

Migrations

STORY BY TOM KOPPEL

New research into the settlement of Polynesia is filling in the gaps — and raising more questions about one of humanity's greatest achievements

Daniel Berman, left; Elyse Burfel

"These fields just continue, one after the next after the next," says archaeologist Alex Morrison. Standing in the dappled shade of a thin forest, he sweeps his arm over a low stone wall running up a hillside and separating two terraced fields in Punalu'u, in Windward O'ahu.

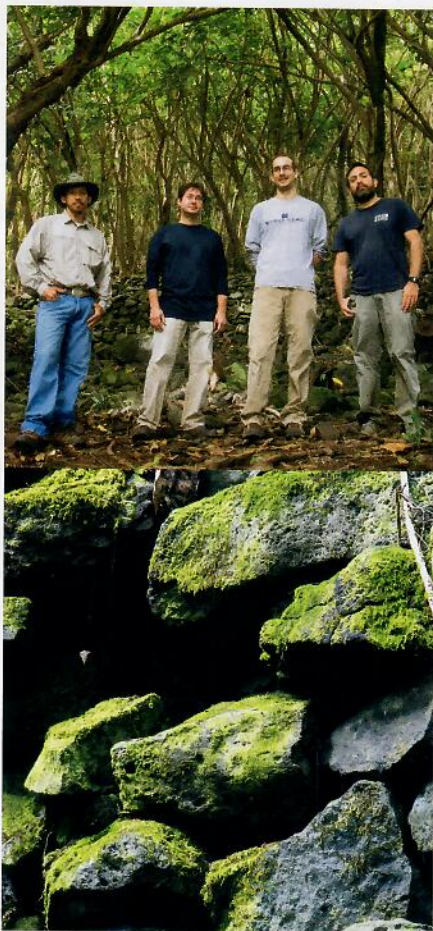
Hundreds of years ago mai'a (banana), 'ulu (breadfruit) and kukui (candlenut) flourished here, yielding huge harvests. "In Hawai'i," Morrison says, "but what you don't see in other Polynesian island groups is the scale of development of these field systems. Absolutely amazing." Nearby are the green-tinted walls of a large rectangular heiau (temple). We're walking through what was once an important agricultural, religious and residential complex. There are the remains of house platforms, where wood-and-thatch structures served as dwellings, likely for kahunas (priests) or the valley's ali'i (chiefs). A royal child named Keaoua Kekuaokalani, a favored nephew of King Kamehameha I, was born on Hawai'i Island but raised on O'ahu. He died in an armed rebellion against his uncle's successor, Liholiho (Kamehameha II), in 1819.

Scientists from the University of Hawai'i at Mānoa, Honolulu's International Archaeological Research Institute and Kamehameha Schools, which owns the land, have been studying this site, assisted by university students during summer field schools. The team has dug into hearths that extend under the stones. Carbon dating of charcoal found there shows that breadfruit was planted as early as the mid-fifteenth century, and the walls were built during the later fifteenth and sixteenth centuries. Archaeobotanist Jennifer Huebert has been examining pollen, starch grains and microscopic structures in plant tissues called phytoliths to identify what other crops may have been cultivated here. None of these plants, however, are native to Hawai'i. All were transported and introduced, one island or archipelago at a time, across thousands of miles of ocean, along with the culture today called Polynesian.

The ancient peopling of Hawai'i resulted from a millennia-long migration of Polynesians into and across the vast mid-Pacific. Scientists have worked for generations to unravel the direction, sequence, timing and details of this migration, revealing that it proceeded in three or four distinct surges, first eastward and then out to the farthest corners of what geographers

call the Polynesian Triangle: Rapa Nui (Easter Island), Aotearoa (New Zealand) and Hawai'i. Contemporary research keeps adding new insights and modifying our understanding of the colonization of the last major area of the world to be discovered and settled by humans.

