DOUBLE MAP SUPPLEMENT: WHERE COLUMBUS FOUND THE NEW WORLD

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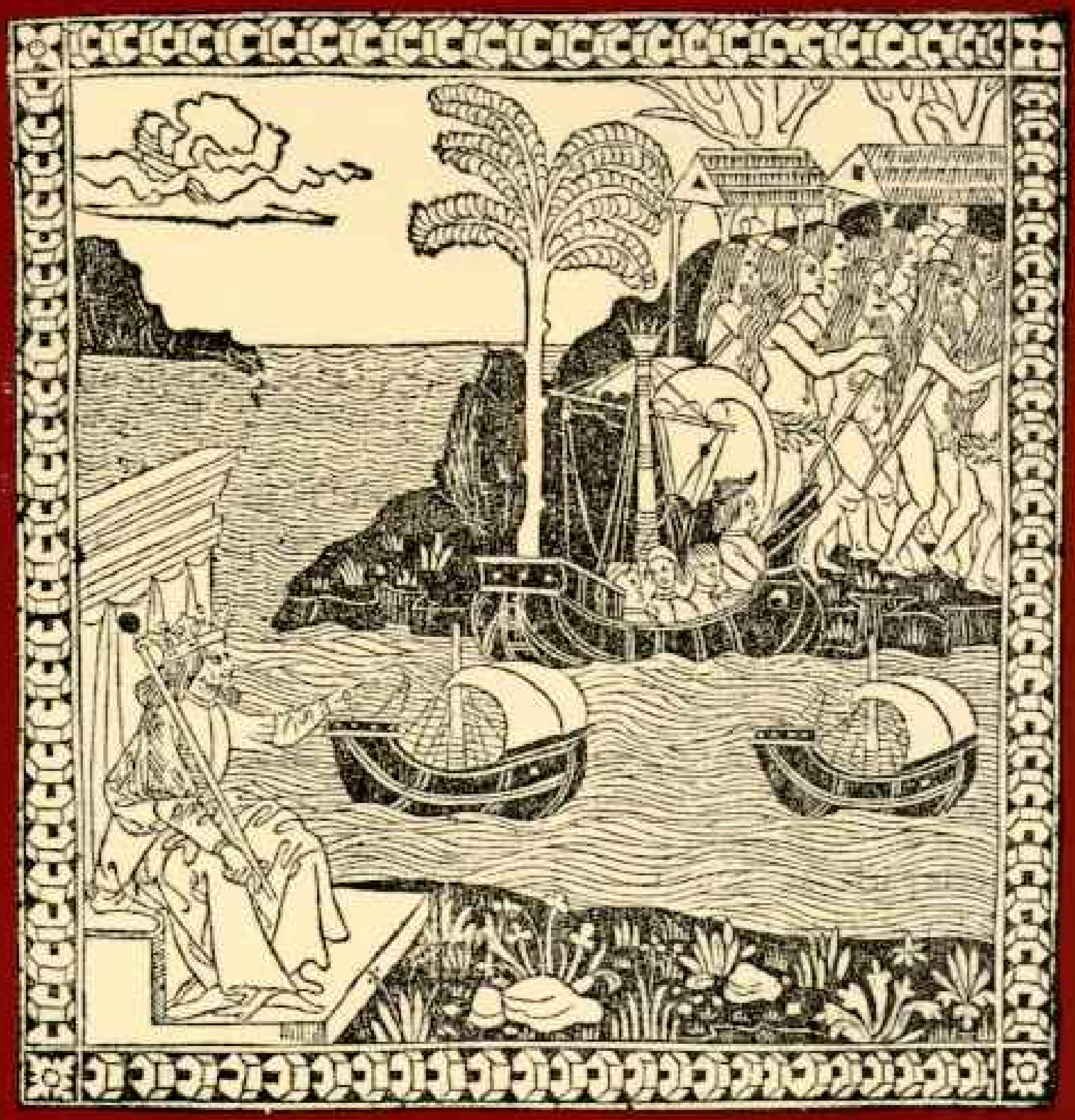

A 1493 ITALIAN WOODCUT SHOWS COLUMBUS REACHING THE NEW WORLD

Our Search for the True Columbus Landfall

By JOSEPH JUDGE
SENIOR ASSOCIATE EDITOR

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centuries earlier. He also cites a request that the king of England order his ships to stop plundering those settlements. Heyerdahl hopes to prove in a forthcoming study that Columbus was aware of the Greenland letters.

According to the Spanish historian Antonio de Herrera, while in Portugal Columbus likely met Martin Behaim, who in 1492 produced his magnificent globe (**right**)—the oldest existing on earth today. The globe, now in the German National Museum in Nürnberg, brought together the best geographic information of the time, with one notable exception: Behaim used Ptolemy's circumference for the earth, which was a quarter too small, leaving—as with Toscanelli's chart—no room for the yet undiscovered Western Hemisphere.

Columbus set sail from the Canaries for Asia with confidence in his sources. After sailing for 33 days and approximately 3,000 miles, he understandably assumed he had reached his goal. On October 24, 1492, he wrote in his log "on the globes which I saw, and in the paintings of *mappamundis*, it [Japan] is in this vicinity."

By superimposing Columbus's track on the Behaim globe, we find that by the 33rd day he would have reached Cipangu had the chart only been correct. It's easy to see how he might think he had missed it and had reached one of the nameless islands of the Sea of the Indies. He thus named the people he met Indians, and quickly sailed on in search of Cathay (China).

It seems Columbus was obsessed with sailing west for one reason—he would become wealthy and powerful by finding a shorter route to the riches of Asia. And national loyalty was of no concern. Before gaining the support of King Ferdinand and Queen Isabella, the Genoese sailor sought patronage for his ideas in Portugal, England, and France. His discoveries did not bring great wealth and power. He died powerless and relatively poor—the very conditions he sought to avoid by sailing west.

On May 20, 1506, with a priest in attendance and a small group of friends and relatives at his bedside, his son Ferdinand reports that Columbus repeated the words attributed to Christ on the Cross—"Unto your hands, Father, I commend my soul"—and died.

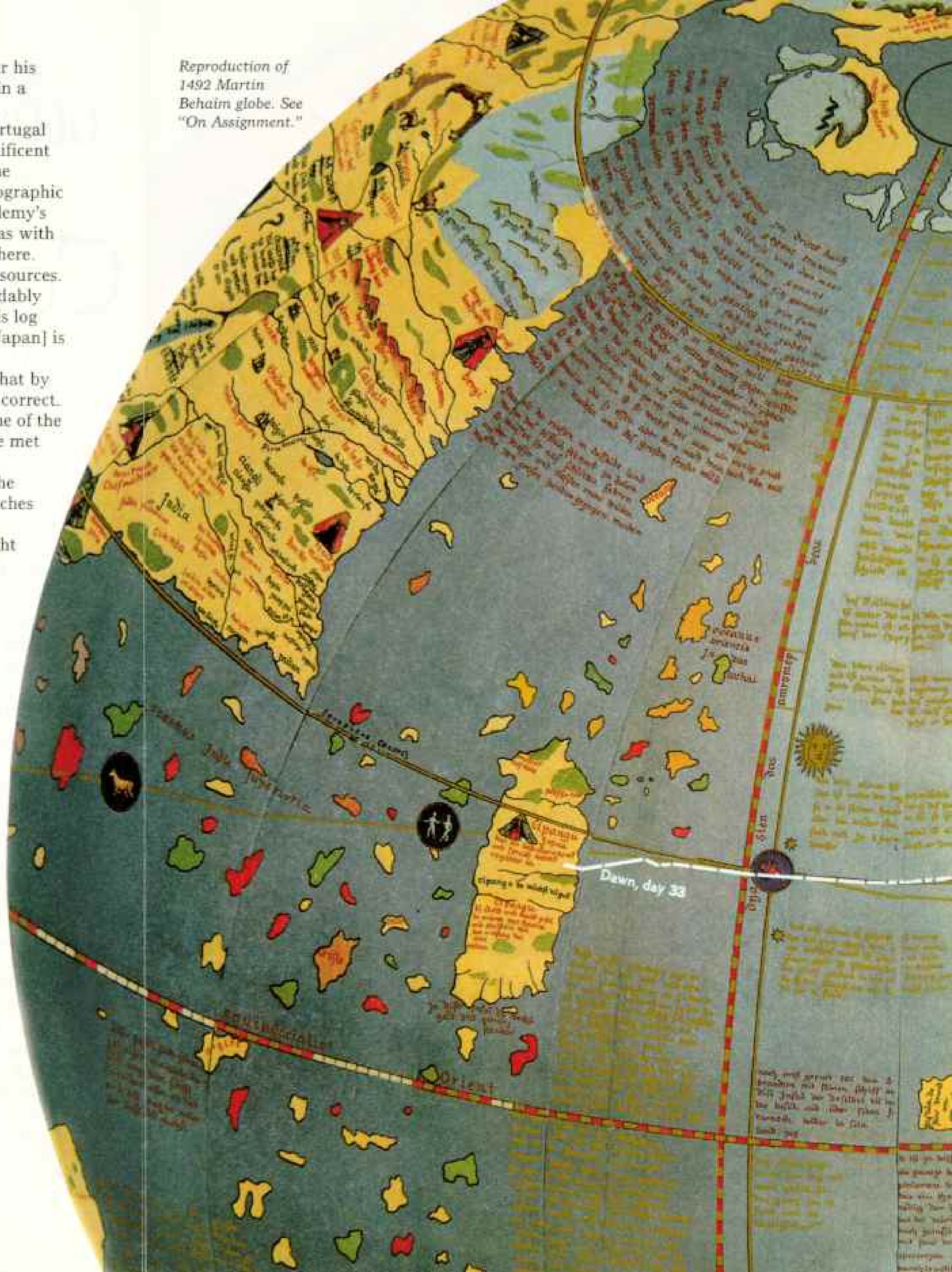
Whether he was the first European to reach the Western Hemisphere is fuel for debate, but except to set the record straight, it doesn't really matter. It was Columbus who brought Europe to the New World, with all the consequences that resulted. As a magnifying glass collects sunbeams and focuses them into a white-hot heat, Columbus had collected the best geographic and cartographic knowledge of his time, and with his four voyages he immediately focused the attention of all Europe on the West, leading countless men to find the fame and fortune that eluded him.

His expeditions had discovered yams, beans, maize, tobacco, and possibly syphilis. He wrote of the beauties of the land and the rivers. The massive outpouring of the Orinoco River along the Venezuela coast convinced Columbus he had also discovered "a very great continent, which until today has been unknown."

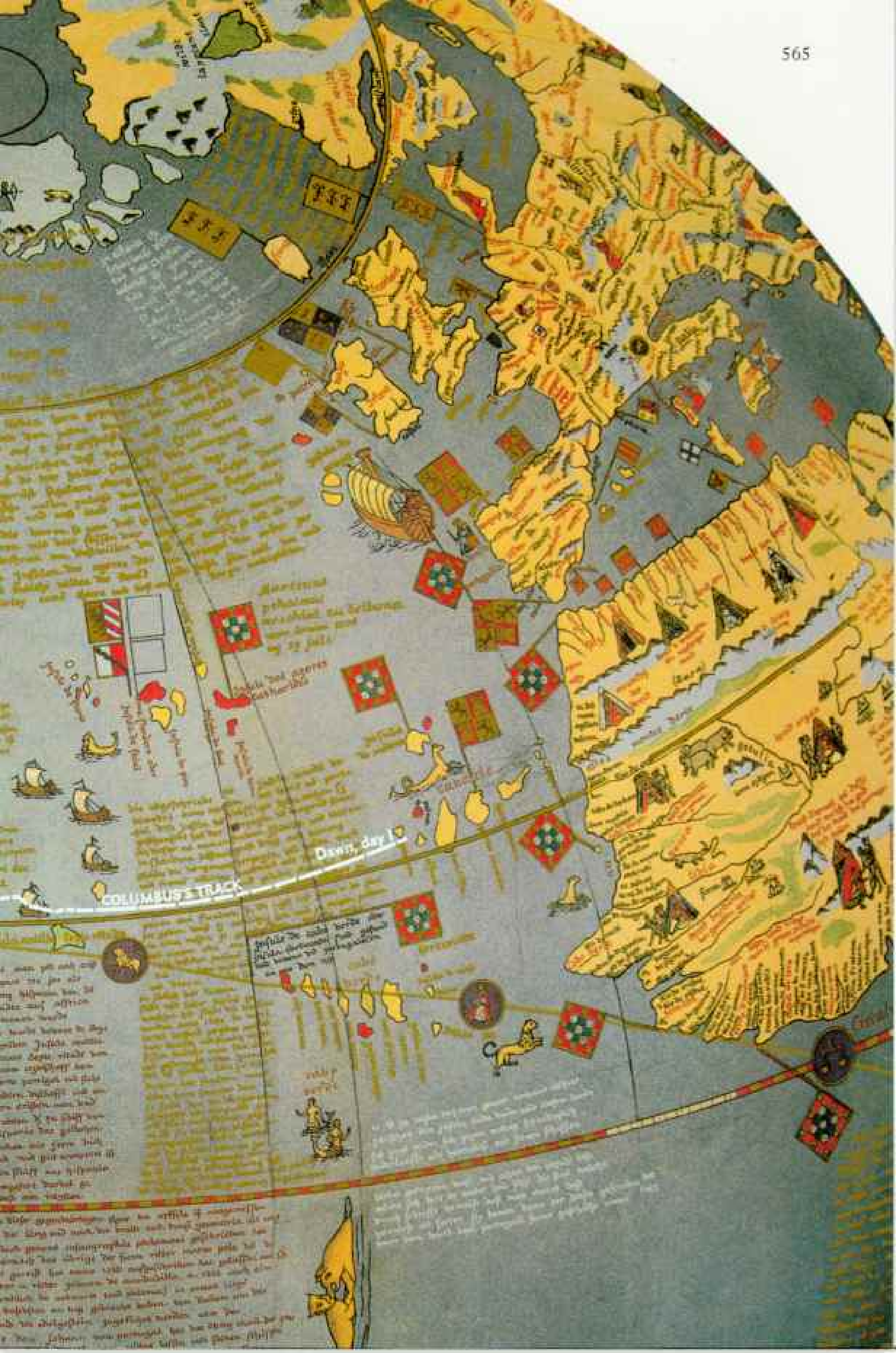
But the greatest irony of all—Columbus died dogmatically claiming he had reached Asia. And to the chagrin of historians, no record survives of where he first set foot in the New World. Senior Associate Editor Joseph Judge believes he knows, and will tell us why in the following pages.

Wilbur E. Garrett

EDITOR



Reproduction of 1492 Martin Behaim globe. See "On Assignment."


Dawn, day 1
COLUMBUS'S TRACK

Where Columbus

By JOSEPH JUDGE
SENIOR ASSOCIATE EDITOR

Photographs by JAMES L. STANFIELD
NATIONAL GEOGRAPHIC PHOTOGRAPHER

At ten at night the Admiral,
being in the sterncastle, saw light . . .
like a small wax candle . . .
the Admiral was certain
they were near the land.

—THE COLUMBUS LOG

Found the New World

Was that famous light a figment of imagination or the glow of torchwood as Lucayan Indians, like modern Bahamians, fished by night?

Or the shine of moonlight on white cliff and sand beach?

And what land was this?

ACKLINS ISLANDERS, *on a seasonal visit to uninhabited Samana Cay in the eastern Bahamas, crab by torchwood light at a point probably seen by the Columbus fleet on October 12, 1492.*

Christopher Columbus first came to the Samana Cay, a small outrider to the sea lying in at latitude 23° 05′ north, longitude 73° 45′ sentence. During those years, a company of

historian, navigator, archaeologist, marine captain, artist, programmer, and cartographer—constructed a reasoned chain of evidence that leads only to Samana Cay.

In that time the team's members together and individually: produced a new translation of the Columbus *diario,* or summary of his log; drew the first transatlantic track based on the log and adjusted for leeway and current; digitized the geography of the Bahamas and used a computer to resail suggested routes electronically; sailed by boat several times to remote Samana and found there evidence of aboriginal occupation and geographic details described by Columbus; found Indian settlements in each place the log specified along the subsequent route to Cuba; and matched the log of Columbus to the modern geography of the Bahamas.

We believe we have solved, after five centuries, one of the grandest of all geographic mysteries and vindicated two 19th-century investigators who came to the same conclusion.

The Columbus landfall is, after all, the place where worlds met with momentous consequences, igniting one of human destiny's most profound changes. It is not to be wondered that the mystery of its location has occupied historians, geographers, and seamen since the end of the 18th century.

What does seem surpassing strange is that the site of this historic event, despite the best efforts of many scholars, has never been known with certainty.

The Spanish flotilla of *Niña, Pinta,* and *Santa María* was there for only two and a half days, and the original record of the visit, the Columbus log, has not been seen since it was dispatched to Queen Isabella on the Admiral's return to Spain. At least one copy was made, but we do not have that either.

What we have is largely a paraphrase of either the original or of a copy by the priest-historian Bartolomé de las Casas, who was 18 in 1492 and whose famed *History of the Indies* opens with the voyage of 1492.

Fortunately the central and critical section of the diario is written in the first person, in the "formal words of the Admiral." It is assumed that Las Casas copied this part word for word, a view supported by the biography of Columbus written by his son Ferdinand, which reproduced parts of the same document.

A 15TH-CENTURY SHIP LIKE SANTA MARÍA ILLUSTRATES A 1493 PRINTING OF COLUMBUS'S LETTER ON HIS DISCOVERY

This portion begins on October 12, 1492, shortly after the landing on the island Columbus named San Salvador, and ends on October 25 as the fleet is running toward Cuba.

It is a difficult document to interpret because of its antique nautical terms, frequent ambiguity, and occasional clear error. And down the years no one was certain of Columbus's units of distance. Las Casas counts four miles to a league, but what do his "miles" mean in modern terms? Arguments have been advanced for a Columbian league from 2.67 nautical miles to 3.18. (The Dunlap-Marden league of 2.82 miles, as discussed on pages 576-7, proved itself in our work.) Finally, there is the nagging thought that Las Casas sometimes confused miles and leagues.

Nevertheless, the diario is packed with information. The Atlantic entries present headings and estimates of distance made

New World at reef-girt, low, and leafy haunting isolation in the far eastern Bahamas, west. It has taken me five years to write that varied talents and kindred interests —

good for each day of the passage. Once arrived in the New World, the busy Admiral managed to keep a running account, sometimes repetitious, of where he thought he was and what was happening.

Anyone who follows the Columbus route through those distant islands soon appreciates his impressive accuracy in estimating distance and his eye for a good anchorage. It is a world of sea and sky and of vibrant colors of sea and sky—the emerald greens of the shallow, sand-bottomed seas and Prussian blues where the ocean falls off to depth. Islands conjured by dawn light loom and recede on approach, scent the salt air with perfume, luring ships toward coral heads rippling brown in gin-clear waters.

Keeping his head while entering such an enchanting, dangerous environment, which no European had ever seen, was a major achievement of the Admiral.

When I first took up the log, I did not begin, as some have done, by selecting an island and starting from it. I first drew out the track on a blank piece of paper "blind" —without reference to modern geography.

The fleet called at five locations in the Bahamas. On October 14 it sailed 20 nautical miles from San Salvador to an island Columbus named Santa María de la Concepción, which had a 14-mile north-south coast and a 28-mile east-west coast; the ships followed it to an anchorage at the western cape. From there, they crossed a gulf of some 25 miles, due west, to a very large island the Admiral named Fernandina; its coast ran northwest-southeast for almost 60 miles. After exploring to the northwest and being turned back by a change of wind, the fleet crossed back on a southeast heading to a fourth island, christened Isabela. After several days it departed Isabela on a west-southwest heading for the Sand Islands, 65 miles away, and thence south to Cuba.

Along this route they encountered Indian settlements and met Indians on each island.

Simple. Draw out this track, mark the villages, lay it over a modern map of the Bahamas and move it around until the parts fit. But, in the past, the variables of interpretation and navigation have played hob with all such attempts.

Indeed, over the years no fewer than nine landfall islands have been suggested, defended, and opposed—Cat, Watling, Conception, Samana Cay, Plana Cays, Mayaguana, East Caicos, Grand Turk, and Egg in the northwestern Bahamas.

The Samana man was Capt. Gustavus V. Fox, who had been Abraham Lincoln's assistant secretary of the Navy and who concluded in 1882 that Columbus's track through the islands could start nowhere else without quickly running afoul of either the statements of the log or the reality of reefs.

Twelve years later cartographer Jacques W. Redway came to the same conclusion, published in the GEOGRAPHIC in 1894.

Fox's view did not take its rightful place as a part of our heritage because a critic, Lt. J. B. Murdock, later an admiral, insisted on incorrect grounds that Fox must be wrong. One meets many admirals—Morison, Murdock, Becher, McElroy—on the Columbus track, as though only one admiral could understand another. In the event, Adm. Samuel Eliot Morison pronounced Murdock's critique "devastating . . . unanswerable."

Morison, the most noted modern biographer of Columbus, all but extinguished the discussion in 1942, when he declared "there is no longer any doubt. . . . I consider the question settled once for all" in favor of Watling Island, which had been renamed San Salvador in 1926 and which lies 65 miles northwest of Samana Cay.

In Morison's view Watling "alone of any island in the Bahamas . . . fits Columbus's description." Further, a track run back from Cuba ends there "and nowhere else."

"Quite large . . . flat . . . green . . . [with] many waters," *Samana Cay fits the description of the island that welcomed Niña, Pinta, and Santa María to what would become known as the New World. The ships anchored where a reef opens on the southwest side. In rowboats, Columbus explored the island he named San Salvador and remarked on geographic features and a large anchorage between the*

reef and the island (dashed track of exploration, **above***) and then departed.*

The identification of San Salvador has been a hotly debated question for two centuries. Using computers to follow the Columbus voyage from the Canaries to Cuba, a NATIONAL GEOGRAPHIC *field party later went to Samana Cay, discovered Lucayan settlements, and identified features like those described in the log.*

For orthodox scholarship, such an opinion from the world's greatest living Columbus expert was ex cathedra. Furthermore, Morison had sailed the Bahamas route in *Mary Otis* in 1940 and identified to his satisfaction the locales of the log. The question was closed, and it remained so for 40 years.

But Morison was wrong on three counts: The question would not go away; the track he sailed and proposed will not bear scrutiny; and the landfall was not Watling.

Of that, I had no doubt. Other dissenters, such as Edwin and Marion Link and Pieter Verhoog and Robert Fuson and Robert Power and Arne Molander, found great fault with the Watling route—but I found their alternatives flawed in other ways.

There is something to be said for Sherlock Holmes's dictum that "when you have eliminated the impossible, whatever remains, *however improbable*, must be the truth."

When, in 1980, the Society for the History of Discoveries took a bold step and reopened the landfall question with a reading of Verhoog's 1954 paper recommending East Caicos, and papers followed advocating Grand Turk and other islands, I knew that at last "the game is afoot." It was time to sic the hounds after Sherlock's grand improbable.

My thought was to sic the computer. The log is filled with quantifiable data—bearings and distances influenced by wind and current and sailing speed. A computer could run the variables out thousands of times.

Our first need was for a new partial translation of the diario. NATIONAL GEOGRAPHIC commissioned an expert in old Spanish documents, Dr. Eugene Lyon, to provide a literal, line-by-line translation from photocopies of the Las Casas manuscript. It was the first in English in many years, it was superb, and it became our bible.

Then I turned to another old friend and colleague, Luis Marden, who had twice sailed the southern route across the Atlantic in his ketch, *Bounty*, with his wife, Ethel, a first-class mathematician. They agreed to tackle the task of rendering the transatlantic log in terms of day-by-day actual position.

The Mardens quickly made two astonishing, and crucial, discoveries. The story of how their corrected daily plots lead to Samana Cay begins in the next column.

(Continued on page 578)

The First Landfall of Columbus

By LUIS MARDEN

FORMER CHIEF, FOREIGN EDITORIAL STAFF

CHRISTOPHER COLUMBUS's discovery of America has been called "perhaps the most important event recorded in secular history." When the Genoese navigator sighted an island gleaming in the moonlight in the early morning hours of October 12, 1492, mankind stood on the threshold of the modern world.

Columbus named his island San Salvador, "in commemoration of His Heavenly Majesty, who marvellously has given all this." The discoverer noted that the "Indians" (his word) called it Guanahani.

But, precisely which island was it?

Most delvers into the identity of San Salvador postulate the first landing place from Columbus's subsequent courses through the islands. Few have traced his transatlantic course, although a transcript of his log has been available since the early 19th century.

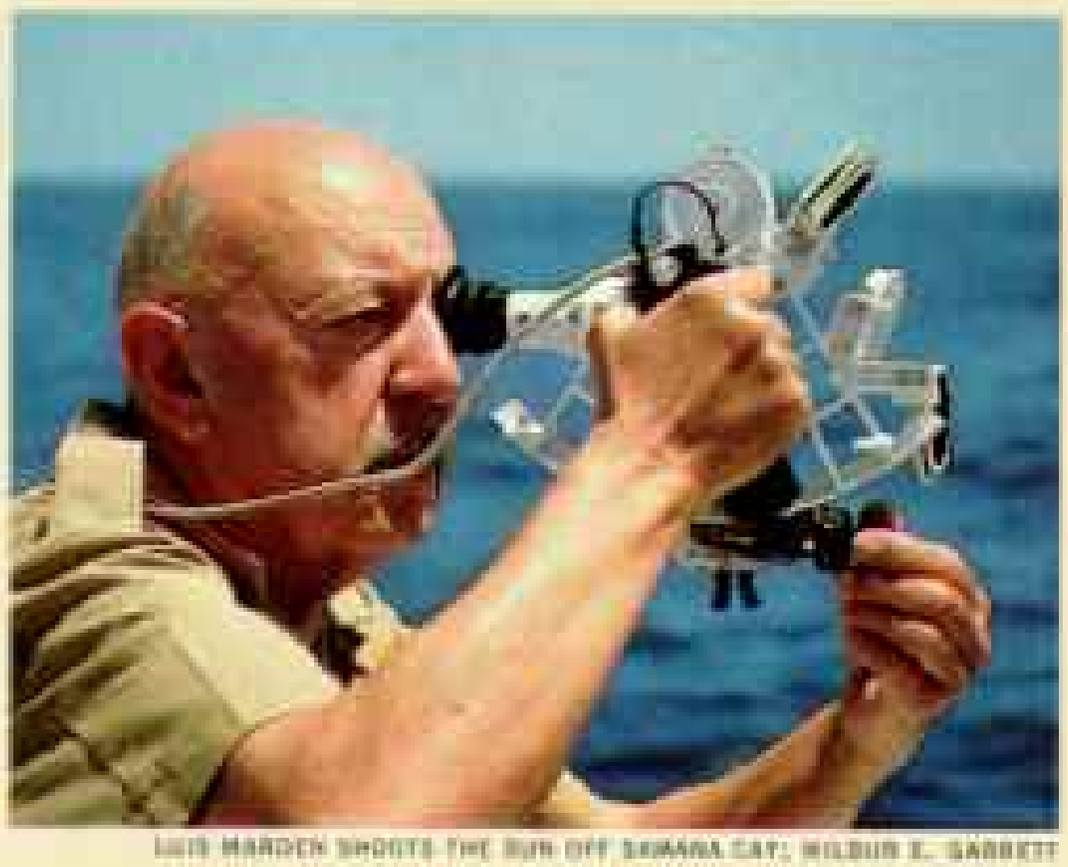
The fullest attempt to retrace the crossing is the excellent study by Lieutenant (later Rear Admiral) John W. McElroy, USNR, published in 1941. This closely reasoned paper and accompanying chart make a persuasive case for Watling Island, if one overlooks what to me is a startling omission.

McElroy's description of his method says, "no allowance whatsoever is being made in this paper for changes in course due to leeway or set of current. But the Journal indicates that strong breezes from a quarter which might have created noticeable leeway were conspicuously absent during his westbound passage; whilst modern pilot charts for the months of September and October indicate that the current encountered in the waters traversed by the fleet is *negligible* [italics added]. Thus leeway and set may be practically disregarded. . . ."

With respect, I find this an astonishing statement. A glance at the modern pilot charts will show that currents of 0.4, 0.5, and even 0.6 of a knot flow throughout Columbus's track. A current of half a knot

means a displacement of anything floating in it of 12 nautical miles in 24 hours, and these currents must be taken cumulatively into account for *33 days*. The current's set, or direction, varies along *Santa María's* track, but its strongest influence is to the southwest.

Leeway is the sideways slip, or slow skid downwind, of a sailing vessel as she moves through the water, owing to the pressure of the wind on her hull and top-hamper. The effect is greatest when the wind is abeam—at right angles to the path of the vessel—and least when the wind is ahead or on the stern. Through most of the crossing Columbus's flagship, *Santa María*, carried the wind on or near the starboard quarter; that is,



LOIS MARDEN SHOOTS THE SUN OFF BAHAMA CAY; WILBUR E. GARRETT

coming over the helmsman's right shoulder.

The amount of leeway varies not only with the direction and strength of the wind but also with the size and shape of the hull. No one knows with certainty what were the shapes and dimensions of Columbus's flotilla of two caravels and a *nao*, a ship-rigged vessel, but we do know that they were full bowed, round bottomed, and of relatively shallow draft. Such hulls are much subject to leeway, skating sideways with a beam wind like an oversize walnut shell.

Alan Pape, the eminent British naval architect, is of opinion that Columbus's ships, sailing westward in the northeast trades, must have made about 1.5 degrees of leeway.

As Bowditch *(The American Practical Navigator)* states: "Leeway is . . . applied by adding its effect to that of current and other elements introducing *geographical error* [italics added] in the dead reckoning."

From all this I reason that it is fruitless to try to retrace Columbus across the ocean if one does not take both current and leeway into the reckoning, in order to establish the true track across the bottom and, eventually, the true landfall at the end of the passage. Amazingly, no one seems to have done this in all the years of argument.

In my endeavor to rerun the courses of the Admiral of the Ocean Sea, I began as McElroy did, by plotting Columbus's daily runs as given in his log, with no allowance for current or leeway. Columbus recorded the distance he ran each 24 hours in leagues. I first used the widely accepted length of the Spanish sea league, 3.18 nautical miles.

Columbus had no way of measuring his speed through the water. He judged it as many yachtsmen still do, by eye, gauging the rush of seas along the sides of the ship. At the end of the preliminary no-current exercise it appeared to me, as it had to McElroy, that Columbus had overestimated his speed and consequently the distance run in each 24 hours. His errors thus were cumulative throughout the length of his passage.

This no-current track, plotted on a modern chart exactly following Columbus's daily runs and using a league of 3.18 miles, ran impossibly far to the west, west of present-day Miami. Obviously this would not do, so I backtracked on the course line to a point that would have given him the first sight of any land, in this case east of Watling, measured the surplus distance, and found it to be 10.5 percent of the total distance plotted from the Canaries.

McElroy found the excess to be 9 percent, but he measured the total distance by a different method. He used Mercator sailing; that is, he took the latitude and longitude of the departure from the Canary Islands and the latitude and longitude of arrival at Watling Island and found by calculation the distance between them when sailing a *straight line* on a Mercator chart. We know that Columbus's course, though close to, was not always, a straight line, so McElroy added one percent for deviation from a straight course—not much. Adding this gave him a result 9 percent greater than the shortest Mercator distance. The difference brought him to the landfall off Watling.

Capt. G. V. Fox, writing on the same problem in 1882, used the same method,

viii.

fu. leguas: vuelta de S.te 44. leguas no
nabo fr. Aqui la gente ya no lo podia
sufrir: quexandose del largo viage: y el
almyr. los esforcaua lo mejor q podia dandoles
buena esperanca. Los prohesos q podian
aver f. y ansi dia q perdemos en que ver
q. ansi lo auian de proseguir hasta hallar
lo por el agujda de nro Señor.

Martes .11. de octubre

El Navego al gsudueste vuelto nuestra
nao q. vieron de vnos q. venian de
vuelta de Guinea. vieron pardelas y vn lumbre
fuera de la nao. vieron tres o. 4. carabelas pin
ta vna cerca y vn palo: y tomaron
palillo labrado alto q. parecia auer hierro
y vn pedaco de caña: y ansi yerba q. nace
en tierra: y vna tablilla. Con esta carave
la ansi tablen vieron otras semejables de
esta y vn palillo rozado de estas mismas: q
estas señales respiraron y alegraronse todos.
Andouieron en este dia hasta puesto de sol
27. leguas.

El despues de sol puesto navego ansi primer
rumbo al gueste: andarian hasta
media noche y hasta las onze despues de media
noche andarian .9. millas q. son 22. leguas
y vieron. y porque la carabela pinta
yua velera q. y yua delante de almyrante
hallo tierra y hizo las señas q. al almyr. avia
mandado. esta tierra vido primero vn marine
ro q. se dezia Rodrigo de triana: puesto q.
el almyr. alcanca no la vian estando cin
quenta millas dende q. fue de noche
hasta q. vino el dia q. llegaron a ella q. fue
toda. q. pero dalonso q. pero gutierrez repostero

hallan ya tierra

saying "this table is worked out by 'Mercator Sailing'. . . which is not so accurate as 'plotting' each day on the chart, but is near enough for practical purposes. . . ."

"Near enough" for the tracing of the most momentous voyage in mankind's history? I think not. Daily plotting for 33 days is tedious, but it is the fundamental step.

We have Columbus's actual courses and distances as he recorded them. Why not simply plot daily the number of miles in the direction he recorded, see where they take you, then backtrack along your course to first landfall? This distance is then your percentage of overrun. That is how I obtained a figure of 10.5 percent excess mileage, and when I subtracted it from each day's run, I too came out within sight of Watling.

The fact that this method, laying down Columbus's logged courses and distances in total disregard of currents and leeway, brings one to Watling proves conclusively, to me, that it cannot possibly be the discoverer's San Salvador. Because to reach it, the Admiral would have had to travel a nearly straight line, *as traced on the seabed*, between departure and landfall. Steering by compass alone, with no astronomical or other checks, this is a physical impossibility, unless the ocean froze solid and railway tracks were laid on its surface.

Columbus *thought* he was sailing due west, where lay Cipangu (Japan), but to trace a true east-west track, he would have had to know the geographic position of his destination. More important, he would have had to know the position of his own ship daily, or at least at frequent intervals, to make corrections in his course.

Christopher Columbus carried a quadrant, a graduated quarter segment of a circle from which hung a line and plumb bob, which theoretically should have enabled him to obtain a rough approximation of his latitude. But he never used it in the crossing, and when he tried it ashore later, his result was greatly in error—though this does not detract from the fact that he is, by the common consent of history, the greatest dead-reckoning navigator that ever lived. And there was not in 1492, nor would there be for nearly 250 years, any accurate method of determining longitude at sea.

He did not know it, but Columbus was sailing along the southern half of the North Atlantic Gyre, the great slow clockwise swirl of winds and currents that begins for the westbound mariner with the northeast trades off Madeira, sweeps in a southwesterly arc to the Bahamas, then flows north and northeast with the Gulf Stream and out to sea at Cape Hatteras, past the Azores, and

And because the caravel
Pinta *was swifter and went*
ahead of the Admiral
it found land and made
the signals. . . .
At two hours after midnight,
the land appeared,
from which they were two leagues.
They . . . lay to waiting until day.
Friday they arrived at a small
isle of the Lucayans which was
called, in the Indians' language,
Guanahani. Then they saw naked
people, and the Admiral went
ashore in the small armed boat. . . .

CASA DE COLÓN

A 15th-century compass *preserved in the Canary Islands swings in gimbals and displays a Virgin and Child. Marginal note on Las Casas' log (***facing page***) reads, "Now they find land."*

back to the Iberian Peninsula. To me his most impressive feat of seamanship was finding his way home again along the northern arc of that unknown, uncharted gyre.

In the physiography of the earth, 1492 is yesterday. Currents and winds cannot have changed, on the average, very much in that instant of geologic time. Today we have the magnificent pilot charts of the world's oceans, first conceived and compiled by the Pathfinder of the Seas, Comdr. Matthew Fontaine Maury, USN. These have been published for nearly 150 years and give currents and probable winds for each month, based on a mass of accumulated data. In two east-to-west crossings under sail from the Canaries in approximately the same waters traversed by Columbus, I found conditions very close to those predicted.

Columbus set out on his thrust into the unknown from Gomera in the Canary Islands on 6 September 1492 (Old Style). He records that he lay becalmed for more than two days before a breeze from the northeast sprang up at three a.m. on Sunday, 9 September.

Here McElroy does the seamanly thing and takes current into account, saying, "Between the two islands, the fleet would have experienced the usual 0.2 knots set in the trend of the channel (NW by N to SE by S), and drifted about 8 miles to S and E." He therefore takes as his departure the position 28° 00′ N latitude and 17° 00′ W longitude.

But, after the departure, does one suddenly turn off the currents—and leeway—for the 3,000 miles ahead? Currents beyond the departure point, as I have said, range from 0.4 to 0.6 of a knot, two or three times the strength in the channel.

Let us then, at three o'clock in the morning of 9 September 1492, set off to retrace man's most momentous voyage *como Dios manda*—as God ordains—and in a sailorlike manner take into scrupulous account heading, magnetic variation, distance run, currents, and leeway.

For the probable magnetic variation in 1492 I have followed Van Bemmelen's reconstruction of the isogonic lines for 1500.

