possibly from disturbed burials. There is a

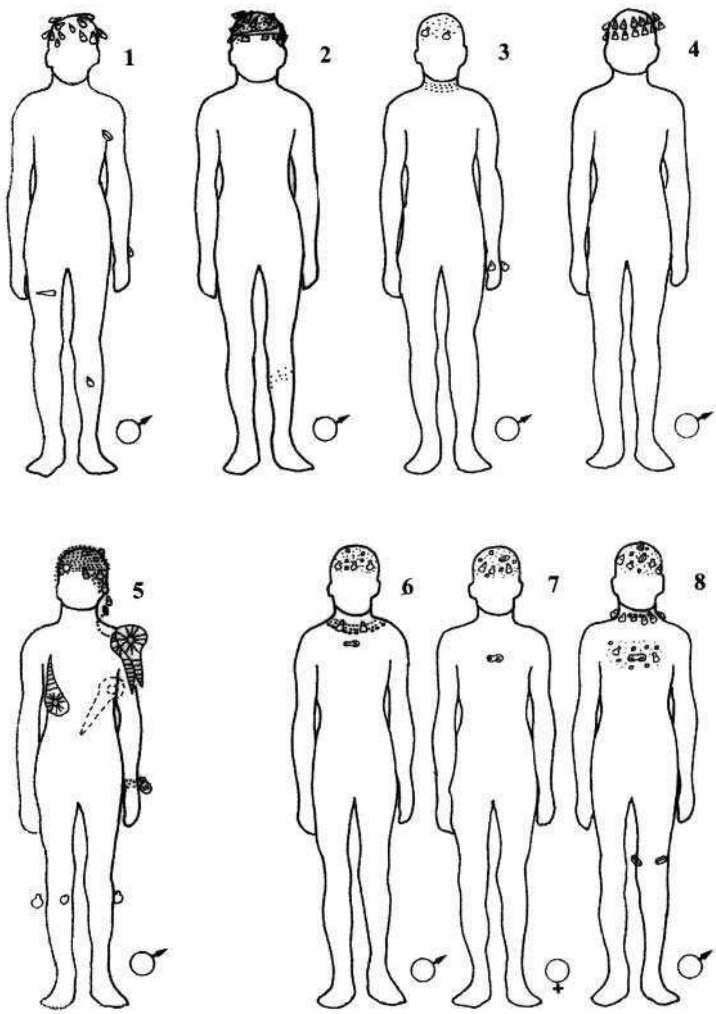

Figure 6.16. Gravettian-Early Epigravettian burials. Location of ornaments and bone tools. 1: Gr. Paglicci level 21d; 2: Gr. del Caviglione; 3: Barrna Grande, single burial (Barma Grande 5); 4: Gr. delle Veneri (damaged double burial); 5: Gr. delle Arene Candide (Arene Candide 1); 6–8: Barma Grande, triple burial.

minimum of ten adult males, and, following recent discoveries, the number of adult females has increased from one to three. Adolescents number six, and according to a recent revision, three are female and three male (Mussi *et al.* 1989). They are accompanied by exactly the same kind of grave goods, and they were interred in the same position, as adults (Fig. 6.16). The only exception is the adolescent from Baousso da Torre, oddly found lying face downwards, without accompanying implements.

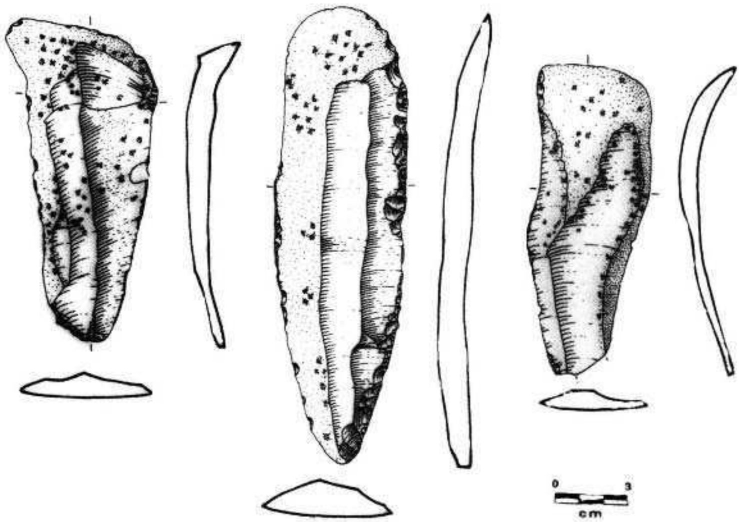

Figure 6.17. Barma Grande. Large ochrated blades deposited as grave goods in the burial at the entrance of the cave (Barma Grande 1) (after Mussi 1995a).

Elsewhere, when the burial is sufficiently well preserved, grave goods are always found. They are personal ornaments, such as necklaces, bracelets or caps, and are made from perforated marine shells and cervid canines, sometimes adding perforated fish vertebrae and bone or ivory pendants (Figs. 6.16 and 6.25). Some bone or flint tools of uncommon size or typology are often included (Fig. 6.17). Ochre—even a bed of ochre—was almost always present.

Except for one at Barma Grande, the burials are invariably positioned in the inner part of the cave. Grave pits have been positively recognized in six, and possibly seven, instances. These were dug, preferentially, close to a wall or to a very large boulder. The burial then followed the axis of the cave. The triple burial at Barma Grande, however, was in a transverse position. This is probably because such a position provided the only possibility to place each body close to a wall-more specifically, with the head close to it. The disposition of the skeletons varies, but extended burials appear to have been preferred. An exception is the two tightly flexed individuals in the double burial at Gr. dei Fanciulli, which also, interestingly, is the earliest one.

Stones were found in association with eight skeletons. These appear to have been intended to protect heads or feet with a slab raised over other stones, to support part of the corpse itself, or just to cover it.

The reasons underlying the selection of a tiny segment of the prehistoric population for complex and formalized burial in a cave need to be better understood. Age and sex were certainly important, as adolescents and adults were chosen, and males were preferred.

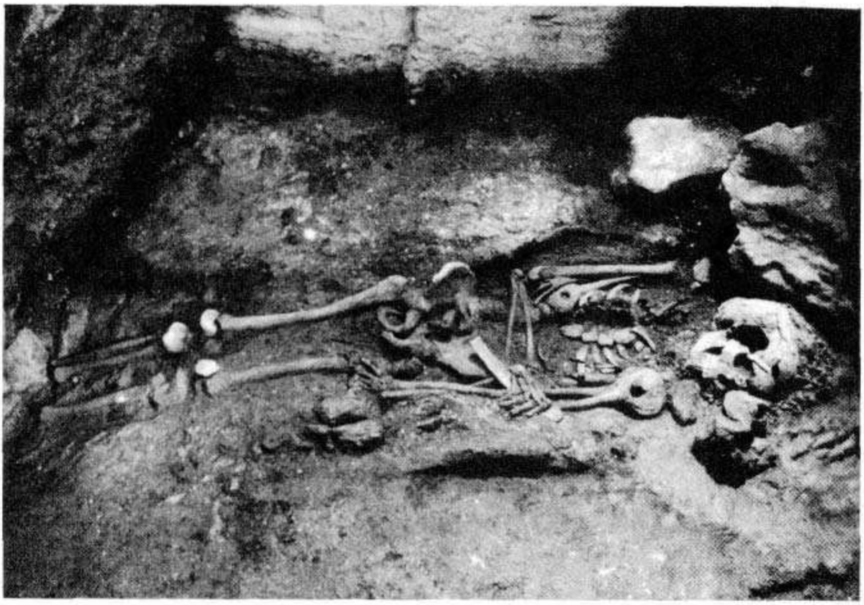

Figure 6.18. (irotta delle Arenc Candide. The Gravettian burial discovered in 1942 (photo by L. Cardini).

In a hunter-gatherer population, adolescent and adult males were presumably the active hunters. The importance of the status attained by hunters is therefore stressed in the burials. It cannot be ruled out that women were involved in similar activities, at least during part of their life–especially as several adolescent girls were given the same distinction as males, if in multiple burials only. It is worth noting that according to Constandse-Westermann *et al.* (1984), prehistoric women did not usually bear children before they were approximately nineteen years old, while Churchill *et al.* (2000) highlight in Gravettian populations an asymmetry of female upper limbs well above that of more recent populations. This suggests that, just like male counterparts, women were possibly regularly engaging in activities such as throwing.

The social importance of hunters can be better seen in the burial below the fifth "hearth" of Gr. delle Arene Candide, nicknamed the "Prince" burial because of the very rich grave goods (Fig. 6.18). When L. Cardini discovered it, he noticed that part of the mandible was missing . The missing area had been filled by a mass of yellow ochre, which was directly in contact with the fractured bone "as if to conceal the devastating wound which had certainly caused the death of the young and robust individual" (Cardini 1942:19; author's translation). It was later found that the fracture had actually started to heal before death occurred (Mussi *et al.* 1989). hunting accident seems an obvious explanation.

Personal characteristics must also have been important: we have already stressed the fact that tall men and adolescent males were selected for burial. The last aspect to he considered is circumstances of death. A tragic event killed the young "Prince." Another disaster of unknown origin led to the contemporaneous death of three individuals, carefully buried in the Barma Grande in a grave pit of convenient size. The simultaneous disappearance of a robust man and two promising girls must have been a traumatic event in a small group of people.

According to L. R. Binford (1971), burial practices emphasizing sex and age groups, as well as status attained on the basis of personal qualities and achievements, and sometimes the circumstances of death, are typical of egalitarian hunter–gatherer groups. On the other hand, the earliest burials, such as the double burial of Gr. dei Fanciulli or the burial found in Gr. Paglicci level 21d, present a limited array of grave goods. The later ones, such as the "Prince" of Gr. delle Arene Candide and the closely related burials of the Barma Grande, are instead richly endowed with unusual tools and elaborate ornaments. There is, therefore, some evidence for an increase in the number and quality of goods in the later burials, which must be substantiated by more direct dating of the skeletons themselves (Mussi 1990). We further elaborate on this problem in the concluding section of this chapter (see 6.5.2).

We also want to stress that very similar characteristics are found in Liguria and Apulia, 700 km apart as the crow flies, but much further when we consider that a chain of high mountains lies between them. This did not happened by chance; there must have been long-distance communication.

6.4.2. The Date of the "Venus" Figurines, Location, Raw Material Constraints, and the Search for Steatite, with Comparisons to Other European Figurines

A total of nineteen carvings representing humans or human-like beings were found at four Italian localities. They are traditionally labeled as "Venus" figurines, because most of the humans are better described as women. As elsewhere in western Europe, they were discovered in the early days of prehistoric research, or in disturbed contexts, and their chronology is open to debate. All over Europe, there is general agreement that the Venus figurines are usually connected to people with Gravettian or closely related industries (De Lumley 1984; Gamble 1982; Leroi-Gourhan 1965; Praslov 1985), even if some researchers cautiously point out that they are also found in later periods (Otte 1981, 1985; Soffer 1987). We discuss the stratigraphic and stylistic evidence that links the Italian figurines to the Gravettian or Early Epigravettian.

The first group was found in the Balzi Rossi caves. It includes fifteen specimens altogether, which were discovered in the late nineteenth century by L. Jullien, an amateur archaeologist (Bolduc *et al.* 1996). Two of the figurines—or maybe three or four, as the extant documentation is to some extent contradictory—were found in Barma Grande, not very far from one of the Gravettian burials, at a depth between 4.2 m and 4.9 m below surface level (Mussi 1990, 1991, 1995b). Jullien, however, most probably also searched in the upper part of the deposit of Gr. du Prince (not to be confused with Gr. delle Arene Candide and its "Prince" burial) that later, during regular excavations, only yielded Mousterian or earlier industries (Mussi 1991). This part of the deposit of Gr. du Prince is now labeled "layer 9," and a stalagmite at its base is known to be 32,600 ± 3000 years old, after Th^{230}/U^{238} analysis, giving a maximum date for the figurines.

Figure 6.19. Balzi Rossi. The rediscovered ivory and soft stone figurines (photo by J. Cinq-Mars; copyright: Pierre Bolduc, Montreal).

Of the figurines, which are definitely from the Barma Grande, one is delicately carved from a piece of yellow steatite; the other, known as the *Femme au goitre,* is made of bone or possibly antler (D. Buisson personal commmunication 1993). They are among the earliest to have been recognized as genuinely Upper Paleolithic by the scientific community, together with five more from the Gr. du Prince, which are known in the literature with different nicknames: the *Polichinelle,* the *Tête négroïde,* the *Losange,* the *Hermaphrodite,* while the fifth one is "anonymous," as it has no special name. It had long been known that eight more figurines existed, but they were found nowhere in Europe, and it was believed that they had been lost. Recently, they reappeared: one, the so-called "Janus,"in the United States (Marshack 1986), and then seven more in Canada, where Jullien had ended his life, for a general total of fifteen (Bolduc *et al.* 1996) (Fig. 6.19). C^{14} dates were obtained from bone remains from Barma Grande that are also part of this collection, giving dates between 14,000 and 19,000 bp (Bisson *et a l.* 1996).

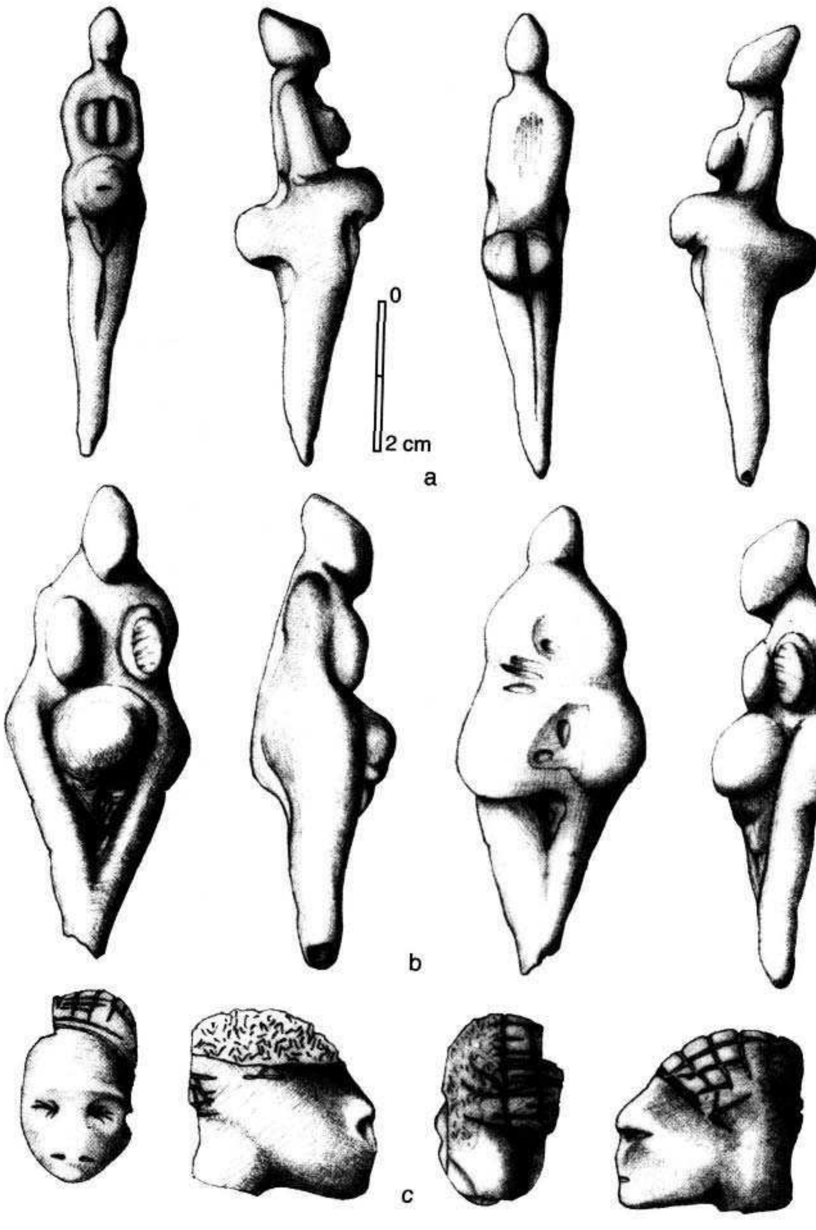

Figure 6.20. Balzi Rossi. Steatite figurines: (a) *Polichinelle;* (b) *Lozenge,* (c) *Tête négroide* (original drawings by M. Mussi).

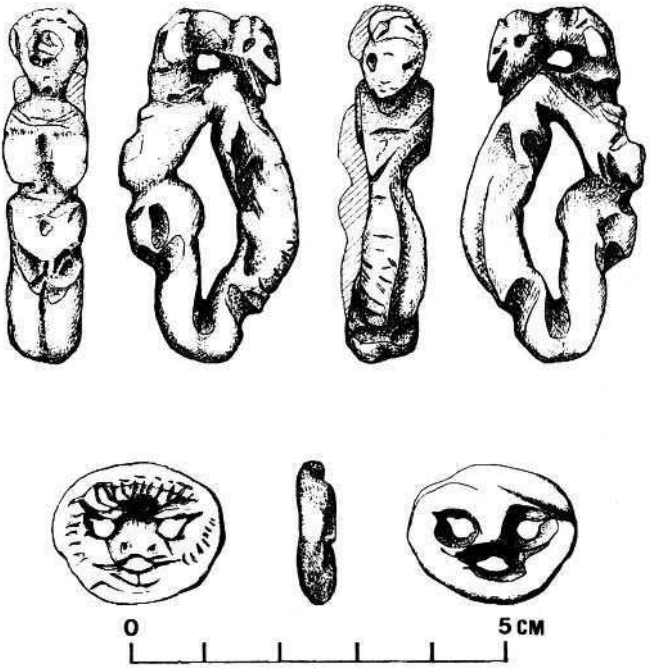

Figure 6.21. Balzi Rossi. Two steatite figurines (after P. Bolduc *et al.* 1996; original drawings and copyright: P. Bolduc, Montreal). Top: "Beauty and the Beast." Bottom: the "Mask."

None of the dated samples, however, were in association with any of the figurines. The results are inconclusive and cannot be taken as indicative of the absolute age of the Venuses (see Bolduc *et al.* 1996 for a discussion). On the other hand, many stylistic and technical characteristics allow close comparison with Gravettian specimens from other parts of Eurasia (Bolduc *et al.* 1996; Mussi *et al.* 2000).

Most of the figurines from the Balzi Rossi are made of steatite or other similar soft stones. The *Tête negroide* (Fig. 6.20c) is a damaged little head, with deep incisions representing a checkered cap or some kind of hairdressing. Similarly incised figurines, or other items, are found at both the Balzi Rossi and elsewhere, and are consistently dated to a Gravettian or slightly later horizon (Mussi 1991, 1995b). The *Tête négroïde* can be compared, for instance, to the *Dame à la capuche* of Brassempouy in France, or to one of the recently discovered figurines of Avdeevo in Ukraine. It is the only Italian figurine with a carefully individualized physiognomy—the feminine character being admittedly just a traditional definition, and a real sexual classification actually impossible.

Another unusual carving is the *Hermaphrodite.* This strange nickname is due to the fact that below the feminine breasts and abdomen, there is an elongated mass, and then a round one, sometimes interpreted as masculine sexual attributes.

To us, it seems more probable that the statuette depicts some kind of double mythological being, the round mass being a second head. Other double beings, some definitely women, are known from France and Russia (Coppens 1989; Mussi 1995b), as well as among the rediscovered figurines of the Balzi Rossi (see below).

Two other Venuses—the *Losange* and the *Polichinelle*-closely resemble each other and those from the Barma Grande in both size and proportions (Fig. 6.20a-b). Just a few cm long, they were carefully carved and polished.

The so-called "Janus" is very roughly carved, with an unusual face repeated on both sides. In the rediscovered part of the collection are other double carvings, elaborated in a sophisticated way: a minuscule one of jade-like steatite is of a woman with a double head—the *Bicéphale*, and another of similar stone is a woman opposed back-to-back with a composite mythical being—the *Doublet*, also known as La *Belle et la Bête* (i.e., "Beauty and the Beast") (Fig. 6.21).

Two other Venuses—the *Dame ocrée* and the *Abrachiafe*—are in ivory and raise interesting problems (Fig. 6.19). Elephants survived in Italy not later than an early part of Isotopic Stage 3, while mammoth remains are exceedingly rare: except for a few fragments discovered at Gr. delle Arene Candide level P7 (Cassoli and Tagliacozzo 1994), they are invariably found with Mousterian industries when associated with any archaeological item (see Chapter 5). We assume that the ivory figurines were either carved far away from Italy and then transported to the Mediterranean shores or carved on the spot (or near it) using imported raw material. Not surprisingly, ivory items of any kind are exceedingly rare and not found outside Liguria, the area adjoining the ice-free corridor connecting the Italian peninsula to western Europe. They are not found in southeastern France, either.

Then, there are two more carvings on a dark soft stone, the *Moniale* and the Buste, to which the "anonymous" one of similar material can be added. Last is the unusual button-like little "Mask," which is the face of another composite mythical being (Fig. 6.21). All together, the fifteen carvings from the Balzi Rossi—either from a single cave or from two nearby sites—are the major such assemblage of western Europe. The evidence from the other Italian sites is much more restricted.

The beautiful and large (221 mm long) Venere di Savignano, of soft serpentine, was discovered by chance in 1925 at Savignano, not far from Modena on the edge of the Po Valley, at a depth of c. 1 m in a fluvial terrace of Upper Pleistocene date (Mussi 1995b, 1996) (Fig. 6.22). No other Upper Paleolithic remains were found in the area, and it has been stressed that in all of northeastern Italy, archaeological evidence is extremely scarce between 25,000 and 16,000 bp (see 6.3.1). In the 1920s, an influential section of the Italian archaeological community, led by L. Pigorini in Rome, did not accept the existence in Italy of an independent Upper Paleolithic, following the Mousterian and preceding the Neolithic (see 1.2.2). They suggested, accordingly, that the figurine was Neolithic. This position was abandoned when the Italian Upper Paleolithic was accepted, and when the similarities with other statuettes became evident (Graziosi 1956).

The figurine of Savignano is especially similar to the *Polichinelle* of the Balzi Rossi. To us, another important stylistic attribute is the extreme longitudinal symmetry attained to the detriment of anatomical realism, as with the *Hermaphrodite* of the Balzi Rossi, or as in one of the Laussel bas-reliefs and in the Tursac

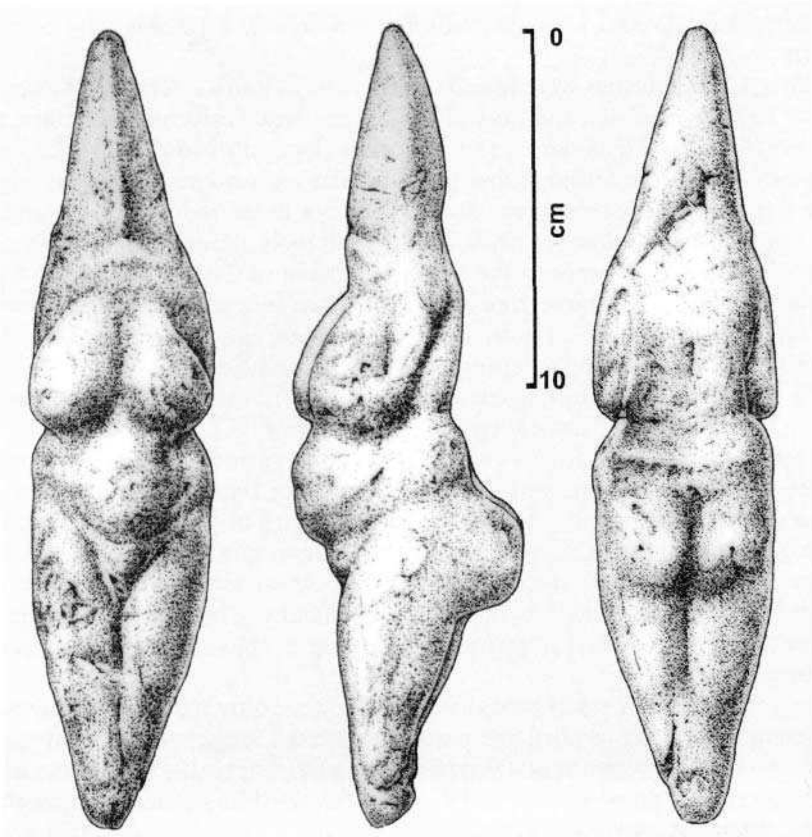

Figure 6.22. 5avignano. The statuette found in 1925 (after Mussi 1996; drawing courtesy of Dipartimento di Scienze tlell'Antichità, Università di Roma "La Sapienza").

Venus, which is also made of a soft stone closely related to steatite (Mussi 1995b). Another relevant stylistic aspect is its ambiguous sexual character: it is clearly a women with large breasts and buttocks, but alternatively, if split in two longitudinally, a double phallus. Ambiguous figurines, variously interpreted as stylized women or masculine organs, are known at other European sites of similar date, such as Trou Magrite, Mauern, Dolni Věstonice, Piedmosti, and so on. They are clearly related to a sophisticated and now vanished cosmogony, in which a feminine and a masculine principle were somehow interrelated into a superior oneness. The *Doublet* and "Beauty and the Beast" point to even more complex beliefs, in which women were directly related or equated with beings that do not exist in the natural world [i.e., with mythical beings also called "monsters" by A. Leroi-Gourhan (1983)].

The little *Venere del Trasimeno* was recognized in the drawer of a museum among tools collected long before from the area around the Trasimeno lake (Palma di Cesnola 1938; Zampetti 1993, 1995). It is a tiny steatite cylinder, with protruding breasts and a single buttock, and closely resembles the Venus of Mauern.

The last two figurines were found in more recent years at Gr. delle Veneri—the "cave of the Venuses"-on the heel of the Italian boot. Unfortunately, once again they were discovered by amateur archaeologists (Radmilli 1966). In the part of the cave where they were found, subsequent regular excavations discovered a gray-brown deposit with a Gravettian industry, and a more reddish one containing Early Epigravettian industries with leaf-shaped tools (Cremonesi 1987). Some reddish deposit still adheres to the figurines (Palma di Cesnola and Bietti 1983). Both were carved out of bone; one is only a few cm long and quite crude, but the other one is much more carefuily finished, with an egg-shaped head on which eyes, nose, and mouth may be represented by horizontal slots.

The so-called *Venere di Chiozza,* sometimes cited as Upper Paleolithic in date, has long been recognized as belonging to the Neolithic.

Most of the Italian statuettes are carved out of steatite or the closely related soft serpentine and chlorite, and just a few from bone, ivory or antler. Steatite was also used to carve pendants (Fig. 6.25). The frequency of this soft stone in the archaeological record might suggest that it is a common raw material, but this is not the case. Steatite is found with metamorphic rocks in mountainous areas, or as small pebbles in riverbeds, but not without difficulty. The search for steatite to produce figurines is related to technical and other problems, and to raw material constraint.

Hard rocks are not easily carved with flint tools. Softer materials must sought. Ivory, commonly used in northern parts of western Europe, as well as in central and eastern Eurasia, was not easily available in Italy. Soft rocks, such as haematite, calcite, limonite, sandstone, and so on, were also used in several European sites. They are often naturally colored, with a wide variety of hues, and this may have been important. Steatite is rather easily carved and was therefore an ideal substitute for ivory. It was actively sought after in Italy for a limited range of curated items, such as figurines and pendants (Mussi 1988–1989,1996).

6.4.3. Parietal Art, the Isolated Paintings of Gr. Paglicci, Comparisons with French Paintings, and More on Long-Distance Relationships

The evidence of parietal art is very scarce. An equid incised on the wall of Gr. del Caviglione was dated to this period, if not to the earlier Aurignacian, on stylistic grounds (Vicino and Simone 1976). D. Zampetti (1987) demonstrated, however, that it stands 5–6 m above the Gravettian layer of the cave and therefore must date to a later period, when more archaeological deposits had accumulated.

There are linear incisions on the left wall at the entrance of Gr. Paglicci. The same incisions were found on a very large block that at some time fell into levels 9–8, which contain a so-called "Evolved Epigravettian" industry (see 7.1.4). The incised blocks are consequently more than 15,500 or 15,000 years old and possibly belong to the Gravettian or Early Epigravettian settlement in the cave (Palma di Cesnola 1988).

Figure 6.23. Grotta Paglicci. Painted red horses (including a horse in vertical posture) and negative handprint from the rear cave (after Zorzi 1962).

Paintings are only exceptionally discovered at Italian Upper Paleolithic sites. The only evidence for the period under consideration is again from Gr. Paglicci. A minimum of three horses, and a series of positive hands, were painted in the inner part of the cave (Zorzi 1962) (Fig. 6.23).

The horses are in a static position, portrayed with huge bellies and details of the eyes and nostrils. P. Graziosi compares them closely to pictures of the Franco-Cantabrian area, such as those at La Pasiega and Pech-Merle, which, according to A. Leroi-Gourhan, belong to Style III and therefore postdate the Gravettian, being more or less contemporary with the Solutrean (Leroi-Gourhan 1965; Graziosi 1973). One of the horses is in a vertical position, and D. Zampetti (1987) stresses that this odd disposition is recorded in painted figures of the Franco-Cantabrian region that are usually not earlier than the Solutrean or the Lower Magdalenian.

Negative hands are well known in the Franco-Cantabrian area, an example being Gargas, where Leroi-Gourhan believes they are related to the Gravettian. Positive hands, much rarer, are found in the lower Rhône valley at Baume Latrone and Grotte Bayol. They are not easily dated; a connection with the Gravettian or the Solutrean is suggested (Leroi-Gourhan 1965; Mussi and Zampetti 1997; Sacchi 1984).

At the entrance of Gr. Paglicci, the fragment of a painted plaquette, which was probably part of the walls, was found at the base of level 14A associated with an assemblage of Early Epigravettian with shouldered tools. The underlying level 14B is dated to 15,600 ± 200 bp (Utrecht) and 15,390 ± 200 bp (Groningen) (Palma di Cesnola 1988). The fragment was obviously painted at a date earlier than the

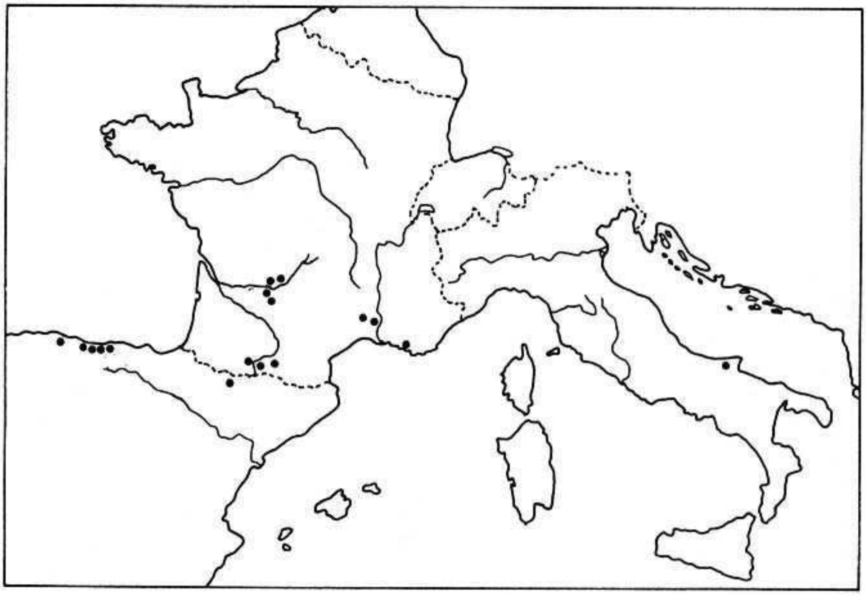

Figure 6.24. Sites with painted positive–negative hands. Geographical distribution (source: Mussi and Zarnpetti 1997).

deposit into which it was eventually embedded. The hindquarters of a horse-apparently in movement—can be seen and, according to Zampetti (1987), closely resemble some of the Lascaux horses. There are stylistic differences with the much more static horses of the inner cave, but it seems improbable that the same rare technique was used to represent the same animal species in the same cave in markedly different periods.

The technical complexities of the painting, and the specific similarities with horses and hands found in the Rhône valley or farther west, rule out the possibility of a convergent but autonomous invention in this remote part of Italy (Fig. 6.24). The recent discovery of a painted cave, Gr. Cosquer, on the Mediterranean coast close to Marseilles (Clottes and Courtin 1994), is a clue toward a connection between these distant areas. Mobile art and other items can circulate over long distances through hand-to-hand exchanges. Parietal art is different, as it implies that people, and not just things, were traveling long distances.

6.4.4. Engravings and Mobile Art

Mobile art is, once again, found only at Gr. Paglicci. The oldest specimen is a bone fragment on which is incised the profile of an ibex. It was discovered in level 20c, associated with a Gravettian industry dated to c. 22,000 bp (Mezzena and Palma di Cesnola 1972). The ibex is in a rigid posture, with only one anterior and one posterior leg represented. It closely matches an incised ibex of similar date from Gargas in Southern France (Zampetti 1987), as well as an incised herbivore

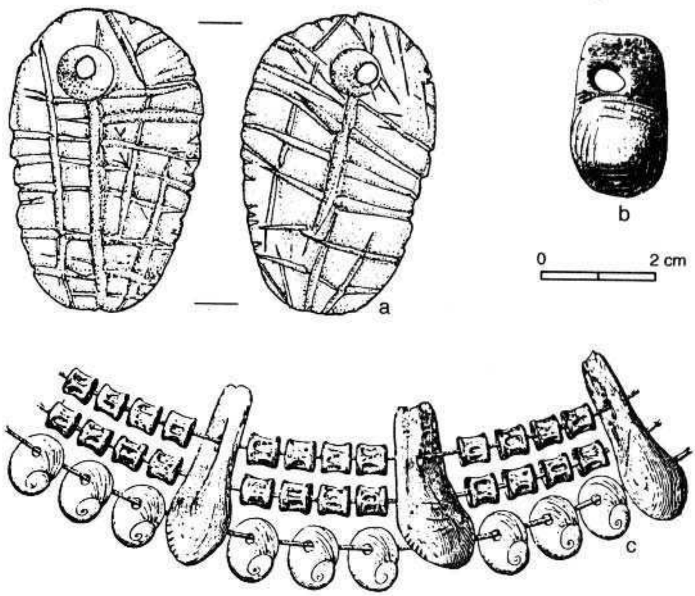

Figure 6.25. Ornaments: (a) steatite pendant from Gavorrano (after Bartoli *et al.* 1977); (b) ivory pendant from the burial of Gr. delle Arene Candide (Arene Candide 1) (after Bietti and Molari 1994); (c) composite necklace from the triple burial of Barma Grande (after De Villeneuve *et al.* 1906–1919).

from the Gravettian deposit of Hohle Fels in southern Germany (Scheer *et al.* 1994). A pattern of chevrons was superimposed on the ibex, and the bone was eventually broken into several fragments.

Another figure was engraved on the cortex of a flint nodule that was then flaked. One such flake was found in level 13, associated with two radiocarbon dates: 16,030 ± 190 and 15,480 ± 150 bp (Groningen). The industry belongs to the very end of the Early Epigravettian. It is impossible to identify the whole figure from the fragment found during excavations. It could have been the belly of an animal. A chevron pattern covers it.

At Riparo Maurizio, in the heart of the Apennines, a core and a flake had linear incisions on the cortex but no naturalistic figure. They were associated with an Early Epigravettian assemblage with shouldered tools (Radmilli 1963).

6.4.5. Body Ornamentation in Chronological Context

Body ornamentation was practiced on a much wider basis than in earlier periods. Perforated marine or, rarely, fossil shells, perforated teeth, sometimes steatite pendants, and even ivory pendants were found at Gr. dei Fanciulli, Riparo Mochi, Barma Grande, Gr. del Broion, Gr. C. Tronci, Gr. La Cala, Cala delle Ossa, and Gr. Paglicci. Open-air sites also yielded ornaments: steatite pendants were found at Gavorrano (Bartoli *et al.* 1977) (Fig. 6.25a) and Monte Longo. They are less frequent in layers with Early Epigravettian with shouldered tools. The perforation was produced by a rotating point held in the hand; the hole was started on one face and completed by drilling a second hole from the opposite face. The shell perforations were also prepared by scratching and cutting the more protruding part, or umbo.

The best evidence was found from the burials, as the ornaments remained in place and were not dispersed. In Liguria, they include pendants carved out of ivory and beads made out of fish vertebrae—not found outside the funerary context. Some are just strings of perforated shells, but others are much more elaborate, and even extremely sophisticated.

A good example is the necklace of the adolescent male in the Triple burial of Barma Grande: very large perforated deer canines were interwoven at regular intervals with two concentric strings of fish vertebrae and an outer string of perforated *Cycope neritea* (De Villeneuve *et al.* 1906–1919) (Fig. 6.25c). The cap of the young "Prince" of Gr. delle Arene Candide was even more complex: it was tightly covered by hundreds of perforated *Cyclope neritea,* to which were added some small sea urchin shells, shells of minute gastropods, *Cpraea* shells, deer canines, and one decorated ivory pendant, all perforated. On the left, in the auricular region, the cap continued with a strip, or tail, decorated with deer canines and *Cypraea* shells, which passed across the left shoulder and finished on the breast (Cardini 1942) (Figs. 6.16:5; and 6.18).

Inside and outside burials, the teeth are invariably perforated red deer canines. The same is true in the subsequent phases of the Upper Paleolithic and in the Mesolithic, while the Aurignacian evidence is slightly less monotonous.

Canines are atrophied in red deer and are not found by chance: the bones of the upper mandible must be opened to extract them. They were widely used all over the Old World but possibly not with the same exclusive enthusiasm as in Italy. A much larger variety of pendants and perforated teeth is described, for instance, in the Aurignacian of central Europe and in the French Upper Paleolithic, while in northern Spain, perforated deer canines became quite common for the first time in Magdalenian levels (Desbrosse *et al.* 1976; Hahn 1972; Straus 1992). We suspect that the exclusive use of such teeth was a result of the adaptation to a more restricted variety of game: not because people were directly obliged to utilize them—after all, bovids, foxes, and so on, were available—but because they had to focus on species that were much less important north of the Alps, and to rearrange their symbolic activity accordingly.

To end with pendants, it should also be remembered that several of the statuettes from the Balzi Rossi are perforated (see 6.4.2). This substantiates the hypothesis of J. Hahn (1990), who has long suggested that small-sized figurines, even when not perforated, could have been fastened and used as pendants.

