

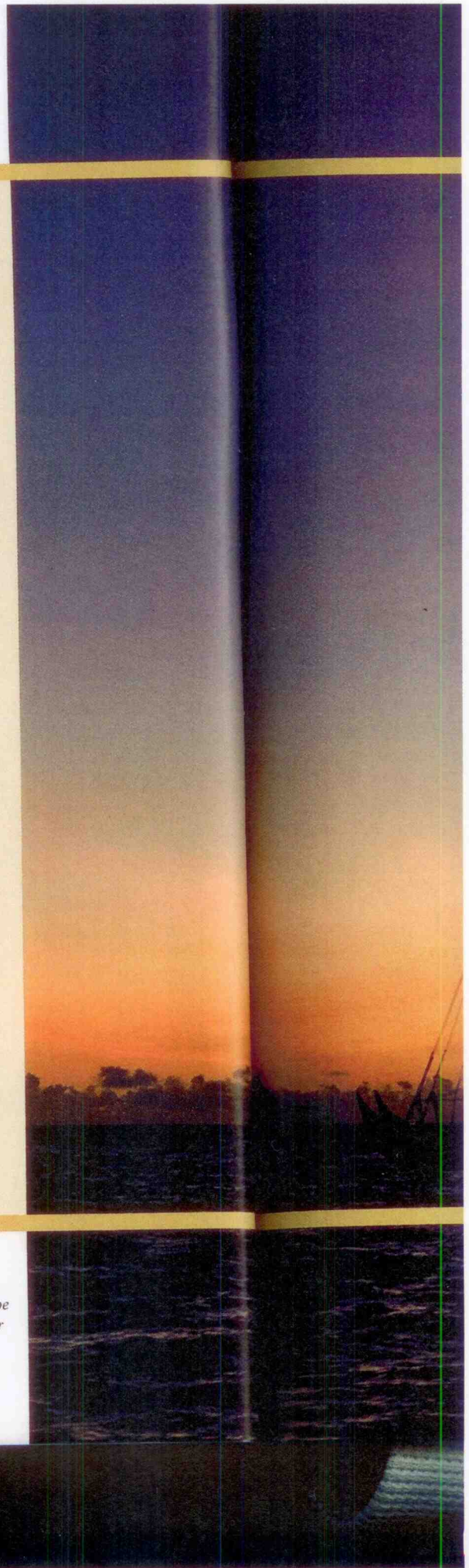
BEYOND THE BLUE HORIZON

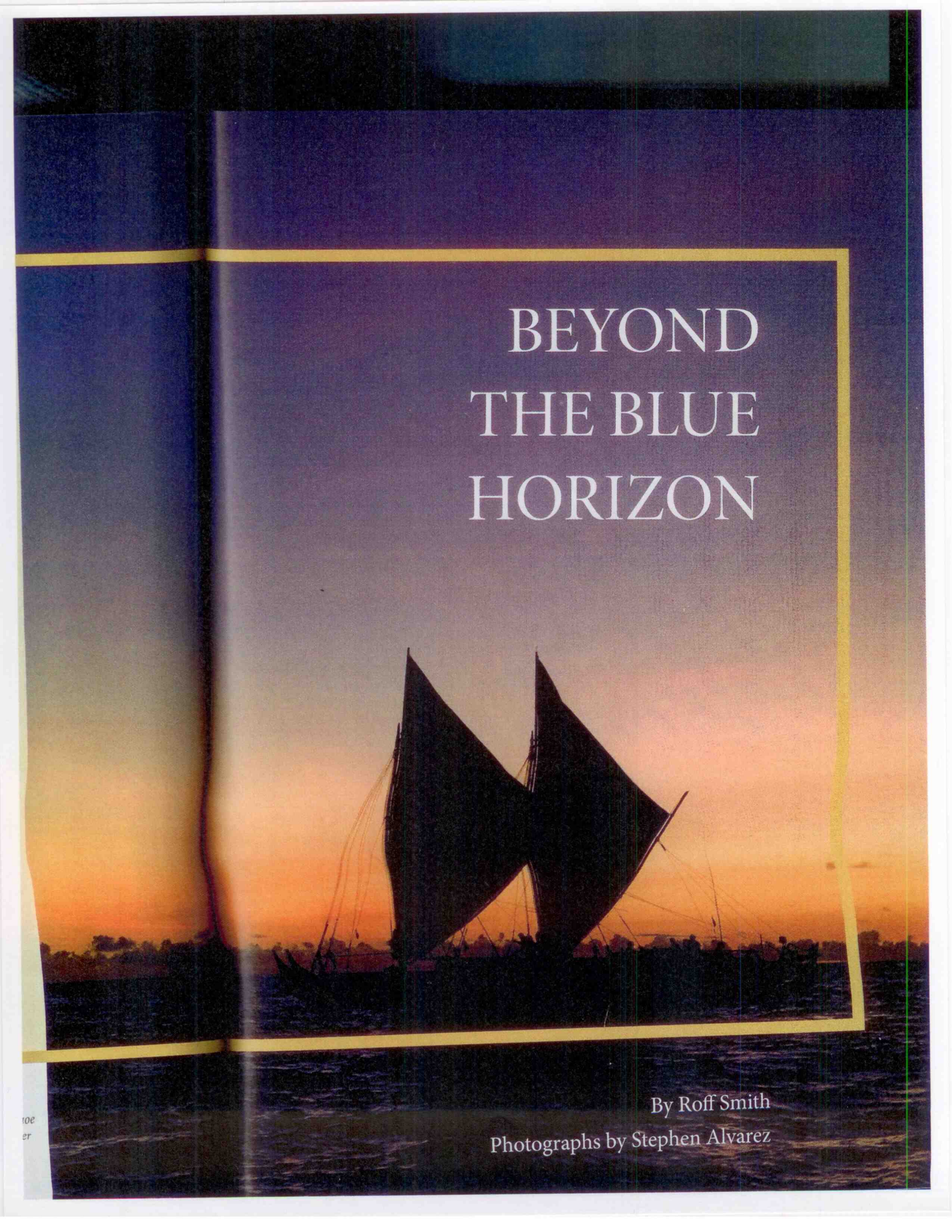
By focusing on recent archaeological finds from Pacific islands, this article outlines our current understanding of how humans colonized this vast ocean. Evidence shows that these islands were colonized in two major waves of human movement. The first wave, around 800 B.C., was limited to the relatively near-by Melanesian Islands. More than a thousand years later, Polynesians launched a second wave as far as the distant islands of Easter Island, Hawaii, and New Zealand. How these colonizations occurred with relatively primitive sailing technologies is still poorly understood, as are the reasons for these long-distance journeys.