The epic nautical trek began in Asia. Genetics and linguistics point to Taiwan as the most likely place of origin for those who became the Polynesians. They spoke an Austronesian language and began to sail south and eastward about five thousand years ago, passing along the



Archaeologist Alex Morrison (above, far right) with his team at an ancient village site in Punalu'u, O'ahu. It's believed the first settlers reached Hawai'i fairly recently—likely sometime in the thirteenth century, nearly five millennia after the ancestors of the Polynesians, called Lapita people for their pottery (seen on the opening spread, right) first took to the sea.

northern shores of New Guinea, the Bismarck Archipelago and the Solomon Islands. That region, called Near Oceania, had been populated for tens of thousands of years by people speaking Papuan languages. But the newcomers kept to themselves; there was little genetic mixing or borrowing of language or culture. They remained a remarkably separate population as they pushed doggedly onward.

The precursors of the Polynesians produced decorated pottery, which was first discovered at Lapita, in New Caledonia. Today those proto-Polynesians are referred to as Lapita people. No one is sure what urged them on—overpopulation? Conflict? Were they drawn to search for pristine islands with untapped resources? Whatever the reason, they must have possessed sailing canoes and developed considerable navigational skill. Some 3,200 years ago, jumping off from the Solomon Islands, they risked open-water crossings of two to five hundred miles, far beyond the horizon, and settled the large, uninhabited islands of Santa Cruz, Vanuatu and New Caledonia. They continued on to Fiji, Tonga and Sāmoa. As they migrated, they carried key plants and animals: breadfruit, banana, taro, yam and pandanus, paper mulberry (for making bark cloth), candlenut (for lighting), chickens, pigs, dogs and rats. Transporting these foods was essential because the native vegetation of Remote Oceania offered little nourishment. But the shorelines teemed with food: giant clams, cone shells, spiny lobsters, octopuses, sea slugs, urchins and crabs, along with edible seaweed. There were sea turtles and fish of almost endless variety that could be caught on hooks, in nets, by spearing or stunning with poisons. And there were birds, many of them flightless.

Canadian archaeologist David Burley has excavated many sites in the Fiji/Tonga/Sāmoa region. The distinctive pottery serves as useful markers, enabling him to trace how the Lapita people gradually "became" Polynesians over an extended period while living in Tonga and Sāmoa. Perhaps because the nearest islands to the east are well over five hundred miles away—and against the winds and currents—no further colonization is known to have taken place during what experts call the Long Pause.

In his lab at Simon Fraser University, near Vancouver, Burley pulls down boxes of carefully wrapped samples of Lapita pottery ("I have thousands of pieces," he says) and other artifacts, including a large

The Great Migrations

needle made from a human forearm bone that was used for weaving thatch. One “big question” for Burley is, “Why did decoration disappear, particularly in Tonga, within 120 years?” Undecorated pottery followed, and ceramics vanished entirely in another few hundred years, along with other cultural and social changes.

