SEA TURTLES - EASTER IS.

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Health &

Prepared by the staff of the Honolulu Advertiser

Saving face on

Statues of Ahu Nau Nau look out over a new day on Easter Island, a

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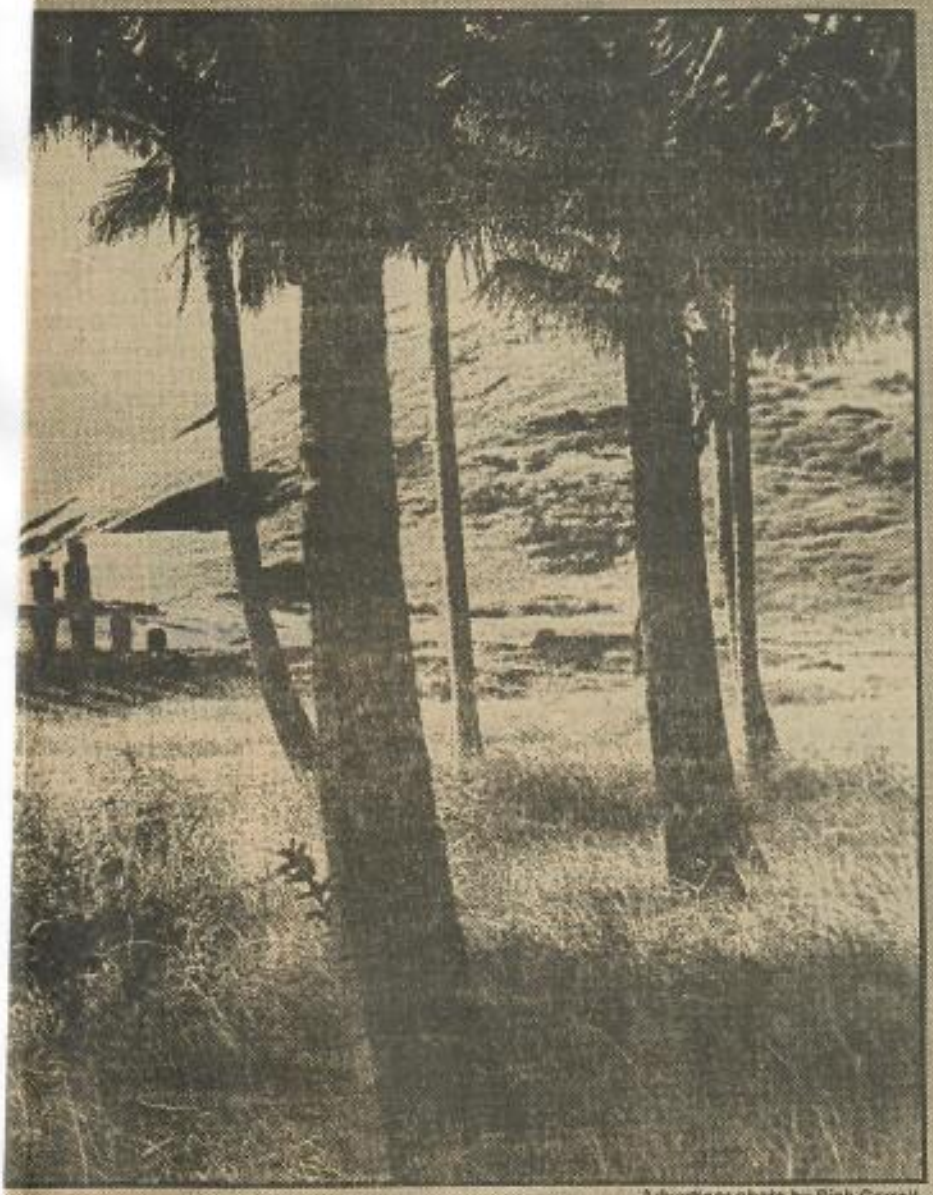
Science

Sunday
Star-Bulletin & Advertiser
Honolulu, June 5, 1988

Easter Island



Advertiser photo by Rick Carroll

they have for centuries.

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EASTER ISLAND, Chile — The giant stone statues of Easter Island are an endangered species. Victims of erosion, these wonders of the world are withering under the blazing sun and blowing away in Antarctic gales.

Touch one and it breaks into pebbles.

Their mighty heads are split, their barrel chests laced with cracks like varicose veins.

Some of the 60-ton behemoths, known as moai, will never stand on their ahus (altars) again; they are washing away into the soil. Others are tumbling head-first into tide pools as sea cliffs wash away.

Even Orongo's famed petroglyphs are fading; many are lost forever.

The situation is so grave Chile halted all restoration projects until scientists can find a way to postpone the inevitable.

"We want to preserve the statues before we restore more," says Sergio Rapu, the governor of Easter Island and its resident archaeologist.

Of the island's 600 statues, fewer than 20 have been restored since 1956. All need help.

* * *

We are here on a rescue mission led by Yosihiko Sinoto, South Seas archaeologist of Honolulu's Bishop Museum.

Sinoto, who first came to Easter Island almost 20 years ago, has returned to save the statues, to resume restoring them.

Rick Carroll
Staff Writer

Tomorrow in The Advertiser Living Section: The long-lost eyes of Easter Island

His plan calls for spraying the tuff and scoria stone statues with a chemical invented by a Honolulu geologist to save Colorado mine timbers from dry rot. The patented chemical, according to creator Gene La Nell, is "a blend of acrylics, vinyls and cross-link agents with a high concentration of ultra-violet absorbers."

He's already applied it to the London Bridge, the rump of Egypt's crumbling Sphinx and has been asked to test it on India's pock-marked Taj Mahal. La Nell claims it dries "fast and clear like Saran Wrap" and allows porous stone to breathe. The invisible protective shield also is cost-efficient — about $200 for each statue.

This is the second attempt to save Easter Island's statues.

In 1986, scientists from Chile's Centro Nacional de Restauracion spent $7,000 to wrap the *moai* at Hanga Kioe like a mummy and apply 350 kilograms of a German chemical, called Wacker Stone Strengthener, from head to toe.

When its black base turned white in the sun, the people of Hanga Roa grew alarmed. It may only be leaching but Chilean officials remain skeptical.

* * *

Without its statues Easter Island would slip off the world list of modern wonders and cease being a destination for the curious.

The statues, which date to 600 A.D., according to Carbon 14 testing of objects found at their feet, are Easter Island's sole tourist attraction and cornerstone of its cottage industry.

Villagers eke out a spare existence peddling $10 miniature statues, replica rongo-rongo boards with unsolved pictographs and birdman wood carvings. They also offer horse-back and mini-van tours to the remote sites.

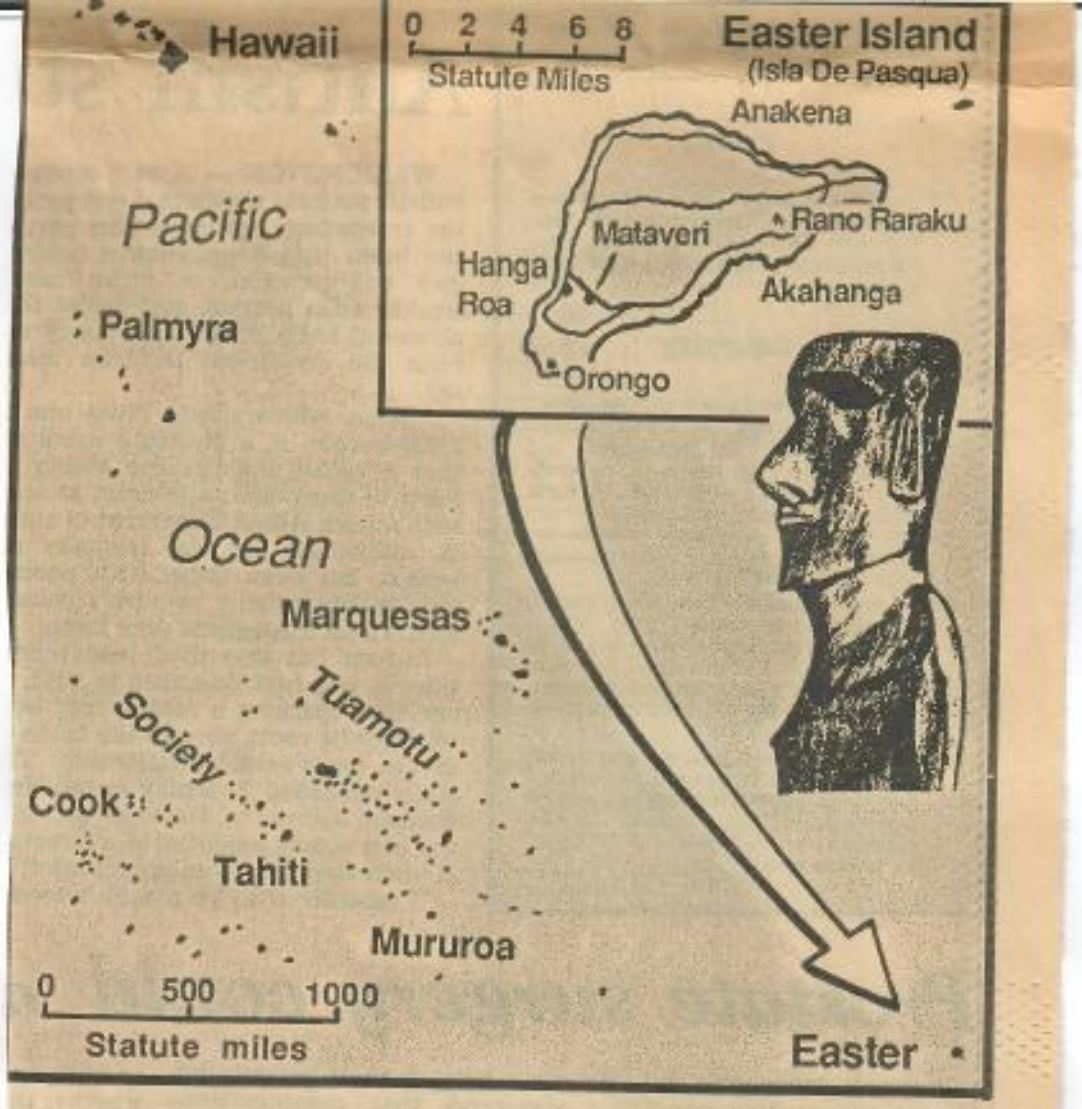
But even now, few passengers on the twice-a-week Lan Chile jet that stops one hour between Santiago and Papeete deplane at Easter Island to take the 30-minute statue tour. The average visitor spends 3.5 days here — until the plane returns.