When reading this article, you should focus on:

- What is the timing of human colonization of the Pacific islands? How many waves of colonization were there and what are the names of the cultures who completed them?
- What might have prompted the colonization of the Pacific?
- How did the colonizers overcome the difficulties associated with long-distance seafaring?
- What environmental conditions might have been associated with Pacific colonization?

Its sails like fins against the dawn sky, the Hokule'a, a modern Hawaiian voyaging canoe built on ancient designs, glides into port after a 3,800-mile voyage.



A photograph of a two-masted sailing ship, possibly a ketch, on the water at sunset. The ship is silhouetted against a bright orange and yellow sky. The water is dark and reflects the light from the sky. The entire image is framed by a thin yellow border.

BEYOND THE BLUE HORIZON

By Roff Smith

Photographs by Stephen Alvarez


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On Easter Island, also called Rapa Nui, mysterious statues stand sentinel as the Milky Way spins cold and bright above. The giant moai may represent ancestors who ruled here after Polynesians discovered the island some thousand years ago during a wave of exploration that has been compared in its boldness to modern space voyages.

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HOW ANCIENT VOYAGERS SETTLED THE FAR-FLUNG ISLANDS OF THE PACIFIC

Much of the thrill of venturing to the far side of the world rests on the romance of difference. So one feels a certain sympathy for Captain James Cook on the day in 1778 that he “discovered” Hawaii. Then on his third expedition to the Pacific, the British navigator had explored scores of islands across the breadth of the sea, from lush New Zealand to the lonely wastes of Easter Island. This latest voyage had taken him thousands of miles north from the Society Islands to an archipelago so remote that even the old Polynesians back on Tahiti knew nothing about it. Imagine Cook’s surprise, then, when the natives of Hawaii came paddling out in their canoes and greeted him in a familiar tongue, one he had heard on virtually every mote of inhabited land he had visited. Marveling at the ubiquity of this Pacific language and culture, he later wondered in his journal: “How shall we account for this Nation spreading it self so far over this Vast ocean?”

That question, and others that flow from it, has tantalized inquiring minds for centuries: Who were these amazing seafarers? Where did they come from, starting more than 3,000 years

The discoveries
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ago? And how could a Neolithic people with simple canoes and no navigation gear manage to find, let alone colonize, hundreds of far-flung island specks scattered across an ocean that spans nearly a third of the globe?

Answers have been slow in coming. But now a startling archaeological find on the island of Éfaté, in the Pacific nation of Vanuatu, has revealed an ancient seafaring people, the distant ancestors of today’s Polynesians, taking their first steps into the unknown. The discoveries there have also opened a window into the shadowy world of those early voyagers.

At the same time, other pieces of this human puzzle are turning up in unlikely places. Climate data gleaned from slow-growing corals around the Pacific and from sediments in alpine lakes in South America may help explain how, more than a thousand years later, a second wave of seafarers beat their way across the entire Pacific.

Adapted from “Beyond the Blue Horizon” by Roff Martin Smith: National Geographic Magazine, March 2008.

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Carvings believed to depict canoe sails scar volcanic stone at the Kona Village Resort on Hawaii, which may once have been the site of a navigators' school. Researchers have studied these and other carvings for clues about ancient Polynesian technology.

On a lonely sun-drenched knoll on Éfaté, about half an hour's drive east of Port-Vila, the old colonial capital of Vanuatu, Matthew Spriggs is sitting on an upturned bucket, gently brushing away crumbs of dirt from a richly decorated piece of pottery unearthed only a few minutes earlier. "I've never seen anything like this," he says, admiring the intricate design. "Nobody has. This is unique."

That description fits much of what is coming out of the ground here. "What we have is a first- or second-generation site containing the graves of some of the Pacific's first explorers," says Spriggs, professor of archaeology at the Australian National University and co-leader of an international team excavating the site. It came to light only by luck. A backhoe operator, digging up topsoil on the grounds of a derelict coconut plantation, scraped open a grave—the first of dozens in a burial ground some 3,000 years old. It is the oldest cemetery ever found in the Pacific islands, and it harbors the

bones of an ancient people archaeologists call the Lapita, a label that derives from a beach in New Caledonia where a landmark cache of their pottery was found in the 1950s.

They were daring blue-water adventurers who roved the sea not just as explorers but also as pioneers, bringing along everything they would need to build new lives—their families and livestock, taro seedlings and stone tools. Within the span of a few centuries the Lapita stretched the boundaries of their world from the jungle-clad volcanoes of Papua New Guinea to the loneliest coral outliers of Tonga, at least 2,000 miles eastward in the Pacific. Along the way they explored millions of square miles of unknown sea, discovering and colonizing scores of tropical islands never before seen by human eyes: Vanuatu, New Caledonia, Fiji, Samoa.

It was their descendants, centuries later, who became the great Polynesian navigators we all tend to think of: the Tahitians and Hawaiians, the New Zealand Maori, and the

curious people erected those structures on Easter Island. It was the Lapita who laid the foundation for the islands' language, customs, and culture. Their descendants carried on.

While the Lapita also left precious few artifacts, what little is known has been pieced together from animal bones, obsidian sources as comparative evidence. Although their language was different from the northern islands, their language was the same across the Pacific. Their peculiar style of pottery, made by pressing a carved design into the clay, may have had its roots in

With the discovery of Éfaté, the volume of evidence has expanded to include at least 62 individuals buried far—including old babies—and more in the ground.

Archaeologists have uncovered six complete burials; only four had ever been discovered. The burials included birds arranged on top of the bodies, down at the human head. Spriggs identifies the remains as important find, Sp identifies the remains as hard for anyone to identify when you have to look inside what is unknown.

Several lines of evidence support Spriggs's conclusion that the pioneers in the remote reaches of the Pacific. The radiocarbon dates place them early in the sequence, another, the chemical analysis of the flakes littering the



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curious people who erected those statues on Easter Island. But it was the Lapita who laid the foundation—who bequeathed to the islands the language, customs, and cultures that their more famous descendants carried around the Pacific.

While the Lapita left a glorious legacy, they also left precious few clues about themselves. What little is known or surmised about them has been pieced together from fragments of pottery, animal bones, obsidian flakes, and such oblique sources as comparative linguistics and geochemistry. Although their voyages can be traced back to the northern islands of Papua New Guinea, their language—variants of which are still spoken across the Pacific—came from Taiwan. And their peculiar style of pottery decoration, created by pressing a carved stamp into the clay, probably had its roots in the northern Philippines.

With the discovery of the Lapita cemetery on Éfaté, the volume of data available to researchers has expanded dramatically. The bones of at least 62 individuals have been uncovered so far—including old men, young women, even babies—and more skeletons are known to be in the ground.