6.5. COMMENTS

6.5.1. Colonizing an Empty Land? The Discrete Geographic Distribution of Sites

We discussed in 6.2.2 the evidence for human settlement in Italy between 30,000 and 25,000 bp. We concluded that isolated individuals, or restricted human groups, probably visited part of the peninsula episodically but that this never led to a stable occupation prior to 25,000 bp—in a conventional C^{14} chronology. We maintain that the peopling of Italy a few millennia before the Glacial Maximum was initiated by migration of groups from the west (i.e., from modern Provence in France) (see 6.2.5). In this area, Gravettian V (or Perigordian V) sites clearly outnumber those of the earlier Perigordian IV (Onoratini 1983). Around 25,000 bp, a threshold reached in the density of human population made possible, for the first time, the continued passage of groups into the depopulated adjoining peninsula.

To the north, Italy was effectively isolated by the glaciated Alps, while to the east the western Balkans were at best sparsely inhabited (Montet-White and Kozlowski 1983; Perles 2000). Later on, the cultural developments in Italy as seen from the lithic industry, proceeded independently in the more distant eastern regions, while the Arenian assemblages of Liguria, and of possibly more southern areas, remained similar to those of Provence. The pattern changed in the Early Epigravettian with shouldered tools.

Everywhere, on the Adriatic as well as on the Tyrrhenian side of the peninsula, long-range contacts are evident in peculiar aspects of the lithic and related technology—such as the hafting of shouldered points—and other aspects of culture, such as artistic production.

The density of the Gravettian–Early Epigravettian population was low but not homogeneous: northeastern Italy and possibly Sicily are examples of regions that were tested by small groups but apparently found unsuitable and exploited only sporadically. The Balzi Rossi sites, Gr. Paglicci, Gr. La Gala, Gr. La Calanca, Ponte di Pietra, and Laterina, represent the opposite picture: they were often, possibly regularly, reoccupied, and local resources were systematically exploited.

The first groups were explorers, who may or may not have been organized as hunting groups. In some instances, they left scarce remains, including a balanced variety of tool types. At other sites, the archaeological material is just as poor, but projectile points are overwhelming and suggest a more restricted set of activities and only hunting parties.

Thus, the lithic series from Riparo Mochi level D f 3.6 would be evidence of a specialized hunting kit and the remains left by a small party, which eventually led to a much more intense occupation. In northeastern Italy, the early sporadic visits that left traces in the deposit of Gr. del Broion were never followed by a continuous settlement of the region. Thousands of years later, the area was an open ground for hunting parties with shouldered projectile points, related to a sophisticated hafting technology, as can be seen at Gr. di Trene and Gr. di Paina. Caves in the adjoining regions of Slovenia and Croatia also yielded poor assemblages with some shouldered points (Montet-White and Kozlowski 1983). An extreme example is the hearth at Fosso di Pagliano in the Marche region, radiocarbon dated to 23,500 ± 400 bp (ROM-144): no lithic implements at all were found at this open-air site (Calderoni *et al.* 1991).

Explorations were undertaken whenever possible: for example, the center of the Apennines was reached just after the Glacial Maximum, as soon as deglaciation had begun. This can be seen at a date earlier than 16,000 bp in the twin sites of Riparo Maurizio and Gr. C. Tronci (Giraudi 1995; Giraudi and Mussi 1999; Radmilli 1956, 1963). The caves open in an intermontane basin at only 700 m asl, but much higher mountains had to be crossed before reaching it. In more northern latitudes, mountain ranges such as the Alps and the Pyrenees were only recolonized much later, after 12,000 bp (Broglio 1984; Clottes 1988).

The areas that were not settled permanently were the less favorable ones. We have stressed that northeastern Italy experienced an arid and steppe-like environment, with a continental climate; in the Marche region, a denuded landscape developed, while rivers carried a heavy load of detritic deposits and were characterized by braided channels (Calderoni *et al.* 1991; Coltorti and Dramis 1995). Sicily was extremely difficult to reach. It also appears that the available territory was too wide to be systematically occupied, and that its limited exploitation was carefully planned.

6.5.2. Low Population Density and Demographic Instability, Evidence of Social Asymmetry, and the Possible Bases of Social Asymmetry

Small isolated populations are not viable (Wobst 1976). Food procurement is not the only major problem. In the medium range, a lack of suitable spouses is as important as a lack of food in making a population extinct. Demographic constraints are as important, or more important, than environmental ones. They are especially effective in an elongated and highly partitioned territory, interrupted by high mountains and even by the sea, where contacts are not easily maintained even between adjoining areas.

Population density was very low. N. David (1973) estimates that in contemporary southwestern France it was just below 0.02 per km², and outside of this much favored area population densities must have been lower. However, human settlement was continuous in Italy after 25,000 bp, which means that a way was found to actively counteract the demographic instability arising from the very low population density. Part of the strategy consisted in concentrating human groups in some areas, and deserting those too difficult to reach, or those that, after inspection, were found to have a less favorable environment.

We suspect that another means of maintaining a balanced if sparse population was to encourage the circulation of people and information. Exploring a new area and deciding whether or not to settle down implies that information was circulated on the territory. An "artifact mode of communication" (i.e., curated items with distinctive stylistic characteristics, whose meaning could be decoded by potential receivers), also existed (Wobst 1977). Personal display being related to self-definition, the many ornaments found inside and outside mortuary contexts prove that people were able to convey via symbols information on personal status and characteristics. Sometimes different parts of the peninsula were linked: this can be seen in the similar burial practices followed in Liguria and Apulia. In other instances, the relationships are with regions well beyond the Alps, as shown by the carved figurines and other aspects of artistic production. Most striking are the paintings of Gr. Paglicci, as they imply that people, and not just items or information, were moving over long distances. The discovery of Grotte Cosquer, a submerged painted cave on the coast close to Marseilles, helps to follow the ideal tracks left by those travelers toward Apulia. Finding an isolated figurine at Savignano, so far away from any conspicuous settlement, is another intriguing piece of evidence for far-reaching travels. Overall, this evidence is in good agreement with recent analyses of the human bone remains from all over Europe, which suggest a high level of gene flow among Gravettian groups (Churchill *et al.* 2000; Formicola and Giannecchini 1999).

We discussed in 6.4.1 the fact that the ceremonial burials reflect a basically egalitarian society. Only a minority of the population, however, was selected for inhumation in caves. A peculiar status was consequently ascribed to this very restricted segment of society. As children were not included, descent alone was not important in this regard, and personal qualities and achievements were required. This is further stressed by the characteristics of some individuals, such as exceptional height, which could well have been important to qualify for high status. We also stressed that there is some evidence of a possible increase in the complexity of burial goods. At Gr. Paglicci, however, scattered human bones were also discovered outside of the burials (Borgognini-Tarli *et al.* 1980). Similar differential treatment of individuals after death is reported at the Gravettian site of Dolni Vestonice in Moravia, and interpreted as possibly reflecting social differentiation (Trinkaus *et al.* 2000), a hypothesis that would also fit the Italian record. Accordingly, there was some social asymmetry, possibly increasing, during the Gravettian.

A social hierarchy must be based on the control of resources of some kind. Among hunter–gatherers, storage practices often promote social inequality based on the control of food (Testart 1982a, 1982b). However, we concluded elsewhere that in the Italian Upper Paleolithic, the natural resources and technologies required in food storage were lacking (Mussi 1990). Information, however, was just as vital in the peculiar environmental and demographic situation around the Glacial Maximum. When people entered new territories, control over geographic knowledge could well have promoted the emergence of leaders. Later, the expansion into distant parts of the peninsula, and the need to maintain contact with groups living far away, stimulated the development of classes of items with symbolic meanings, and some control over them. This could well have been reinforced by rituals, which would also have attracted people from different areas.

While these considerations are speculative, the development of ritual can actually be seen in the corpus of what are usually termed “works of art,” as well as in burial practices. Exchanges were actually taking place, as can be seen from the intriguing evidence of Mainz-Lisenberg, in the middle Rhine valley: not only are ornaments quite similar to some of those found in the Grimaldi burials, but also Mediterranean shells were discovered at the German site, beyond the Alps and at a distance of 750 km from the sea as the crow flies (Cziesla 1992; Mussi 1995a). A network of information exchange over vast territories is neither started nor maintained by chance, and it requires some formalization.

6.5.3. Gravettian and Aurignacian Settlement Compared: A Definitive Colonization

There are broadly the same number of Aurignacian and of Gravettian–Early Epigravettian sites. Site numbers are admittedly a rough estimate of population density for many obvious reasons, ranging from preservation and excavation or collecting methods to function and duration of stay. However, they are the only available data with which to attempt such a comparison. The many biases in each sample probably allow us somehow to equate them and make some guesstimates.

Radiocarbon dates indicate that the Aurignacian existed in Italy for three or four millennia, and the Gravettian–Early Epigravettian for three times that. The duration is so different that we assume that the difference will not disappear even when calibration for the totality of these periods becomes available in the future. The fifty or so later sites are therefore related to an even lower population density. The "Aurignacians" had access, if anything, to a slightly more conspicuous reservoir of potential mates, and we would expect less problems related to demographic instability. This population, however, never recovered from the consequences of a major volcanic eruption and disappeared from the archaeological record, while the later one originated a permanent settlement.

A more difficult environment around 30,000 could explain this pattern, but we have no evidence for that. "Aurignacians" experienced both a phase of arid and cold climate, and a subsequent milder oscillation. Similar fluctuations, or even more extreme (i.e., colder) ones, were experienced by "Gravettian–Early Epigravettian" groups. Nor can the more wooded environment of the final Aurignacian be blamed. The landscape was not covered by thick woods; there were just a few more isolated trees and thickets, which meant, if anything, that it was easier to collect firewood. The ungulate species sought by the hunters were the same, and we find it difficult to believe that an increase in the number of horses, at the expense of deer, or vice versa, would provoke starvation and death.

If we consider the other major problem for survival (i.e., demography), we have a different picture. We emphasized in 6.5.1 that "Gravettian–Early Epigravettian" groups only settled in some regions. The "Aurignacians" were much less selective: they were living in northeastern Italy, or on the Tyrrhenian coast south of the Tiber Valley, or in Sicily—where there are, at best, only limited traces of the subsequent human groups—and scaled mountains in the Alps and the Apennines. This much broader diffusion over a partitioned territory made it more difficult to keep in touch. Their symbolic capacity, as embodied in works of art and ornaments, was limited: artistic remains consist only of a few notched bones from Riparo Bombrini and Riparo di Fumane, and of a limestone cylinder with linear incisions from Riparo di Fontana Nuova in Sicily. Ornaments were found only at some of the Balzi Rossi caves (Gr. dei Fanciulli, Riparo Mochi, Riparo Bombrini), at Riparo di Fumane in Veneto, and at Gr. del Fossellone on the central Tyrrhenian coast. As usual, during the Aurignacian, burials were not discovered, and there is thus very limited evidence both for ritual and for the “artifact mode of communication” at the time when people were most dispersed and would have needed to maintain contacts. The “Aurignacian” groups were very isolated from each other, and any isolated biological population is at risk of extinction solely on demographic grounds. When a volcanic catastrophe erased part of the territory and swept away human and animal populations, recovery was simply impossible.

We believe the “Gravettian–Early Epigravettian” groups were more successful in their settlement, even if populations were smaller, because they were equipped much more effectively than their predecessors with symbolic capacities used in rituals and other activities to promote contact and counteract isolation. Even if they had an egalitarian social organization, leaders could well have emerged, especially during the initial pioneering phases of settlement. When unexpected problems arose, as shown by the search for suitable new raw materials to prepare *bâtons de commandement* or to carve figurines, ingenious solutions were found. They did their best to maintain their traditions, managing to acquire exotic raw materials such as ivory or to make use of odd ones, such as elk antler. The maximum advantage was soon extracted from the game available in this southern region, as can be seen from the red deer remains at Gr. La Cala and Gr. La Calanca. The adaptation to the new environment was definitely a success.

6.5.4. The Glacial Maximum in Europe and in Italy: A Changing Social Organization in a Changing World

At the peak of the Glacial Maximum, around 20,000–19,000 bp, most of the European middle latitudes were deserted (Soffer and Gamble 1990). An increasingly dense human settlement is reported in the south of the continent, especially in Cantabria, where forty-four Solutrean sites are known (Straus 1992). However, it was not a general phenomenon, and there is no such evidence of growing population in Italy. In Apulia, we can very tentatively spot some influx of people coming from outside: the exceptional paintings of Gr. Paglicci can possibly be attributed to this period (see 6.4.3) and could therefore be related to the arrival of individuals previously living beyond the Alps, although other explanations are possible. In this way, the sudden and short-lived fashion of leaf-shaped points, as seen in level 17, and in a few other sites as well, would also have some direct explanation (Mussi 2000).

Even if this scenario is close to what actually happened, it would only prove some restricted immigration, as the overall number of sites and occupied areas are only slightly less numerous during the four or five millennia before 20,000 bp, than after that time (Mussi 1990). However, following the Glacial Maximum, there is less and less evidence of items, ideas, and techniques being common farther north. The exotic *bâtons de commandernent* or the *pointes d’Isturitz,* as well as the ivory ornaments, have no later counterpart. Apart from the Paglicci paintings, the evidence of long-distance interaction is restricted to the technique of hafting shouldered points—a technique already known, if less diffuse, in the previous millennia (Mussi and Zampetti 1988). If the female figurines were carved by people using Gravettian lithics, as seems probable, and leaving aside the paintings, the

Table 6.9. Central Apennine. Climatic Fluctuations around the LGM, with Temperatures Compared to the Present Ones in the Same Area.[a]

Time range (bp)	Difference in mean temperature	Climate
16.000–17.500	< -5.7°	Mild
17,500-21,000	-5 7° to -6 7" C	Very cold and dry
21.000-25.500	-7 3° to -8 3" C	Very cold and wer (LGM)
25.500–27.000		Mild (?) and wet
27,000–28,500		Cold (?) and dry
28,500–31,500		Transitional
Before 31.500		Mild and wet

[a] Source Giraudi and Mussi (1999)

only direct evidence of later artistic activity is the incised flake of Gr. Paglicci level 13. There are no longer rich burials in caves and personal ornaments become rare.

Even if there were changes in the environment, including lowered temperatures (Table 6.9) and a reduced arboreal cover, there is no evidence in Italy around the Glacial Maximum for acute environmental stress at a scale comparable to continental Europe (Mussi 1990). We suspect that the apparent cultural impoverishment, as seen from the disappearance of exotic goods and ritual manifestations, was the result of a less stressful way of life or a more balanced relation with the environment: the latter was well explored, and the available resources were fully monitored and exploited. A status once based on the control of a now widely diffused knowledge of the land was difficult to maintain, much more so if it had been reinforced by ritual and by a network of information exchange connecting local communities with very distant ones, which had eventually been disrupted by the reorganization of the relationships between human groups following the abandonment of large parts of the continent. The items with complex symbolic meanings, requiring much work in procurement and manufacture, were less and less in use and gradually disappeared. Elaborate ornaments were no longer used to convey information about their owners. Less formal relationships were established between individuals.

The population was growing, albeit at a very slow rate. The traces left by hunters using shouldered projectile points over wide areas devoid of long-lived sites suggest a possibly increased mobility, at least of some members of the human groups. More frequent informal contacts would arise as substitutes for the previous exchanges between groups that we suspect had been more ritualized.

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Chapter 7

The Great Shift

7.1. INTRODUCTION

The millennia that follow the Glacial Maximum are those during which the coastal plains shrink or disappear, while high mountain ranges are made accessible, in quick succession, to plants, animals, and, eventually, humans. At higher latitudes enormous areas that had been abandoned by humans are also progressively recolonized. This process had already occurred earlier during the Quaternary but it is the first time that the chronological resolution is sufficiently fine-grained to allow a detailed study. Furthermore, the lapse of time between fully glacial and fully interglacial conditions is quite restricted. The period is, accordingly, especially important to test the reactions of humans when confronted with a quickly changing environment.

7.1.1. The Late Glacial and Early Postglacial Record: Why We Do Not Split This Chronological Time Span

Italy is characterized by both extensive coastal areas and mountain ranges within short distance of the coast. Accordingly, it is ideally suited to illustrate the great shift in human adaptation that occurred at the full glacial–full interglacial interface. This part of the prehistoric record has also attracted considerable attention from the scientific community. There are various reasons for this interest, including better preservation of a relatively "recent" record, as well as the current generalized concern for the global climatic change; that is, information is available both from the strictly archaeological side of research, and from scientists more involved with paleoenvironmental reconstruction.

In this broader perspective, we are not much concerned by the end of the Wiirmian glaciation as such, which, conventionally, occurred at 10,300 bp in an uncalibrated chronology (see 7.1.2). By then, a major change in the vegetation was initiated and it turned within centuries from steppe-like to rather wooded, while other aspects of the environment changed as well. What we are really interested in, however, is how humans reacted to this challenge in their subsistence base and in their traditional way of life, that even caused a change in hunting grounds and other aspects of territoriality. Accordingly, we do not split the archaeological record into a Paleolithic and Wurmian one, and a Mesolithic and Holocene one. To grasp what happened, we do not break a continuum starting, for the sake of the present discussion, when deglaciation was under way and at c. 16,000 bp.

7.1.2. Calibration and Absolute Chronology and the Problem of the Evolved Epigravettian

The period considered is well within the range of radiocarbon dating and conventional systems (as opposed to accelerator systems) can be safely used. Not surprisingly, some two hundred absolute dates are available for Italy alone (for radiocarbon date list, see Broglio and Improta 1994-1995; Skeates 1994a). The real problem—so to speak—derives from the fact that calibration is also feasible; that is, it is quite easy to transform a raw date into a close approximation of a real calendar one, and programs of conversion, such as Stuiver and Reimer's (1993) Calib 3 and following versions, are widely used. Admittedly, the process is safer for more recent periods and the Holocene than for the late Pleistocene, for which more than one option in calibration is presently available. The general trend, however, is clear: for the period under consideration, due to causes such as fluctuations in the intensity of cosmic rays, radiocarbon analyses provide dates that are consistently too young. The gap between C^{14} dates and calendar dates, which is c. 2,000 years for the early Holocene, broadens progressively to c. 4,000 years around the Glacial Maximum (Fig. 7.1).

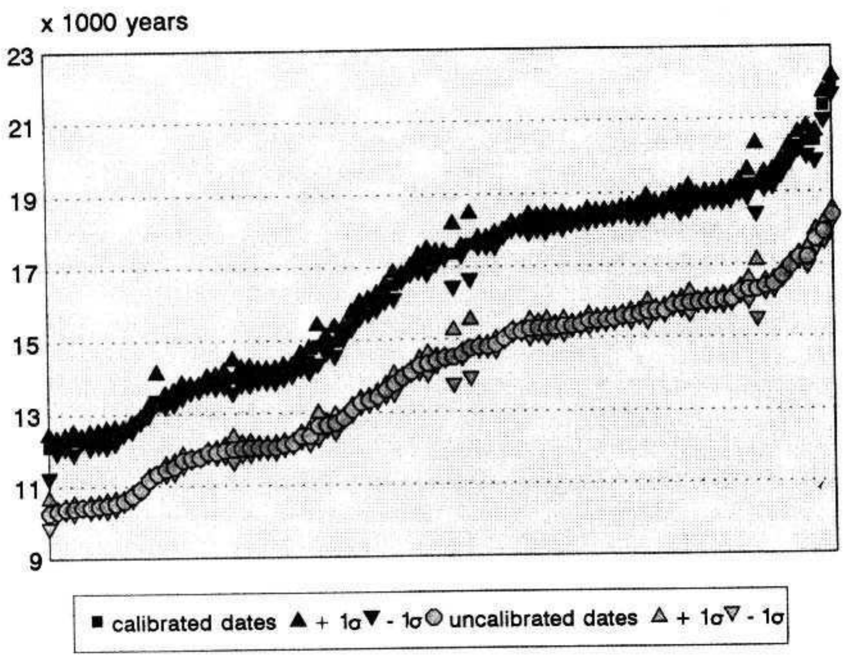

Figure 7.1. The calibrated and uncalibrated C^{14} dates of twenty-two Epigravettian sites, arranged according to the progressive increase of the central values (after Gioia *et al.* in press). Dates are before present.

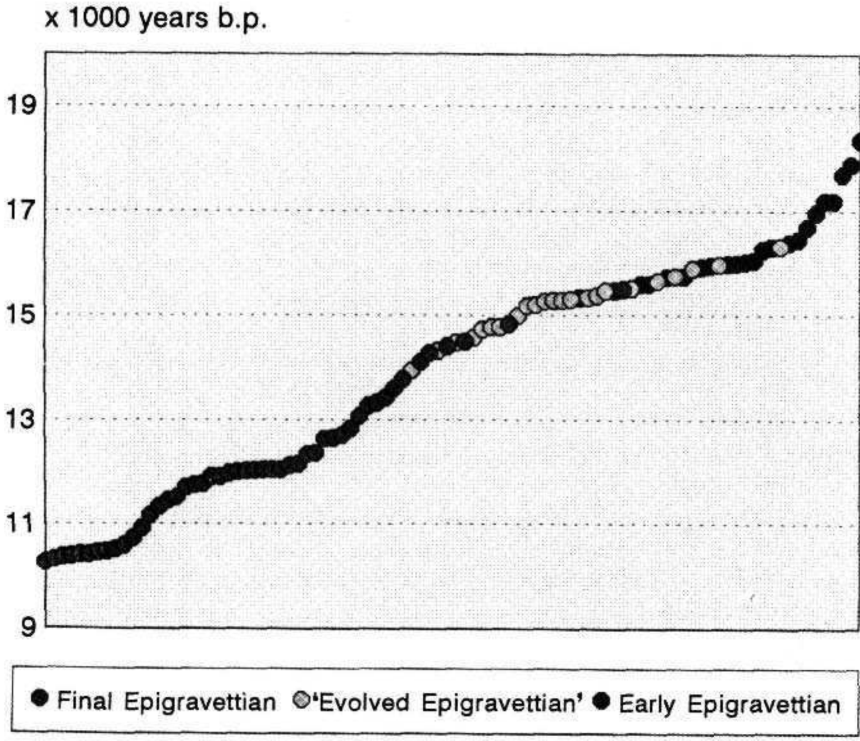

Figure 7.2. The uncalibrated dates of twenty-two Epigravettian sites, arranged according to the progressive increase of the central values and distinguished by phases (after Gioia *et al.* in press). Note the overlaps with the "Evolved Epigravettian."

Both calibrated and uncalibrated dates have their use. In order to avoid some of the confusion that inevitably arises, we follow the convention of using "bp" for uncalibrated dates, and "BP" for calibrated ones.

The Italian record *is* also faced with a different chronological problem because of the seriation traditionally in use. Starting with the work of G. Laplace in the late 1950s and early 1960s, a parallel was established between the development of the Magdalenian in France and that of the "Tardigravettian" in Italy (see also 6.2.3) (Laplace 1964, 1966). The lithic industries of the latter country were recognized as different from the Magdalenian ones—hence, a different name (i.e., "Tardigravettian" soon changed to "Epigravettian"). A relative chronology was established from typological seriation because the use of radioactive isotopes, namely, radiocarbon, was then in its infancy. The archaeological record, which follows the Gravettian, was divided into Early, Evolved, and Final Epigravettian, from the earlier to the later. The Evolved Epigravettian was more or less equated with the whole Magdalenian.

Some fifteen years later, a group of Italian archaeologists updated the framework established by Laplace (Bartoloinei *et al.* 1979). By then, the evolved Epigravettian was taken as the chronological equivalent of the Middle Magdalenian only, and some refinement was given in the definition of the assemblages, while a list of C14 dates was provided.

The Evolved Epigravettian was originally defined by the relative frequency of various types of endscrapers and burins in a small group of sites. Such sites, however, while not increasing in overall number, kept changing with each successive revision of the Italian Upper Paleolithic after 1979 and up to the present (Gioia *et al.* in press). A definition that was not simply typological and related to lithic industry was not proposed. When other aspects of prehistoric life are taken into account, such as burial practices and works of art, the Evolved Epigravettian looks like an almost empty box (Mussi *et al.* 1989; Mussi and Zampetti 1997; Zampetti and Mussi 1999).

Absolute dating makes matters even worse: the results cluster from 16,000 to 14,000 bp but, in doing so, consistently overlap with dates of sites correlated to the Early Epigravettian and to the Final Epigravettian (Fig. 7.2). Then, when the dates are calibrated, there is simply no such thing as a chronologically autonomous Evolved Epigravettian.

We do not retain the shifting label "Evolved Epigravettian" for any site. Instead, we call Early Epigravettian those industries assumed to have been knapped before 16,000 bp, and Final Epigravettian all those later than 16,000 bp.

7.1.3. Discussing the Terminology of Final Epigravettian and Mesolithic: Different Meanings in Italian Archaeology, and the Sauveterrian and Castelnovian

The term "Mesolithic" appeared in the late nineteenth century more or less contemporaneously in England (Westropp 1872) and in France (Reboux 1873). It was a residual category for lithic industries found to be of intermediate age between the Paleolithic and the Neolithic (Czarnik 1976). Not surprisingly, the very meaning of the word "Mesolithic" has been controversial from the beginning. In attempts to get rid of the ambiguity, generations of scholars have put forward various definitions involving chronology, technology, economy, a changing environment, and human social organization (for updates, see Bonsall 1989; Commission de Pré- et Protohistoire 1991; Larsson 1996; Rozoy 1978; Villaverde Bonilla 1995; Zvelebil 1986).

As far as Italian archaeology is concerned, in 1960, A. M. Radmilli proposed an economic definition relating the Mesolithic to the food shortage supposedly caused by the changing environment: the disappearance of the large herds of herbivores would have caused a complete modification in subsistence strategies and a reliance on small mammals, birds, fish, and mollusks. In this sense, accumulations of remains including a substantial amount of smaller fauna were termed as "Mesolithic," even when a Pleistocene date was recognized.

In the late 1960s, M. Taschini (1968) insisted on a more optimistic approach, based on the fact that people were not starving and instead were taking advantage of the different resources offered by the new ecological niches opening in the early Holocene. Persistence of a more traditional way of life, including the making of industries easily recognized as Epigravettian, was also accepted for part of the Holocene record. This was based on the evidence of some sites, such as Arma

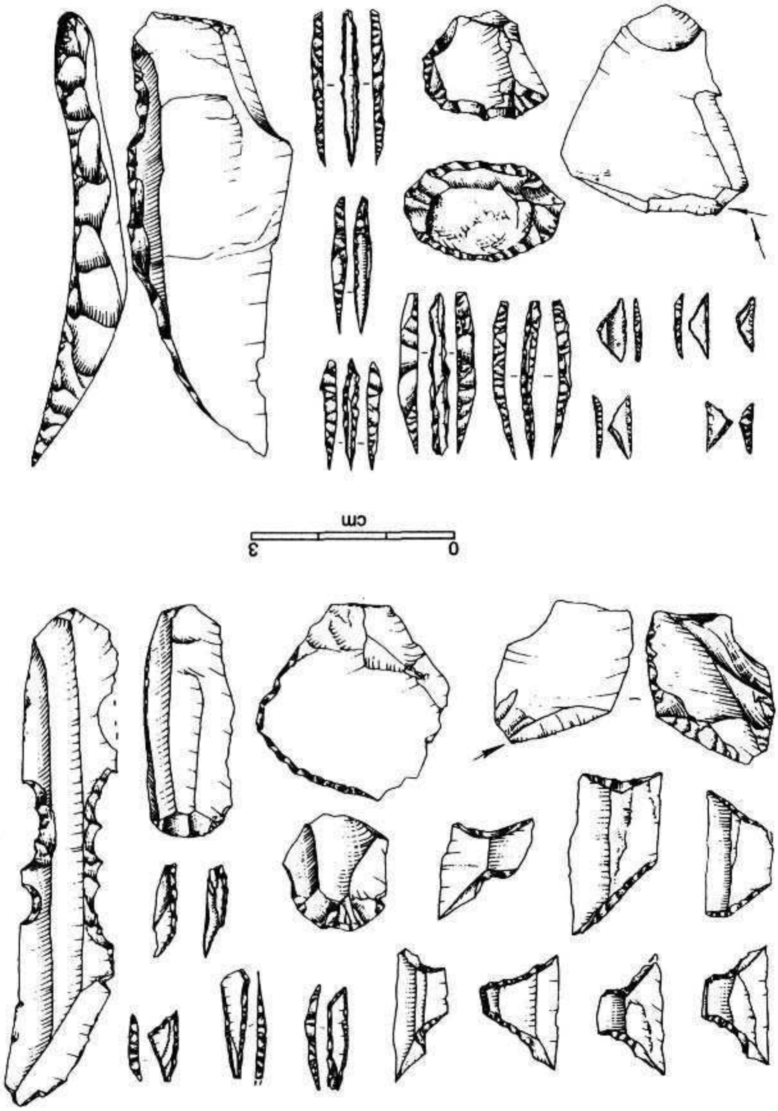

Figure 7.3. Riparo di Romagnano. Castelnovian (top) and Sauveterrian (bottom) assemblages (source: M. Lanzinger 1991).

dello Stefanin in Liguria, in which an Epigravettian industry was dated by C^{14} to the early Holocene. More recent excavations, however, and new dates, proved that the settlement antedating the Neolithic in the local sequence was in fact of late Pleistocene date, and that the Epigravettian industry had been made before the beginning of the Holocene (Biagi *et a1.*1989).

It is now accepted that there is no overlap between Final Epigravettian and Mesolithic industries; that is, the lithic tools made by the last hunter–gatherers during the early Holocene are both typologically and technologically distinct from those of the late Pleistocene. In the Final Epigravettian, as a rule, endscrapers tend to outnumber burins, and also become shorter through time. The backed tools include backed bladelets. Around 12,000–11,000 bp, tiny backed rectangles/trapezes are made with a double truncation and are more frequent than lunates and triangles, which also occur, although in limited number. The microburin technique is used. Deep and multiple notches are also characteristic of some assemblages. Shouldered points are found in variable percentages, but not at any site. Regional differences have been recognized, as opposed to a more homogeneous Early Epigravettian (see 7.3.1).

Mesolithic industries are better represented in northeastern Italy, where comprehensive surveys and excavations have been carried out in mountain areas, starting in the 1960s. During rhe Preboreal and Boreal, industries are found that are classified as Sauveterrian on the basis of similarities with the Sauveterrian first recognized in France. Later, during the early Atlantic, Castelnovian industries are found (Bagolini *et al.* 1983; Broglio and Improta 1994–1995; Broglio and Kozlowski 1983). The distinction between Sauveterrian and Castelnovian is made on both typological and technological grounds. While there are always specialized microlithic armatures, the Sauveterrian is characterized by tiny, double-backed points—the Sauveterrian points—and the Castelnovian by trapezes and also by the production of more regular blades/bladelets (Fig. 7.3).

A continuity between the Final Epigravettian and the Sauveterrian, and then the Castelnovian, is recognized following different lines of evidence: stratigraphic continuity, such as at the open-air site of Isola Santa in central Italy (Alessio *et al.* 1983; Tozzi 1978), as well as typological and technological continuity (Broglio and Kozlowski 1983; Guerreschi 1983).

7.1.4. Reference Sites of the Late Pleistocene and Early Holocene Age

A number of sites yielded a variety of lithic and bone assemblages, burials, aesthetic remains, and dwelling structures, and will be repeatedly mentioned. More comprehensive information on some of them is given below (see also Fig. 7.4).

7.1.4.1. Riparo Tagliente (Veneto)

This vast rock shelter opens in the flint-rich sector of Monti Lessini in the pre-Alps, at 250 m asl. We consider the upper part of the stratigraphic sequence, which also includes Mousterian (see 4.1.4) and Aurignacian layers, that is, levels 18–4 from bottom to top (Fig. 7.5) (Bartolomei *et al.* 1974, 1982; Capuzzi and Sala 1980; Guerreschi 1984; Leonardi 1972; Mezzena 1964). The C^{14} dates range

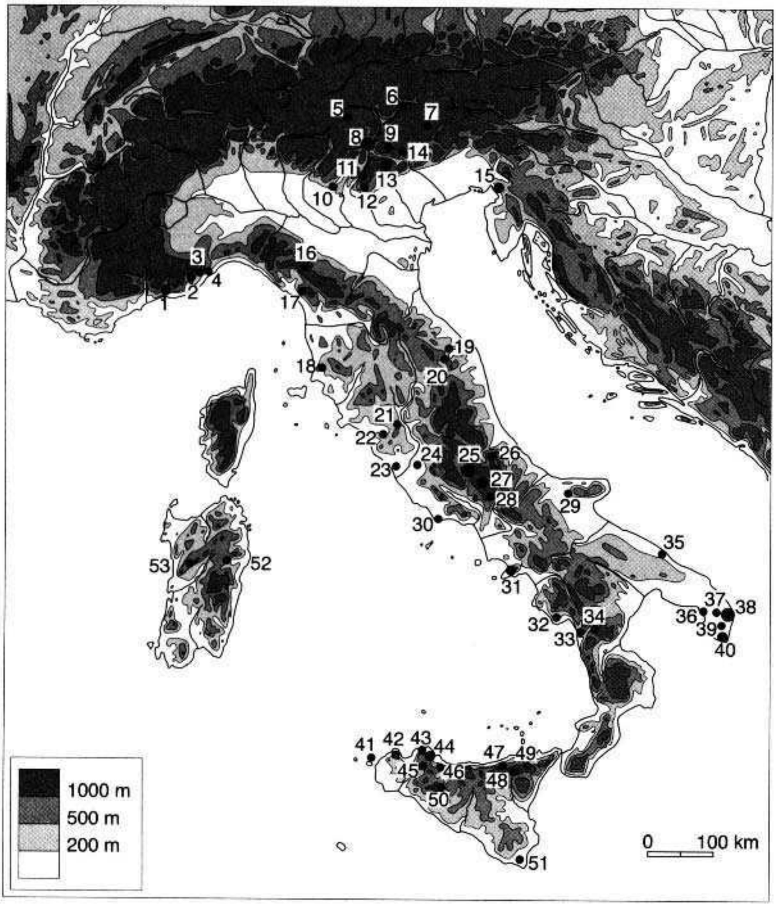

Figure 7.4. Location of sites of the Final Pleistocene and early Holocene. 1: Grimaldi or Balzi Rossi sites (Gr. dei Fanciulli, Rip. Mochi); 2: Arma dello Stefanin; 3: Gr. della Básura; 4: Gr. delle Arene Candide; 5: Dosso Gavia; 6: Rip. Cionstoan; 7: Mondeval de Sora; 8: Rip. di Romagnano, Rip. Gaban, Rip. Pradestel, Rip. Vatte di Zambana, Rip. di Paludei; 9: Gr. di Ernesto; 10: Fienile Rossino; 11: Rip. Soman; 12: Rip. Tagliente; 13: Rip. Dalmeri, Val Lastari; 14: Rip. Villabruna; 15: Gr. Azzurra, Gr. Benussi; 16: Monte Bagioletto; 17: Isola Santa ; 18: Vado all'Arancio; 19: Fosso Mergaoni; 20: Gr. del Prete; 21: Cenciano Diruto; 22: Rip. Biedano; 23: Rip. di Palidoro; 24: Gr. Polesini; 25: Gr. Maritza, Gr. Continenza, Gr. di Pozzo; 26: Rip. di S. Bartolomeo; 27: Fonte La Ria, Fonte Chiarano; 28: Gr. A. Graziani; 29: Gr. Paglicci; 30: Rip. Blanc; 31: Gr. del Mezzogiorno, Gr. Erica, Gr. La Porta; 32: Gr. della Serratura; 33: Gr. della Madonna; 34: Gr. del Romito; 35: Gr. delle Mura; 36: Gr. del Cavallo; 37: Gr. delle Veneri; 38: Gr. Marisa, Gr. di Porto Badisco, Gr. Romanelli, Gr. Zinzulusa; 39: Taurisano; 40: Gr. delle Cipolliane, Gr. delle Prazziche; 41: Gr. dei Cervi (Levanzo); 42: Gr. dell'Uzzo; 43: Gr. Perciata; 44: Gr. dell'Addaura, Gr. Niscemi; 45: Gr. della Molara; 46: Rip. del Castello; 47: Gr. di S. Teodoro; 48: Rocca S. Marco; 49: Sperlinga di S. Basilio; 50: Gr. dell'Acqua Fitusa; 51: Gr. Corruggi; 52: Gr. Corbeddu; 53: Macomer.

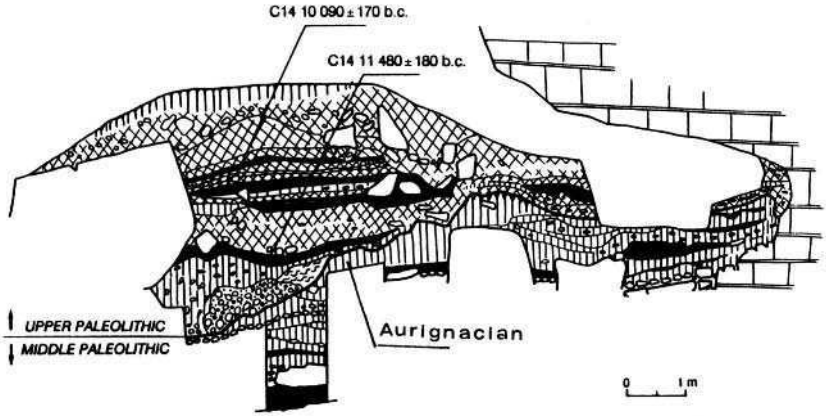

Figure 7.5. Riparo Tagliente. The stratigraphic sequence (after Castiglioni *et al.* 1990).

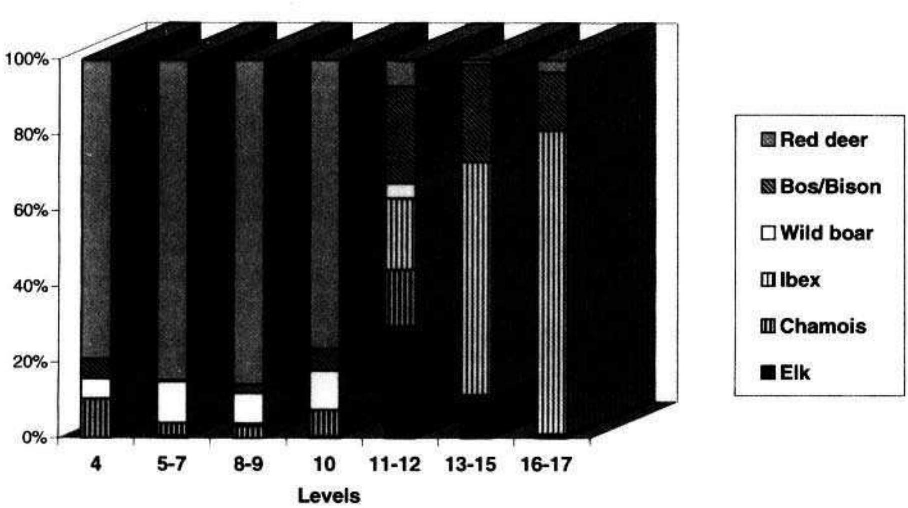

Figure 7.6. Riparo Tagliente. Ungulate frequencies in levels 17 to 4 (source: Bartolomei *et al.* 1982). The hydruntine horse, with a single tooth in level 7, is not included.

from 13.430 ± 180 (R-605a) and 13.330 ± 160 bp (R-605) in levels 16–15, to 12,650 ± 160 bp (OxA-3530) in level 10a, and 12.040 ± 170 bp (R-371) in levels 10–8. Humans contributed to the deposit bringing inside, in addition to bones, tools, and so on, even some loess, apparently to make the floor less uneven. The uppermost levels (levels 1–3) are disturbed by intrusive material of Holocene age.