I worked from the original Spanish of the transcript of Columbus's journal by Dominican bishop Bartolomé de las Casas. I began by plotting graphically the courses across the Atlantic as Columbus recorded them, without current or leeway, on individual universal plotting sheets, one for each day of the passage. This gave latitude and longitude at the end of each day's run, which, in Columbus's reckoning, was from sunrise to sunrise. For subsequent "crossings" Ethel Marden and I used two navigational computers, the Tamaya NC-77 and NC-88.

We plotted effects of current by taking the current's direction and strength from pilot charts for each leg. At the end of the passage we came out—as expected—some 60 miles south of Watling and found—again as expected—that because of the current's push, there was an overrun in Columbus's reckoning. The plotted track ran too far west, past or across islands to the longitude of central Cuba. Backtracking along the plotted course to first sight of any land, we recomputed each day's run, less the percentage of overrun, and ended up some ten miles northeast of Samana Cay.

Let me stress again the importance of this event, the first sight of land, for our reconstruction of the passage. The only certain quantity we have for the crossing—other than Columbus's departure point—is that in the early morning of October 12, 1492, Columbus sighted an island.

It is therefore entirely legitimate—indeed, it is mandatory—to make a retracing come out with a first sight of land at that time on that day by either moving backward or forward along the course line dictated by the log and current.

When I had completed the original computing and plotting, I sent the results to Dale Dunlap of Annapolis, Maryland, for vetting. Mr. Dunlap, a navigation authority, was co-author of the navigation text used by midshipmen at the U. S. Naval Academy. In general he confirmed the results, but in the course of research he discovered an electrifying piece of information that sent me back to the computers.

In his collection of old texts on navigation, Mr. Dunlap has a copy of a book originally published in 1594. It is by Master Thomas Blundeville, who states: "you haue to note that every Spanish league containeth 2857 fathams' and that our English league containeth no more but 2500 fathams . . . and every fatham containeth 6 foote." There in plain Elizabethan English is the answer to

that vexed question, how long was an Iberian sea league? A little arithmetic gives the answer: 2.82 nautical miles.

Mr. Dunlap's discovery moved me to search through my own navigation library. I found the same definition in William Bourne's *A Regiment for the Sea*, an English navigation manual published in 1574, 20 years earlier than Blundeville, only 68 years after the death of Columbus.

Bourne gives the same figure for the Portuguese league. He says: "Whereby you may knowe iustly howe many leagues and partes of a league the ship goeth in an houre .&c. For an Englishe league doth containe .2500. fadome. And a spanish or portingale league doth contain .2857. fadomes .&c."

Thus we have on record, in practical sailor's manuals of the period, the actual length of the Iberian sea league, and have no need to rely on conjecture.

The recomputed course, using a league of 2.82 nautical miles and incorporating current and leeway, because of the push of the current again came out too far west. Measuring the overrun back to the first possible landfall, I found an excess of 9 percent. Recalculating the daily distances less this percentage, we come to a position some ten miles east-northeast of Samana Cay.

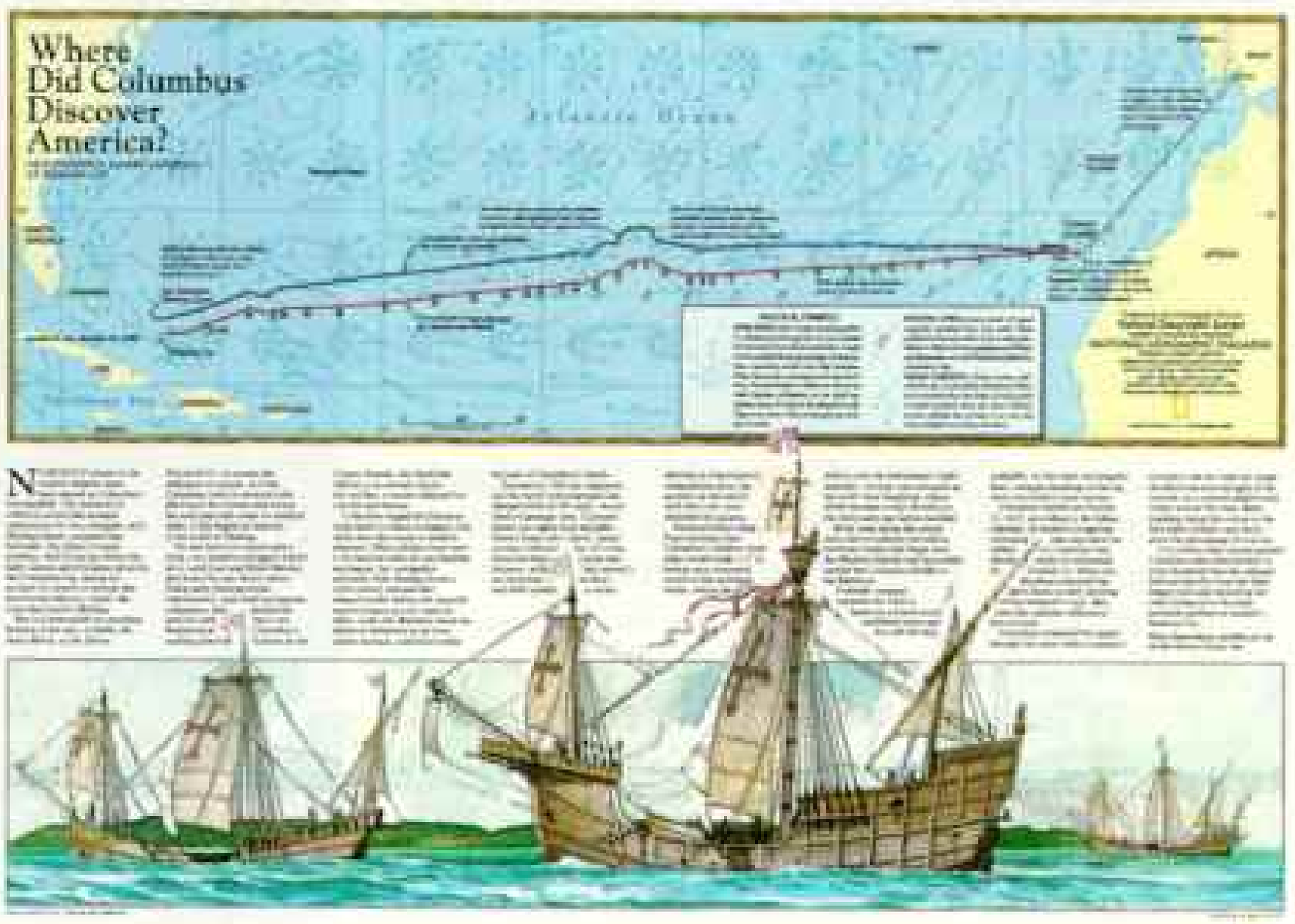
Marc Auslander, a research scientist with IBM, recomputed my figures using a more powerful computer, into which he had entered the total winds of all the wind roses along the transatlantic track, giving an even closer evaluation of possible leeway, and took my figures to more decimal places. This fine-tuning gave us a final fix of 23° 09′ 00″ N latitude and 73° 29′ 13″ W longitude.

We cannot say that we have established with absolute certainty the precise point of Columbus's landfall. Currents may vary, and there are still unknown factors. But unless some new data (such as the finding of the original Columbus log in his own hand) were to emerge, we can say, in the present-day navigator's parlance, that latitude 23° 09′ 00″ N and longitude 73° 29′ 13″ W is "the most probable position" of Christopher Columbus's first landfall in the New World.

It remains now for a sailing vessel to take a departure from the Canaries in September and to steer Columbus's courses *by compass alone*, due west where he went due west and elsewhere where he deviated, and see where it ends up.

In Spain timber has already been cut and is seasoning to build replicas of *Santa María*, *Niña*, and *Pinta*. In 1992, on the quincentennial of the discovery, they will set sail for the New World. Let them steer by compass and the Admiral's log alone, and they too may unfurl the green-crossed banner of the Most Catholic Monarchs on the soil of Columbus's true San Salvador. □

Recharting the discoverer's epic voyage



Sail with Columbus to first landfall on the special supplement in this issue

In 1984 a major computer firm, Control Data Corporation, joined the Columbus team in the figure of Vice President Robert Lillestrand, an Arctic-navigation expert who became intrigued with the Columbus mystery. He assigned Carla Ryti and Scott Devitt to create the Columbus Research Tool (CRT)—an interactive program marrying a Control Data Cyber 170/865 computer with a color display in which the geography of the Bahamas had been digitized, and in which it was possible to sail courses electronically and instantaneously from any point to any point. An early run-through using the CRT quickly discounted tracks from Grand Turk as not consonant with the Columbus log.

So—how does one go about discovering where Columbus discovered the New World? And how can you prove it once you have found it?

Long ago Morison proposed three commonsense tests. First, the transatlantic track ends there. Second, a track drawn backward from an undisputed point in Cuba ends there. Third, the island must fit the description in the log.

To these I add a fourth—a modern sailor must be able to sail from San Salvador to Cuba using only the Columbus log. Passages from island to island must be as he describes in terms of distance, nature and trending of coasts, Indian occupation, sailing times, and performance within the ships' capacity.

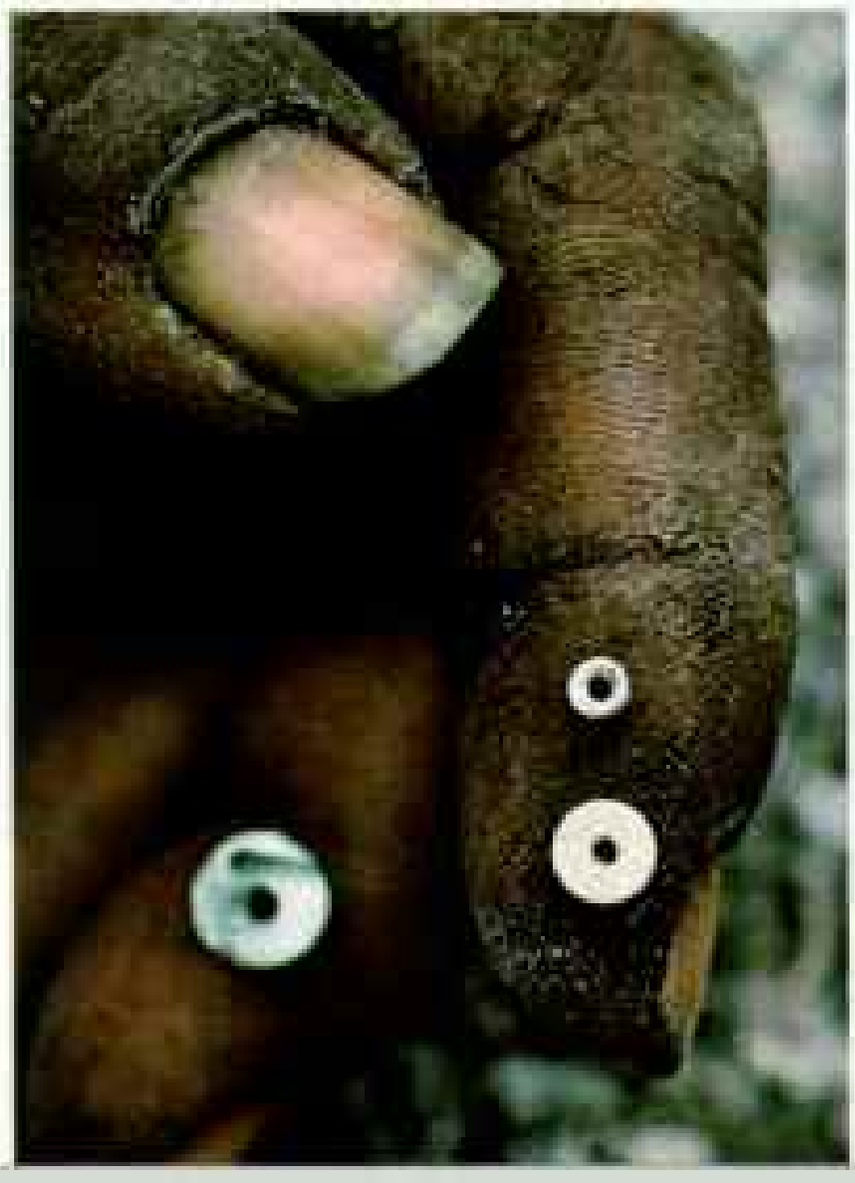
We quickly concluded that the Cuba test was not and could not be a true one because of a gap of nearly 40 hours in the log's navigational information as the fleet is approaching Cuba. The backward track from Cuba can be made to go anywhere.

There is, however, a place from which it is possible to run backward with bearings and distance estimates all the way to San Salvador. It is the one place on the way to Cuba where two bearings cross. My colleague, artist and seaman Jan Adkins, and I began thinking of it as the "Cape Verde fix," since the estimated position is about 20 nautical miles southeast of Cape Verde, the southwestern point of Columbus's Fernandina, and west-southwest from the northern point of the island he named Isabela.

We assumed that this position, and the whole track, would lie somewhere in the

An unchanged life-style *stretches over 500 years of Samana Cay history. Acklins islanders visit Samana to collect conch meat and cascarilla bark, used to flavor Campari. They fish the reef, as the Lucayan Indians did, grow Indian corn* ***(above)****, and collect rainwater.*

*The author (**right,** at left), archaeologist Nancy Watford Hoffman, and NATIONAL GEOGRAPHIC associate art director Jan Adkins examine sherds of Palmetto ware (**left**), evidence of Lucayan presence. The team located several sites where they predicted they would be, based on the Columbus log.*



Clues to Lucayan history on Samana

LONG DISMISSED *as uninhabited, Samana Cay is not described in any major survey of Bahamian archaeology but yielded a surprising amount and variety of Lucayan pottery from nine different sites. Two of the locations were excavated by the Hoffmans with the help of Acklins islanders* (**above**). *Smoke helps keep insects at bay.*

National Geographic, November 1986

KEITH PHILPOTT (ABOVE)

*Palmetto ware in relative abundance and shell beads (**left**) turned up, but no Spanish artifacts were excavated. "It would be truly miraculous if any were found," says archaeologist Charles Hoffman. The party did pick up a large piece of olive-jar pottery from a vessel used to carry water, olive oil, or olives in ships of the early Spanish period. While Columbus mentions his sailors trading "broken pieces of bowls" on Guanahani, as Indians called the island, Hoffman warns: "We can speculate but can't prove where the sherd came from or when."*

*Among the pottery uncovered was a piece strongly resembling Carrier ware (**bottom right**) that is identified with Hispaniola—modern Haiti and the Dominican Republic—and is dated to the period of the Spanish conquest. The Samana piece is marked with a design remarkably similar to that of a ceramic bottle cap in the form of a bird (**top**) found by archaeologist Kathleen Deagan in Haiti at the possible site of Navidad, the first Spanish settlement in the New World, founded by Columbus on Christmas Day, 1492.*

central Bahamas, since three later pieces of evidence all point that way:

• In 1500 Vicente Yáñez Pinzón had led a fleet of four caravels, possibly including *Pinta*, on a voyage of exploration that passed "Isabela which they call Xumeto"—the Columbus island, and clearly in the central Bahamas.

• Juan Ponce de León, on his way to discover Florida in 1513, had actually stopped at Guanahaní, Columbus's San Salvador; his track leaves no doubt that it is in the central Bahamas.

• Finally, Alonso de Chaves's sailing guide of about 1530 locates Guanahaní in the same region.

Running 65 miles back from a longitude east of the Ragged Island Range, we located our Cape Verde fix southeast of Long Island and west of Fortune Island (map, page 596).

By Christmas of 1985 all the lines of evidence were converging on remote, desolate Samana Cay. The Marden track fetched up ten miles east-northeast of Samana. The CRT track back from the Cape Verde fix hit Samana on its southern shore.

We began to assemble the scant information on the island and found it had an evil reputation. Cruising guides warned ships away because of a dangerous encircling reef studded with broken hulls and masts. In a south wind a ship could be pinned down there for days, perhaps forever.

On San Salvador Columbus met Indians and saw settlements, but Samana is described today as uninhabited—and only one major survey of Bahamian archaeology even mentions the place.

Could this difficult place *really* be San Salvador? There was one way to find out.

Jan and I set out from Nassau on the morning of January 8 on the motor vessel *Zemi*, named for figurines that represent ancient Lucayan spirits, and captained by a handsome, strapping Bahamian of great reputation, Craig Miller. I told him that our research indicated an anchorage on the southwest side of the island, where in all probability the Columbus fleet had anchored. He smiled and said, "If it's there, I'll put you dead on it."

We had hoped to run the 200 miles straight to Samana, but that night, as we turned east through the Exuma Cays into the open sea, the roof fell in. Winds screamed up to 45 knots and more, and *Zemi* was hitting the bottom of huge wave troughs as though she had fallen off a building. In a pale, stormy dawn we limped into harbor at Clarence Town on Long Island, and Jan smiled wanly and said: "I think the admirals are not fond of what we are doing."

We made a second attempt at Samana starting at midnight and once more had to run for shelter, finding it at Atwood Harbour on the northeast end of Acklins Island. At dawn on the 12th the wind finally quieted and veered.

"Northwest," Craig said. "We go."

And finally, about ten that morning,

The feet of a zemi, *a Lucayan-carved figurine thought to have been a small idol, were found on Samana by Charles Hoffman (**left**). They match those of another (**right**), displayed 30 years ago in Nassau but now missing. Seven other zemis—all four to six inches in height—have been found in the Bahamas and the Turks and Caicos. The four-foot cedar canoe paddle, found in a cave in 1912 (**facing page**), is the only known Bahamian survivor of the type Columbus described as resembling a baker's peel, a long-handled paddle for removing bread from an oven.*

JAMES L. STANFIELD (ABOVE), JULIAN GARBERRY (RIGHT), AND STEVEN ZEBIE, COURTESY MUSEUM OF THE AMERICAN INDIAN, NEW YORK (FACING PAGE)

Samana rose from a gray sea eight miles ahead, first a blaze of white from cliffs fronting south, then a brilliant chalk mark of white from linear beaches. And, thank Thee, a horizontal rainbow floating in the scudding gray clouds overhead.

The island seemed to withdraw and flatten out as we approached. It was, as Columbus said, very low lying. Beyond a tiny cay that divided the southern shore into bays, asterisks of coconut palms floated over gentle ridges with large trees that moved in the wind. It was, as he said, very green.

Craig was better than his word. He put *Zemi* not into the Columbus anchorage, where the surrounding reef opens wide and welcomes a boat to deep water near shore, but into the large western bay—threading through coral heads, a superlative bit of seamanship.

We were surprised to find three men on the beach, Acklins islanders who had come to Samana in a small boat to fish for conch and strip cascarilla bark, with which the aperitif Campari is flavored. The shelters and huts used by these seasonal visitors, some roofed with Dacron sails from shipwrecks, were scattered along the ridge that looked south. And it was there, along a path under the towering palms, that we found lying on the surface dozens of sherds of Palmetto ware, the pottery made by Lucayan Indians 500 and more years ago. They had been there ever since, eroded out by storms, buried by others, on an island no one wanted—never specifically claimed or granted, or commercially cultivated in all the centuries since Columbus left it.

Many more discoveries would follow, but that is the moment I will remember, when Jan, still stooping, opened his hand to reveal the first potsherd and said, "Hey, Joe . . . is this what you're looking for?"

That night we threw out fishing lines where we believed *Santa María* once rode at anchor, for we were at the junction between the Marden transatlantic track and the CRT track back from the Cape Verde fix, and we looked out at an island that matched in every detail the Columbus log. We now had to apply the final test and run the track out toward Cuba, comparing the log, the Watling track, and the Samana track. But for this moment we sat in the dark, watching the fiery citadels of stars burning on shores beyond our ken.

The first island: San Salvador

On Thursday, October 11, that night of all nights of American discovery, the little flotilla was running west through big, rolling seas breaking white in the bright moonlight. They were 33 days out of sight of land—some 40 men and boys in the ship *Santa María*, 26 in the caravel *Pinta* under Martín Alonso Pinzón, 24 in the caravel *Niña* under Vicente Yáñez Pinzón—and they were filled with anticipation, for signs of land had been increasing.

At 10 o'clock that night, Columbus had claimed to have seen a light far ahead, a "dim thing" that has burned ever since in the heat of controversy.

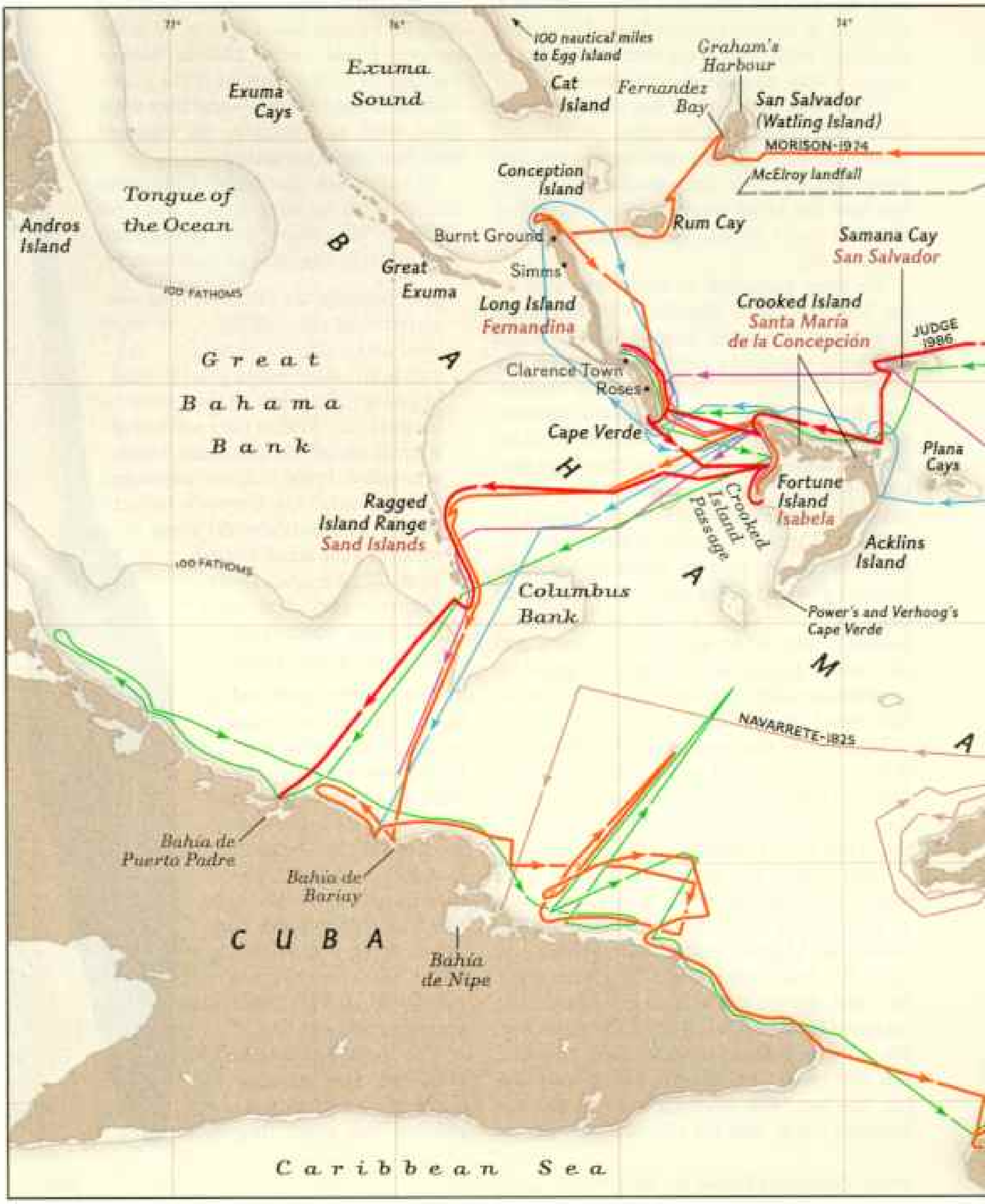
> "And because the caravel *Pinta* was swifter and went ahead . . . it found land and made the signals. . . . At two hours after midnight, the land appeared, from which they were two leagues. . . . Friday they arrived at a small isle of the Lucayans which was called, in the Indians' language, Guanahaní. Then they saw naked people, and the Admiral went ashore in the small armed boat. . . . Set upon shore, they saw very green trees and many waters and fruits of various kinds."

The people gathered at the beach were all young, under 30, including a girl, Columbus noted. They were a handsome and sturdy people, with the widest foreheads and heads he had ever seen (the result of the Lucayan custom of head binding). They were decorated, some a little, some a lot, in black, white, and red paint, and all were "naked as their mother bore them."

The Lucayans watched in what we may assume was amazement as the shore party planted the royal flag and

Debates over routes etch the seas with controversy

NINE DIFFERENT ISLANDS, along a 400-mile arc, have been identified as the spot where Columbus first stepped ashore. The six tracks shown below display the range. Historians try to follow the routes and descriptions given in Columbus's log as he sailed to four islands he called San Salvador, Santa María de la Concepción, Fernandina,



and Isabela, on his way to Cuba.

The earliest favorite landfall, Cat Island (top left center) was supported by such famous figures as Washington Irving, but George Gibbs, a resident of Grand Turk, disqualified Cat in 1846 and proposed his home island.

He was not alone. In 1825 Martín Fernández de Navarrete, the scholar who had rediscovered the version of the Columbus log by Bartolomé de las Casas, had also opted for Grand Turk, but his track ignores Fernandina.

Today, Robert Power continues to advocate Grand Turk and a track from there to the Caicos Islands and eventually to Little and Great Inagua—but it hangs on the improbable assertion that Columbus thought that Mayaguana, the Plana Cays, and Acklins were one island, and the track to Cuba from Little Inagua is too far and in the wrong direction.

The East Caicos landfall advocated by Edwin and Marion Link assumes that Columbus, after leaving San Salvador, passed a second island without stopping or naming it, which few scholars accept. The track then reaches impossibly far west beyond Mayaguana to Samana Cay and Long and Crooked Islands, adding too many miles to the log distances. Pieter Verhoog also leaves from Caicos and finds his Fernandina in Acklins Island, which trends the wrong way. Moreover, the run from southern Acklins to Little Inagua would take far longer than Columbus records.

The Mayaguana landfall of Francisco Varnhagen requires an impossible circumnavigation of Long Island.

The Plana Cays are close together, and Columbus mentions only one island. Conception Island (upper center), proposed by R. T. Gould, does not match the topographical data for San Salvador.

Watling Island was first suggested by Juan Bautista Muñoz in 1793 and found champions in Becher, Major, and Murdock, all in the century before Morison, the celebrated author of Admiral of the Ocean Sea, declared it the landfall. It was supported by McElroy's transatlantic track (1941).

In 1882 Gustavus Fox refuted Becher's track and suggested Samana Cay, a judgment now supported by separate lines of evidence provided by the NATIONAL GEOGRAPHIC team, including Luis Marden's adjusted transatlantic track. (For a comparison of the central Bahamas routes of Morison and Judge after Fox, see the special supplement.)

Recently, Arne Molander suggested Egg Island in the northwestern Bahamas. This is at least 180 miles away from any landfall provided by the transatlantic log data, and the route falls apart trying to get from Andros Island (far left) to Cuba on the log headings.

proclaimed possession. Then a lively trade sprang up—red bonnets and small glass beads and little bells used in falconry, for live parrots and cotton thread and native spears tipped with fish teeth.

Columbus noticed some of the men bore the scars of wounds, "and they showed me how people came there from other islands which were nearby and wished to take them." He later heard that there was land to the south, where a king with much gold was said to live, and to the west and northwest, and that those "from the northwest came to battle with them many times." He made up his mind in which direction to head.

The trading resumed after dawn on the following day, Saturday the 13th, when young men arrived at the anchorage in canoes "made of the trunk of a tree," some large enough to hold more than 40 and all propelled by "a spade-like blade like a baker's peel."

That night Columbus summed up his view of San Salvador, which he had named after the Savior:

> "This island is quite large and very flat and with very green trees and many waters and a very large lake in the center, without any mountain."

This "*laguna en medio*" is an important feature that has drawn many adherents to Watling because that island has a large interior lake on its western side. "Laguna" meant a low-lying lake in 15th-century Spanish. On Samana a long, linear lake lies in a great swale behind the old dune line north of the bay. This lake, broken into

Solutions and mysteries *mark Samana. From the anchorage, the ships' boats on October 14 rowed along a beach (dashed track). Columbus mentions a large "laguna en medio," and a low, marshy lake is visible behind the ridge and in the rainy season may run almost half the island's length (**left**). He also noticed a "piece of land that is made like an island even though it is not"—one that could be made into an island in two days. From the bay, the buttonhook peninsula, foreground, appears to be an island; it could be cut at its narrow neck (dotted line).*

*Near that point Charles Hoffman and the author examine a 200-yard-long "conch causeway" (**above** and broken line **left**). Why this bank of shells was created is unknown. Conch is still a mainstay of Acklins islanders' diet and economy; the dried meat (**below**) is sold in Nassau.*

ponds during the dry season, was one of the most surprising of all Samana's features when we beheld it, framed in trees, after climbing the dune ridge. It is the view Columbus would have seen had he climbed a few yards up from the beach.

We believe that anchorage was to the southwest, where the reef opens, and that the fleet rounded the west end of Samana to reach it, arriving in early morning. Almost as soon as they had the hook down, perhaps before, they saw the Indians gathered a few hundred yards away and, as the log simply states it, "the Admiral went ashore."

On Watling, from a landfall near 24°N, the fleet would have to make its way around the southern end of a very much larger island, sailing 18 miles from dawn until late in the morning and having to search out an opening in the reef before entering Fernandez, or Long, Bay. The log makes no mention of this extensive fleet movement—one of the chief purposes for which a log is kept.

Watling has been called the only possible match for the Guanahani of the log, but it is such a poor match that Columbus's anchorage has been ascribed to no fewer than five sites, and four monuments celebrate his landing. A perfect match if only it could be made to fit!

An interesting light on the many Watling anchorages was shed in 1980 when L. Anthony Leicester, a diver, examined "the nautical architecture of the bottom" and found that only one site, on the west, offered a first-rate anchorage. A southern passage to this anchorage would compound the long approach. But the fleet would not have rounded to the north; else, there would have been no need to explore that way, as they soon did. At dawn of Sunday, October 14, Columbus ordered the ships' boats:

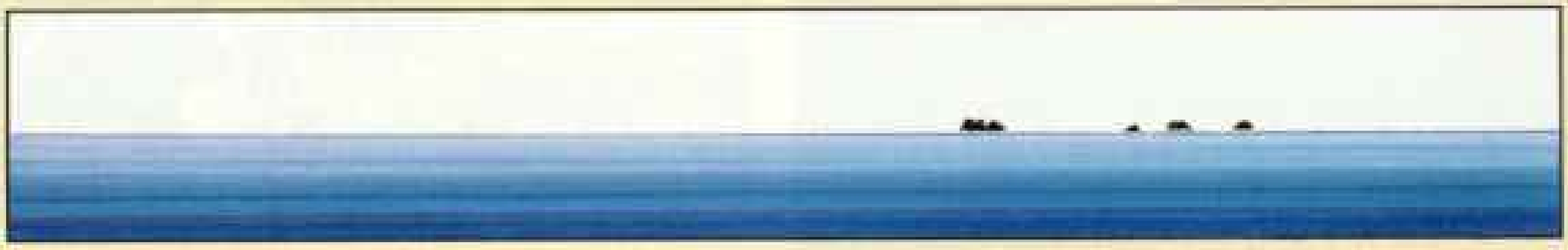
> ". . . readied and went along the island on a north-northeast course, in order to see the other part, which was the eastern part, and also in order to see the settlements. And I saw then two or three, and the people who all came to the beach calling us and giving thanks to God."

A poignant, ironic moment. Within 40 years—by 1513, by some estimates—every Lucayan Indian, including those of Samana, would be dead, the race exterminated by enslavement and epidemic disease, and

A computer helps solve the case of the many islands

AFTER EXPLORING San Salvador, Columbus returned to the ships, set sail, and at once began to see "many islands" rising from the sea ahead—so many he had trouble deciding which way to head; the Indians he had brought aboard "named by their name more than a hundred."

This passage creates a major problem for advocates of the Watling track, since only Rum Cay is visible when sailing from Watling. They reply that



this man they now hailed would die embittered and deprived of the glory he sought. But those are other stories.

While leading this rowing exploration, Columbus made note of two geographic features that any candidate for San Salvador must display:

> "I was alarmed at seeing a large reef . . . which surrounded that entire island. And in between, it remained deep and a port for as many ships as there are in all Christendom, and the entrance of it very narrow." Looking for "where one could build a fort . . . I saw one piece of land that is made like an island even though it is not . . . which one could cut into an island in two days."

On Samana, Jan and I quickly found this convincing clue to Guanahaní. The island that is not one lies immediately to the east of the western bay; in fact, it closes the bay on that side (pages 586-7). To anyone approaching from the west, as we did and as we think Columbus did, it appears without question to be an island, separated from Samana proper by a narrow lagoon. Only when the small promontory at the southern end is rounded does one see with surprise that it is not an island at all, but a buttonhook peninsula. A narrow neck about 200 yards wide just north of the promontory is the logical place to make a real island of it.

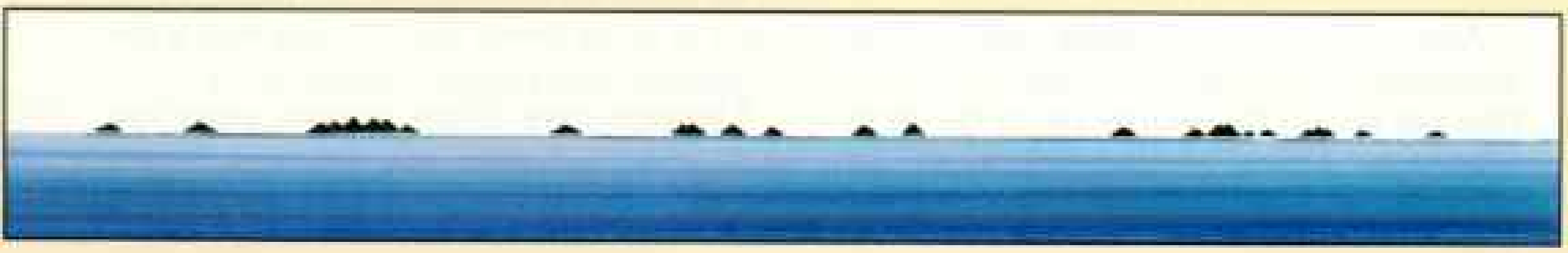
Rounding that promontory opens a four-mile vista to the east, where two large cays stand out to the misty sea from the eastern end of Samana. The reef can be seen running the full length of view, and the expanse of water it shelters seems broad enough indeed to harbor all the ships of Columbus's Christendom—ten feet deep when we later slipped *Zemi* in through the narrow, 40-foot entrance near the southern cay.

> "I examined that whole port and afterward returned to the ship and set sail."

How long did this rowing exploration take? Because of later fleet movements, speeds, and time estimates, no longer than six or seven hours is the fairest estimate, starting at dawn. On Samana this is easily accomplished by the heavy ships' boats, with time to swing them aboard using the large boom, and set sail. But on Watling, the candidates for both the large port and the

Rum Cay's various hills seem to be separate islands when viewed from a ship at sea; Morison sees six and calls Rum Cay a "six-in-one island."

*The Columbus Research Tool (CRT), developed by Control Data Corporation, compares the number of islands, apparent or real, that rise when sailing from Watling and from Samana. Artist William H. Bond has translated the computer's circles of visibility into landscapes that a sailor would see. All "islands" on the approach to Rum Cay (**left**) are on one heading—no dilemma for Columbus. South of Samana (**right**) a true panoply appears; the CDC team located 117 islands in the group. The fleet made for the largest—the Northeast Point of Acklins.*



island that is not one are ten miles away from Long Bay. The exploration in the time given would require sustained rowing speeds of three to five knots for six or seven hours.

When I discussed this with Tim Severin, who captained a rowing boat from Greece to Soviet Georgia, he uttered the only conclusion: "Impossible."

Graham's Harbour, the Watling port, is also four miles long, and the "island that isn't" is now an actual isle, named Cut Cay, just off the end of a peninsula. In Columbus's time, we are asked to believe, it was part of the peninsula and looked like an island that was not one—but the whole would still have looked like a peninsula, not like an island, in 1492.

The second island: Santa María de la Concepción

After exploring the eastern reach of San Salvador on Sunday morning, the little fleet set sail to the southwest in the early afternoon. Almost at once Columbus saw islands rising from the blue sea to the south:

> "So many that I did not know how to decide which one to go to first. . . . Finally, I looked at the largest and decided to go to that, and thus I do, and it would be distant from . . . San Salvador five leagues and the others, some more, some less. All are very flat . . . and they war upon each other."

It is marvelous to see the islands rising as one voyages south from Samana, especially in a hazy sea that adds to the drama of blue-gray points of land emerging in every southerly direction around to due west, where a 150-foot hill on Crooked Island seems a distant shimmering pyramid. The largest point, and the one that beckons, is the Northeast Point of Acklins. Sailing toward it, we could see the length of the island's east coast as far as Creek Point—very nearly the 14 nautical miles in the Columbus log.