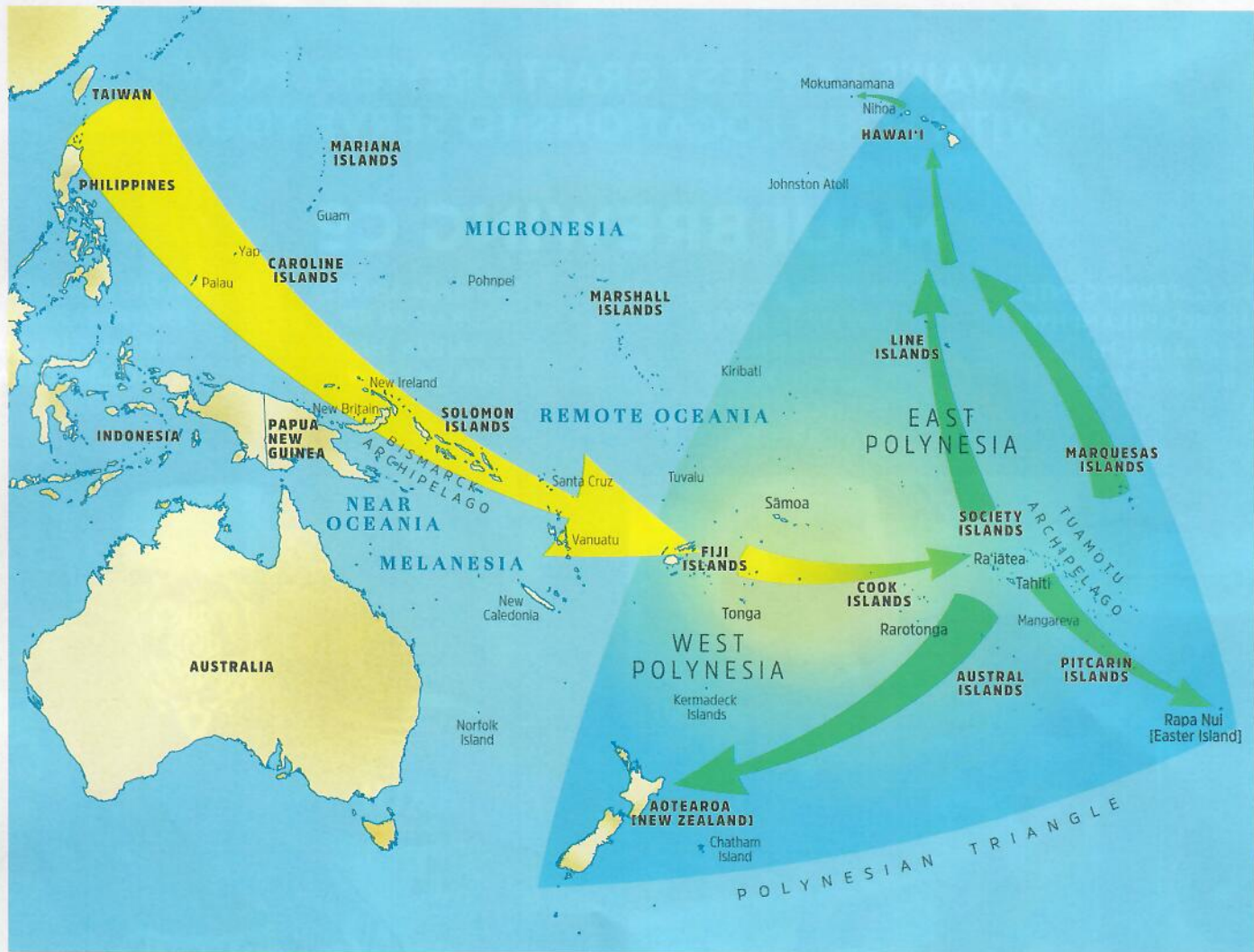
The earliest settlers in Fiji and Tonga were mainly shore dwellers who lived in stilt houses built over coral reefs. In 2010, while investigating some unusual ground, Burley made a “spectacular” discovery. “We didn’t know if it was a natural feature,” he says, so “we used a bucket auger to excavate down two meters; turned out it was a planting pit.” Dug deep into the sand and filled with a heavy mulch, it was used to grow swamp taro, breadfruit and other staples. For mobile migrants “it’s a wonderful adaptation, because you don’t know what kind of islands you’re going to find.” Some lack prime agricultural land and offer

only beaches or sandspits. Over time, in Tonga, the population expanded and people developed intensive nonirrigated agriculture, much like at Punalu’u, but mainly on flat land, not terraced slopes.