Then the Santiago-bound jet roars

See Easter Island, Page E-4

Stone faces of Ahu Akivi look out across Easter Island and into the sky. Carbon dating places the carving of these giant stones at around 600 A.D. Now, these "moai" and others like them around the island are crumbling and the governor of Easter Island, Sergio Rapu, shown at left, is determined to save them. His ally in the rescue mission is Yosihiko Sinoto of the Bishop Museum and a chemical invented by Honolulu geologist Gene La Nell.

Advertiser photos by Rick Carroll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Anakena
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Science: Saving face on Easter Island

It's in the middle of nowhere — with a NASA landing strip

The first remarkable thing about Easter Island is that it's even there — in the middle of nowhere in the Pacific.

South America is 2,230 miles east. Pitcairn Island's 1,100 miles west. Mexico's north, Antarctica's south. That's why Easter Island's called the most remote spot on earth.

It's a two-jet, 11-hour hop south from Honolulu to "the center of the world," or Te Pito o te Henua, as early inhabitants called Easter Island.

A wedge-shaped 45 square mile island under the flag of Chile, it sports three volcanoes in each corner — Terevaka, Pukatikei and Rano Kau — and about 600 statues. Three hundred are lodged in Rano Raraku's quarry, most of the others are strewn face-down along the coast.

Dutch explorer, Roggeveen, named it Easter Island, (Isla de Pascua) because he first saw it on Easter of 1722. The brooding man-made statues, known as moai, already had stood for about 1,300 years. Some still stood when Captain Cook dropped anchor on March 11, 1774. All those now standing have been restored.

The first surprise is that nearly all the erect statues face inland — not out to sea. And they are everywhere, even in front yards of homes in Hanga Roa, the dirt-road capital (Pop. 2,000).

People here call Easter Island, Rapu Nui, which roughly translates — big paddle. They also speak Rapa Nui, a language more Polynesian than Spanish.

There are no paved roads or income taxes and few cars. Horses outnumber people two to one. Fishing, wood carving and tourism are chief industries.

The island's biggest man-made landmark isn't statues but Mataveri Airport's nearly two-mile long runway, built by NASA in the one-in-100,000 chance the Challenger space shuttle needs an emergency landing strip.

Some people here think NASA's a bigger mystery than the statues.

Easter Island

From Page One

off, leaving Easter Island in a kind of modern Stone Age limbo.

We spent five days with Sinoto on Easter Island examining endangered statues.

A hero since he rescued a statue from a tide pool in 1983, Sinoto is considered most likely to succeed saving the statues — and the island's frail economy. Sensitive to local worries, he's come back to check results of last November's preliminary chemical field test on a fallen Ahu Nau Nau topknot.

So far, he believes, the chemical appears to have stopped the erosion and caused no harm. To be sure no damage results, Sinoto's has installed his protege Toru Hayashi, 29, a Tokyo archaeologist, on Easter Island to conduct a series of year-long tests.

As resident archaeologist, Hayashi will treat tuff and scoria stones with the chemical, place them in various environmental sites and monitor results.

A broken chunk of a statue and a red piece of scoria, similar to topknots, also will be lab-tested in Honolulu. Accelerated aging tests also are planned.

"It could take one, two or even three years for results," Sinoto said, "but we want to be sure this chemical is the best to use for conservation."

If successful, Sinoto, Hayashi and LaNell could save the modern wonders of the world for future generations to ponder — and brighten the future of Easter Island's people.

Over dinner that night (of fresh lobster with crisp white Chilean wine) at Topa Ra'a, a new lodge overlooking the port town of Hanga Roa, the eyes of Ahu Nau Nau surfaced in conversation with the governor.

Since he first discovered pieces of eyes in April of 1978, Gov. Rapu has unearthed more fragments at different sites.

All told, he's unearthed fragments of 67 eyes — pieces of finely crafted white coral and black obsidian — and reassembled six eyes to give the statues vision they lacked for centuries. The discoveries, he said, lead him to theorize that perhaps all but the first generation of crude "potato head" statues originally had eyes.

Europeans, he said, once knew the island as Mata ki te Rangi ("Eyes that look to the sky,") but thought it referred to craters of three extinct volcanoes at each corner of the triangular island. Now, he knows otherwise.

When he discovered the first fragment at Anakena, he thought it was a pot.

Then, he found more fragments "all alike, so fine they looked like they were made in a factory" and then a complete eye, preserved in sand.

"At that moment," he said, "we were completely certain that these statues carried inlaid eyes.

"I was excited ... with this new discovery," he said, "but when I showed it to the oldest man (in the village) and said 'This is the arioko of the moai,' he was not surprised.

"He told me, 'My father used to tell me that when men walked at Rano Raraku among the statues that these statues are not blind.'"

"How do they look with eyes?" I asked, never expecting to see more than a photograph.

The governor smiled.

"You have never seen the eyes?" he asked Sinoto.

"Only in the museum," Sinoto said.

"Well, then," the governor said, "let's go put them in tomorrow at sunrise."

Advertiser photo by Rick Carroll

Yosihiko Sinoto, Bishop Museum archaeologist, with some of the moai he is trying to save.

Ex-Easter Island leader sees Hawaii as a model

GAIL

Our Honolulu

By Bob Krauss

EASTER ISLAND — Sergio Rapu, a former governor of Rapa Nui (Easter Island), has one foot in Hawaii. He has a home on Oahu and his two children attend Punahou School.

But Rapu's ancestors built giant stone statues on this remote island, were taken as slaves to South America, and returned to Rapa Nui to the havoc that was dealt their culture.

His story is the emergence of Easter Island into the modern world.

Rapu started as a school teacher, turned to archaeology, became the first curator of Easter Island's tiny museum, and in 1984 was appointed by the president of Chile as the first native governor of its offshore territory.

After six years, Rapu took an assignment as cultural director at the Polynesian Cultural Center and director of Polynesian studies at Brigham Young University-Hawaii.

Then his mother became ill on Rapa Nui and he went home to run the little family hotel while his wife, Cindy (from Texas), stayed to work on Oahu and see their children through Punahou.

Rapu said he considers Hawaii as a better model than nearer neighbor Tahiti for Easter Island's relations with Chile, the nation that annexed the island in 1888.

He said many Chileans look upon natives of Rapa Nui as second-class citizens.

But there is also an influential Friends of Rapa Nui group that lobbies for Easter Island causes on mainland Chile.

The government has made substantial appropriations for infrastructure, education and scholarships, Rapu added.

A primary conflict with the Chilean government is over land. Only 8 percent of the land on Rapa Nui is owned by natives. "Basically, the government of Chile owns most of it," Rapu said.

A regressive "indigenous" law enacted two years ago prevents natives from buying government land and limits leases to five years. But Chileans can buy land.

Rapu: One foot in Hawaii

Signs protesting the new land policy went up on the grounds of the Catholic church. The law has fueled a separatist movement among some of Easter Island's 2,800 population.

Separatism is strong in Tahiti, where Rapu Nui has traditional ties. Yet Rapu believes Rapa Nui's future is with Chile as Hawaii's is with the United States.

"How could we exist as an independent nation?" he asked. "If we joined a Pacific Island Federation, our capital would move from Santiago to Papeete and we would take orders from Tahiti instead of Chile."

So Rapu is interested in building closer ties to Hawaii, where greater autonomy came with statehood.