Archaeologists were also thrilled to discover six complete Lapita pots; before this, only four had ever been found. Other discoveries included a burial urn with modeled birds arranged on the rim as though peering down at the human bones sealed inside. It's an important find, Spriggs says, for it conclusively identifies the remains as Lapita. "It would be hard for anyone to argue that these aren't Lapita when you have human bones enshrined inside what is unmistakably a Lapita urn."

Several lines of evidence also undergird Spriggs's conclusion that this was a community of pioneers making their first voyages into the remote reaches of Oceania. For one thing, the radiocarbon dating of bones and charcoal places them early in the Lapita expansion. For another, the chemical makeup of the obsidian flakes littering the site indicates that the rock

While the Lapita left a glorious legacy, they also left precious few clues about themselves.

wasn't local; instead it was imported from a large island in Papua New Guinea's Bismarck Archipelago, the springboard for the Lapita's thrust into the Pacific. This beautiful volcanic glass was

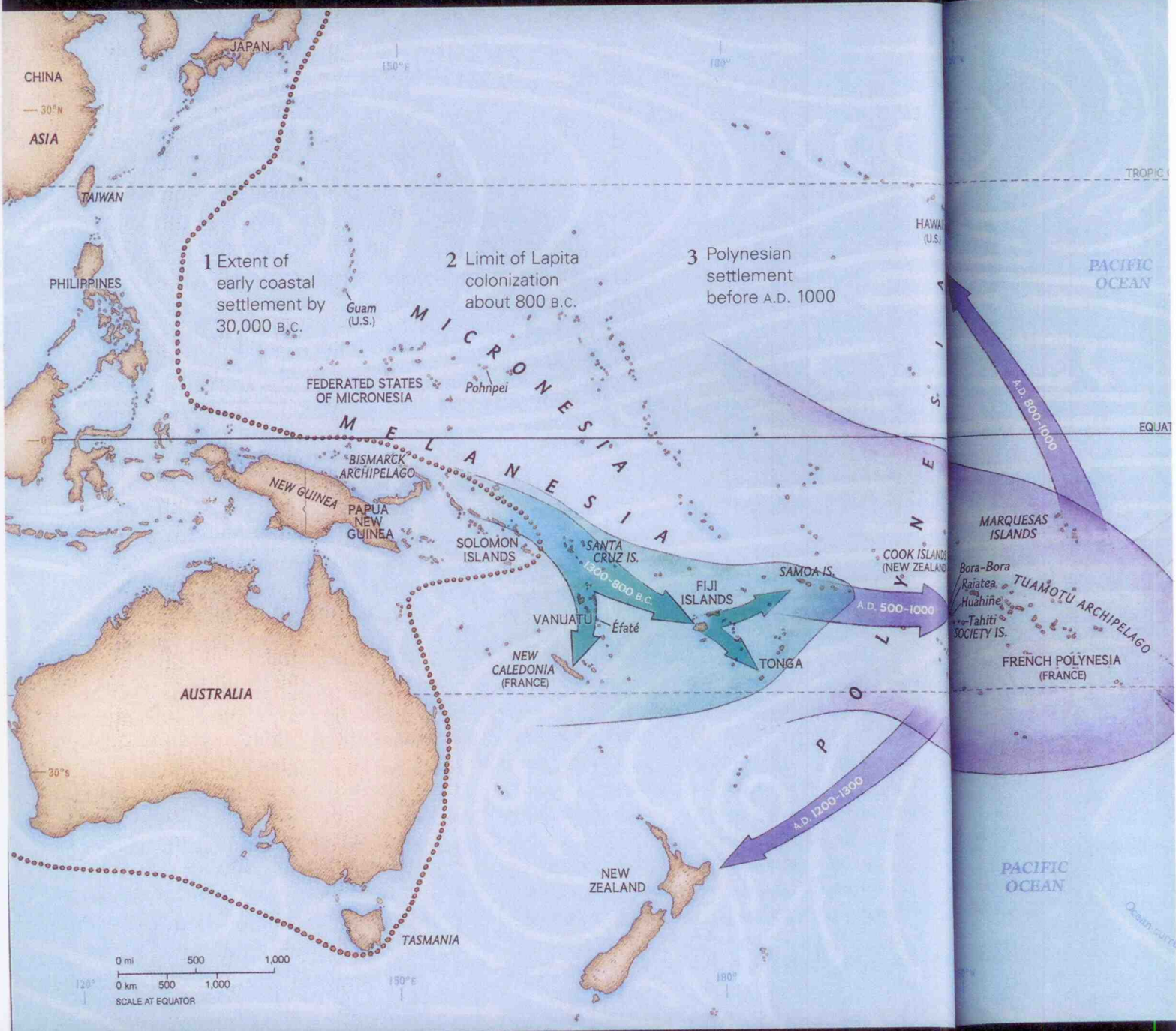
fashioned into cutting and scraping tools, exactly the type of survival gear explorers would have packed into their canoes.

A particularly intriguing clue comes from chemical tests on the teeth of several skeletons. Then as now, the food and water you consume as a child deposits oxygen, carbon, strontium, and other elements in your still-forming adult teeth. The isotope signatures of these elements vary subtly from place to place, so that if you grow up in, say, Buffalo, New York, then spend your adult life in California, tests on the isotopes in your teeth will always reveal your eastern roots.

Isotope analysis indicates that several of the Lapita buried on Éfaté didn't spend their childhoods here but came from somewhere else. And while isotopes can't pinpoint their precise island of origin, this much is clear: At some point in their lives, these people left the villages of their birth and made a voyage by seagoing canoe, never to return.