Exactly how long the Long Pause lasted in West Polynesia is key to understanding the timing and sequence of the Polynesian migration. The beginning of the pause in Tonga is “very well dated,” Burley explains, because “in one planting pit, I’ve got this coral abrader out of the muck in the bottom.” Uranium-thorium dating on coral is accurate within six to ten years, making the abrader a major piece in the migration puzzle; based on that artifact, and confirmed by other finds, says Burley, “I’d say Tonga was clearly settled by 2,850 years ago.” When East Polynesia was first settled has been more contentious. Since the 1980s, more widely applied carbon dating techniques have been greatly refined, casting doubt on results from earlier archaeological

digs. For example, in the 1960s, Yoshihiko Sinoto of Honolulu’s Bishop Museum dated carbon samples from a dig in the Marquesas Islands to 300 CE. Two decades later he re-evaluated the site using improved techniques and concluded that it was occupied no earlier than 1000 CE. A similar pattern of dating revision has prevailed for the rest of East Polynesia, which was apparently first settled many centuries *later* than previously believed. The Long Pause in West Polynesia had lasted nearly two thousand years, ample time for the Lapita culture to morph fully into the Polynesian.

“When people go into East Polynesia, they’ve already developed intensified agriculture and the Polynesian chiefdoms in all their complexity,” says Burley. They have the Polynesian language, the religious architecture of *marae* (temples akin to Hawai’i’s heiau) with powerful priests, a pantheon of deities, ritual human sacrifice and they cook mainly in imu, or earth



The discovery and settlement of Oceania began some five thousand years ago and ended recently, in the middle of the last millennium when voyagers reached the three vertices of the Polynesian Triangle—Hawai’i, Aotearoa (New Zealand) and Rapa Nui (Easter Island). This great migration, achieved without the use of any variant of modern navigational technology or even metal, is believed to have begun from Taiwan and completed in two phases, the first settling the islands of Near Oceania and then, after a “Long Pause” during which long-distance voyaging stopped, the archipelagoes of Remote Oceania, including Polynesia.

Map illustration: Lora Lamm

ovens. “These are not the same people who arrived in Tonga 2,850 years ago,” Burley says. “They’ve developed and enhanced the Polynesian cultural system and society, and they are bringing it along intact.”

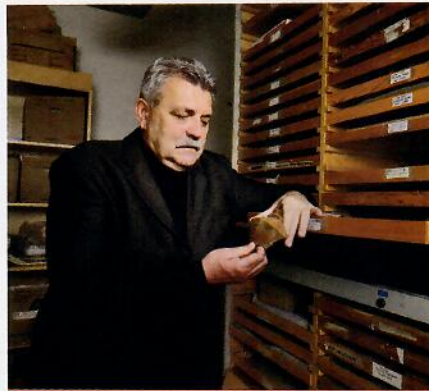
Not until about a thousand years ago, therefore, did Polynesians resume their odyssey. Improved canoes that sailed better to windward may have enabled the renewed search for islands to the east. Or perhaps it was a cyclical climate change with more frequent periods of favorable westerly winds. This new wave of settlement reached the Cook Islands, Societies, Tuamotus and Marquesas in only a century or two.

The impact of the new arrivals on the natural environment was profound and permanent. The settlers burned forests to plant crops, causing massive erosion, and replaced many forest species with new ones. The devastation continued what they had wrought in West Polynesia during the initial Lapita years. The settlers also devoured wildlife, as Burley discovered from digging in early Tonga sites. “It was a blitzkrieg,” he says. “At the bottom of excavated fire pits, we found the remains of extinct iguanas, large sea turtles and incredible quantities of birds. They wiped out over twenty species of land birds, including some far larger than present-day species.” Others fell prey to the rats and dogs the settlers introduced. Many seabirds survived only on the remote outer islets that these predators never reached. This decimation of native wildlife continued across Remote Oceania and throughout the Polynesian migration. Among most island groups the number of seabird species dropped from fifteen or twenty to only a handful today.

The most dramatic extinction was that of the giant moa birds of Aotearoa, wiped out in fifty to one hundred years. In Hawai‘i well over half of all native bird species were driven to extinction, roughly half during the ancient Polynesian period and the rest since Western contact. These included the flightless ducks and all but one of eight goose species. Only the nēnē has survived.