In the lowermost part of the sequence, ibex is the most frequent species (Fig. 7.6), and marmot is also relatively frequent. Then, starting in levels 12–11, but mostly from level 10 upwards, red deer is the dominant species, accompanied by forest species such as roe deer and wild boar. A single tooth of hydruntine horse (*Equus hydruntinus*) is most notable in level 7a, as this small equid was nearly absent from northern Italy. The few carnivore remains include some brown bear.

Backed tools are the commonest lithic group and make up to 50–60 percent of the assemblage in most levels (Table 7.1). Most of them are fragments of straight-backed bladelets, even if a few large arch-backed points also occur. There are a few geometric microliths from level 10 upwards. Endscrapers become shorter in the upper cuts, including thumbnail ones. Areas devoted to intensive knapping activity, and with much more waste material than retouched tools, are also part of the deposit.

Table 7.1. Riparo Tagliente. Inventories of Lithic Tools from Selected Levels. [a]

Typelist	t.16 (*n* = 539) %	t.10 (*n* = 1128) %	t.4 (*n* = 595) %
Single endscraper	7.0	11.4	13.1
Shouldered endscraper	0.9	0.7	0.3
Carinated endscraper	1.8	0.9	0.7
Borer	0.7	1.3	1.2
Dihedral burin	4.6	4.5	2.3
Burin on break	3.9	2.5	1.5
Burin on truncation	3.0	1.7	1.8
Backed point	1.5	5.3	3.5
Backed and shouldered point	0.2	–	–
Backed blade/bladelet	1.3	2.9	1.8
Truncated backed blade/bladelet	1.3	6.0	8.2
Backed fragment	40.0	39.5	38.6
Geometric microlith	–	0.1	–
Truncation	6.7	5.3	3.2
Blade with continuous retouch	1.7	1.9	1.5
Notch/denticulate	3.7	2.8	9.4
Scaled piece	0.2	1.2	0.8
Sidescraper	3.3	2.7	3.7
Point	1.7	0.7	10
Miscellaneous	0.2	0.2	0.3
Total	100.0	100.0	100.0

[a] Source: Bartolomei *et al.* (1982).

The burial of a twenty-two to twenty-four-year-old man was discovered in level 13, but the grave had been disturbed during the Middle Ages. As a result, the upper part of the body and the head are missing. The deceased lay in a burial pit on his back. The horn of a bovid was next to him, and he was covered by stone blocks. One was engraved with the representation of aurochs horns, and of a lion or lioness (Fig, 7.47), and another was engraved with linear patterns.

In total, a dozen animals are engraved on bones, pebbles, slabs or blocks, but not all of them were found in an undisturbed stratigraphic position (Guerreschi and Leonardi 1984; Zampetti 1987). Bison, lions, a single ibex, a single aurochs, and several undetermined herbivores were represented. Geometric engravings are also part of the assemblage (Fig. 7.39:3).

As is usual at Italian sites, the bone industry is restricted. Some perforated deer canines, bone points, and a few more bone tools were discovered. Perforated marine shells were also found, mostly the tiny *Cyclope neritea.*

Dwelling structures, such as postholes, small pits, and a paved area some 40 cm in diameter, were recognized during excavations.

7.1.4.2. Gr. Polesini (Latium)

This large cave opens next to the present riverbed of the Aniene River, an affluent of the Tiber River, between Rome and Tivoli. It was excavated over an area of 114 m² and down to 5 m below datum in 1953–1956 (Mussi 1990-1991; Mussi and Zarnpetti 1993; Radmilli 1974; Sala 1983; Zampetti 1990-1991). As part of the deposit lies below the modern water table, pumps were used to empty the trenches, and the stratigraphic sequence is not well assessed. There is a single radiocarbon date, 10,090 ± 80 bp (R-1265) from level 7, more or less in the middle part of the stratigraphic sequence, which continues with Bronze Age and later remains. The establishment of a detailed chronology is not possive Everything is on a huge scale at this site. The collected lithics amount to nearly half a million implements, and the bone remains weigh two metric tons. Of the ungulates, which have been studied into some detail, red deer predominate (Table 7.22). The carnivores include wolves, foxes, lynxes, wildcats, badgers, weasels, and, truly exceptional in Italy, the wolverine. There are also leporids, marmots, and a variety of small rodents. The most frequently recorded bird is the partridge, while anatids are indicative of nearby bodies of water, and *Lagopus mutus*, the ptarmigan, as well as *Tetrao urogallus*, the capercaillie, are related to the nearby mountains. Both land and pond tortoise are also documented.

The lithic industry is made up of abundant *débitage* with thousands of cores, and some 25,000 formal tools. More than half of them are backed bladelets, including a few truncated backed bladelets and some geometric microliths. Some tiny, double-backed bipoints are illustrated, which suggest the presence of Sauveterrian points. Endscrapers, of which about 10 percent are small circular or subcircular types, vastly outnumber burins.

About 100 pebbles display evidence of use–wear or other artificial modifications, some of them being ochre-stained or finely incised with geometric or naturalistic patterns (Figs. 7.27 and 7.29). Bones, too, were engraved (Fig. 7.29;

Fig. 7.39:2). The animals depictions identified with certainty are aurochs, horses, leporids, cervids and a wolf, while others are more problematic. Nearly 300 bone tools are recorded, which is exceptional for an Italian site. Some of them are engraved.

There are seventy-nine human bones, representing a minimum of fourteen individuals of both sexes, including four children. Burials, if any, went unrecorded, but some ochre-stained bones are strongly suggestive of their existence. Ornaments include 80 perforated deer canines, 164 *Columbella rustica,* 49 *Cyclope neritea,* 8 *Pectunculus* sp., 1 *Pecten* sp., 9 *Dentalium* sp., while *Mytilus* sp, and *Cardium* sp. were found as fragments. There are also 260 fish vertebrae, some of which were ochre-stained.

7.1.4.3. Gr. Paglicci (Apulia)

We consider here the uppermost part of the sequence of this cave of Monte Gargano, that is, levels 9–1 (for earlier levels, see 6.2.1). Lithic series, faunal assemblages, human bones, works of art, and bone tools were all found (Mezzena and Palma di Cesnola 1967, 1972, 1992; Palma di Cesnola 1988; Palma di Cesnola *et al.* 1983; Sala 1983; Zorzi 1962), and the preservation is good enough to allow extensive microwear analysis (Donahue 1988). Several C^{14} dates range progressively from 15,270 ± 250 bp (F-67) and 15,460 ± 220 bp (F-66) in levels 9 and 8 respectively, to 11,440 ± 180 bp (F-94) in levels 3–2 (Fig. 6.8). The entrance was closed by falling rocks, seemingly sometime around 11,000 bp.

Within the very abundant lithic industry, endscrapers generally outnumber burins (Table 7.2). The former usually are on the extremity of a blade in the earliest levels, where “endscraper-points” also occur (i.e., endscrapers on a fully retouched and pointed blade, which are a type peculiar to Italy in the final Paleolithic). Shorter and shorter endscrapers, and eventually circular ones, are found in the uppermost levels. Burins are similarly on a blade in the earlier levels, while core burins were produced later. Backed bladelets, most often broken, are found in great numbers, especially from more recent excavations. Tiny Sauveterrian points also appear in the uppermost levels, with some geometric microliths.

As far as faunal remains are concerned, preliminary analysis is available only for ungulates, from levels 9–3 (Fig. 7.23). Red deer, wild boar, aurochs, equids, and ibex are all present in substantial, if varying, numbers with other less frequently occurring species.

Ornaments, some bone tools, bones, and stones engraved with naturalistic scenes or geometric patterns also occur in small numbers. Most of the naturalistic engravings were found in levels 9-8. Horses, cervids, bovids, birds—possibly including *Alca impennis,* the Great Auk, whose remains were discovered at coastal sites—were represented (Fig. 7.7). Human bones are found scattered, with some concentrations in levels 6 and 4 (Corrain 1966). Part of the articulated skeleton of an adult male was discovered in level 5.

Table 7.2. Grotta Paglicci. The Lithic Tools of Levels 7-2, after the Preliminary Inventories of the 1972-1973 Field Seasons.[a]

	Endscrapers %	Burins %	Truncations %	Backed tools %	Sidescrapers, notches, denticu-lates, points %	Varia %	TOTAL
Level 2 (*n* = 94)	8.5	8.5	5.3	42.5	33.1	2.1	100
Level 3 (*n* = 465)	8.8	12.3	7.3	43.0	27.3	1.3	100
Level 4 (*n* = 100)	12.0	9.0	7.0	42.0	30.0	–	100
Level 5 (*n* = 347)	11.0	5.5	10.7	37.1	33.4	2.3	100
Level 6 (*n* = 108)	11.1	0.9	8.3	43.6	34.2	1.9	100
Level 7 (*n* = 167)	7.8	10.8	6.0	50.1	22.9	2.4	100

[a]Source: Palmadi Cesnola *et al.* (1983).

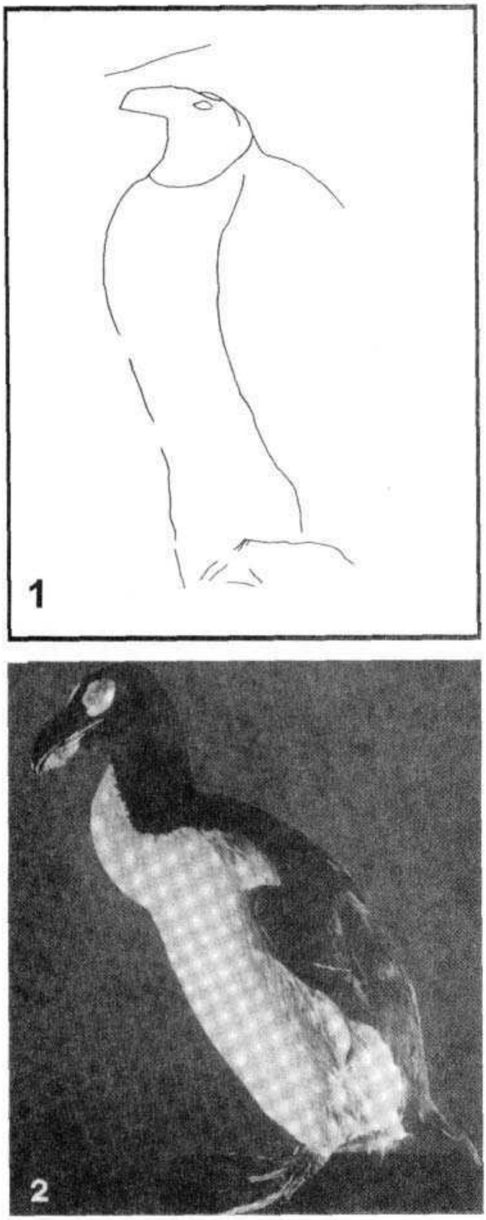

Figure 7.7. The extinct *Alca impennis*.1: the bird engraved on a stone from level 9 of Gr. Paglicci (length: c. 13 cm)(after Mezzena and Palmadi Cesnola 1992); 2: a stuffed *Alca impennis* in the collections of the Museo Civico di Storia in Milan.

7.1.4.4. Grotta Romanelli (Apulia)

This cave was discovered in 1900 by P. E. Stasi, who first excavated it. Later, G. A. Blanc, from 1914 to 1938, and L. Cardini, in 1954 and 1958, also directed major research in the cave, which opens 8 m asl on the cliffs of Terra d' Otranto at the extremity of the "heel" of the Italian boot. It is situated at the base of the low altitude karstic plateau of Salento. The late Pleistocene levels are collectively known as the *Terre brune,* ("brown earth") as opposed to the underlying *Terre rosse* ("red earth"), that is, levels that produced Middle Paleolithic tools, if in limited numbers (see 4.3.2). The *Terre brune* are subdivided in levels E-A, from bottom to top. After more limited excavations in the 1960s and 1970s, they were renamed VI–I from D to A (with level A subdivided in two parts).

Several C^{14} determinations were produced by two different laboratories, with somewhat contrasting results, even if a quick rate of sedimentation seems granted (Alessio *et al.* 1964, 1965; Bella *et al.* 1958–1961; Vogel and Waterbolk 1963). Level D: 10,640 ± 100 bp (GrN-2055); level C: 9,790 ± 80 bp (GrN-2154) and 10,390 ± 80 bp (GrN-2153); level B: 11,930 ± 520 bp (R-56); level A: 10,320 ± 130 bp (GrN-2305) and 9,880 ± 100 bp (GrN-2056); 11,800 ± 600 bp (R-58) and 9,050 ± 100 bp (R-54), the latter at no more than 5 cm from the surface.

Lithic industry is abundant, and particularly so in level C (Fig. 7.25). The tools were studied by several scholars, if only in a preliminary way (Blanc 1930; Laplace 1966; Palma di Cesnola *et al.* 1983; Taschini and Bietti 1972). Endscrapers always account for one-fourth of the total, vastly outnumbering burins. Short and very short types, often circular or unguiform, occur frequently and increase through time. Core burins are regarded as characteristic of the assemblages of Gr. Romanelli. Backed tools include many backed truncated tools. Some geometric microliths (segments and triangles) were found, and the microburin technique was used. A characteristic lithic type is the "Romanellian point," which is an accurately retouched point on a blade, bladelet, or flake, sometimes double and, accordingly, bipointed.

Some of the Romanellian tools infiltrated into the underlying *Terre rosse,* where large pachyderms are part of the faunal assemblage. In the early twentieth century, this led to the conclusion that hippos and elephants had survived in southern ltaly up to the end of the "Glacial Age."

The fauna is characterized by hydruntine horse, aurochs, and red deer remains, in addition to a few roe deer and wild boars, as well as many hares (Biondi 1995; G.A. Blanc 1920, 1953; Cassoli *et al.* 1997; Fiore and Curci 1995). Marmot has also been identified in small numbers. The red fox is the most common carnivore, but wolf, wildcat, marten, and badger also lived in the surroundings. A few bones of monk seal (*Monachus inonachus*) and of common dolphin (*Delphinus delphis*) were discovered in level A, along with some fish remains all over the deposit.

Thousands of bird bones from 115 different species were also collected during excavation. In most levels, they included remains of *Alca impennis,* the so-called "penguin" of the Boreal hemisphere or Great Auk, now extinct (Fig. 7.7). Many marine mollusks, such as limpets. are documented from the *Terre brune* (Blanc 1930).

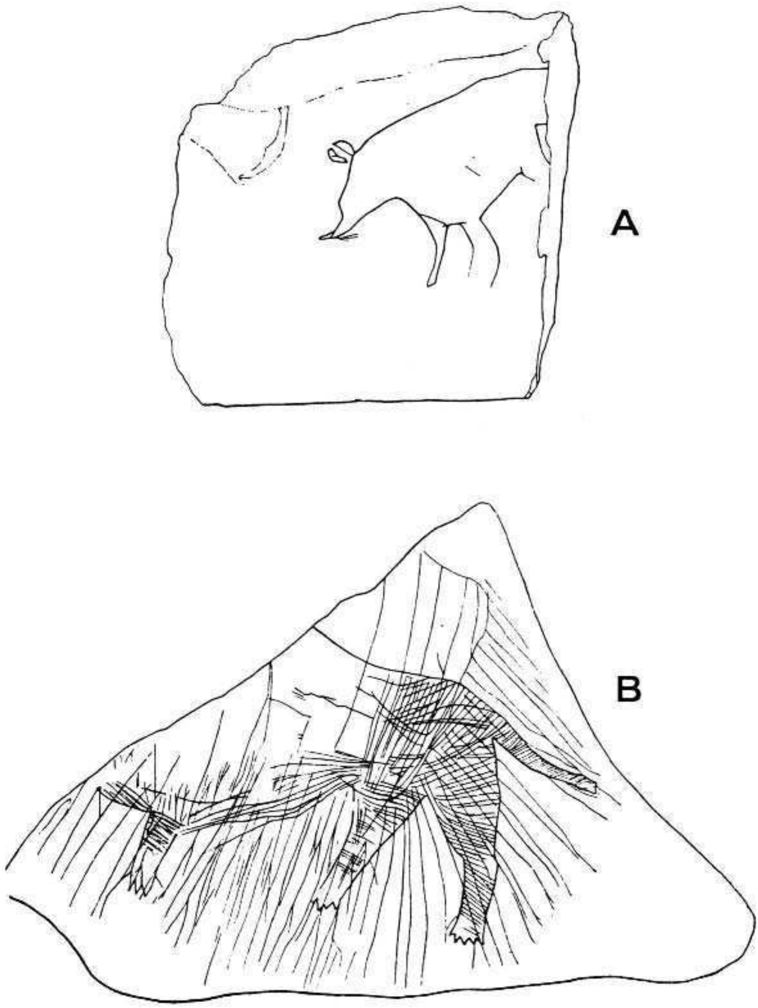

Figure 7.8. Grotta Romanelli. Stone engravings (after Blanc 1939-1940). A: supposed wild boar; B: felid, probably a wild cat.

Bone points, perforated deer canines, and perforated shells are also part of the archaeological collections. Fossil shark teeth must be added to this inventory, since their use–wear points to the fact that they were not only collected but also utilized for some practical task.

Aesthetic remains were also discovered (Acanfora 1967; Blanc 1938–1939; Graziosi 1932–1933). A limestone block from levels B–C was painted in red, with rows of tiny arch-shaped patterns (Fig. 7.32). The walls of the front cave were engraved with a schematic bovid (Fig. 7.34), with linear patterns, fusiform ones that could represent stylized women, and possibly vulvas. Some engraved rock frag-

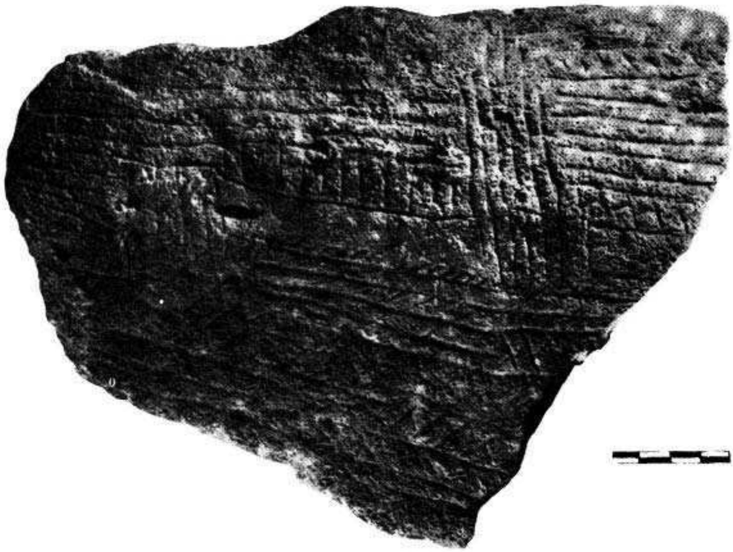

Figure 7.9. Grotta Romanelli. Stone with a geometric engraved pattern (width: 21 cm) (after Acanfora 1967).

ments broke off and eventually became incorporated into level C, giving a clue to the chronology of the engravings.

Many more engraved stone slabs were discovered at various levels, but with a concentration at the base of level C. The represented animals include some bovids, a doe, a small felid, and possibly a wild boar (Fig. 7.8).More often, however, geometric figures were engraved, and sometimes extended all over the stone surface (Fig. 7.9).

Adult and children burials were also briefly described by P. E. Stasi and E. Regalia (1904).

7.2. DIFFERENT NICHES IN A CHANGING LANDSCAPE

The climate, landscape, fauna, and flora were quickly changing. We describe below the general trends and then, in greater detail, specific environments that attracted human groups.

7.2.1. The General Environment: Deglaciation, Forest Development, the Rising Sea Level, the Fauna, and Volcanic Eruptions

In the southern fringes of the Alps, and farther south, the glacial expanse that characterizes the Glacial Maximum was relatively short-lived. The glaciers that had developed in the pre-Alps were quickly retreating, well before 14,000 bp, and by

13,000 bp, the area was substantially free of ice (Cremaschi and Chiesa 1992). In the Apennines, the process was enhanced by the lower latitude and minor elevation of mountains: if anything, it started earlier, and was completed earlier than in the Alps (Giraudi personal communication 1996)—up to the present, with a single small glacier left in the Gran Sasso of Abruzzo. The deglaciation of the Alps and the Apennines, however, was a discontinuous process, with phases during which moraines were formed at intermediate positions between that of the maximum expansion and the present situation: where best preserved, three to four such moraine rings are known to exist (Federici 1979; Venzo 1971) (Fig. 7.10). There is also evidence that at some point during the early Holocene, the extension of some Alpine glaciers was smaller than today (Orombelli and Porter 1982).

During the late Pleistocene, and while open prairie and steppe environments prevailed, loess deposits—of admittedly limited thickness—were blown by strong winds from the southern or southeastern quadrants and accumulated on the plateau and in the caves of the pre-Alps (Castiglioni *et al.* 1990; Cremaschi 1990). Phases of aeolian sedimentation are also recorded in the Apennines, with volcanic ash sometimes an added constituent of the loess deposits (Frezzotti and Giraudi 1990a, 1990b). Of the many eruptions from the several active volcanoes during the Late Glacial, the most impressive led to the deposition of the so-called *Tufo giallo napoletano,* around 12,000 bp. The latter volcanic ash originated in the Phlegrean Fields near Naples and was related to a large-scale event, even if it was more restricted than the one leading to the deposition of the earlier Campanian Ignimbrite (see 5.1.6). The *Tufo giallo napoletano* is extensively recorded in central Italy (Frezzotti and Narcisi 1989, 1996).

The vegetation was changing. Fluctuations in its composition are documented by the palynological record and related to climatic modifications. However, the alternating warmer and colder episodes established in northern Europe and named Bolling, Older Dryas, Allerod, and Younger Dryas, are not recognized with certainty in northern Italy (Lowe 1992); this is also the case in the Western Alps (Bintz 1992) and further south in Italy (Watts *et al.* 1996). After a rather continuous dry and cold phase, which started before the Glacial Maximum, at the very end of the Pleistocene, there is evidence of no more than a single mild climatic oscillation, followed by the cold Younger Dryas. This is admittedly in contrast with the more articulated record left by the retreating glaciers. However, the response of the vegetation to changes in temperature and precipitation is extremely complex, because of so many local factors related to insolation, soil composition, and so on, and cannot be straightforwardly correlated with geological events. We accordingly follow J. J. Lowe's (1992) proposal of referring to the "Lateglacial Interstadial" when mentioning evidence of a warmer climate occurring just before the Younger Dryas.

In the combined pollen profiles of Prato Spilla A and C, at 1,550 m and 1,350 m asl in the northern Apennines, after a pioneering phase during which trees and shrubs are established, the Lateglacial Interstadial (*Abies, Pinus, Quercus, Coryfus, Arternisla*) can be traced from > 12,360 bp to c. 11,600 bp (Lowe 1992). Later, there is a colder phase (*Pinus, Abies, Artemisia,* herbs) that lasts for some 1,000 years, and around 10,600-10,300 bp, the Younger Dryas/Holocene transition is marked by rapidly falling *Pinus* and *Artemisia* percentages. The spectra are then

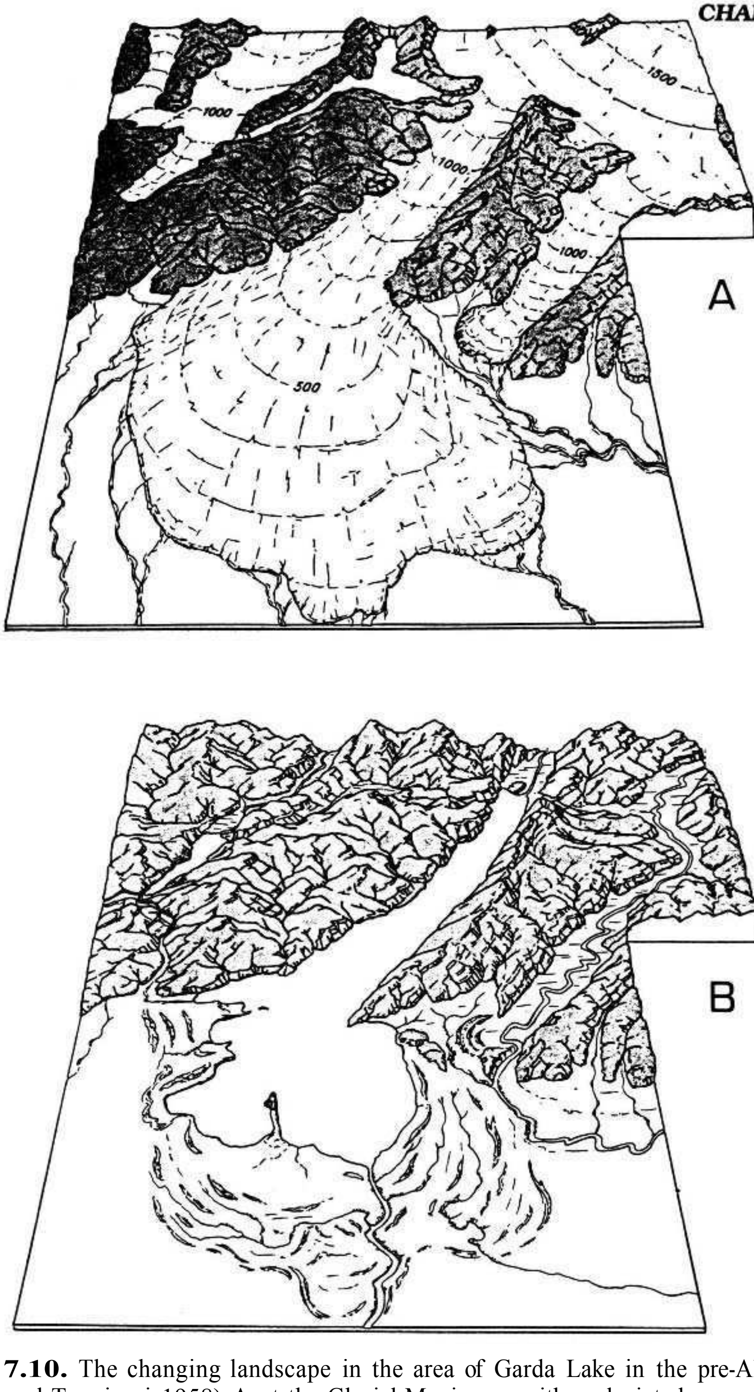

Figure 7.10. The changing landscape in the area of Garda Lake in the pre-Alps (after Trevisan and Tongiorgi 1958). A: at the Glacial Maximum, with a glaciated area extending inside the lake basin south of the modern town of Verona, and another glaciated area inside the present Adige valley; B: the present situation, with terminal moraines enclosing the southern shores of the lake.

characterized by *Quercus* and *Abies* in the early Holocene, and by *Fagus* in the middle Holocene.

In the Monti Lessini, in the pre-Alps and at a lower altitude, the Lateglacial Interstadial is documented in the sequence of Riparo Tagliente: from c. 13,500 to 12,000 bp, there is a steppe characterized by *Artemisia,* the sagebrush, with rising percentages of trees (Cattani 1990, 1992). Then there is a marked increase in arboreal pollens, which also include hazelnut and species typical of a mixed oak forest. The wooded Lateglacial Interstadial can also be traced in peat deposits from the same general area (Paganelli 1984); it is then followed again by a more open, steppe-like environment with *Artemisia.* The Preboreal is best documented at an archaeological site, Riparo di Pradestel, near Bolzano (Scotch pine and some broad-leaved trees), while a mixed oak forest develops during the Boreal (Cattani 1992). Higher up in the mountains, however, and well above 1,000 m asl, the Mesolithic Sauveterrian campsites were established in a montane grassland environment.

Better information is available in central Italy, where continuous sequences have been worked out. The late glacial and early Holocene vegetation is evidenced by the pollen sequence of Lago di Monterosi at low elevation and some 40 km north of Rome (Bonatti 1970). An arid *Artemisia* steppe is in existence from the base of the deposit at c. 25,000 bp to c. 15,000, when a grassland dominated by Gramineae was established. A mixed oak forest develops at the very end of the Pleistocene and is dominant during the Holocene. At Lago di Vico, not far away, there is similarly an *Artemisia* steppe alternating with a more wooded environment, and then with another phase of steppe-like vegetation, before the establishment of the mixed oak forest in the early Holocene (Frank 1969). A more detailed and better dated sequence is available at Valle di Castiglione, in the volcanic district of Rome (Alessio *et al.* 1986): during the Lateglacial, steppe formations are the rule, with dominant *Artemisia,* Chenopodiaceae, and Gramineae, which are followed by the development of forest in the Holocene; however, after 14,000 bp, and before 10,800, which is the extrapolated date for the beginning of the Holocene reforestation, there is a temporary increase in precipitation and possibly in temperature, and then soon after, a new expansion of steppe plants.

In the mountains of Abruzzo, an *Artemisia* steppe existed during the late glacial, both in the Fucino basin at 700 m asl and much higher up on the Aremogna plateau at c. 1500 m asl (Frezzotti and Giraudi 1989). The vegetation, if open, was probably developing there earlier than at a similar altitude in the Alps, as, for instance, at Bondone (Kofler 1992). A mixed oak forest, which also included birch, was established in the Fucino basin not later than c. 10,000 bp (Lubell *et al.* 1999; Magri and Follieri 1991). Close to the Aremogna plateau and at c. 1,600 m asl, the beech forest was well developed by c. 6,400 bp. In this area, thanks to detailed geomorphological studies and an extensive coverage of radiocarbon dates, climatic fluctuations are also known with much finer resolution (Table 7.3) (Frezzotti and Narcisi 1996; Giraudi 1996, 1998; Giraudi and Frezzotti 1997; Giraudi and Mussi 1999). There is evidence of an overall improving climate in the Late glacial, but also of a dramatic, if short-lived, fall in temperature and moisture during the Younger Dryas at c. 11,000–10,500 bp. Relative dryness also characterizes the early Holocene.

Table 7.3. Central Apennine. Climatic Fluctuations during the Late Pleistocene and Early Holocene.[a,b]

Time range (bp)	Difference in mean temperature	Climate
8.000–10,000		Mild and dry
10,000–10,500		Cool and dry
10,500–11,000	-5.6° to -6.7°	Cold and very dry
11.000-13,000	<-4.8°	Mild
13.000–14,500	>-5.4°	Cold and dry
14,500-16,000	-6°	Cold and wet

[a]Sources: Giraudi (19S8); Giraudi and Mussi (1999); Mussi *et al.* (2000).
[b]Temperatures are compared to the present ones in the same area.

Not much research has been carried out farther south, but the extant evidence does not contradict what has been established in northern and central Italy. At Laghi di Monticchio, east of Naples and in the center of the peninsula, the usual *Arremisia* steppe is followed by a much more wooded environment, dominated at first by birch, and soon after by oak (Watts 1985; Watts *et al*. 1996). At Canolo Nuovo, 900 m aslin the Aspromonte of Calabria, the treeless *Artemisia* steppe is documented around 12,400 bp (Gruger 1977; Schneider 1985). After a hiatus in the sedimentation, a beech forest appears to have been in existence soon after 8,000 bp. The *Arremisia* steppe is also recorded, alternating with forest expansions, in cores taken in the middle of what is now the Adriatic Sea (Bottema and Van Straaten 1966).

To summarize, the fragmentary evidence points to open landscapes and probably blowing winds during most of the Late Pleistocene. A steppe-like vegetation seems to have been widespread. It was invariably characterized by *Artemisia,* the sagebrush (Fig. 7.11): the genus, however, is rather large, and it is not clear if it was an herbaceous species or a shrubby one, or both, depending on localities. Small amounts of tree pollens suggest that thickets, riparian woodlands and so on, were growing in protected parts of the territory. There are also shifts toward richer grassland associations and a phase of more wooded vegetation just before the last definitely cold and arid episode, which is the Younger Dryas.

In the south, however, the later oscillations cannot be traced in the scarce palynological evidence. G. Bartolomei (1980), following a different line of evidence (i.e., the analysis of small mammal remains) actually came to the conclusion that the overall temperature rose around 15,500 to 14,000 bp. A monotonous and arid environment was by then established in the southern part of the peninsula, which did not undergo any major change. As a general rule, a drier climate must be expected in southeastern Italy because of the prevailing circulation of winds, that bring humidity and clouds in a west to east trajectory: more precipitation falls on the western part of the peninsula than on the eastern one, which also has a more continental climate because of the proximity of the Balkans.

The reestablishment of woods occurs rather quickly at the Pleistocene-Holocene boundary, if at differential rates due to altitudinal gradients. Generally speaking, a mixed oak woodland, and then a beech forest at higher altitudes,

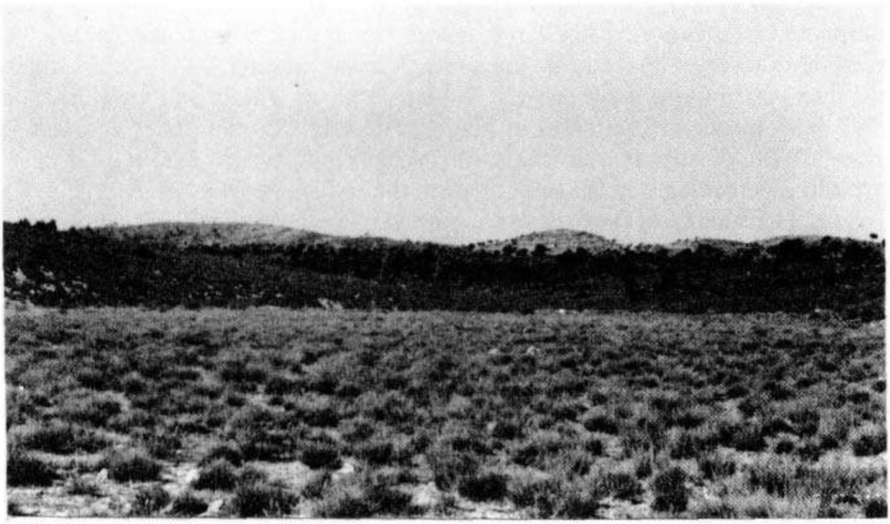

Figure 7.11. The Artemisia steppe, as presently developing at 1,100 m asl in the Telidjene Valley of eastern Algeria (photo by D. Lubell).

veloped over large stretches of the peninsula, while vegetation remained grassy and open in the highest mountain ranges as well as in parts of southern Italy.

The fauna is rather monotonous. There is a marked depletion in large carnivore species, which simply disappear from the record. This holds true for cave bear, whose remains had still been accumulating in great numbers at Gr. della Básura in Liguria around 30,000 bp (De Lumley *et al.* 1984) and were also amply represented in Veneto at Gr. di Paina and Gr. di Trene around the Glacial Maximum (see 6.3.1). In association with the Final Epigravettian industries of Riparo Soman and Riparo Tagliente in Veneto, a region in which *Ursus spelaeus* once thrived, *Ursus arctos* is documented (Bartolomei *et al.* 1982; Tagliacozzo and Cassoli 1992). The hyenas, which also left ample evidence of their presence at approximately 30,000 bp in Gr. Paglicci of Apulia (Palma di Cesnola 1993), survived in the Salento—the southernmost tip of Apulia—to the end of the glaciation, based nn the evidence of Gr. Romanelli and Gr. Zinzulusa, and maybe in Sicily as well (Blanc 1920; Cardini 1958–1961; Vigliardi 1982). Leopards, which were never that frequent, faded away, while lions still haunted people's imaginations (see 7.5.3) but are only known from a few scattered remains—often teeth—from a handful of Lateglacial sites, from Gr. dei Fanciulli in Liguria to Gr. della Madonna in Calabria and Gr. di Porto Badisco in Apulia (Cardini 1970; De Villeneuve *et al.* 1906-1919; Istituto Italiano di Preistoria e Protostoria 1986). After the evidence of Riparo Fredian in the mountains of northern Tuscany some lions even managed to survive into the early Holocene (Boschian *et al.* 1995). The wolf, on the contrary, is well represented, and lynxes possibly increased in number, while there was an abundance of small carnivores, often including foxes, wildcats, and weasels, and, very occasionally, the wolverine.

Ungulates include the usual types of deer, mostly the ubiquitous red deer, accompanied by the more discrete roe deer in wooded environments. The elk (*Alces alces*) lasts to the Holocene in the north Adriatic (Riedel 1975), while chamois and ibex distribution progressively shifts to high mountain ranges, retreating in front of Holocene reforestation at low and middle altitudes. They completely, if progressively, disappear from the south of the peninsula, as best seen from their dwindling percentages in the upper part of the sequence of Gr. Paglicci (Fig. 7.23). Some isolated herds of ibex survived, however, late even there, and some remains were reported by G. A. Blanc (1920) from the upper part of the sequence of Gr. Romanelli around 11,000–10,000 bp; on the Tyrrhenian coast, as far south as the caves of the *penisola sorrentina* and maybe at Gr. della Madonna in Calabria, ibex was still hunted during the early Holocene (Bonuccelli 1971; Cardini 1972; Radmilli and Tongiorgi 1958; Tozzi 1975).

The fallow deer is assumed to have become extinct around the Glacial Maximum, and to have been reintroduced in Roman times, but the exact timing of its disappearance is not well understood. Scraps of evidence have been assembled, possibly pointing to survival throughout the final Pleistocene (Masseti and Rustioni 1988). The matter is controversial and far from settled. The giant deer also disappeared. This happened after 15,000 bp, a time at which it was still roaming in the vicinity of the modern town of Bologna (Pasini 1968). The bison was similarly on the verge of extinction after its expansion toward the south which happened during OIS 4 (see 4.2.3). However, it is recorded in northern Italy as late as the Lateglacial Interstadial, on the evidence of Riparo Tagliente level 12, which is dated to c. 13,000 bp (Bartolomei *et al.* 1982; Capuzzi and Sala 1980). At Riparo Soman, in the same general area, the rich archaeological assemblage of final Younger Dryas date includes aurochs but not bison (Tagliacozzo and Cassoli 1992). Aurochs are more demanding than bison about environment and the quality of pasture. During the Holocene, richer grazing grounds became available, and aurochs were able to expand. It also seems that aurochs and bison cannot share the same territory, as males of the two species have been observed to fight fiercely (Auguste and Patou-Mathis 1994). There is some evidence that small aurochs herds were still to be found in Roman times (Farello 1995).