The attractive course is west along the north side of Acklins and Crooked, which

*"**I know of no sect whatever,**" wrote Columbus of the Indians on Fernandina, his third landfall, today's Long Island. Yet a few miles inland from where his fleet coasted, caves have yielded wooden seats, called duhos **(below)**. Thirteen, all from Bahamian caves, are documented and suggest chieftainship and ceremony.*

*After leaving the Lucayan village, Columbus explored north-northwest and came upon "a very wonderful port with . . . two entrances" created by an island in the middle—modern Little Harbour **(left)**. The central island may have been broken in two in the past 500 years by a storm, such as the one of 1985 that devastated this part of Long Island.*

JIM BRANDENBURG, COURTESY ST. JOHN'S ABBEY, COLLEGEVILLE, MINNESOTA

are separated only by a creek (they could easily be taken for a single island), and outside the continuous reef that guards the whole distance of 28 miles, again almost exactly on the Columbus estimate.

Columbus named this second large island Santa María de la Concepción, after the Virgin Mary. The fleet sailed west all afternoon, clipping along at 5.2 knots, and anchored at sunset under the northwest point of Crooked Island, near modern Landrail Point (map, page 596).

On the southwest course from Watling none of this happens. There are tortured explanations of why it does not.

One sees not "many islands"—only one: Rum Cay. The offered explanation is that the various hills of Rum Cay appear to be many islands. Morison testifies to six and calls Rum Cay a "six-in-one island."

All, of course, would have been on the same heading, leaving no need for Columbus to puzzle out his direction. And how could some of these hills on one small island be closer than five leagues to San Salvador and some more than five leagues?

When Columbus says all are flat and adds that they make war upon one another, he surely has more than one island in mind.

Besides depending on the illusion of being "many islands" to be Columbus's Santa María, Rum Cay has a more serious flaw: It is less than half the size he describes.

There are two ways to account for this discrepancy. The easiest is to assume that Las Casas has written leagues where Columbus wrote miles. Morison simply maintains that at this point in the voyage, without noting it, Columbus began using a different unit of measurement for land than for sea.

This idea was first suggested by two Cuban scholars who were trying to work out similar discrepancies between the log distances and the actual distances along the Cuban coast later in the voyage, but there is neither evidence nor need for it. James E. Kelley, Jr., in an independent computer simulation of the Columbus track, has

shown convincingly that adjusting the Cuban distances for current—one of the strongest in the region—effectively removes the problem.

If Columbus is not using the "alongshore" league at Rum Cay, that is another reason it cannot be Santa María.

Whatever Las Casas wrote, the actual dimensions of Rum Cay are known: It is five by ten nautical miles. The fleet ran the east-west coast between noon and dusk. They were moving, then, at 1.6 knots—far slower than the rowers on Watling. Yet in most translations, Columbus says he had to crowd on sail; otherwise, he could not have reached the western cape before dark.

They reached an anchorage near that cape at sunset of the 15th. At midnight one of the Guanahaní Indians taken captive by Columbus managed to escape, so when the Admiral went ashore next morning, he went armed. The local Lucayans, however, "allowed us to go through the island and gave us what we asked of them."

No Indian settlement has been discovered in the vicinity of Sandy Point, the southwestern end of Rum Cay. But archaeologists have located one near the northwest end of Crooked Island, where the Samana track has the fleet anchored below Landrail Point.

While they were exploring:

> "The wind freshened to a southeast cross-wind, I did not wish to delay. . . . And I sailed then, to go to the other large island which I had seen to the west."

Both the Watling and Samana tracks agree that the next island visited, which Columbus named for his king, is modern Long Island. The CRT, assuming 100-foot trees, sees it from Bird Rock, and sees a hilly coast from only three miles west of there, where the fleet swung around. It is the only island in the south-central Bahamas that fits his general description of a very large island, running by his estimate almost 60 miles (correct) and trending northwest to southeast.

The Watling track, crossing 18 miles from Rum Cay, hits Long at its far northern end, while the Samana track, crossing 25 miles (very near the log distance) from Crooked, hits Long at its far southern end; that difference portends disaster for the Watling track.

The third island: Fernandina

Ahead of them now lay the open sea. Columbus uses the word *golfo*, an apt description for Crooked Island Passage, still a major seaway. Halfway across they came upon an Indian in a canoe, outfitted with a handful of bread, a gourd of water, a piece of red earth—probably for body paint—and tobacco. He carried in a basket European trade goods, a string of beads and two coins, which made Columbus think he had come from San Salvador.

They hoisted the canoe aboard and held west until late in the day. Ever cautious, that night Columbus again lay to off the coast of Fernandina, close enough so that canoes from a nearby village came to visit. Their released hitchhiker had spread favorable word.

The constant in the log references to Fernandina is its unusual size. Once arrived at the island, Columbus notes: "I saw fully twenty leagues of it—but it did not end there."

There *are* extraordinary views as one coasts Long Island—miles and miles of

unbroken shore bending out of sight over the horizon.

At dawn the fleet closed the land, anchored at the village, and spent the morning trading and observing the flora and fauna.

> "Here the fish are so different from ours that it is a wonder. . . . blues, yellows, reds . . . painted in a thousand ways."

They had seen whales in these waters, but there was no wildlife on land except parrots and lizards. The trees, however, were a wonder: Columbus reports that several different kinds of branches grew on one trunk!

He was more favorably impressed by the people. Even though of the same language and culture as those of San Salvador and Santa María, they were:

> "a somewhat more tractable and domesticated people . . . they know better how to bargain. . . . I know of no sect whatever, and believe they would very shortly become Christians, because they are of very good intelligence."

But the Lucayans did have a "sect" of some sort. A few miles inland from Columbus's course are limestone caves that centuries later yielded carved ceremonial stools called *duhos* and zemi figurines that may have religious connotation.

On Wednesday, October 17, the fleet departed and sailed north-northwest.

> "When I went near the cape of the island, at two leagues, I found a very wonderful port with . . . two entrances, for it has a small island in the middle."

Columbus thought ("stupidly," says Morison) he might be looking at a river mouth wide enough for a hundred ships of his day. He anchored outside and sent in the ships' boats with casks to collect fresh water.

Expectations were dashed when soundings showed "there was no depth" at the entrance, but a small party of Indians, eight or ten, led the men away to an inland village where there was water. While they were gone, Columbus went for a walk in the woods and rhapsodized about their beauty.

The returning men described the village—"houses . . . in the manner of booths, and very high and [with] good chimneys" and also noted how clean they were.

> "After having taken [on] water, I . . . set sail and went so far to the northwest that I discovered that whole part of the island, up to the coast that runs east-west. . . . Then the wind there went calm, and began to blow west-northwest. . . . And thus I turned. . . ."

And thus day ended on Wednesday, October 17. The fleet turned before the wind and zigzagged southeastward, keeping off the hidden coast, in winds that Columbus called "very light." Where had he been that day?

There are three geographic features to be located: the village anchorage, the harbor with two mouths, and the east-west coast.

Morison was unsuccessful in locating any of them at the northern end of Long Island. Of the village anchorage, he first wrote that the fleet had *not* anchored since that coast of Long is too steep to permit it. Twenty years later, he offered two locations ("near Burnt Ground, or possibly Simms"), neither of which is tenable since there is no anchorage off Burnt Ground and Simms is on the wrong side of the island.

The harbor with two mouths was first located at Newton Cay, then at Calabash Bay, Hoosie Harbour, and finally at Santa María Harbour—on the west side of Long Island. Morison says it "perfectly fits," but it does not have two mouths, is not two leagues from the northern cape, and the fleet could not have come about in a west-northwest wind in that vicinity (map, facing page).

The Lyon translation has the fleet sailing northwest as far as "the coast that runs east-west," where it turned and reversed course. Morison translates the passage: "I . . . sailed to the NW until I had explored all that part of the island along the coast which runs east-west." This permits him to sail the fleet around the northern end of the island and bear southwest "far enough to see the coast . . . falling away to the southwestward."

But where is the east-west coast?

Thus, the north end of Long yields a 0 for 3 score in firmly locating these prominent features, even when one twists the log, and the track, to the wrong side of the island.

It seems obvious from the track given by Columbus that the movements he describes have to occur at the south end of Long,

where there is room to maneuver north.

The Samana track places the village and anchorage at Adam's Hole, a deepwater cove on Long's southeastern coast and a good anchorage, according to Long islanders, when the wind and the moon are right as they were in October 1492. We find the harbor with two mouths at Little Harbour, about six miles northwest of Adam's Hole, and the east-west coast ten miles farther on, beginning at Strachan Cay where the coast suddenly turns west past Clarence Town before resuming north. We are comfortable with that 3 for 3—even more so because of the events that follow.

Dawn of the 18th found the fleet at sea:

> ". . . this night it rained very heavily after midnight until almost daybreak. And it is cloudy and threatens rain, and we [will go] to the cape of the island in the southeast part, where I hope to anchor until it clears."

It did clear, for the next entry, the briefest of all in this part of the log, reads in its entirety:

> "After it cleared, I sailed with the wind and went around the island as far as I could, and anchored when it was too dark for sailing, but I did not go ashore and, at dawn, I set sail."

This straightforward fleet movement in what was now a north wind, to the southeast cape and beyond, occurs between one dawn, the 18th, and the next, when the ships depart Fernandina. Because their track is still 60 miles away from the cape on the night of the 17th, Watling advocates must ask us to believe the impossible.

The track as described by Morison in various histories is so ambiguous and contradictory, it is difficult to reproduce. For one example, Morison has the fleet anchored at Cape Verde, the south point of Long Island, at daybreak of the 18th—after a sail of some 60 miles in "little" wind—hardly possible. He later comments that Cape Verde was "seen and so named . . . on 19 October."

His maps, however, show the fleet sailing to Roses, not as far as Cape Verde, on the 18th—the same day he has the fleet there (in one book) at daybreak!

One must look ahead a day to understand

The Albert Town Light *is hung each evening* ***(below)*** *to guide mariners passing Fortune Island. The Judge track identifies it as Columbus's Isabela on the Crooked Island Passage, a major seaway that Columbus crossed twice—en route to Fernandina and then to Isabela. His fleet raised Fortune Hill and cruised the western coast of Fortune Island to a cape he named Laguna for the large lake* ***(right)*** *visible from that point. After trying to sail the shallow Bight of Acklins, right, he reversed course and headed finally for Cuba.*

this complete confusion. Many Watling adherents are convinced that only Bird Rock, off the northwest point of Crooked Island, could be the landfall on Isabela, the next island to be discovered. The heading backward from Bird Rock leads to Roses, from which the fleet would have departed at dawn on the 19th.

This leaves only the 18th for the fleet to sail from northern Long Island all the way to Cape Verde, which Columbus visited and named, and back to Roses. Since it cannot be done, the question is smothered in ambiguities and finally ignored entirely.

The Samana track takes the fleet on the 18th past the southeastern cape and down to Cape Verde and into the shallow ground to the west. The following dawn Columbus divided the fleet—*Pinta* east-southeast, *Santa María* southeast, and *Niña* south-southeast—and left from somewhere near Cape Verde, looking for an "island or city" named Saomete and a king reputed to be rich in gold.

The fourth island: Isabela

By midmorning one ship had made a landfall to the east and sent a signal to the others; they arrived before midday at an island that Columbus decided to call Isabela after his queen—"at the north point where it forms a small island and a rock reef outside of it to the north."

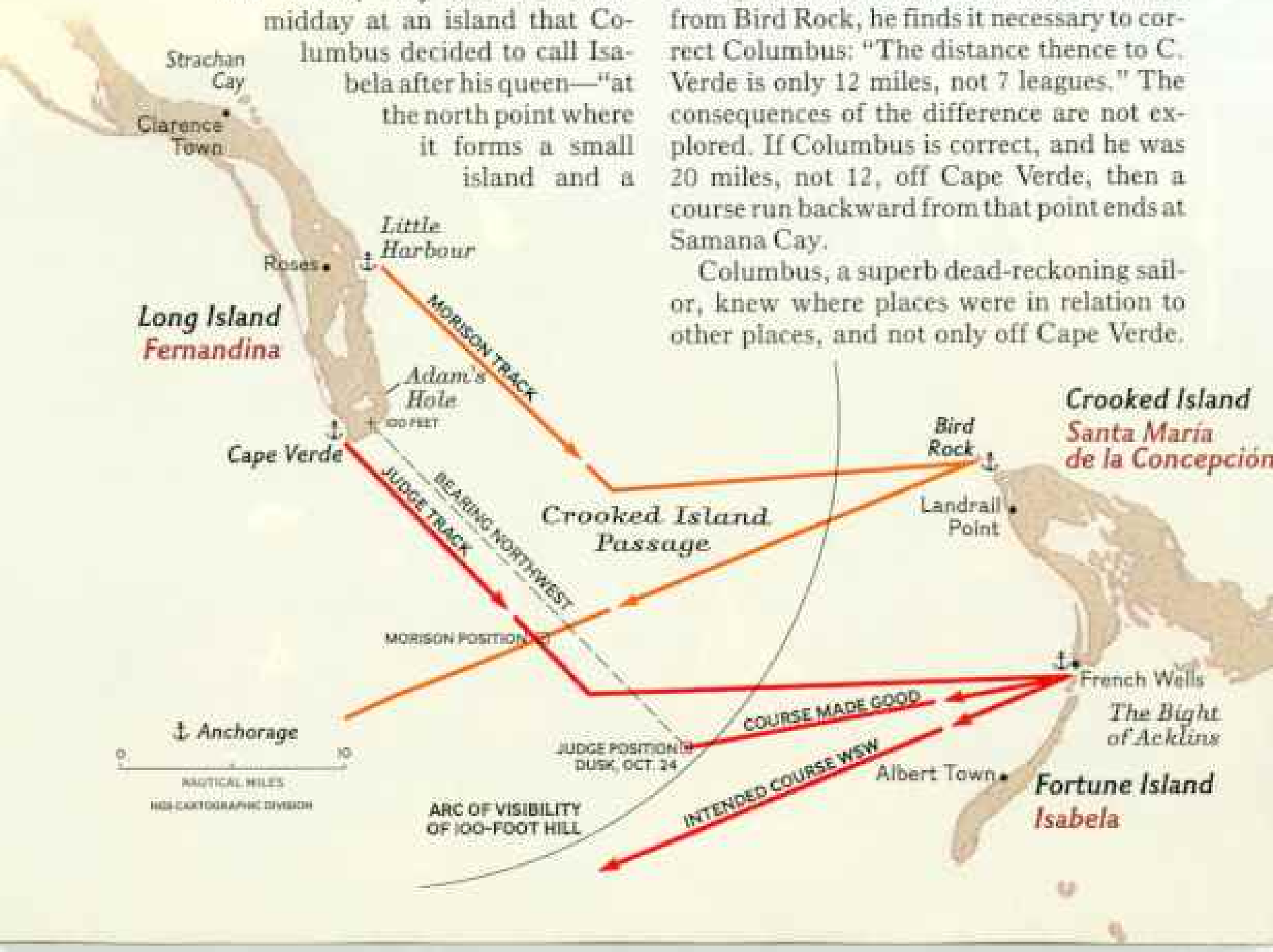
The bearings from Cape Verde locate this point at French Wells, just north of Fortune Island. The Watling track from Roses goes to Bird Rock ten miles north.

The log during the exploration of Isabela is the most difficult to interpret of the voyage, but by both tracks the fleet coasted Isabela, today named Fortune Island or, confusingly, Long Cay, rounded its southern end, and tried to head east and north through the shallow Bight of Acklins. Columbus finally had to reverse his course and return to the "Cape of the Small Island."

The fleet waited off Isabela several days for the king with the gold to appear, and when he did not, they left on the first small wind they had after two days of rain and dead calm—at midnight on October 23, heading west-southwest. They did not go far and at dawn were becalmed until early afternoon. By dusk that evening Columbus noted in the log that Cape Verde stood seven leagues to the northwest.

The Cape Verde fix, where two bearings cross for the first time (map, left), is a major clue to the backward track. Morison gives the longitude and latitude of this crucial position, but since his west-southwest line runs from Bird Rock, he finds it necessary to correct Columbus: "The distance thence to C. Verde is only 12 miles, not 7 leagues." The consequences of the difference are not explored. If Columbus is correct, and he was 20 miles, not 12, off Cape Verde, then a course run backward from that point ends at Samana Cay.

Columbus, a superb dead-reckoning sailor, knew where places were in relation to other places, and not only off Cape Verde.



Later, on November 19 and 20, he would sail north-northeast from the Cuban coast to a position that he noted was 12 leagues from Isabela. He comments that he could have kept on and anchored at Isabela, but he was afraid his Guanahaní Indians would escape and make it home, since that island was eight leagues beyond Isabela.

Jan Adkins plotted Columbus's course from Nipe in Cuba—his departure on our track—to a position just north of the Verde cays, with Fortune due north-northeast. Columbus is looking directly at Fortune when he talks of Isabela.

In March of this year Jan and I returned to Samana with Craig Miller in *Zemi*, taking archaeologists Charles and Nancy Hoffman to confirm our village site and find others, since Columbus mentions seeing "two or three." In only three days we succeeded beyond all expectations, finding nine additional sites, large and small—including one on the promontory of the "island that isn't."

***A vital key** to the puzzle of the Columbus track was finding the remains of Lucayan occupation —including incised Indian pottery (**below**)—on the north side of Adam's Hole on southern Long Island (**above**), a site that fits the Columbus description.*

More Acklins islanders had arrived. Some were growing Indian corn in fields along the ridge behind the beach; the men were fishing for conch on the reef. Behind that ridge, beside the long lake, Nancy found a piece of pottery dating into the time of Columbus and similar to Carrier ware from Hispaniola. On the ridge above, Charlie picked up the lower half of a zemi figurine.

Across the neck of the peninsula, we came upon a causeway of very old conch shells (page 587) and beside it, part of an earthen vessel used on Spanish ships to carry olives, olive oil, or water. One can only speculate on its origin.

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We then sailed *Zemi* down the Columbus track to Acklins-Crooked and across to Long. To complete the chain of evidence, we needed to find the village site at Adam's Hole. The moon and the tide and the wind were against taking *Zemi* into the cove, so we had no choice but to walk.

It was Sunday, March 16. We went down the long road from Clarence Town to the southern end of Long and started east through thick bush and mangroves. When we reached the cove five hours later, running out of water, we were almost too exhausted to look.

But after an hour George Shafnacker, the sound man on a Geographic film crew, began waving frantically from a hill on the north side of the cove.

I ran up the beach toward him, praying that he had it. He had it—Palmetto ware in an outstretched hand. It was a moment of extreme exhilaration.

With a Society grant, Charles and Nancy went back to the usually lonely Samana in April and opened digs at two sites. They also had other worldly visitors—United States surveillance planes, followed by a helicopter with armed Bahamas Defense Forces personnel and a U. S. Drug Enforcement Administration man from New Jersey.

That kind of thing scared off the Acklins islander work force, but it was the most excitement on Samana in 500 years.

So what have we proved?

With the maximum conceivable error built into it, the Marden track might vary between 16 miles south and 44 miles north of the Samana landfall, and only one island, Samana, lies within the target zone. Taking the Columbus estimates of position as logged, and adjusting them for leeway and current, leads one directly to Samana.

The backward track from the "Cape Verde fix" also goes to Samana and to nowhere else.

All of the features described in the log are present on Samana, and we have established what had been dismissed, Lucayan occupation there.

A skipper can sail from Samana to Cuba following the Columbus log without resort to constant correction and invention. This is true of no other proposed landfall.

Later voyages by Vicente Pinzón and

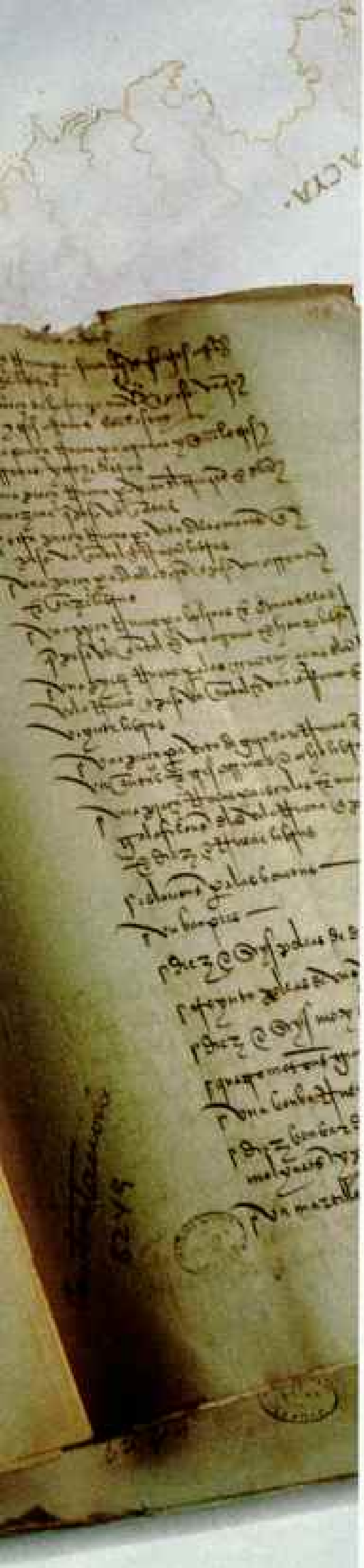
First discovered islands, *named in a 1493 woodcut* ***(below)****, were soon joined by countless others as men sailed for the New World—*Mundus Novus*—as seen in the Miller Atlas circa 1519* ***(facing page)****, which shows Spanish flags on the Bahamas north of Cuba and Hispaniola. The old world of the Indians would come to a tragic end in a historic process that we believe began at Samana Cay.*

COURTESY NEW YORK PUBLIC LIBRARY (ABOVE AND PAGE 598)

Juan Ponce de León, and the Alonso de Chaves sailing guide, place the Columbus islands in the central Bahamas. Only two islands are possible San Salvadors: Watling and Samana. And it can be demonstrated that the Watling track simply doesn't work.

Columbus himself later locates Isabela and Guanahaní northeast of a position 70 miles northeast of the port of Nipe on Cuba's northern coast, a statement that further bolsters the Samana track.

Thus, six separate lines of evidence converge on the sands of Samana. Perhaps infallible proof will come only with discovery of the original Columbus log and chart. But until that day comes, we must conclude that it is impossible to explain the facts at our disposal in any other way. The solution to the mystery is Samana Cay. □



15th-Century Manuscript Yields First Look at Niña

By EUGENE LYON

IT IS A NICKNAME that has become immortal in the annals of exploration: *Niña—Little Girl.* When I saw her name on the aged paper before me in Spain's Archive of the Indies in Seville, I did not immediately grasp its significance. I was examining a bundle of documents dating from as early as 1494, in a study of the early Spanish shipping system. The 400-page bundle, called the *Libro de Armadas* (left), described the sending of several caravel fleets to the New World between 1495 and 1500.

In the difficult archaic script, I read what proved to be a receipt by one Pedro Francés for a vessel he was to sail to Hispaniola in 1498. It included details of sails, rigging, and other equipment. Her name: *"Niña,* also known as *Santa Clara."*

Suddenly the questions came: Could this be the historic *Niña,* the favorite ship of Christopher Columbus? If so, what could these documents tell us about not only *Niña* but also all those other little-known Spanish caravels of discovery?

The little ship first comes to our view at Palos de la Frontera beside the Río Tinto in Andalusia, during the heated, excited summer days of 1492. Palos, required to furnish two caravels for royal purposes, was the fitting-out point for Columbus's first expedition. *Niña,* the property of Juan Niño (whence her nickname), had been built at nearby Moguer and was formally named *Santa Clara* for the town's patron saint. Juan Niño sailed aboard his ship as master under Capt. Vicente Váñez Pinzón of Palos. Her sister caravel, *Pinta,* was commanded by his brother, Martín Alonso Pinzón.

On Friday, August 3, 1492, led by Columbus in his flagship, *Santa María,* the tiny fleet left the river mouth for the open Atlantic. *Niña* soon proved sea-kindly and swift; Columbus was favorably impressed. After leaving the Canary Islands, the three ships plodded west for more than a month. As the days wore on, despair grew; one can imagine the crew's delight at first glimpse of lovely green San Salvador.

***A new picture** of Columbus's favorite ship emerges from this late 15th-century document, which describes Niña's sails, rigging, and cargo in detail. Until now, her style was assumed from drawings such as these sailing across a map, dating from the early 1500s.*

MAP FROM BIBLIOTECA COLUMBINA, SEVILLE

As they sailed on toward Cuba, *Niña* and *Pinta* often scouted ahead of the clumsy *Santa María*, seeking the wealth of Asia, led on by natives' tales. On November 21, Martín Alonso Pinzón left the fleet to follow his own route with the *Pinta*. Columbus continued on to Hispaniola, modern-day Haiti and the Dominican Republic. There on Christmas, 1492, *Santa María* ran aground.

Building a fort from her timbers, Columbus left a settlement named Navidad and sailed for home in *Niña*. He credited her seaworthiness, as well as God's mercy, for their salvation when a fierce winter storm battered them in mid-Atlantic. The sea-stained caravel bore him triumphantly into the Río Tinto on March 15, 1493.

INTOXICATED by the world's new dimensions, multitudes clamored to join the next Indies enterprise. A flotilla of 17 vessels left Cádiz in September 1493, among them one named *Niña*. (I believe, like most historians, that the first- and second-voyage *Niñas* were one and the same.)

Finding the fort burned and the garrison dead at Navidad, Columbus moved eastward, founded a new settlement, Isabela, and sent many of his ships back to Spain.

Bent on further discovery, the Admiral departed Isabela with flagship *Niña*, whose ownership he now shared with the crown, and two other caravels, still seeking Cipangu (Japan), Cathay, and the Grand Khan. He sighted and claimed Jamaica and coasted Cuba's south shore, convinced that it was Asia. On June 12, 1494, "aboard the caravel *Niña*, also known as *Santa Clara*," he required all his crews to swear to their belief about reaching the mainland of Asia. Then they sailed back to Hispaniola.

In August 1495 four caravels were sent from Spain with supplies. The *Libro de Armadas* details their outfitting. The vessels arrived safely at Isabela, only to be sunk in a hurricane. Sturdy *Niña* was badly damaged and had to be refitted. The *Libro* mentions "*Niña*, which was remade in the Indies." From the wrecked caravels Columbus built another, named the *Santa Cruz*.

In 1496 he returned to Spain with the *Niña* and *Santa Cruz*, bringing New World products: some gold, wood, cotton, and a barrel of sand he thought to be precious ore. He faced some disappointment at court and criticism about his governing of Hispaniola.

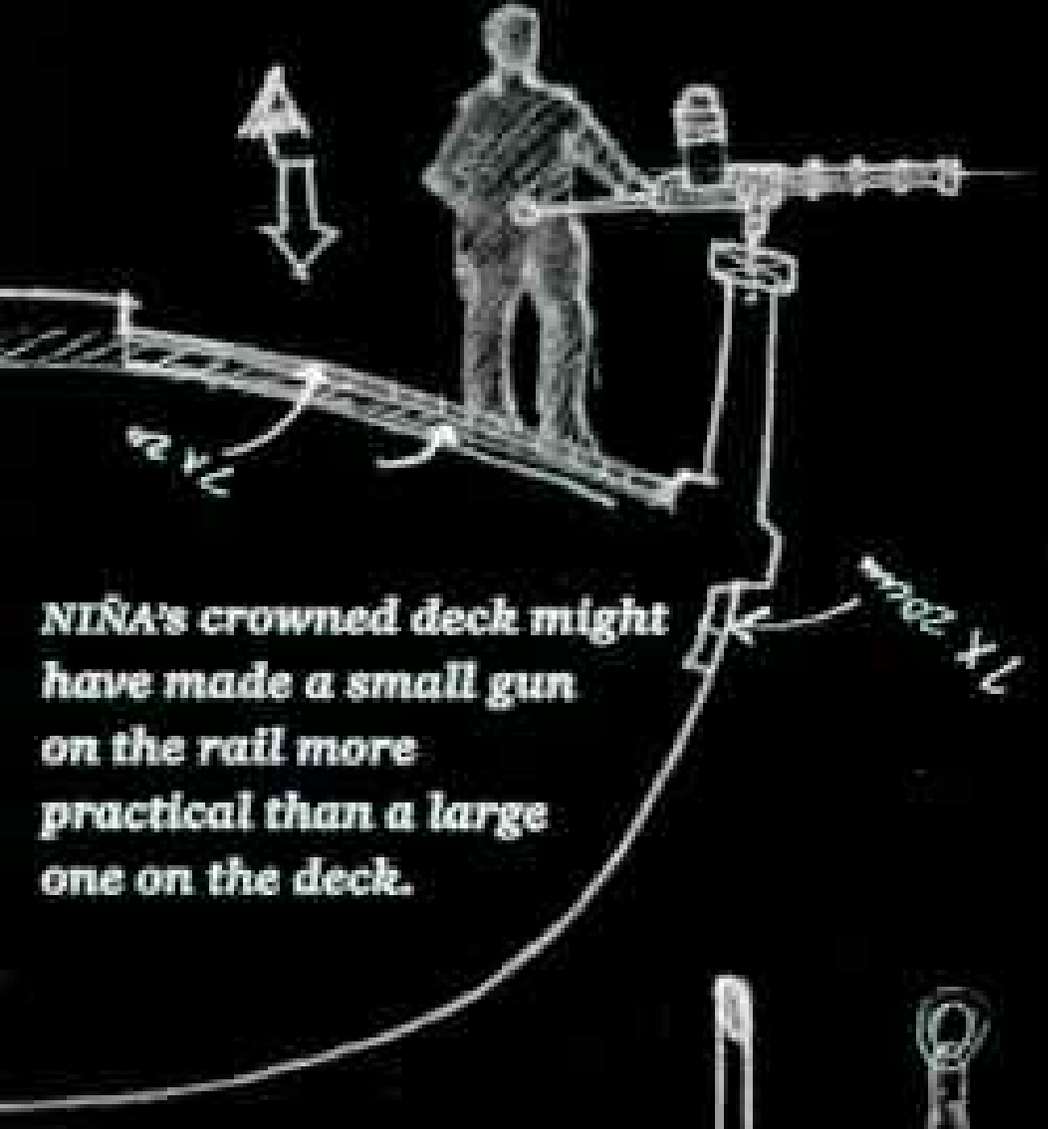
Next *Niña* went to Rome on a commercial voyage in 1497, evidently without Columbus's approval. On her return journey she was hijacked off the coast of Sardinia by a French pirate who "took her crew, artillery, arms, and clothing," but the crew, through bribery, escaped and returned *Niña* safely to Spain.

An angry Columbus recovered *Niña*, but enthusiasm for expensive New World expeditions had cooled, and it took almost two years to prepare for his third voyage. He decided to dispatch *Niña* and *Santa Cruz* ahead to Hispaniola with much needed supplies. To pay his seamen, the *Libro* reveals, Columbus used funds he was to have taken to Hispaniola, hoping to balance the books with gold to be found there.

Niña received new sails, a new 200-pound anchor, and cartloads of planking. Caulkers worked 40 days on her deck and hull. Finally, the *Libro* tells us, she was refitted and fully laden: 18 tons of wheat, 17 tons of wine in great pipe barrels, some seven tons of sea

TO EXPLORE *the possible meanings of archaic terms used in the 400-page Libro de Armadas, a collection of papers on early Spanish ships, Jan Adkins, associate art director at* NATIONAL GEOGRAPHIC *and an experienced sailor, worked with the author to make these sketches (right). Capt. José María Martínez-Hidalgo, former director of the Maritime Museum in Barcelona, was consulted on hull design. Roger Hambidge, of Mystic Seaport, Connecticut, made a scale model of Niña (below), using authentic shipbuilding techniques. The nearly four-foot-long completed model is now on display at National Geographic Society headquarters in Washington, D. C.*

IN THE STYLE *of Niña's day, Roger Hambidge pegged together the model's overlapping ribs with pin-thick bamboo pegs.*

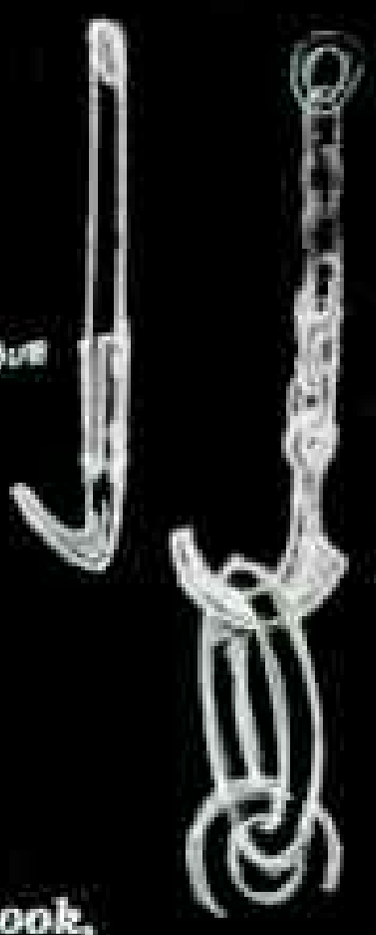


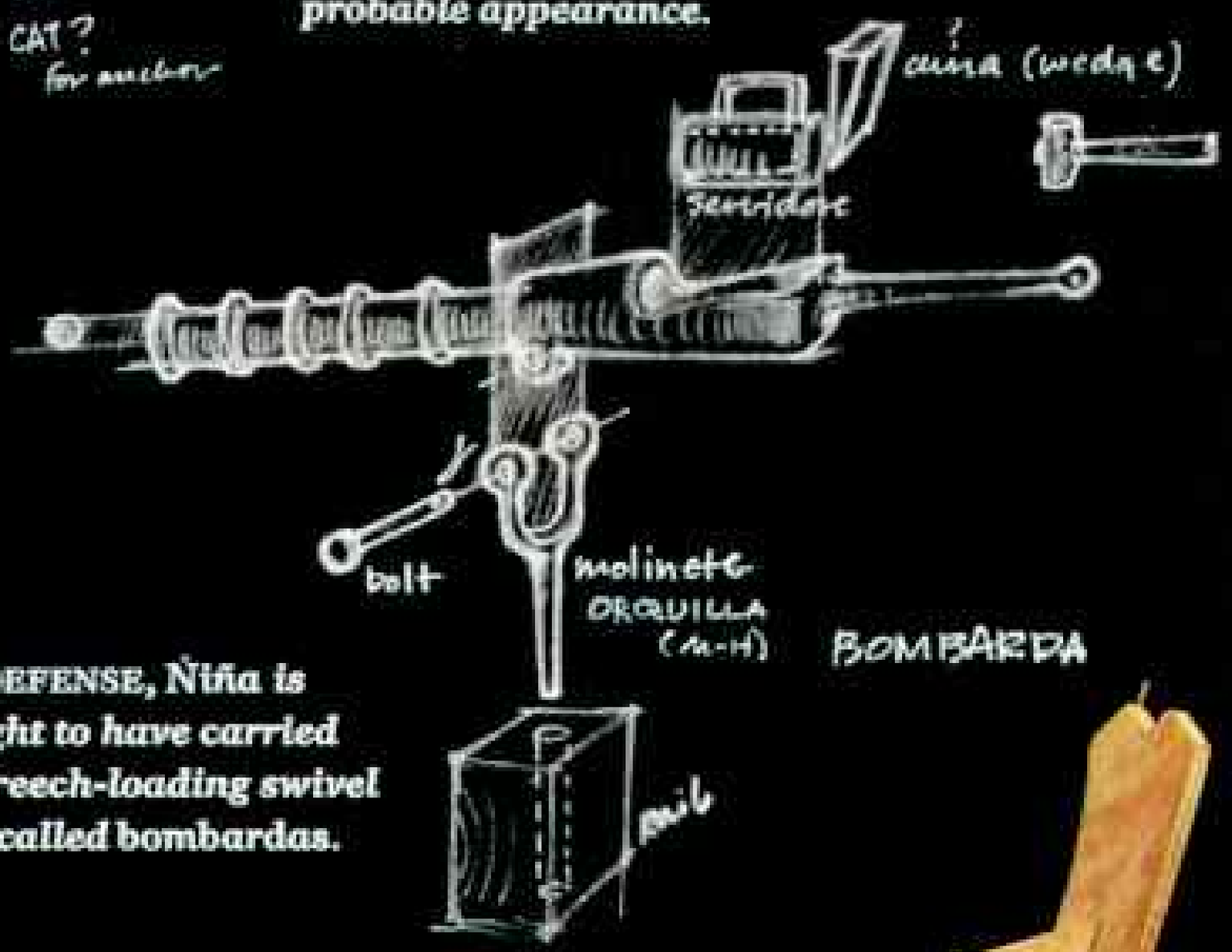
NIÑA's crowned deck might have made a small gun on the rail more practical than a large one on the deck.