Only a century or two after the colonization of East Polynesia, the most daring episodes in the Polynesian expansion began. Huge sailing canoes, sometimes fleets of them, set off on month-long journeys across two to three thousand miles to the farthest corners of the Polynesian Triangle: Rapa Nui, Aotearoa and Hawai‘i. They may even have reached South America. As Burley says, “If Polynesians

can find the myriad islands in the midst of the Pacific, how the hell could they miss a continent?” Chicken bones dating to the fourteenth or early fifteenth century, with DNA similar to that of Polynesian chickens, were unearthed in 2002 on the coast of Chile, predating the introduction of European chickens to the New World by the Spanish. The find offers a possible explanation for how the sweet potato, of South



What’s really distinctive about these types of pottery,” says archaeologist David Burley (seen at top), “is the type of decoration. ... When you see that, you can track people across Oceania.” Above and on the opening spread, right, artifacts Burley has collected that help to date the settlement of Pacific islands.

American origin, came to Polynesia, where it rapidly spread throughout the region.

As with the move into East Polynesia, there has been a widespread re-evaluation of radiocarbon dates for this explosion in distant voyaging and rejection of what most textbooks once posited. The new consensus is that Aotearoa was not reached and settled until between 1230 and 1282. The earliest arrival of Polynesians at Rapa Nui (between 1200 and 1253) and Hawai‘i also apparently occurred in the same time frame; with overlapping margins of error, it is possible that all three distant archipelagoes were reached essentially simultaneously. Timothy Rieth, one of the Punalu‘u archaeologists, has reviewed over nine hundred radiocarbon results for Hawai‘i Island; he puts the likely first arrival there at between 1220 and 1261. This is far more recent than once believed, which has upset some. But Rieth doesn’t see this later arrival date as “taking away at all from the glory of the Hawaiian past.” From his perspective it makes what Hawaiians achieved “that much more impressive,” he says, because in the few centuries between colonization and Western contact, “You had this fluorescence of religious architecture, the development of massive food production and the innovation of aquaculture”—i.e., fishponds—which “isn’t seen anywhere else in the Pacific.”

There is uncertainty and conjecture as to where the canoe expeditions that reached Hawai‘i, Aotearoa and Rapa Nui originated. According to Hawaiian oral histories, says Rieth, there were at least two, maybe three arrival events. One mentions a priest coming from Tahiti, bringing “a new kind of heiau.” “The sweet potato shows up in East Polynesia in the thirteenth or fourteenth centuries,” he adds, “which is later than the initial colonization of Hawai‘i.” Some linguistic indicators point to the Marquesas, others to Tahiti or neighboring Society Islands; quite possibly both. Comparisons by Sinoto of fishhooks found the greatest similarity between Hawaiian hooks and Marquesan ones. New Zealand molecular biologist Lisa Matisso-Smith has studied DNA of the Pacific rat in Hawai‘i and found there were likely two separate introductions, one from the Marquesas and another from the Society Islands.

Whatever the timing or origins, these long ocean passages were major undertakings. The capacious watercraft had twin hulls bridged by large decks and a cabin structure. They were stocked with

All images: Daniel Berman

fresh and dried or fermented food sufficient for many weeks at sea. Gourds or lengths of bamboo held drinking water, and rainwater was collected as it ran off the sails. The canoes also carried tools, like stone adzes, which could not be made on coral atolls, and everything else required to establish agriculture and animal husbandry at their destinations. Pigs, chickens and dogs were likely caged and required feed of their own. Cuttings, corms, seeds and roots of plants were wrapped in leaves or bark cloth as protection from salt spray.

Embarking on such a quest was a roll of the dice. Some canoes were presumably lost at sea. Unless there had been earlier scouting expeditions, navigators could not be sure where new lands might be found. For Hawai'i the flight of migrating birds might have hinted that a large archipelago lay far to the north. To stay on course, navigators steered by the stars at night, by the direction of the sun and swells in daytime.