Equids including both the common horse (*Equus caballus*) and the hydruntine horse (*E. hydruntinus*) are quite rare in the rugged parts of the north but rather common in the plains and valleys of the center and the south, and mostly so in Apulia. In this region, hydruntine horse survives up to the Neolithic (Bököny 1977-1982).

Wild boar, which had almost disappeared during the Glacial Maximum, quickly enlarges its range and becomes one of the staple species in the Holocene.

7.2.2. Cliffs and Lagoons: The Exploitation of Marine Resources

The cliffs of the Italian coasts are prominent in the archaeological literature, because of the numerous caves that open in them at the Balzi Rossi, at Monte Circeo in the area of Marina di Camerota, at Monte Gargano in the Salento, and so on. Rocky stretches, however, nowadays alternate with marshes and lagoons, as is to be expected in the present situation of interglacial high marine stand. Examples are to be found around Orbetello on the coast of Tuscany, next to Monte Circeo, and north of Monte Gargano—not to mention the lagoon of Venice. Others have been drained in the past when land reclamation was an important social and economic goal, such as in the Po and Tiber deltas. Elsewhere, such as along the rocky and picturesque *penisola sorrentina,* the lagoons of the early Holocene have disappeared because of tectonic activity and of the still rising sea level. While in many areas the once existing lagoons are now barely imaginable, there is positive evidence of their much wider occurrence and extension in the past (Segre 1969).

Detailed paleogeographic reconstruction is available in selected areas. In Terra d'Otranto of Salento, Gr. Romanelli opened in a quickly changing environment when human groups settled there at the end of the Pleistocene (Cassoli *et al.* 1979) (Fig. 7.12). The sea, which was more than 20 km away at the Glacial Maximum (when human groups did not enter the cave), was rising and approaching the present situation at which it abuts the cliffs and the cave entrance itself. The period considered is bracketed between 12,000 and 10,000 bp, if not without contradictory C^{14} dates (see 7.1.4).

A sandy coastal plain was still in existence when level E was deposited in the cave. Dunes were actively forming, while arms of the sea were expanding closer and closer. Lagoons soon started to develop, with a maximum extension correlating to levels D and C in the cave. At the end of this period, the sea level was at c. –55 m. While it rose, the sand bars were progressively submerged. At 50 m, smaller lagoons were still in existence just at the foot of the cliffs, in which the water of now submerged springs mixed with the salty water, giving rise to brackish water.

The local geomorphology granted easy access to both the diversified coastal environment and to the steppe-like plateau just above the cave. The vegetation included some trees—mostly pine, but also juniper, possibly oak, and even poplar and ash (Follieri 1968). The hunted animals were accordingly mostly red deer, hydruntine horse, aurochs, and, much more rarely, wild boar and roe deer (see 7.1.4 and 7.2.6). The red fox, rather unusually, was also killed and eaten on a regular basis (Compagnoni *et al.* 1997). Ibex possibly still lived on the rocky cliffs. Marine mollusks were collected; fishes were another resource. Monk seal and dolphin remains are also recorded, but it is not known if they were caught by humans.

Birds are especially abundant at Gr. Romanelli. The species identified belong to both open and even steppe-like environments (such as partridges and bustards, respectively) and to a marine environment, such as the extinct Great Auk (*Alca impennis*), as well as species that thrive in quiet bodies of water, as the many ducks. The plain, cliffs, and lagoons were favorable to all of them, and Terra d'Otranto is nowadays on a major migratory route for birds between Europe and Africa. The cut marks on some of the bones, and the fact that others were partially burnt, positively prove bird consumption and, presumably, bird hunting during the final Pleistocene (Cassoli 1972).

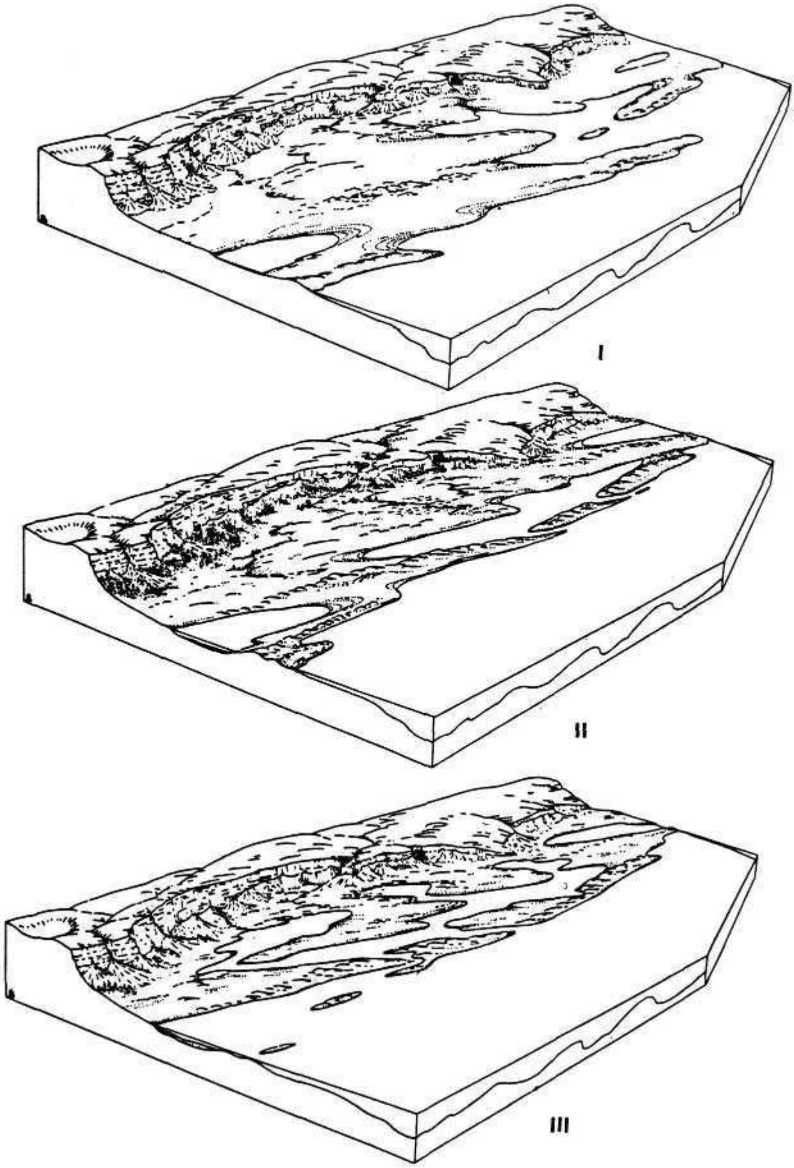

Figure 7.12. Grotta Romanelli. The changing landscape during the final Pleistocene (after Cassoli *et al.* 1979). Some 25 km of linear coast are represented, with altitude at a different scale. I: sea level at –75 m to –60 m. II: sea level at –55 m. III: sea level at -50 m. Black triangle: the opening of the cave.

The rich environment of Gr. Romanelli was not exceptional at this time. A similar variety of resources were also exploited at the later Holocene sites in the region and accompanied by Epiromanellian industries (see 7.3.1). On the opposite (i,e.,Tyrrhenian) side of the peninsula, a varied environment also existed next to Gr. della Madonna of Praia a Mare. At this site, the last two millennia of the Pleistocene are represented, but there is also a later archaeological sequence spanning most of the Holocene. We consider approximately the period between 12,000 and 8,000 bp. Most of the archaeological material, however, was deposited between 11,000 and 8,000 bp, as the lowermost deposit did not yield evidence of frequent use of the cave (Cardini 1970, 1972).

The coast was never as far away, such as at Gr. Romanelli, as the modern isobath of –100 m is 2–4 km offshore. However, the rising sea level and the retreating coastline affected human life, as can be seen from the mollusks that were collected in great quantities. While in the lowermost levels they are usually terrestrial and *Helix ligata* (a species that does not tolerate a saline environment) is the staple species, around 10,000 to 9,000 bp, there is a major change and several species of limpets predominate, accompanied by *Monodonta turbinata* and *Mytilus galloprovincialis* (Durante and Settepassi 1972). Interestingly, nonedible marine species were also collected, in particular *Columbella rustica*, found as hundreds of specimens, generally perforated or broken during perforation. This shell was highly prized as an ornament in the late Pleistocene and later on, during the Holocene (see 7.4.2).

More than just mollusks were eaten at Praia a Mare. Remains of *Salmo trutta* were found by the thousand, with a few *Anguilla anguilla* and *Sparus auratus* as well (Durante 1978). All of them can be found in either fresh or brackish water, and it is presumed that the trout could swim back up to the nearby River Noce, which is nowadays dry during most of the year, and could be easily caught during the breeding season. It is worth remembering that salmonids are no longer present in the Mediterranean.

Bird remains are also abundant, some bearing evidence of having been cooked, as at Gr. Romanelli: mostly doves, accompanied by many aquatic birds and bustards (Cassoli 1972). The larger fauna is not known in much detail, but a list of species is given: ibex seem to have still been frequent in the rocky surroundings, while on the nearby flatlands were herds of aurochs. Red deer, roe deer, wild boar, and hare are also documented, while the carnivores include wolf and, quite exceptionally, lion (Cardini 1970, 1972).

The same variety of food resources is displayed during the Holocene at Riparo Blanc, which presently opens at 20 m asl on the cliffs of Monte Circeo in coastal Latium (Taschini 1964, 1968). This small rock shelter used to be also close to a vast lagoon that disappeared during later prehistoric times (Segre 1969) (Fig. 7.13). A single C^{14} date gave an age of 8,565 ± 80 bp (R-341). Large amounts of marine mollusks were found, mostly turbins and limpets, while the terrestrial *Helix ligata* was collected in much smaller numbers. As at Gr. della Madonna, *Columbella rustica* was actively looked for and perforated, and some 1,400 specimens were discovered during the excavations. Other resources were sea urchins, crabs, fishes, pond tortoises, and birds. Roe deer and wild boar, and, quite

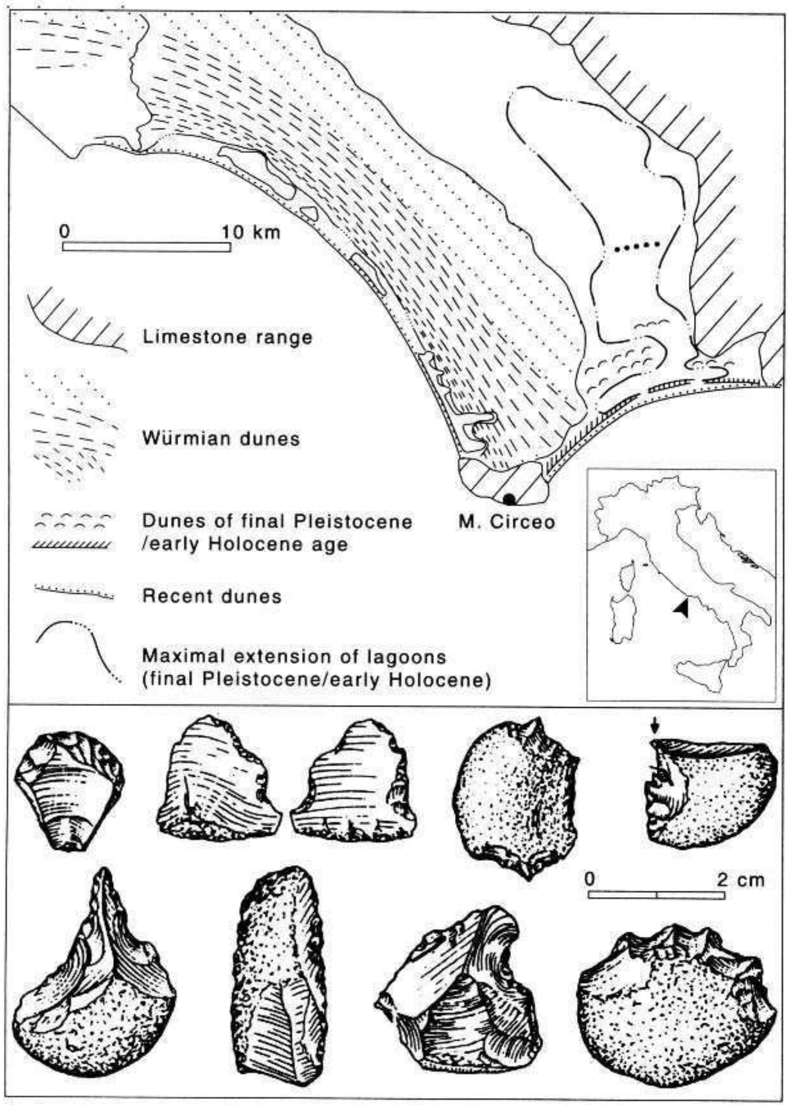

Figure 7.13. Riparo Blanc (dot). Top: the environment close to M. Circeo during the early Holocene (redrawn after Segre 1969). Bottom: Mesolithic tools (after Taschini 1969).

rarely, red deer were also hunted. The remains of a variety of small carnivores have also been found, such as fox, wildcat, and badger.

The complex subsistence base is reflected at coastal sites in lithic assemblages that usually display a varied typology, with an array of endscrapers, burins, backed tools, and geometric microliths, as well as points at Gr. Romanelli. The exception is Riparo Blanc, with a marked predominance of notches and denticulates (Table 7.4). Notches and denticulates are also very frequent at Gr. della Madonna and

Table 7.4. Riparo Blanc. Inventory of the Mesolithic Assemblage.[a]

Type list	n	%
Endscraper	20	8.1
Burin	2	0.8
Borer/Piercer	41	16.5
Truncation	6	2.4
Backed tool	6	2.4
Blade with continuous retouch	10	4.0
Notch	66	26.6
Denticulate	69	27.8
Sidescraper	25	10.1
Point	3	1.2
Total	248	99.9
Flakes	2,204	
Scaled pieces	13	
Cores	44	
TOTAL	2,509	

[a]Source: Taschini (1964).

have been related to the exploitation of marine mollusks. Some species have to be forcibly removed from the reefs; others have to be broken open, and the mollusk must be extracted. Damaged edges are often noticed on limpets, while turbins are frequently broken laterally.

7.2.3. The Coastal Areas, the Dwindling Great Adriatic Plain, and the Glacial Marshland

Shell middens are frequently found on the coasts of both peninsular Italy and Sicily (see 7.2.2 and 7.2.7), starting around 12,000 bp (Mussi *et al.* 1995). At several sites, a shift from terrestrial to marine mollusks is recorded, which reflects the diminishing extent of coastal plains. Coastlines were getting closer and closer to the cave sites opening in limestone ranges and cliffs, many of which, however, were never submerged. Subsistence strategies were modified accordingly.

The most dramatic change after the Glacial Maximum is the progressive disappearance of the Great Adriatic Plain (i.e., the plain of some 300 x 150 km that once existed north of 43° latitude, instead of the northward extension of the present Adriatic Sea). Some 40,000 to 50,000 km² of once solid ground are now under up to 100 m or more of water.

The origin of the deltaic and now submerged plain has already been briefly discussed (see 4.2.2). In fact, its very existence during the Wurm is totally at odds with the usual glacial coastal morphology: low marine levels imply rejuvenation of drainage systems and widespread erosion—not the aggradation of a delta, deltas being common features of present interglacial landscapes. A glacial delta, however, was formed by the powerful river that resulted from the merging of the Po with the Adige and many minor streams (Fig. 7.14). It came into existence only because

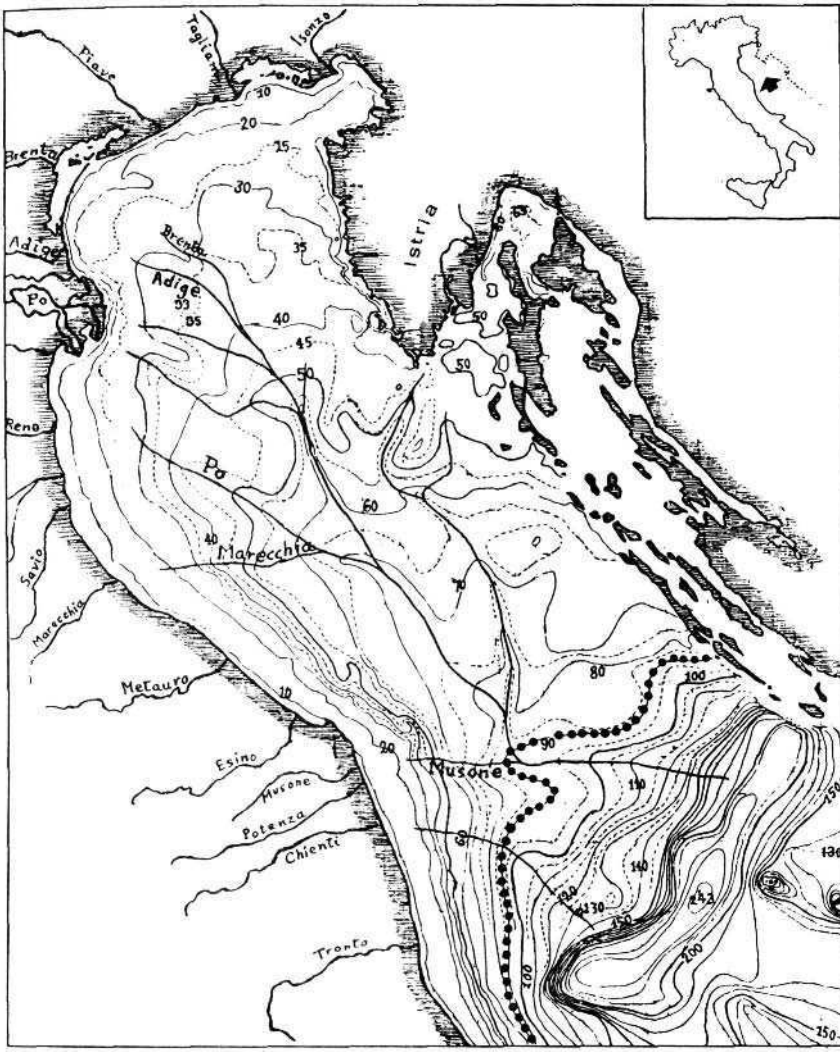

Figure 7.14. The Great Adriatic Plain. The classic reconstruction by L. De Marchi (1922), as modified by Ciabatti *et al.* (1987). Depth below present sea level is in meters. The dotted line represents the boundary between erosional and depositional shelf during the latest glacial. The modern city of Venice is located close to the mouth of the River Brenta.

the Adriatic area has been subjected to marked subsidence during most of the Upper Pleistocene; that is, the marine shelf was subsiding at a rate greater than that of the sea level fall (Ciabatti *et al.* 1987). The rivers deposited coarse alluvia and progressively built up the plain to reach an equilibrium with a sea level which, in this region of the world, was higher and higher in comparison to the mainland.

Detailed information on the Great Adriatic Plain is not available, but an overall picture has been outlined (Ciabatti *et al.* 1987; Colantoni *et al.* 1979; Mosetti and D'Ambrosi 1966). The north–south gradient was probably very low, some 10 m each 50 linear km or less. In the center of the plain, riverbeds were poorly defined. On the margins of the great depression, and closer to the mountains, there were high-energy streams side by side with swamps and bogs. Deposits that escaped later erosion are still to be found in the minor valleys of the Marche region, not far from the modern Adriatic (Calderoni *et al.* 1991). A major episode of peat formation in this region has been radiocarbon dated to c. 15,000 bp. Muddy flats alternated with gravel bars over vast areas. Peat layers accumulated in calm water, and lagoons developed closer to the coast.

We also suspect that this flat area, all enclosed by mountains except on its southern edge, was subjected to seasonal high-speed winds. The northern Adriatic is presently an area of violent winter winds, with the notorious and freezing Bora of Trieste blowing at times over 100 km/hour. The high pressure stationed over the glaciated Alps and the Northern ice cap would just have enhanced high-speed cold winds.

The flora and fauna are simply not known, but information gained along the 400 km or so of the extant Po Plain–once a part of the Great Adriatic Plain–allow some cautious guesses. While equids and caprids can be ruled out of a picture of mud and marshes, the giant deer and moose that seem to have once populated the bottom of the Po valley (Mussi 1999) were probably also living further south in the broader plain. Forest of pine *(Pinus sylvestris* with some *P. mugo)* occupied large stretches of the now lower course of the Po, colonizing recently deposited alluvia (Paganelli 1984). They could well have extended farther south. The pollen core 270, extracted in the middle part of the Adriatic and at some distance from the maximum extension of the plain, suggests in fact a Late Glacial Artemisia steppe, but also includes fair amounts of pine (Bottema and Van Straaten 1966).

The Versilian transgression (i.e., the Flandrian transgression of other parts of Europe) that started after the Glacial Maximum and progressively submerged the plain was not a straightforward process. The overall rising sea level was again affected by 20–30 m of subsidence in the Holocene alone. After deglaciation had started in the mountains, rivers also accumulated heavy loads of deposits that delayed the return of marine floods. The coastline was unstable. Phases of marine transgression were followed by regressions, best exemplified close to Trieste. Here, a restricted gulf came into existence at the end of the Würm, but later in the Holocene, and possibly around 6,000 bp, the connection with the open sea was clogged by the alluvia of the Isonzo and Tagliamento Rivers, which were merging together (Mosetti and D'Ambrosi 1966). By then; the present lagoon of Venice was a stretch of solid land some 20 km inland from the coast (Colantoni *et al.* 1979). Maximal of the Versilian transgression was reached not more than 2,000–3,000 years ago, and the ever-changing balance between solid land and sea can be seen in now submerged Roman and even medieval buildings.

The archaeology of an underwater plain is well beyond the possibilities of present technology, and only guesses can be made about the nature of the human presence, using the surviving evidence at the borders of the submerged area.

It has already been emphasized that, around the Glacial Maximum, northeastern Italy was far from being densely settled—in fact, only hunting parties were scouring it occasionally (see 6.3.1). The picture is not much different on the other side of the plain and on the coasts of modern Slovenia and Croatia (Montet-White and Kozlowski 1983). In the following millennia, and from approximately 18,000 to 14,000 bp, humans virtually disappear from the record. Then, starting during the Late Glacial and the early Holocene as well, more and more archaeological sites were formed just when the Great Plain was dwindling and disappearing (Aspes 1984; Biagi 1994; Boschian and Montagnari Kokelj 1984; Broglio 1994; Broglio and Lollini 1982; Montet-White and Kozlowski 1983).

A simple explanation would be that the human groups once living in the middle of the Great Plain were retreating to its borders because of the rising sea level. This model, however, does not allow for the fact that at the Glacial Maximum, and when the plain was most extensive, human groups were actually passing at the fringes of the area and even repeatedly settling in search of good raw material, such as at the open-air site of Ponte di Pietra (see 6.3.2). It is later, and just when the sea level had started to rise, that they faded away. During those empty millennia, one would also expect some evidence of seasonal occupation in the caves of the mountain ranges encircling the plain: there is none. This is especially striking at Sandalja II, a cave strategically located at the southern tip of the present peninsula of Istria, which was once the limestone range most projected toward the center of the Great Plain. Even here, there is only the usual evidence around the Glacial Maximum, and then, after a hiatus, at the end of the Würm.

We suspect that the glacial marshlands were not a favorable and favored ecological niche. Late Paleolithic hunters are known at most Italian sites to focus on red deer and ibex, or on red deer and horse. It cannot be said how much the ubiquitous red deer adapted to this peculiar environment, but caprids and equids were certainly not living there. The reindeer that were caught at sites on the eastern side of the plain and outside modern Italy cannot be expected to have colonized an area of swamps and bogs, and aurochs probably similarly kept away from the area. Wild boar that survived the Glacial Maximum in protected areas could not have lived in this cold environment. Furthermore, if pine forests were well developed, as we suggested, the herbivores would not there have found their preferred habitat, discouraging the search of late Paleolithic hunters. The lagoons, marshes, and ponds would possibly also have been less productive niches under a glacial climate than they are known to have been during the following and present warm interglacial phase. The overall lack of natural shelters in a flatland swept by cold winds in winter would have been a further problem for humans. The possible absence or shortage of suitable, fine-grained rocks can be added to this list of difficulties.

The northernmost part of the plain, and the Karst of Trieste, only appears consistently settled during the Holocene. By then, many red deer, as well as some roe deer and wild boar, and the last elk, were all caught by the Mesolithic hunters near Gr. Azzurra, Gr. Benussi, and several other caves (Cannarella and Cremonesi 1967; Riedel 1975). Good use was also made of aquatic resources, such as pond tortoises, and marine mollusks, and fishes; that is, the same mixed resources were looked for, as along the other coasts.

Therefore, perhaps the loss of the Great Plain due to marine floods had fewer consequences on human life than would be expected. The disappearance of much narrower stretches of land along most of the southern and western coasts was felt more strongly. When this process was completed, caves that had once opened in front of a gentle and flat landscape stretching for some kilometers toward the sea, barely visible in the foreground, could only be reached by scaling cliffs, sometimes only at low tide, or were too dangerous to be reached and even partially or totally submerged (see Fig. 4.4 for the contrasted glacial–interglacial setting of a coastal cave). The loss of hunting ground as well as shelter was counterbalanced at some caves in a protected position by their access to the rich, if seasonal, resources of extended lagoons. Some compensations, however, had to be sought elsewhere.

7.2.4. At the Foothills and up the Mountains

Warmer and warmer temperatures provoked the melting of ice caps and glaciers, while the enormous amounts of running water that were released ended up in rising sea levels and in the submersion of coasts. As the consequences of a single global phenomenon, mountain ranges were made accessible just when coastal plains were dwindling and disappearing. In Italy, the sharp altitudinal gradient allows for compensation within short distances.

During the last thirty years, much research has been carried out on Lateglacial mountain recolonization. Investigations focused at first on the pre-Alps and eastern Alps, which are the most thoroughly investigated part of Italy, and probably one of the best surveyed in the world, thanks to the comprehensive research approach established by teams of the University of Ferrara. Later, similar lines of research were extended to northern and central parts of the Apennines. Some evidence is also available in more southern regions, where there is a dearth of recent investigation, if one carefully reconsiders old evidence.

The Alps are the greatest European mountain range, and extend from west to east in an arch-shaped pattern. The width of the overall chain is not constant; in most parts, it is 100 to 150 km, as the crow flies, but it increases to over 200 km in the eastern Alps, including the local pre-Alps. Here, a wedge of mountains higher than 1,000 m expands toward the south and to just north of the modern town of Verona. Interestingly, this wedge is split in two by a major depression that allows easier penetration. It was occupied in the past by a glacial expansion, and now by the Adige River (Fig. 7.10). The bottom of the Adige Valley is at a low altitude and just at a few hundred meters asl over a part of its course. North of the Adige, however, there are crests higher than 3,000 m. The main Alpine watershed is situated just at the head of the great river. This north–south watershed is a major geographical division: south of it, the drainage ends in the Adriatic; to the north, it ends in the Danube, the Rhine, and the Rhône, and in completely different quadrants of Europe.

In the millennia following the Glacial Maximum, the freshly deglaciated valleys and plateau still bore ample evidence of the recent events, and moraine accumulations were widespread. Lakes, bogs, and swamps became through time a frequent feature of the landscape. Lakes and marshes also formed in the Adige Valley, which was still clogged by moraines.

The colonization, or recolonization, of mountain environments is well documented in the eastern Alps, and particularly so in the Dolomites, starting with the Lateglacial Interstadial or soon before it (Alessio *et al.* 1983; Bagolini *et al.* 1983; Bagolini 1971, 1992a, 1992b, 1994, 1995; Broglio and Improta 1994–1995). At c. 13,500 bp, admittedly, only one site is known to exist (i.e., Riparo Tagliente, at 250 m asl in the pre-Alps). Soon, however, archaeological sites can be counted by tens: they yield later Final Epigravettian industry and are dated to c. 12,000-10,000 bp, either directly by radiocarbon or, more often, by typological seriation. By then, besides Riparo Tagliente, other important caves at the bottom of valleys are Riparo Soman and Riparo Villabruna. Positive evidence also occurs at c. 11,000 bp just above 1,000 m at Riparo Dalmeri and in the open at Val Lastari, both sites being on the same plateau. This evidence has been interpreted as suggesting residential sites not only inside valleys but also at a higher elevation. Other sites of possibly slightly later date are widespread between 1,000 and 1,500 m asl, with a peak at 1,850 m asl with Riparo Cionstoan, where only a restricted assemblage was located. Stays of a shorter duration are suggested at many of them.

During this final part of the Pleistocene, human groups explored what is better termed as the pre-Alps and the southern Alps. A different and much deeper penetration occurs in the early Holocene. Starting around 9,800–9500 bp, base camps are established at the bottom of valleys and around low-altitude lakes, as exemplified by the many rock shelters surrounding the lacustrine basin of Trento, in the Adige Valley, 200–250 m asl: Riparo di Romagnano, Riparo Gaban, Riparo Pradestel, and Riparo Vatte di Zambana. The middle altitudes seem to have been overlooked by prehistoric groups, but hundreds of sites are recorded between 1,900 and 2,300 m asl, and up to the main north–south Alpine watershed. No archaeological evidence appears to exist deeper into the heart of the Alps, however. The industries are invariably classified as Sauveterrian ones.

The high altitude settlements, some of them quite short-lived, others repeatedly occupied, were established during the early Holocene in selected positions: next to small lakes or on passes, or in an otherwise commanding position. The lakes themselves had a strategic value, as in a karstified limestone landscape they were often the only available source of water for humans as well as for their prey (Lanzinger 1990). Many such camps are in the open, but in some instances use was made of the shelter offered by large erratic boulders or other rock overhangs. Further diversification at open-air sites is given by the activities that were performed there. In some instances, ephemeral sites have been discovered, at which arrows had been prepared and microlithic armatures hafted, probably while good watch was made for any approaching animals (Dalmeri and Lanzinger 1992). Bones and other organic remains are, unfortunately, only exceptionally preserved.

The massive exploitation of mountain environments ends abruptly soon after 8,000 bp with the climatic optimum of the Atlantic period. By then, one of the very few sites at altitude is Mondeval de Sora, 2,100 m asl and quite a distance from the other settlements. Archaeological deposits with Castelnovian tools are still found–for a while–in the basin of Trento but mostly occur outside of the mountain range. Potsherds and other clues of contact with the Neolithic world start to be found at about 6,500 bp (Bagolini *et al.* 1983). The lithic industry is of Castelnovian type. A similar abandonment of high ranges is also recorded in the western Alps (Bintz 1992).

Sharp environmental changes are assumed to have been behind the shifting colonization of mountains. Deglaciation and global warming were present in the beginning, of course, but once the territory was free from ice and vegetation was reestablished, the balance between steppes–grasslands and woodlands seems to have been the critical factor. Herbivores are dependent on an overall open vegetation, even if some species, such as roe deer, live in forests, while red deer are known to adapt to a loosely forested environment. Caprids have different needs: chamois live between forest and rocky stretches, but ibex only tolerate open environments.

A deer/caprids opposition characterizes the Lateglacial and early Holocene faunal assemblages of northeastern Italy, with equids nearly nonexistent, bovids rare, and wild boar becoming frequent only relatively late (Tagliacozzo and Cassoli 1992). Their respective percentages were changing, while increasingly thicker tree cover was developing at low altitudes and eventually expanding up the mountain slopes.

If we assume that the archaeological record fairly reflects the relative abundance of prey, at least in a given environment, the retreating caprids and expanding deer can be followed from the pre-Alps to the inner mountain ranges, and from valley bottoms upland. At Riparo Tagliente, at low altitude and at the periphery of the major chains, at around 13,000 bp, there is a marked shift from the predominant caprids of the lower part of the sequence to very high percentages of red and roe deer starting with level 10 (Fig. 7.6). At Riparo di Villabruna, in an inner position and in the Cismon Valley at 500 m asl, the shift from caprid to red deer exploitation can be followed later from levels 17–10 to levels 9–4 (Fig. 7.15) (Amar *et al.* 1992). Levels 17–10 are radiocarbon dated to 12,000 bp, while the upper levels are yet undated, but there are no major changes detectable in lithic typology and technology. Accordingly, deer became the most frequent prey soon after 12,000 bp. Just before 11,000 bp, however, ibex still largely prevailed over other hunted species at a higher altitude, as can be seen at Riparo Dalmeri at 1,000 m asl on the Asiago plateau (Broglio and Improta 1994–1995). At a lower altitude, but well within the modern Adige Valley, at Riparo di Romagnano near Trento, ibex was still the animal most frequently brought back to the site when the first part of the sequence was deposited, and up to c. 9,000 bp. Soon after, however, and starting with levels AC 5-4, red deer, accompanied by roe deer, become the dominant species (Boscato and Sala 1980). Ibex (and chamois) were supposedly caught not in the valley itself, but on the nearby Bondone plateau, because at that time their herds were no longer frequent at low altitude.

Hunters were quick to learn how to meet the herds at summer pastures. Whenever faunal remains are preserved, they give evidence that the Alpine grasslands just above the tree line were inhabited by both resident ibex and chamois, and by red deer seasonally migrating upland. This would be the period of the innumerable seasonal Sauveterrian sites of the early Holocene. The penetration into the heart of the Alps seems also to have been favored by a further glacial retreat even more marked than today (Angelucci *et al.* 1992; Orombelli and Porter 1982). In the Atlantic phase, however, the quickly expanding forests more and more re-

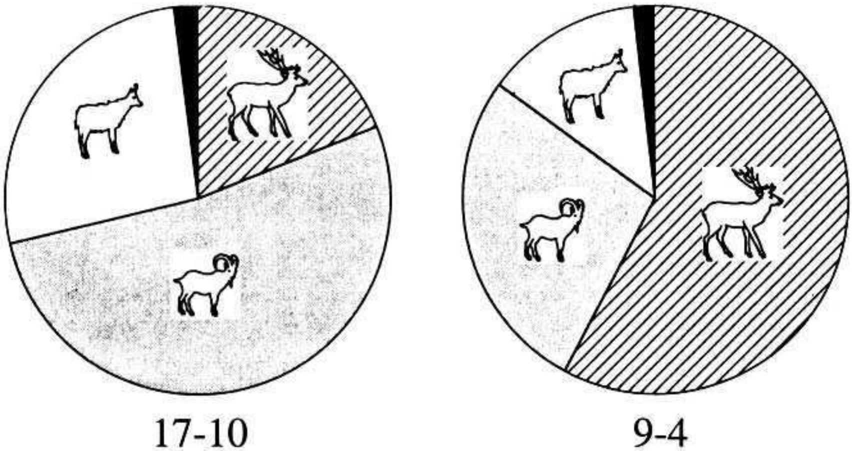

Figure 7.15. Riparo di Villabruna. The increase of red deer remains, and decrease of chamois and ibex remains, from levels 17-10 to levels 9-4, based on NISP counts (after Aimar *et al.* 1992). Miscellaneous large mammals in black. Total NISP = 393.

stricted the open areas to higher and higher altitudes: the upper limit of the tree belt is known to have actually exceeded the present one in the early Holocene (Oeggl and Wahlmuller 1992; Sala 1977). Red deer had to go to ever-increasing altitudes to reach their summer grazing grounds, while the chamois and ibex herds had to retreat to mountain peaks to avoid the expanding forest. They were eventually confined there and had to undergo a difficult adaptation. It is no surprise that the modern ibex is definitely smaller in size than its Upper Pleistocene counterparts that once roamed the rocky coasts (Bartolomei and Sala 1972).

The staple diet, however, was not made up of large herbivores only, and much more was happening at lake and river shores.

At Riparo Dalmeri (i.e., around 11,000 bp), beavers and marmots were caught, and fishing was another resource, even if the nearby River Brenta was actually at the bottom of an escarpment (Dalmeri and Lanzinger 1989). Small to medium-sized freshwater fishes (cf. *Alburnus* sp., i.e., the bleak) were also brought back to Riparo Soman at approximately the same time, while hares, beavers, squirrels, and hedgehogs are listed in the faunal inventory (Tagliacozzo and Cassoli 1992). The grave goods of two burials, at Riparo di Villabruna and at Mondeval de Sora, furthermore include small masses of a glue of a kind made of propolis and other by-products of bees. This indirectly suggests that honey was also collected, starting 12,000 years ago (uncalibrated) and well into the Holocene (Aimar *et al.* 1992; Alciati *et al.* 1992). In the Holocene settlements of the Trento basin, fishing was practiced in the nearby lake, and freshwater mussels (*Unio* sp.) were gathered, pond tortoises were caught, and bird eggs were also collected (Boscato and Sala 1980; Sala 1977). Beavers were especially frequent at Riparo di Pradestel, and the fragmented bones suggest that they were eaten once they had been skinned. The abundant fish remains from another rock shelter, Paludei, include *Abramis brama,* the common bream, no longer found south of the Alps (Bagolini *et al.* 1978).

Human occupation of the Alps was obviously not restricted to the east, and is actually recorded elsewhere, if in less detail, as in the Central Alps (Angelucci *et al.* 1992; Biagi 1992). It cannot be assumed, however, that the same settlement-system was established everywhere—just the reverse is actually supported by the archaeological record. Extensive surveys and research in Switzerland proved that in this more northern area, only the foothill plateau and the pre-Alps were colonized. Human groups did not even establish themselves deep into the major Rhône and Rhine valleys, which split the mountain ranges in a way similar to the Adige Valley (Crotti and Pignat 1992). In France, too, only the outer chains and high plateau of the western Alps were settled (Bintz 1992). So, even within the Alps, human settlement was different and somewhat easier south of the main watershed.

The colonization of mountain ranges was also a complex and differentiated process within Italy, and the Alpine model cannot be mechanically applied to the Apennines. A different distribution of sites has been emphasized farther south in the Apennines and as far as Tuscany. The altitudinal belt between 1,000 and 2,000 m, which was scarcely settled by the Mesolithic inhabitants of the Alps, is widely utilized in this different landscape. Furthermore, and again in contrast with the Alps, Castelnovian sites outnumber Sauveterrian sites, pointing to more continuity in late mountain settlement (Biagi *et al.* 1980; Ghiretti and Guerreschi 1988).

Yet another model can be proposed in Abruzzo and in the very center of the Apennines. The area is distinctly different because of its more southerly latitude and wide basins, the major one being the Avezzano basin c. 700 m asl, once occupied by the now-drained Fucino lake. The peaks and plateau surrounding it are by no means lower than elsewhere in the Apennines. The recolonization, however, started much earlier in this mountain range, and the Fucino caves were settled soon after the Glacial Maximum (see 6.5.1). Industries of Final Epigravettian type were also discovered at several caves around the lake and at Grotta A. Graziani as well, at a distance from the basin and at 1,000 m asl (Radmilli 1977). In a nearby zone of high plateau, the Altipiani Maggiori, Fonte La Ria at 1,500 m asl is an extensive open-air site (Lubell and Mussi 1995) (Fig. 7.16). The time of the first occupation would have been 12,000 to 11,000 years ago, on the basis of typological seriation and an uncalibrated chronology. Then, during the early Holocene, Sauveterrian industries were produced at sites located in a strategic position at the entrance of small valleys or in the command of gorges, both next to the Fucino and up to 1,600 m asl on the plateau (Lubell *et al.* 1999). There is some evidence, however, that the area might have been vacated during some centuries at the height of the Younger Dryas cold oscillation (Giraudi and Mussi 1999).