Rapa Nui is moving in the same direction, he said. His oldest brother led a movement to grant Rapa Nuians the right to elect their local officials, then was elected mayor for the next 12 years.

The next step is to win an elected seat in the Chilean legislature for Rapa Nui, he said.

Meanwhile, he would like for Rapa Nui to benefit from Hawaii's experience in areas such as canoeing and tourism.

"Our people no longer build outrigger canoes," Rapu said. "Hawaiians could teach us. Tourism is our leading industry (600 beds, 8,000 visitors a year) as it is yours. We welcome visitors from Hawaii."

His dream is for veteran Hawaiian navigators to make the first modern non-instrument voyage to Rapa Nui in the spirit that ancient Polynesians set out to discover new islands.

Rapu believes that such a daring achievement would finally put to rest the theory that Easter Island was discovered by raft from South America.

One other parallel in the history of Hawaii and Rapa Nui intrigues him. Hawaiians and Rapa Nuians both overthrew their traditional religion. The abolishment of the kapu system in Hawaii and tipping over of statues in Rapa Nui took place after foreign contact. Coincidence or another result of Western contact?

A better understanding of why it happened might be useful for people of both cultures, he said.

Tomorrow: Revival of native culture in Rapa Nui.

Hope for the future

The famous statues of Easter Island serve as touchstones to the past for islanders looking for a brighter political future. Former Easter Island Gov. Sergio Rapu says he hopes for the day when Chile will not look upon these young citizens of Easter Island, below, or others on the island as second-class citizens.

Rob Krauss/The Honolulu Advertiser

Our Honolulu

By Bob Krauss 4/29/96 A2

Easter Island set apart from Hawaii by mystique

EASTER ISLAND — The "mystery" of Easter Island is more subtle and human than the reports you've read about balsa log raft voyages from South America or visitors from outer space.

Legends of Rapa Nui (Easter Island) recount that the first people came with a chief named Hotu Matua in a large canoe from the west.

He sent out scouts who returned with a recommendation not to settle here. The island was not fertile. There were no streams. A rock-bound coast provided only two beaches for landing canoes. There were no reefs for fishing.

Hotu Matua rejected this advice.

To a group from Hawaii who came here this month with Dr. Yosihiko Sinoto, senior anthropologist at the Bishop Museum, the island is like Kohala: cool and rainy, rounded volcanic hills covered with grass and scattered clumps of trees.

There was no doubt in any of our minds that Hotu Matua and his people were Polynesian. It's in the language. Their word for bird is *manu*, as it is in Hawaii. The word for turtle is *honu*. It goes on and on. The place names are familiar.

Yet there are eerie and awesome differences.

The stone platforms that guard the entire coastline, one after another, are recognizable as *heiau*, or temples. But the enormous stone statues upon them are a new, incredible experience.

It is as if those ancient people, marooned on a hard-scrabble island, turned to the spiritual and aesthetic resources within themselves to carve giant statues of their ancestors.

Legends and archaeological evidence indicate that if Hotu Matua brought pigs in his canoe, the people ate them. Dogs did not long survive, only chickens, and the small Polynesian rat.

Seeds of great trees like the Hawaiian koa did not find their way to the tiny island a little bigger than Kahoolawe, 2,500 miles from South America in one direction, 2,500 from Tahiti in the other.

There were no coconut trees. If Hotu Matua brought the breadfruit, it didn't grow. A smaller Chilean palm was already there. It provided the best timber. The food crops included unirrigated yam, sweet potato, taro and banana.

So the people from a lush, tropical island had to adapt to scarcity.

Sergio Rapu, archaeologist and a native of Rapa Nui, said the *hookupu* (gift giving) of his people is different from that of Polynesians where there was an abundance of food.

A young man seeking a wife did not present his prospective father-in-law with a pile of food. Rather, he gave a single, beautiful chicken.

Rapu said the people looked upon the beautifully carved statues the same way — with a pride and satisfaction that made up for lack of food.

These must have been a proud people as we all are. Like Native American tribes who called themselves simply The People, Rapa Nuians had no name for themselves, as Hawaiians did not.

But there is a great, round, gray stone of smooth basalt on a rocky coast that they called The Center of the Earth.

Imagine such a people, all of their intellectual capacity, their multiple ambitions and artistic talent, cooped up on a tiny island of limited resources.

Rapu said he believes that they were unable to expand in area, so they grew aesthetically. Umi Kai, a Hawaiian with our group, said he thinks the people were hungry for contact and the only outside contact possible was with spirits.

To me it seemed that the one resource available on Rapa Nui in abundance was stone, so the people turned

See Krauss, Page A31

Krauss: Easter Island set apart by its mystique

FROM PAGE A25

their energies upon it with what one anthropologist called a kind of madness.

The whole island vibrates with that energy even now.

Like Polynesian clans all over the Pacific, the families on Rapa Nui must have competed. Each family wanted a bigger statue of its ancestor than the other clans. So the statues got bigger and bigger.

The religion finally collapsed after about 1,000 years, when scarcity became intolerable. Warrior chiefs replaced the traditional *alii* (nobility) descended from Hotu Matua, bent on getting food by raid and pillage if necessary.

Warfare became endemic. The accepted method of humiliating a defeated clan was to not only take the food, but to throw down the statues of revered ancestors.

Even the new religion of fertility displayed the amazing creativity of the Rapa Nuians. From carving statues, the craftsmen must have turned to carving petroglyphs, which are considerably more detailed than those in Hawaii.

There are more than 1,000 petroglyph sites on the small island. Left to themselves, the Rapa Nuians might have carved up every rock in the place.

They evolved a unique new method of selecting what

Advertiser graphic

Hawaiians call a *mo'i*, or ruling chief. Every year the candidates climbed down a 1,000-foot cliff and swam out 1¼ miles to Motu Nui, an islet where sooty terns nest.

The first to climb back up with a speckled egg became chief for the year. The cliff-top village where people gathered for this event is called Orongo, the ruins of stone houses still standing, a superb archaeological site.

Peruvian pirates dealt almost a mortal blow to this fascinating culture when they carried off up to 1,000 Rapa Nuians in a single year, reducing the population from a high of perhaps 7,000 in ancient times to 111 in the 1860s.

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Bob Krauss has been writing about Honolulu for more than 40 years.

Sunday Travel

e Sunday Star-Bulletin & Advertiser

Easter Island: Navel of

By Allan Seiden

When the legendary King Hotu Mau'a reached Easter Island from somewhere far beyond the sea's unbroken horizon, he had discovered one of the world's most isolated landfalls. To the east, South America's coast, from where some believe Hotu Matu'a set sail, is more than 2300 miles distant.

To the west, and almost equally far removed, are the Marquesas and the other islands of Polynesia. Most explanations say it was these South Pacific islands that Hotu Matu'a and Easter Island's first settlers originally called home.

By Easter Sunday 1772, when the first Europeans sighted Te Pito O Te Henua, The Navel of the World as the natives called their island, they found a civilization that was not only unique, but so ancient that its origins were already shrouded in myth and legend.

Seven stone statues or moai stare out toward the heavens at a restored site in central Easter Island. After the island's civil wars had ended none of the statues was left standing.

Prepared by the staff of the Honolulu Advertiser July 11, 198

the World

ward every horizon, stark colors subdued by the diffused light that marks the end of day. Returning to our jeep, we are surrounded by a silence made all the more profound by the stark silhouette of moai against ther lingering colors of the dusk sky.

Another sunset, this time on horseback from the ruins of the ceremonial village of Orongo. Situated atop the Kau volcano, Orongo faces the setting sun from a grassy spit of land bordered by cliffs that plunge six hundred feet to the sea, and Kau's equally sheer crater walls. It was at Orongo that Easter Island's numerous clans assembled each year to perform ceremonial rituals.

Chief among these was the competition to bring back to Orongo, undamaged, a tern's egg from nesting grounds on the tiny islet of Motu Nui. The competition was designed as a test of stamina, strength and skill, with representatives of the various clans descending the cliff face, swimming the half mile of turbulent seas separating Motu Nui from the shore, securing an egg and then returning to Orongo. To the victor and his clan went honors, prestige and authority.

Today only the wind or an inquisitive visitor enters the fifty-one sod-roofed stone houses that make up the village. Set among them are hundreds of intricate petro-

price dependent upon facilities, which in the more basic residencias may not include in-house plumbing. With tourism slow, rates may prove negotiable, with discounts for longer stays or lower rates if certain meals are eliminated.

The hotel is a well-maintained, comfortable, pre-fabricated complex brought in from the States some years back, when tourism was booming. Despite a seeming abundance of rooms, reservations are recommended, particularly during the more heavily booked summer months between December and March.

If a residencia is preferred, the Apina Nui is a good bet. Located within a short walk of the hotel and the center of Hangaroa, it is run by the friendly and helpful Rapu family.

If prices seem surprisingly high, you soon come to understand why. With almost everything brought in from Santiago, nothing comes cheap. Want a cool beer after a day out exploring? Better be prepared to spend a cool four dollars.