Arriving safely was only the beginning. Generations of toil lay ahead, and it would be centuries before Hawaiian society evolved to the point where constructing the Punalu'u complex and its adjacent fishponds would be possible. Before that there were follow-up canoe arrivals and, in the early years, return voyages from Hawai'i to a vaguely identified southern homeland called Kahiki (possibly Tahiti), perhaps to recruit additional colonists. Evidence suggests that there was a robust period of interisland voyaging. Oral histories published in the nineteenth century by King David Kalākaua tell of a flotilla of five canoes that sailed from Hawai'i to Ra'iātea in the Society Islands. An adze head found in the Tuamotus has been traced chemically to stone from the small island of Kaho'olawe off Maui. Rat DNA shows that some rats might have been carried south from Hawai'i to the Societies or the Cook Islands. Burley has studied petroglyphs in Tonga that were almost certainly carved by a Hawaiian who had traveled south; their stylistic features—one depicts a surfer—match those of petroglyphs carved in Hawai'i around 1450, just as long-distance voyaging ended.

By the time Cook arrived in Polynesia in 1769, it appears such voyaging had come to an end. How to account for the decline of a wanderlust that had lasted so long? New Zealand historian Kerry Howe writes: "What could be found had been found. What could be settled and colonized was so. The geographic limits," he thought, "had been reached."

But not quite. One final, late thrust of discovery and intermittent occupation, motivated by religion, took Polynesians out to rocky, mile-long islets northwest of the main Hawaiian Islands. Nihoa, barely habitable, lies 150 miles beyond Kaua'i. Mokumanamana (a.k.a. Necker Island), even smaller and more barren, lies 150 miles farther northwest. They were probably the last islands in Polynesia to be colonized, and among the least promising, with very little water or soil. Yet, according to Keku-ewa Kikiloi, an archaeologist and professor of Hawaiian studies at the University of Hawai'i at Mānoa, carbon dating and coral dating show that from 1400 to 1815, Mokumanamana, with thirty-three temple sites, was "a ritual center of power for the Hawaiian system of heiau." Situated on the Tropic of Cancer, the sun was directly overhead at the summer solstice, making the island unique. "The whole competitive religious system was synchronized with the movement of the sun, the changing of the seasons."

In the Polynesian worldview, Kikiloi says, "people die, turn into spirits, are

elevated in rank and move into the after-life." Mana (spiritual power) comes from the west, where the sun sets and the ancestors dwell. "Mokumanamana was the axis between two worlds—one where the sun shines and the other where it doesn't shine. It was right on a line that divides the spirit world from the realm of man," the latter being the high islands to the east. Nihoa had agricultural terraces and house sites, and could likely support 150 or more inhabitants. "People are using Nihoa as a staging point for Mokumanamana because Mokumanamana is even harder to get to, with less water and no resources, only heiau sites and cave shelters."

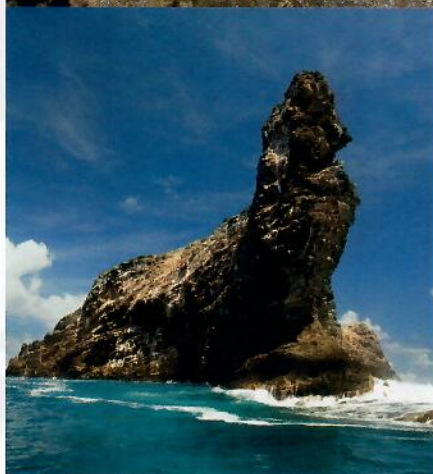
Kikiloi has compared the style of shrines at Mokumanamana to those on the main islands, finding "some general patterns and linkages to the mountaintops, like Mauna Kea, Mauna Loa and Haleakalā." He also did geochemical sourcing of basalt stone tools from Nihoa and Mokumanamana. "Some were definitely being brought to the islands. They seem to match up with stone from Mauna Kea and O'ahu, also Kaua'i." This means that for centuries, canoes repeatedly visited from distant islands to build the heiau and conduct rituals on Mokumanamana. They had to bring along food, water and wood for structures as well. "People went to great lengths to get to the island to hold these ceremonies, because it's part of the way you get mana."