As in the Alpine sequences, ibex and chamois dominate the earliest deposits, such as in the lower deposit of Gr. Maritza (Grifoni and Radmilli 1964). Red and roe deer, as well as wild boar, become more frequent later on and during the very end of the Pleistocene. The chronology, however, is not yet firmly fixed. The large herbivores were also more diverse in the Fucino, including some aurochs and equids.

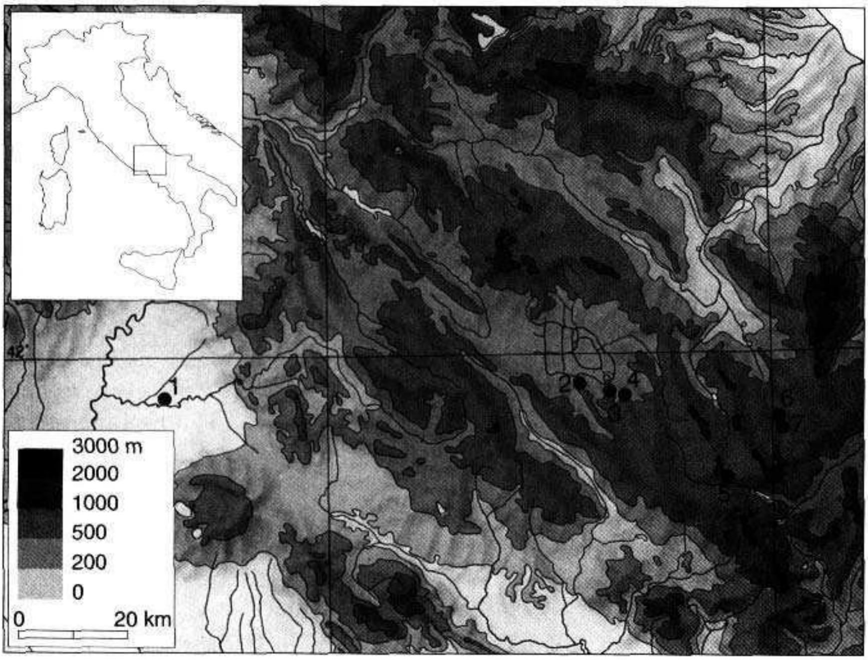

Figure 7.16. Avezznno basin and surroundings. Location of sites of final Pleistocene and early Holocene date. 1: Gr. Polesini; 2: Gr. Continenza; 3: Gr. Maritza: 4: Gr. di Pozzo; 5: Gr. A. Graziani; 6: Fonte La Ria; 7: Fonte Chiarano.

A variety of resources were sought after: remains of trout are usually found at cave sites, while birds range from bustards to quails to ducks at Gr. Continenza in the Fucino (Wilkens 1991). Even if the lake is better described as a marsh than as a body of water during the final Pleistocene and early Holocene (Giraudi 1989; Lubell *et al.* 1999), it was a magnet for wildlife all the same, and human groups took advantage of the situation.

Terrestrial mollusks were collected as well, and shell middens occur at a couple of sites. At Gr. di Pozzo, the accumulation of shells and charcoals was dated to 9,140 ± 70 bp (TO-3421) and 9,370 ± 80 bp (TO-3422), which is quite an early date for this specialized activity, later widely practiced all over the Mediterranean basin (Mussi *et al.* 1995, 2000) (Fig. 7.17). At this site, there is evidence for occupation during late summer to early autumn, on the basis of several lines of evidence that include the ripening time of berries and fruits found carbonized.

Castelnovian sites are not known. Instead, people who had a Neolithic lithic industry, and used pots, established a seasonal campsite in the open and in the plateau area: this is Fonte Chiarano, radiocarbon dated at 6,360 ± 180 bp (AECV-1996C) and 1,600 m asl (Lubell and Mussi 1995). This is not surprising, since the Neolithic settlement of the Fucino basin was already under way around 6,800 bp. However, it is at odds with the eastern Alps, which were more or less abandoned during the Neolithic. The regional developments were very different from those of northern Italy.

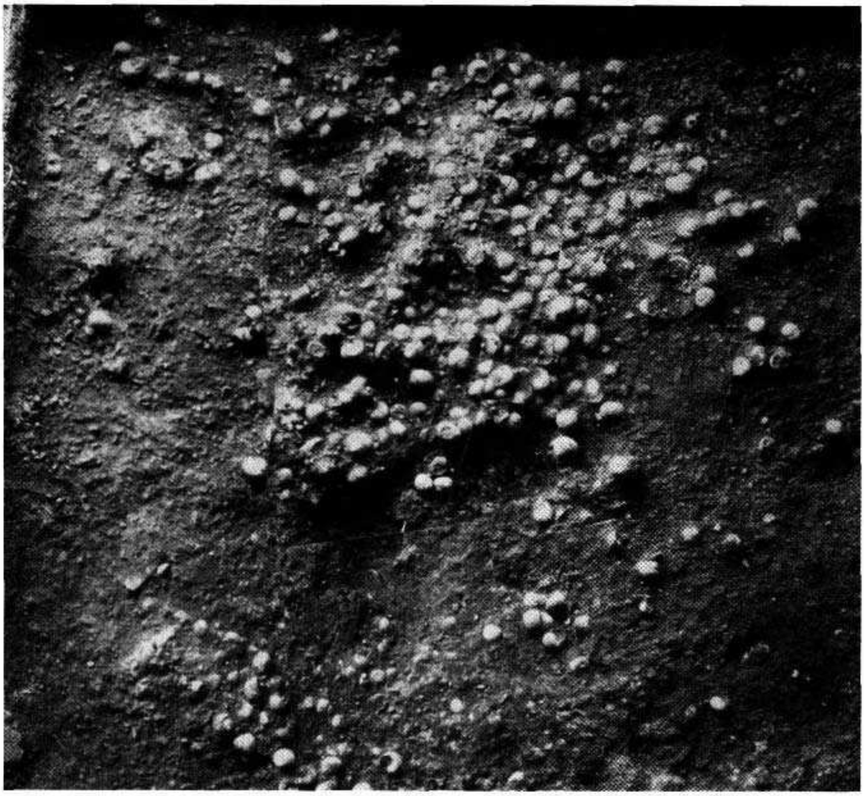

Figure 7.17. Grotta di Pozzo. Land snail accumulation in the early Holocene deposit (after Mussi *et al.* 1995).

7.2.5. Where Mountains and Sea Merge

Italy is a land of contrasts over short distances, and mountain and sea are known to merge. This is most evident in the northern part of the Apennine, that is, in the mountain range that bounds Liguria—Liguria being a region sheltered from the winds and enjoys a particularly mild climate. In eastern Liguria, peaks of nearly 2,000 m altitude stand within a short distance from the modern coast, with the main watershed in some points at 25 km from the sea (Maggi and Negrino 1992) (Fig. 7.18). The sharp altitudinal gradient was gentler in the early Holocene, but a depth of -100 m is reached within 5 km off the present shoreline and no extensive platform ever emerged. Very different niches (i.e., coastal and mountainous ones) were to be found within a few walking hours, and the highest peaks could have been scaled no later than two days after leaving the shores. In the surveyed, area the Castelnovian sites (i.e., the later ones) are also markedly more numerous than the Sauveterrian sites and located at even higher altitude, which is a further contrast with the eastern Alps model. It was suggested that the varying

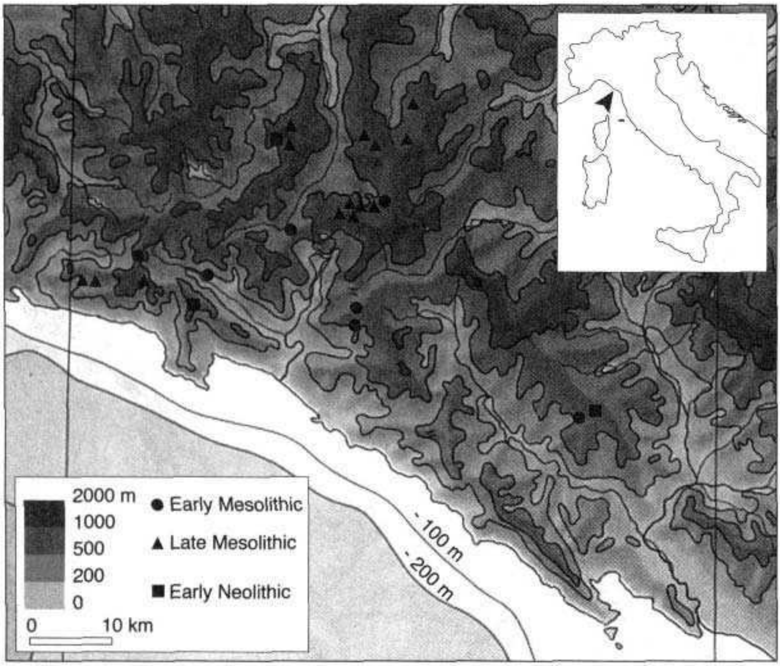

Figure 7.18. Eastern Liguria. The colonization of mountains during the early Holocene (redrawn after Maggi and Negrino 1992).

mountain exploitation through time is related to the different local development of forested areas. It is unfortunate that the coastal geomorphology did not allow for the preservation of any coastal site and evidence of a marine–montane integrated economy, if any.

Coastal sites are known to occur in western Liguria and give complementary information. It should be noticed, however, that they are always earlier (i.e., of final Pleistocene date). Accordingly, they cannot be straightforwardly integrated with the data for eastern Liguria.

At the final Pleistocene site of Gr. delle Arene Candide, at sea level, both marine and terrestrial mollusks were collected around 11,000-10,000 bp (the *so-called* "Mesolithic" layer) (Emiliani *et al.* 1964). The most abundant mammal species are deer (red and roe deer) and wild boar, but ibex and even chamois are still found, albeit more rarely (Cassoli and Tagliacozzo 1994). The dove (*Columbia livia*) is very frequent. Carbonized seeds and fruits, including hazelnuts, were also discovered (Cardini 1946).

A shell midden of limpets and turbins was also excavated at Gr. dei Fanciulli level B, at the Balzi Rossi, and at the southernmost fringes of the Alps (De Villeneuve *et al.* 1906–1919). Red deer, horse, ibex, and a few wild boar remains are recorded. A date of 12,200 ±400 bp (MC-499) for this level seems relatively early given a subsistence based in part on marine mollusks. It comes from C^{14} analysis of marine shells, which are known sometimes to give too early results.

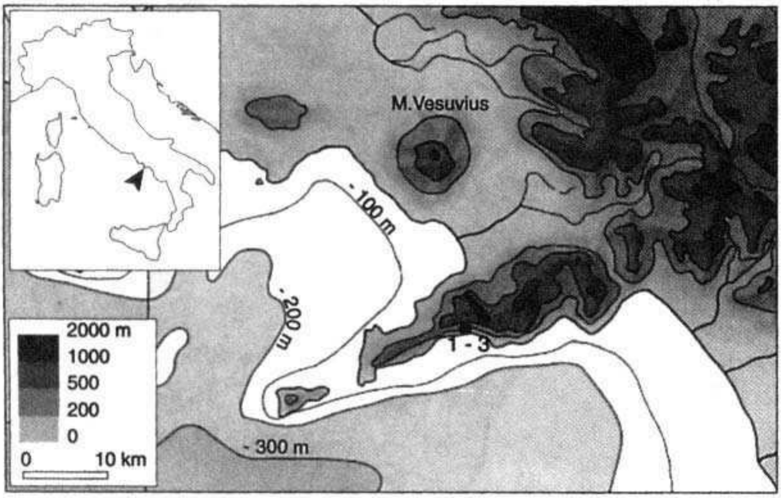

Figure 7.19. Penisola sorrentina. Location of the Mesolithic sites,

In an inner position 440 m asl, and surrounded by mountain peaks, is Arma dello Stefanin (Leale Anfossi and Palma di Cesnola 1972). It was once believed to be of Holocene date on the basis of some C^{14} determinations, but a late Pleistocene date has now been demonstrated (Biagi *et al.* 1989) (see 7.1.3). The overwhelming majority of mammal remains is made up of ibex bones, accompanied by other species such as red deer and wild boar. Marine shells, and remains of a salmonid, suggest a link with the not distant sea. The lithic industry is quite similar to the one from Gr. delle Arene Candide and classified as Final Epigravettian. There is also a striking similarity in the interest for pigments and other mineral substances: ochre, limonite, graphite, and the like were all discovered in some abundance at both sites.

The overlap of mountain and coastal environments is even more clear-cut in the *penisola sorrentina,* the 20-km-long peninsula that closes the southern edge of the Gulf of Naples: the peak of Monte S. Angelo reaches 1,443 m asl at a couple of kilometers off the sea, as the crow flies (Fig. 7.19). A number of caves excavated near Positano open close to the sea and at the foot of Monte S. Angelo.

The most frequent ungulate is ibex, but there are nearly as many wild boar in several deposits, as at Grotta Erica, Grotta La Porta, Gr. del Mezzogiorno (also known as Gr. delle Soppressate): both species, in fact, constitute the bulk of the remains, even if smaller percentages of red and roe deer are always present (Fig. 7.20) (Radmilli and Tongiorgi 1958; Sala 1983). In the lowermost part of the stratigraphic sequences, hunting is the only procurement strategy recorded. Later, in the closing millennia of the Pleistocene and then in the early Holocene, terrestrial snails are also collected in great numbers, as best exemplified at Gr. del Mezzogiorno (Bietti *et al.* 1983; Tozzi 1975). Marine mollusks prevail later on, a clear indication that the coastal plain was disappearing, while hunting was practiced

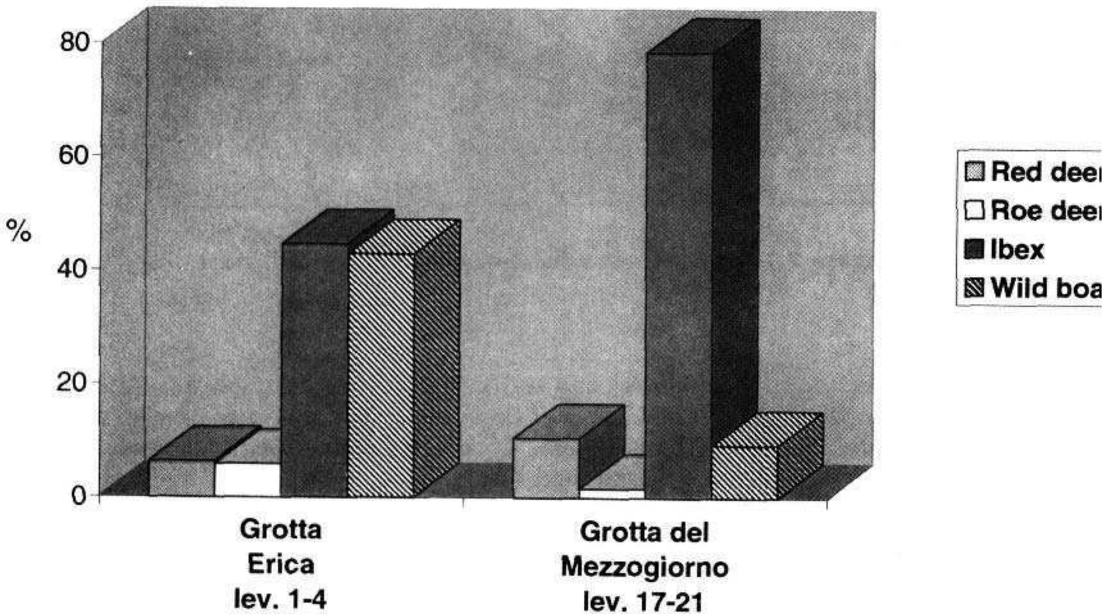

Figure 7.20. Grotta Erica and Grotta del Mezzogiorno. The ungulate assemblages. Gr. Erica: NISP = 356. Gr. del Mezzogiorno: NISP = 257 (source: Sala 1983).

just as before. Dates obtained in the pioneering days of radiocarbon analysis, however, do not allow for a detailed chronology.

Fishing was also practiced, and hares are recorded at Gr. Erica, where there are also small carnivores (Bonnuccelli 1971).

The lithic industry used in this unusual habitat of ibex and wild boar, supplemented in diet by snails, marine mollusks, and fishes, is not known in much details. In the sequence of Gr. del Mezzogiorno, the Final Epigravettian industry includes backed bladelets and microlithic *armatures,* and increasing numbers of tiny endscrapers accompanied by burins. Sauveterrian points are also found, possibly even before the Holocene. In level B of Gr. La Porta, which is an accumulation of limpets, also found were some twenty limestone chopping tools, which seem to have been used to detach the mollusks from the rocks.

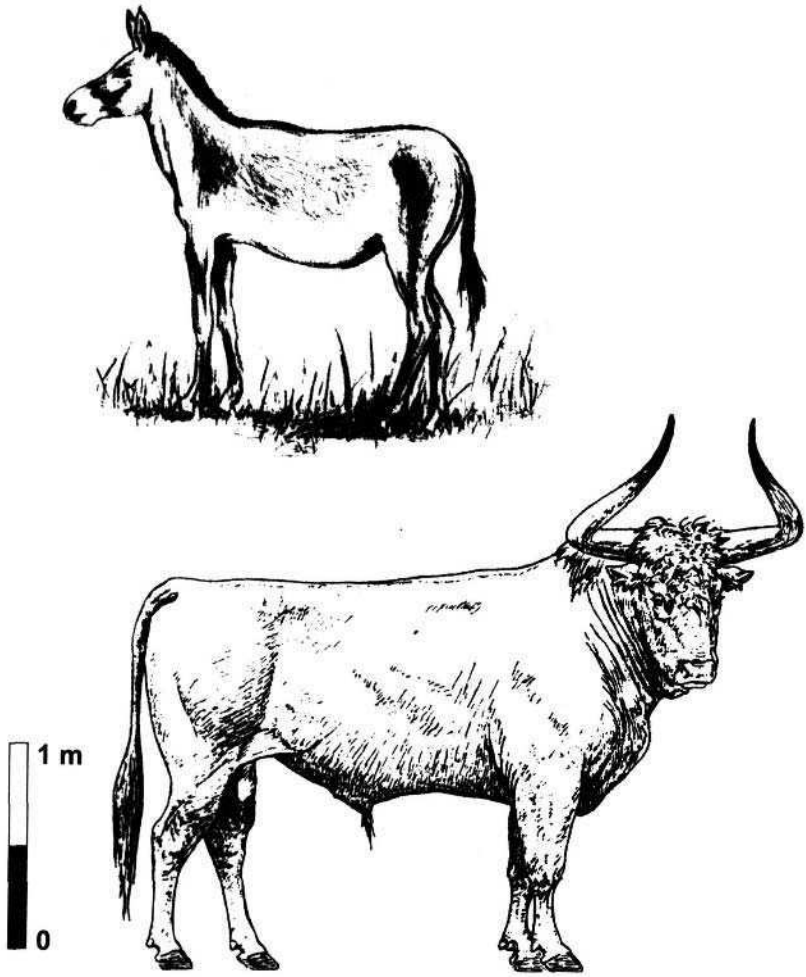

Figure 7.21. Reconstruction of extinct animals. *Equus hydruntinus,* the hydruntine horse, and *Bos primigenius,* the aurochs, at the same scale (hydruntine horse: after an original drawing by S. Marroni in Biondi 1995; aurochs: after Gautier 1990).

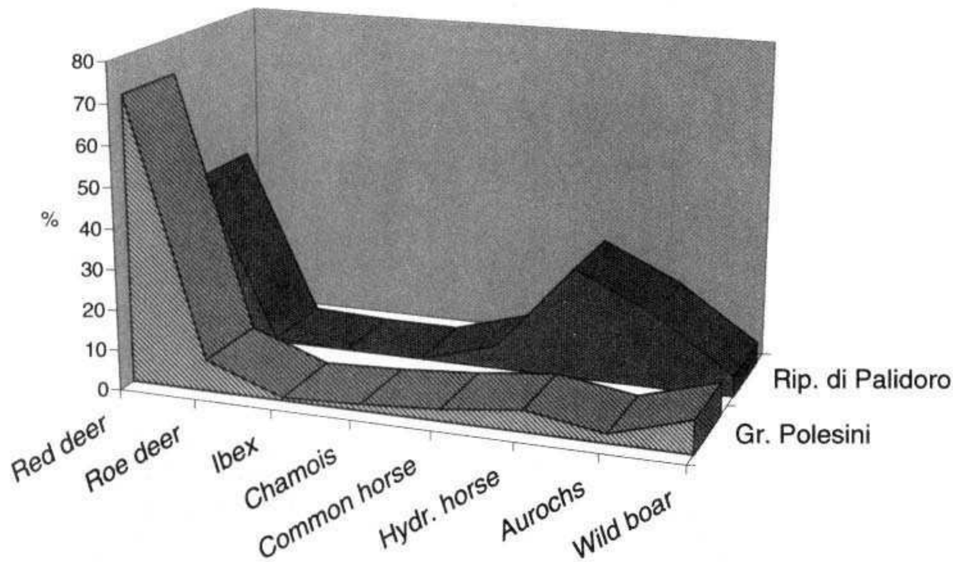

Figure 7.22. Riparo di Palidoro and Grotta Polesini. The ungulate assemblages. Rip. di Palidoro: NISP = 1270. Gr. Polesini, levels 1-12: NISP = 41,394 (source: Sala 1983).

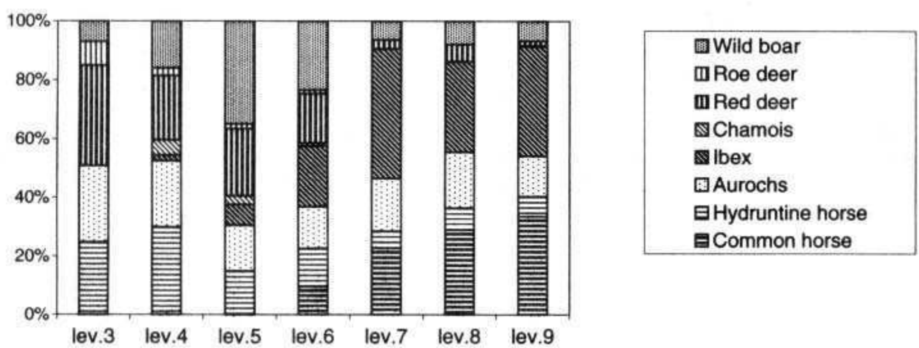

Figure 7.23. Grotta Paglicci. The ungulate assemblages of levels 9 to 3. Total NISP = 3,542 (source: Sala 1983).

7.2.6. Away from the Coasts and out of the Mountains

Not much remains of Italy when coasts and mountains are excluded. The widespread alluvial deposits in the major valleys also reduce the in-between observable scenario. Furthermore, bones are almost never preserved at open-air sites. Some attention must be given, however, to archaeological deposits in a flat and open environment, if equid and aurochs hunting is not to be overlooked (Fig. 7.21).

The now quarried away Riparo di Palidoro once opened in a travertine formation west of Rome. The rock shelter was some kilometers from the modern coast and would have been farther away 16,000 to 14,000 years ago (uncalibrated): by then, on the basis of the many C^{14} dates, the deposit was quickly accumulating (Alessio *et al.* 1976–1977). The dominant species is red deer, but the second one is hydruntine horse (*Fquus hydruntinus*), accompanied by a few horses; aurochs are also found in substantial numbers (Fig. 7.22) (Cassoli 1976-1977). It is also worth noting the presence of the lion (a single tooth), a species by then on the verge of extinction.
The vegetation, however, was rapidly changing, as phases of forest expansion occurred before the end of the Pleistocene on this side of central Italy (see 7.2.1). Some millennia later than the time at which the deposit of Riparo di Palidoro was formed, just small numbers of equids and aurochs were hunted in the surroundings of Gr. Polesini, a cave in the valley of the Aniene Rver and east of Rome (see 7.1.4) (Sala 1983).

Here, red deer was the staple food (Fig. 7.22). It was probably caught taking advantage of seasonal migrations (Barker 1975): the site is strategically located at the foothill of the last Apennine fringes, a short distance from a small gorge leading to the alluvial plain.
A winter occupation has been suggested, because c. 10 percent of the red deer in the assemblage were less than one year of age: the young were presumably born in the preceding June–July. A diversified environment is reflected in the faunal record. Apart from the overwhelming red deer remains, and from the equids and aurochs that point to flatland and grazing areas, there are species indicative of a rocky environment (chamois, ibex), of forests (roe deer, wild cat) and of bodies of water (pond tortoise, ducks, fishes). Gr. Polesini would be the equivalent of Riparo di Romagnano and of other sites in the basin of Trento. The latter sites are also surrounded by mountains in which summer sites were established. One can speculate that Gr. Polesini was similarly related to summer settlements in the mountains, which would have been the sites of the Fucino basin, at a distance of some 60 km as the crow flies, as well as those higher up on the plateau (Fig. 7.16). The sites are definitely earlier than those near Trento, which makes sense, as the climatic change and recolonization of mountain areas occurred earlier in central Italy than in the North (see 7.2.4).

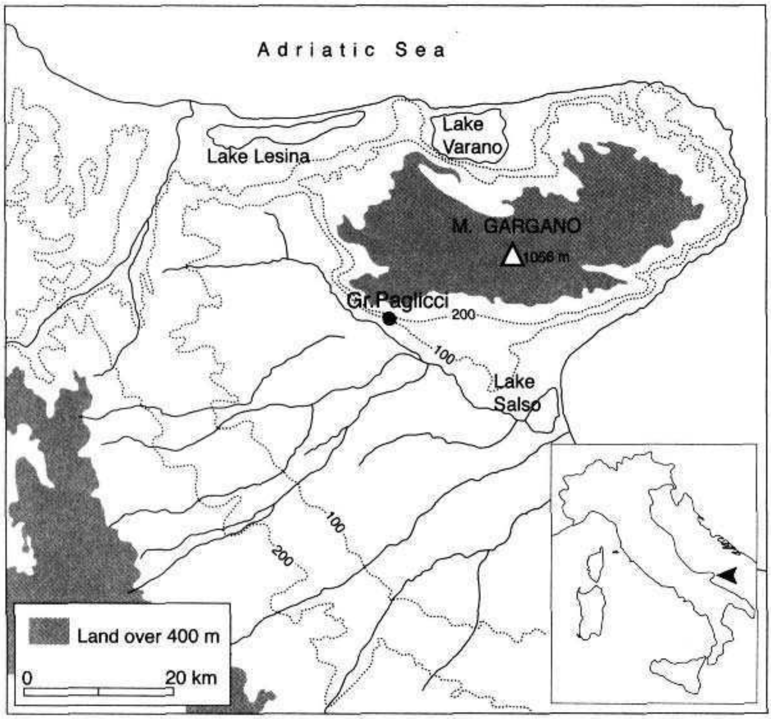

Figure 7.24. Grotta Paglicci. Location of the cave at the foothill of Monte Gargano.

Equids and aurochs were also caught in the plain next to Gr. Paglicci, which is situated just at the foothills of Monte Gargano in Apulia and on the Adriatic side of the peninsula (see 7.1.4). After 15,500 bp, more than 20 percent of the remains are those of equids, with hydruntine horse progressively supplanting common. horse (Fig. 7.23). Aurochs are also found in substantial numbers, while red deer and wild boar are well represented, too. The caprids, both the ibex and the chamois that would have been hunted on Monte Gargano, are recorded in significant numbers up to level 6d, and before 14,000-14,500 bp. Later, they markedly diminish. Monte Gargano is an isolated mound that culminates at 1,056 m asl (Fig. 7.24). Caprid herds had to seek refuge there while an increasingly warmer climate was being established in lowland Apulia. However, forests were expanding—a majestic beech forest known as Foresta Umbra nowadays covers the top of Monte Gargano—and the local morphology and limited height did not allow for the survival of grazing lands at altitude. The integrated lowland and upland hunting seasons of the Alps and the Apennines were just impossible. Instead, good use had to be made of the available resources. There is evidence of a residual shell midden and of the collection of terrestrial snails soon before the closing of the cave around 11,000 bp (Palma di Cesnola 1978). But, most of all, the expanding herds of horses and hydruntine horses, and of aurochs, as well as red deer, were increasingly hunted in the plain.

Southern Apulia is made by a flat peninsula, the Salento, linked to the rest of the region through the moderate elevation of the karstic Murge. A steppe-like environment was established there starting in the final Pleistocene (see 7.2.1), which was perfectly suited to horse, hydruntine horse, and aurochs. Taurisano is a rock shelter at some distance from the coast, which, admittedly, is never far away in a peninsula 20 km wide. The archaeological deposit was laid down at 16,000-15,000 bp, contemporary with that of Riparo di Palidoro, and with levels 14–8 at Gr. Paglicci. Aurochs and horses alone make up 70 percent of the faunal assemblage, which also includes some *Equus hydruntinus*, red deer, and wild boar (Bietti 1979). Then, at the very end of the Pleistocene, the assemblage of nearby Gr. Romanelli is characterized by many more hydruntine horses, and no common horses, accompanied mainly by aurochs and red deer (see also 7.1.4 and 7.2.2). The age structure of the more than 200 individual hydruntine horses recorded there shows some reduction of frequencies through time: accordingly, the hypothesis has been proposed that the small equid was systematically if randomly hunted, and that not many animals reached old age (Biondi 1995). Then, *E hydruntinus* and red deer were brought back to the cave as whole or partitioned carcasses, while only selected parts of the aurochs—generally young aurochs—were carried back (Cassoli *et al.* 1997).

Aurochs were just as important, or even more important than *E. hydruntinus* at Gr. Romanelli (Fiore and Curci 1995). At other contemporary or later sites of Apulia, such as Gr. delle Mura and Gr. delle Veneri, aurochs are actually the principal species, and equids and red deer are far less frequent (Bon and Boscato 1995; Sala 1983). Furthermore, outside Gr. Romanelli, common horses are always found together with *Equus hydruntinus*.

7.2.7. A New World: Sicily, Nautical Skills, and the Problematic Sardinia

Sicily was, in a way, the “last frontier” throughout the Paleolithic, as it is very close to, and clearly visible from, the mainland and—apparently—well within easy reach. The treacherous waters of the Strait of Messina, discussed in Chapter 5 (see 5.2.3), were certainly negotiated by human groups manufacturing Aurignacian tools. This early Upper Paleolithic settlement, however, was a dead-end. Real and permanent colonization only happened much later and was a well established fact by 12,000 bp.

This new wave of immigration actually started before 13,000 bp, and the earliest dated Sicilian site is Grotta dell’Acqua Fitusa. At this site, a hearth has a radiocarbon determination of 13,760 ± 330 bp (F-26) (Bianchini and Gambassini

1973). The area, however, in an inner part of the province of Agrigento and west of the island, was certainly not the first one to be settled. Evidence actually exists for a somewhat earlier colonization but so far has not been substantiated (Laplace 1966; Segre and Vigliardi 1983; Vigliardi 1982; see also Mussi 1992 for a review). As a general rule for Sicily, the value of the information available on many sites is rather limited, either because it is incomplete, or because the caves were excavated well before the age of scientific archaeology—often in the search for Middle Pleistocene dwarf pachyderms that were shipped to paleontological museums around the world, or even just to extract some fertile humus to add to otherwise not very productive fields.

Only scarce remains of red deer and wild boar were preserved at Gr. dell'Acqua Fitusa. Better evidence of the animals hunted in the new environment is given by Gr. di S. Teodoro in eastern Sicily. The archaeological deposit of this vast cave, which is one of the most famous Sicilian sites, is supposedly not much later in date (Vigliardi 1968). Preliminary analysis suggests that red deer make up 50–70 percent of the faunal assemblage, accompanied by wild boar and aurochs. *Equus hydruntinus* was also present, if rarely caught, while it should be stressed that *E.* caballusnever appears in the Pleistocene record of Sicily; likewise, ibex and chamois. The anthracoanalysis suggests a development of oaks, accompanied by maple trees and Pomoideae (including wild pears and prunes) (Lona 1949). Red deer populations were thriving on the island and had already been the most frequent—and almost unique—prey of the Aurignacian groups of Fontana Nuova (Chilardi *et al.* 1996). There is also evidence of red deer populations differentiated by size (i.e., "regular" and "small" ones) living in the same general area of western Sicily (Tagliacozzo 1993).

Once the new land was reached, it seems that people were eager to duplicate the settlement pattern experienced in the mainland. Sperlinga di San Basilio, near Messina, is a cave site 600 m asl in the Monti Peloritani, in which humans settled repeatedly, if briefly, during the Holocene. The faunal assemblage is mostly made up of red deer bones but also of some roe deer and equids, as well as foxes (Biddittu 1971; Cavalier 1971). Not far away, but in a commanding position at over 1,200 m asl, Rocca San Marco is unfortunately only known from surface collections (Bernabo Brea 1965). One can speculate about hunting parties up the mountains. The herds of caprids of peninsular Italy, however, were not to be encountered in the mountain ranges of Sicily.

Many shell middens are mentioned in the literature, including both terrestrial and marine mollusks, at coastal sites ranging in date from late Pleistocene to early Holocene (Mussi *et al.* 1995). They are rarely directly dated, however. A shell midden at Gr. Perciata near Palermo is radiocarbon dated to 11,960 ± 330 bp (F-27) (Azzi *et al.* 1973).

More comprehensive evidence is available at two coastal sites in western Sicily, Gr. dell'Uzzo and Gr. dei Cervi. The latter is nowadays situated in Levanzo, an islet of the Egadi archipelago, but was once part of a peninsula: the arm of the sea severing it from Sicily is nowhere deeper than 40 m and was submerged relatively late.

Table 7.5. Grotta dei Cervi. The Large Mammals, Reptiles, and Fishes of Levels 3 and 2.[a]

	Level 3		Level 2	
	NISP	MNI	NISP	MNI
Cervus elaphus	129	10	35	4
Bos primigenius	32	3	5	2
Equus hydruntinus	16	3	4	1
Sus scrofa	4	1	20	2
Vulpes vulpes	6	–	–	–
Monachus monachrrs	–	–	1	1
Oryctolagus cuniculus	–	–	3	–
Total	187		68	
Emys orbicularis	–	–	1	1
Caretta caretta	–	–	33	2
Dentex sp.	–	–	4	2
Epinephelus sp.	–	–	117	10
Labrax sp.	–	–	1	1
Sparus sp.	–	–	9	4
Total	–	–	131	–
TOTAL	187	–	233	–

[a]Source, Cassoli and Tagliacozzo (1982).

At Gr. dei Cervi in Levanzo, the lowermost part of the deposit, level 3, was dated by different laboratories. The slightly contrasting results cluster around 11,000 to 10,000 bp (Vigliardi 1982). Red deer were the most frequent prey, but remains of aurochs, hydruntine horse, wild boar, and bustard were also identified (Table 7.5) (Cassoli and Tagliacozzo 1982). In the upper and undated part of the deposit, there are no major changes in the industry but the faunal inventory is much more complex: the same species were still caught, but they were accompanied by turtle, pond tortoise, fishes. This same level **2** is defined as a shell midden, with both terrestrial snails and marine mollusks (*Monodonta* sp., *Patella* sp., *Triton* sp.). Remains of hare and monk seal were also discovered but could be intrusive and not related to any human activity.

At Gr. dell'Uzzo, opening in another peninsula of western Sicily, there is the same shift toward a broader subsistence base and a more intensive use of marine resources. The hunted mammals are predominantly red deer and, to a lesser extent, wild boar. The rugged environment and very restricted flatlands were not favorable to herds of aurochs, and equids simply never occur (Tagliacozzo 1993; Tagliacozzo and Piperno 1993).

Detailed evidence is available from the analysis of the faunal assemblage of trench F (Table 7.6). In the earlier and undated part of the Mesolithic sequence (t. 32–23), not much more than large mammals remains—and some small carnivores—is found. Some aquatic birds and ducks were probably hunted at a distance from the site, as there was no natural habitat for these species in the immediate surroundings, and some limpets and turbins are mentioned. In the upper part of

Table 7.6. Grotta dell'Uzzo. The Large Mammals, Reptiles and Fishes Found in the Assemblages of Trench F. [a]

	t. 33-32		t. 22-15		t. 14-11	
	NISP	MNI	NISP	MNI	NISP	MNI
Cervus elaphus	427	14	1302	36	1928	
Bos primigenius	2	1	41	3	1	
Sus scrofa	25	6	477	19	758	
Canis sp.	–	–	–	–	2	1
Vulpes vulpes	36	4	39	4	145	
Felis silvestris	–	–	1	1	67	
Martes sp.	–	–	1	1	–	–
Mustela cfr. *nivalis*	1	1	–	–	–	
Ind. Mustelids	5	1	–	–	–	–
Monachus monachus	–	–	3	1	–	–
Cetaceans	–	–	8	?	86	?
Total	496	27	1.872	65	2,987	
Emys orbicularis	–		2		7	
Ind. Tortoises	1		–		3	
Lacerta viridis	–		5		–	
Total	1		7		10	

(Continued)

Table 7.6. (Continued)

	t. 33–32 NISP	MNI	t. 22–15 NISP	MNI	t. 14–11 NISP	MNI
Dentex dentex	–		–		12	
Diplodus sargus	1		1		14	
Epinephelus sp.	–		35		422	
Labrus merula	–		3		13	
Lithognatus mormyrus	1		1		–	
Mugil cephalus	–		3		5	
Muraena helena	–		1		12	
Pagellus sp.	–		–		1	
Sarpa salpa	–		–		4	
Sciaena umbra	–		–		1	
Seriola dumerili	–		–		1	
Sparus aurata	–		–		2	
Sparus pagrus	–		–		2	
Spondyliosoma cantharus			–		2	
Total	2		44		491	
TOTAL	499		1,923		3.488	

[a] *Source: Tagliacozo* (1993).

the Mesolithic sequence—t. 22–15, for which a date of 8,570 ± 90 bp (P-2735) is provided—there are many more fish remains—mostly grouper—while marine mollusks dramatically increase in number, and the monk seal appears, together with cetaceans. The even richer assemblage of the final Mesolithic (t. 14–11) is characterized by increasing numbers of marine mollusks and fishes (groupers, and some giltheads and eels), with the addition of crabs and different species of dolphins and other cetaceans.