JAN ADKINS

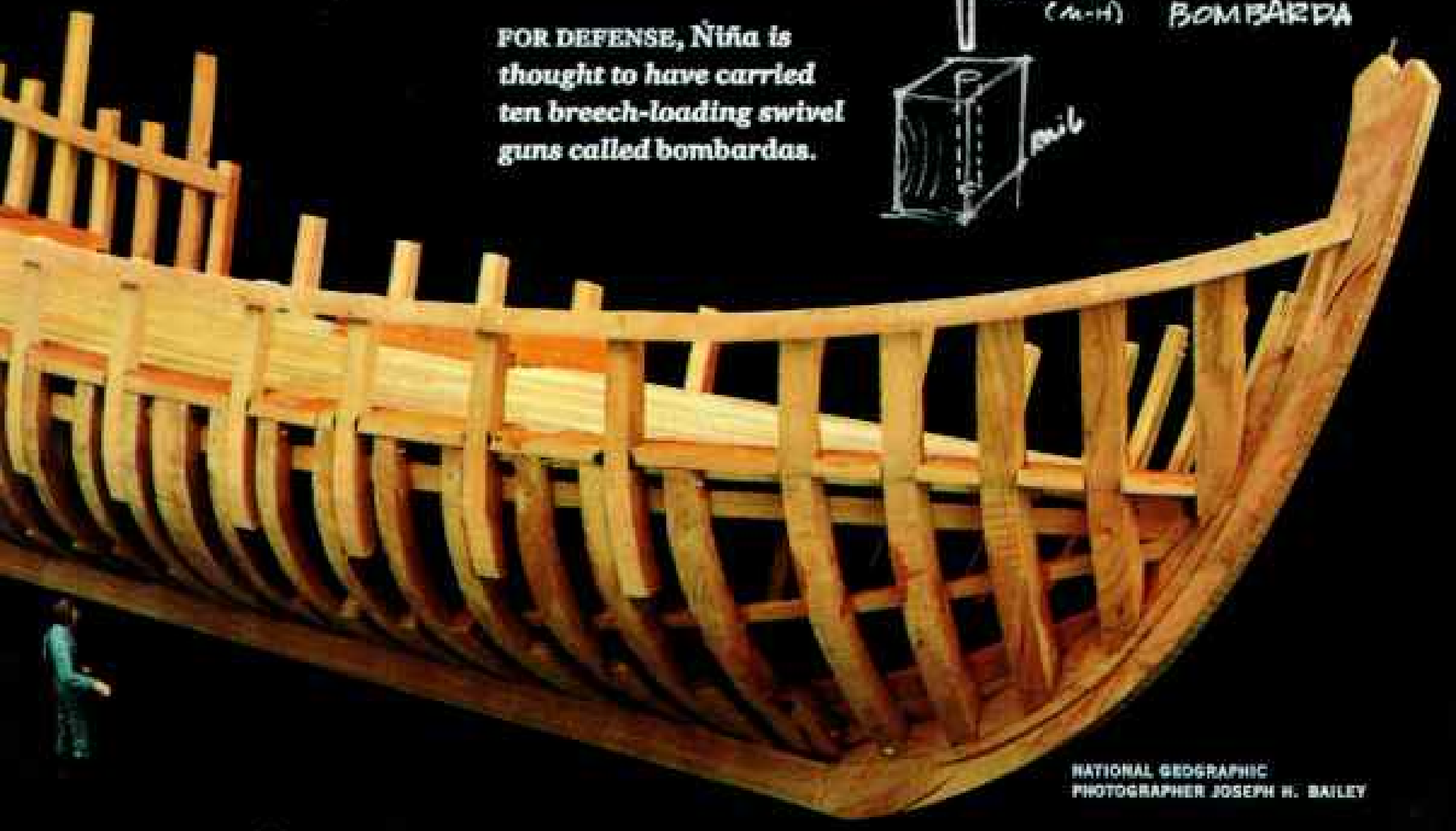
COMBINING *scholarship and sailing knowledge, the author, right, and artist Richard Schlecht rendered Niña's probable appearance.*

A STERN LANTERN, *boat hook, and anchor hook were listed among the ship's gear.*





FOR DEFENSE, Niña *is thought to have carried ten breech-loading swivel guns called bombardas.*



NATIONAL GEOGRAPHIC
PHOTOGRAPHER JOSEPH H. BAILEY

biscuit, almost two tons of flour, more than 2,000 pounds of cheese, and a ton of salt pork. Also aboard for the colonists were olive oil, sardines, raisins, and that essential of Spanish cookery, garlic.

FOR HIS THIRD VOYAGE, in 1498, Columbus had received permission to take as many as 330 persons to the Indies on royal salary. *Niña* and *Santa Cruz* carried more than 90 of them, including 18 farmers or stockmen, 50 crossbowmen, a priest, locksmith, miner, and surgeon. Two of the four women were Gypsies named Catalina and María, convicted murderers freed by the crown on condition that they emigrate. Clearly, Columbus intended to plant an enduring settlement on Hispaniola.

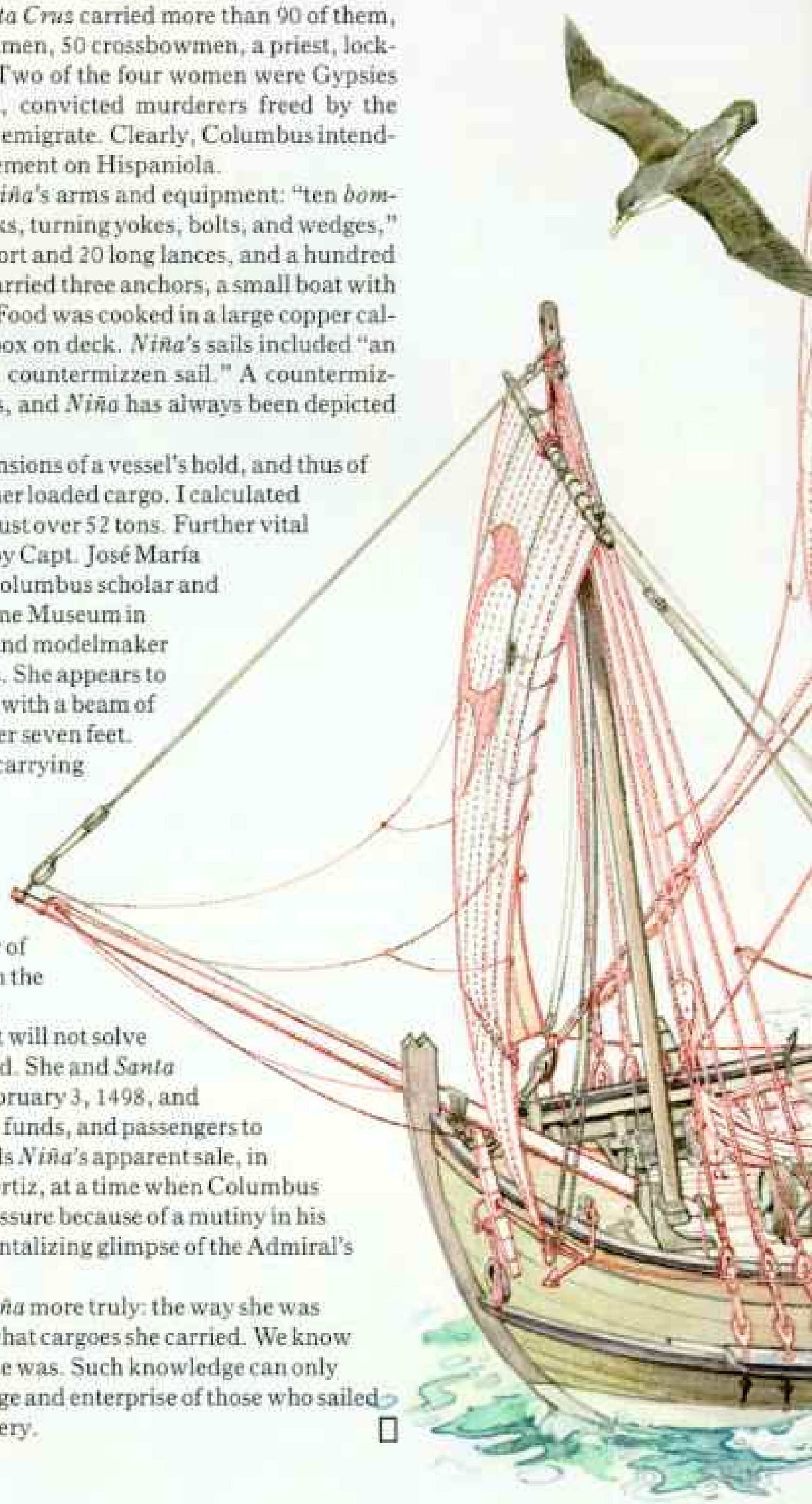
I was most intrigued by *Niña*'s arms and equipment: "ten *bombardas* with their breechblocks, turningyokes, bolts, and wedges," as well as 80 lead balls, 54 short and 20 long lances, and a hundred pounds of gunpowder. She carried three anchors, a small boat with six oars, and 11 water butts. Food was cooked in a large copper caldron, doubtless over a sandbox on deck. *Niña*'s sails included "an old mizzen sail, a half-worn countermizzen sail." A countermizzen? That implied *four* masts, and *Niña* has always been depicted with two or three.

One can estimate the dimensions of a vessel's hold, and thus of her hull, from knowledge of her loaded cargo. I calculated *Niña*'s 1498 Indies lading at just over 52 tons. Further vital details generously provided by Capt. José María Martínez-Hidalgo, a noted Columbus scholar and former director of the Maritime Museum in Barcelona, helped the artist and modelmaker re-create *Niña* on these pages. She appears to have been about 67 feet long, with a beam of 21 feet and a draft of just under seven feet. Her tonnage: 58 to 60 tons of carrying capacity.

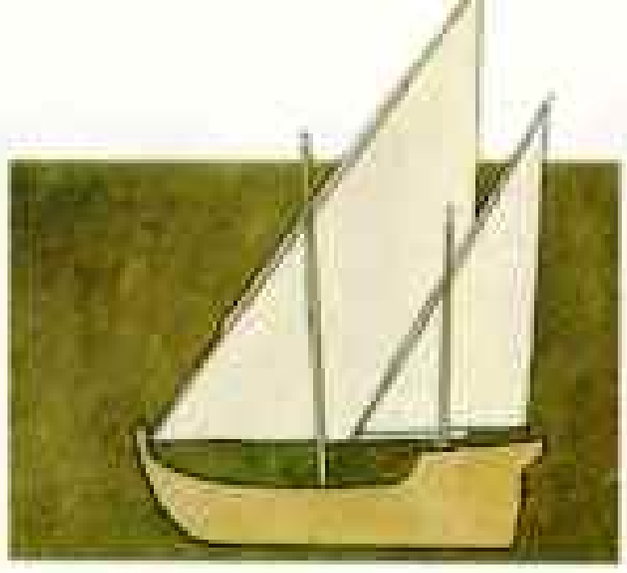
A FULL TRANSLATION of the *Libro de Armadas* has been sponsored by the University of Florida, through a grant from the National Endowment for the Humanities. Unfortunately it will not solve the mystery of *Niña*'s final end. She and *Santa Cruz* sailed from Spain on February 3, 1498, and safely brought their supplies, funds, and passengers to Hispaniola. The *Libro* records *Niña*'s apparent sale, in October 1499, to one Diego Ortiz, at a time when Columbus was under great financial pressure because of a mutiny in his colony. And that is our last tantalizing glimpse of the Admiral's beloved *Little Girl*.

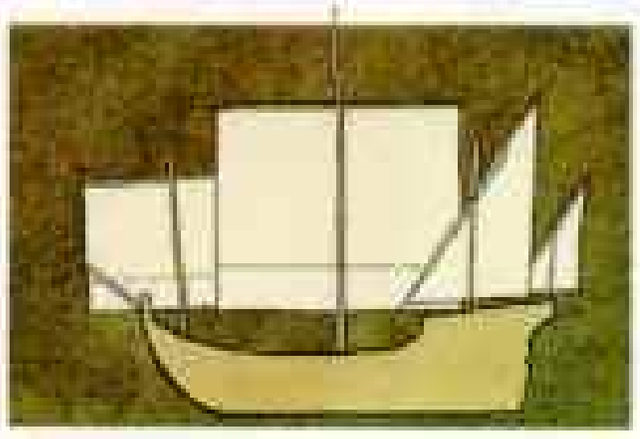
But now we can picture *Niña* more truly: the way she was rigged, how she sailed, and what cargoes she carried. We know what an honest little vessel she was. Such knowledge can only enhance our awe of the courage and enterprise of those who sailed aboard the caravels of discovery. □

One surprise: The Libro de Armadas reveals that in 1498 Niña had four masts, not two or three as previously believed. Her design also included a bowsprit. Small, fast, and seaworthy,



the caravel measured about 67 feet and was among the most advanced ships of her day. She probably took part in three of Columbus's four voyages to the New World.





To take advantage of prevailing Atlantic winds, Columbus changed Niña's sails in the Canary Islands from lateen, left, to square-rigged.

Newfound details of sails and rigging, as described in the Libro, are shown in red in this drawing of the stout caravel that carried Columbus into history.

TOKYO

By WILLIAM GRAVES
SENIOR ASSISTANT EDITOR

Photographs by DAVID ALAN HARVEY
NATIONAL GEOGRAPHIC PHOTOGRAPHER

A Profile of Success

東京の成功横顔

Already at one with the well-ordered confusion of her city, a private-school commuter awaits her train at Shinjuku, Japan's largest station, transited by nearly three million people daily. Prosperity has arrived in a blur to a teeming city that still reflects images of its cultural traditions. Characters ***(above)*** *depict the English title.*

IT WAS THE EARTHQUAKE'S second shock that caught me by surprise. When the first tremor struck, I did all the right things: shouted *"Jishin!"* (Earthquake!) to the two children, snapped off the apartment's gas main, pushed the youngsters under the kitchen table, and joined them there as the room rocked violently around us.

As with most earthquakes in Tokyo, the rocking soon subsided, and after a few moments I got to my feet while the children remained under the table. A second later I was jolted to the floor by a sudden aftershock. Feeling slightly foolish, I looked up after a time and saw the face of Tatsuo Kimura regarding me from the kitchen door.

"Graves-san," he said politely, "if that were a real earthquake, the children would be fine. I am sorry I cannot say the same for you."

No one knows how many lives Mr. Kimura's earthquake truck has saved—only the future, and a massive shock in Tokyo, may tell. Against that grim possibility Tatsuo Kimura and his crew tour the neighborhoods of Japan's capital for their employer, the Tokyo Fire Department, teaching as

Invasion of things Western first took a foothold in the Ginza district, where traditional kimonos occasionally pass glitzy mannequins. But the high-fashion path that the world now beats to Tokyo is two-way: While Western models are de rigueur here, their Japanese counterparts steal the show in New York and Paris. The Ginza has long had the luster of money about it. It was the site of the mint (gin means "silver") from 1612 to 1800. Today a square foot of Ginza real estate commands $18,000.

many as possible of the city's 12 million residents how to survive a major earthquake.

The half-hour course includes a brief lecture and an optional test in the large chamber on Mr. Kimura's truck. The chamber is furnished like a typical Japanese kitchen, and it can be shaken by a powerful hydraulic system at any level on the Japanese earthquake scale.

Mr. Kimura seldom pushes the controls beyond level 3, though in fact the machine can go as high as level 7, the top of the Japanese scale. That is one level above the force of the 1923 earthquake that claimed as many as 140,000 lives in the Tokyo area.

During a later test, I performed to Mr. Kimura's satisfaction. I asked him then who had invented the earthquake truck.

"I am not sure," he replied, "but I believe it was developed in this country." He smiled modestly. "Who but a Japanese would think of such a thing?"

PRECISELY that question is echoed around the world today with a mixture of envy and frustration. Thanks to the same technology and skill that produced Mr. Kimura's earthquake truck, Japan has captured global markets in everything from motorcycles and minicomputers to laser-disc video systems and, more recently, high-fashion design.

The result is a staggering Japanese foreign trade surplus approaching 100 billion dollars, 85 percent of it with the United States alone—a fact that does little to improve Japanese-American relations. Although cracks have begun to form in the foundations of Japan's success, they are still barely visible, and time alone will tell whether they mean serious trouble ahead.

At center stage stands Tokyo, glittering symbol of the country's new wealth and international influence. Once a manufacturing giant itself, Tokyo has long since been transformed into a control room for the colossal economic engine that is Japan's modern industry.

Tokyoites respond to their new global status with a mixture of pride and a lingering sense of inferiority. In the land of the world's most advanced and efficient automakers, some customers nevertheless order a Mercedes or Ferrari from abroad with left-hand

drive, the wrong side for Japan, just so there will be no doubt that the machine is imported.

Other imports bear stunning price tags. On one of my first days in Tokyo after an absence of many years I went on a window-shopping tour along the Ginza, still the commercial heart of the city. In terms of dress the crowds that swirled around me might have come from any large Western city. The kimono has virtually disappeared, and instead all is designer jeans, T-shirts, well-cut business suits, and the very latest in women's fashions.

What Tokyo buys is as striking as what it wears. In a specialty shop just off the Ginza, I found imported cantaloupes priced at 10,000 yen (roughly $65) apiece, apples for $5.25 each, and a box of gleaming cherries at a cost of $240. I stopped to count the cherries—there were 104 of them, for an average of $2.30 per cherry.

In part such prices stem from the cost of Tokyo itself: Not far from the specialty shop lies the city's most expensive land, an area of the Ginza selling for $18,000 a square foot.

Space, or the lack of it, rules every aspect of Tokyo life both at work and at play. No import today carries a higher price tag than that venerable Scottish pastime, golf. Nine out of ten golf courses in Tokyo belong to private clubs, and a membership in one of the best recently cost $900,000.

"Many clubs have stopped taking new members," a Japanese golfer explains. "As a result, memberships are often bought and sold like stocks—more for the investment than for the pleasure of the game.

"Even so," he adds, "most clubs are hopelessly crowded. If I want to play at my club on a weekend, I have to reserve a month in advance. At a public course on *any* day of the week, I have to reserve three months ahead and pray for good weather—there is no such thing as a rain check."

All honor to the children: *A seven-year-old daughter's portrait is preserved at Meiji Shrine on Seven-Five-Three Day, celebrated for children of those years, around November 15. Such ages were considered milestones for the young to achieve in bygone days of high child mortality.*

Humble fishing village *called Edo became a powerhouse after Tokugawa Ieyasu* ***(left)****, first of a great dynasty of shoguns, or military rulers, chose it as his headquarters in 1590. After the shogunate fell in 1867, Edo was renamed Tokyo—the new capital. Disaster has continually changed the city's blueprint. In the great fire of 1657 many of the 100,000 victims perished when trapped by the Sumida River. As a remedy, one of the first bridges built was the Ryogokubashi* ***(right)****. Mount Fuji, beyond, still skyscrapes the horizon* ***(below)*** *when smog and haze abate sufficiently—now an average of 78 days a year, compared with 13 in 1965. The Sumida, however, remains polluted. With the vertical reach for living space, sunshine rights are a burning issue, and developers are required to compensate those overshadowed by their buildings. The city's open space totals only 10 percent.*

TOKYO KAIJYOU CO. LTD. (FACING PAGE AND ABOVE)

LIKE NEARLY ALL great modern cities, Tokyo long ago took to the air to ease its space problems. Though it is no longer the world's largest metropolis—Mexico City and São Paulo, Brazil, both have larger populations—Tokyo nonetheless jams its 12 million residents into 800 teeming square miles and moves them around the city with legendary efficiency. Yet the cost is considerable. The Japanese National Railways alone, which serves Tokyo as well as the country, has a current deficit of 85 billion dollars—greater than the Mexican national debt.

Only one-tenth of Tokyo is open space, as compared with Washington, D. C., which has 34 percent devoted to parks and public areas. But what little open space Tokyo has, it cherishes dearly and sees to it that others may do the same. "This city," says an expatriate New Yorker admiringly, "is probably one of the very few left that's so safe the parks at night are still for lovers."

Home, on the other hand, is no place for lovers. The average Tokyo family of four occupies a mere 700 square feet of living space, about the same as an American one-bedroom apartment. If the Tokyo family wants to buy a modest two-bedroom condominium in the downtown area, prices start around $400,000.

And still the Japanese flock to Tokyo. The city has one-tenth of the country's population but relatively few natives—three out of every four Tokyoites were born someplace else. Like the rest of their countrymen, Tokyo residents are the longest-lived people in the world today, reaching an average of 74.5 years for men and 80 for women.

With the continuing influx the only direction is up, and as Tokyo soars skyward, it is increasingly concerned with the health of those below. The city has pioneered in what the Japanese call *nisshoken*—sunshine right—a law requiring compensation for residents who are cast into shadow by neighboring tall buildings.

"Nisshoken is important, especially in winter," declares a Tokyo lawyer specializing in the field. "Unlike Americans, we Japanese have almost no central heating, and we depend on sunlight in winter to help warm our houses."

By a complex formula the law requires high-rise builders to pay households they overshadow a onetime compensation ranging from $420 to $1,260 for each hour of sunlight lost on a winter day.

Special cases, particularly those involving children, have resulted in far higher settlements. According to one story, the builder of a skyscraper in the prosperous Shinjuku area failed to take nisshoken into account. Halfway through construction he found, to his horror, that the building would permanently overshadow a neighboring kindergarten playground.

Whether from an excess of public spirit or

an effort to avoid a ruinous suit by the outraged parents, the builder added a playground on the top of the skyscraper.

Not every case of nisshoken is settled as happily. Akira Matsumoto, as he asked to be identified, is a quiet man in his 50s who lives with his wife and two children in a second-floor apartment above the family's small rice shop in the Jimbo-cho area.

The Matsumotos today live in perpetual darkness, thanks to high-rise buildings on three sides and a doorway facing north into a narrow street.

"The builders *(Continued on page 620)*

Generations apart *suggest a shift in society. The middle-aged embody Yamato damashii, the "Japanese spirit" that rebuilt, in an economic eye blink, a war-torn nation into one with a trade surplus nearing 100 billion dollars. Young people have been called the "bean-sprout generation"—fast-growing but weak, more leisure-oriented, less dedicated to the company. In a recent survey, fewer than half the new job recruits planned to stay with their first firm until retirement.*

TOKYO: Giant in motion

WORLD'S LARGEST CITY in the early 18th century ***(below)****, Edo contained 1.3 million people. With its castle now the Imperial Palace, the emperor's home, the old town is the hub of metropolitan Tokyo* ***(right)****, with 12 million people shoehorned into 800 square miles. Toshima-ku, the most crowded ward, counts 57,200 per square mile.*

The city's history is much more of the mind than the eye. From hundreds of earthquakes and fires, typhoons and floods, Tokyoites have rebuilt, creating a numbing urban hodgepodge. Here and there green walls of oxidized copper testify to the prewar era in buildings that survived the catastrophic U. S. firebombing in 1945. It destroyed almost half the city and killed nearly 100,000. Today rebuilt, the city is laced together by an efficient subway system of ten lines totaling about 150 miles, as well as the 101-year-old Yamanote Line that loops central Tokyo.


KITA-KU
ARAKAWA-KU
TAITO-KU
BUNKYO-KU
SUMIDA-KU
JUKU-KU
CHIYODA-KU
KOTO-KU
CHUO-KU
MINATO-KU
MINAMISUNA
Railroad, station
Expressway
Subway
Map represents central Tokyo
ASUKAYAMA PARK
SHINKANSEN (BULLET-TRAIN LINE)
YAMANOTE LINE
RIKUGIEN GARDEN
KOISHIKAWA BOTANICAL GARDEN
UENO PARK
University of Tokyo (Tokyo Imperial University)
UENO STATION
ASAKUSA PARK
Asakusa Kannon Temple
Earthquake Memorial Hall
JIMBO-CHO
Kanda Myojin Shrine
Ryogoku Bridge
National Theater
Imperial Palace
TOKYO STATION
Police Supply Exchange
NIHONBASHI
National Diet Building
GINZA
Kabuki-za Theater
U. S. Embassy
ROPPONGI
Tokyo Tower
Sumida
Keio University
TOKYO HARBOR
Sony Corporation
SHINKANSEN (BULLET-TRAIN LINE)
0 1 km
0 1 mi
NGS CARTOGRAPHIC DIVISION
DESIGN: DAVID E. CHANDLER
RESEARCH: DOROTHY A. NICHOLSON, BARBARA F. HOLLAND
PRODUCTION: JAMES E. McCLELLAND, JR.
MAP EDITOR: JOHN T. KLOSS

PEABODY MUSEUM OF SALEM, MASSACHUSETTS

Getting down to business *after quitting time, office workers depart a Shinjuku complex* (**left**) *for a round of drinks and dinner together. Stalls serving yakitori—barbecued snacks—are favorites in the Ginza* (**right**). *Far more than just a drink with the gang, the practice is called* nemawashi, *or root-binding. It cements relationships and lets workers seek consensus for new ideas in an informal group, rather than be hurt by rejection back at the office. Most companies treat the ritual as an investment, with supervisors adding it to their budgets and senior men picking up part of the tabs of their subordinates.*

Today's businessmen are spiritual heirs of the samurai, elite warriors of the Edo period. The samurai abolished their own special status amid the winds of modernization, spurred by contact with the outside world, that swept through Japan in the 1870s. In a ceremonial and nostalgic display (**above**) *a group of samurai don their old swords and armor—declared illegal as everyday dress after 1876—to honor the adoption of the Meiji Constitution of 1889, 21 years after the fall of the last shogun.*

Only a few are out of step *with the pace of prosperity, as revealed by a lunchtime scene in Shinjuku. Tokyo's unemployed reflect the low national rate of 2.7 percent. Many of the down-and-out work as day laborers.*

With less work and more play the aim of the young, the work week is shrinking from five and a half to five days, and the leisure industry now produces 16 percent of the gross national product. New applicants seek "in" jobs with trendy firms such as liquor producers.

would not listen," Mr. Matsumoto told me sadly. "We asked them to leave a little space between their walls and ours, so a bit of sunlight would filter down. But they were greedy and built right up against us."

The case went to court, but for reasons still unclear the family lost. The builders thereupon offered a pittance in compensation. Mr. Matsumoto refused, not because of the amount but because, as he told me, "One does not sell the sunlight from one's life."

I asked why he didn't move, and he shook his head. "I have spent my whole life selling rice in the Jimbo-cho area. Where would I

find such wonderful neighbors and customers again?"

To older Japanese, Mr. Matsumoto's staunch resistance is an example of *Yamato damashii*, or Japanese spirit, which succeeds when all else fails. Many adults today believe the younger generation is sadly lacking in such spirit.

"Our young people have been called *moyashiko*—the bean-sprout generation," a Tokyo businessman told me. "Like bean sprouts they grow fast and in the dark and have no strength."

Such sentiments are universal among adults the world over, but the Japanese character lends special emphasis.

"Older Japanese made enormous sacrifices to rebuild their country after World War II," says Tracy Dahlby, a highly respected American journalist based in Tokyo for many years. "Those people created something of a miracle in their own eyes, and they expect a measure of sacrifice from those who are going to inherit it.

"Of course," Tracy adds, "many younger Japanese know very little of World War II—to them Pearl Harbor is simply a popular honeymoon resort."

ONE OF THE MAJOR SACRIFICES demanded of young Japanese today concerns education. So extreme is parental pressure to gain entrance into good schools and universities that Japanese refer to the selection process as *shiken jigoku*—examination hell.

"We even have entrance exams for kindergarten classes!" declares Atsuko Takagi, an attractive 21-year-old junior majoring in design at a top Tokyo university. I met Atsuko one evening along with a group of her fellow university students at a small café in Shinjuku.

Inevitably talk turned to the bean-sprout label, and reactions were mixed. Some of the group flatly rejected the charge, and others simply considered it outdated.

"I think it is a matter of different values," a young history student remarked. "Our parents worked hard to build Japan into a prosperous country, and to them the symbols of wealth are important: Some people show off their child's university diploma as if it were a brand-new Nissan limousine. But to us it is more important where you go in the Nissan than who sees you driving it."

"It is extremely difficult to get into a good university," Atsuko added, "but once you are accepted, it is easy to stay there. The university does not require you to work, and many students hardly ever open a book. Yet they receive their diplomas just the same."

Another student nodded. "Some Japanese companies are just as bad," he said. "When they interview graduates for jobs, they do not look for brains or imagination. They look for people who are popular and get along with others—what you Americans

call team players. The companies tell the student, 'Never mind your grades; we will take you and then train you our way.' "

THINGS ARE DIFFERENT at Sony. The giant Tokyo-based electronics firm that has become a world symbol for Japanese quality and craftsmanship has no interest in mediocrity. To maintain sales of seven billion dollars a year, Sony hires only the best. The company looks at everything from grades to background and character before choosing and training its future executives.

Despite a crowded schedule, Sony's co-founder and current chairman of the board, Akio Morita, agreed to meet me at company headquarters in south Tokyo.

Mr. Morita's research-and-development teams are currently at work perfecting an ultra-high-quality video system that may one day become the world standard for television broadcast and reception.

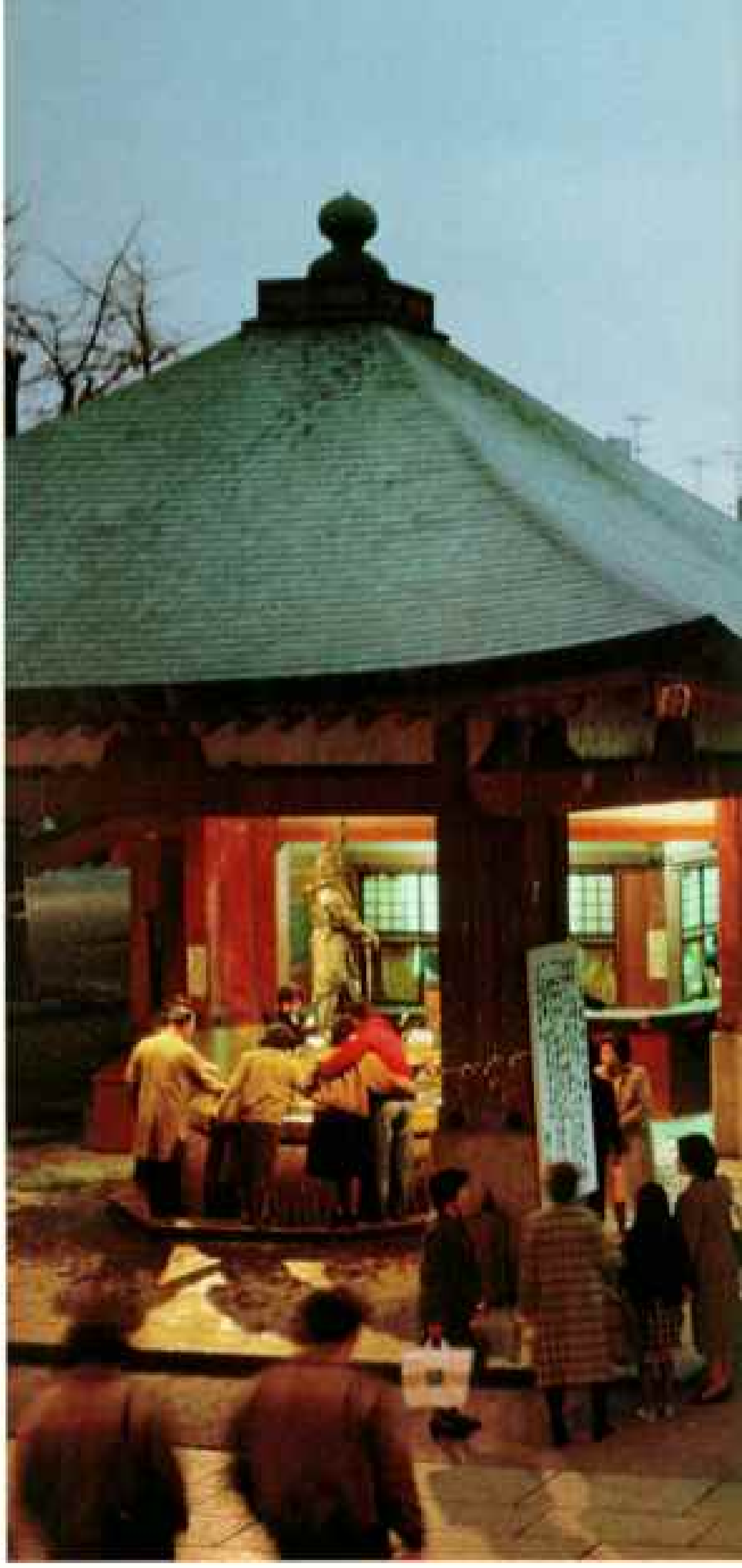
"We call it the Sony HDVS, for high-definition video system," Mr. Morita explained. "Today in your country the standard television screen contains 525 'scanning lines,' or horizontal lines, that make up the picture. The HDVS has more than twice that number—1,125 lines, to be exact. The improvement in picture quality is quite noticeable."

Stunning is more like it. I later watched an HDVS test featuring scenes of a candle flickering in a breeze. One could virtually feel the heat of the flame, and when the candle blew out, I half-expected the smoke to come out of the video screen.

I asked Mr. Morita how Sony managed to read the American market so successfully, producing one runaway best-seller after another in the electronics field. For the first time he smiled.

"Many reasons," he answered, "but I would say the first three are quality, quality, and again quality. Many Americans think that is something new to Japanese industry, but quality is an age-old tradition among us.

"It is true that before World War II we exported cheap products to the United States. But that is what America wanted from Japan at the time. Today it is far different, and the main difference is quality. I like to think Sony has had something to do with it."



DESPITE the acknowledged high quality of Japanese goods, the country's huge trade surplus stems from other factors as well, not all of them universally admired. Many countries complain that Japan exports its own goods freely but refuses to buy from others in return.

"They have a point," says Bill Rapp, an expert on Japanese economic affairs and a senior executive with BankAmerica in Tokyo. Amid the barrage of threats and accusations from both sides in the U. S.-Japan trade dispute, I turned to Bill for facts.

PRIVATE COLLECTION OF JUNICHI HAYASHI

Haven for body and soul, *the Buddhist temple of Asakusa Kannon* **(above)** *draws multitudes to burn incense and enjoy shops and amusements. When the great earthquake of 1923 touched off an inferno* **(left)**, *thousands flocked to the temple and were saved by its open space—but as many as 140,000 others perished. Today many skyscrapers incorporate an anti-quake design, because the earth beneath Japan never sleeps. Though few tremors are felt, an average of three a day occur.*

"They're there for anyone to see," Bill said when I called on him at his office near the Imperial Palace. "Americans tend to think of Japanese workers as some sort of super-robots who can outproduce anyone in the world. But that's nonsense. The fact is that per capita productivity in the United States today is still roughly 28 percent greater than in Japan.

"Basically," Bill added, "three main industries keep this country rolling. They are automobiles, steel, and electronic goods, and the Japanese government has protected and subsidized all three at one time or another. The idea of Japan's superefficiency in every field is simply a myth." I started to interrupt, but Bill held up a hand.

"Consider these points. The Japanese economy is fast becoming like ours—that is, a service economy specializing more in distribution and retail than in manufacture. It's already a 60 percent service economy, compared with our figure of 70 percent.

"But Japan's retail-and-distribution system is incredibly archaic and inefficient. Even in Tokyo it's nearly all based on the small one-family shop or firm that occupies space but is barely marginal. As a result, there's very little mass distribution here as we know it—and you can't run a service economy today without that."

If Japan is so inefficient, I asked, how does it pile up a hundred-billion-dollar foreign-trade surplus in a single year?

"Hard work in the export field," Bill acknowledged, "and with the help of extensive trade barriers. Let's take wood products for example. In this country today there are approximately 700 plywood manufacturing plants, and probably less than 50 of them can compete with foreign producers in terms of cost and efficiency. But just try importing a shipment of plywood from Seattle and you'll run into high tariffs and more red tape than you can believe.

Making a wish *for heroic strength, students practice on a professional sumo wrestler* ***(facing page)****. Sumo is still a big draw, but it cannot match baseball mania. Fans of Tokyo's Seibu Lions* ***(below)*** *return by subway from a game of the 1985 Japan Series; the Lions ultimately lost to Osaka's Hanshin Tigers. Tokyoites also relish tennis and golf, but a golf club membership can cost $900,000.*

"It's the same with all kinds of imported goods," Bill added, "from petrochemicals and telecommunications equipment to rice and even aluminum baseball bats. It's not just the U. S. that's complaining. Labor-intensive countries like Taiwan and South Korea are hurting even worse, because there's no way they can invade the Japanese market with their low-priced goods."

JAPANESE INDUSTRY has already undergone a massive invasion at home by a relatively new phenomenon—the working woman. From a state of virtual unemployment following World War II, Japanese women today constitute nearly 40 percent of the country's work force and are gaining rapidly on the men.

"But not in terms of salary," declares Mariko Fujiwara, a director of research at Tokyo's Hakuhodo Institute of Life and Living. "The Japanese woman," says Mrs. Fujiwara, "receives little more than half the

A long hot soak together *keeps the gossip flowing in the sento, or public bath. A father follows parental duty by bringing in his young daughter for a scrub, at left, but for adults the facilities have long been segregated. Mixed bathing, practiced*

after the first commercial bath opened in 1591, now survives mostly in a few hot-spring resorts in the countryside. The sento lives on by both tradition and necessity, since one-fourth of the city's housing units still lack private baths.

salary of a man doing comparable work. There's still a strong attitude here of the young woman employee as *shokuba no hana*, or office flower, who's there more for decoration than for actual work."

At least one woman in Tokyo performs both functions superbly. Kiyomi Saito is a highly successful international bond broker who at 34 could pass for a Miss Universe candidate. I had seen a brief article on Kiyomi in a Tokyo magazine and called at her office at Morgan Stanley International, a global investment firm, to learn more about her.

A graduate in economics from Tokyo's top-ranked Keio University, Kiyomi worked in Tokyo for several years, was married, divorced, and then decided to visit the United States. The visit involved a master's degree in business administration from the Harvard Business School in 1981. With degree in hand, Kiyomi decided that she and corporate Japan were ready for each other.