"There is this idea in archaeology about monumentality," Kikiloi adds, "the overt expression of power" by a chief. This could involve "building the biggest possible heiau to show how strong you are. But in the context of these islands, I think monumentality is expressed through voyaging. Imagine how much energy and resources it took for the ali'i to make these trips back and forth over hundreds of years." He points to a contemporary illustration. The voyaging canoe *Makali'i*, based at Kohala on Hawai'i Island, plans to sail to Mokumanamana in June 2019 for the solstice. "It has taken an entire community of volunteers a year or two to grow and prepare the food and other provisions," Kikiloi says, "just for a trip of a few weeks."

This puts into perspective the much longer voyages of Polynesian sailors a millennium or more ago. Trusting to their hand-carved wooden canoes and guided by the stars, they found and settled nearly every island in the immense and trackless reaches of the Pacific. In all of history, this surely ranks among humanity's most daring and heroic accomplishments. HH



Courtesy Shane Egan, He'ātafu, Tongatapu



Wayne Levin

Voyaging likely continued in Polynesia long after each island group was settled. Above top, Hawaiian-style petroglyphs Burley found on the Tongan island of Foa suggest someone from Hawai'i might have visited Tonga in the fifteenth century. Above bottom, the islet of Mokumanamana would have required repeated voyages from the main Hawaiian Islands to supply the resident population.



Hana Hou!

THE MAGAZINE OF HAWAIIAN AIRLINES



contents

Volume 22 Number 3
June / July 2019
www.hanahou.com

Native Intelligence

- 21 **Kitty Klatch**
Story by Tiffany Hill / Photos by Elyse Butler
- 22 **Downtown Upscale Local**
Story by Martha Cheng / Photos by Michelle Park
- 25 **Friends for Chèvre**
Story by Martha Cheng / Photo by Elyse Butler
- 26 **Sound & Style**
Story by Brittany Lyte / Photo by Mike Coots
- 29 **Seabird Saviors**
Story by Shannon Wiannecki / Photo by Bryan Berkowitz
- 30 **Avian Impressions**
Story by Andy Wright / Photos by Megan Spelman

- 34 **The Waterman Eclectic**
Surfer, windsurfer, foilboarder, kitesurfer, stand up paddler — Kai Lenny takes to the water any way he can
Story by Beau Flemister / Photos by Mike Coots

- 47 **String Band Revival**
Sovereign Strings is breathing new life into nineteenth-century Hawaiian popular music
Story by Nate Chinen / Photos by Megan Spelman

- 59 **Women of the Cloth**
In the hands of today's practitioners, the ancient craft of kapa making becomes modern art
Story by Catharine Lo Griffin / Photos by Michelle Mishina

- 71 **The Bigger Picture**
To Kamea Hadar, every wall is a window
Story by Sonny Ganaden / Photos by Matt Mallams



Hana Hou!

THE MAGAZINE OF HAWAIIAN AIRLINES



78 **Land Down Under**
Hawai'i's best dive sites can be rough, dangerous, difficult—and totally worth it
Story by Hunter Haskins / Photos by David Fleetham

90 **Stone By Stone**
Can an ancient system of aquaculture help feed the Islands today?
Story by Shannon Wianecki / Photos by PF Bentley

102 **The Great Migrations**
New research into the settlement of Polynesia is filling in the gaps—and raising more questions—about one of humanity's greatest achievements
Story by Tom Koppel

115 **The Scout**
Dan Cox knows major league talent when he sees it
Story by DW Gibson / Photos by PF Bentley

125 **Fete in the Garden**
Each summer, Heiva i Kaua'i brings the intensity and sensuality of Tahitian dance to the Garden Isle
Story by Sonny Ganaden / Photos by PF Bentley

135 **Island Events**
Calendar for O'ahu, Maui, Kaua'i & Hawai'i Island

147 **Hawaiian Airlines Information**

163 **Hana Hou! Crossword**
Deep Hawai'i
Crossword puzzle by Garison Piatt

164 **Pau Hana**
KitKat Krazy
Story and photo by Mari Taketa