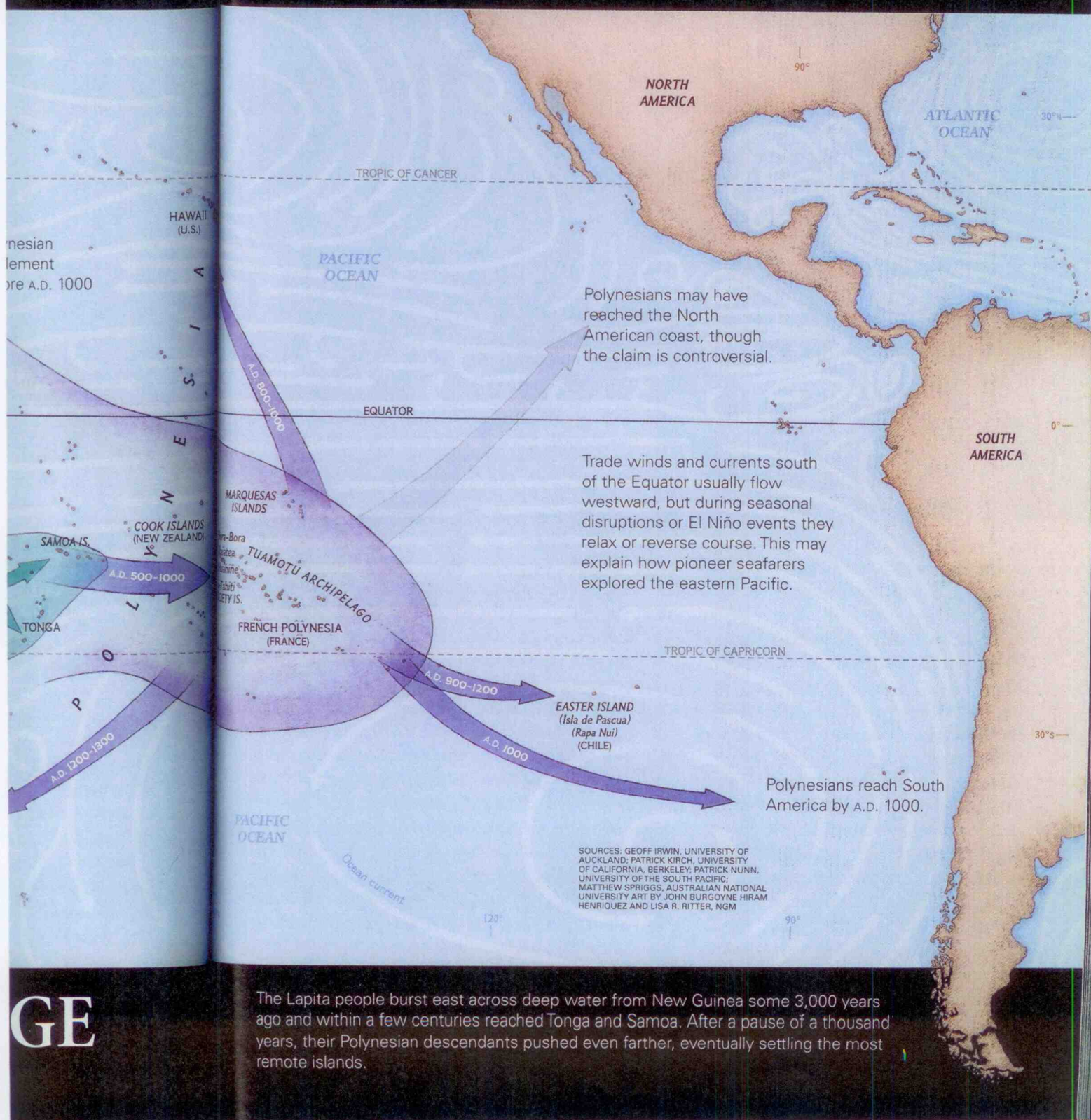
DNA teased from these ancient bones may also help answer one of the most puzzling questions in Pacific anthropology: Did all Pacific islanders spring from one source or many? Was there only one outward migration from a single point in Asia, or several from different points? "This represents the best opportunity we've had yet," says Spriggs, "to find out who the Lapita actually were, where they came from, and who their closest descendants are today."

There is one stubborn question for which archaeology has yet to provide any answers: How did the Lapita accomplish the ancient equivalent of a moon landing, many times over? No one has found one of their canoes or any rigging, which could reveal how the canoes were sailed. Nor do the oral histories and traditions of later Polynesians offer (Continued on page 62)



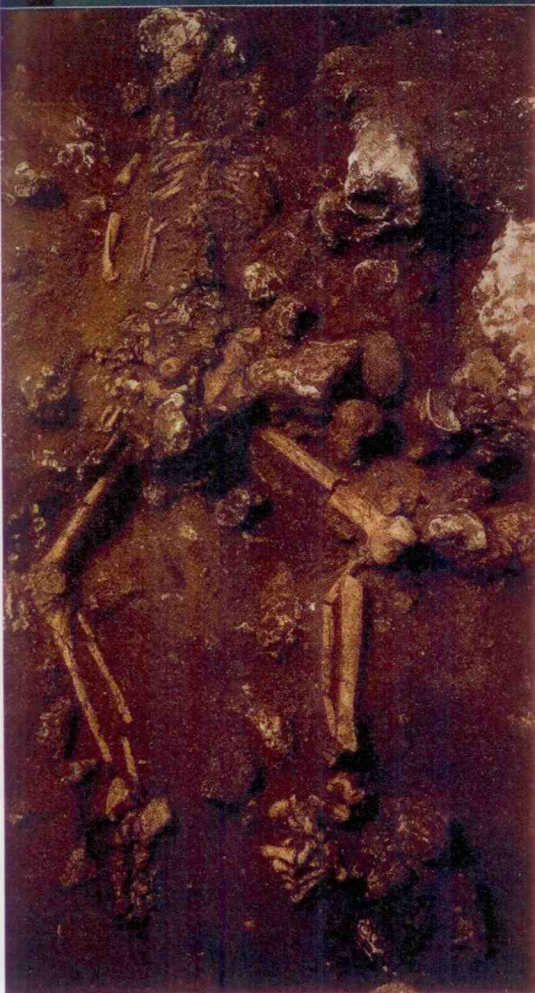
FANTASTIC VOYAGE

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The Lapita people burst east across deep water from New Guinea some 3,000 years ago and within a few centuries reached Tonga and Samoa. After a pause of a thousand years, their Polynesian descendants pushed even farther, eventually settling the most remote islands.



SECRETS OF THE LAPITA

Before 2004 few Lapita burial sites had been found. Then a backhoe operator on Éfaté island in Vanuatu accidentally discovered a cemetery containing at least 62 individuals. "We're seeing things we've never seen before," says archaeologist Stuart Bedford. The 3,000-year-old site is yielding details about these early explorers' distinctive ceramics, which bear stamped patterns (above), and their funeral rituals. No skulls were found with skeletons (left), some of which were also missing arm and rib bones. Evidence suggests the bones were removed after the bodies had decomposed. "The living knew who was buried there, and they were revisiting them," says Bedford. "It shows a very different attitude toward death."

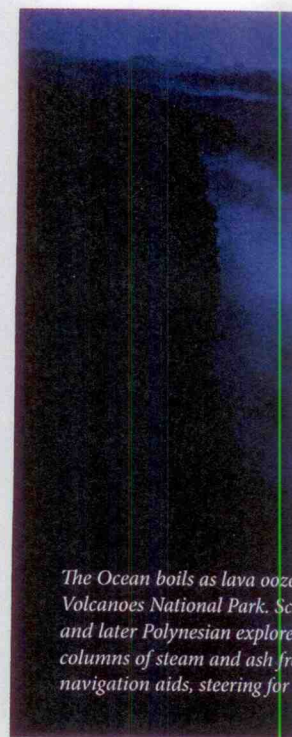
(Continued from page 59) any insights, for they segue into myth long before they reach as far back in time as the Lapita.