Sicily was a well integrated part of the European world, as can be seen from many different lines of evidence (see also 7.4.3 and 7.4.4). Continuous contacts with the mainland imply more than just anecdotal nautical skills. Contacts with more distant lands over the sea could accordingly have been established as well. However, following careful comparisons with North African archaeological sites, it must be concluded that there is simply no evidence so far of any north–south contacts across the Mediterranean (Zampetti 1989).

The time of the first colonization of Sardinia by human groups is also a complex problem. In theory, reaching this large island during the final Pleistocene would fit the general pattern of maritime journeys through the Mediterranean, conspicuously proved in Sicily not later than 14,000 bp (discussed earlier), and in the Greek islands around 10,000 bp (Perlès 1979). Sardinia, however, together with closely related Corsica, is located much farther away from the mainland than Sicily. Not surprisingly, the Sardinian and Corsican faunas are much more unbalanced than the Sicilian ones at this time, and markedly endemic as well: the only mammals of some substantial size were the deer *Megaloceros cazioti,* the small canid *Cynotherium sardous,* and the ochotonid Prolagus sardus—a kind of short-eared hare. Admittedly, during the early Holocene and, to some extent, during the final Pleistocene as well, regular use was generally made of birds, fish, snails, mollusks, tortoises (discussed previously) (i.e., resources that would have been a complement to the restricted number of island mammal species). However, even assuming that nautical skills were developed enough to allow regular crossing from mainland to island, or just that a human group large enough to give origin to a viable population was stranded at some point on the coasts of Sardinia, the challenge of adapting to a quite abnormal environment would have been great.

Considerable efforts have been made to prove a human presence during the late Pleistocene and early Holocene, mostly following the excavations at Grotta Corbeddu, which yielded a very large faunal assemblage (Klein Hofmeijer 1997; Klein Hofmeijer and Sondaar 1993; Klein Hofmeijer *et al.* 1987–1988; Sondaar *et al.* 1984). However, while there is some positive evidence of human groups during the early Holocene, both in Sardinia and in nearby Corsica, no uncontroversial Upper Paleolithic seems so far to have been discovered (Cherry 1990). Clearly, much more field research is needed in Sardinia before the matter is settled, possibly putting into a new perspective old finds, such as the so-called ''Venus of Macomer"—a female figurine with a *Prolagus* head, discovered before the age of scientific archaeology, which would rather fit the Upper Paleolithic typology of humans with an animal head (Mussi in press) (Fig. 7.30).

7.3. LOCAL AND REGIONAL DIVERSIFICATION

7.3.1. Regionalization in the Lithic Industry: Romanellian and Epiromanellian, Bouverian. Sicilian Industries

While Gravettian and Early Epigravettian industries are generally believed to share the same general characteristics throughout Italy, regional developments are discernible in the late Upper Paleolithic and within the Final Epigravettian. This was recognized quite early and acknowledged by G. Laplace (1964, 1966). One of the most widely known regional developments is the Romanellian of Apulia, named after the well-known Gr. Romanelli (see also 7.1.4 *Gr. Romanelli*).

At the eponymous site, the Romanellian industry is characterized by tiny circular or unguiform endscrapers, by prismatic burins or cores, and by retouched points (Fig. 7.25). Backed bladelets, some pointed or truncated, and geometric microliths are also part of the assemblage. The Romanellian is dated to 11,000-10,000 bp at Gr. Romanelli itself, and at 10,810±100 bp (UTC-1462) at Gr. delle

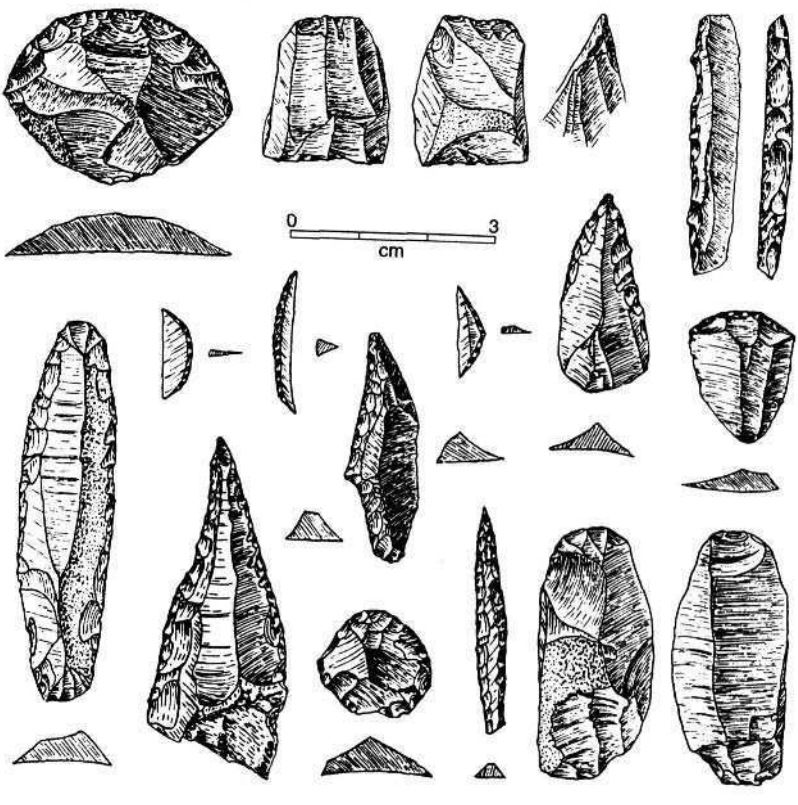

Figure 7.25. Grotta Romanelli. Lithic industry from level C (source: G. A. Blanc 1930).

Mura, on the coast of central Apulia (Bon and Boscato 1995). It is supposedly a local development from industries better known at Taurisano, a rock shelter in the same region, with industries c. 16,000 to 15,000 years old (Bietti 1979). While there are not many Romanellian sites, the Epiromanellian ones are more frequent and cluster in central and southern Apulia: the industry is even smaller and includes microlithic semicircular endscrapers. The Epiromanellian is found in coastal caves in association with shell middens. While so far undated, and not found in any stratigraphic sequence also including the Romanellian, it is believed to be of Holocene date.

Late Pleistocene industries have also been labeled as "Romanellian" outside Apulia, both in central Italy and in southern France, following the finding of microlithic circular endscrapers in the assemblages. The Romanellian, however, is characterized by more than just endscrapers, and the use of this name is best restricted to the original region.

Table 7.7. Grotta dei Fanciulli. Inventory of the Lithic Tools of Level C.[a]

Type list	n
Single endscraper	11
Endscraper on retouched blade	16
Fan-shaped endscraper	2
Endscraper on flake	3
Circular endscraper	1
Thumbnail endscraper	8
Endscraper-truncation	3
Borer-endscraper	1
Borer	1
Dihedral burin	2
Multiple dihedral burin	1
Busked burin	1
Multiple mixed burin	2
Gravette point	3
Microgravette	3
Atypical shouldered point	1
Truncation	1
Blade with continuous retouch: one edge	4
Blade with continuous retouch: two edges	3
Notch	11
Sidescraper	3
Backed bladelet	3
Pointed blade	7
Miscellaneous	16
Total	107
IG = 38.31	
1B = 560	

[a]Source: Onoratini and Da Silva (1978).

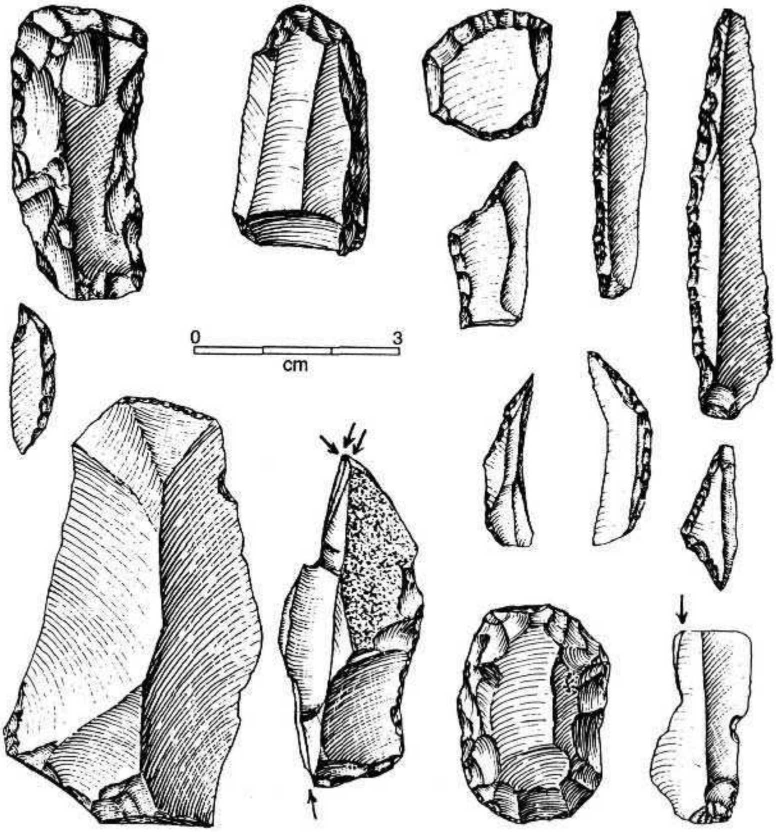

Figure 7.26. Grotta di S. Teodoro. Lithic industry from levels C and D (source: Vigliardi 1968).

Lithic industries from sites of Liguria have been classified in accordance with groupings established in nearby France and outside the Laplacian scheme. As a consequence, different and, to some extent, contrasting interpretations and dates exist for the relevant part of the stratigraphic sequence of sites of the Balzi Rossi and just at the boundary between Italy and France, that is, Gr. dei Fanciulli levels E to C, and Riparo Mochi level A (Fig. 6.3). Researchers working in Provence suggest attributing the lithic assemblages to the Bouverian, which is characterized by many endscrapers—often thumbnail endscrapers—by a more restricted number of burins, and by many backed bladelets, some geometric microliths (including rectangles), deep notches, and thick points similar to the earlier Arenian points of the same general area (Table 7.7) (Onoratini 1982, 1983; Onoratini and Da Silva 1978). A. Palma di Cesnola (1983), who follows the scheme established by Laplace, classifies the same assemblages as Evolved and then a Final Epigravettian at both Gr. dei Fanciulli and Riparo Mochi. The absolute chronology has not yet been worked out.

The typological system established by Laplace precludes any stylistic analysis. However, on the basis of published illustrations, Arenian points are also found on other sites in northwestern and central Italy, such as Arma dello Stefanin. They are positively documented in Final Epigravettian assemblages in northern Latium, such as at Cenciano Diruto and at Riparo Biedano (Pennacchioni and Tozzi 1984, 1985). Other lithic types common in the Bouverian, such as multiple deep notches, are also found in central and northwestern Italy. There is a distinct possibility that common regional characteristics can be traced in lithic industry, linking this part of Italy to southern France.

Sicily is, not surprisingly, another region in which local developments are recognized, even if the quality and number of archaeological assemblages are limited (Segre and Vigliardi 1983; Zampetti 1989). The implements are sometimes larger than on the mainland. This is in part because of the use of the locally available fine-grained quartzite, and of the production of large blades and flake at sites such as Gr. di San Teodoro (Figs. 1.3 and 7.26). An unusual number of geometric microliths, namely, triangles, were also discovered at some of the earliest sites, while the backed tools often have a characteristic arched profile. Endscrapers tend to be on a blade even if short and circular endscrapers happen to be frequent. A peculiar type of endscraper, with a much protruding front delineated by two wide notches, was first described in the Holocene industry of Gr. dell'Uzzo but also occurs at other late sites (Piperno 1976-1977).

7.3.2. Technological Complexity: The Limited Evidence of Bone Tool Manufacture, a General Trend toward Microlithization, Grinding and Pounding, Dwelling Structures, and the Vanished Record

The final Pleistocene and early Holocene are times of great technological innovation, of which there is consistent, if often indirect, evidence in the archaeological record.

Bone, ivory, and antler tools, which are assumed to represent a significant part of the Upper Paleolithic technological background, are admittedly poorly represented (see also 5.3.3 and 6.3.1). This is partially explained by the lack of reindeer and mammoths in the final Pleistocene of Italy, and consequently of reindeer antler and mammoth ivory. Also significant is the generalized nonpreservation of organic remains at open-air sites, which further reduces the range of evidence. The vagaries in the preservation of distinct phases of the reduction sequence further complicate the pattern. At Gr. Romanelli, for instance, red deer antler fragments and other bone by-products, as well as formal tools, such as bone points, have been discovered. At Gr. dell'Uzzo, on the contrary, it was noted that antlers had been severed from red deer skulls using lithic tools and that antler tips also occurred (Tagliacozzo 1993). However, the in-between pieces of antler, which would have been the most suitable parts to produce tools, were missing, and there were no antler tools. There is ground to speculate that red deer antler could have been moved into the open as raw material provisions, or as manufactured tools, and not preserved.

We suspect, however, that an even more perishable raw material (i.e., wood) was widely used in Italy, in contrast to Franco-Cantabria and other parts of western Europe. In fact, while reindeer were not available in the peninsula and in Sicily as well, trees and shrubs were always part of the *Artemisia* steppes, if limited to thickets in protected positions, to riparian woodlands, and so on. In that, there was possibly a major difference between Italy and parts of Europe beyond the Alps—most notably so with the north European plains.

On the other hand, even if negative evidence is difficult to handle in any scientific way, we assume that microliths had to be fitted into a suitable and well-shaped piece of some organic and perishable material. Accordingly, there is considerable evidence of the need for a variety of handles and shafts in the lithic assemblage itself. The bone and red deer antler tools that do occur, albeit in limited numbers, are not sufficient to account for the whole record—and are not even suited to hafting microliths, being limited to bone points more often than not.

A trend toward microlithization starts in the Final Epigravettian: the industries usually are more reduced in size than the Gravettian–Early Epigravettian ones, and increasingly so. Backed bladelets, pointed or not, are always a common find. A restricted number of geometric microliths, such as triangles and lunates produced by the microburin technique, is usually found. Around 12,000–11,000 bp, and from north to south, lithic assemblages also include a number of tiny backed tools with a double truncation, which are best described as rectangles. Sauveterrian points are also mentioned and become frequent during the first millennia of the Holocene. Endscrapers, too, are increasingly reduced in size, and thumbnail or circular ones become common. The microlithization of the industry—or of part of it—is even more extreme in the Holocene and is clearly seen in the many backed microliths of the Sauveterrian industries, in the trapezes of the Castelnovian, and in the circular and semicircular endscrapers of the Epiromanellian assemblages.

Sites are reported at which microlithic *armatures* account for up to 90 percent of the assemblage (Lanzinger 1985). They are related to the preparation of hafted projectiles and hunting activities. There is also indication from microwear analysis that the small endscrapers from Riparo di Romagnano and Gr. Romanelli were used with different inclinations and for the working of different materials (D'Errico 1984). This indirectly suggests a variety of hafted tools, which is also evident from the archaeological and ethnographic record outside Italy (Deacon and Deacon 1980; Plisson 1987). Lumps of glue recovered in the burials of Riparo di Villabruna and Mondeval de Sora were presumably used to make pieces of rock adhere to organic material, and to fix arrows or other tools (Aimar *et al.* 1992; Alciati *et al.* 1992).

Pebbles that have been modified by use along the edges or on the surfaces have been discovered at a number of sites, especially from modern excavations (Mussi and Zampetti 1992). They are rather standardized in size and denote a preference for flattish shapes. When engraved or colored, they were recognized and preserved even in the past, but we suspect many have been discarded and lost. Microwear analysis suggests that pebbles and other pieces of rock were used

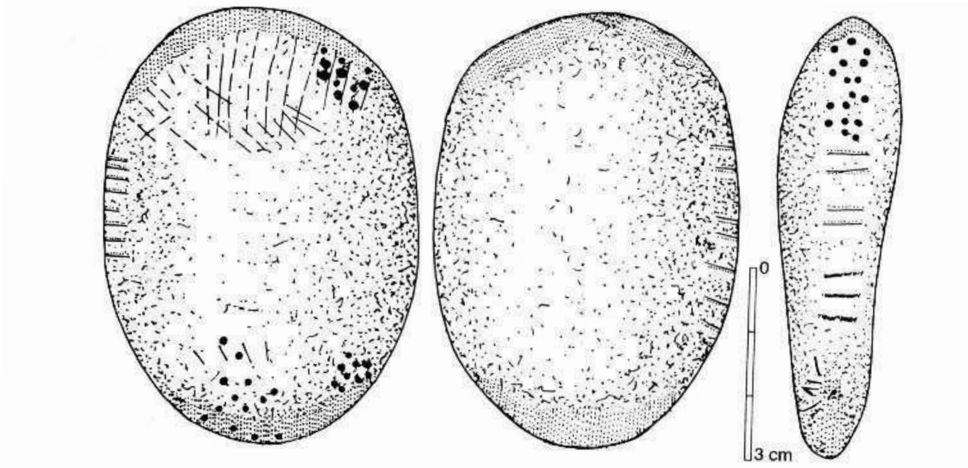

Figure 7.27. The use of pebbles for a variety of tasks, as exemplified by a specimen from Gr. Polesini (after Mussi and Zampetti 1993): the edges have been thinned after rubbing and scraping, and there are traces of impact (dots). Note also the groups of linear incisions, which are ochre-stained.

for rubbing and scraping, and for active as well as passive percussion (i.e.,as strikers, pounders, and anvils) (Mussi and Zampetti 1993) (Fig. 7.27). They could well have been used in bone breaking and/or hide processing, and can also be considered indicative of use—possibly increasing use—of vegetables, nuts, and *so* on. At Gr. delle Arene Candide, there are indications of their use to crush pigments.

Containers were quite obviously in demand, and some evidence of them is found in graves. Both at Riparo di Villabruna and at Mondeval de Sora, groups of objects next to the skeleton are interpreted as probably having been deposited in a bag or pouch (Fig. 7.33). Containers are also necessary to collect and transport to a short- or long-term campsite any substantial number of terrestrial snails, mussels, and other shellfish, and hazelnuts or small-sized resources in general that must be grouped for effective consumption. These are just the kind of foodstuffs increasingly being exploited during the period in question. The survival of woven baskets, mats, cordage, and the like cannot be expected in a humid and temperate environment, but are found in the much drier Eastern Mediterranean—as in the 8,000- to 9,000-year-old (uncalibrated) levels of Nahal HemarCave in the Judean Desert (Bar-Yosef 1985).

Fishing equipment is another item of our inventory of vanished tools implicit in the archaeological record. Fish remains are known at Gravettian sites, for example, trout vertebrae are part of the ornaments found in burials from the Balzi Rossi caves (see 6.4.5). However, there is no evidence before the final Pleistocene that fishing was regularly practiced. On the evidence of the later record, when both freshwater and marine fish were systematically caught, one is left speculating about the existence of nets, pots, hooks, and the like in the final Pleistocene and early Holocene. Material culture would probably also have included canoes or

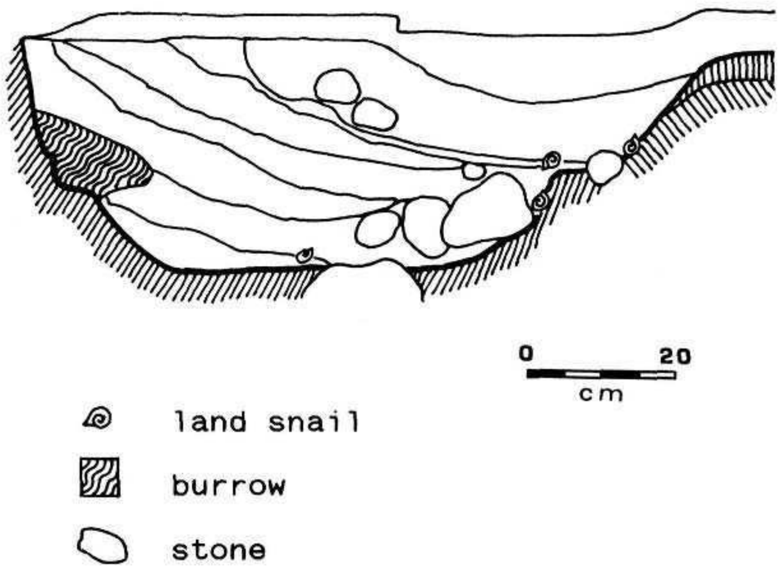

Figure 7.28. Grotta di Pozzo. Cross-section of a pit in the Sauveterrian shell midden (courtesy of Dipartimento di Scienze dell'Antichità, Università di Roma "La Sapienza").

pirogues in order to account for the Sicilian record. Rafts would have been sufficient for occasional crossings in the early Upper Paleolithic but not for the many contacts later established between island and mainland (see 7.2.7). People are similarly known to have scoured the eastern Mediterranean at this time in search of good raw materials for their tools (Perlès 1979).

The ability to shape tools and to modify the environment is also evident in the pits dug for various purposes. Grave pits are obvious examples, and some have already been mentioned at Gravettian sites (see 6.4.1). But for the first time pits unrelated to burials, postholes, hearths excavated into the ground, and the like are quite frequent in caves and in the open, from north to south. Examples, among others, can be found at Riparo Tagliente (Guerreschi 1984), Armadello Stefanin (Leale Anfossi and Palma di Cesnola 1972), Fienile Rossino (Accorsi *et al.* 1987), Monte Bagioletto (Cremaschi *et al.* 1981-1982), and Gr. di Pozzo (Mussi unpublished data) (Fig. 7.28). Specialized tools that must have been available to dig and shovel are not recognized or preserved in the archaeological record. People were frequently modifying the area they inhabited, apparently without major difficulties.

Complex dwelling structures were established in caves and rock shelters, such as at Gr. dei Fanciulli in the Balzi Rossi and Plan de Frea in the Alps (De Villeneuve *et al.* 1906–1919; Broglio *et al.* 1978). At Gr. dei Fanciulli, a semicircular dry stone wall, 1.2 m high and 0.7 in thick, was noticed in level D after it had been dismantled to a considerable extent. It had a radius of 4.4 m and enclosed the innermost part of the cave. At Plan de Frea, a tent or hut was constructed against a huge rock, covering a slightly depressed area of 15 m^2. Stones seem to have been used to secure at the base the skins or other materials covering it. Some wide and shallow pits were dug inside, one of them tentatively described as a hearth.

People were also able to provide lighting quite effectively, evidenced by the torches discovered in deep caves (see 7.4.4).

7.3.3. Engravings of the Mainland and of Sicily, the Representation of Human Beings, Paintings, and the Late Emergence of a Regional Artistic Style

The artistic record is discontinuous through time. Around 16,000–15,000 bp, the only evidence for any artistic production comes from levels 9 and 8 of Gr. Paglicci (see 7.1.4 and Fig. 7.7). Later, after 13,000 bp, the number of sites increases to approximately thirty, widely scattered all over the peninsula and in Sicily. Engravings are much more frequent than paintings, both as parietal and as portable art. Portable art is better represented in the mainland, and parietal art is more common in Sicily, but this is far from being an absolute rule (Zampetti 1987). A distinction can be made among naturalistic art, schematic art, and geometric art, even if the subdivision is not always that clear-cut (Mussi and Zampetti 1997; Zampetti and Mussi 1999).

The naturalistic art includes mostly animals engraved on cave walls or on slabs, pebbles, and bones. Aurochs, equids, and deer are represented quite often, while felids, leporids, bison, ibex, wild boars, wolves, and birds also occur in decreasing frequencies and in small numbers. This artistic production is best exemplified at Riparo Tagliente, Grotta Polesini, Grotta Paglicci, Gr. dei Cervi (Levanzo), Gr. dell' Addaura, and Gr. Niscemi, near Palermo. Elsewhere, engravings are more restricted in number or just less well preserved. Only a fraction of the sample comes from open-air sites. While the chronology is not always well defined, because of either the usual problem of dating panels isolated from any archaeological assemblage or the poor recovery practices and local stratigraphic disturbances, there is a body of evidence pointing to a final Pleistocene date and no evidence at all for the continuation of this naturalistic style into the Holocene.

The animals are generally in proportion and often in a dynamic posture, with attention for details such as eyes, hair, and horns. Stylistically, they cannot be separated from those found in Franco-Cantabria and typical of Magdalenian art. Even the conventions followed in horns and muzzles, and in perspective, are identical (Figs. 7.29, 7.46, and 7.47).

This also holds true for the rarer human figures. The arms and legs, but generally not the hands or feet, are clearly indicated, and can be raised or divaricated (Fig. 7.31). Women are signified by the pubic triangle, breasts, or the overall shape of the body (Fig. 7.30). Some possible vulvas are engraved on the ceiling of Gr. Romanelli. Men are recognizable when the penis or, rarely, the beard is represented. A few indeterminate figures, found on the cave walls of Gr. dei Cervi, are tentatively identified as men, but they have an odd, mushroom-like head. Other men, possibly masked and with a sort of beak, are represented at Gr. dell' Addaura (see below). A woman with an animal head–possibly *Equus hydruntinus*-is engraved on a pebble discovered at Tolentino, in the Marche region (Massi *et al.*

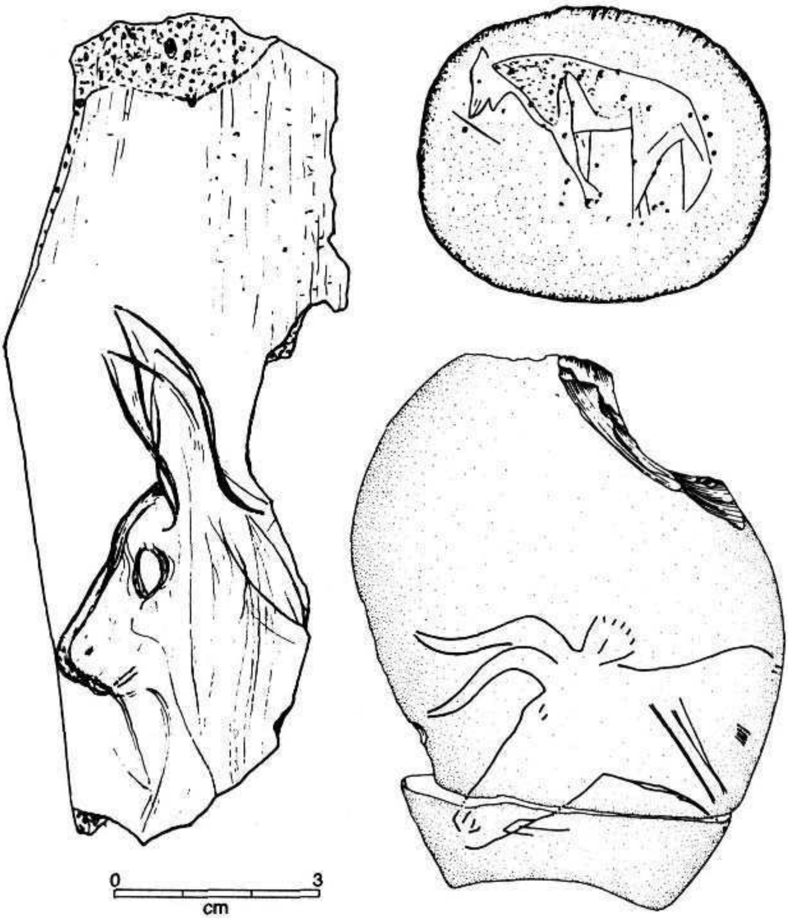

Figure 7.29. Grotta Polesini. Bone and pebbles engraved with a hare or rabbit, a wolf, and an aurochs (sources: Mussi 1990-1991; Radmilli 1974).

1997), while a poorly dated figurine from Macomer in Sardinia also fits into this group of representations (see 7.2.7)(Fig. 7.30).

Isolated figures—animals and rarely humans—are frequent, especiallyin portable art and on pebbles. Another example among many is the wolf carefully engraved, with detailed representation of its fur, on a small limestone pebble from Gr. Polesini (Fig. 7.29). It was also taken as indicative of "hunting magic:" the small holes on the surface were interpreted as the result of projectiles being thrown at it (Radmilli 1974). The holes were later found to be the effect of natural limestone dissolution in the water-logged deposit (Mussi and Zampetti 1993).

Complex scenes, however, also occur (see also 7.4.4). For instance, a horse basin, with a scene representing several horses and deer hit by arrows or other projectiles, was discovered in Gr. Paglicci level 8 (Zorzi 1962); the heads of an aurochs and a deer were engraved on the other side of the same bone. The most

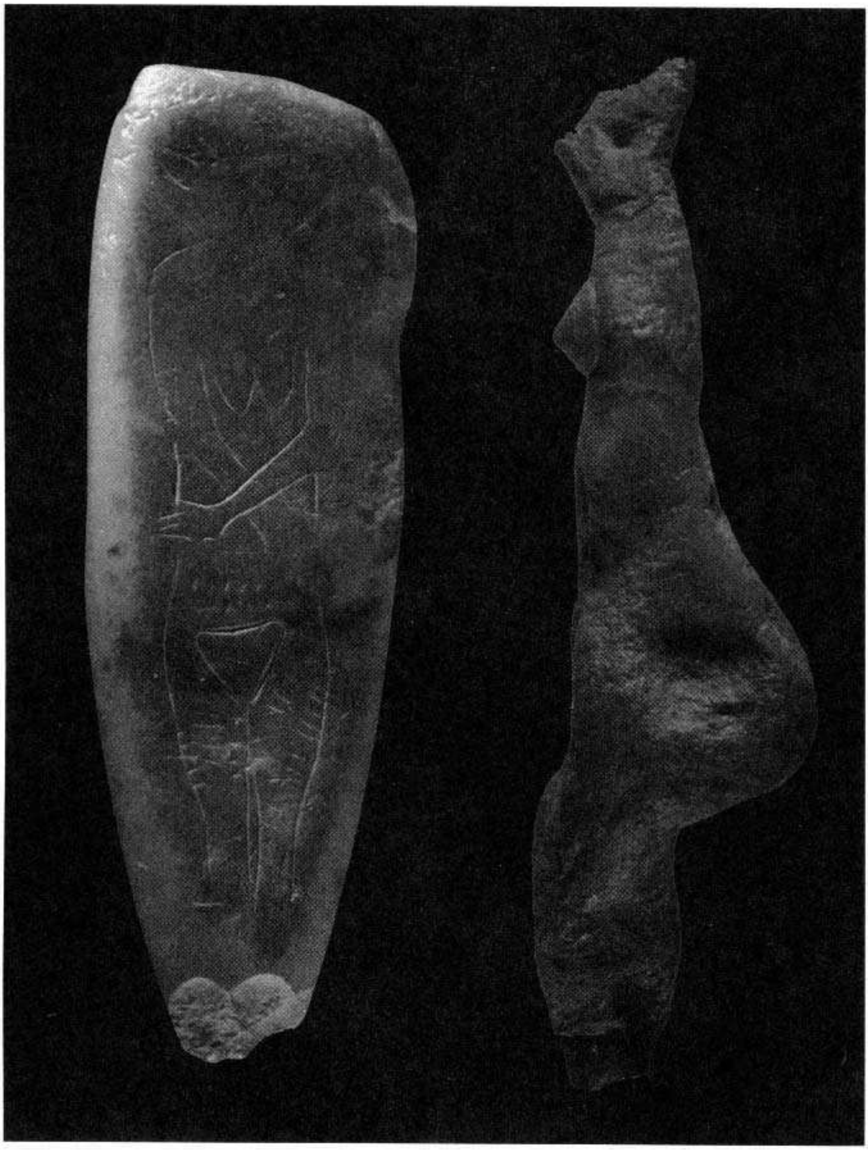

Figure 7.30. Human figures. An engraved pebble from Tolentino depicting a woman with the head of a hydruntine mare (pebble length: 127 mm) and a female statuette of volcanic rock, with the head of a *Prolagus,* from Macomer (length: 134 mm) (sources: Massi *et al.* 1997; Mussi in press).

extraordinary composition of the Italian Paleolithic art, however, is the one on the walls of Gr. dell'Addaura in Sicily. More than one panel once existed, but surfaces have been damaged by exfoliation. On a better preserved wall, a dozen humans in lively postures are represented next to as many herbivores: equids, bovids, and

Figure 7.31. Grotta dell'Addaura.Part of the engraved panel with the "Acrobats" (approx. 2 m in length) (after Graziosi 1973).

deer, some being naturalistic, others schematic and angular in shape (Fig. 7.31). The latter are clearly superimposed on earlier engravings (see below for schematic art).

Both men and a few women are represented, most of them standing or walking. Some men possibly carry spears or poles, while a woman has a bulging bag on her shoulders. The men also have a hood or voluminous hairdressing, as well as a beak of a kind, as already noted. Two of them, in a more or less horizontal position, are superimposed on each other. Not surprisingly, the interpretation of the scene, known as the "Acrobats of Gr. dell' Addaura," is hotly debated in the literature. While alternative interpretations range from homosexual intercourse (Bovio Marconi 1953) to an initiation ceremony (Chiappella 1954) and to ritual killing (Blanc 1954), such anecdotal interpretations probably are outside the range of archaeological science. More recently, it was observed that lines are incised across the "Acrobats," and that in Franco-Cantabrian art, the theme of humans in a odd position, crossed by lines, is a well-known one, labeled as *"l'homme blessé"* or *"l'homme* tué" (Mussi and Zampetti in press).

Geometric engraved or painted decorations are found at a number of sites. Engravings rarely occur on bone. Rows of notches or incisions were sometimes made on deer canines or other small-sized objects. Bone points or other formal tools with an articulate decoration are extremely rare.

Geometric engravings are best exemplified by decorated pebbles which were used for a variety of tasks, as proved by use–wear and other scars (Mussi and Zampetti 1992, 1993). Painting also occurs. Actually, inany decorated pebbles are best described as "Azilian pebbles" (Figs. 7.40 and 7.41); that is, they have the characteristic dots, stripes, "M" patterns, and so on, first described at Mas d'Azil in France (Couraud 1985). Azilian pebbles have been discovered at sites from Liguria to the Eastern Alps to Levanzo in Sicily. Several are from a disturbed or poorly defined stratigraphic context. The dated ones are found both at final Pleistocene sites and around 11,000-10,000 bp, such as at Gr. delle Arene Candide and at Gr. della Serratura, and at early Holocene sites with a date of c. 9,000 bp such as at Gr. della Madonna (Cardini 1972; Martini 1992).

The walls of caves were also painted, although it is rare for evidence to survive. At Gr. di Levanzo, at some distance from the mushroom-headed, engraved humans, there is another similarly shaped but made in red painting (Graziosi 1962). A block with rows of red arched patterns was discovered at Gr. Romanelli, level C–B, but it cannot be said for sure that it was once part of a painted ceiling (Blanc 1938–1939) (Fig. 7.32). At Riparo di Villabruna, the walls were painted with red stripes (Broglio 1992c). Stone blocks were also decorated with more red painting and with repetitive geometric motifs, in one instance suggesting plants with two rows of leaves (Fig. 7.33).

The painted stones covered a burial, or were at the burial level, for which several dates consistently cluster at c. 12,000 bp. Another burial dated to c. 12,000 bp was discovered at Riparo Tagliente in the same general region of northeastern Italy (Bartolomei *et al.* 1974). A beautiful lioness or maneless lion was engraved on one of the large blocks covering the burial (Fig. 7.47). This is an indication that naturalistic and geometric art cannot be contrasted in any simple chronological or functional way.

Another style is exemplified by schematic animals and human beings. They were discovered engraved on slabs, blocks, or walls at sites in Apulia and Sicily in southern Italy, with one example only from central Italy (i.e., a single decorated pebble of Gr. Polesini). The overall shape is angular, the posture is rigid, and a hatched filling occurs.

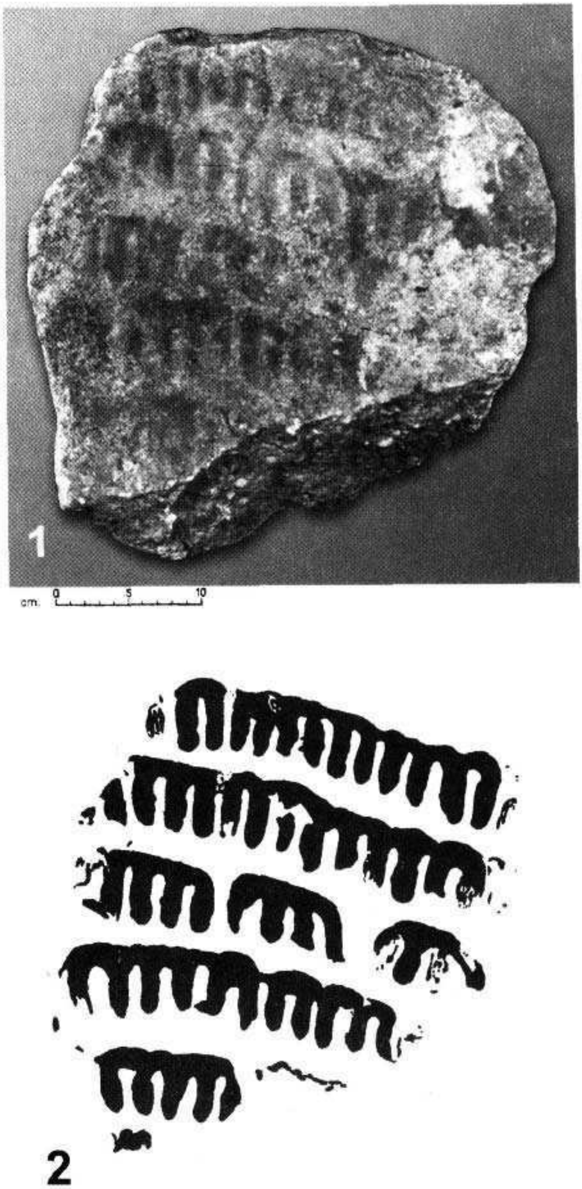

Figure 7.32. Grotta Romanelli. Block from the final Pleistocene deposit, with a geometric pattern originally painted in red (after Blanc 1938–1939).

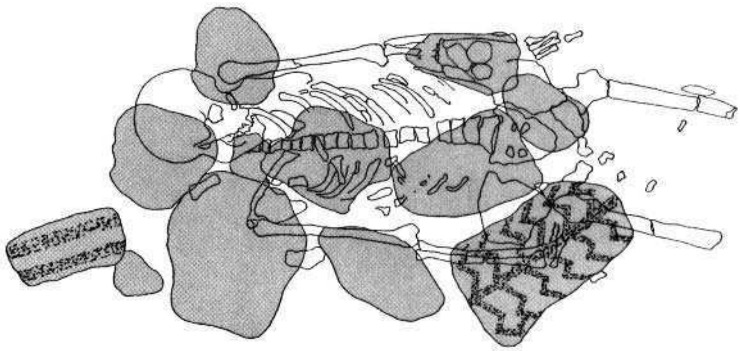

Figure 7.33. Riparo di Villabruna. The burial of an adult male, with the lower legs and feet destroyed by quarrying activity. Grouped burial goods—a bone point, two flint implements, a core, a pebble, a lump of resin, and propolis—were found next to the left forearm. Some of the rocks covering the grave are painted with red patterns, the largest being 34 cm long (after Broglio *et al.* 1992).