Don't think you'll save much by switching to soda. A two liter bottle will set you back $8.50. And it's a similar story for everything from apples to cement.

Once you get used to the prices after the initial shock, you still wonder just how the islanders make ends meet. With no industry and little to provide employment, many families rely on monies earned by those who've moved to Santiago or Valparaiso.

Nearly half a century of civil wars had so devastated the island that its culture was in a state of terminal decline. Hundreds of moai, the mystic stone figures that were erected over the centuries by each of the island's villages to honor family ancestors, had been toppled.

Work had stopped at Ranu Raraku, the extinct volcano whose weathered slopes served as a quarry for the tufa stone from which the moai were carved. Hundreds of statues stood anchored in the wind-blown soil at the base of Ranu Raraku, while dozens of others had been abandoned in the midst of carving, still bound to the quarry walls from which they had yet to be cut free.

For more than two centuries recurrent civil wars were to continue, only to be followed by raiding slave ships which carried away thousands of islanders to work on South American plantations and on guano-rich islands off the South American coast. At the turn of the century, when Easter Island was already declared a dependency of Chile, fewer than 125 islanders were left. It is from the genetic remnant and an occasional outside settler that today's 2000 Pascuenses are descended.

Even in a world of shrinking dimensions, Easter Island remains an isolated outpost, linked to the rest of the world by supply ships that arrive several times a year and by LanChile's two weekly round trip flights linking Santiago, Easter Island and Tahiti. You know you are off the beaten path not just because it has taken nearly five hours to get here from Santiago; not only because of the lack of paved roads or the fact that you see more horses than cars in the streets of Hangaroa, the island's only village; but because of a sense of isolation that being on a remote speck of land centered in a vast oceanic moat, makes tangible.

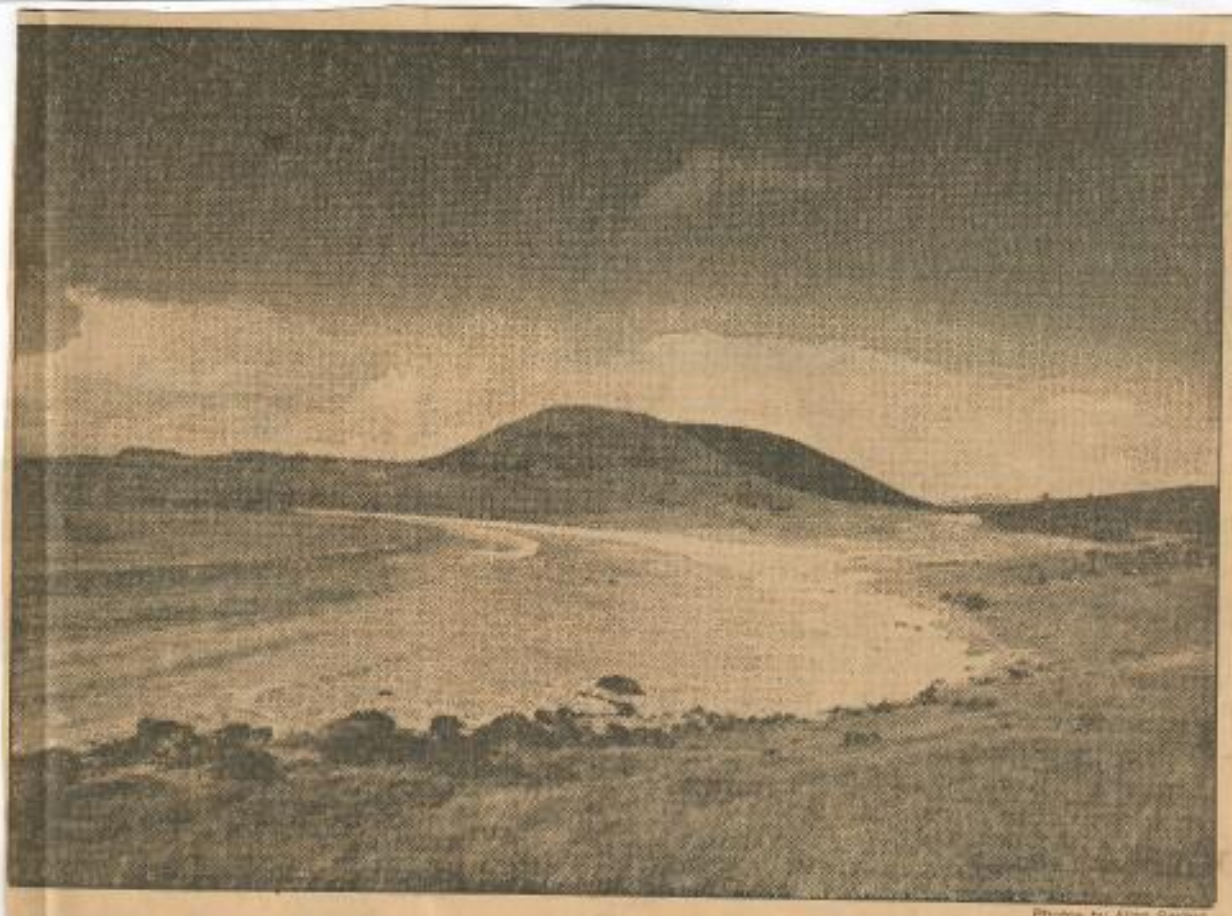
You feel it in the air, in the silence, and in the constant presence of the sea. And it's no great disappointment to find that you really have arrived somewhere where tourism hasn't interferred with authenticity.

Tucked away in its eastern pocket of the Pacific, this sense of isolation accentuates the aura of mystery that surrounds Easter Island. While scientific study has revealed much about the island's culture, much remains uncertain about the past.

Just who were the first islanders? Where did they come from? How did they manage to produce so comprehensive, sophisticated and complex a culture on an island of fewer than 65 square miles? What forces ultimately led to the civil wars that left all these accomplishements in ruins?

Today, with all of Easter Island's population clustered in and around Hangaroa, most of the island remains open

A wood carver fashions a copy of his island's famous stone figures. Woodcarving is one of the few locally practiced handicrafts.



Photos by Allan Seiden

Anakena Beach is one of the island's two beaches. A restored ahu and moai complex lies about 200-feet behind the beach.

Two books to take along

Travelers interested in a good, solid background on Easter Island should get two books recently published by the University Press of Hawaii.

First on the list is "The Eighth Land," subtitled "The Polynesian Discovery and Settlement of Easter Island." Written by Thomas S. Barthel, this book presents an excellent multi-level analysis of Easter Island myths and legends. Barthel's primary source is "Manuscript E," a document authored by the islanders themselves that remained hidden until the middle 1950's.

Last year the press published "Rapanui," subtitled "Tradition and Survival on Easter Island." The theme of Grant McCall's book is the way in which the modern population of Easter Island has responded to change. In addition to a short history of the island he discusses various cultural concepts and explains how the islanders manage to make a living on such an isolated landfall. Examined, too, are their relationships to outsiders and, in particular, with the people of Chile.

Both books are available in local bookstores or from the University Press of Hawaii, 2840 Kolowalu St., Honolulu.

and uncluttered, far less densely settled than it was in ancient times. Much of the island in fact is protected as part of Chile's national park system and by a government commitment to preserving its historic monuments, and an attitude and lifestyle that in many ways remain Polynesian.

The result is an island made for exploring. You can rent a horse for about ten dollars a day and roam just about anywhere. Or if you want to go further afield, motorcyles ($60 a day and up), four-wheel drive jeeps and vans ($90 a day and up) and jeep and driver rentals ($100-$150 per day) are available. So are van tours that take in the islands best known attractions.

Of primary interest are the hundreds of moai that lie scattered about the island. While most remain toppled, several major groupings have been righted in the thirty years since Thor Hyerdahl visited Easter Island and presented its exotic civilization to the world.

Standing fifteen to thirty-five feet tall, the moai preside enigmatically over the softly contoured landscape, linking villages that are no more, with the heavens, home to ancestors who were held sacred and imbued with great power and significance. It was for this reason that the moai were a constant casualty of inter-clan battles, destroyed as a means of undermining the morale and

strength of real and potential enemies.

While the restored moai have great drama and beauty, it's just as exciting to explore sites that remain in ruins. Somehow there's an even more mystic impact in searching the silent earth for your own clues, only to discover the past in a frozen stare from the half hidden eyes of a fallen moai.

Easter Island provided an abundance of dramatic encounters, not only with the past, but via a setting that is at once serene and timeless. At Ranu Raraku toward the end of the day, an afternoon sun casts warm golden rays on the hundreds of moai that surround the crater's long-abandoned quarries. Still others lie fallen beside the roadway along which they were hauled, transported with ropes and rollers from the quarry to the villages for which they'd been carved.

It is here more than anywhere else on Easter Island that the haunting beauty of the maoi becomes readily apparent, for some of the most perfectly preserved and skillfully carved were left untouched, even as civil wars saw others systematically destroyed.