"All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them," says Geoff Irwin, a professor of archaeology at the University of Auckland and an avid yachtsman. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific making short crossings to islands within sight of each other. The real adventure didn't begin, however, until their Lapita descendants neared the end of the Solomons chain, for this was the edge of the world. The nearest landfall, the Santa Cruz Islands, is almost 230 miles away, and for at least 150 of those miles the Lapita sailors would have been out of sight of land, with empty horizons on every side.

Yet that passage, around 1200 b.c., was just the warm-up act, for Santa Cruz and Vanuatu were the Lapita's first and easiest discoveries. Reaching Fiji, as they did a century or so later, meant crossing more than 500 miles of ocean, pressing on day after day into the great blue void of the Pacific. What gave them the courage to launch out on such a risky voyage?

The Lapita's thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. "They could sail out for days into the unknown and reconnoiter, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride home on the trade winds. It's what made the whole thing work."

Once out there, skilled seafarers would detect abundant leads to follow to land: seabirds and turtles, coconuts and twigs carried out to sea by the tides, and the afternoon pileup of clouds



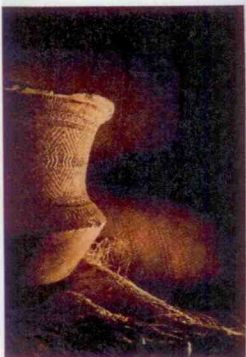
The Ocean boils as lava oozes from the slopes of Mount Yasur in Vanuatu's Volcanoes National Park. Seafarers used the island's distinctive columns of steam and ash from navigation aids, steering for the horizon.

on the horizon that often led them to the distance.

Some islands may have been discovered with far less subtlety. Some of the most violent eruptions on the planet during the Holocene occurred in Melanesia, where one of the most explosive volcanoes on Earth. Even less spectacular eruptions have sent plumes of smoke into the stratosphere and rained ash for miles. It's possible that the signs of distant islands appeared in their direction, knowing the way.

For returning explorers, the geography of their home islands provided a safety net to keep them from shooting their home ports into eternity. Vanuatu, for example, is less than 500 miles in a northwesterly direction from its scores of intervisible islands, a natural stop for mariners riding the trade winds.

All this presupposes oral tradition, says Atholl Anderson, professor of archaeology at the Australian National University. Irwin, a keen yachtsman: the

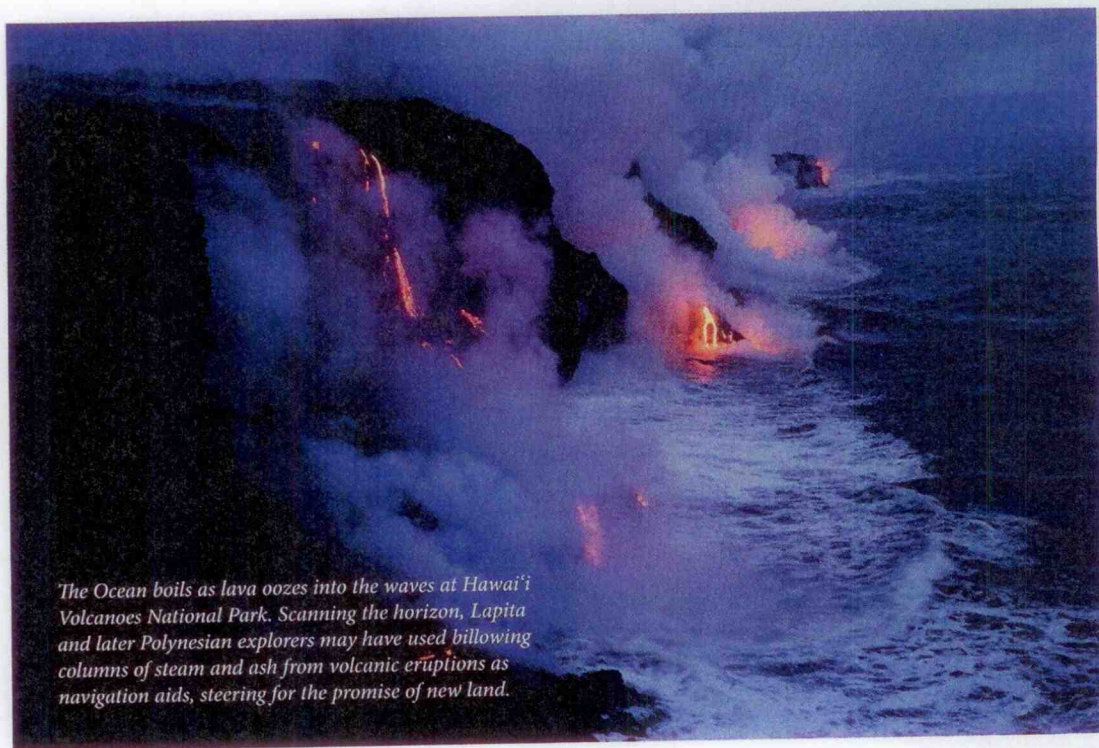


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The Ocean boils as lava oozes into the waves at Hawai'i Volcanoes National Park. Scanning the horizon, Lapita and later Polynesian explorers may have used billowing columns of steam and ash from volcanic eruptions as navigation aids, steering for the promise of new land.

on the horizon that often betokens an island in the distance.

Some islands may have broadcast their presence with far less subtlety than a cloud bank. Some of the most violent eruptions anywhere on the planet during the past 10,000 years occurred in Melanesia, which sits nervously in one of the most explosive volcanic regions on Earth. Even less spectacular eruptions would have sent plumes of smoke billowing into the stratosphere and rained ash for hundreds of miles. It's possible that the Lapita saw these signs of distant islands and later sailed off in their direction, knowing they would find land.