"I was only half right," she recalled, smiling. "I was ready for *them*, but they were interested in men, not women.

"If you're a young man in Tokyo," she said, "and you want to be successful, you go to a good university, then you join a big company and get on the corporate escalator. If you have brains and ambition and a little

patience, you can ride that escalator all the way to the top.

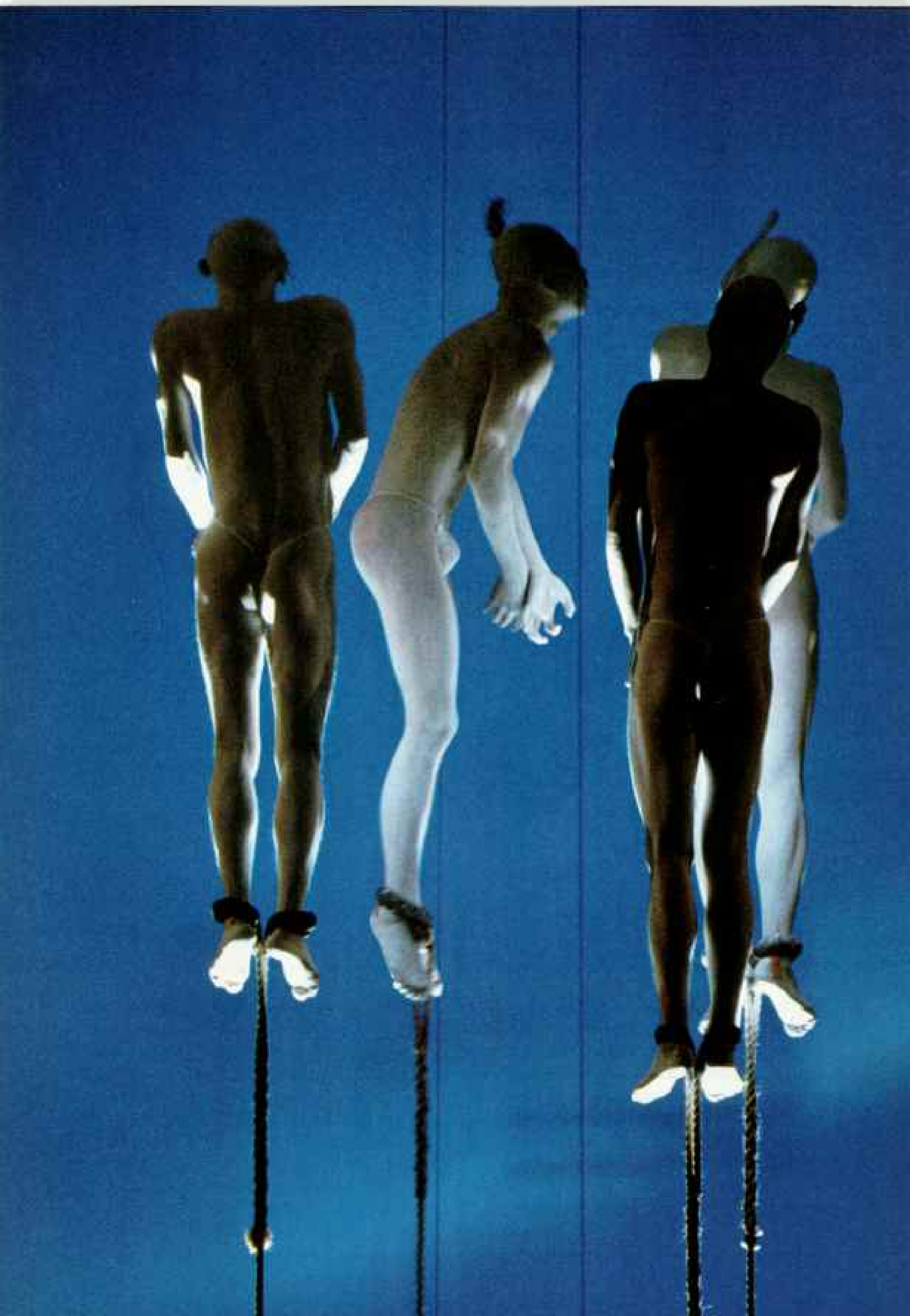
"But if you're a woman," Kiyomi continued, "you can't even *find* the escalator, and if you do, somehow it's not working. When I applied for my first job here after Harvard, the interviewer asked, 'Can you play 18 holes of golf, are you any good at mah-jongg, can you drink right along with the men?' It was a long time before I found a spot where those things didn't really matter."

On a good day now Kiyomi may sell 50 million dollars' worth of U. S. Treasury bonds, Eurobonds, and such things as "lollipops," broker's slang for bonds issued by the Louisiana Power & Light Company. She likes her position at Morgan Stanley and works well with major Japanese firms. I asked if she would ever join such a firm, and she smiled.

"If I ever did," she answered, "you'd see a lot more women on the escalator."

I THOUGHT OF KIYOMI and her escalator not long afterward in a Tokyo department store. In such places tradition dies slowly, and teams of attractive young women still greet shoppers at the entrances to escalators with a graceful bow and a murmured *"Irasshaimase"* (Welcome). The job

"Violently running tribes," *or* bosozoku, *a generic name for motorcycle gangs, now run more cautiously after a police crackdown. This group calls itself Little Saint* ***(left)****. In an outpouring of dance and dress re-creating the fifties craze they never knew, other young people flood Yoyogi Park on Sunday, including Makoto Inagaki and his son, Tatsuya* ***(above)****.*



is literally back-bending; a Tokyo columnist once calculated that each young woman bows an average of 665,600 times a year. That was if the woman worked five days a week, the columnist explained. For a six-day week the total would be 798,720 bows.

Such minimal jobs help explain Japan's phenomenal unemployment rate of only 2.7 percent of the work force, compared with 7 percent or more in the United States. Japanese employers start young women at salaries as low as $8,000 a year and keep them on till they marry or reach the age of 30, then ease them out and replace them with younger women at the original low salary.

The mystery to Westerners is how anyone can survive on such income in a city of staggering prices. "It's simple—we just don't eat imported cherries," jokes my friend Minoru Aoo, on the staff of Tokyo's prestigious *Japan Economic Journal*.

"As for single young women," Minoru adds seriously, "they normally live with their parents till they marry. We have a saying that single young women are the richest people in Tokyo, because they're fed and housed and have all their expenses paid—except possibly for their makeup."

Other factors help, such as an income tax that averages less than 10 percent for middle- and low-income groups.

"But subsidy is really the name of the game," says Minoru, who represented the *Journal* in Los Angeles for several years. "Few people could make it in Tokyo unless their company helped them out in a number of ways.

"I have a friend," he said, "who's married and has two children. He earns about $42,000 a year as a sales manager for a big Tokyo steel firm. Since his company owns his apartment building in the suburbs, he pays only $80 rent a month for what Tokyo real estate agents call a mansion—two tiny bedrooms, plus a kitchen, dining room, and living room.

"The company also pays for his parking space at home, his yearly pass on the commuter train, and a variety of medical and other benefits, plus quite a good pension plan. His wife doesn't work, but she's very careful with the family budget.

"Altogether," Minoru concluded, "they lead a pretty good life, including tennis on weekends, piano lessons for the children, and a couple of family vacations a year. And they still manage to save 20 percent of their income—the rule of thumb for most Japanese families."

One of the specters that haunts people like Minoru's friend is the possibility of being transferred to another city, either in Japan or abroad. Though companies normally pay a substantial part of the costs of moving, many families cannot face the prospect of

Master of persuasion, *Tojuro Sawamura* ***(below)*** *prepares for the role of a samurai's lover in a Kabuki play at the National Theater. Men have been cast in female roles since women were banned from Kabuki in 1629. In avant-garde dance called buto, members of the Sankai Juku troupe make their entrance* ***(facing page)****. Last year in Seattle one was killed when his rope snapped.*

***Identity masked**, a protester (**left**) demands freedom for a convicted murderer. Supporters claim prejudice because he belongs to the* burakumin, *descendants of outcasts whose tasks, such as slaughtering animals, were regarded as unclean.*

*For a mark of distinction, a customer is adorned by a tattoo artist (**right**). The profession has close ties to the underworld yakuza that deals in organized vice and accounts for much of the city's minuscule crime rate.*

uprooting themselves and their children and beginning a new life elsewhere.

The result is a significant number of what the Japanese refer to as *tanshin funin zoku*—single-body transfer people—men who leave their families behind and move to other cities, often remaining for years with only rare visits home.

The effect can be devastating on the Japanese family, the very unit the husband and wife sought to preserve. Divorce and juvenile delinquency, both rarities in years past, are on the rise, and some Tokyo housewives whose children have grown up and left home have taken to prostitution. "It's rarely just for the money," a marriage counselor assured me. "For most wives it's more a matter of companionship—anything is better than being totally alone."

NO AMERICAN, at least, can feel totally alone in Tokyo—the city is too much like home. Despite the highly publicized flood of Japanese goods pouring into the United States, things American somehow continue to find their way into nearly every corner of Tokyo life. Witness, for example, the astronomical success of Tokyo's new Disneyland and the fact that one of the highest priced issues on the Tokyo Stock Exchange is Seven-Eleven Japan. In everyday Tokyo life, however, nothing is more visible and quintessentially American than the T-shirt, nearly always inscribed in English.

During my travels around the city I made note of some of the more bizarre slogans displayed on T-shirts. Some were nonsensical, such as "Summer Is Born of the Passion of 1921" and "Dreamfashion Expects 100% Powerful Action." A second type featured presumably intentional puns such as "Afternoon Coffee Brake" and "Planter's Pinch."

Finally, a third category seemed born of subtle but unconscious error. One of my favorites adorned a strikingly pretty girl and read simply, "The Real McCloy." But the all-time winner was worn by a bespectacled and extremely sober-looking university student that proclaimed "Ivy's League."

In Tokyo's more rarefied realm of high fashion, Western influence is equally strong. The majority of professional models in the city's world of haute couture are American and European women. Conversely, Japanese models have become increasingly popular in the New York and Paris salons. The seeming paradox is a familiar story to Fumihiko Umezawa and his colleagues, for they have been reshaping Japanese faces to look like Western ones for more than half a century.

Dr. Umezawa is assistant director of Tokyo's famed Jujin Hospital, a center of cosmetic surgery that has served Japanese and foreign women since 1933 (page 643). Dr. Umezawa graciously received me in the hospital's consultation room, whose walls are

adorned with impressive before-and-after photographs of former patients.

The most common operation today, Dr. Umezawa said, is a fairly simple one in which the surgeon adds a fold to each eyelid.

"Most Japanese women," he explained, "have the so-called single eyelid, a totally smooth layer of skin without a crease in it. By contrast, many Western women—especially models—have the double eyelid, with a horizontal crease near the edge. Your American model, Brooke Shields, has such eyelids, and they are much admired here."

I asked how complicated the double eyelid opeeration is, and Dr. Umezawa dismissed it with a wave. "In most cases," he said, "it is done under local anesthetic and takes between 10 and 15 minutes. The surgeon simply stitches a crease into each eyelid. The patient may go home immediately."

Barring complications, I learned, the basic operation costs $1,000, and nearly every patient considers it worthwhile. A Jujin face-lift costs around $4,000, compared with as much as $10,000 in the United States today.

"A number of American women used to come to us for that," Dr. Umezawa said. "But the yen is worth more against the dollar now, and perhaps it is not quite the bargain it once was."

So skillful are Jujin surgeons that American women ran the risk of difficulty on their return home. "We provided a certificate saying they had had a face-lift," Dr. Umezawa said. "Sometimes, you see, they did not resemble their passport photograph at all."

QUITE A DIFFERENT TYPE of cosmetic surgery is practiced among the *yakuza*, Japan's equivalent of the Mafia. Some 2,500 "families" totaling an estimated 110,000 members nationwide control everything from gambling and prostitution to pornography shops and "protection" for businesses.

Nowhere is the yakuza's presence more apparent than in Kabuki-cho, Tokyo's colorful nightclub and massage-parlor district in Shinjuku. After weeks of careful negotiation by a Japanese friend, one of the leaders of the yakuza agreed to meet photographer Dave Harvey and me at his Kabuki-cho office, ostensibly the headquarters of a small book-publishing firm.

They long for a little garden *and a house of their own, but many Tokyoites make do with a steel box in the sky. Modern apartment complexes mirror one another in Minamisuna district (**right**). In a similar building on land reclaimed from Tokyo Bay—a process nearly four centuries old—the family of Masahiko Iida, a systems engineer (**below**), enjoys affluence amid cramped quarters.*

Average living-space for a family of four is 700 square feet. Land is precious, rent high. But corporate paternalism often comes to the rescue by owning the building and subsidizing employees' rent as well as paying for parking at home and transportation to work.

Mr. Yoshida, as he asked to be called, proved to be a cheerful and dapper man in his mid-50s, dressed in a neat business suit set off by an enormous jade stickpin. He welcomed us with traditional cups of green tea and gave us a brief history of the yakuza.

The portrait was outrageously slanted, with little mention of crime and heavy emphasis instead on good works in the form of yakuza contributions to charity and volunteer activities during civil emergencies such as fires and earthquakes.

"Like the samurai of old we believe in absolute loyalty and discipline," Mr. Yoshida said proudly. "Disobedience or mistakes are punished by the ancient yakuza code of *enko zume*, or shorten finger. Under the code a first offense is punished by cutting off the end joint of the little finger of the offender's left hand. Normally such punishment is enough, but if the person persists in his misguided ways, another joint, and even a third and a fourth, may be removed.

"In the old days," Mr. Yoshida continued, "the offender was required to do the cutting himself, to show his spirit. But now"—a note of disapproval crept into his voice—"someone else does the cutting and often a friend of the victim even helps to hold his hand steady."

I noted that Mr. Yoshida's hands were unmarred. Later that evening he took us to a neighborhood restaurant where his *kumi*, or family, had planned an informal social gathering. Some 40 guests showed up, and though they were all neatly dressed, they were the hardest-looking lot I have seen in many a year, with not a smile among them. We took a table and sipped coffee while the members talked and visited back and forth, always with a respectful nod to Mr. Yoshida when they passed us.

I couldn't help noticing that a good many left hands lacked the end joint of the little finger, and a good many more hands were simply tucked out of sight in jacket pockets. Then an enormous man with close-cropped hair sat down nearby and put his left hand across his neighbor's chair.

I was shocked to note that four fingers of the hand lacked not just one end joint but two—a grand total of eight missing joints. I was obviously looking at one of the toughest or else the most hopelessly inept yakuza in the history of organized crime. At that moment Mr. Yoshida caught my glance and shook his head. "Ah no," he explained, "that is not punishment—as a young man he caught his hand in a milling machine."

HAPPILY FOR TOKYO it has so far escaped the worst of modern crime's most lucrative business—narcotics. Older Tokyoites assured me that despite the younger generation's many shortcomings, the use of hard drugs is not among them. To confirm the fact, I called on Hiroshi Fujita, deputy chief of drug enforcement for the Tokyo Metropolitan Police Department. Mr. Fujita informed me that my friends were sadly mistaken: In recent years the use of heroin, for instance, had grown at an alarming rate—roughly 25 percent in a single year.

In my own city of Washington, D. C., which has about one-twentieth the population of Tokyo, the number of arrests for possession of heroin averages more than 1,700 a year. I asked Mr. Fujita what the figure was in Tokyo, and he gave me a grim look.

"In 1983," he replied, "we had 29 cases of suspected heroin possession in Tokyo. The next year the number had grown to 36 cases—an increase of nearly a quarter."

The figures seemed ridiculously small for a city of 12 million people, and my surprise must have shown. Mr. Fujita misunderstood. "Of course," he added quickly, "those were *suspected* cases—the convictions were not so numerous."

However small the crime in Tokyo, it is seldom forgotten; the memory of the law is as long as its proverbial arm. My friend Dai Iwai, the National Geographic Far East representative, has his offices in the Roppongi entertainment district of Tokyo. In 1975 a bicycle belonging to one of Dai's employees was stolen from the rack outside the building. The police were duly notified and given the serial number that each of Japan's estimated 55 million bicycles have indelibly stamped on the frame.

Last autumn, slightly more than ten years after the theft, a policeman appeared at Dai's office with the stolen bicycle. It had been identified a day or two earlier in a routine check of a subway-station parking lot.

Every now and then, however, Japanese

Success runs in the family, *and grades are rungs on the ladder, so Tsunekazu Matsudaira keeps a close eye on the homework of his elder son, Kazuhisa (**left**), who hopes to become a teacher. He and his brother have no tutors, unlike many middle-class children, and rely solely on their parents for help.*

*An executive with Kokusai Denshin Denwa, Japan's major telecommunications corporation, Matsudaira owns a Western-style home in the fashionable Seijo area (**below**). His family, prominently intertwined with Japan's history, includes a grandfather who served as ambassador to the United States and a great-grandfather who was in line to become shogun before the overthrow of the regime.*

ingenuity gets the better of Japanese justice. Tokyoites still smile over the unknown genius who built an exact replica of a bank's overnight deposit box. After dark he attached the replica to the wall of the bank alongside the real deposit box and put a sign over the latter: "Out of order, use other box." Early the next morning he collected the night's receipts and disappeared forever into Tokyo legend.

WHEN it comes to exact replicas, Yasuaki Iwasaki and his team of master craftsmen have few equals in the world. At their kitchen workshop in the Ota-ku area of Tokyo they create a dazzling array of culinary masterpieces ranging from tender filets mignons and grilled Dover sole to delicate chocolate mousses and wafer-thin meringues that would bring tears of envy to the eyes of a French pastry chef.

Every item is for sale, and none is for consumption, since Iwasaki creations are fashioned of vinyl plastic and are strictly for display. One sees them throughout Japan in restaurant and tearoom show windows, enticing customers with such startling realism that newcomers are often fooled into thinking them actual food.

At Mr. Iwasaki's invitation I visited the four-story Iwasaki Company food workshop and followed him cautiously among mountain ranges of unfinished chocolate sundaes, pizzas, and that fairly recent Japanese craze, Big Macs.

Plastic food displays are something of a Japanese specialty, and I asked Mr. Iwasaki how the idea originated. "From funerals," he answered. "Traditionally at Buddhist funerals a symbolic offering of food is placed with the body. Often the foods were made of wax, and some were so realistic I believe they inspired the idea of displays for the living."

No item in Mr. Iwasaki's catalog is cheap. A Big Mac, for example, lists at $18—roughly six times the cost of the real thing. For $1,750 one can order an elaborate custom-made wedding cake, and $300 buys a whole raw fish so lifelike it almost wriggles before one's eyes.

Because of the Japanese love of raw foods, Mr. Iwasaki devotes an entire floor to

such displays. We paused beside two older workers who were carefully hand-painting samples of sashimi, or sliced raw fish, and a variety of sushi balls. I remarked that the results looked astonishingly real, and Mr. Iwasaki gave me an injured look.

"To be a sushi chef in a restaurant," he said with dignity, "requires no more than four or five years' apprenticeship. But to be an *Iwasaki* sushi chef, one must train many more years than that."

Soaking away jet lag. *Tooru Imafuku, a pilot and 14-year veteran of All Nippon Airways, relaxes in his Setagaya district home with his children—Arata, in his arms, Wataru, left, and Kaoru, rear. For their children's future, as well as their own retirement and medical emergencies, most middle-class parents manage to save 20 percent of their income.*

THE ELECTRONIC AGE is fast overtaking Mr. Iwasaki's business of display. At a science exposition in the city of Tsukuba north of Tokyo I watched a modeling demonstration conducted by computer imaging in the kimono section of a Seibu department store. By means of a system combining the computer with a laser disc, a customer can project her own portrait on a video screen wearing any one of 59 patterns and colors of

***An "A" in cleanliness** goes to pupils who serve lunch (**below**) in their classrooms at private Rikkyo Primary School. Day one of a child's education is recorded by parents at Bancho Elementary School (**facing page**). The continuing pressure-ridden process to enter top schools is termed examination hell and can even include entrance exams for kindergarten.*

kimono stocked by the store. The image was realistic, but it struck me as slightly gimmicky. Most women, after all, prefer to try on a dress physically, to see how it feels as well as looks. The Japanese saleslady undertook my education.

"To put a kimono on properly," she explained, "requires at least 20 minutes. If a customer wanted to try on each one of our 59 patterns, it would take her more than 19 hours. This way"—she gestured at the screen—"it takes less than ten minutes."

Ironically such speed and precision have doomed the kimono itself, at least in terms of its creation by age-old techniques. I talked one day with Yasutaka Komiya, a wonderfully burly but gentle man of 61 who resembles a wrestler far more than what he is—a traditional dyer of kimono fabric whose genius has earned him the revered Japanese designation of living national treasure.

Like his father before him, who was also a living treasure, Yasutaka Komiya dyes the fabric by use of traditional hand-cut rice paper stencils, which he orders from a few surviving stencil cutters.

"They are dying out," he said of the cutters. "The stencils are now made by computer-guided machines and they are clever imitations, but still that is what they are—imitations. Anyone can tell the difference."

I frankly could not, when Mr. Komiya showed me samples. The designs were so intricate—they are still known as *Edokomon*, or roughly "Edo small design"—that it was hard to tell the handmade item from the machined copy. I had no trouble, however, appreciating the extraordinary beauty of the fabric he dyes by the ancient method.

"It, too, will pass," he said of the technique. "First the stencils and then the dyeing; there is little hope for either one. I do not believe others will take up the art in an age when technology replaces the human hand, even though it can never replace the spirit."

To Mr. Komiya the loss is more than the passing of a treasured art form; it is a threat to the quality of all Japanese life.

"In the past we have abandoned a good many of our traditions," he told me, "and we have paid dearly for it. If we continue to follow that path, in time we will become mere copies of what we once were, just like the stencils. I fear that is the way Tokyo and this country are going."

OTHERS have more confidence in Tokyo's future. During my last days there I called on two men, both devoted in separate ways to the quality of their city's life. The first was Koji Kakizawa, a brilliant representative from Tokyo to the Diet, Japan's national legislature, who at 52 is a symbol of the city's achievements in the environmental field.

Mr. Kakizawa's home district includes Nihonbashi, the heart of old Tokyo, located beside the Sumida River. As a boy in the

1930s Koji swam and fished in the river, experiences he still recalls with pleasure.

"It was a fine clean river in those days," he told me at his Diet office overlooking the city. "Then came the war and massive industrial expansion, followed by the destruction and gradual rebuilding. Those were hard times, not prosperous ones, and Tokyo gave little thought to the quality of life—we were grateful for any life at all."

The Sumida became an open sewer that neither fish nor child dared venture into. "There were geisha houses along the bank," Mr. Kakizawa recalled, "and the methane gas from the river was so powerful it turned the silver pins in the geishas' headdresses black overnight. Eventually the houses moved away."

The Tokyo Olympics of 1964 with its tens of thousands of foreign visitors focused the city's attention, and shame, on its appalling pollution. By then Tokyo traffic policemen assigned to duty at downtown intersections had taken to carrying small cylinders of oxygen with them for an occasional breath for relief from the automobile exhaust fumes.

In 1967 the Diet passed landmark legislation that launched Tokyo and Japan on their long and remarkable comeback. Subsequent laws sponsored by Koji Kakizawa and his fellow environmentalists in the Diet have made Tokyo one of the cleanest big cities in the world, with many pollution standards considerably higher than those in the United States.

"We have come quite a distance, but there is still much to be done," Mr. Kakizawa said as I rose to go. I asked if he had any particular goal, and his answer was instantaneous: "To swim with my grandchildren in the Sumida River!"

FINALLY there was Kiyoshi Muto, a man as diminutive in size as his stature is great among architects of the world. Professor Muto has spent most of his 83 years attempting to ensure that no earthquake will ever again bludgeon his city to death as did the shock of 1923.

At that time young Kiyoshi was an engineering student at Tokyo Imperial University. On the terrible day the earthquake struck, Saturday, September 1, Kiyoshi was visiting a professor's home near Aomori, 350 miles to the north of Tokyo. That probably saved his life and later inspired him to pursue his ultimate career.

When transportation was finally restored and Kiyoshi could return to Tokyo, he was appalled to find the city flattened—the earthquake and fire had destroyed half a million houses, plus a number of modern concrete buildings. It was sometime during the first week that Kiyoshi saw the pagoda.

"It was an old one, in Ueno Park," Professor Muto told me over coffee one afternoon at his office in a Shinjuku skyscraper. "All around it was complete devastation, and there stood the pagoda—five stories and about a hundred feet of graceful wooden structure that looked as if a good breeze could blow it down. Obviously the old designers and builders knew something about earthquakes that we had forgotten."

Intrigued, young Kiyoshi threw himself into a structural analysis of pagodas, a project that resulted in a paper on the subject delivered to a world conference on earthquakes held in Tokyo in 1930.

What Kiyoshi had learned was that the old pagodas were built on a principle of flexibility, with thousands of interconnecting wooden parts that absorbed and dissipated the force of an earthquake as it traveled up and down the structure.

Over the years that followed, Kiyoshi Muto translated the principle into a design for modern skyscrapers. He called the design *jukozo*, or flexible structure, and lectured on the principle at several Tokyo universities.

From a modern perspective jukozo was a revolutionary concept, and Japanese architects were wary of it. Even as late as the 1960s Japanese architectural theory still favored extremely deep concrete foundations as the only defense against earthquakes.

Undeterred, Professor Muto conducted physical tests on his theory and pioneered in the use of computers to study the effects of earthquakes on buildings. He constructed buildings of his own several stories high and systematically crushed them with enormous hydraulic jacks in the manner of earthquakes to discover their flaws. One by one he eliminated the flaws, and architects around the world began to take notice.

"We built the first jukozo skyscraper here

Dictates of fashion *made smoking all the rage in the Edo period, as shown by a woman and her pipe* ***(right)****, despite antitobacco edicts of the shoguns. A modern craving for chic has created 53 years of excellence in cosmetic surgery at Jujin Hospital* ***(below)****, where surgeons add a fold to a Japanese woman's eyelids, making her eyes appear desirably round. Last year the hospital performed about 8,000 such operations, twice as many as a decade ago. Other patients had noses or chins restructured or received face-lifts.*

IDEMITSU MUSEUM OF ART

The young will get second billing *in the Tokyo of tomorrow, unlike the actresses on this poster. Within 15 years one of every five Japanese will be 60 or older. Life expectancy is unmatched, 80 years for women, 74.5 for men. Where will they live in a society changing from one of the developed world's youngest to its oldest?*

in 1968," Professor Muto told me. "It is 482 feet high and contains 36 stories—not a world record by any means, but the tallest building in Tokyo at the time."

Over the following 18 years Professor Muto and his associates designed some 25 skyscrapers in Japan, a few in other cities but most in Tokyo, the tallest one standing 742 feet high and containing 60 stories. Professor Muto's dream is to design a 100-story giant before he retires. Meanwhile, from a physical vantage point of little more than five feet he can survey Tokyo's soaring skyline and in a true sense call it his own.

I asked the inevitable question: What would happen to that skyline in a major earthquake, not a level 3 but a level 6 such as the 1923 shock?

"There would be casualties, of course," Professor Muto replied soberly. "That cannot be avoided, but I believe they would not be so severe as last time. As for the skyscrapers, they would stand." He smiled at a sudden image. "They would sway like the hula dancers in your Hawaiian Islands, they would bend and ripple, but they would not break and they would not fall. They are designed to stand the very worst."

I thanked him then and said good-bye. It was early April, and a week later I joined a group of Japanese and American friends at Ueno Park for the traditional cherry blossom viewing, a rite of almost mystical proportions in Japan. After a picnic lunch I took a walk through the park and came upon Professor Muto's pagoda, soaring serenely above the pale white canopy of blossoms.

In a sense modern Tokyo had begun on this spot, born of an ancient symbol of art and survival. It occurred to me that the sight would have cheered my friend Mr. Komiya, the kimono dyer, greatly. Far from abandoning the past, Tokyo is actually building on it for the future. There is no better foundation in all the world. □


三笑ノ章子
週くらら
三笑ノ章子
新珠三千代

War's most innocent victim, a child awaits treatment at a feeding center in Ethiopia run by the International Committee of the Red Cross. Founded to protect victims of armed conflict, this neutral Swiss intermediary is the conscience of an imperfect world.

A Little Humanity *Amid the Horrors of War*

By PETER T. WHITE NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by STEVE RAYMER NATIONAL GEOGRAPHIC PHOTOGRAPHER

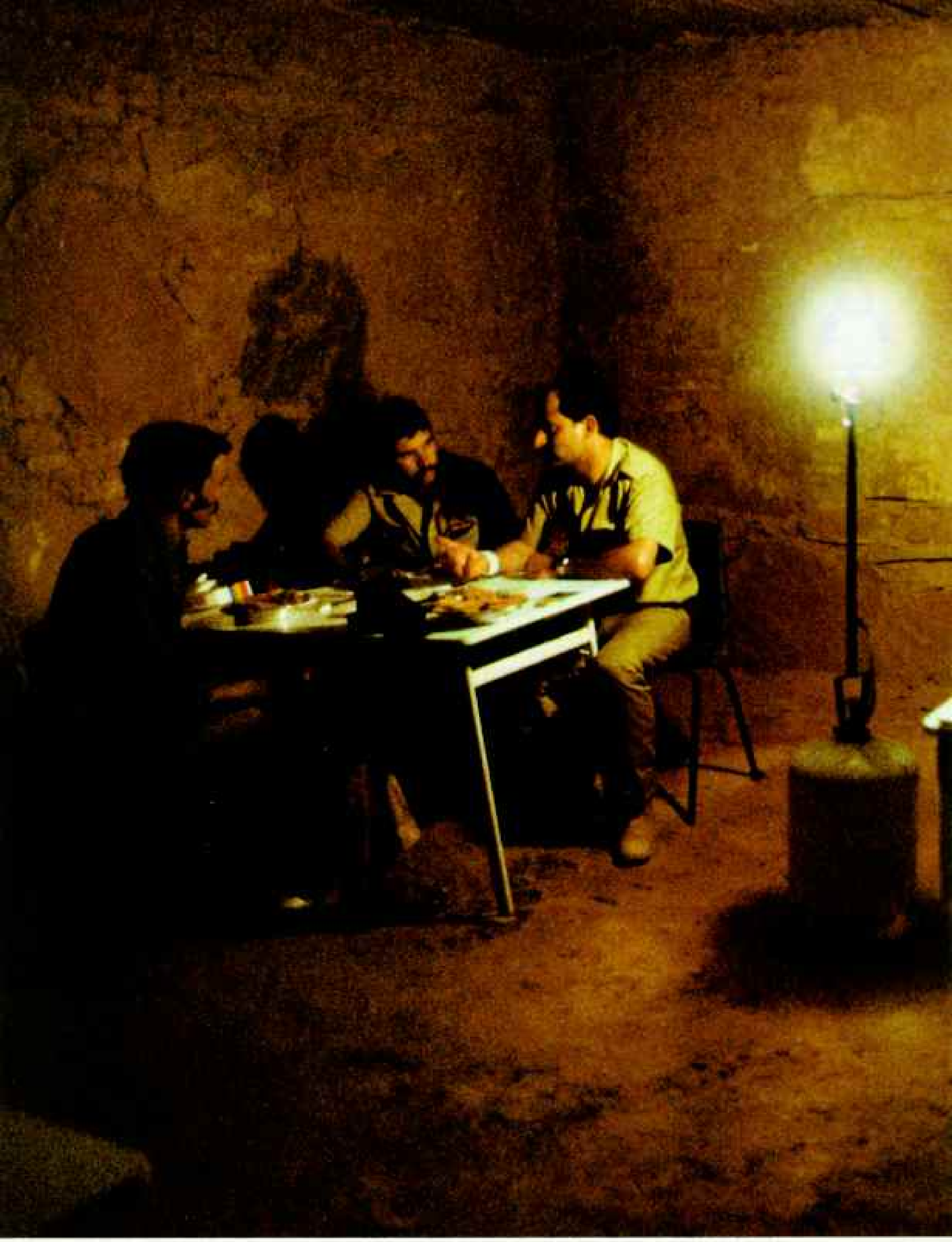
ON A HILL IN GENEVA, overlooking the spring green Swiss countryside—with a great lake and snowy mountains beyond—stands what used to be a luxury hotel and is now headquarters for an organization unparalleled in history.

It is private and composed solely of Swiss citizens. Under Swiss law it is, as its director general puts it, "an association just like any bowling or yodeling club." Yet, by solemn agreement, 164 sovereign states enable it to do an incalculable lot of good—to be a lifeline, so to speak—for hundreds of thousands of people around the world who at this moment are in danger, often deadly, and who are not and often cannot be helped by anyone else. For prisoners of war; for their families wondering if they are dead or alive; for women and children destitute in no-man's-land. For those, in short, who are victims, in one way or another, of the dozens of armed conflicts and upheavals smoldering today in so many parts of the globe. How many countries can say that some of their people may not be similar victims tomorrow?

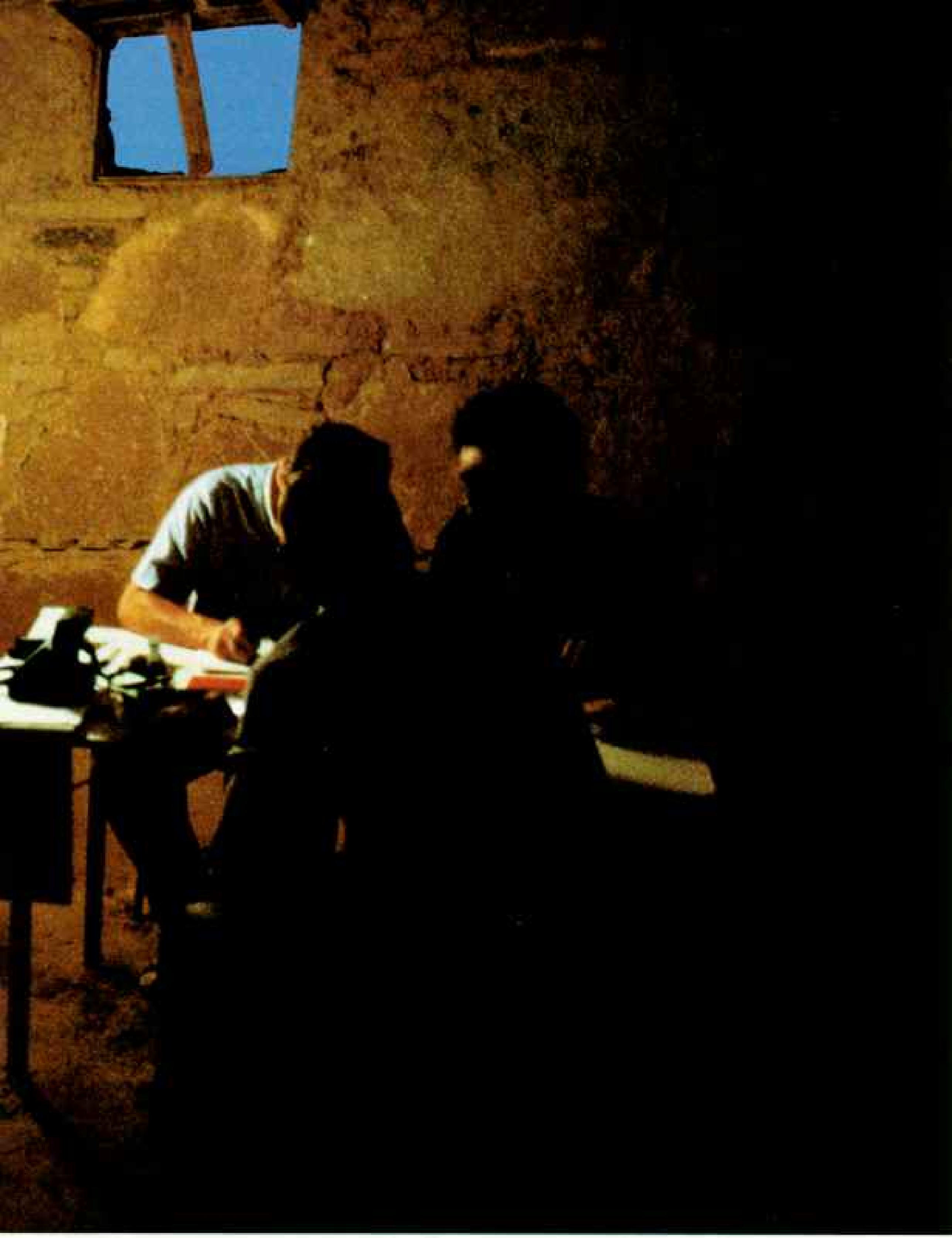
This remarkable organization—employing no more than 500 men and women at headquarters, plus some 500 delegates in the field—is ICRC, the International Committee of the Red Cross, eager to carry out its mandate under the so-called Geneva Conventions, the world's most widely ratified treaties. War between Mali and Burkina Faso? Bloody uprising in the People's Democratic Republic of Yemen? Virtually overnight, delegates are on the spot, repatriating prisoners, evacuating wounded. Some Americans in trouble also have benefited of late.

When the 39 hostages from the hijacked TWA Flight 847 were released last year in Beirut, they left in white ICRC cars with big Red Cross markings. When Iranian revolutionary guards held 52 Americans inside the U. S. Embassy in Tehran, only a man from ICRC was permitted to see them *all*. And then there was the case of U. S. Navy Lt. Robert O. Goodman, Jr., from the aircraft carrier *John F. Kennedy*.