On the east, Ranu Raraku rises from the surrounding plain in a rampart of steep cliffs. Small hawks glide from cliff top on the updraughts produced by winds that blow in steadily from the sea. Entering the crater over its eroded western wall, I startle a herd of free-roaming horses grazing at the edge of a small lake that fills the center of the crater.

An afternoon sun, a half hour above the horizon, turns their shining auburn coats a fiery red as they gallop across the crater and disappear over its northern rim, followed by the muffled echo of hoofs crushing the dry lava soil. From the summit, a pastel panorama stretches to-

'Nearly half a century of civil wars had so devastated the island that its culture was in a state of terminal decline. Hundreds of moai, the mystic stone figures that were erected over the centuries by each of the island's villages to honor family ancestors, had been toppled.'

glyphs, most of which have been excellently preserved.

Cost has been the primary reason that the number of visitors to Easter Island has dropped steadily since having peaked at more than eight thousand in 1974, when American tour operators took advantage of subsidized air fares to create Easter Island itineraries.

Now for the first time in a number of years, a special fare is again being offered in the form of a $1450 Circle Fare that allows for travel on LanChile between Los Angeles, Miami, Lima, Santiago, Easter Island and Papeete, and via UTA from Papeete to Los Angeles.

Accommodations on Rapa Nui, as Easter Island is known in the Polynesian language (and still widely spoken), range from the Hotel Hangaroa to numerous residencies, the private homes that take in visitors. Even when considering that all meals are included, rates are a bit steep. The Hangaroa, with the island's only restaurant, lists its rates at $158, double per night.

Residencias range from approximately $35-$100, with

With few opportunities, many islanders leave when they are young, visiting on occasion, and often returning to retire. For Easter Island's tight-knit families, a unique lifestyle is a constant lure to return.

Life is lived simply by most Pascuensis, with the sea and the land providing at least a degree of self-sufficiency, in keeping with Polynesian tradition. "On this island you cannot live off of one thing," an island fisherman told me as he hauled his net in while standing on brittle lava rock. "You get a little from the sea, a little from the land, and you buy a little. That's how we put it all together here."

For visitors, the result is likely to be frequent servings of delicious island lobster, crab and fish. With few cattle or sheep on the island, meat, while available, is less frequently served.

But food and cost become secondary considerations once you're here, and there's hardly a moment when it doesn't seem worth it. The moai, the beauty, Orongo, the people all play a role in Easter Island living up to expectations. The mystery, the silences, the drama are all there, combining to reveal the island's greatest secret in a sense of timelessness and natural rhythms that are truly primeval. If the costs can be substantial, so can the rewards.

Cattle graze peacefully around Ahu Tangariki, the largest restored temple complex on Easter Island.

Easter Island

It's closer than you think — and full of the mysteries of ancient Rapa Nui

By Bob Krauss
Advertiser Columnist

Easter Island is closer than you think and more exciting then you dream. It's not all that expensive, either.

Sit on the veranda of the Topara'a Inn and the view reminds you of Waimea on the Big Island. There's one big difference — the lonely stone statues standing on or tipped from platforms along the black lava coastline; about 350 of them.

The "mystery" of Easter Island is all around you and within exploring distance, 16 miles from end to end.

True, only one road across the island is paved. The rest of them are like Molokai Ranch two-tire tracks and it rains a lot. But getting stuck in the mud is part of the adventure.

If you are a Hawaiiana buff, or a South Seas romantic, or a mystic of any persuasion, Easter Island is your cup of tea. There's more *mana* (spiritual power) per square foot than even in Haleakala Crater.

One of the young ladies in our expedition of amateur archaeologists led by Yosihiki Sinoto, senior anthropologist at the Bishop Museum, talked to the statues. It seemed perfectly natural in that remote environment.

Juan Haoa, carver and kapuna (cultural resource) on Easter Island

"The first statue I talked to was at peace," said Dhana Wong, a pastry cook. "The second was uneasy. One statue asked me to share his presence with people in Hawaii. This is a happy one. He's a joker."

Even scientists are overcome by the giant stone statues on sacred platforms that stand guard one after another around the island.

"Awesome" is the only way to describe the effort required to carve the enormous statues, to move them by hand to their platforms and to stand them erect.

"It has to be spiritual," said University of Hawaii zoologist Alison Kay, an authority on seashells. "So many people working so hard for a common objective."

Don't expect the natives of Rapa Nui (Easter Island) to confirm theories about how the statues were carved by Incas from South America or visitors from outer space.

People on the island look upon the statues as images of their Polynesian ancestors. The patriarch of carvers,

See Easter, Page E2

What to do ...

■ **TOURS:** Unless you're Indiana Jones, the three-day package is probably your best choice, a nonstop adventure among the mysteries of Easter Island. You can't possibly see them all in that time.

With enough time, you can spend a day exploring caves and ruins on horseback on the side of the island where there aren't any roads at all, only trails.

You can rub petroglyphs that abound on Rapa Nui. So few people come here that it's allowed, even encouraged to interest people in the culture.

Sunday morning in church is a good way to mingle with Rapa Nuians. The singing is superb.

■ **OTHER TIPS:** You'll need a passport but no visa.

U.S. dollars are good everywhere, but not credit cards.

Bring plenty of film. It's in short supply on the island.

The weather is like Waimea on the Big Island, cool at night, and it rains.

TRAVEL

E

The Honolulu Advertiser

Sunday, May 19 1996

Travel Editor: Ed Kennedy, 525-8023

Easter Island: Ancient past

FROM PAGE E1

Juan Haoa, chooses a particular statue, or *moai*, to copy when he does a miniature for sale. Otherwise the *moai* is not true to the culture.

The best authority on the island about the history and culture of Rapa Nui is Sergio Rapu, who is now running the Topara'a Inn because his mother became ill and it's the family business.

Rapu was trained as an archaeologist, has made important excavations on the island, served six years as governor of Rapa Nui, then worked at the Polynesian Culture Center and Brigham Young University, Hawaii Campus, until called back by his family.

He speaks English, which few people do on Rapa Nui, and enjoys meeting people from Hawaii. The guides and drivers are willing, but they speak mostly Spanish.

However, you can map out your own Easter Island adventure with advance preparation and some knowledge of Rapa Nui history.

The starting place is Anakena across the island from Hanga Roa, the village where the airport, the cargo-ship anchorage, hotels and shops are located.

Anakena is the best of the few beaches on the island. It was here, according to legend, that Hotu Matua and his people landed in a large canoe from the west to settle the island in spite of advice from his scouts that it was not fertile.

A handsome *ahu* (the Rapa Nui name for a temple complex with its platform and statues) overlooks the beach. Look around and you'll find a shelter cave and petroglyphs. It's a great picnic spot.

Rapu excavated and restored the *ahu* at Anakena where he discovered that the *moai* had eyes of white coral, probably put in place to give the statues *mana* when they were erected.

You'll notice as you move around the island that some *moai* are bigger than others. The belief is that they grew in size as families compeed to carve the biggest statue of their ancestors.

The carving place, a vast quarry on the side of a volcano crater, is worth a whole morning or afternoon. It's called Ranu Raraku. Like other sites, it's maintained as a National Park by the government of Chile, which annexed Easter Island in 1888.

At Ranu Raraku, you will see several hundred *moai* in all stages of completion. The photo opportunities are terrific.

Nearby on the coast is Ahu Tongariki, one of the most spectacular restorations on the island, 15 statues standing against the sky, and a field of interesting petroglyphs.

After about 1,000 years, the burden of carving giant statues became so great that warrior chiefs revolted against the ancestor-worshiping descendents of Hotu Matua. Tipping the statues over began. You see many ancestors with faces in the dirt.

A religion of fertility evolved with emphasis on getting food by raid and theft if necessary. A birdman cult oversaw the selection every year of a ruling chief.

The competition took place at Orongo, a breathtaking cliff site of 50 stone houses and birdman petroglyphs. Here competing champions climbed down a 1,000-foot cliff and swam out more than a mile to a small rock island where sooty terns nest.

Whoever climbed back up the cliff with the first speckled egg became chief for a year. You can stand in the village among the petroglyphs and look down the cliff to the bare rock islet.

These are the places to visit first if you can stay only three days. The alternative (dictated by airline schedules) is a 10-day stay, and there's plenty more to keep you busy if you are an outdoor person.

If you go in late January or early February, you can see traditional singing and dancing for the Semana de Rapa Nui, a weeklong celebration of island culture.

Our THA Honolulu

By Bob Krauss A3 5/1/96

Easter Isle: A fostering of renewal in culture

EASTER ISLAND — One thing Easter Islanders and Hawaiians have in common is that they've both made fools of pessimists who predicted that their cultures were doomed.

A leader in the cultural revival of Rapa Nui is Juan Haoa, patriarch of island carvers and a respected kupuna (elder, source of knowledge).

He said he began to carve at age 10, is now 71, and had no formal instruction. He watched how it was done and tried to do it better.