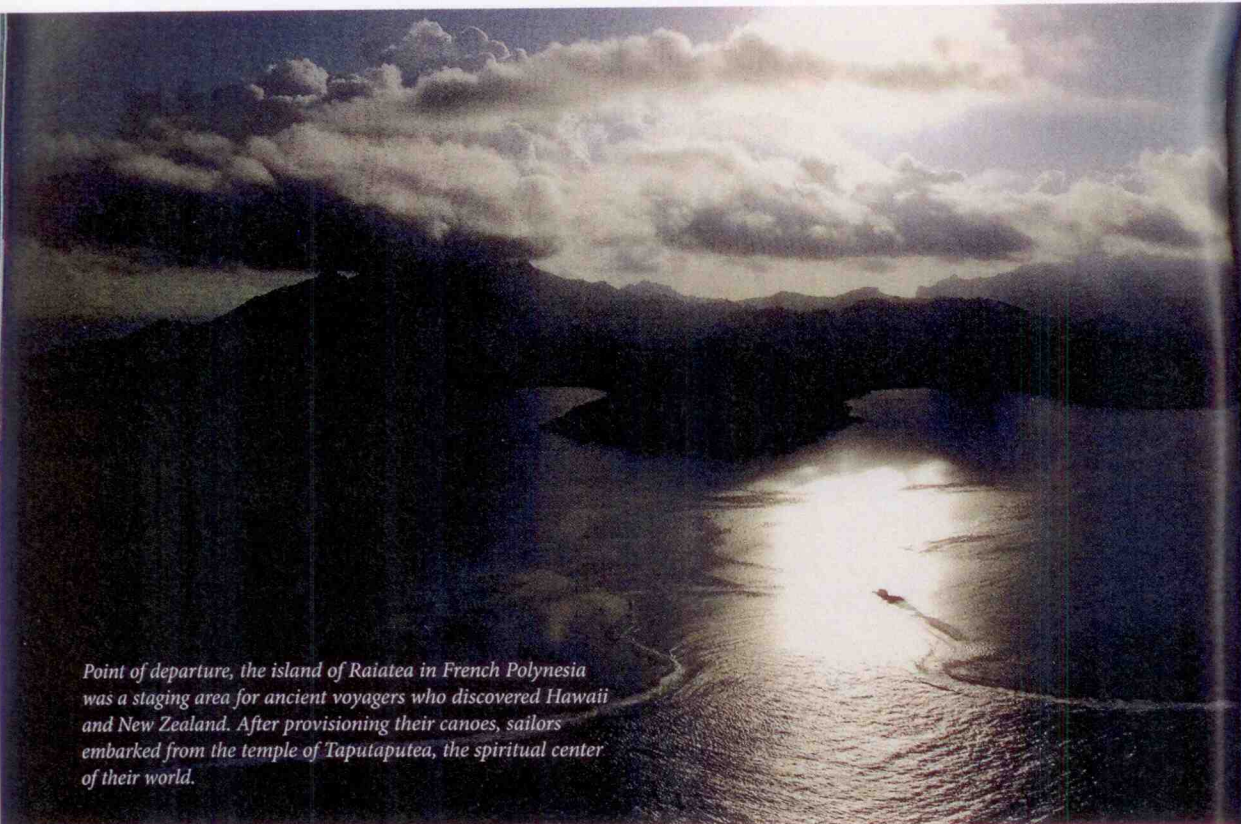
For returning explorers, successful or not, the geography of their own archipelagoes provided a safety net to keep them from overshooting their home ports and sailing off into eternity. Vanuatu, for example, stretches more than 500 miles in a northwest-southeast trend, its scores of intervisible islands forming a back-stop for mariners riding the trade winds home.

All this presupposes one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University and, like Irwin, a keen yachtsman: that the Lapita had

mastered the advanced art of tacking into the wind. "And there's no proof that they could do any such thing," Anderson says. "There has been this assumption that they must have done so, and people have built canoes to re-create those early voyages based on that assumption. But nobody has any idea what their canoes looked like or how they were rigged."

However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific, and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they encountered hundreds of islands—more than 300 in Fiji alone. Supplied with such an embarrassment of riches, they could settle down and enjoy what for a time were Earth's last Edens.

"It would have been absolutely amazing to have seen this place back then," says Stuart Bedford, an archaeologist from the Australian National University and co-leader,



Point of departure, the island of Raiatea in French Polynesia was a staging area for ancient voyagers who discovered Hawaii and New Zealand. After provisioning their canoes, sailors embarked from the temple of Taputaputea, the spiritual center of their world.

along with Matthew Spriggs, of the excavation on Éfaté. "These islands were far richer in biodiversity in those days than they are today." By way of illustration, he picks up a trochus shell the size of a dinner plate that was exposed in a test trench only that morning. "The reefs then were covered with thousands of these, each one a meal in itself. The seas were teeming with fish, and huge flightless birds could be found in the rain forest, virtually tame since they had never seen a human being. The Lapita would have thought they'd stumbled onto paradise."

As indeed it was. But theirs is a story of paradise found and lost, for although the Lapita were a Neolithic people, they had a modern capacity for overexploiting natural resources. Within a short span of time—a couple of generations, no more—those huge trochus shells vanished from the archaeological record. The plump flightless birds followed suit, as did a species of terrestrial crocodile. In all, it's estimated that more than a thousand species became extinct across the breadth of the Pacific islands after humans appeared on the scene.

Still, more than a millennium would pass before the Lapita's descendants, a people we now call the Polynesians, struck out in search of new territory. The pioneers who launched this second age of discovery some 1,200 or more years ago faced even greater challenges than their Lapita ancestors, for now they were sailing out beyond the island-stippled waters of Melanesia and western Polynesia and into the central Pacific, where distances are reckoned in thousands of miles, and tiny motes of islands are few and far between.

How difficult would it have been to find terra firma in all that watery wilderness? Consider this: When Magellan's fleet traversed the Pacific in 1520-21, sailing blind across an unknown sea, they went nearly four months without setting foot on land. (They missed the Society Islands, the Tuamotus, and the Marquesas, among other archipelagoes.) Many of the hapless sailors died of thirst, malnutrition, scurvy, and other diseases before the fleet reached the Philippines.

The early Polynesians found nearly everything there was to find, although it took them

centuries to do so. They are remembered in annual cultural festivals across


It is midafternoon. A visitor has settled over the island of Borabora. The air is fragrant with the sands of cheering sailors to witness the grand Va'a, a grueling, traditional canoe race that virtu

"This is our heritage," says a former champion. "This is our home island of Huahine. I'm out there competing. They must have enjoyed they had crossing the

Imagination is now up those epic sea voyagers, the earliest Polynesian their seafaring life. Of their canoe have ever been. No surviving examples of ing canoes thought to pioneers has yet been

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centuries to do so. Their feats of exploration are remembered and celebrated today at cultural festivals across the Pacific.