December 4, 1983: His A-6E bomber, attacking artillery positions in Lebanon,



In the still, small hours of morning, ICRC delegates register Moroccan prisoners of war held by the Polisario Front in the Western Sahara. ICRC does not ask for release of detainees; it does send



strictly confidential condition reports to involved authorities. Its low-profile diplomacy enables it to operate on both sides of a conflict as it seeks to improve prison conditions.

is shot down. He winds up in a cell in Damascus. The Syrians call him a prisoner of war. December 8: An ICRC man brings him forms for messages to his family. Ten days after that he gets a package, via ICRC, with letters from home and clothing. Also sent in that package was a bag of gourmet jelly beans—but those, it turned out, never reached Lieutenant Goodman. Alas, not everything always goes as ICRC would like.

"They put me in touch with my husband," *says Terry Goodman, wife of U. S. Navy aviator Lt. Robert O. Goodman, Jr., who holds letters delivered via ICRC. Downed in Lebanon in 1983, he was imprisoned by the Syrians for a month.*

SOON I'LL BE WATCHING some of those delegates up to their necks in the troubles of Ethiopia, El Salvador, and the Middle East. But first—in case you've been wondering—let's clear up a couple of likely questions.

Is ICRC connected with the numerous national Red Cross societies, such as the American Red Cross? (There are 137 of them, as of this writing; total membership: 250 million.) The answer is yes, they're all part of the International Red Cross movement, dedicated to alleviating human suffering. But there are fundamental differences.

Broadly speaking, national Red Cross societies help in natural disasters—floods, earthquakes, volcanic eruptions. In wartime they act as auxiliaries to the medical services of their countries' armed forces. In times of peace they focus on doing good at home, such as collecting blood and teaching first aid; they welcome publicity and usually depend on financial support from the public. ICRC, on the other hand, seeks to protect victims of man-made disaster at any time, anywhere—in war, civil war, politically induced disturbances. It is financed primarily by voluntary contributions from governments and works as quietly as it can.

But why does it have to be all Swiss? Because that, says the director general, sustains what ICRC, as a neutral intermediary, needs most, namely the confidence of both sides in any possible conflict. He recalls why the neutrality of Switzerland was agreed on at the Congress of Vienna in 1815: "The French didn't want the Austrians to control the passes in the Alps, and the Austrians didn't want the French to control them. And so it is exactly with ICRC. What's important for the Israelis, for example, is to be certain that no Arabs or friends of the Arabs control or influence the committee. And what's important for the Arabs is that neither the Israelis nor their friends control or influence it."

The main thing, he adds, is that all ICRC people be from one single and traditionally neutral country—this assures each side that the other won't influence them. That this single country happens to be Switzerland is an accident of history. "We could have been from Sweden, or Liechtenstein."

NOW I'm in the mountainous Tigray region of northern Ethiopia—in the subregional capital of Adwa, surrounded by the Tigray People's Liberation

Front. Among some 80 foreign relief groups active in the Ethiopian famine, only ICRC has government approval to distribute food independently in this "conflicted area." Emaciated women walk for days to pick up monthly rations: per adult, twelve and a half kilos wheat flour, two liters cooking oil, two kilos horsebeans. Then they walk back.

For some 100,000 beneficiaries, that requires more than 1,000 tons a month by ICRC-chartered planes to Aksum. Then it's half an hour by gravel road and fast-running trucks flying big Red Cross flags. The rebels, discreetly contacted through another country, gave approval too, provided no soldiers go along. "But if there are mines, the flag won't help you," says Hans-Ulrich, an ICRC delegate from Zurich. The army is supposed to sweep the road in the morning.

In the conflicted hinterland of Ethiopia's Eritrea region—in Keren, a subregional capital surrounded by the Eritrean People's Liberation Front—a delegate named Paul, from the Swiss canton of Aargau, struggles with the problem of five missing cans of vegetable oil.

A trifling matter? Not at all. Many relief groups turn over their stuff to governments; then who knows where it goes? ICRC strives for strict accountability, so it can report to donor countries—the United States, say, or Canada, or the European Economic Community—exactly where their contributions went, from the port of entry to the recipients. I've seen the computer printouts in Geneva. For example, from wheat shipment ETH 0090—"15935 bags 796750 kilos value 645253 Swiss Francs" unloaded in Mitsiwa 5/4/84—98 bags went to the feeding center for children in Mekele 21/6/84. . . .

Local warehouse helpers, hired by ICRC or supplied by the Ethiopian Red Cross, must learn to count and record what comes in and when, what goes out and where, all on proper forms. After an hour at a desk with papers and in the dark warehouse with a flashlight, Paul finds 21 cases, or 315 cans, too many. He'll let it go at that, probably a delivery was recorded inaccurately.

But what to do about this white-robed sheikh, a powerful tribal leader who insists he has 40,000 starving people, when Paul knows he has 10,000 and wants the food to do with as he likes? Paul asks for lists from village elders, so he can follow up. The elders, fearing their leader, keep mum. The sheikh stalks off, probably to complain to the local administrator and to the Communist Party chief. Now Paul must visit them too, to explain, lest ICRC get a bad name.

I admire Paul. Eventually he'll get lists and see appropriate amounts delivered where they should go—staying invariably polite but firm.

ETHIOPIA is ICRC's costliest current operation: a hundred million dollars a year to feed 700,000 people victimized by both drought and armed conflict. The problems are correspondingly big—first a shortage of food at the ports, then not enough transport. What strikes me no less is what I see a single delegate putting up with.

Here's Gabriela from St. Gallen, making stops on the road south from Asmera. Dekemhare. Segeneyti. Adi Hadid. An administrator squeezes recipients; militiamen extort ration cards, then send their wives to pick up rations; recipients cheat. As she encounters each situation, she tackles it. Makes the administrator return the money. Stops the phony distribution. Changes the way the food is given out. In Senafe, refugees from Tigray cower in caves, abandoned, starving. She arranges a special distribution.

Gabriela is 27, has been with ICRC seven weeks and in Eritrea for all of three—yet here she is firmly telling a high functionary of the Provisional Military Government of Socialist Ethiopia, surrounded by his guards with submachine guns, that ICRC works by special agreement with his government, that it has the right to choose its beneficiaries. . . . How does she do it all in such a friendly way? "Oh, I just try to bring practice as close as I can to theory."

THE THEORY that sustains ICRC's work is rooted in the text of the Geneva Conventions of 1949—four of them, containing 429 articles—which have been widely ratified but are not widely understood. Explaining them is one of ICRC's tasks. I see it done in a Central American country currently enmeshed in civil war, El Salvador, by Urs from St. Gallen. Listening are soldiers of the elite cavalry regiment that

In the public eye, *ICRC President Alexandre Hay briefs the press on negotiations regarding the Mideast hijacking of TWA Flight 847 after meeting with President Reagan last year. Talks had been scheduled prior to the hostage crisis to discuss additions to the Geneva Conventions of 1949. The conventions have been ratified by 164 nations.*

fights the FMLN, the Farabundo Marti National Liberation Front.

The gist is this: In armed conflict, international or internal, soldiers have the right to kill opposing soldiers. But "*persons taking no active part in the hostilities*"—meaning wounded or captured fighters, and civilians—"*shall in all circumstances be treated humanely.*" ICRC will ask both sides to let it visit their prisoners, to learn how they are in fact treated. And civilians may ask ICRC for medical help and for food for children and pregnant women, all of which both sides should let pass freely. ICRC, for its part, is pledged to be absolutely neutral and impartial. It takes no part in controversies ideological or political. Any questions?

Lots. How can a person *not* be political? Why do you give aid to *subversives?* Have *you* participated in subversion?

Urs looks pained. He answers that ICRC acts only in the interest of the victims, it doesn't ask which side is good or bad. . . .

As we leave, I can sense that the highly indoctrinated cavalrymen still find this difficult to understand. Not so the Salvadoran government, which permits ICRC to do its work all over the country.

ON WEDNESDAYS, from delegation headquarters in San Salvador, the capital, the schedule for the next week's medical and food-relief convoys goes to the army, the air force, and the regional

A Friend in Need

The International Committee of the Red Cross does what it can

brigade commanders concerned. And also to the leaders of the "armed opposition"; they should know it by Friday. And so, even though the insurgents have warned that next week any vehicles on country roads may be attacked, ICRC convoys will go through to Suchitoto, as well as across the Torola River in Morazán province.

Kurt from Basel visits the jail at National Police headquarters. As soon as anyone is arrested on political charges, ICRC is supposed to be notified, so a delegate can go and register the new detainee. ICRC then notifies the family. A delegate is supposed to be allowed to interview any prisoner he wishes, *without witnesses*, and to make follow-up visits. Simply to be registered is considered some protection, reducing the chances that the prisoner will somehow disappear.

Today 11 men wait in the courtyard, to be released. They are turned over to Kurt, who takes them outside where the mother of one, a teenager, has been waiting. I thought there'd be noisy greetings.

Held captive by politics, Moroccan prisoners sit in a jail run by Polisario fighters. The 11-year-old conflict over the mineral-rich Western Sahara—a former Spanish colony—pits Morocco against the Polisario

Front, which claims independent-nation status. To interview these men, delegates undertook a round-trip of more than 600 miles in heat reaching 110°F. Last year ICRC visited 60,000 prisoners in 35 countries.

But no, the emotion is all in the faces.

In another prison Bernhard from the canton of Valais registers a new arrival, a distinguished middle-aged man. He shows Bernhard lesions—from electric shocks, he says. An ICRC doctor will come and make an examination. If the doctor confirms what the man says, the delegation chief may send a report of bad treatment to the highest Salvadoran authorities—strongly worded, strictly confidential. This is another of ICRC's unique ways of working. No accusations in public, no fuel for propaganda by anyone. Such quiet remonstrances often bring good results, less maltreatment. And the government continues to trust ICRC; without such trust it would not have allowed visits to its prisoners in the first place.

WHO are those Salvadoran women sitting patiently in the delegation's lobby? They've come to see delegates from ICRC's Central Tracing Agency. Since its beginnings in the Franco-Prussian War of 1870, the agency has brought word across the lines to millions of families anxious about the fate of a loved one. During both World Wars, the India-Pakistan war, the conflict on Cyprus. Here ICRC makes inquiries about people alleged to have "disappeared."

Sophie from Geneva tells me there are hundreds of such allegations a year. Today she'll go out to follow up in the case of a young man reportedly arrested eight months ago near his home on the slopes of the Volcano of San Salvador, an area much frequented by *los muchachos*, the boys, as many call the guerrillas.

The mother came here repeatedly, and ICRC visited seven military and police offices. All professed to know nothing. Now we drive on and on, up and up to a tiny settlement, to a tiny lady who runs a little general store on a great coffee estate.

She thanks Sophie for coming. Her boy's body was found not long ago, she says, decomposed, in a room in an abandoned

Homeward bound, *wounded Iranian prisoners, to be repatriated under Geneva Convention rules, leave an Iraqi jet at Ankara, Turkey* ***(left)****. An ICRC woman delegate accepts custody of the 28 from Iraqi officials* ***(below)*** *and delivers them to the Iranians. ICRC delegates must be Swiss citizens and at least 25 years old. The work demands resourcefulness, diplomacy, and courage. Since World War II some 20 delegates have been killed, accidentally and otherwise, while on duty.*

school nearby. She recognized his scarf.

Back at delegation headquarters in San Salvador there's high excitement. Foreign ambassadors and cabinet members, powerful military officers and churchmen debate hour after hour under the chairmanship of Pierre from Basel, the delegation chief. Agreement has been negotiated in Panama for the simultaneous release of people long held by both sides, plus the evacuation of wounded guerrillas from their redoubts to exile abroad. But how to implement it all? The West German ambassador tells me, "Without ICRC it could never be done, both sides distrust each other so much." Pierre calmly writes precise orders, who will go where with whom.

Starting next day at 3 a.m., Valerie, Philippe, Jacqueline, and two dozen others fan out across the country—to prisons and guerrilla areas—accompanied by diplomats and clergymen to monitor the implementation of the agreement by both sides. Will it work?

All day radio messages crackle in. An ICRC car has broken down. Elizabeth is under fire. A brigade commander, disapproving of the agreement, refuses to let Martin pass his lines. Pierre works with two phones, advising here, cajoling there, reassuring jumpy guerrilla leaders abroad.

Shortly before midnight he telexes Geneva: pickups at 13 points—3 political detainees and 101 wounded guerrillas now en route by air to Mexico and Panama.

Also, 18 important guerrillas and 23 abducted politicians released locally. And Salvadoran President José Napoleón Duarte has been on television—he has his abducted daughter back. It was, as one of my ICRC friends likes to put it, "one of those Red Cross moments—when we really achieve what we're supposed to achieve."

ICRC OWES ITS EXISTENCE to an accident of history 127 years ago. A businessman of Geneva, Henry Dunant, went to seek a favor from French Emperor Napoleon III, who was then with his troops in northern Italy. Near the little town of Solferino, Dunant blundered into the aftermath of a battle of the French and their Sardinian allies against the Austrians—amid 6,000 dead lay another 42,000 wounded, most of them unattended, suffering horribly. This appalled Dunant, and he did something about it.

In the great church in nearby Castiglione he organized local women to tend to the pitiful survivors as best they could, irrespective of their uniforms. Then he wrote a book, *A Memory of Solferino*, describing what he had seen and propounding two seminal ideas: that "zealous, devoted, and thoroughly qualified volunteers" be organized in peacetime to care for the wounded in time of war; and that these should be respected as neutral under "some international principle, sanctioned by a Convention inviolate in character."

The book appeared in 1862 and quickly found much response. Prompted by a committee of five influential citizens of Geneva, a number of European sovereigns asked the Swiss government to convene a diplomatic conference, which in 1864 drafted the treaty known as the first Geneva Convention. To Dunant's basic notions it added that field hospitals and medical aides might bear a distinctive flag or armlet with the reverse of the Swiss emblem, namely a red cross on a white background. By 1875 Red Cross societies flourished in several countries—and that committee in Geneva had become the International Committee of the Red Cross.

And Dunant had met with personal disaster. He was bankrupt and unwelcome in Geneva. Formerly lionized by royalty, he now found himself so poor that, as he wrote, he was "one of those who on the street took little bites from a piece of bread hidden in a pocket, who blackened their [threadbare] suits with ink." After 17 wandering years he found a second home in a hospital in the little Swiss town of Heiden. But before he died in 1910, a newspaper article lifted him from obscurity, and he became one of the two recipients of the first Nobel Peace Prize.

Today near Solferino a great monument and ubiquitous plaques commemorate the

A gauge of strife: *An ICRC nurse in an East Timor village measures the circumference of a child's upper arm, a rough index of nutritional status. ICRC found severe malnourishment among the children of several villages whose crops and livestock were destroyed by war.*

The tenderest mercy, *feeding children caught in conflict, is carried out at an ICRC center on Atauro, off East Timor. In 1975-76, Indonesia invaded and annexed formerly Portuguese East Timor. Perhaps 100,000 Timorese have since perished. Suspected insurgent sympathizers, at one time as many as 4,000, were moved to Atauro. Some 800 remain.*

inception of the Red Cross. Irrigation sprinklers send shiny streamlets into the late summer air, vines rise man high, birds chirp, a cock crows. It's a little world of peace. But looking eastward from a once much fought-over hill, I see two domes and a thin tower on the horizon—a radar station, manned by the Italian Army. It's part of the NATO alliance that faces another great alliance farther east, a reminder that tomorrow the International Committee of the Red Cross may be more needed than ever.

NOW I'M IN TURKEY, at Ankara airport, watching an ICRC operation run like clockwork. Iranian prisoners of war, chosen by a medical commission, are to be repatriated from Iraq because they have disabling injuries or health problems—precisely as provided in the Geneva Conventions. The local Red Crescent, as the equivalent of a Red Cross society is known in some Muslim countries, has provided a canvas partition; and so the Iranians and the Iraqis—enemies in today's only international conflict universally recognized as such—will not have to meet or even see each other.

A blue-and-white Iranian Boeing 727 lands, rolls to the end of the runway, and waits. Lucia from Lausanne puts on a head scarf, in deference to Iranian sensibilities.

A green-and-white Iraqi Boeing, Red Crosses on its sides, lands, a door opens, bewildered men emerge (page 656). Some on stretchers or missing a foot or an arm, some psychiatric cases. In a trailer the Iraqi ambassador to Turkey signs forms, handing over "to ICRC . . . 28 Iranian prisoners of war, as per attached list." The Iraqi plane roars off. The ex-prisoners pray and sing revolutionary songs.

Now, in the trailer, it's an Iranian diplomat who signs forms, accepting delivery of the men "under the auspices of ICRC." He

Children of a tormented land *fill water jugs at a refugee camp on the Thai-Kampuchean border* ***(left)****. Beyond lies their country, Kampuchea, now under Vietnamese occupation contested by guerrilla groups including the Khmer Rouge, whose 1975-78 regime brought death to at least a million Kampucheans. At another camp ICRC posts queries from relatives seeking lost loved ones* ***(right)****. The ICRC Central Tracing Agency reunited 149 Kampuchean families last year.*

steps outside, puts flowers around the neck of each and gives him a kiss, a handshake, and a plate with golden writing from the Koran. As the men board the Iranian Boeing, one cries, most smile. Now that plane is gone too, and Lucia takes off her head scarf. An ICRC doctor says, "It's one of the nicest jobs we can do."

But behind this nice facade, bitter reality stymies ICRC. This six-year-old war, said to have caused a million dead already, has put some 10,000 Iranians and 60,000 Iraqis into prison camps. And here is something terrible. Of those 60,000 Iraqis, ICRC has been permitted to visit and register no more than 46,000. Imagine what this means: Several hundreds of thousands of Iraqis have been reported missing and are presumed dead; among that number are 14,000—the unregistered prisoners—who are alive. But *who* are they? Thus the families of all those hundreds of thousands remain plagued by doubt. And in Iraq—a country of 14 million, where a family usually numbers 20 to 30 members—that could amount to virtually everyone. . . .

BACK AT ICRC headquarters in Geneva—in a brightly lit meeting room decorated with portraits of Henry Dunant and the four others of the committee of 1863—I get a glimpse of the select group making up the present-day International Committee of the Red Cross itself. It's limited to 25 members, all elected by previous members and thus beholden to nobody else. There've been 20 of late—bankers and big businessmen, lawyers, a professor of political science. Today they welcome a newly elected colleague, an official of the Swiss Federation of Metalworkers.

The president, Alexandre Hay, calls them to order with a brass bell. They'll discuss the budget and hear President Hay report on his recent Washington visit with President Reagan; it's no secret that he's been urging the U. S. to ratify the so-called Protocols Additional to the Geneva Conventions of 1949. That's an ICRC responsibility too—to foster development of what experts now call international humanitarian law.

Progress has been slow but steady. In the wake of World War I came updated conventions to protect not only the war wounded but also prisoners of war. The experience of World War II, in which military casualties were outnumbered by civilian victims, led to the Conventions of 1949, extending protection to civilians in internment camps or living in occupied territory. And after the postwar wave of decolonization and liberation struggles, a diplomatic conference from 1974 to 1977 produced Additional Protocols

Reaching out, *a Khmer guerrilla fighter comforts a comrade who has suffered a leg amputation at the ICRC hospital at Khao-I-Dang on the Thai-Kampuchean border. The Vietnamese have mined the border, causing many of the injuries treated here.*

I and II, aiming to shield civilians from military attack. So far, only a third of the states have ratified these protocols. Some, including the U. S., object to provisions formally granting captured guerrillas the same protection prisoners of war are supposed to get.

But to ICRC, action goes before codification, as it did for Henry Dunant. It constantly negotiates for access to political detainees arrested in situations of internal tension not as yet covered by any international agreement. ICRC rarely mentions political prisoners—words governments don't like to hear. Instead it refers, diplomatically, to "persons arrested because of the events."

And so since World War II, ICRC delegates have visited more than 500,000 detainees in 95 countries in situations not covered by the Geneva Conventions. IRA members in Northern Ireland. ETA people in Spain. Solidarity activists in Poland. Similarly in Uruguay and Argentina, where now—because the situation has eased—it's no longer necessary; and in Chile, where it still is.

Currently ICRC is negotiating for access in Turkey, Guatemala, Sri Lanka. And stepping up its efforts in South Africa; there it gives financial support to families of people convicted under various emergency laws.

All in all, then, things seem to be going pretty much the way ICRC would wish?

President Hay tells me this is not so. To governments, he says, the most important things are politics, economics, security. "Humanitarian problems get tenth priority—or worse."

I GET ANOTHER SOBERING LESSON at the Summer School on International Humanitarian Law, sponsored by ICRC and the Polish Red Cross in Warsaw, where ICRC lawyers and law professors—from England, West Germany, Hungary, Poland—meet law students from Scandinavia, Bulgaria, the U.S.S.R., the U. S. Some students want to know why lawyers don't write better humanitarian law. Why is it so full of holes?

ICRC: All law is a compromise. Humanitarian law is a compromise between humanitarian interest and military necessity.

A student: Protecting humanity is more important than military necessity!

ICRC: We have to take what we can get.

Student: You mean you cannot change the world?

ICRC: We don't pretend that we are able to do that. We take a bad situation and make it a little better, if possible.

In short, ICRC does what it can.

"YES, PROBLEMS everywhere—also opportunities." That's Michel from Geneva, ICRC's man at the United Nations 40th General Assembly session in New York. At this super-bazaar of international diplomacy—where everyone asks himself what's my country's interest in each agenda item, and how can I further that interest in practical ways—Michel quietly but resolutely pursues ICRC interests: to be involved in some things, not in others.

Today, for example, regarding a Jordanian resolution for a "New International Humanitarian Order," he uses what he calls soft pressure to have due allowance made for the role of ICRC. Diplomats from three countries promise they'll do their best.

Governments care about their image, and it's usually to a country's political advantage if it can say that ICRC is active there. "That's fine," Michel says. "But if they should state that ICRC visits their jails and finds no problems—that would be improper." He'd have to react. He might say something in the General Assembly's Third Committee, the one on human rights. "Of course we'd try to discourage them first, through various channels. . . ."

There's constant coming and going in the meeting halls, to and from the white leather

sofas and chairs outside the assembly. Michel uses many channels. The liberation and resistance movements widely represented here like to deal with ICRC; they think it lends them legitimacy. And the powers party to the conventions have undertaken not only to respect these but also *to ensure respect* for them. "We must have contact with everyone," Michel says, "and address the positive side of everyone. Not judge them—others will do that. We appeal to a sense of humanity. Often it works." And off he goes—as he puts it, to ambush another ambassador.

Here's another way to look at it. ICRC's worldwide humanitarian diplomacy often works because, combined with its idealistic appeal, its approach is strictly practical; because, like all successful diplomacy, it has at its basis a hard look at political and strategic reality. That reality is that in most conflicts of today the influence of the big powers, while seldom openly acknowledged, is often decisive. And so ICRC's top officials seek ways of getting the right message through the right channel from one capital to another—so that at last those ships will be unloaded, those planes will take off, those trucks will roll. And when the food gets to the hungry, when prison doors finally open to ICRC delegates, no one will have lost face or be seen to have intervened

Acts of war: *A morality play by Khmer refugees (**right**) teaches humanitarian tenets. A Khmer portrays Swiss businessman Henry Dunant (**above**), who in 1859 saw the carnage of a battle between Austrian and allied French and Sardinian troops. Shocked, he wrote a memoir that inspired creation of ICRC and of national Red Cross societies worldwide. Years later Dunant had retreated into obscure poverty. Found by a journalist, he shared the first Nobel Peace Prize. But he cared little for the award money, willing it to charity.*

in another sovereign country's affairs.

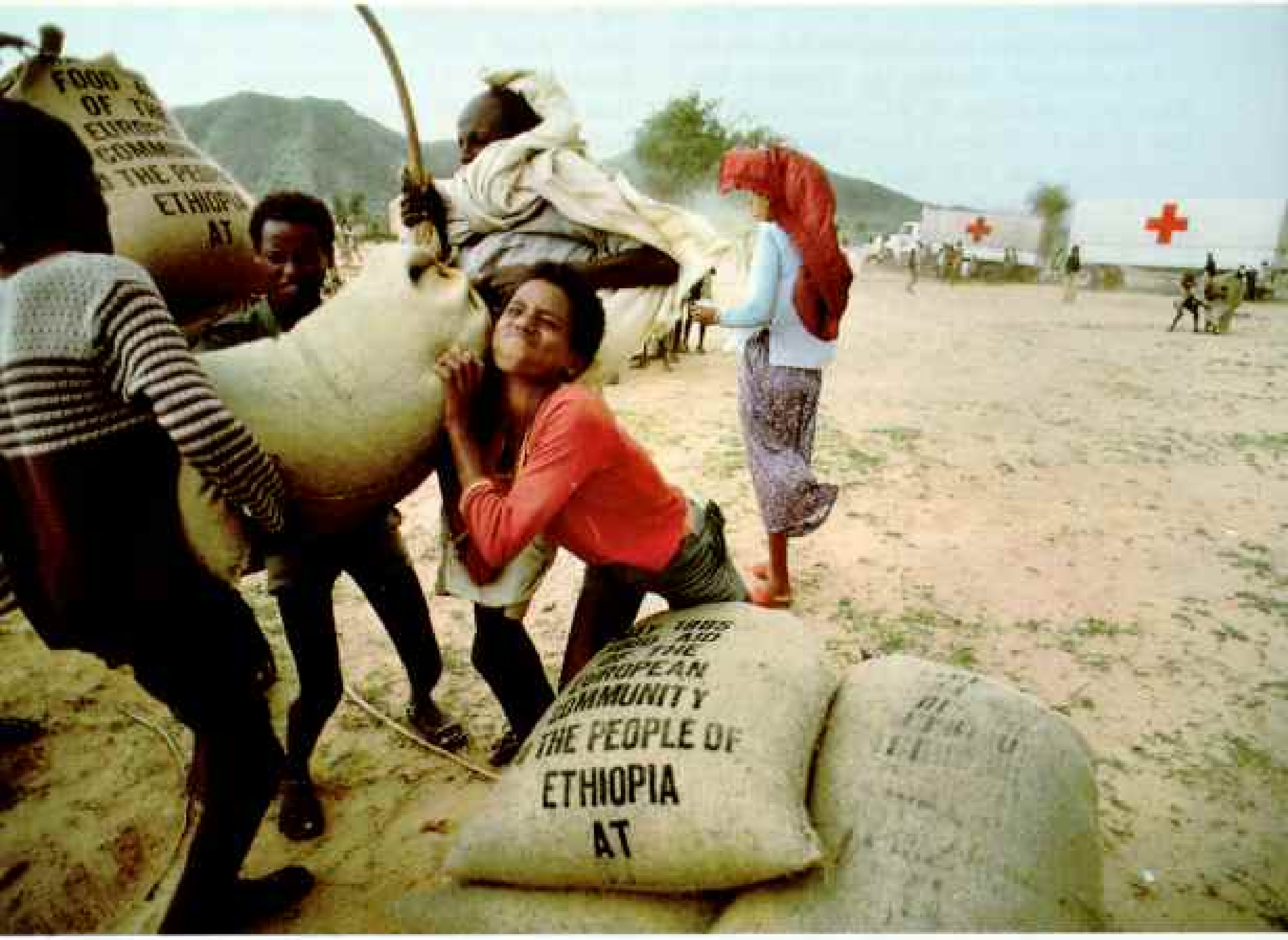
But there have been notable failures too.

For example: During the Vietnam War, despite much effort, ICRC never could visit any of the U. S. servicemen imprisoned in North Vietnam. Why not?

In adhering to the third Geneva Convention, the Soviet Union and its European allies—as well as Albania, North Korea, and China—made a reservation: They said that should a prisoner of war be convicted of a war crime, he would no longer enjoy prisoner-of-war status. North Vietnam went even further. Its reservation in 1957 declared that captured combatants "prosecuted and sentenced" for war crimes would not be covered by the convention. Years later, when North Vietnam had captured hundreds of U. S. servicemen, it said that they would be prosecuted for having indiscriminately attacked civilians—that they were not considered prisoners of war, and were not eligible for ICRC protection.

In a future war—so some international law experts wonder—might the Soviet Union adopt a similar position?

ICRC HAS EXPANDED mightily over the past two decades with ever greater relief actions. Biafra 1968. Bangladesh 1971. Kampuchea 1979. A gigantic operation along the Thai-Kampuchean border peaked



Wrestling bags of grain *from a truck, Ethiopian workers near the town of Rama unload an ICRC shipment before a storm's onset. To expedite delivery, ICRC employs a fleet of nine aircraft and 80 trucks in the country. A policy of strict accountability from port of entry to distribution keeps losses to a minimum.*

in 1980, as half a million starving Khmer refugees sought succor in the aftermath of the Pol Pot tyranny and Vietnamese intervention. Most of that burden has passed to a UN program, but ICRC is still around. When a Khmer resistance fighter falls along the 500-mile border, when refugees come to grief in a minefield, ICRC ambulances are ready. So is ICRC's surgical hospital at Khao-I-Dang (pages 664-5). Nearby, amid the vast complex of huts and dusty paths called Site 2, now sheltering some 140,000 Khmer refugees, I see a veritable incarnation of Henry Dunant.

He's in a play, on an outdoor stage (preceding pages). Initial scene: Brutal soldiers mistreat a wounded man, a woman, a baby. Next Dunant and other well-dressed gentlemen nod and shake hands, they're concocting the first Geneva Convention. Finally soldiers again—restrained now by a man with a Red Cross armband, they treat people humanely.

My ICRC companion tells me he suggested the play but putting Dunant in it was a Khmer idea. I can imagine how pleased Henry Dunant would be if he could somehow see these people, so different, so far away from his world, propagate his teaching so enthusiastically. He might have valued that as much as his Nobel prize.

AND NOW I must deal with a very dark chapter, in a place I shall never forget but shall not name. Why single out one country when others do the same?

A team of delegates inspects prisoners' sleeping quarters, the kitchen, tastes the

food. Not bad. The men wear brand-new shirts and pants. A delegate explains to them that each will be registered and can write a message home, that a Polaroid picture will be taken to send along. These men have been prisoners for years. Here are visitors sympathetic to them. Why do they look so downcast, so frightened?

During interviews without witnesses it all comes out. Those good quarters aren't theirs at all; they sleep outside on the ground. Their new clothes were provided only just now. They're worked very hard and fed very little. Some have died of disease brought on by malnutrition. If they'd speak freely where guards could hear, there might be terrible consequences. . . .

Before leaving, the delegates will talk with officers in charge of the prisoners. Then, from ICRC headquarters, there'll be pressures in the hope that the Geneva Conventions may be better observed.

As to those messages to families, the delegates will take them to Geneva and pass them to representatives of the prisoners' home country. But will they ever be delivered? Some states tell the families of the missing the enemy doesn't take prisoners, so your husbands and fathers must be dead.

YOUNG DELEGATES become frustrated when they witness too many bad situations. Fifteen thousand people are dying of hunger ten miles away and you can't go there—mines! Or, after a food distribution, the militia drags off recipients, for relocation far away where they don't want to go. Or government planes bomb them because their men are rebels. Or soldiers high on hashish rob and rape the women. And why deal so politely with prison warders and policemen who torture and murder? To really help their poor victims, shouldn't one push harder, openly? Shout for all the world to hear? Like that outspoken human rights organization, Amnesty International!

Older delegates know the feeling, the frustrations of being limited in so many ways. "But ICRC finds strength in its limitations," the director general says. How so?

"It is because we do not call the aggressor an aggressor that we can see the prisoners that this aggressor holds. And it is only because we keep what we see confidential that we can help hundreds of thousands who otherwise would get no help at all. And that we can come back and see them again."

One sunny day in Geneva I find President Hay in a pensive mood. He speaks about the worst sort of situation, civil strife, that fans hatred to its highest.

"People in higher positions, heads of state, understand what we do. But lower down, heads of prisons, not so much. The jailers want to beat the prisoners down, to annihilate them in prison. They say, 'These people, we should kill them. But you come and assist them!' We say we're just here to see that people are treated as human beings, not that you must release them. Let them have enough to eat, exercise an hour a day, and not overcrowd them too much.

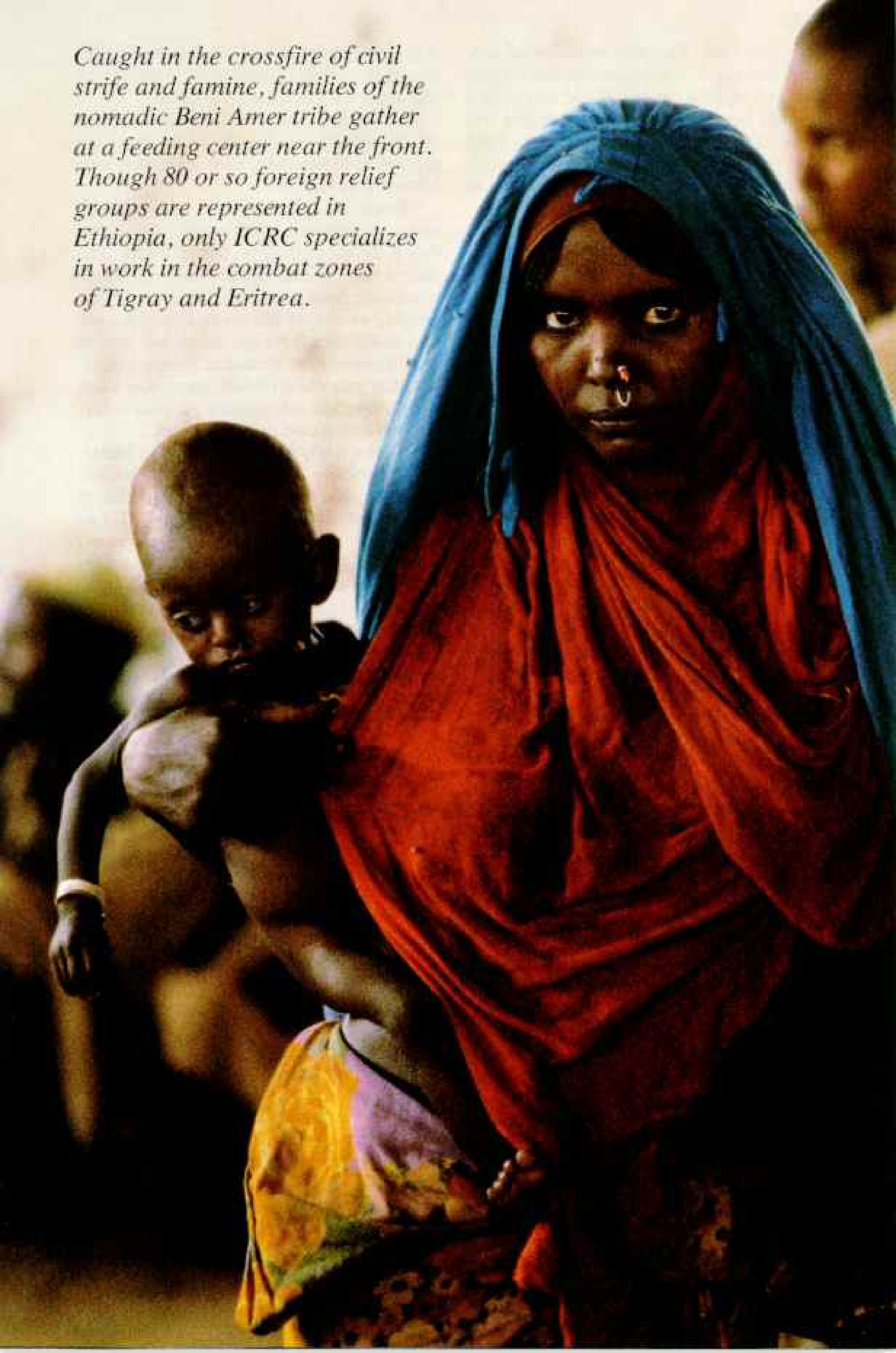
"After a while they understand us better. Sooner or later there'll be more or less satisfactory results. But if after months of representations nothing happens, if bad treatment continues, we can say, you're not listening, so we'll go, and tell other countries that's why we left.

"Of course for the victims to know that ICRC will come to see them sometime is an enormous psychological help. We're the only ones they can talk to freely. That's why we would leave a country only after long reflection. The effect on the victims would be terrible, that we won't be coming any more, to bring them a cigarette and listen. . . ."

MY LAST ICRC VISIT is to Lebanon, a country of only three million people, only 130 miles long and about 30 miles wide, where less than a fifteenth of that area is controlled by the government and the rest by two dozen armed groups in ever shifting alliances, fighting each other, primarily killing civilians. In this morass of anarchy and suspicion, abduction, assassination, and periodic massacre—how can ICRC delegates function at all?

I see checkpoints, checkpoints everywhere, young men with automatic rifles, trucks with twin cannon. Motorists anxiously show their identity cards. Jacques from Fribourg maintains contact with all the factions in the south. We just drove from Tyre, with three Palestinian camps, to Sidon, ruled by Sunni Muslims, two Shiite Muslim groups—Amal and Hizbullah—

Caught in the crossfire of civil strife and famine, families of the nomadic Beni Amer tribe gather at a feeding center near the front. Though 80 or so foreign relief groups are represented in Ethiopia, only ICRC specializes in work in the combat zones of Tigray and Eritrea.



and Communists. Jacques says a blowup may come anytime. From there north to Beirut—around the town of Damur, where Palestinians attacked Christians ten years ago while Christians massacred Palestinians not far away—the checkpoints belong to PSP, the Progressive Socialist Party of the Druze sect. Then it's Amal again, in west Beirut.