If he had a teacher it was his *hanai* (adopted) father, Juan Tepano, who was the principal informant for Alfred Metraux, the anthropologist who did the first important study of Easter Island in 1935.

Haoa told an amusing story about how, as a boy, he helped around camp. Noticing Metraux's interest in buying ancient artifacts, the boy carved a petroglyph and put it in the fire, where his mother hastily rescued it and sold it to Metraux.

The anthropologist added it to his collection. Haoa believes it is now in the Bishop Museum.

Since then, Haoa himself has served as an informant to the expeditions of Thor Heyerdahl of Kon Tiki fame, William Mulloy (dean of Easter Island researchers) and Sergio Rapu, a former governor of Rapa Nui who said Haoa's sense of authenticity is invaluable.

His son carries on the carving tradition while he pursues a new passion: preservation of correct language.

He is one of six elders who meet regularly to decide on the meaning of place names which embody the history of the island. Incidents in legends are remembered by giving their names to places where they occurred. A mistake in a place name constitutes a revision of history.

His granddaughter leads a group of younger people who last year began collecting oral histories of old people to

See Easter Islanders, Page A5

Easter Islanders:
Renaissance beginning

FROM PAGE A3

preserve the knowledge.

Rapu rounded up musicians for a recent group of visitors from Hawaii. They sang, accompanied by guitars. The songs of the younger duo displayed outside influence except, instead of reggae rhythms that have crept into Hawaiian music, the Rapa Nui musicians borrow from Chile and Tahiti.

One member of the visiting Hawaii group, Umi Kai, carves bone and wood replicas of ancient fishhooks. After meeting with four Rapa Nui carvers, he said he believes that Hawaiians are in some ways ahead in preserving their culture.

"The renaissance here (on Easter Island) is just starting," he said. "I don't think they've felt the need to preserve but contacts with Hawaii like this has told them not to wait."

Rapa Nui stone and wood workers carve with the adz, or toki — steel bladed and lashed with heavy rubber bands that are easier to unbind than sennit (coconut fiber). Kai asked the Rapa Nui carvers to teach him how to use the toki (ko'i in Hawaiian).

They make small moai — the huge, haunting statues for which the island is best known — and other traditional objects for the visitor market. The best carvers have done impressive, life-size statues of Christ, the Virgin Mary and the saints for the Catholic Church. Rapu's brother has won international awards.

They gave Kai two adzes and other gifts.

"My friend, Miguel Mahoe, taught me the Polynesian way, to give without expecting something in return," said Kai. "He said it was for the pleasure of meeting me.

"He wouldn't accept one of my fishhooks until I told him it was not an exchange. It was a gift from my heart."

Hawaii expertise focuses on Easter Island

Bob Krauss

Advertiser Columnist

9/29/96 A3 THA

EASTER ISLAND — A Hawaii archaeologist is spearheading a U.S. effort in an international competition to stop the weathering of Easter Island's massive stone statues.

As much as a foot of surface has crumbled from the backs of huge, fallen images called *moai*. Statues restored to their upright positions have weathered so badly that the Chilean government has halted such restoration.

Three countries have offered solutions.

Dr. Yosihiko Sinoto, senior anthropologist at the Bishop Museum, heads the U.S. experiment, using a preservative called Parabond, invented by an American engineer, Gene La Nell, in Hawaii.

A German team applied a preparation to an eroding statue in 1990 at a cost of $8,000. An archaeologist on Easter Island said the treatment prevents moisture from getting into the porous volcanic tuff from which the statues are carved, but does not prevent its crumbling.

About 230 statues on platforms ring Easter Island's rugged coastline. Sinoto said treating each statue at a cost of $8,000 would be prohibitive.

Last year a Japanese team received permission from the government of Chile, of which Easter Island is a territory, to treat statues on a major site called Ahu Tongariki.

Sinoto and other archaeologists agreed it is too early to judge the results of the Japanese experiment. They also agreed that the need to stop the weathering is urgent.

Ahu Tongariki is near the vast volcano crater quarry where the images were carved before they were moved by hand (the largest weighs 80 tons) to platforms miles away. Several hundred statues, many uncompleted, stand or lie at the quarry.

Sinoto said the distance between Hawaii and Easter Island, and the disappointment of Easter Islanders with past results, has slowed the testing process. He doesn't want to experiment on finished statues as the Germans and Japanese did, he said.

On his recent expedition, he applied Parabond to the severed head of a defaced moai and to several other scraps of tuff near Easter Island's small museum.

Sinoto said he would send a solution of Parabond with the museum's director to Santiago, Chile, for accelerated laboratory testing. The cost of treatment by Parabond with spray equipment is estimated at $200 per statue, he said.

The *moai* are the most dramatic objects in need of preservation on Rapa Nui (Easter Island), Sinoto said, but are only part of his concern.

There are at least 1,000 petroglyphs (rock art) sites on the island, which is a little bigger than Kahoolawe, and many other ruins.

Sinoto said Easter Island needs "designed research" to answer questions about which people argue, such as settlement dates, still problematical for both Hawaii and Rapa Nui.

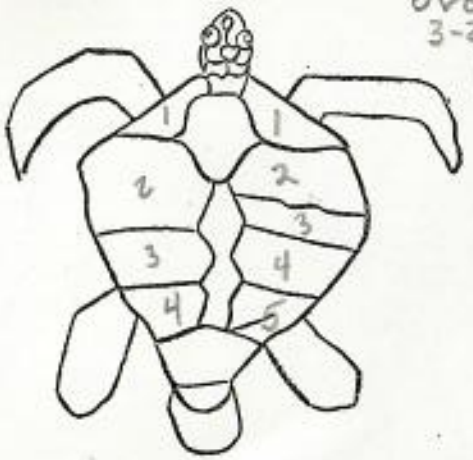
(Tomorrow: Easter Island emerges into the modern world.)

■ **Egypt's antiquities next on Parabond inventor's list. See story, Page A4.**

Puis viennent les tortues, les grosses tortues du type galapagos (onu) qui jadis arrivaient en bandes vers les rivages de l'île. On en surveillait la venue du haut de tours construites spécialement pour l'usage des pêcheurs.

Depuis que les rois ont disparu, les tortues ne viennent plus, nous dit Tepano. C'était leur mana (leur force magique) qui les attirait vers l'île.

TRANSLATION OVER 3-24-83 TELEPHONED BY WIL VAN CAMPEN



Chaque poisson couvre plus d'un mètre carré de lave, entouré d'une multitude de masques aux gros yeux. L'hypothèse de l'image d'un dieu de la pêche se confirme.

Parfois le lit de lave est percé d'ouvertures rectangulaires, longues de trente à quarante centimètres, larges d'une quinzaine, profonde de dix. Je vois plus d'une fois Pakomio se pencher et y boire l'eau de pluie. Ce geste fournit l'explication de l'objet. Dans un pays où il n'y a que la pierre qui puisse fournir la matière des récipients, à quoi bon se donner le mal de rendre transportables ceux dont on a besoin toujours au même endroit? Les pêcheurs assemblés, surveillant la mer, creusaient leurs coupes à même la lave. Il y a aussi là des cavités circulaires plus profondes que ferme un morceau de dalle plate. C'est, d'après Tepano, des viviers où se conservaient les appâts.

ANA KIONGA

Dans la région de Ahu Vaimata nous avons vu les premières maisons souterraines (Ana Kionga).

Au dehors, c'est une surface ovale couverte de gros galets amoncelés. A l'une des extrémités, Tepano soulève un galet rectangulaire plus plat et plus gros et découvre l'entrée d'un puits de la largeur d'un homme. Environ deux mètres et demi de profondeur. Au fond, on devine l'entrée d'un couloir d'un demi-mètre de haut parallèle à la surface du sol. Métraux descend, car il n'est pas certain que le couloir ne sera pas trop étroit pour moi. Mais j'entends bientôt sa voix qui m'appelle. Je descends à mon tour. Le couloir est en pente. J'avance à quatre pattes dans la nuit. Je débouche dans la chambre souterraine.

Une sorte de tréteau de pierre surélève une partie du sol. Des ossements, un crâne, auquel la lumière hésitante de nos torches électriques donne un regard noir. Nous éteignons. Une lumière vague se glisser entre les galets mal scellés et bientôt nous pouvons voir la chambre en son entier. Nous nous tenons debout au milieu, touchons le plafond. La forme de la chambre est ovale et rappelle celle des maisons (hare paenga) de la surface. Tepano m'a suivi. Il nous raconte que ce genre de maisons dont plusieurs exemplaires se voient dans les environs, servaient de refuge en cas de guerre. Mais les ressemblances que nous trouvons avec les maisons de la surface nous font penser qu'il s'agit de maisons d'habitation ordinaires. On profite pour les établir d'un creux dans la roche.

Nous en avons retrouvé en d'autres endroits, faisant comme ici, partie d'un village. Mais ici, une entrée semblable conduit à un couloir souterrain de plus de cent mètres de long, parfaitement aéré par des fentes invisibles. Il mène à une grotte naturelle large de quelques mètres.