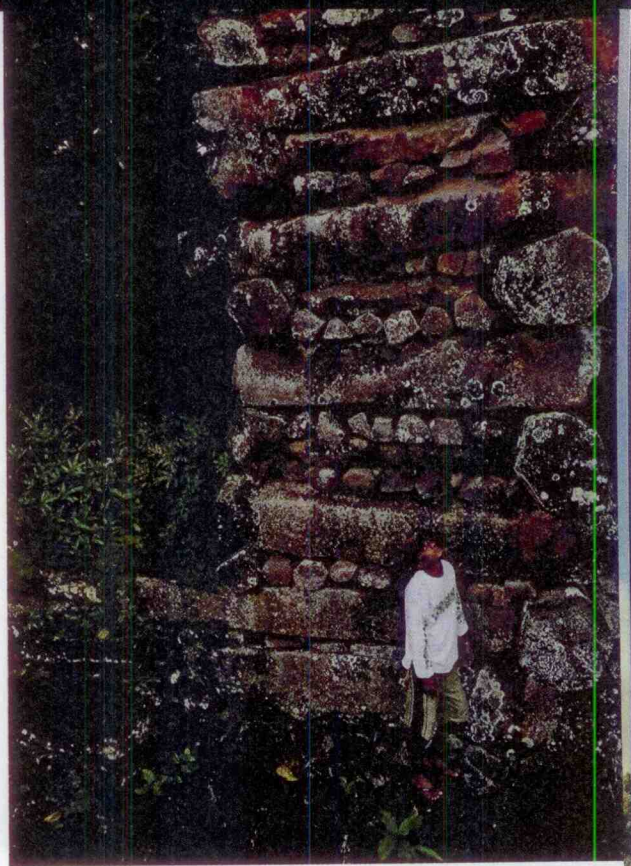
It is midafternoon, and a carnival atmosphere has settled over the beach at Matira Point on the island of Bora-Bora in French Polynesia. The air is fragrant with barbecue, and thousands of cheering spectators throng the shore to witness the grand finale of the Hawaiki Nui Va'a, a grueling, three-stage, 80-mile outrigger canoe race that virtually stops the nation.

"This is our heritage," says Manutea Owen, a former champion and a revered hero on his home island of Huahine. "Our people came from over the sea by canoe. Sometimes when I'm out there competing, I try to imagine what they must have endured and the adventures they had crossing those huge distances."

Imagination is now the only way one can conjure up those epic sea voyages. Like their Lapita ancestors, the earliest Polynesians left scanty artifacts of their seafaring life. Only a few pieces of one ancient canoe have ever been found, on Huahine in 1977. No surviving example of the great seagoing, sailing canoes thought to have borne the Polynesian pioneers has yet been discovered.

European explorers left the earliest descriptions of watercraft used by Pacific islanders. In the less isolated waters of Micronesia, they encountered sleek, lateen-rigged canoes, a style that may have filtered into the Pacific from China and the Arab world. But in the remote corners of Polynesia—Hawaii, the Marquesas, and New Zealand—the explorers saw only simple craft. Atholl Anderson suspects that these were the truly indigenous boats, the kind that, centuries earlier, carried Polynesian settlers to far islands.

Anderson also questions conventional wisdom about Polynesian seamanship, citing a later explorer, Captain Cook. While Cook was impressed with the speed of the Polynesian canoes—they could literally sail circles around his ships—he came to question the islanders' ability to make long, intentional sea voyages. He records an account of a group of Tahitians who, helpless in the face of a contrary wind and



STILTS AND STONE


From the simple stilt houses of the early Lapita to the giant moai of Easter Island, Pacific islanders developed a range of architectural and artistic styles. One of the most mysterious and massive examples is Nan Madol, seat of an ancient dynasty on the island of Pohnpei in Micronesia. Beginning about a.d. 500 and continuing for perhaps a thousand years, Pohnpeians built nearly a hundred artificial islets atop a flat expanse of reef. On these foundations they erected houses, ceremonial buildings, and robust tombs from thick columns of basalt. With its islets interspersed by canals, Nan Madol has been called the Venice of the Pacific.

unable to set a course for home, drifted hundreds of miles off course and were marooned on Aitutaki, in what is now the Cook Islands.

Rather than give all the credit to human skill and daring, Anderson invokes the winds of chance. El Niño, the same climate disruption that affects the Pacific today, may have helped scatter the first settlers to the ends of the ocean, Anderson suggests. Climate data obtained from slow-growing corals around the Pacific and from lake-bed sediments in the Andes of South America point to a series of unusually frequent El Niños around the time of the Lapita expansion, and again between 1,600 and 1,200 years ago, when the second (Continued on page 68)

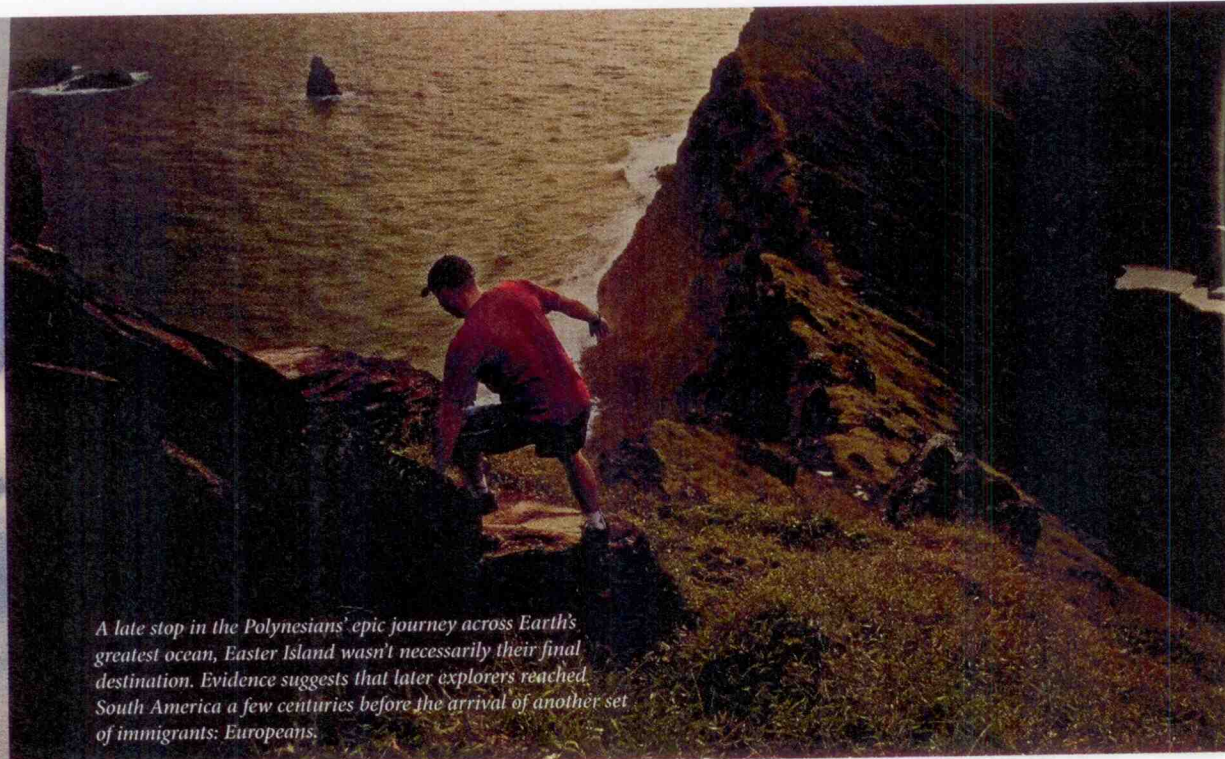
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Imposing walls of a tomb complex on Pohnpei were built for Nan Madol's rulers around a.d. 1350. Workers did not carve the stone but chose natural basalt columns—some weighing more than ten tons—and fit them expertly together.