A block with an engraved rectangular bovid was discovered in level 3 of Gr. dei Cervi, which on the evidence of C^{14} is dated to c. 11,000 to 10,000 years bp (Graziosi 1962; Vigliardi 1982). At Gr. Romanelli, several more, with different animal species, were found in level C. Accordingly, at this site, too, they are 11,000 to 10,000 years old (Acanfora 1967; Taschini and Bietti 1972). Interestingly, one of the blocks is decorated with a schematic deer on one side and with a much more naturalistic bovid on the other. Some chronological overlap between a naturalistic and a schematic style is demonstrated. Another aurochs with an angular shape is engraved on a wall of this cave (Fig. 7.34).

At Gr. dell' Addaura, however, the rigid schematic bovids are clearly superimposed on the much more naturalistic scene of the main panel (discussed previously) (Fig. 7.31). At Gr. del Cavalloin southern Apulia, a block with a rectangular-shaped man was found in a disturbed position, and correlated to the Epiromanellian part of the sequence (Fig. 4.5) (Palma di Cesnola 1972; Vigliardi 1972). Accordingly, it would be of early Holocene date, and later than any known example of naturalistic art.

The schematic art of southern Italy overlaps with naturalistic art. However, its origins cannot be traced before 11,000 bp (i.e.,substantially later than naturalistic art), while it possibly lasts into the Holocene, just when naturalistic art disappears. The latest developments of schematic art, characterized by squared shapes, are found only in the southernmost part of Italy. A regional development is also seen in hundreds of blocks, slabs, and bones that are thickly covered by engraved geometric patterns. They have been mostly found at Epiromanellian sites in southern Apulia, such as Gr. delle Veneri, Gr. del Cavallo,and Gr. Marisa (Creinonesi 1992; Vigliardi 1972). At Gr. delle Mura in central Apulia, and in association with a Sauveterrian industry, a few more were discovered in level 2, with C^{14} determinations of 8,240 ± 120 bp (Utc-780) and 8,290 ± 50 bp (Utc-1417) (Bon and Boscato 1985; Calattini 1992).

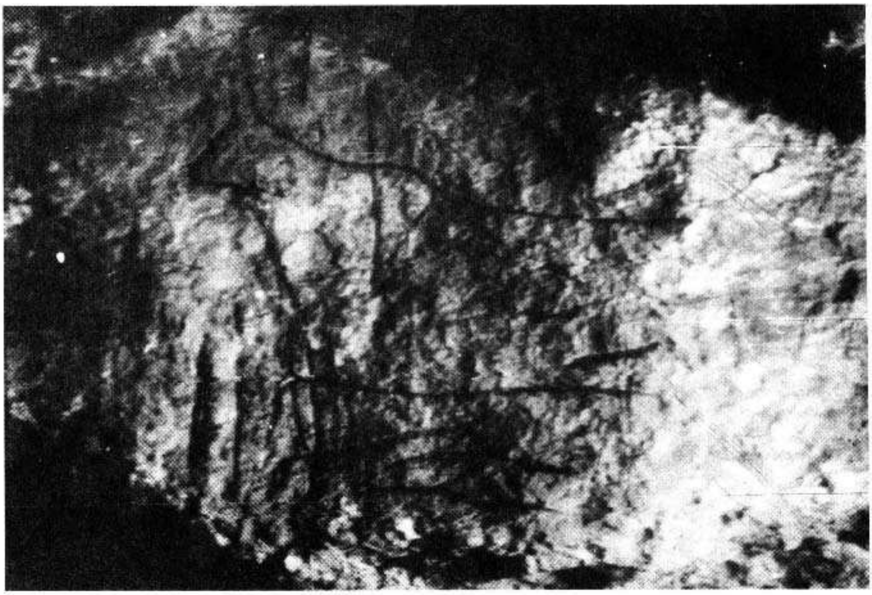

Figure 7.34. Grotta Romanelli. The schematic and angular bovid engraved on a wall (length of the engraving: c. 50 cm) (after G. A Blanc 1930).

In this interpretation, regionalization in art is limited to restricted parts of Italy (Mussi and Zampetti 1997; Zampetti and Mussi 1999). It is also a late and short-lived aspect of artistic production. A different reconstruction was proposed by P. Graziosi, who started studying Italian art in the 1930s and later produced a widely circulated monograph on this topic (Graziosi 1956). For Graziosi, a "Mediterranean Province" of schematic and geometric art is the southern counterpart of the "classic" Franco-Cantabrian art.

It should be stressed, however, that Graziosi started with the study of a sample of artistic production that is much more restricted than that of today, and also before the age of absolute chronology. Through time, he progressively restricted the extension of the "Mediterranean Province" to southern Italy and to a period later than the time span covered by Gravettian assemblages (Graziosi 1973). Since then, new discoveries have also enhanced the general knowledge of the post-Magdalenian artistic production, that is, of what is found associated with Azilian and Epipaleolithic industries beyond the Alps (Aparicio Pérez 1990; Guy 1993; Lejeune 1986; Lorblanchet 1989; Martin 1989). The rigid animal shapes, often with an engraved hatching, recognized at such sites are very close to those of Gr. Romanelli and other southern Italian sites. To us, a Mediterranean Province, if it exists at all, must be restricted only to the very final developments of schematic and geometric art in parts of southern Italy, when truly squared shapes appear in figurative art.

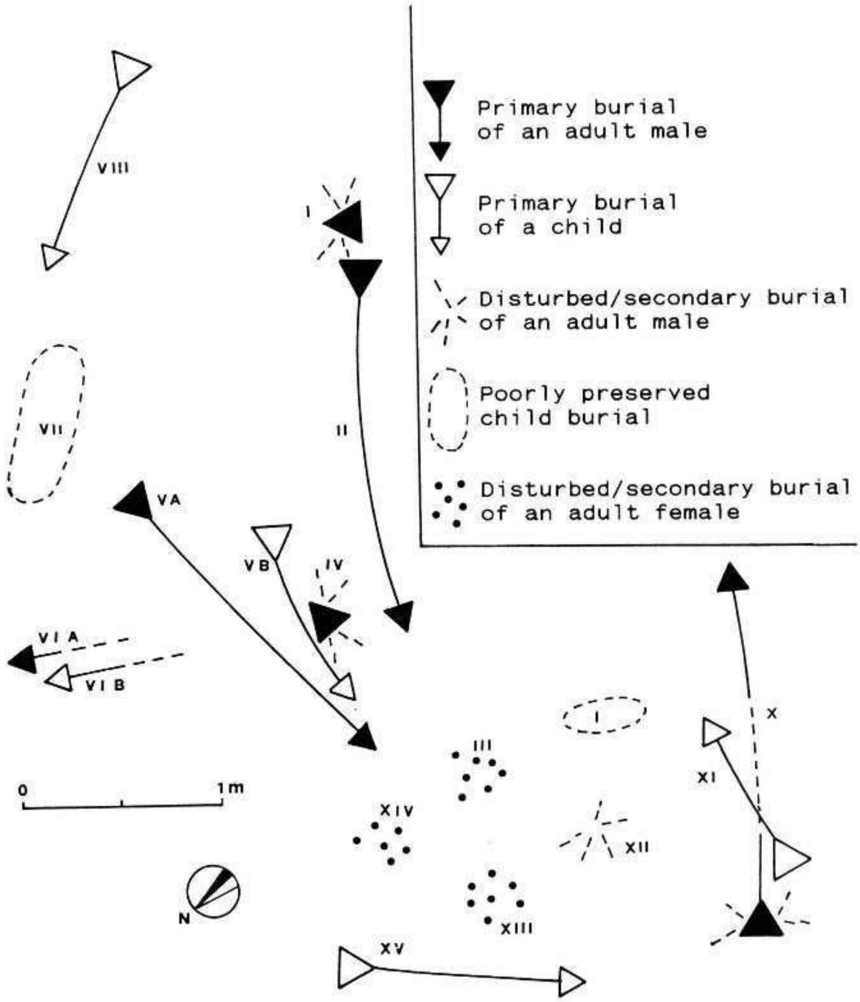

Figure 7.35. Grotta delle Arene Candide. Scheme of the burial area (after Mussi *et al.* 1989).

7.3.4. Local Burial Practices and a Comparison with Earlier Practices

Italy is relatively well endowed with late Pleistocene burials: some forty were discovered at a dozen sites, widely dispersed over the peninsula and in Sicily. Many more probably existed at Gr. Polesini and at Gr. Roinanelli (see 7.1.4). It is the largest available sample for this period all over Europe. A date earlier than 13,000 bp cannot be proven for any of these burials.

Burials of early Holocene date found in association with Mesolithic industries are less well documented and limited to two sites in northeastern Italy (Riparo Vatte di Zambana and Mondeval de Sora), one in Calabria (Gr. della Madonna), and at two in Sicily (Grotta della Molara and Gr. dell'Uzzo, with a larger number of burials). These finds have invariably been made in caves or rock shelters, which is not surprising given the general lack of bone preservation in the open.

In comparison with the much earlier Gravettian burials, major differences are self-evident (Mussi 1986; Mussi *et al.* 1989): young children are buried rather frequently; there are more women, some of them in single interments, unaccompanied by any man; and a tightly contracted position, which, in Gravettian burials, was uniquely evinced by the double and lowermost burial at Gr. dei Fanciulli, is found again and again, both in the final Pleistocene (Gr. Continenza) and in the Holocene (Gr. della Molara and Gr. dell'Uzzo). Outside northern Italy, grave goods are restricted in number and quality, or are absent. When present, they appear to reflect concern for hunting and other practical activities, and maybe less interest for status. Hence, there is a change in both the items deposited with the dead and in the values symbolically reflected in burial practices. Furthermore, there is a marked regionalization, requiring a separate description for nearly every area.

The largest number of burials comes from the upper part of the deposit at Gr. delle Arene Candide in Liguria (level M). The remains of some twenty individuals were discovered at this site, some still articulated, others much disturbed and/or as secondary burials (Cardini 1980; Formicola 1986; Paoli *et al.* 1980) (Fig. 7.35). Some C^{14} dates exist for level M, which accumulated over a considerable period of time, with reuse of the same area of the wide cave for new interments: 11,750 ± 100 bp (R-743); 10,900 ± 900 bp (R-740); 10,330 ± 95 bp (R-100). People of any age, from newborn children to adults, were selected for burial. However, while adult males and children are found in primary contexts, or in disturbed primary contexts, women are only known from occurrences of some heaps of bones in the central part of the burial area, without any accompanying burial goods. No female skull was discovered. The direct connection of children with adult males—as opposed to females—is also emphasized in some burials. In the double one known as VA and VB, both a c. thirty-year-old man and a four- or five-year-old child were discovered extended side to side. The grave goods include lithic implements, perforated shells and deer canines, crescent-like shell fragments, pebbles (some colored) and ochre-stained grinding stones, bone points, raw material supplies (soapstone, graphite, galenite, ochre), and animal bones. Like all the child burials, the child VB also had caudal vertebrae from a squirrel positioned on its thorax, interpreted as the remains of a fur garment (Fig 7.36). Part of any child's dress, in life as in death, was probably made or decorated with squirrel tails.

In burial X-XI, a three- or four-year-old child was interred above and somehow in the middle of a twenty- to twenty-five-year-old male. The adult had died long before, as the natural arrangement of the skeleton was disturbed when some ground was cleared for the second burial. The bones were rearranged at both extremities among the undisturbed ones. The child skeleton is articulated. The burial goods, if deposited on two different occasions, were carefully chosen to be exactly the same for both: perforated shells and deer canines, crescent-like shell

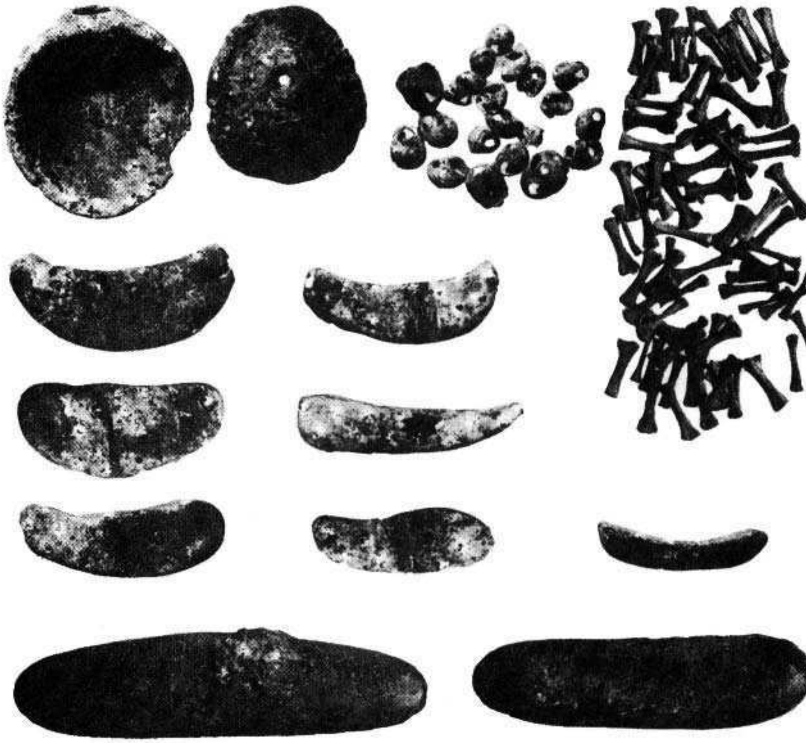

Figure 7.36. Grottadelle Arene Candide. Some of the burial goods accompanying the child in grave V (after Cardini 1980): perforated clam and limpet shells; perforated *Cyclope neritea* shells; squirrel caudal vertebrae; crescent-like fragments of shell, some with evidence of ligature in the middle; flat pebbles.

fragments, lithic tools, pebbles and colored pebbles, raw materials (ochre, limonite), animal bones (from hedgehogs, crows, fishes, some articulated), and two grinding stones, found side to side, each with its grinder on it. The child also had the usual squirrel vertebrae on its thorax.

Young child remains were discovered at a number of other sites, both of late Pleistocene (Gr.dei Fanciulli level C, Gr. Maritza, Vado all'kancio) and Holocene age (Gr. della Madonna, Gr. dell'Uzzo). A clear-cut association with adults, however, is not recognized elsewhere. Both at Gr. Maritza and at Vado all'Arancio, a man and a child were buried together, though most probably at different times. There are no caves with a woman and a child interred together. The exception would be Gr. dei Fanciulli, but at this cave, the woman in level B was interred later—and substantially later at that—the children were in level C (Fig. 7.37).

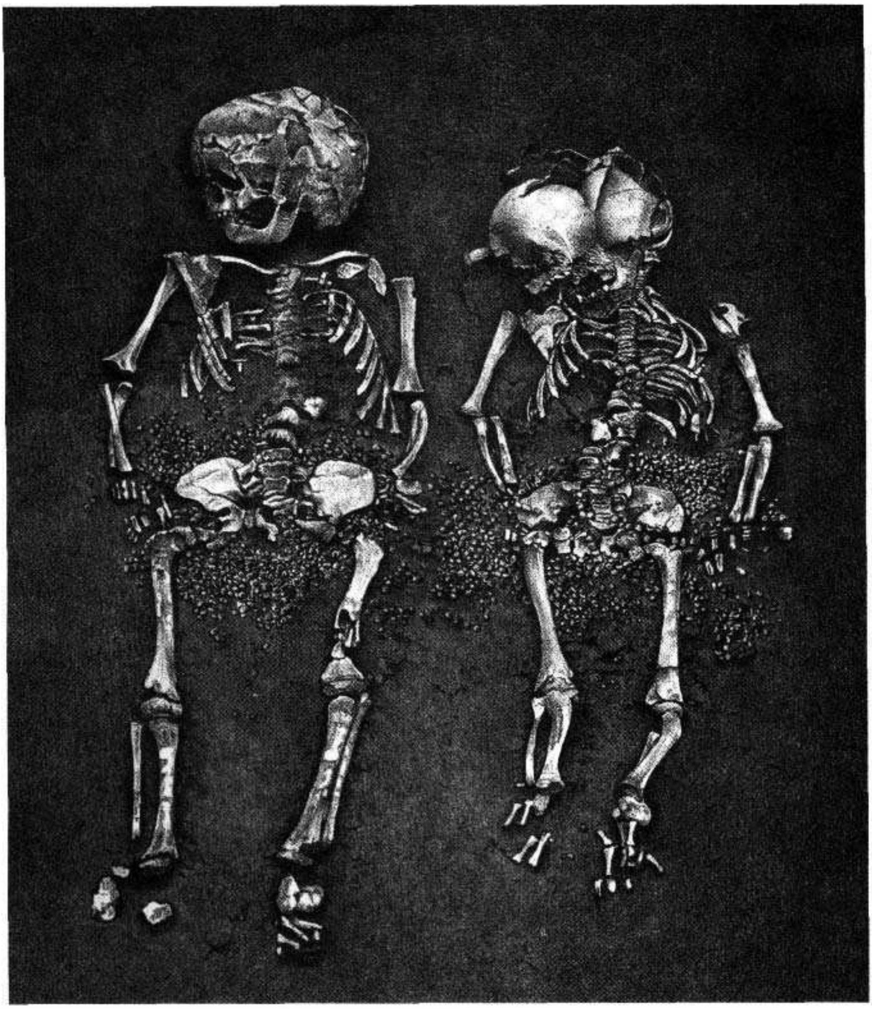

Figure 7.37. Grotta dei Fanciulli *(Gr. des Enfants).* The double child burial from layer C (after Riviere 1887). Note the concentrations of perforated *Cyclope neritea* shells around the basins.

A different set of interpersonal relationships is probably emphasized at Riparo del Romito in Calabria, excavated a long time ago and unfortunately known only through preliminary reports (Fabbri *et al.* 1989; Frayer *et al.* 1988; Graziosi 1963, 1964, 1967). Several burials were discovered in this cave located in the mountains of Calabria. The archaeological level of the burials was dated to 11,150 ± 150 bp (R-300), and a level c. 30 cm higher up to 10,250 ± 450 bp (R-298) (Alessio *et al.* 1967). A man and a woman were found in two graves side by side in the inner cave. In the front cave, two more double graves were discovered. From the available descriptions, it seems that the man and the woman found in each were somehow embracing each other with their stretched arms. This possibly suggests contemporary internment, as well as an emphasis on couple bonding. The double burials were next to a wall and at the foot of a panel with engraved bovids, parietal art being quite rare in peninsular Italy.

Two more double burials of a man and a woman were discovered in the Mesolithic levels of Gr. dell'Uzzo in Sicily, where single men, women, and children were also found inhumed (Borgognini-Tarli *et al.* 1993). But while Uzzo IV A and B were laid down side by side in a wide if shallow pit, Uzzo IA, the woman, was added transversally on the top of Uzzo IB, the adult man in a lowermost position in the same pit.

Single individuals were also buried. Single women were discovered in primary context at Gr. dei Fanciulli level B, Riparo Vatte di Zambana, and Gr. dell'Uzzo. While the last two sites are of Holocene date, level B of Gr. dei Fanciulli is a shell midden, radiocarbon dated to 12,200 ± 400 bp (MC-499). Doubts about this date were expressed earlier (see 7.2.5).

Single men are more frequent, both at sites where other burials also occur (such as at Gr. delle Arene Candide, Vado all'Arancio, Gr. Maritza, Gr. Continenza, Gr. Paglicci, Gr. di San Teodoro, and Gr. dell'Uzzo) and at sites where nobody else seems to have been interred. This is the case in northeastern Italy at the late Pleistocene and Holocene sites of Riparo Tagliente, Riparo di Villabruna, and Mondeval de Sora. It was emphasized by Dalmeri and Lanzinger (1992) that the array of grave goods in the last two sites, which include bladelet cores ready for use, blanks and glue to fix geometric microliths on wooden shafts, is just the personal equipment of any active hunter. Bone tools were also discovered in both graves, and the inhumations of Mondeval de Sora also had pendants made by perforated deer canines.

It can be concluded that both interpersonal relationships and personal qualities were symbolized in the varying burial customs and in different regions of Italy. Young children are buried just as adults, and there is apparently interest in underlying their relationships with adult males. At other sites (Riparo del Romito, Gr. dell'Uzzo), the ties of a woman with a man are stressed by a common burial. In northeastern Italy, isolated adult males were also buried, reasserting their identity as hunters. Single graves of women are a rarity.

7.4. EXCHANGING AND SHARING RESOURCES AND IDEAS

While regional aspects develop through time, as seen in lithic assemblages, engravings, and burial practices, other parts of the archaeological record point to exchange relationships Human groups with different practices in some aspects of daily life were also acquiring raw materials and items, as well as models, ideas, and know-how, which had originated at distance, and sometimes at a great distance.

7.4.1. Innovative Rojectile Points, Quarry Sites, and Flint and Rock Crystal of Distant Origin

Technical and practical constraints can be assumed to have impinged on the characteristics of any lithic assemblage, as the tasks for which they were manufactured had to be performed in an effective way. Groups distant from each other were exchanging information on innovative techniques, as can be seen by the diffusion of different projectile points. The Azilian points (i,e., small backed points with a markedly arched outline, sometimes merging into lunates, and in other instances with a truncated base) that characterize the final Magdalenian and the Azilian beyond the Alps were also produced in Sicily: D. Zampetti (1984–1987) recognized them at Riparo del Castello, as well as at Gr. dell'Acqua Fitusa and Gr. di S. Teodoro. Their date is in the range of 14,000–12,000 bp. The typological inventories of other sites, including peninsular Italy, have been established following the typological list of G. Laplace. The Azilian points, if any, are lumped in a more general group of ''backed tools" or "backed and truncated tools," and just ignored.

For the Mesolithic of northeastern Italy, a different typological list is currently in use, and the Sauveterrian points are properly recognized as such. They characterize the early Mesolithic (i.e., the Sauveterrian) but are also a component of Final Epigravettian assemblages. On the Tyrrhenian coast, they are found as far south as Gr. della Serratura at Marina di Camerota, both in the Final Epigravettian levels radiocarbon dated to c. 11,500–10,000 bp, and in the following Sauveterrian ones at around 10,000–9,500bp (Martini 1993). At Gr. di Pozzo in the central Apennines, following recent excavations (Mussi unpublished data), they are documented below a midden layer dated at 9,370 ± 80 bp (TO-3422). They are also known to occur on the Adriatic side of the peninsula and in the uppermost levels of Gr. Paglicci, which were deposited before 11,000 bp (see 7.1.4). The lithic industry illustrated by the still preliminary publications on Gr. Romanelli apparently also includes the tiny double-backed bipoints (G. A. Blanc 1930) (Fig. 7.25). Later, a Sauveterrian industry is also documented at some time before 8,000 bp in central Apulia (Bon and Boscato 1995; Calattini 1989).

The study of raw material distribution allows for more circumstantial evidence of people and items moving around. As far as the Final Epigravettian is concerned, information is available on sites established next to flint outcrops (i.e., quarry sites). Examples are to be found at Riparo Tagliente, Fosso Mergaoni, and Riparo di San Bartolomeo. Heaps of flaking debris discovered at each locale were made by thousands of pieces of flint: tested nodules, discarded cores, broken flakes and blades, and the like, with a few retouched tools (Boschian 1995; Guerreschi 1984; Istituto Italiano di Preistoria e Protostoria 1985; Silvestrini Lavagnoli 1985–1986; Silvestrini and Pignocchi 1987). Not much, however, is known about the actual circulation of flint once the cores had been roughed out and/or blanks produced.

More detailed studies have been carried out at Mesolithic sites, both in the Alps and in the Apennines.

Research on flint circulation helped establish the seasonal migrations linking settlements in caves at a low altitude, such as those of the basin of Trento, with open-air sites and caves in the eastern Alps. This was well established for the period during which Sauveterrian assemblages were produced (i.e., during the early Holocene). By then, the good-quality flint of the southern Alpine fringes and Trentino was systematically used in the area where it outcrops. It was also carried eastwards to the summer sites of the Dolomites, where the local inaterial is of poor quality and not much used (Broglio 1992a). At Mondeval de Sora, with a Castelnovian industry, the flint seems to have come from the south and from the pre-Alps of the area of Treviso, Via the Piave valley (Alciati *et al.* 1992).

Some of the flint from the eastern Alps and Trentino ended up in the central Alps, as evidenced at the Sauveterrian site of Dosso Gavia, at 2,300 in as1 (Angelucci *et al.* 1992). To reach the eastern sources, probably passing through the Adige Valley, mountain passes at 2,600–2,700m as1 had to be negotiated.

Some pieces of flint were taken froin the pre-Alps to the open-air Mesolithic sites established on the Apennine range that bounds eastern Liguria: a distance of 100 km or more was traveled, but not much raw material went that far or to that many places either, as it is known at three sites only (Biagi *et al.* 1980; Cremaschi 1981; Ghiretti and Guerreschi 1988). The Po River seems to have been a major divide, possibly because of the marshy areas that developed at the bottom of the valley. Most of the flint was brought froin shorter distances to the settlements in this part of the Apennines. The mountain sites were stocked with raw material collected or extracted at both the northern and the southern foothills (i.e., from each side of the main watershed of this mountain range).

During the early Holocene, a distance of some 30 km, as the crow flies, was also traveled to bring good quality flint to the Fucino basin from the nearby plateau of the central Apennines (Lube11 *et al.* 1999; Mussi *et al.* 2000). The flint outcrops, however, are found above 1,500 m asl. It is assumed that people traveled and collected flint supplies mostly during good seasons: in winter, the quarry sites would have been blanketed by snow and difficult to access. The movement from high plateau to lower altitudes was just the reverse of what was described previously in the eastern Alps (i.e., from outcrops at low altitudes toward mountain sites).

Quartz, mainly hyaline quartz, was another rock in demand. Small numbers of quartz implements were found at some twenty sites in the eastern Alps, and mostly in the Dolomites (Broglio and Lunz 1983). This peculiar raw material was part of Sauveterrian and Castelnovian assemblages, and is mentioned at a few Final Epigravettian sites. During the Holocene, it was also used in other Alpine regions (Angelucci *et al.* 1992; Bintz 1992; Crotti and Pignat 1992). In the eastern Alps, the main concentration of quartz is found at sites outside the area where sizeable quartz crystals outcrop. As undamaged pieces were apparently knapped, it has been suggested that there was no inajor natural transport. People would have traveled northwards to collect the crystals. This meant a minimum of 60 km, as the crow flies, in the case of Mondeval de Sora (Alciati *et al.* 1992). The distance traveled was even greater from the outcrops to the sites of the basin of Trento, where a few pieces of quartz eventually ended up, including a beautiful Sauveter rian point of translucent quartz from Riparodi Romagnano.

Quartz was also searched for further south. It is known to outcrop in the northern Apennines and was possibly used at some of the Mesolithic sites discovered nearby (Ghiretti and Guerreschi 1988). A very few fragments, some of which were certainly flaked, have also been discovered at Final Epigravettian and Mesolithic sites of the central Apennines (Lube11 *et al.* 1999; Mussi *et al.* 2000), while more fragments were found associated with Final Epigravettian burials at Gr Continenza (Grifoni Cremonesi *et al.* 1995). They are definitely not of local origin. As the exploitation of this raw material cannot have been of much practical use, motivation other than economic motives must be investigated.

7.4.2. Marine Shell Procurement and Distribution: The Evidence for Specialized Sites

Marine shells were popular ornaments throughout the Upper Paleolithic and the Mesolithic. They are easily spotted and recognized as of distant origin at sites away from the coasts. A number of species were looked for, but some seem to have been either more easily collected or preferred. They include the various *Dentalium* species, and also *Cyclope neritea,* which have a long archaeological record. Notable examples are the hundreds of *Cyclope neritea* from the double child burial at Gr. dei Fanciulli. When first discovered by E. Riviere (1887), the shells were neatly arranged in vertical rows above and below the basin of the inhumed children, as if sewn on a garment (Fig. 7.37). Other species, such as *Columbella rustica,* did not really become popular before the end of the Pleistocene. As it is a mollusk of temperate waters that nowadays is found in the Mediterranean as well as on the coasts of West Africa, this must have been because the global warming created a favorable environment along the Italian coasts.

Specimens of *Columbella rustica* were discovered at earlier sites, such as the Gravettian levels of Gr. La Cala and Gr. Paglicci. Then, they disappear from the record and are found again much later and at the very end of the Pleistocene, starting with sites such as Arma dello Stefanin, Gr. Polesini, and Gr. del Prete—the latter dated just at the turning point between Pleistocene and Holocene (Broglio and Lollini 1982). At most sites, this tiny shell occurs either singly or just as a handful. A notable exception is Gr. Polesini, at which as many as 164 specimens are recorded. This is not really surprising, as numbers and quantities are always huge at this enormous site, and we assume that the marine shells were found widely scattered in the deposit.

At some smaller sites of the Tyrhenian coast, however, namely, Gr. della Madonna, Gr. della Serratura, and Riparo Blanc, the amount of *Columbella rustica* is strikingly higher than anywhere else (see 7.2.2). Hundreds of specimens are recorded at the first two sites, and 1,400 at the third one. Some of them were broken while the perforation was made. The numbers are far in excess of local use and replacement of worn examples—even more so at Riparo Blanc, which is a small rock shelter, unfit for more than seasonal occupation and short stays. At Gr. della Serratura, most of them (i.e., c. 500), half of which were perforated, clustered in levels 5-4 (Martini 1993). As these are coastal sites, there is the distinct possibility that the *Columbella rustica* shells were carefully sought, perforated, and hoarded for some time before they were taken to distant places to be exchanged for other commodities or just given away.

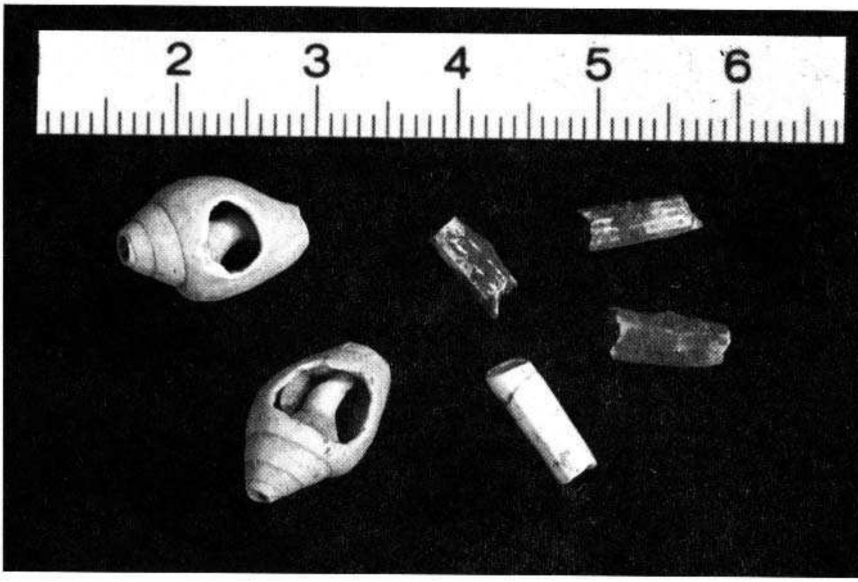

Figure 7.38. Grotta di Pozzo, central Apennine. Exotic materials from the Sauveterrian deposit (scale in cm): perforated *Columbella rustica* shells and tubular fragments of *Dentalium dentalis* (after Mussi *et al.* 2000).

The distances to which they were circulated before been lost or discarded is variable but includes many a mountain setting: for example , Arma dello Stefanin in Liguria, the rock shelters in the basin of Trento during the Holocene (Riparo di Roinagnano, Riparo Vatte di Zambana), and Gr. Maritza, Gr. Continenza, and Gr. di Pozzo in the Fucino basin (Fig. 7.38). At Mesolithic sites, *Columbella rustica* is constantly found when preservation allows for it, as in the many sites of the Karst of Trieste. The same interest for this shell seems to have been shared in the south, as in Sicily at Riparo del Castello and Gr. Corruggi (Bernabo Brea 1949; Zampetti 1984-1987). At Gr.dell'Uzzo, two of the many *Columbella rustica* were even delicately engraved with geometric patterns (Compagnoni 1991). The circulation of the tiny Mediterranean shells also extended beyond the Alps and to modern Switzerland, apparently via the Rhône Valley (Crotti and Pignat 1992).

Worn and rolled pieces of marine shells, oblong or crescent-like in shape, were also actively sought; that is, they were collected on the beaches, regardless of the species of the original shell, which was found to be quite variable (Cornaggia Castiglioni and Girod 1965). Some were also incised with small notches along their edges. At Gr. delle Arene Candide, there is evidence from the distribution of ochre particles that they were attached or sewn onto garments (Cardini 1980) (Fig. 7.36).

At any site, the worn fragments are usually less frequently found than the *Columbella* shells and other marine species. All the same, a few specimens were found from Barma Grande (Balzi Kossi) to Gr. Maritza in the Fucino basin, to Gr. Paglicci and Gr. delle Cipolliane level 1, as well as other Epiromanellian sites in

Apulia (Cornaggia Castiglioni and Girod 1965, Grifoni and Radmilli 1964, Palma di Cesnola 1962, Riviere 1887)—that is, from north to south, and from coasts to mountains A far greater number of worn fragments was discovered at Gr. delle Arene Candide than anywhere else. In seven instances, they were included among the burial goods, both for adults and for children: one or more pieces, next to the head, or feet, or on the body, and, most notably, twenty-eight of them with child VB Of the latter, twenty-two were on the left side of the inhumation and were perhaps a kind of provision, as also occurs in other burials from this cave with other items or raw materials (see 7. 3 .4) Hundreds of fragments, however, are mentioned from this site (Cardini 1946, Taborin 1974). Perhaps they were not solely used for funerary purposes they seem to have been collected in great number, just like *C. rustica* at other coastal sites.

7.4.3. More on Painting, Engraving, and Decorated Pebbles and Comparisons with Franco-Cantabria

Works of art allow us to trace links between distant regions of Italy. A good example is the peculiar hairdressing or hood of male figures from Gr. dell'Addaura in Sicily: this feature is duplicated on a bone engraving from Vado all'Arancio in Tuscany, a site for which there is a C^{14} date of $11{,}330 \pm 50$ bp (R-1333) (Minellono 1985-1986). The red wall painting with siinple geometric patterns at both Riparo di Villabruna and Gr. Romanelli, and in the final Pleistocene, cannot have occurred as a convergent autonomous development, either (see 7.3.3). Pebbles were decorated in many different ways, but the same red dots can be seen on specimens from Gr. della Serratura on the Tyrrhenian coast, and Gr. delle Prazziche on the Adriatic coast (Borzatti von Lowenstern 1965; Martini 1992). A painted "M" pattern was similarly discovered on a pebble at both Gr. delle Arene Candide and Gr. della Madonna, at the two extremities of the Tyrrhenian side of the peninsula (Cardini 1972). A complicated squared and angular pattern with harched stripes appears on engraved bone fragments from Gr. Polesini and Gr. Maritza in Central Italy, and from Riparo Tagliente in the northeast as well (Fig. 7.39). The fragmentary and discontinuous extant evidence points to a once-continuous flow of exchanges and contacts.

A broader network linking Italy with the rest of western Europe can also be suspected. Stylistic ties with both Magdalenian and Azilian and Epipaleolithic art have already been mentioned (see 7.3.3). Specific comparisons have actually been established between Italian engravings and others discovered beyond the Alps (Mussi and Zampetti 1988, 1997; Zampetti 1987; Zampetti and Mussi 1999). At Vado all'Arancio, the gentleinan depicted with a "Sicilian" hood—so to speak—has a profile identical to those of Magdalenian engravings at Gr. de La Marche in France The lion/lioness on a block covering the burial at Riparo Tagliente resembles closely an engraving from Gr. de la Vache; and in both instances the subject itself had already become extinct, or nearly so, with traditional representations possibly replacing the real model. The nesting bird of Gr. Paglicci closely matches a specimen froin Cauna del Belvis in the northern Pyrenean fringes, and so on.

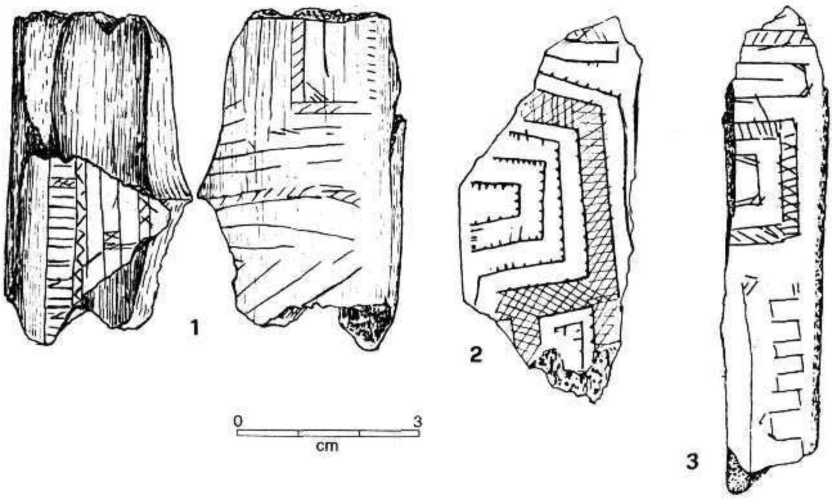

Figure 7.39. Engraved bones. 1:Gr. Maritza; 2:Gr.Polesini; *3:* Riparo Tagliente (sources: Aspes 1984; Grifoni and Radmilli 1964; Radmilli 1974).

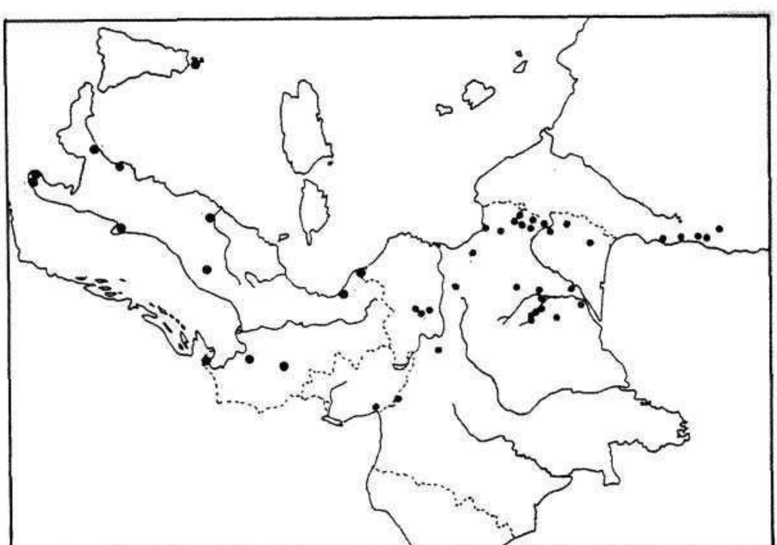

Figure 7.40. Azilian pebbles. The geographical distribution of sites (sources: Couraud 1985; Mussi and Zampetti 1988).