Le long de la côte, un matin que je m'occupe du relèvement des dessins du grand pétroglyphe des poissons, Métraux suit un autre couloir souterrain en compagnie de Pakomio. La grotte où ils aboutissent s'ouvre sur l'horizon marin. L'écho

299 pp.

HENRI A. LAVACHERY

ILE DE PAQUES

Orné de 32 pages hors texte d'illustrations en héliogravure.

ÉDITIONS BERNARD GRASSET
61, RUE DES SAINTS-PÈRES, 61
PARIS (VI^e^)

Then comes the big great turtles of the Galapagos type, ONU, which formerly arrived in bays on the coast of the island. There arrival was watched for from the top of towers constructed especially for the use of fishermen. After the kings disappeared the turtles did not come anymore. It was their "mana" (magic force) that attracted them to the island.

+ Spirit of departed will lead a turtle ashore.
+ Petroglyphs

Alfred
HENRI LAVACHERY
Docteur en Philosophie et Lettres
Attaché des Musées Royaux d'Art et d'Histoire
(Département de l'Ethnographie) à Bruxelles

LES PÉTROGLYPHES DE L'ÎLE DE PÂQUES

OUVRAGE PUBLIÉ AVEC LE CONCOURS
DE LA FONDATION UNIVERSITAIRE DE BELGIQUE

1939
DE SIKKEL, KRUISHOFSTRAAT 223, ANVERS

Le croquis, très médiocre, que j'ai pu en faire (fig. 423), exige des éclaircissements.

A l'intérieur du sanctuaire AHU VINAPU (nº 135 de la carte), sur la côte Sud, une demeure a été établie en retirant une partie des blocs de lave qui formaient la masse sur laquelle s'appuyaient les dalles de la plate-forme. Les statues qui se dressaient sur cette dernière ont été, comme ailleurs, culbutées la tête en avant. L'une d'elle forme la paroi du toit de la demeure dans AHU VINAPU. Le croquis représente la chambre unique de cette retraite. L'entrée est à gauche. A droite, dans le coin supérieur, une ouverture, dans les pierres amoncelées, laisse pénétrer une pauvre lumière. De la statue, on voit le tronc renversé, un bras, la gorge et le ventre. Elle est brisée au col et de la tête, enterrée dans les gravats, on ne voit que le cou. Ce dernier et la partie supérieure du tronc porte des traces de peintures dont les limites sont marquées dans le croquis par des traits noirs qui n'existent pas en réalité. Les bandes rubannées sont blanches avec quelques points rouges. Les surfaces pointillées sont rouges. Le cou est tatoué de huit traits (les quatre derniers incomplets), comme on en voit aux statues du volcan (fig. 209 et suivantes).

Il semble probable que le reste du tronc de la statue était également peint, mais la pluie, qui entre par la baie (à droite du croquis), en a depuis longtemps lavé toutes les traces.

On pourrait reconstituer hypothétiquement la peinture corporelle de la statue de VINAPU suivant le croquis (fig. 424). Les bandes étaient blanches et les surfaces pleines (en noir) étaient rouges. Le cou portait des lignes tatouées ondulées, dans le sens vertical. Il est possible que le cou fût peint en rouge également. Une autre statue de VINAPU restée à l'extérieur de l'ahu porte, au cou, des traces de teinture rouge.

Je ne connais pas de documents relatifs à la peinture corporelle des Polynésiens qui puisse être comparé à la figure 424.

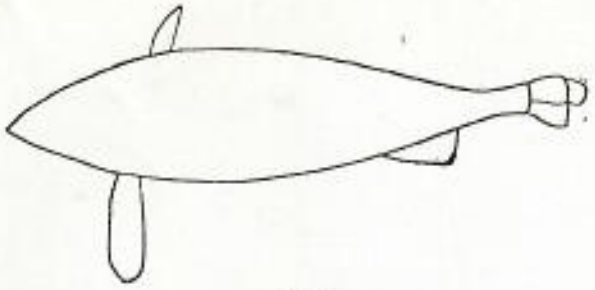
Il est à supposer que des décorations de ce genre n'étaient appliquées aux statues qu'à l'occasion de certaines fêtes. Les images ancestrales étaient probablement peintes comme se peignaient les participants aux cérémonies qui avaient pour théâtre l'esplanade située devant l'ahu.

Il ne me semble pas qu'il y ait, parmi les figures des tablettes, des tracés se rapportant soit aux tatouages soit aux peintures corporelles.

REPRÉSENTATIONS DES ANIMAUX

Une partie des animaux connus des Pascuans anciens ont leur effigie gravée sur les roches de l'île.

Le cachalot (fig. 96).
La tortue (fig. 13, 19, 171, 174, 178, 184, 185, 186).
L'oiseau-frégate. *Fregata minor* (fig. 193, 220, 402).
Anoüs Stolidus (?) (fig. 388).
Gygis alba (?) (fig. 103).
Sterna Fuscata (Frontispice).
Le requin (fig. 162).



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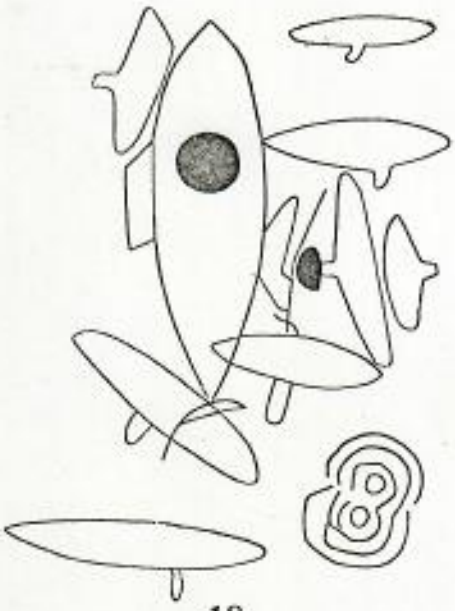

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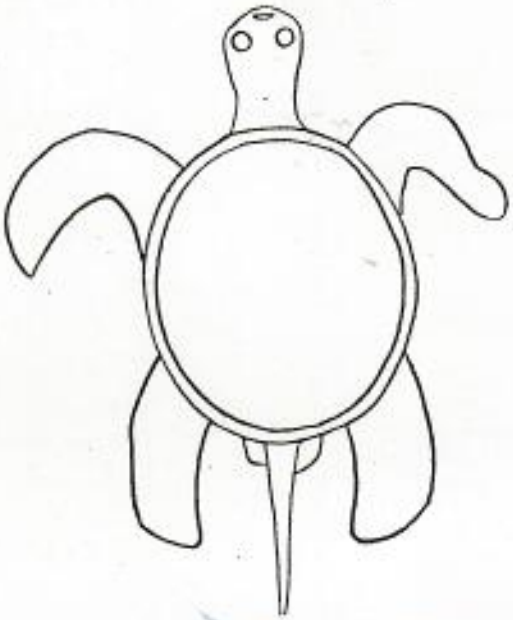

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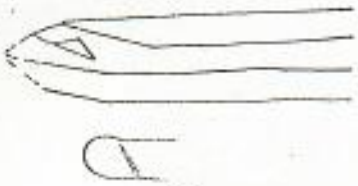

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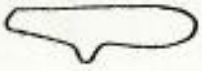

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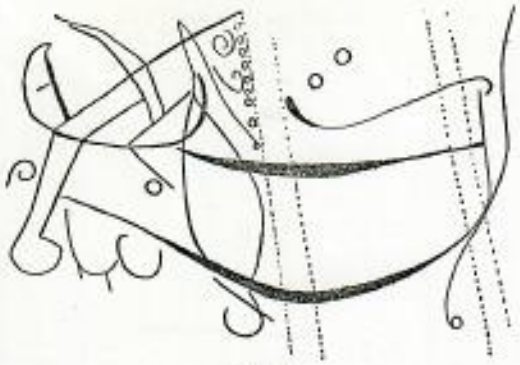

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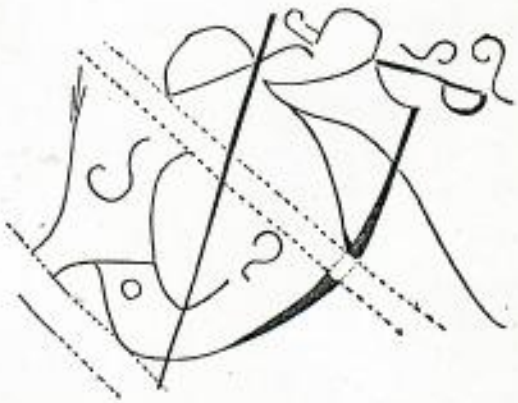

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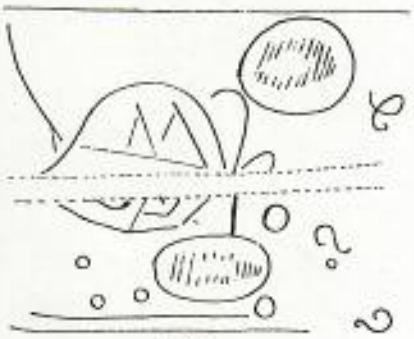