Next morning Jerome from Valais takes me along into east Beirut—and beyond, into what he calls the Christian bubble. Inside a perimeter held by the Christian militia simply called the Lebanese Forces, displaced Christians are concentrated from all over Lebanon. In time of calm, Jerome says, delegates must constantly take the temperature of local situations and meet as many people as they can who can be helpful when a big blowup comes. Such as villagers who know which roads are too narrow or too dangerous if relief trucks must be brought in. And commanders of local army and militia units who'd have to let those trucks pass. And politicians one can appeal to on humanitarian grounds, so they'll authorize the bringing out of the wounded and the dead. Two months ago he learned where the Christian bubble might be cut in three places, so medical and food stocks were deposited at three points. When attacks came in two places, ICRC and the Lebanese Red Cross were ready. "The idea is not to be cornered, otherwise you cannot cross."

In a mountain-ridge villa we have coffee with a Lebanese Army colonel. A few shells land nearby, from the Syrians and the Druzes. Mortars reply. In a little town Jerome visits a dispensary. How are things? The lady says *yani*, not good, not bad. By 1 p.m., she says, when school lets out, a sniper will start firing into the central square. The children know how to move between houses, people adapt. In front of shop entrances are cinder-block walls and sandbags. Jerome notes new holes in the walls. Rockets. Things here are getting warmer.

On such rounds a delegate is accompanied by an ICRC field officer, a local resident long familiar with the area and its people. Passing through east Beirut once more, we see artillery, ready to reply if shells should come in from Muslim west Beirut; it often starts around noon, so people are hurrying home now. We cross the Green Line, the strip of no-man's-land that divides the capital, at the museum crossing point—for diplomatic and ICRC cars only. Jerome steps on the gas. There are snipers here too.

DELEGATES do similar reconnaissance in the north, around Tripoli. In the Bekaa Valley in the east. And in the Israeli-imposed "security zone" in the far south, ruled by the Israeli-supported SLA, the South Lebanese Army; there, local contacts report names of people just arrested, so ICRC can look for them.

In west Beirut, Pierre from the canton of Vaud visits Sabra and Shatila, often called camps for Palestinians—actually districts of town with mostly two-story buildings but some with five or more; they are surrounded by Amal militiamen.

In a café in Sabra, Pierre's field officer inquires where a certain Mustafa lives. Then we trudge up three flights and hand Mustafa a message from his brother Ziyad, who left with the PLO fighters evacuated from Beirut in 1982. Mustafa thought Ziyad might be in Libya, or dead. But no, he's alive and well and working in Wolfsburg, West Germany. "Thank God," says Mustafa. "God protect you." On a wall of the house a poster depicts a young PLO fighter killed at a checkpoint here two days ago.

In Shatila, an old man approaches Pierre. He recently heard from ICRC in Beirut—who'd been notified by ICRC in Tel Aviv—that the Israelis, who are holding two of his nephews as PLO activists, will shortly release them at Lebanon's southern border. Now he asks, could Pierre please arrange that one boy be escorted through the security zone, so the South Lebanese Army won't harm him? But the second boy mustn't come to Beirut! The Syrians are after him. He need say no more. Shatila is controlled by several PLO factions; some, at odds with

His grip on life *as slender as his twig-thin limbs, a dying Ethiopian child is examined by an ICRC doctor at an intensive-feeding facility in Mekele. ICRC spends 100 million dollars a year in Ethiopia, making this country stricken by drought and secessionist war its costliest current operation.*

***A lifeline** for those caught on the rebel side of fighting in El Salvador—where five leftist factions battle the government—an ICRC truck delivers food to guerrilla-held territory. More than 600 people waited for the monthly delivery at an abandoned village. ICRC does not feed fighters; guerrillas looking on did merely that and made no move to confiscate food. ICRC involvement helps the highest echelons too. Last year it implemented the release of Salvadoran President José Napoleón Duarte's abducted daughter.*

Yasir Arafat, are supported by Syria. Pierre tells the old man he'll see to it—it'll be *tamam*, OK.

Inside a mosque at the edge of Shatila I see rows of tombs, reminders of a massacre here in 1982.

FROM NOTES taken while riding in an ICRC car:

• I'm on Beirut's picturesque seashore drive. Right here this morning yet another ICRC car was stolen. An old Datsun cut it off, two green-clad militiamen—who knows from what group?—got out, pointed pistols at the delegate, told him to get out.

Over there in 1976 an ICRC man found the body of U. S. Ambassador Francis Meloy; he'd been abducted at the museum crossing point.

• I'm in the Shuf mountains, southeast of Beirut. Our VHF car radio tuned to the ICRC frequency says it's raining in Tyre. I say who cares? The delegate says it means shells are falling. When you see weapons, you say "toys." Tanks are "frogs." Fighting is "playing." It's a code. Nothing secret about it, just a nonprovocative way of speaking on the open radio. "And you don't say dead bodies, you say 'chocolates.'"

• Passing through the town of Dayr al Qamar, a delegate tells what happened here. After Israeli troops withdrew southward in 1983, Christians crowded together here, surrounded by Druzes. The siege lasts weeks. Will there be another massacre? ICRC draws on all its skills and contacts—and at last brings out 1,004 women, children, and old people in five convoys, past one hostile checkpoint after another, to safety in east Beirut. Thus in a single week so much hard work paid off.

On my last day in Beirut, the radio reports a car exploded—a hundred kilos TNT, three dead, 27 injured. On the seaside road, I see jam-packed cars racing south, horns blaring, led by a white Cadillac with the trunk lid wide open. In the trunk huddle three men, one with a launching tube for rocket-propelled grenades. They're headed

for the Palestinian camp of Burj al Barajinah. It's going to be another bad situation.

ON THE OUTSKIRTS of Geneva, another two-week course for new delegates has begun. Most are unmarried, all are at least 25 and hold university degrees—in law, biochemistry, ethnology. I wish I could be one of them. But I'm not Swiss.

They'll learn how to negotiate. How not to be taken in by jailers, nor by prisoners. Always to park the car pointed for a quick getaway. Plus a hundred things a delegate should know from the start, which will be soon. After the course, and a week at headquarters, most of them will go to the field.

Instructors illustrate their teaching with stories out of recent experience, in Angola, in Chad and Uganda, in the war over the Falkland Islands. A veteran delegate I know

The quality of mercy was strained *when a 16-year-old Salvadoran guerrilla accidentally shot herself in the head while cleaning her rifle. The guerrillas flagged an ICRC truck for help, and the next day an ICRC doctor* (**left,** *in plaid shirt) gave emergency assistance. Government and guerrilla representatives spent hours arguing about conditions for her evacuation. At first both sides refused to come to terms, and it seemed the girl might be left there. But an agreement was reached, and the patient was evacuated to a hospital in San Miguel.*

An ICRC medical convoy fords the Torola River (**above**)*, the line between government and rebel-held territory in the northeast province of Morazán. ICRC goes where others cannot to bind humanity's self-inflicted wounds. "They just unfurl the flag and barge right into no-man's-land," says photographer Steve Raymer. At a lecture for government troops* (**right**) *a soldier passes out ICRC booklets explaining Geneva Convention rules.*

Behind bars, *political prisoners wait for an interview-without-witness by an ICRC delegate at National Police headquarters in San Salvador. ICRC gives assistance without discrimination. As French scientist Louis Pasteur said, "We do not ask a suffering man what country he comes from or what his religion is, but say simply that he is in pain . . . and that we will give him relief."*

is speaking—will he tell about getting stitched up without anesthetic in Africa? About the months it took him to get over the horrors he saw there? No, he winds up with something quite different, a tale from the stockade at Ansar in Lebanon where the Israeli Army held Palestinian and Lebanese Shiite fighters in 1982.

The inmates are restless, the guards nervous. The inmates plan a demonstration for the anniversary of the Israeli invasion, a day of confrontation, sacrifice, martyrdom. It looks like a bloodbath for sure.

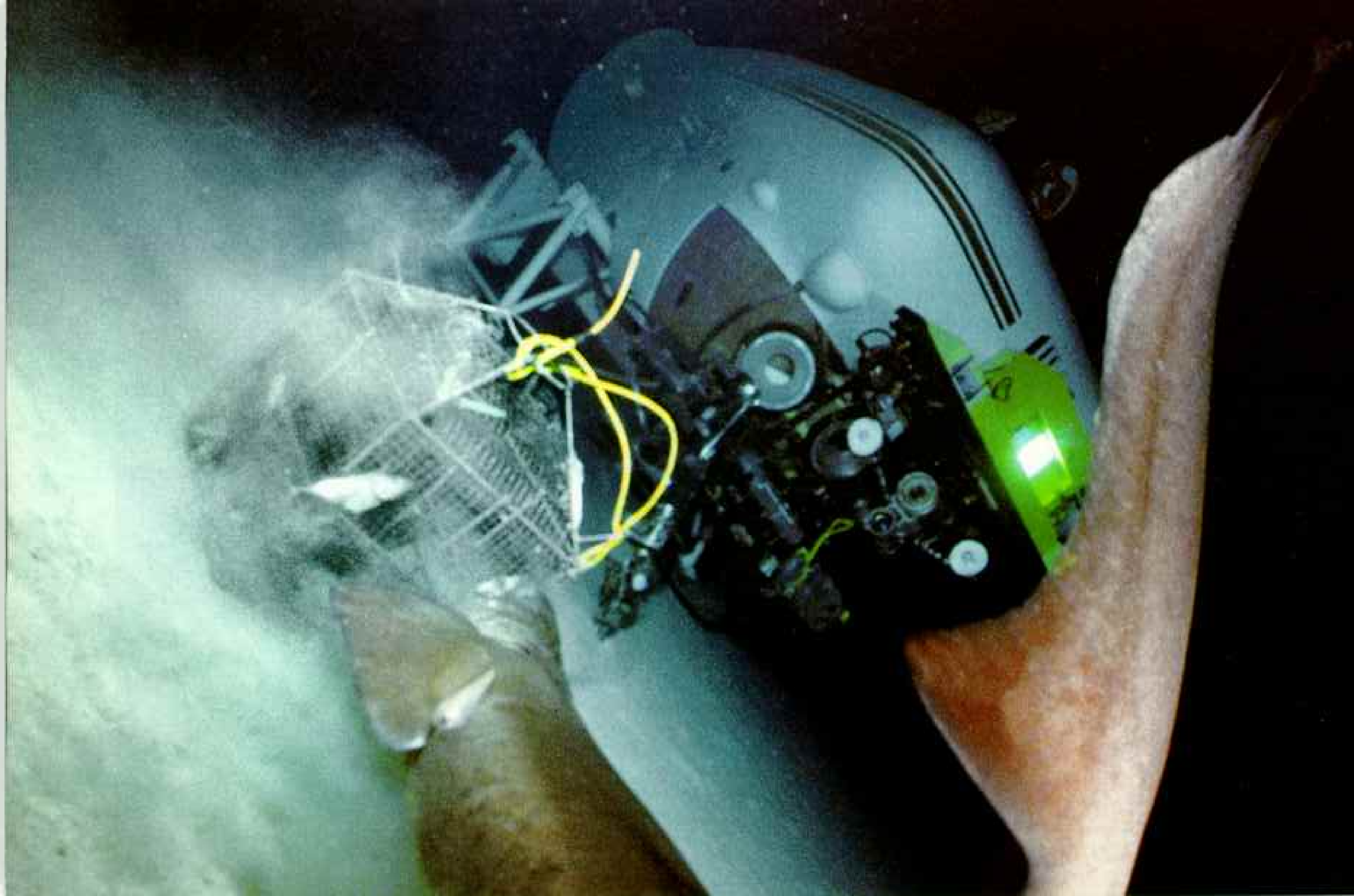
The delegate contacts Geneva. What would headquarters advise? Geneva radios back, "Get a good idea." So he went to Beirut and bought 3,000 chickens and 10,000 pastries. On the crucial day the inmates had their hands full, cooking and eating. And there was no bloodbath at Ansar.

BEFORE THE END of this year there'll be a notable Red Cross event, the XXVth International Conference of the Red Cross. It will be a great get-together of the worldwide Red Cross movement: representatives of ICRC, of the League of Red Cross and Red Crescent Societies, of all the national societies. And also from the 164 states that are party to the Geneva Conventions. They'll discuss their common humanitarian concerns, as they do every four or five years. Last time the place was Manila. This year, Geneva.

A big topic will be how to assure more respect for the Geneva Conventions—those principles and rules that rank among the best things civilization has produced—in a world of ever more tension, more chaos, more war.

ICRC, I know, will do what it can.

And that, I can say after seeing what I've seen, is a lot. □



New Eyes for the Dark Reveal the World of

Sharks at 2,000 Feet

By EUGENIE CLARK and EMORY KRISTOF
as reported to DOUGLAS LEE
NATIONAL GEOGRAPHIC STAFF

"THERE'S a huge tail outside my window," said *Pisces VI* pilot Tim Marzolf to shark expert Dr. Eugenie Clark. A noise like teeth chewing metal filled the cramped compartment as armored hide scraped the submersible's skin. The craft rocked and lifted slightly, nudged from below by a creature of enormous strength.

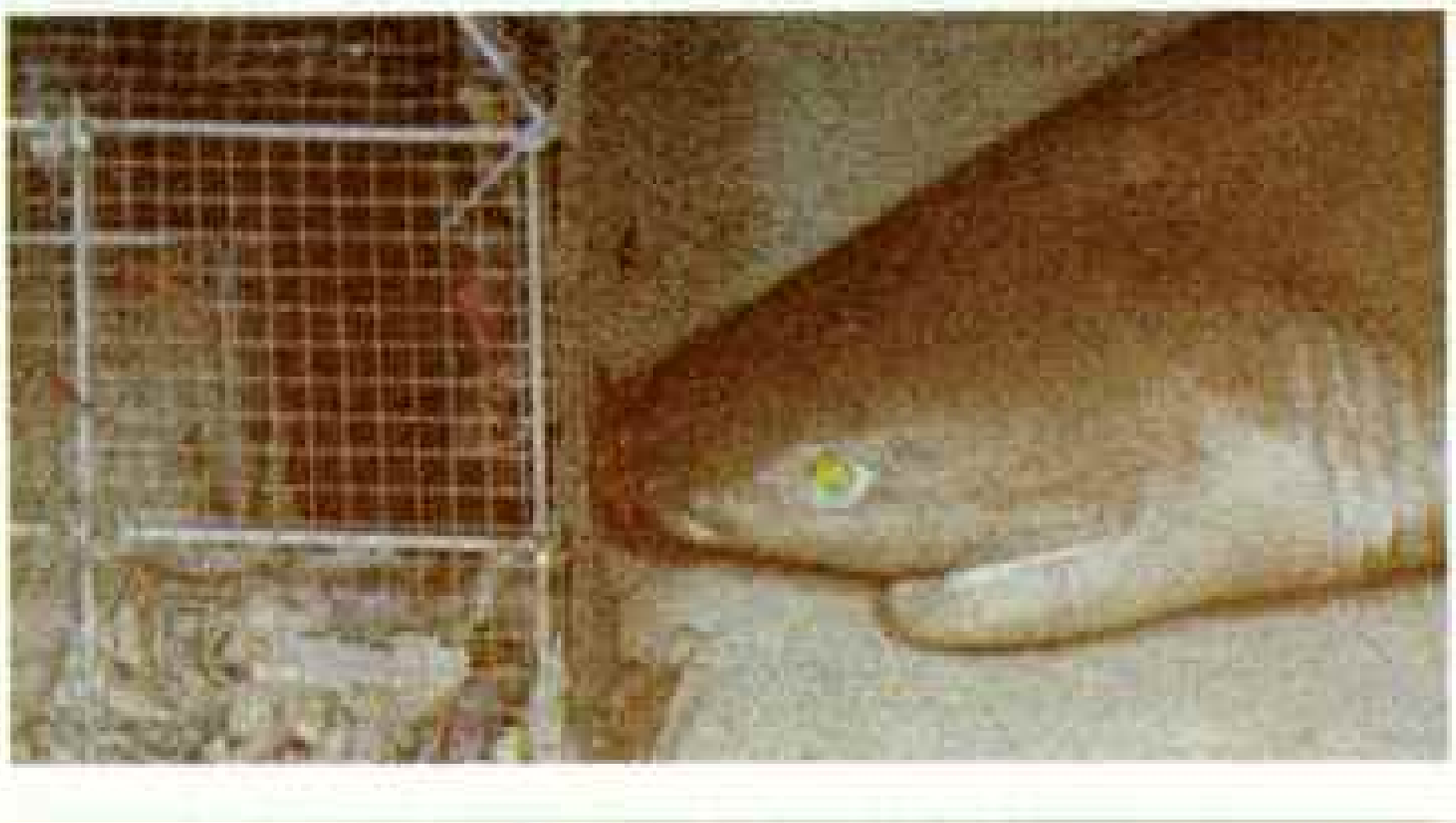
"I thought, gosh, I hope I see something," says Dr. Clark. "Then this huge, broad head came from underneath the sub, and the green eye of a shark was looking in as if looking at me."

It was a startling welcome to the lightless ocean bottom 2,000 feet down, where the *Pisces VI* submersible had settled moments earlier on the sloping side of Bermuda's mid-Atlantic seamount. It was also confirmation of the success photographer Emory Kristof had reported from *Pisces VI* a few days before, when deep-sea sharks had appeared in response to his experimental technique combining fish bait, dim green lights, and quietly lying in wait.

Fifty years ago Dr. William Beebe initiated manned deep-sea exploration with descents off Bermuda to 3,028 feet in his bathysphere, hanging silently from a cable. Today submersibles move freely at great depths, but their lights and noise seem to frighten creatures, and opportunities to study animals' behavior have been limited. Kristof's quiet methods, which included long periods on the bottom with all lights off, drew creatures rarely observed in their habitat—such as a 14-foot sixgill shark battering at a cage of bait (*left*)—and created a new technique for deep-sea observation.

A RESEARCH PROJECT SUPPORTED IN PART BY YOUR SOCIETY

EMORY KRISTOF AND ALVIN M. CHANDLER, BOTH NATIONAL GEOGRAPHIC STAFF, AND TIM MARZOLF



"**The whole idea** is to use the sub as a blind," Kristof explains. "Sit on the bottom, put out some bait, take a nap, and see what comes in." On his first dive, 18 minutes after *Pisces VI*'s mechanical arm placed a can of bait in the green glow of a thallium iodide light, a 12-foot-long sixgill shark swam out of the dark and made off with it, trailing a foam float (***above***).

Another dive and another bait can later, the support crew welded a cage of steel rods, weighted with lead, that defied the nudges and bites heard in the sub several feet away. A video sequence shows a sixgill's eye rolling protectively to reveal the white sclera as the shark attacks the cage (***left***).

EMORY KRISTOF, ALVIN M. CHANDLER, AND TIM HARTOLF (ABOVE AND BELOW LEFT); EMORY KRISTOF (BELOW)

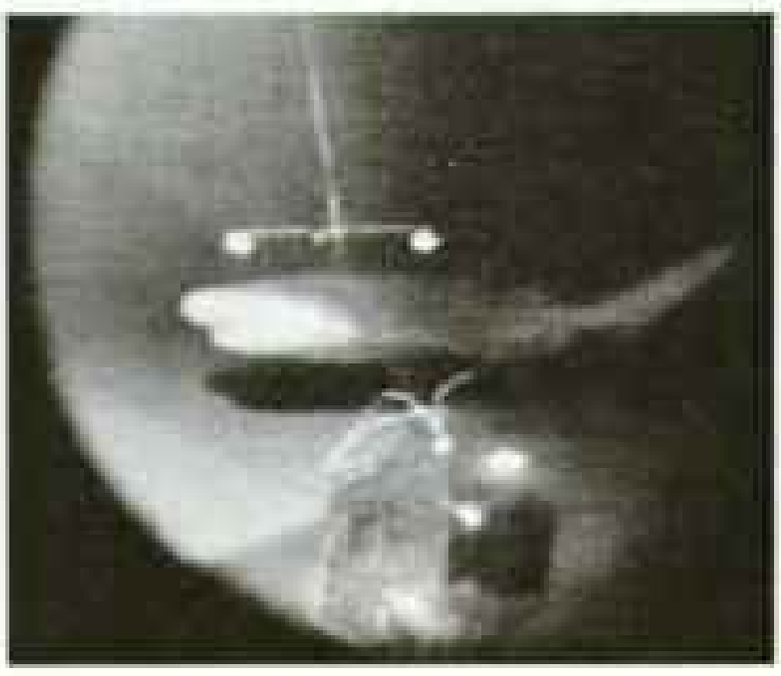
Perhaps the supreme predators of the deep, ranging to at least 6,000 feet, sixgills are primitive cousins of the species with five pairs of gills that account for most sharks. They are also among the least known.

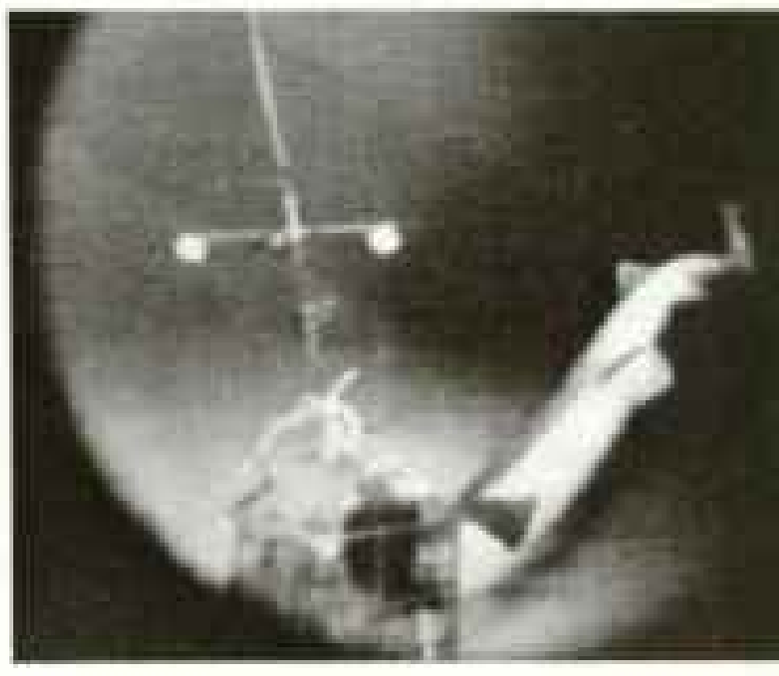
"We've rarely had such an opportunity to observe their behavior," says Dr. Clark, professor of zoology at the University of Maryland, "even though we've had deep submersibles for many years."

"It's a frontier at last being pursued with planning and purpose," says Dr. Andreas Rechnitzer, former coordinator of the Navy's deep-submergence program.

"It's extravagant to take an expensive submersible and just sit there," Kristof explains. But bright operating lights disturb creatures like a gulper shark, whose eye has no apparent functional iris (***below***).

All the elements of Kristof's blind—submersibles, thallium iodide lights whose green rays penetrate farther through water than most colors, and baiting fish to cameras—have been used before. But he is the first to combine them with baiting sharks to a submersible.





ALL BY CHUCK KRISTOF, ALVIN W. GRIESER, AND TIM MARTENS

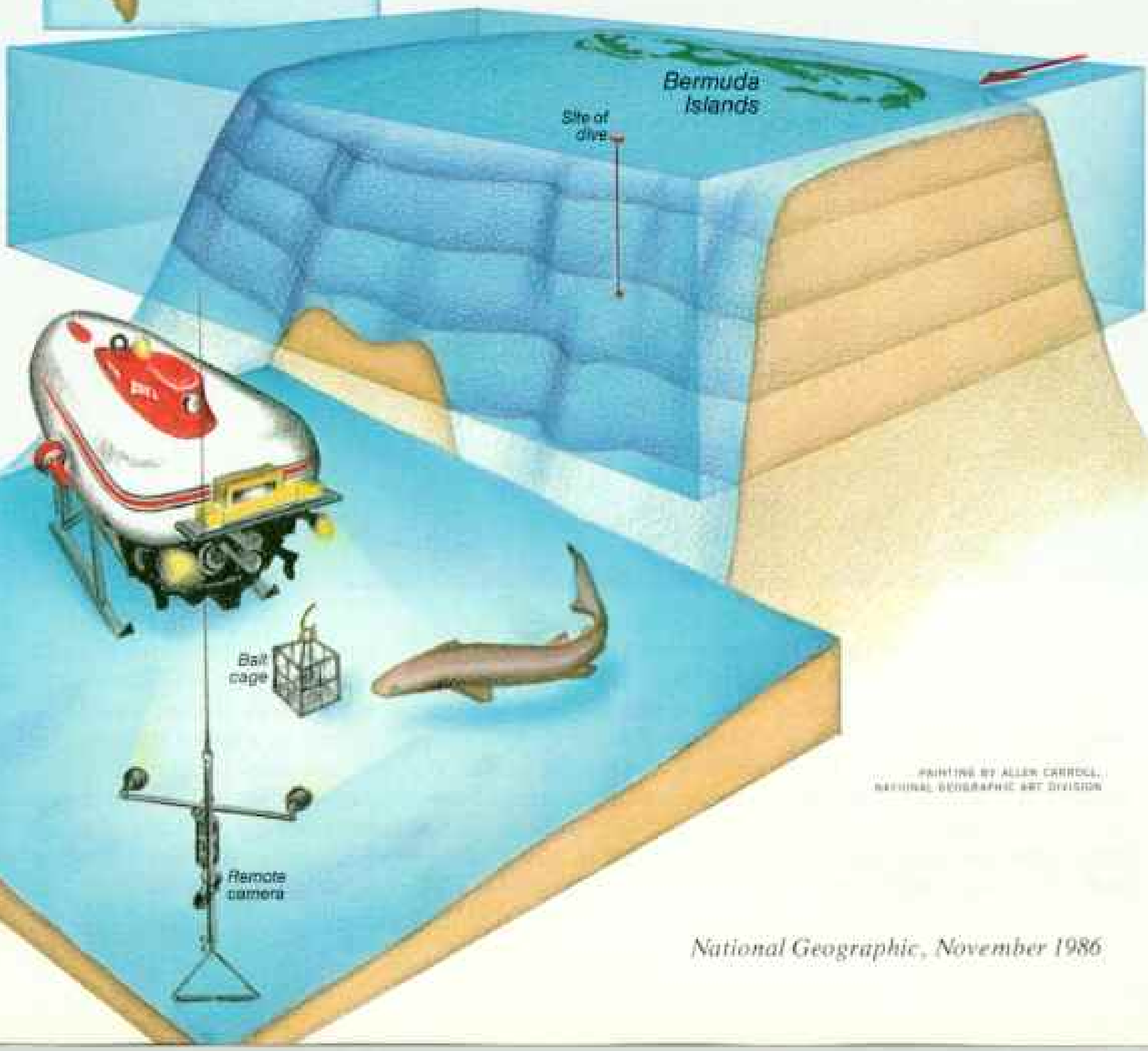
Shying from the limelight, a nine-foot-long shark turns from the bait as strobe lights on a remote camera cast the fish's shadow on the sloping floor (***above***). A thallium iodide light on *Pisces VI*, background, provides light for video pictures (***left***) of a big sixgill circling between the remote camera and the cage, brushing it, and standing nearly vertical to root beneath. Chemical light sticks help attract life to the bait; the remote camera's strobe reflectors mirror thallium iodide light. An RCA video camera with a light sensitivity equivalent to 1,000,000 ASA could photograph in near-total darkness. Large sharks would approach in a green glow similar in intensity to that of a full moon. When all electric lights were doused, swarms of small fish appeared, then left when lights were triggered.

Photographing the life of an undersea mountain

A layer cake of life at many levels, Bermuda provided an ideal setting for Kristof and Clark's "Beebe Project," named in honor of the pioneer who conducted his research in these same waters. "You get more deep-sea creatures close to shore on a sharp drop-off like Bermuda's than on continental shelves, where they live way out to sea," says Dr. Clark.

Funded by the National Geographic Society, the National Oceanic and Atmospheric Administration, and private donors, the expedition was given use of the Pisces VI by André Galerne of International Underwater Contractors. Towing the craft to the dive site saved the costs of a long-range surface ship that would be required to carry the sub to deep dives far from land.

A surface vessel lowered the remote camera rig, weighted at its bottom and attached by lines to buoys that held it vertical on the sloping seafloor. Pisces VI then followed the line down, set the bait before the camera with its mechanical arm, and moved away to allow full play to its own panning video and still cameras, controlled from the submersible. Strobe lights on Pisces VI triggered a photoelectric cell to activate the remote camera. Brighter than thallium iodide, a halogen light on Pisces VI allowed video recording in color, but repelled all but the largest sharks.



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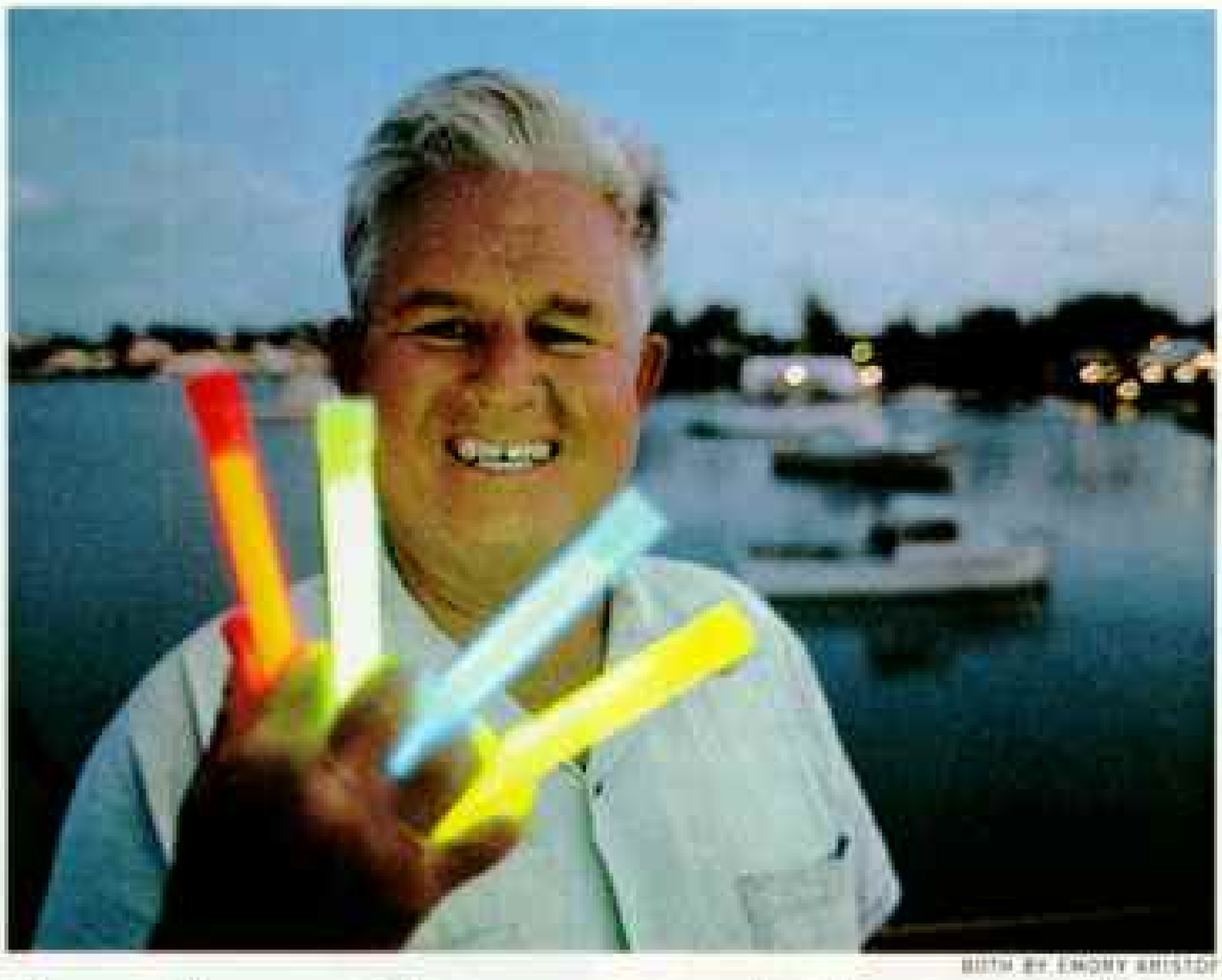
National Geographic, November 1986



BOTH BY EMORY KRISTOF

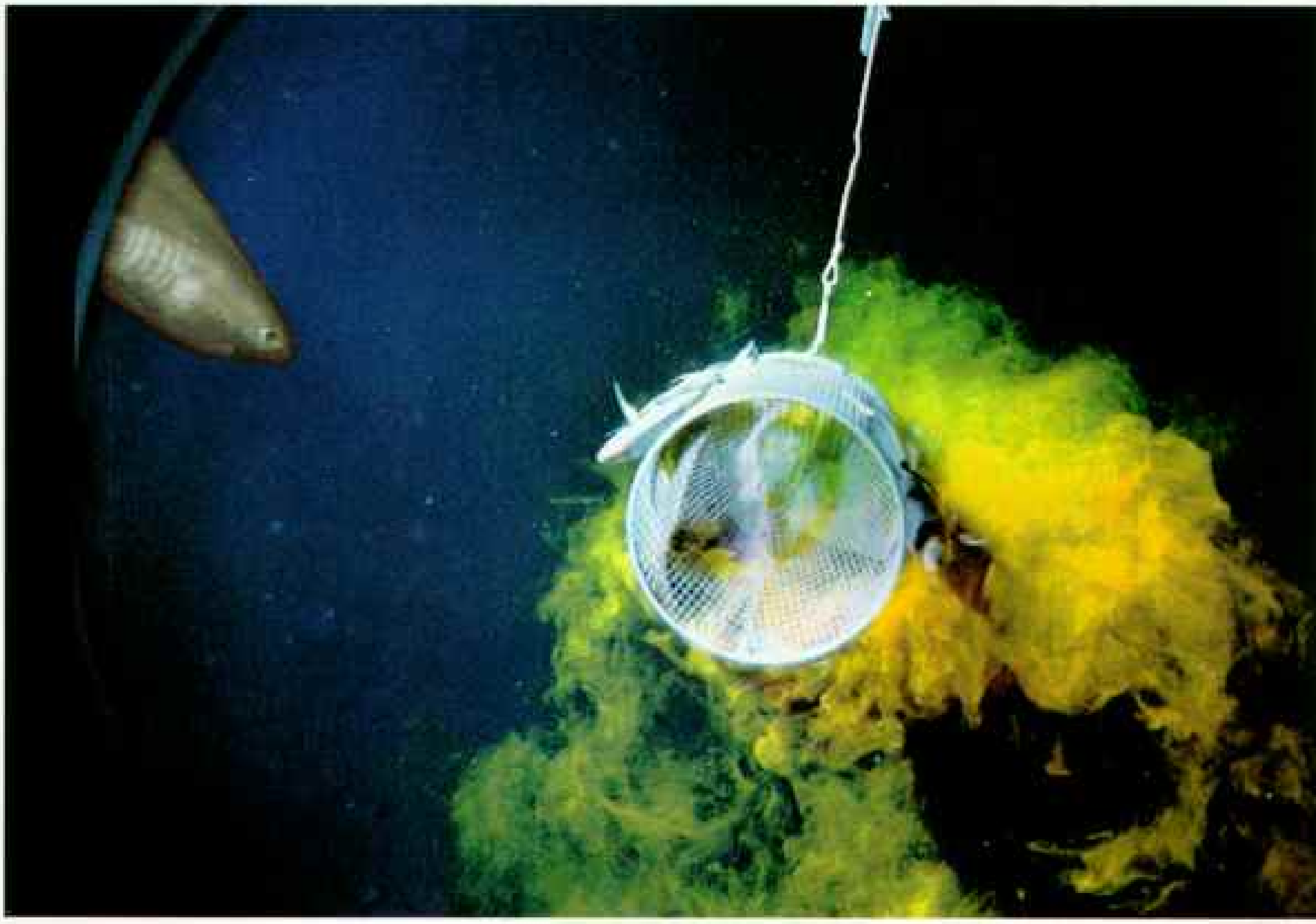
Dean of deep-sea fishermen, Bermudian Teddy Tucker plays with light sticks (***above***), which mimic oceanic bioluminescence. Used as lures on longlines set for swordfish, the lights may be mistaken for glowing prey by large sea predators.

No stranger to monsters of the deep, Tucker has fished the depths as sideline to his work as one of the world's foremost wreck divers and treasure salvors. His advice led the expedition to the dive site, where he has hooked sixgills even larger than an 18-footer seen from *Pisces VI*'s window.

"Teddy has told us about catching all kinds of rare sharks," says Dr. Clark. "Some of them aren't even supposed to be in the Atlantic. Maybe they're not so rare after all."

Dr. Clark also hoped to learn about the sharks' keen senses. Dye streaming from a can of bait (***below***) indicates the direction that the scent is carried on a current, while a sixgill approaches from the opposite side.

The opportunity for direct observation solved a frustration Kristof felt in the 1970s. Inspired by the work of deep-sea photography pioneer John Isaacs, he baited deepwater cameras set to photograph at intervals. "I got awful tired of seeing a puff of silt where something big had just been."



shared by few other deep creatures, enable them to carry heavy "pingers," which transmit information on water temperature, depth, and locator coordinates.