A late stop in the Polynesians' epic journey across Earth's greatest ocean, Easter Island wasn't necessarily their final destination. Evidence suggests that later explorers reached South America a few centuries before the arrival of another set of immigrants: Europeans.

(Continued from page 65) wave of pioneer navigators made their voyages farther east, to the remotest corners of the Pacific. By reversing the regular east-to-west flow of the trade winds for weeks at a time, these “super El Niños” might have sped the Pacific’s ancient mariners on long, unplanned voyages far over the horizon.

The volley of El Niños that coincided with the second wave of voyages could have been key to launching Polynesians across the wide expanse of open water between Tonga, where the Lapita stopped, and the distant archipelagoes of eastern Polynesia. “Once they crossed that gap, they could island hop throughout the region, and from the Marquesas it’s mostly downwind to Hawaii,” Anderson says. It took another 400 years for mariners to reach Easter Island, which lies in the opposite direction—normally upwind. “Once again this was during a period of frequent El Niño activity.”

Exactly how big a role El Niño played in dispersing humans across the Pacific is a matter of lively academic debate. Could lucky breaks and fickle winds really account for so wide a spread of people throughout the 65-million-square-mile vastness of the Pacific? By the time Europeans came on the scene, virtually every speck

of habitable land, hundreds of islands and atolls in all, had already been discovered by native seafarers—who ultimately made it all the way to South America. Archaeologists in Chile recently found ancient chicken bones containing DNA that matches early Polynesian fowl.

Nor did they arrive as lone castaways who soon died out. They came to stay, in groups, with animals and crops from their former homes. “My sense is that there had to be something more at work here than canoes simply blown before a wind,” says Irwin. He notes that the trade winds slacken during the summer monsoon, which might have allowed islanders to purposefully sail eastward. Moreover, says Irwin, “Sophisticated traditions of seafaring were planted in every island. Did they develop independently in all of those islands? If so, why do these traditions bear so many details in common?”

“But whatever you believe, the really fascinating part of this story isn’t the methods they used, but their motives. The Lapita, for example, didn’t need to pick up and go; there was nothing forcing them, no overcrowded homeland.

“They went,” he says, “because they wanted to go and see what was over the horizon.”

Discussion

- What did the Polynesians disperse?
- What are the groups of Polynesians, and how do they fit into the story of Éfaté?
- What were the consequences of the colonization of the Pacific?

Archaeology

- How did the Polynesians reach Éfaté? What evidence do you have from the time of these voyages? Consider the evidence from the DNA of the fowl.
- What are the proposed reasons for the migration of the Polynesians? Consider the evidence from the DNA of the fowl.



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Discussion Questions:

- What drives colonization of vastly dispersed areas like the Pacific islands?
- What are the names of the two primary groups that colonized the Pacific and how does the archaeological site of Éfaté fit into the story?
- What were the effects of human colonization on island ecosystems?

Archaeological Interpretations:

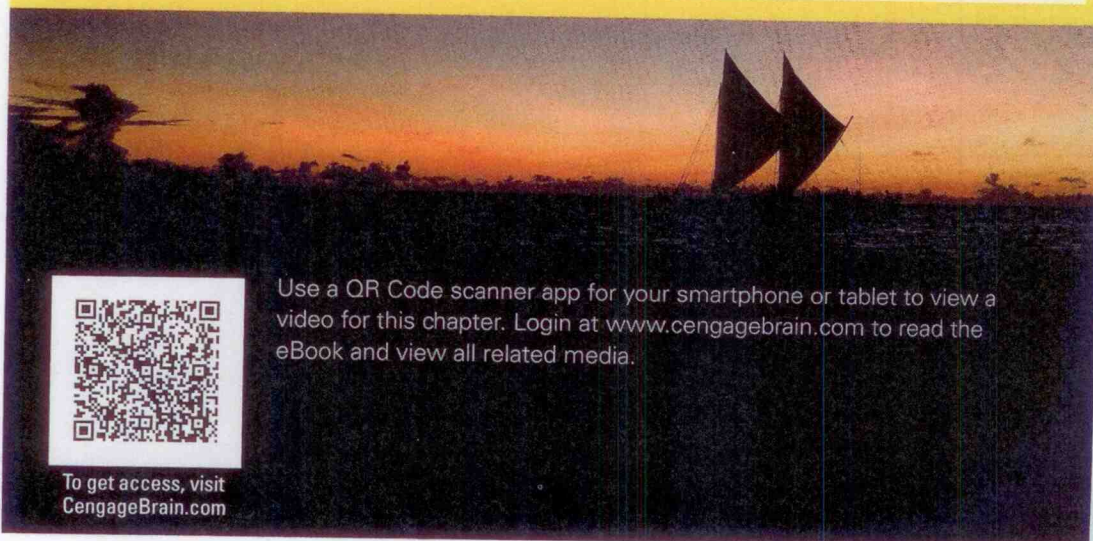
- How did the archaeologists working at Éfaté determine the original homeland of ancient skeletons that they uncovered? How did they determine the time period and cultural affiliation of these remains? Why was this considered important?
- What are some of the theories proposed within the article about how people were able to colonize the islands of the Pacific with relatively basic marine technology?

- How does the archaeological evidence of human colonization of the Pacific influence our ideas of human ingenuity and exploration?

Paradigm Creation:

Geographic Happenstance and Directed Human Action

- What are the supporting arguments for how and why people may have “accidentally” discovered and colonized the islands of the Pacific? What are the supporting arguments for a more purposeful discovery?
- How can we compare the story of Pacific colonization to other stories of “discovery” such as Columbus’ travel to the Americas or the exploration of space? How do political, social, and environmental circumstances factor into these stories? How does each touch on themes of adventure, goal-oriented action, and luck?



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