The same holds true for schematic and geometric art. The squared and angular engravings on bones at several sites are also found in France at Gr. du Taï. The "M" motif of Azilian pebbles from Italyis also characteristic at the eponymous site of Mas d'Azil. Other decorative patterns common both to Italy and other regions, such as stripes, "barbed-wire" engravings, fusiform patterns, and so on, could be

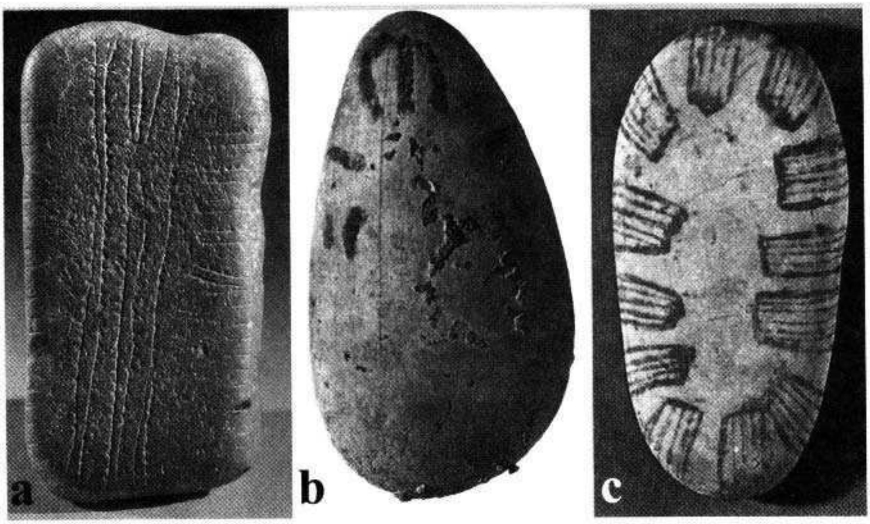

Figure 7.41. Azilian pebbles. Specimens from Italian sites: (a) Gr. della Ferrovia (length: 9.8 cm); (b) Gr. della Madonna (length: 14 cm); (c) Gr. dei Cervi (Levanzo) (length: 9.5 cm) (sources: Graziosi 1973; Lollini and Silvestrini 1990).

mentioned. There is also a continuum in the geographical distribution of sites with engraved or painted pebbles, down to Sicily and Levanzo (Fig. 7.40). The period is also quite similar, spanning dated sites from c. 11,000 at Gr. delle Arene Candide to as late as 9,000 bp at Gr. della Madonna (Fig. 7.41).

7.4.4. The Search for Deep Subterranean Caves and the Organization of the "Sanctuary" of Levanzo Compared to the Franco-Cantabrian Evidence

The search and exploration of deep caves was recognized by A. Leroi-Gourhan (1965) as characteristic of the middle phase of the Magdalenian, during which works of art were also produced in "sanctuaries" at a great distance from the natural entrance (see Clottes and Lewis-Williams 1996 for an update). An apparently gratuitous exploration of deep caves with difficult access was also highlighted during the early Holocene in the Vercors of the western Alps, to the point of suggesting a paleospeleology of a kind (Bintz and Picavet 1992). The remains typically are charcoals and burnt torches, and a few lithic tools.

At Gr. della Básura in Liguria, a small party went through hundreds of meters of a dark cave with difficult access, stamping feet in the floor and leaving many footprints (De Lumley *et al.* 1984; Molleson *et al.* 1972; Rembado and Vicino 1985) (Fig. 7.42). They lit their way with torches of pine wood *(Pinus laricio,* still used today for the same purpose) (Follieri 1958–1961). During their visit(s), they threw pellets of wet clay against the walls and traced marks with their fingers on

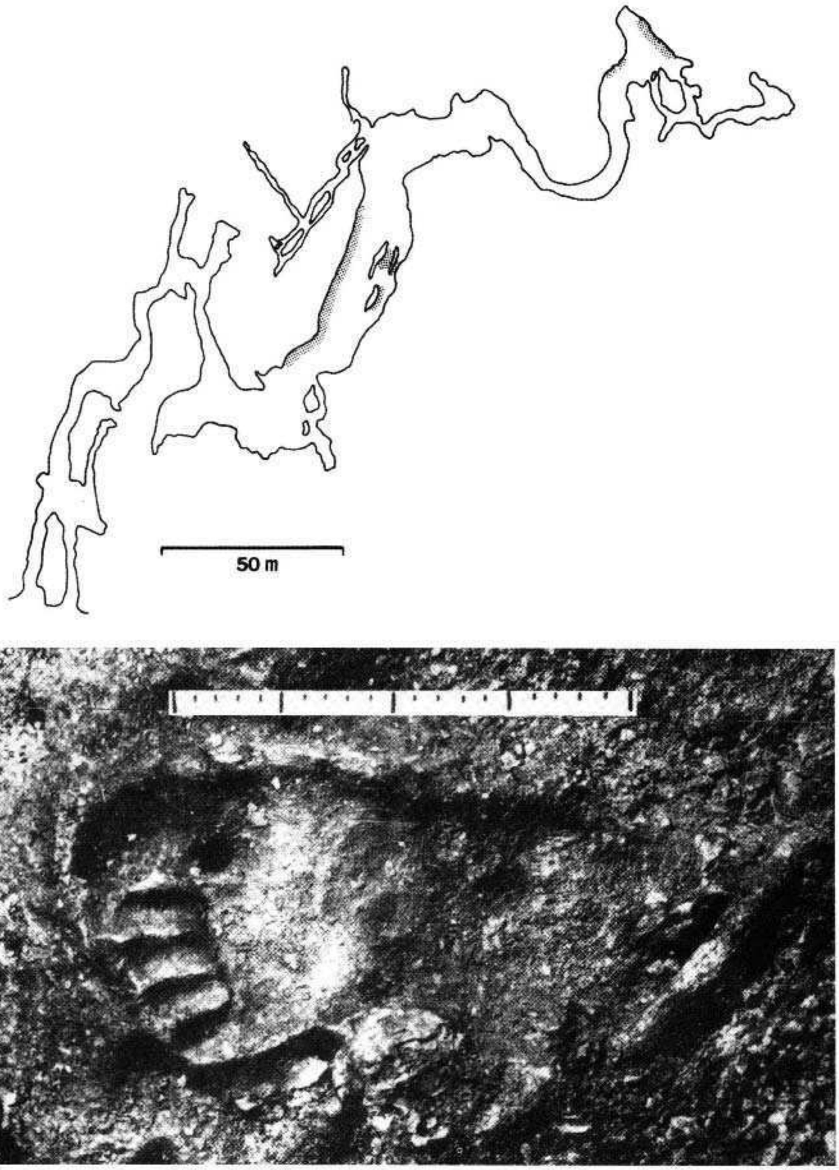

Figure 7.42. Grotta della Básura. Top: plan with the areas in which footprints, fingerprints, and other traces were preserved (dotted). Bottom: a footprint (scale in cm) (after De Lumley and Giacobini 1985).

Figure 7.43. Grotta Niscemi. Aurochs and hydruntine horses engraved on the wall (the largest aurochs is 36 cm long) (after Rovio Marconi 1954-1955).

muddy flats. The charcoals were found to be 12,340 ± 160 years old (GrN-5007), uncalibrated. The stalagmite that concretioned the human footprints was deposited around 13,000–15,000 years ago, based on U-Th and U-Pa determinations, in good accordance—due to the different methods—with the C^{14}. result: in calendar years, the latter date would be some thousand years earlier than the raw determination suggests. When first discovered, after the entrance had been sealed at some point of prehistory and reopened in the 1950s, the footprints were wrongly believed to have been left by Neandertals.

People settled at Gr. di Ernesto, 1,130 m asl in the Alps, in a dark cave that develops over 65 m and was also closed for thousands of years before archaeologists identified an entrance (Awsiuk *et al.* 1991). The floor was made by an accumulation of rock fragments that do not allow for footprints. A hearth was still present on the surface of an inner chamber, where lithic industry and animal bones were also excavated. An innermost cave, 35 m from the modern entrance and at a level 6.5 m lower than the paleosurface on which the hearth stands, was also explored: tiny charcoals and remains of torches were found there. The lithic industry of the settled part of the cave is of Sauveterrian type. Results of several radiocarbon determinations point to the fact that people entered the cave at around 9,000 bp and not later than 8,000 bp.

At Gr. dei Cervi in the islet of Levanzo, once connected to western Sicily, five human and twenty-eight animal figures were engraved on the wall of the enclosed and dark rear cave with difficult access (Graziosi 1962). The animals—aurochs, hydruntine horses, and deer—are rendered in an elegant naturalistic style. The human beings are also in a dynamic posture, as if dancing. In addition to those already described (see 7.3.3), a funny pair of running legs—devoid of any upper body—must be added. The topographic location of the human and animal figures perfectly fits the "sanctuary" model established by A. Leroi-Gourhan in France and Spain: bovids and equids are in the center of the engraved panels, with the other figures at the periphery (Leroi-Gourhan 1972; Zampetti 1987). The only significant difference is that hydruntine horses occupy the position held by common horses in Franco-Cantabria. Hydruntine horses were also associated with aurochs on the walls of Gr. Niscemi near Palermo (Bovio Marconi 1954–1955) (Fig. 7.43). The peculiar faunal assemblage of Sicily accounts for this variation. It is also a fine example of flexibility, and of the capacity of adapting beliefs and traditional symbolism to a local situation.

Everyday activities were not taking place next to the engraved panel and in the dark inner cave. The settled area of Gr. dei Cervi was located at the entrance of the cave and illuminated by sunlight. The complex strategy of food procurement at this site has already been described (see 7.2.7). It was suggested that the engravings of the rear cave could actually be earlier than the occupation of the front cave, which dates back to c. 11,000–10,000 bp on the evidence of C^{14} (Vigliardi 1982). The schematic bovid engraved on a slab and found in this settled area is also stylistically quite different from engravings on the walls of the rear cave (see 7.3.3).

7.5. COMMENTS

7.5.1. Caring for the Living and for the Dead, and Evidence Pertaining to Disabled People

Analyses by physical anthropologists of the relatively numerous human bones allow for glimpses into aspects of human life not available from the study of material culture alone.

Different feeding habits and a different way of life were reflected in the state of dentition. Caries and premortem tooth loss never occur in the rather large sample of Gr. delle Arene Candide dating to the final Pleistocene in northern Italy (Formicola 1986, 1987a, 1987b). At the early Holocene Gr. dell'Uzzo, in Sicily, most of the adults had several caries, and some also suffered from abscesses (Borgognini-Tarli *et al.* 1993). Teeth also decayed during lifetime, and an adult was nearly totally edentate. However, overall good nutritional and health conditions were recognized in this population following the accurate analysis of other lines of evidence, including the entire skeletons. No indicators of major stress were detected in the sample from Arene Candide, either.

Circumstantial evidence of the way of life is given by the variety of traumatic events that left their mark on skeletal remains. This allows us to understand how people reacted when faced with the problem of supporting disabled individuals.

The twenty- to twenty-five-year-old man who was buried at Vado all'Arancio in Tuscany without any notable grave goods had suffered from a serious multiple fracture of the left ankle (Minellono *et al.* 1980). This had happened some years before death, apparently after he had fallen from some height. It can be taken for granted that he was unable to move for a rather long penod and, even after healing, was left lame for the rest of his life. This person was successfully supported by his social group and parents while unable to move, and possibly later on as well, albeit to a lesser extent.

A rather unusual pathology was experienced by another man, also twenty-five years old at death, i.e., specimen 2 of Gr. delle Arene Candide: the lack of the lesser trochanter of both femurs (Formicola *et al.* 1990). The most likely explanation is that the avulsion was the effect of a trauma, possibly a repeated trauma, as this could well have happened at different times for each leg. This individual would have been debilitated for some months, requiring the assistance of other people. In the end, however, he was able to walk more or less normally.

The skull of another man from this site, Arene Candide 19, who was older than thirty-five years at death, exhibits a singular deformation (Formicola and Scarsini 1987)-i.e., it is much longer than normal (Fig. 7.44). While artificial cranial deformation was practiced up to recent times in various parts of the world, several lines of evidence indicate that, here, the growth of the skull was affected by a different cause. In fact, a possible case of rickets has been detected reexamining the remains of another adult male from the same cave (Formicola 1995). This would have been an inherited and rare form of the disease, known as X-linked hypophosphatemic rickets. The observed changes point to a mild form of the disease. V. Formicola argues that the other pathological remains of Gr. delle Arene Candide are best understood by assuming that this was a closely related group, and that familial hypophosphatemic rickets also affected other members. This would account for the deformed skull, as well as the bilateral avulsion of the lesser trochanter not followed by the reattachment of the apophyses.

Other major pathologies of human remains include poliostotic dysplasia at Mondeval de Sora (Alciati *et al.* 1992) which could or could not have had severe and painful effects. A large calculus was found at Gr. dell'Uzzo, which was once in the urinary tract of Uzzo IA and would have made her suffer quite a lot. To complete the list, it should be remembered that the edentate adult of this site had special needs as far as feeding was concerned.

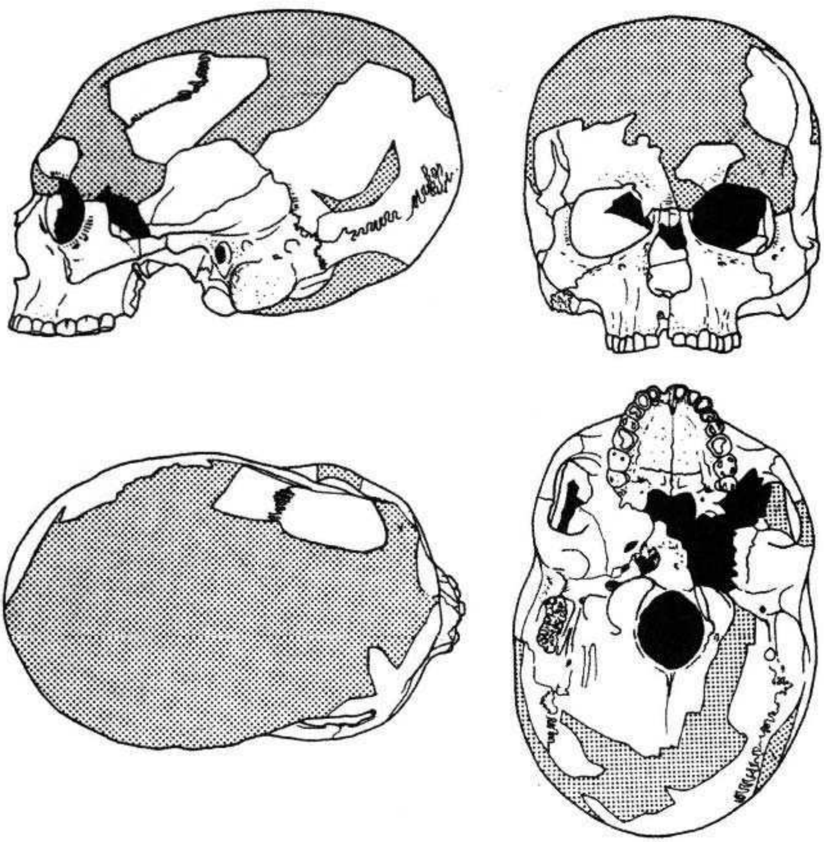

Figure 7.44. Grotta delle Arene Candide. The deformed skull Arene Candide 19 (after Formicola and Scarsini 1987).

The most extraordinary case, however, is that of one of the inhumations at Gr. del Romito, placed in a double grave at the foot of a wall engraved with three aurochs (see 7.3.4): Romito 2 is a male adolescent of probably seventeen years, who suffered from chondrodystrophic dwarfism (Frayer *et al.* 1987, 1988). The boy was 1 m to 1.3 m in height (Fig. 7.45). This is the earliest evidence of this rare congenital disease.

Even more interesting, however, are the behavioral implications. His condition must have become self-evident by the time the child was expected to begin walking and was found unable to do it properly. His difficulties and problems became more accentuated through time. Walking over long distances must always have been difficult or just impossible for him, and even more *so* in the rugged Calabria. He was certainly incapable of hunting any sizable animal. His group had to support him throughout his life: i.e., he was not helped as an able-bodied person temporarily sick or wounded, but as a permanently handicapped one who had never been able to support himself properly. Then, when he died, he was

Figure 7.45. Grotta del Romito. The dwarf adolescent (photo by D. W. Frayer).

awarded the not very frequent distinction of a burial in a cave. The nearby occurrence of an engraved panel perhaps gives further ritual emphasis to the burial. The boy was found in the same grave as a much older woman of tiny proportions (i.e., less than 1.5 m in height). It cannot be said if she was his mother or otherwise related to him, or if a spouse of a somewhat similar size had been sought for him, to the point of accepting such a markedly older woman.

This perhaps unexpected care for the sick and handicapped should not suggest, however, too rosy a picture of life at that time. One of the two children discovered by E. Riviere (1887) in the unique double child burial of level C of Gr. dei Fanciulli—after whom the cave was named *Gr. des Enfants,* or Cave of the Children—was found to have a projectile point suck between the vertebrae (Dastugue and De Lumley 1976) (Fig. 7.37). The child probably ended its short life quite violently.

7.5.2. A Successful and Expanding Population: Coping with a Changing Landscape

The evidence gained from paleopathology and physical anthropology points to an overall fit and, presumably, well-nourished population that was able to support temporarily or permanently handicapped people. The archaeological record gives evidence of a variety of hunting strategies that made use of thriving populations of red deer and increasing numbers of wild boar, while ibex, chamois, aurochs, horses, and hydruntine horses were also frequently caught in the discrete parts of the territory where they lived. Terrestrial snails and, later, limpets, mussels, crabs, and the like were collected on the coasts. Tortoises, turtles, hares, beavers, possibly squirrels, birds, and eggs were actively sought. Fishing was practiced in the sea as in fresh waters. Seals and cetaceans were probably not overlooked on the southern coasts. Honey was collected; likewise hazelnuts, whose shells are mentioned at several sites in northern and central Italy. Fruits and berries are also documented, if more rarely preserved. While the diversification of exploited resources happened through time, in the final millennia of the Pleistocene, and certainly so by 11,000 bp, virtually no site exists in which there is not evidence of more than just herbivore hunting.

The population was also increasing. Admittedly, when trying to highlight changes in demography and territorial distribution, archaeologists can only rely on an evaluation of number, extension, and seasonality of sites. This approach is not very satisfactory. However, it seems less problematic when major changes—as opposed to gradual changes—can be documented. This is the case for the end of the Pleistocene and the early Holocene.

The archaeological remains of the earlier part of the period considered here, from c. 16,000 to 14,000 bp, have often been referred to as "Evolved Epigravettian"—a term that we have discussed and rejected (see 7.1.2). One of our arguments is the fact that through time, the assemblages of some twenty sites have been variously placed in this group or discarded. Whatever the value of the term "Evolved Epigravettian," however, the point is that after the Glacial Maximum, only a few sites are known. The population was certainly quite sparse.

Then, around 14,000 to 13,000 bp, one spots the beginning of an exponential growth in the number of sites. This is best seen from the thorough surveys in northeastern Italy, with hundreds of settlements eventually documented in the early Holocene. The same increase, however, is also evident in the Apennines and all over the coast. The colonization of Sicily can also be viewed from this perspective. It is not a localized phenomenon: we mentioned that the other side of the Adriatic is also repeopled at this time (see 7.2.3), and the western Alps were similarly reoccupied, starting at c. 13,000 bp (Bintz 1992), while human groups were also expanding all over once deserted northern Europe (Housley *et al.* 1997). Even if a marked seasonality and brief duration must be taken into account for sites in the high mountain ranges, we assume that the human population was expanding.

As a matter of fact, all the archaeological, anthropological, and ecological indicators consistently suggest that people were coping with the changing environment, and quite successfully, too. A balanced diet and a satisfactory way of life, however, were not attained without difficulties. A distinctive aspect of the period from 14,000 to, say, 8,000 bp is that the area next to the sea had to be cleared off. Meanwhile, thicker and thicker woods were encroaching upon grasslands, obliging herbivores to search for pasture in new areas. Their predators—including humans—had to adapt.

New niches developed and new resources, admittedly, came into existence, both along the costs and in inner basins. This process was enhanced by the rising temperature, which possibly meant higher productivity of aquatic environments and also allowed for the rapid expansion of terrestrial snail populations. To exploit them effectively, however, practical solutions had to be found for a variety of new tasks, and developments were required in many fields of traditional technology (see 7.3.2). To establish hunting grounds in the newly deglaciated areas, resources and dangers also had to be accurately evaluated. The mountains cannot be exploited without acquiring firsthand knowledge of weather, weather changes, and seasonality—not to mention the need to locate sources suitable raw material, water, shelter, and so on. Exploration is not an easy, risk-free task, and considerable effort is needed before a new area is properly monitored and open to regular settlement.

7.5.3. Causes of Concern, Intensified Ritual Activity, and Exogamy and Spousal Exchange

Higher and higher tides, eventually leading to a new coastline, do not go unnoticed. The same is true for the thicker and thicker tree cover that rapidly modifies vegetation. Changes in the landscape possibly experienced within a human life were certainly retained in memories and traditions. It has been suggested that fires lit on purpose to burn out stretches of woodland and thus expand grazing areas for herbivores possibly account for horizons with large charcoal pieces in many deposits of Holocene date in the Apennines. These do not always include lithic tools or other archaeological material (Biagi *et al.* 1980). Adaptation to a changing environment is stressful even when new and satisfying solutions are eventually found. Even with a full stomach, anxiety can be expected to develop while bison, elk, and giant deer become extinct, and ibex and chamois herds vanish into the mountain ranges, retreating to higher and higher altitudes.

As a social response to tensions and anxiety, intensification in ritual activities can be expected. We suspect this explains the surge in art production and burial practices in the archaeological record.

Figure 7.46. Riparo Tagliente. The engraved bison from level 10 (length: c. 20 cm) (source: Leonardi 1972).

The animals represented in Paleolithic art have long been known to differ significantly in species and frequencies from those people actually encountered or hunted. The Italian record is no exception. But whatever the scope of an engraving, an interest in the selected subject is implied either because people were seeking what it represented or avoiding it. In this perspective, the record from Riparo Tagliente is of interest. Not many of the engraved animals are both recognizable as species and from a secure part of the stratigraphic sequence. Two bison, on a bone and on a cobble, satisfy both conditions (Fig. 7.46). They were found in levels 13a and 10, respectively. The only remains of bison identified with certainty are from level 12. The animal was not often seen and hunted. The lion/lioness on a stone block covering the burial, which is correlated to level 13, was also a rare or even exceptional animal (Fig. 7.47). The progressive disappearance of the two species seems to have been closely monitored by people.

Another possible example of attention to and maybe concern for dwindling animal species is related to *Alces alces.* Elk is an animal of wooded environments that are interrupted by openings and bodies of water. The bottom of the Po Valley, and probably the Great Adriatic Plain, would have been an ideal habitat. It was never a major prey but is known in some number from the lowermost levels of the Epigravettian sequence of Riparo Tagliente (Fig. 7.6). At Riparo Soman, it disappears at the Pleistocene/Holocene boundary. As noted earlier, in Italy, this species became extinct during the early Holocene (see 7.2.1). This was part of a general withdrawal from the middle latitudes of Europe, and while becoming rarer and

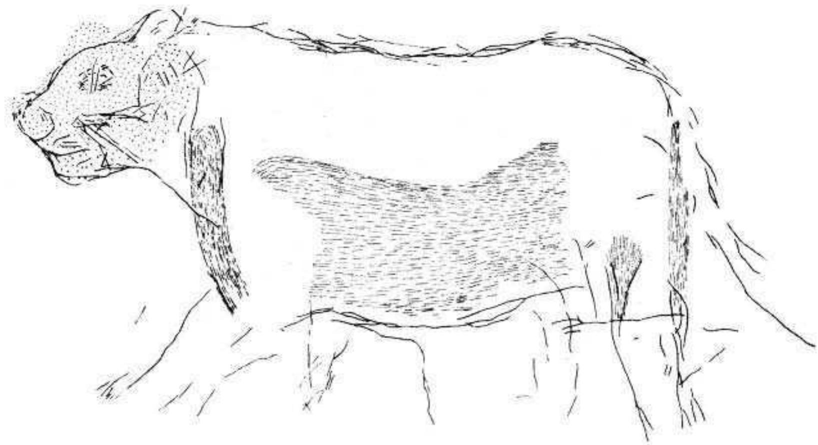

Figure 7.47. Riparo Tagliente. The lion/lioness engraved on a block covering the burial related to level 13 (length: c. 15 cm) (source: Bartolomei *et al.* 1974).

rarer, elk possibly acquired a special value and a symbolic status (Bridault 1992). In northern Europe, selected elk remains are most notably found in graves, even when not present at the main settlement. Interestingly, isolated elk remains are found in Italy in a mortuary context, just when the great deer had disappeared, or nearly *so,* from the general environment. The examples are Gr. delle Arene Candide and Mondeval de Sora. At the Ligurian cave, dated to the final Pleistocene, a fine pair of complete and well preserved elk antlers lying side by side was found in the middle of the main burial area (Cardini 1980). Two more elk antlers, with some ochre staining, were discovered in a marginal area; a human mandible was buried just below (Formicola 1986). At Mondeval de Sora, some millennia later, a man was inhumed who, quite exceptionally, had on the thorax a bone point made out of an elk metacarpal. A second, different bone point, between the knees, seems to have been put in a position symmetrical to the first one, and both are interpreted as probably fastening the burial shroud that wrapped the deceased (Alciati *et al.* 1992).

Traditional hunting and foraging grounds keep changing, while some areas disappear under water or thick trees, and others become increasingly rich in resources. Meanwhile, the diversification of exploited resources requires frequent moves from one area to another. The hunter–gatherers of the late Pleistocene and early Holocene of Italy probably are characterized by a higher mobility than earlier "pure" hunters, if they were to make full use of both mountain and coastal or lacustrine environments—the various niches being known to occur within relatively short distances in many parts of the peninsula. To account for finding deciduous teeth at the Alpine site of Frea IV, it was suggested that complete groups and whole families migrated seasonally (Broglio and Improta 1994–1995).

A human group can be expected to assert and reassert its rights over a territory when challenged by endless changes—even more so if the exploitation of a varied environment and split apart resources is necessary to make a good living. The overall population was also increasing, and it cannot be ruled out that some intergroup competition was present to the point of surges of violence, as evidenced by the killing of a toddler—or maybe two—implied by the double child burial at Gr. dei Fanciulli (see 7.5.1).

The burial of the dead in the homeland is a traditional way of reasserting a group's identity and rights. The legitimate continuity from one generation to the next seems to have been stressed by both the frequent burial of children and the association of children with men, as strikingly demonstrated by the graves of Gr. delle Arene Candide (see 7.3.4). The male–child bond would then refer to the acquisition of rights through descent, which, obviously, could be patrilineal as well as matrilineal given that property and rights are inherited from the mother's brother in a matrilineal society.

Women are definitely different from men as far as children are concerned: on the basis of the symbolism displayed at burial grounds, they seem to be unrelated to their offspring. We assume that descent was traced more through the male line than the female line. The bonds uniting men and women, on the contrary, are stressed in the double burials, in which a couple is found embracing (Gr. del Romito), or just buried in the same grave at once or in succession (Gr. dell'uzzo). The exchange of spouses and asserting alliances established through marriage would account for this aspect of the funerary record (Mussi *et al.* 1989). The small woman buried with the dwarf boy of Gr. del Romito would probably have been sought, and have come from a distant group—provided that she, was indeed his spouse.

The higher demographic density could have allowed for a rather formalized family structure. H. M. Wobst's simulations (1974, 1976) suggest that a regional group must include a minimum of 500 individuals if spousal exchange is to be established and maintained on a regular basis within its boundaries. Problems arise as far as exchanges are concerned when the territory is irregularly shaped and some local bands happen to live in less favored areas than others. Increased social and ritual activity is useful to strengthen social bonds and counteract disaggregation. This is a further reason for performing the vanished ceremonies reflected in the solid record of works of art and graves. A set of ceremonial activities is represented by the "Acrobats" scene of Gr. dell'Addaura. Even if it maybe just illustrates some mythological event, the people who engraved the panel, first of all, had to have direct experience of men and women gathering together for some nonpractical (i.e., ceremonial) purpose.

The density implied by demographic models can be tentatively tested. Sicily is a good example, as it is a self-contained area of some 25,000 km^2. A population of 500 implies a density of 0.02 inhabitants per km^2. This figure seems well within the carrying capacity of the rich environment effectively exploited at Gr. dei Cervi and Gr. dell'Uzzo (see 7.2.7).

Regionalization was described in lithic industry, raw materials, late artistic styles, burial customs, and even hunting practices, if the hydruntine horse/aurochs hunters of Apulia are to be contrasted to the ibex/chamois hunters of the mountains, within a general framework of red deer catching (see 7.2 and 7.3). This access to different foodstuffs is reflected in the healthy dentition of the people buried at Gr. delle Arene Candide, compared to the rotten dentition of the deceased at Gr. dell'Uzzo,who, some millennia later and in a more southern environment, had a frequent—and probably higher—sugar intake (Borgognini-Tarli and Repetto 1985; Borgognini-Tarli *et al.* 1989, 1993) (see 7.5.1).

A contrasting pattern of exchange over long distances within peninsular and insular Italy, and beyond the Alps, is reflected by other aspects of the archaeological record: the majority of the artistic evidence (including naturalistic as well as schematic art, and Azilian pebbles), distinct projectile points, and the circulation of marine shells, flint, and rock crystal. Both the *Columbellae rusticae* and the crescent-shaped shell fragments were collected ih great numbers at special coastal sites. We assume that this was in anticipation of encounters and exchanges with people from inner territories, endowed with different resources.

The strengthening of local links is not to be opposed to the establishment of exchanges with more distant countries. A growing population in a changing environment requires the formalization of rights over territory just at the time when it allows the establishment of a more regular network of spousal exchange. Some kind of boundary and regional identity is the consequence of both. This is in good accordance with the evidence gained directly from the study of human remains: starting with the Lateglacial, physical anthropologists suspect a decreased gene flow among the human populations of Europe (Formicola and Giannecchini 1999). Solidarity is enhanced at the local level, and a variety of tasks can also be performed with the participation of more people (Mussi and Zampetti 1988).

At the same time, however, a safety net of a kind must be established against the vagaries of an ever-challenging environment. In case natural forces become uncontrollable and disruptive, ties and solidarity beyond the local group allow lor access to other territories and resources, and to survival. On the evidence of the archaeological record, both the local and the supraregional poles of interest seem to have been effectively integrated in the social organization of the last hunter-gatherers.

7.6. FINAL REMARKS

7.6.1. Comparison with Previous Interglacials

The record from OIS 1 and from the present interglacial is quite distinct from the previous records (e.g., OIS 5, 015 7, and OIS 9).

The recent coastal evidence is typically a shell midden, which includes fishes, birds, tortoises, and herbivore bones. In the mountains, it is scattered high-altitude seasonal sites surrounding settlements of lower elevation that exploit lacustrine environments. Aquatic birds, tortoises, fishes, small mammals, terrestrial snails, and herbivore bones are to be found, as well as hazelnuts.

In previous interglacials, the typical bounty would have been a cluster of elephants and other herbivores in a humid zone, with both humans and large carnivores competing for access to carcasses. In the mountains, the record is scattered, but people scaled quite high ranges before the last glacial expansion.

The differences are striking, and must be explained. A first point is the severe depletion of animal species: many became extinct during OIS 4 and OIS 2. A landscape peopled by elephants, hippos, and rhinos, with monkeys in the trees, is nowadays more reminiscent of Africa than Europe. The "cold" species that then colonized the peninsula benefiting from the glacial phases did not survive when the climate warmed up again. And, of course, in OIS 1, modern humans are in the picture, and for the first time during an interglacial—at least in Italy.

The extent to which the hunters of the final Pleistocene were innovative when they turned to new resources, and started collecting more, is a subject of debate. As far as marine resources are concerned, the usual objection is that the rising sea level can easily have erased any previous evidence of shellfish exploitation and fishing at sites once close to the coastline and now under water; hence, conclusions cannot be made *ex absentia.*

We are not convinced by this argument, however. If one considers the whole record, from the coasts to the interior, and throughout the ages, it is quite clear that the point is not marine resources as such, but the general use of food occurring in small packages that has to be painfully collected in large quantities to be of any substantial value. Terrestrial snails and hazelnuts, which are not coastal resources, do not appear in the record before 12,000 bp but are then documented time and again. It is not simply a matter of a warming climate and expanding populations. During the Lateglacial Interstadial, snails and nuts do not seem to have been collected, whereas they were prized during the colder Younger Dryas and at the very end of the Pleistocene. Freshwater fishes are another characteristic of the latest sites only, next to lakes and to rivers. We cannot believe that fishes and mollusks were exploited earlier at sea than on the mainland and, furthermore, deposited exactly where the rising sea level would eventually destroy the evidence. Fishing became at once, and in different environments, a way of getting food. To us, sites devoted to fishing and shellfish gathering, supposedly encircling the coasts during the Wurm or earlier and now submerged, are just a fine piece of archaeological mythology. The ability to collect mollusks, snails, nuts, honey, berries, fruits in any quantity (i.e., not in an anecdotal way) and, more generally, to fish, catch birds, trap squirrels and the like in substantial numbers, is a major innovation and achievement only during the closing millennia of the Pleistocene.

Turning to the mountains, when contrasting hundreds of final Epigravettian and Mesolithic sites with some scattered Middle Paleolithic tools, the destruction caused by subsequent glacial expansions must be carefully evaluated. Admittedly, probably more exists in the field than usually reported, simply because the disturbed and scattered material does not seem to be worth full analysis. However, when caves or rock shelters opening higher than 1,000 m asl are excavated, a Middle Paleolithic layer, that could have escaped destruction within the cave, is not found; it also should be stressed that the period involved is much more than ten times as long as the most recent recolonization of mountains, allowing for more than one episode of settlement.

We suspect that shelters are the critical factor in a mountain environment. Caves were systematically settled during the early Würm and before, and the colonization of caves was a major step forward for which the Neandertals and/or other archaic *Homo sapiens* groups must be credited. The first evidence of the capacity to build shelters in the open, however, is provided during the Upper Paleolithic by modern humans, namely, in Italy, possibly in association with Aurignacian industries. The multitude of seasonal sites established in the open and above 1,000 m asl during early OIS 1 must be related to a dramatic increase in mechanical skills and to a sophisticated technology, even if tents and other mobile shelters rarely left any trace. People were able to erect shelters more or less at will and to settle in the most suitable spots without being limited by the absence of a cave in the vicinity. The Neandertals, by contrast, could only seek refuge in natural caves, which did not occur everywhere. This impinged upon their capacity to explore and expand into distant ranges, and limited their access to the hunting and foraging grounds at altitude.

In our interpretation, the different record of OIS 1 is related to a much more complex technological background than that in previous interglacials. A number of fishing, collecting, and trapping devices were developed to make use of the resources that became available nest to coasts, lagoons, and lakes—apparently, mostly after 12,000 to 11,000 bp, a time when the sea level had already risen markedly, while deglaciation was well under way and inner basins were available for settlement. The development of mobile shelters and, probably, pirogues and the like allowed access to various and distant environments whose resources complemented each other. The many constituents of tools, such as pieces of wood, reefs, skins, pigments, glue, and the like, were also collected and cured in advance of the anticipated needs. A network of exchanges was established to obtain commodities available at distant places. The planning capacity, embedded in the social organization, allowed for the systematic use of food resources that were previously only occasionally sought. This amply balanced the depletion of large herbivore species and actually allowed a marked demographic increase.

The reason that the modern humans, and not the more archaic ones of previous interglacials, turned to new resources is debatable. We suspect that the disappearance of large pachyderms and other species accounts for only part of the difference: a much more complex and effective technological background was also needed to make effective use of the bounties of the present interglacial. We do not know if it was all started just by need and as an alternative to starvation—after all, some large mammal species were just thriving. Certainly, the populations of Italy remained well fed and became more numerous. The enlargement of the subsistence base was a major shift from previous traditions—and a very successful one.

7.6.2. Epilogue

The Neolithic has been occasionally mentioned throughout this chapter. Indeed, before 7,000 bp (uncalibrated), and while hunter–gatherers were still busy establishing the last series of seasonal campsites in the Alps, well-organized farmers had already started encroaching upon Apulia. They established a fully settled way of life all over the region as village communities with an economy based on cereals and domesticated animals (cattle, sheep, goats, pigs). An early example is Rendina, whose external enclosing ditch started to be refilled at 7,110 ± 140 bp (Lj-4548) (Cipolloni Sampò 1977–1982). Even if less extensively documented, in Sicily, too, and in the central Tyrrhenian area, the new way of life started early.

In Apulia, the arrival of new groups from the east and from beyond the Adriatic Sea probably accounts for the sudden surge of farming and settled life, which does not seem to be rooted in the local Mesolithic (Cassano 1985). The diffusion to other parts of the territory was not a straightforward process, and a stable frontier zone seems to have been established with the hunter–gatherer populations just north of this area. It was calculated that 800 calendar years separate the first establishment of the Neolithic in Apulia and its appearance on the central Adriatic coast, after which it spread rapidly northwards (Skeates 1994b).

The new food and new objects brought in by the farmers were probably attractive to the hunter–gatherers, who have been documented as being flexible, innovative, and prone to experimentation. One can figure several scenarios in which game, furs, honey, and the like, were traded for cereals, pots, or perhaps even live sheep or goats—not to mention the possibility that hunter–gatherers helped themselves without giving anything in return when favorable circumstances arose. Potsherds actually occur at cave sites within a rather "traditional" hunter–gatherer context. However, the establishment of farming neighbors definitely ended in loss of territory and in a subtle transformation of the landscape, including fauna and flora (Whitehouse 1971). It has been well documented throughout the world that hunter–gatherers who were unwilling to change their traditional ways of life sooner or later always had to retreat in the face of differently organized farming groups. Symbiotic arrangements, however, could also have developed between farmers and some or most hunter–gatherers, which eventually led to the latter adopting farming. We assume that most of the later inhabitants of Italy were the descendants of people who once had a Castelnovian, Epiromanellian, Sauveterrian, and so on, lithic industry.

By c. 6,500 bp, and by 7,500 years ago or more in a calibrated chronology, it was all over. The last recognizable hunter–gatherers had disappeared. The way of life that had shaped the physical and behavioral characteristics of our species was no longer to be found, at least in Italy.

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