Before *Pisces VI* became available, Dr. Clark experimented with catching sharks on longlines. Tucker's experience showed that big sharks hooked deep and released on the surface did not survive—due, Dr. Clark believes, to the warm surface temperature—so she wanted to tag hooked sharks at colder 150-foot depths. A four-foot gummy shark and sixgills of seven and eleven feet, all caught on one line, created a tangle that she was unable to cut away (***right***). A surface-operated robot camera hovering nearby provides a video image of Kristof photographing Dr. Clark's rescue attempt (***below***).

Dissected on board, the largest sixgill proved to be an immature female. Tucker reports hooking a mature specimen he estimates at 25 feet. The expedition caught what may be a previously unknown species of sixgill. Two are already known to science.

Curious about the three-dimensional travels of deep-water sharks and a possible link with the deep scattering layers—organisms that move up and down in a diurnal cycle—Dr. Clark hopes to use *Pisces VI* (***above***) for tagging subjects with acoustic devices for tracking. The sharks' large size and muscular bodies, features

EMORY KRISTOF AND ALVIN M. CHANDLER (ABOVE); EMORY KRISTOF

Vigil in the depths lasted 12 hours on Dr. Clark's most successful dive, when four species of sharks were sighted. Swarms of small fishes, such as the epigonids seen with a gummy shark (***left***), also invite further study. With all external lights off, *Pisces VI*'s crew could watch large creatures approach on sonar (***above***). Cold, tired, and wet from condensation, Dr. Clark attempted to catnap during the nightlong dive. "But every time I closed my eyes, 'Tim, the pilot, would say, 'Here comes another one.'"

Writing in NATIONAL GEOGRAPHIC in 1931, Beebe termed the state of deep-sea knowledge "comparable to the information of a student of African animals, who has trapped a small collection of rats and mice but is still wholly unaware of antelope, elephants, lions and rhinos."

"We know about the elephants," Dr. Clark replies. "Now we can begin to learn about them." □

EMORY KRISTOF, ALVIN M. CHANDLER, AND TIM MARCOU (LEFT); TIM MARCOU

Laos: March 29, 1972

Missing in Action

By PETER T. WHITE NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by SENY NORASINGH

February 18, 1986. Systematically, step-by-step, a United States Army team examines what's left of the four-engined U. S. Air Force AC-130 whose call sign was Spectre 13—seeking what can be found of its 14-man crew. Sgt. 1st Class Randy Nash holds back an aluminum fuselage section (*right*), while Capt. Paul Bethke attaches a cable so that a pile of wreckage can be pulled apart with block and tackle. What has brought them to the forests of southern Laos is compassion for the families of Vietnam War servicemen still unaccounted for, as well as a new willingness of the government of Laos to cooperate.

The plane, equipped with sophisticated sensors to spot North Vietnamese trucks at night and rapid-fire guns to attack them, had been on a reconnaissance mission over the Ho Chi Minh Trail. A surface-to-air missile brought it down in the dark. Nearly three years later, in December 1975, all Laos came under Communist control. And ten years after that, as both the Lao People's Democratic Republic, allied to Vietnam, and the United States sought better relations, the Lao agreed to admit U. S. Army search-and-recovery teams—but not in uniform. They also promised help with the fieldwork.

The first such joint effort, last year, recovered the remains of 13 Americans—ten positively identified. Among the finds of this second and latest "U. S./Lao joint crash-site search": a dog tag (***above***) of Capt. Richard Castillo, USAF, the plane's infrared-sensor operator. Although Army experts later identified some of the remains found as those of her husband, Mrs. Elizabeth Castillo of Corpus Christi, Texas, planned to seek a second opinion—an option offered to all families. She cited unconfirmed reports from the 1970s that some of the plane's crew may have been rescued by Lao civilians or taken prisoner. "After 14 years," she said, "for my own peace of mind I have to be sure."

THE OPERATION, 80 miles east of the city of Savannakhet, is strenuous and expensive. First a survey party identifies the missing plane by numbers on remnants of its tail—55-0044. Next Lao soldiers cut down 100-foot trees and 60-foot bamboos to open a 1,400-square-yard landing spot for a helicopter near the scattered wreckage.

Then two U. S. C-130 transports arrive in Savannakhet with a team including six men from the U. S. Army's Central Identification Laboratory in Hawaii, a medic, and two explosives-disposal experts. They bring picks, shovels, chain saws; tents, cots, mosquito nets; dehydrated food and cans of drinking water. And dozens of drums of fuel—for a Lao military helicopter, a Soviet-made MI-8, to lift men and materials to the site; and for an American generator to power a Lao radio transmitter. Moving that 1,000-pound generator is a joint U. S./Lao project in itself (***right***). Fifteen Lao assisted in this search; Laos also supplied cooks, radio operators, and guards—some 200 people in all. The U. S. paid all expenses, including helicopter charter and a price for the felled trees.

First the explosives-disposal men begin collecting scattered, still dangerous cannon and machine-gun ammunition. Then team members divide wreckage areas into 20-foot squares, using white tape so that finds can be precisely located for their records. Initially they tag and document larger items—such as the pocketknife and revolver shown by Sgt. 1st Class Rick Huston (***below***). The work is mostly painstaking sifting of dry soil through a wire screen, as Sgt. Raymond Harrison (***top right***) does with the help of his Lao partner. Their masks protect against irritating fiberglass particles from the plane's insulation.

After nine days the yield includes some 5,000 bone fragments, many no larger than a rice kernel. The largest range up to three inches in length. They all go into plastic envelopes, labeled as to where they were found.

One morning a five-foot snake slithered from twisted aluminum. The excited Americans clicked their cameras at it. The delighted Lao caught the snake, saying they would fatten and eat it.

TENTH DAY on the site, "clearout day": After all collected ammunition is destroyed at Lao request, in three big explosions, everyone heads for home. The Lao take along a sizable cache of excess American medical supplies.

The U. S. team considered its mission a success. True, the human remains recovered are scant. The plane's high-speed impact and secondary explosions took their toll. And this site, like others in Laos, had been disturbed, not only by local villagers taking what was obviously useful, but also possibly by American adventurers and assorted Southeast Asian mercenaries on illegal cross-border forays from Thailand. Despite discouragement from all governments involved, bones from such crash sites have been sold in Bangkok. One American reportedly paid $30,000 for what he was told were the remains of his son.

At the Army's Central Identification Laboratory in Honolulu, forensic experts made lengthy analyses. Some 60 teeth and fragments proved almost as valuable as fingerprints, for they can be checked against military dental records. Of Spectre 13's 14 crew members, six identifications have been made—subject to confirmation. If further individual identifications cannot be made, a group burial will be recommended.

As of this writing, 2,392 American servicemen and 42 civilians are listed as missing in Laos, Kampuchea, and Vietnam. Hundreds of aircraft crash sites have been determined—more than 250 in Laos alone. By now, all missing servicemen of the Vietnam War—with one symbolic exception—have been declared presumed dead by the U. S. Department of Defense, even though their bodies have not been recovered. Thus their families are entitled to survivors' benefits. But what about families still plagued by doubt?

The Lao government has promised another joint site search sometime during the October to May dry season. □

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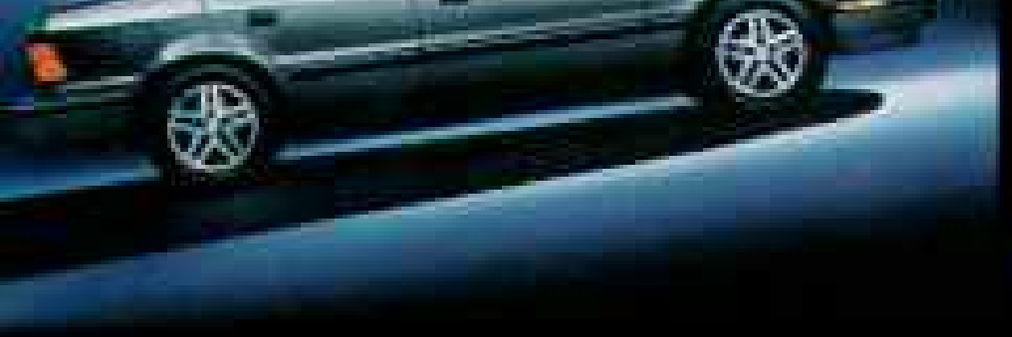

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*Based on survey of owner problems with '86 cars & light trucks (combined) designed & built in No. America and sold Oct.-Nov. '85 (5 mos. avg. usage) and on a warranty comparison of competitively priced models. See 5/50 limited warranty on powertrain & outer body rust-through at dealer. Excludes leases. Restrictions apply.

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Marianas Fruit Bat **Genus:** Pteropus **Species:** mariannus **Adult size:** Approx. 25.4cm in length; wingspan, 91.4cm **Adult weight:** Approx. 454g **Habitat:** Rain forests on Guam and the Northern Mariana Islands **Surviving number:** Estimated at less than 500 on Guam; declining throughout the Islands and nearing extinction on several. Photographed by Merlin D. Tuttle

Wildlife as Canon sees it: A photographic heritage for all generations.

The Marianas fruit bat is one of many bat species worldwide that play a critical role in the ecological balance of their habitat. Native forests depend on the Marianas fruit bat for seed dispersal and as a primary pollinator of numerous plants and trees.

Once common throughout the 15-island archipelago, the population of fruit bats on the Mariana Islands has steadily declined due to unregulated commercial hunting. Conservation and resource management are necessary to ensure the survival of the species. An invaluable research tool, photography has been instrumental in these efforts as a means of broadening people's understanding of this fascinating mammal and its vital role in the forest ecosystem.

And understanding is perhaps the single most important factor in saving the Marianas fruit bat and all of wildlife.

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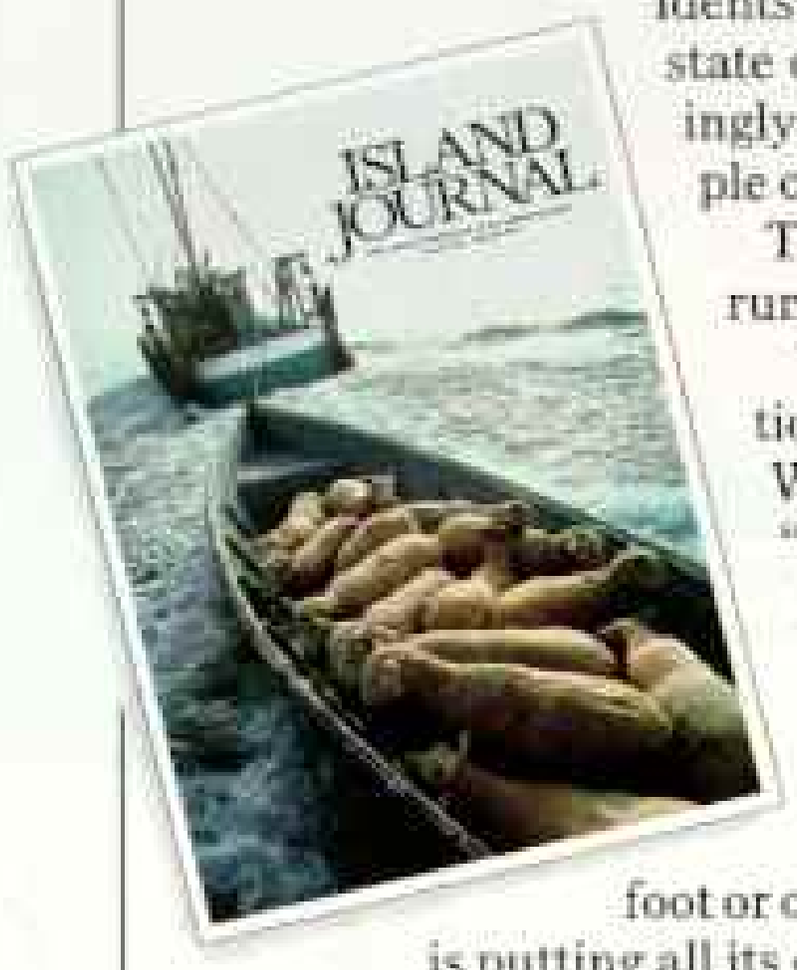
Getting things done for conservation

SOME OF THE BEST NEWS and clearest evidence pointing to the robust strength of the conservation ethic continues to come from private, nonprofit organizations working at local or regional levels. I'm fortunate to hear about them in my service with the President's Commission on Americans Outdoors and from my colleagues returning from assignments. These citizen-run groups are flourishing, and new ones are being organized to turn problems into opportunities.

Of the hundreds of such groups from all across the country, the Island Institute in Maine and the Bob Marshall Foundation in Montana are as typical as any—that is, not typical at all, and they are quite different from each other.

The islands of the Maine coast—some 3,000—concern a lot of people: summer residents and visitors, conservationists, boaters, developers, scientists, state officials, and—above all—year-round residents. Not surprisingly, there has been less than perfect agreement among those people on what is best for the islands' future.



The founders of the Island Institute felt the need to create a forum where that future could be discussed, and planned for, by all.

Their counterparts who established the Bob Marshall Foundation had a more straightforward problem. The Bob Marshall Wilderness, linked with two others and known collectively as "the Bob," is an immense piece of primeval Montana. Its trails, put in as part of a fire-control program before the advent of fire fighting by air, have deteriorated badly. In these budget-cutting times, the U. S. Forest Service, which administers the Bob, has limited funds for trail maintenance.

Since the enjoyment and safety of visitors packing in on foot or on horseback depend largely on adequate trails, the foundation is putting all its current efforts into raising funds to help clear and rehabilitate about 200 miles' worth as a first priority. This unusual partnership, a private foundation raising funds to help a government facility, has been born out of necessity and a sense of responsibility to the past and future.

That same sense also motivates the Island Institute to act as an advocate for the 14 year-round island communities and to help Maine assess current public use and future potential of state-owned islands.

The question of island access is difficult since many smaller islands are privately owned by people who guard their privacy or by conservation groups protecting wildlife habitat. Then again, permanent residents trying to make a living off their islands may tend to rank summer people and scientists somewhat lower than lobster culls.

Since the common future of all depends on communication, the Island Institute publishes newsletters and a handsome annual report for wide circulation—and runs conferences where everything from fisheries to sewage treatment to lighthouses is considered. It also works to preserve the small island schools that are the central institutions of their communities.

The Island Institute (P.O. Box 429, Rockland, ME 04841) and the Bob Marshall Foundation, Inc. (P.O. Box 1691, Kalispell, MT 59901), would be glad to hear from you. So would some similar group doing work in your community or region, and *it* will probably also be happy to put you to work.

Gilbert M. Grosvenor

PRESIDENT, NATIONAL GEOGRAPHIC SOCIETY

PHOTOGRAPH BY PETER RALSTON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Members Forum

Statue of Liberty

The excellent article on the Statue of Liberty (July 1986) states that it was originally conceived as a gift to the U. S. I was under the impression that Bartholdi designed the piece to be a lighthouse at the Suez Canal, and that Ismail Pasha wouldn't support the concept. The proposal by Laboulaye was propitious since Bartholdi happened to have something handy.

G. R. Johnson
Islington, Ontario

In 1867, two years after Laboulaye proposed a gift for America, Bartholdi sought a commission for a colossal female statue at the canal, but the khedive of Egypt could not pay for it. The sculptor reworked the concept for New York Harbor.

The picture of the torch with people standing on the balcony brought back boyhood memories. I have always maintained that I climbed the stairs of the arm. Most people say I probably dreamed I did. Was it ever open to the public?

Robert Bailey
Seattle, Washington

The torch, accessible by ladder, was open to the public only until 1916, but we have heard of people climbing after that.

The map (page 19) places the statue in New Jersey. I've been told recently that the state line has been moved. Is the statue in New York or New Jersey?

F. C. Thompson
Albemarle, North Carolina

The state line hasn't moved. However, the two states have long disagreed about the meaning of an 1834 compact setting the border that allowed New York to retain its "present jurisdiction" over the islands. Recently the governors of New York and New Jersey agreed to share the revenues from tax receipts of concessionaires on Liberty and Ellis Islands, pending legislative approval.

If you compare Liberty's face to the bust or photographs of Bartholdi's mother, you see that the two have entirely different eyes, noses, mouths, brows, cheekbones, and chin structures. Liberty has the classical face of antiquity; Bartholdi's mother looks like somebody's mother. Let's get off the "Who-Is-Liberty-Really" bandwagon.

Terry Wilhelm
Burnsville, Minnesota

My parents immigrated from Slovakia—Mother in 1903 and Father much earlier, as an infant. The Lady With the Lamp greeted them. In November 1984 I was fortunate to see her; it brought a joy that had to be felt by millions of our immigrants. Thanks for the remarkable remembrance.

Irene C. Adams
Uniontown, Pennsylvania

New York Harbor

While you were working on your stories on the statue and New York Harbor (July 1986), I as a fisheries biologist was defining the movements of immature striped bass in the harbor. On page 21 the Gowanus Canal is called "gangrenous." Yet during the winter it is one of the most productive nurseries for juvenile fishes in the region. The biological health of the harbor changes drastically with the seasons. The public's perception of that aquatic habitat needs much help.

William L. Dovel
Venice, Florida

As a born-and-raised Californian, I grew up in a society that knew little of New York City and its Golden Door. The huddled masses yearning to breathe free in my neighborhood were my brothers from across the Mexican border and those who sailed into San Francisco in search of a new future and found it. Please don't let your foreign and East Coast readers assume that the U. S. ends at the Hudson River. There's a whole other world out there, and it's called the West.

Richard G. Webster
Julita, Sweden

Are there no women working in New York Harbor? Even the photo of the passengers on the Staten Island Ferry shows a crowd almost exclusively male. Must we be content with token mascot females in the forms of Ms. Liberty and the *Queen Mary*? In all New York Harbor is there not one working female, not one Tugboat Annie?

Elree Harris
Salt Lake City, Utah

Philippines

Thank you for the superb article about the Philippines (July 1986). Now the American people finally know what they have been supporting.

Joan B. Sturm
Edgewood, Kentucky

When I became a U. S. citizen in 1978, the judge remarked, "I am sure you feel emotion as you renounce your native land, the home of your childhood, your parents, your friends. . . . But let me assure you that your allegiance does not and should not be considered a severance of the ties and friendship and love that bind you to your family, friends, and memories."

That is why to this American of Philippine descent, your July issue is a treasure. It deepened my understanding of the most recognized symbol of American freedom. It renewed my affection for the country of my birth, whose citizens have shown in a most eloquent way that their commitment to freedom could not be crushed.

Jose C. Pangan
Ware, Massachusetts

I was wondering if the topography of Imelda Marcos's closet assists immeasurably "man's knowledge of earth, sea, and sky"?

Caryl Silver
Willowdale, Ontario

Corazon Aquino's capacity to lead and serve intelligently was perceived during her student days at the College of Mount Saint Vincent on the Hudson. She was elected to the National Catholic College Graduate Honor Society, pledged to leadership and service after graduation. We are proud of what she is doing for her country.

Frances Noetzel
University Heights, Ohio

I thank Arthur Zich for mentioning that Corazon Cojuangco Aquino is a member of one of the richest families in the Philippines. With one of her Cojuangco brothers, she owns the United Fidelity Bank, one of the top hundred in Asia. Marcos passed a land reform law in 1984 to divide land among peasants who had worked it all their lives. One plantation is her 17,300-acre Hacienda Luisita, which employs 6,000.

Edward J. Toner
Howell, New Jersey

President Aquino has promised that her family's hacienda will serve as a model for land reform.

The existing poverty in the Philippines reflects a sad irony regarding health care: The 13,710 Filipino physicians in the U. S. nearly equal in number all the physicians in the Philippines.

William V. Dolan, M.D.
Park Ridge, Illinois

The story is instructive of the Philippines' plight, but it is misleading in its mild nature. It suggests that there is/was no chance of the NPA negotiating with the Aquino government when, in fact, there were promising beginnings before Casper Weinberger insisted on supplying military aid to continue fighting the NPA. The plight of the people of Negros is laid to the drop in the price of sugar. All the land was set aside by wealthy landowners for sugar. Even now, with massive starvation, use of land is being denied to the people for plots of vegetables.

RC Johnsen
Winnipeg, Manitoba

Some 12,500 acres have been loaned for small cooperative farms.

You cite brutal statistics of poverty and unemployment. Then you throw in the right-wing

view that the "greatest threat . . . to the nation lies in the Communist insurgency." Come on, NATIONAL GEOGRAPHIC, let the reader decide what is the greatest threat to the Philippines.

Les Brake
Willow, Alaska

The photograph on page 100 of the child and grandmother stopped me cold. The intravenous feeding has infiltrated the soft tissue in his left arm, causing more harm and fear than good. It speaks volumes about the quality of medical care on the islands.

Sandy Blair, R.N.
Richardson, Texas

Corregidor

"Corregidor Revisited" (July 1986) is very interesting. It reminds me of the bravery displayed by Filipino and American soldiers fighting side by side. The defense of Corregidor delayed the Japanese invasion, paving the way for Gen. Douglas MacArthur's escape to Australia to build up a liberation force.

Conrado A. Estrada
Wake Island

My husband fought on Corregidor, was captured by the Japanese, and spent three and a half years in prison camps. One man survived to return home out of every two who were captured on Bataan or Corregidor, and many still living suffer the effects of post-traumatic stress disorder, which at the time was not recognized.

Beverly B. McKendree
Austin, Texas

Fraser River

In your article "The Untamed Fraser River" (July 1986) the pictorial display has succeeded in portraying the people as uncultured and totally unrefined buffoons. The majority of the people of British Columbia live in fine communities in well-built homes with indoor plumbing, and they watch television in the comfort of their living rooms. Very few live reclusive lives. The article is misleading; the pictures an outright sham.

Yvonne Norn
Victoria, British Columbia

The danger to the natural state of the Fraser and to other rivers now mere lakes behind concrete dams no longer need be. Nuclear plants, properly built with safeguards, are an answer. Technology is to be used, not hidden and feared.

Cameron K. Wehringer
Hillsboro, New Hampshire

Letters should be addressed to ***Members Forum****, National Geographic Magazine, Box 37448, Washington, D.C. 20013, and should include sender's address and telephone number. Not all letters can be used. Those that are will often be edited and excerpted.*

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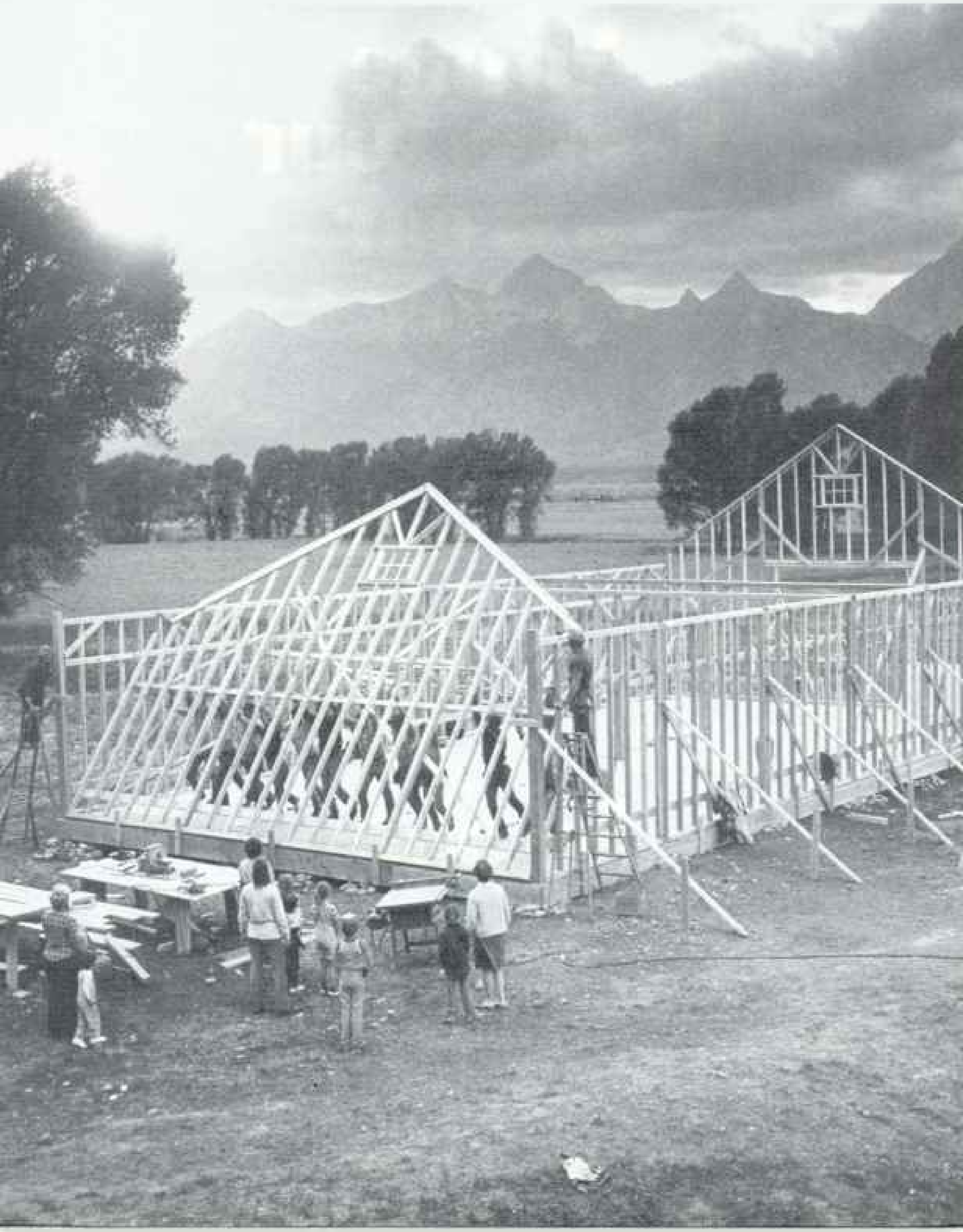

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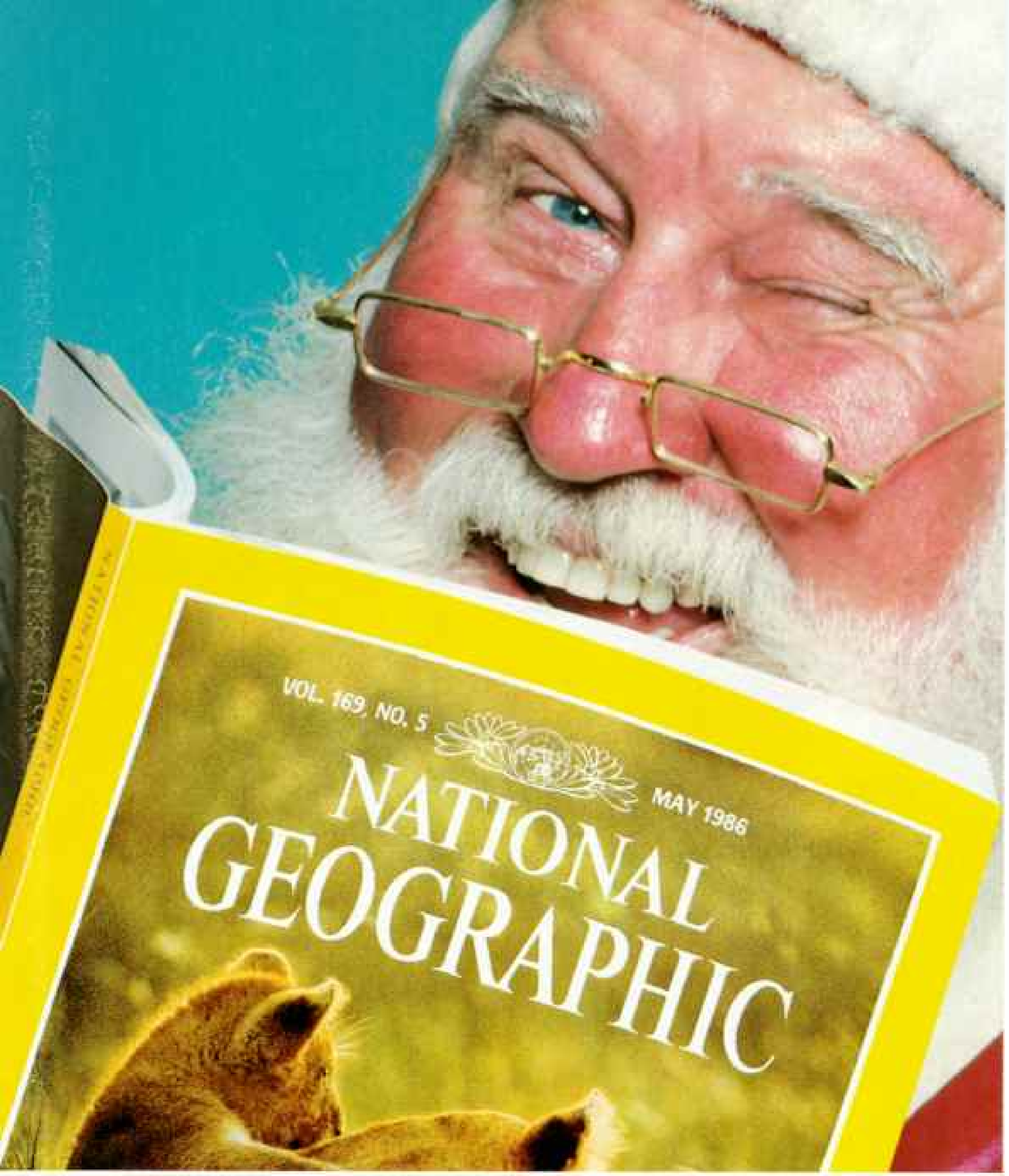

NATIONAL GEOGRAPHIC

NOVEMBER 1986

Columbus and the New World

COVER: *Woodcut illustrates a rare Florentine edition of Columbus's letter of discovery. Courtesy British Library.*

Christopher Columbus was definitely not a candidate for membership in the Flat Earth Society. Like other European intellectuals of his time, he accepted that the earth was round.

The Greek mathematician Pythagoras declared the earth round in the sixth century B.C. Aristotle reported rumors of lands to the west of Europe, and Eratosthenes computed the circumference of the world amazingly accurately centuries before Christ. The Greek geographer Strabo about 7 B.C. wrote of attempts to circumnavigate the earth; in the first century A.D. Pliny the Elder wrote that oceans surround the whole earth and that the distance from east to west is that from India to Spain. Romans had ports in India and probably explored the South China Sea. By the tenth century Venice was trading in the spices of the Indies. Marco Polo returned to Europe in 1295 with vivid descriptions of the wealth and sophistication of India, China, and Japan (Cipangu).

By Columbus's time rough maps of Asia existed. In 1462 the king of Portugal is said to have offered a reward for discovery of rumored islands to the west.

Cipangu is the most noble and richest island in the east, full of spices and precious stones. . . . has a King and language of its own.

JAPAN ON 1492 BEHAIM GLOBE

Columbus reportedly sent a "sphere" with his ideas of "sailing west to reach the east" to Florentine scholar Paolo Toscanelli, who responded in 1474 with a letter and a chart, which showed that by sailing 3,000 miles west from the Canary Islands one would reach the East with no obstacles to block the way. On Columbus's travels south to Africa and north to Ireland and perhaps Iceland, he certainly heard the rumors of lands to the west.

Explorer Thor Heyerdahl claims Columbus had more than rumors, that he knew where he would find the lands to the west because of letters to the Vatican from Norse priests in Greenland settlements four

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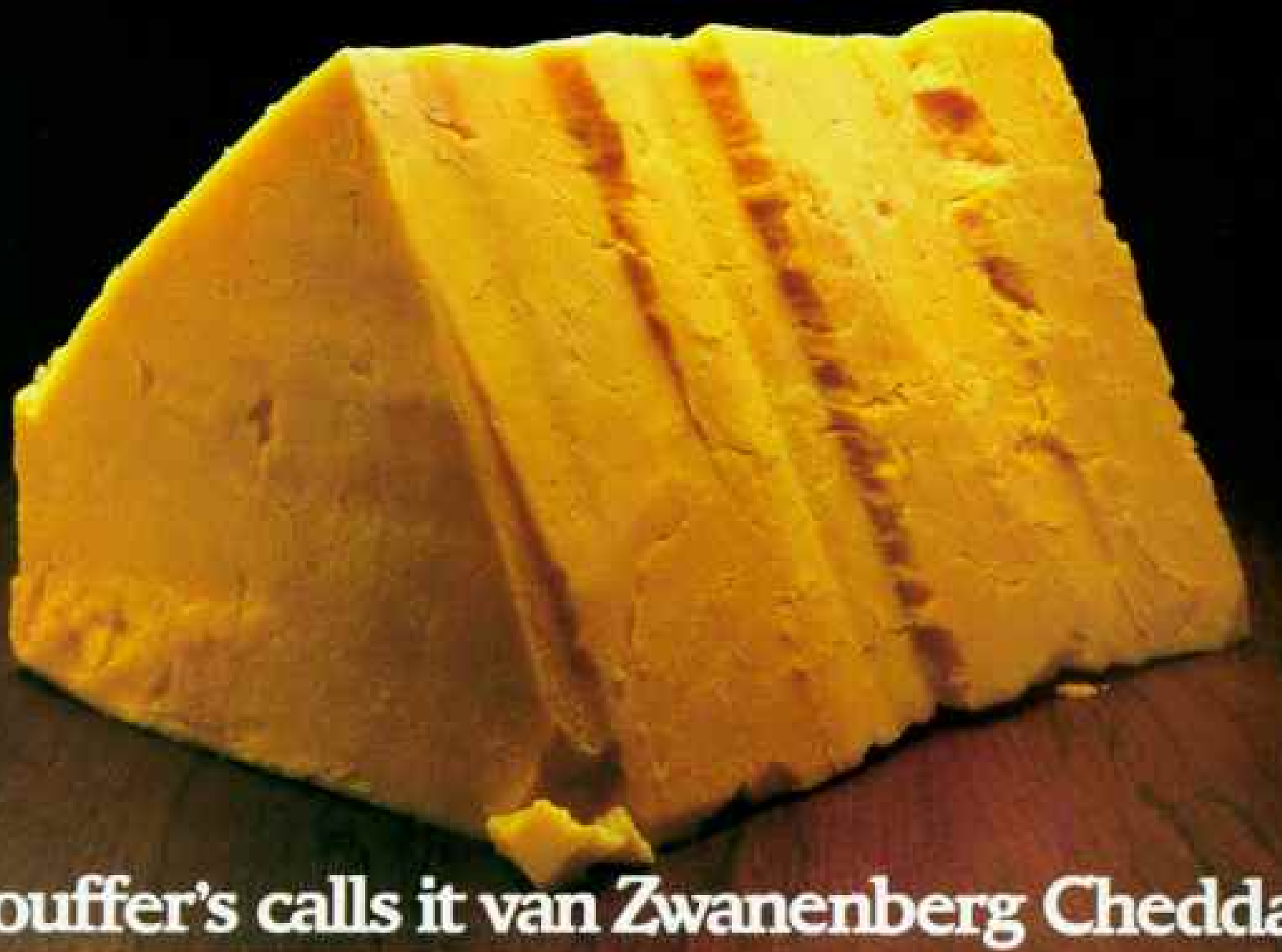
On Assignment

FOR ADVENTUROUS HISTORIANS, technology has always been the handmaiden of new ideas. The oldest existing terrestrial globe (***top***), designed by Martin Behaim in Nürnberg, Germany, and made in 1492 even as Columbus was sailing across the Atlantic, was a marvel of its time—although it displayed a round world a quarter too small. To show the area from Europe to Asia in one flat view, GEOGRAPHIC cartographer ***Richard K. Rogers*** (***right***) and his staff reproduced gores of a facsimile made in 1908 and pasted them on the inside half of a globe. A fish-eye lens provided the unique 180° view on pages 563-5.

It was another bit of a technological array that had been brought to bear on the mystery of the true Columbus landfall. ***Marc Auslander*** (***below,*** at right), an IBM research scientist and a sailor like ***Luis Marden,*** left, applied his superb programming skills to an IBM personal computer to check the Marden transatlantic track. Marden himself had supplemented his wife Ethel's trigonometric calculations with two small navigation computers, a Tamaya NC-77 and NC-88.

But the highest technology was provided by Control Data Corporation. ***Carla Ryti*** and ***Scott Devitt*** (***lower right***) were members of a team that developed the Columbus Research Tool, or CRT. An interactive system employing CDC's powerful Cyber 170/865 computer and a Ramtek color monitor, it enabled researchers to enter courses and distances from Columbus's log and sail on their screen voyages through the Bahamas and Turks and Caicos Islands—a tool, like the Behaim globe of 500 years ago, for searching after truth.

PHOTOGRAPHS BY JOSEPH B. LAVENBURG, NGS (ABOVE), STEVEN FERRY (BELOW), AND NICK KELSH



Stouffer's calls it van Zwanenberg Cheddar.

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Now you know one of the reasons why Stouffer's Macaroni and Cheese is as good as can be.

Stouffer's.
As good as can be.

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portrays the life of Jim Corbett, India's "tiger man." A pioneering conservationist, he was famous for both tracking down the big cats that preyed on villagers *and* for protecting those that remained in their jungle domain. This unique dramatization airs November 30. *Don't miss it!*

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