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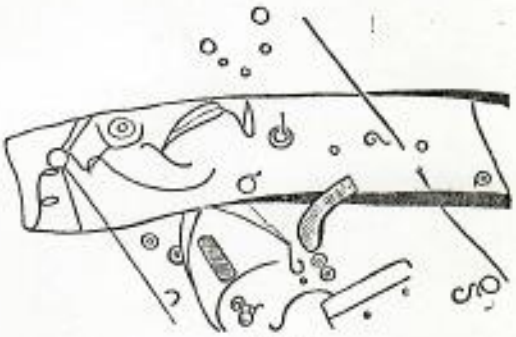

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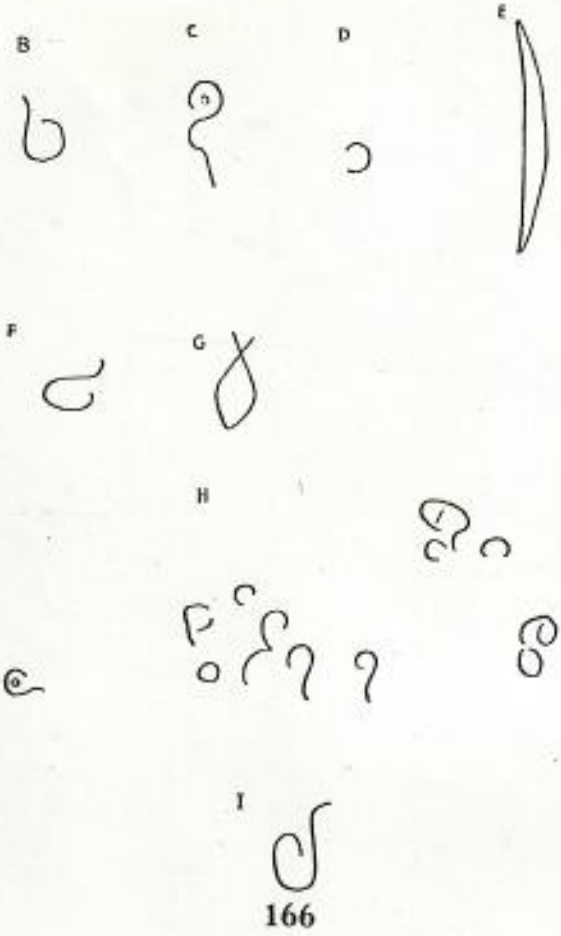

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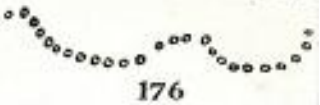

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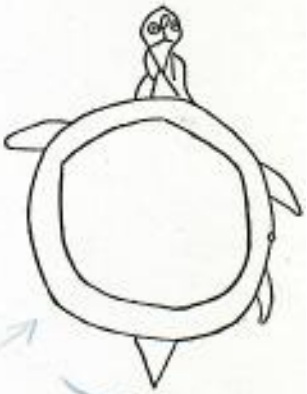

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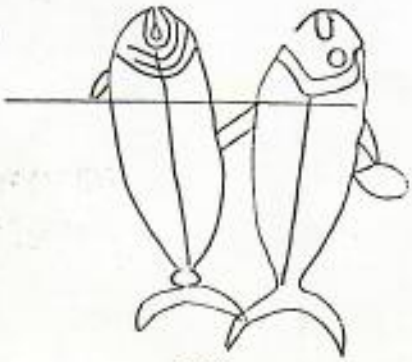

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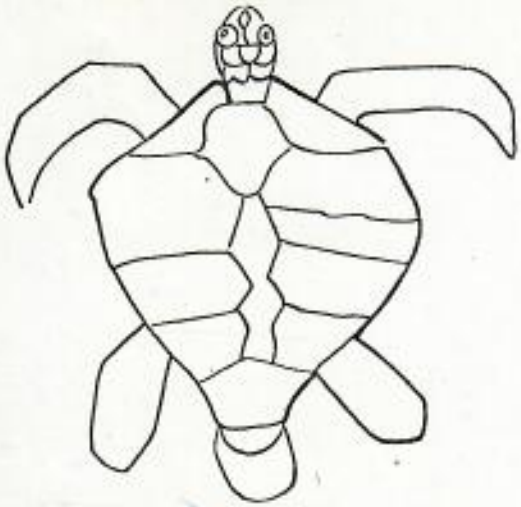

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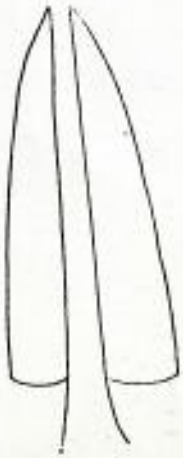

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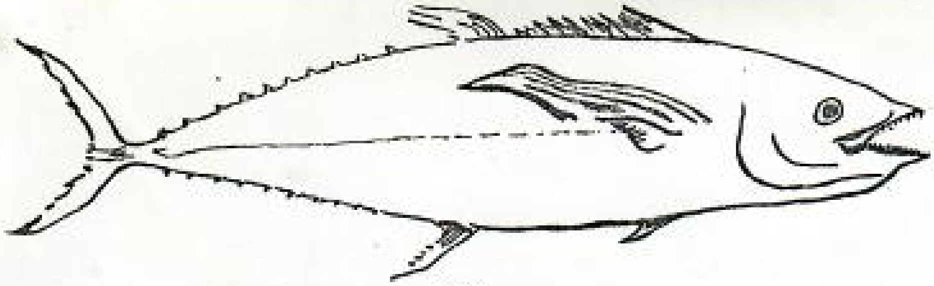

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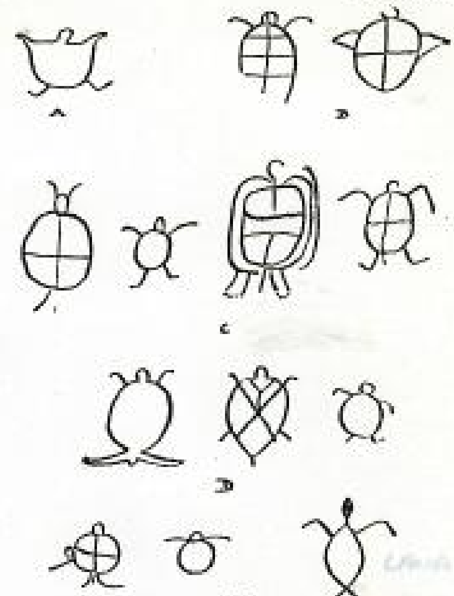

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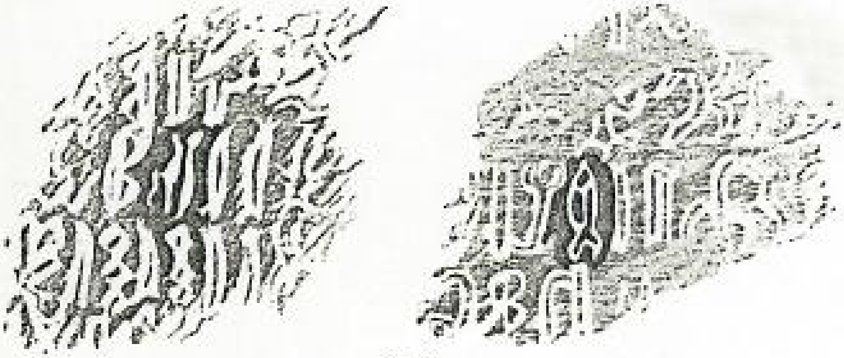

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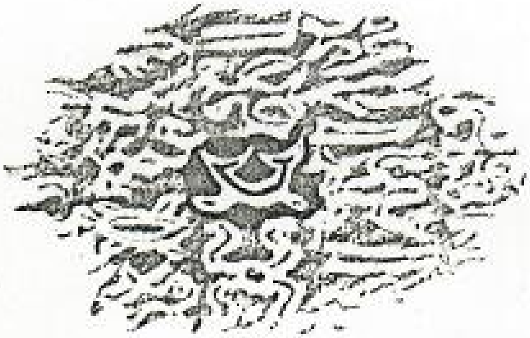

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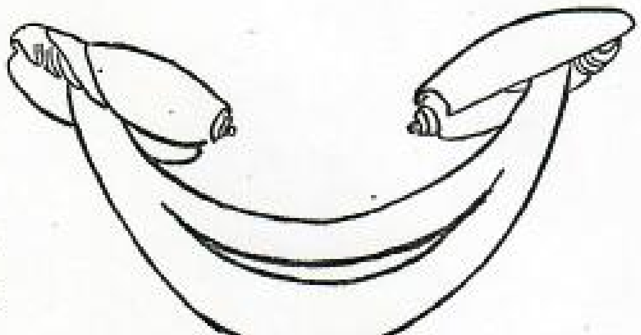

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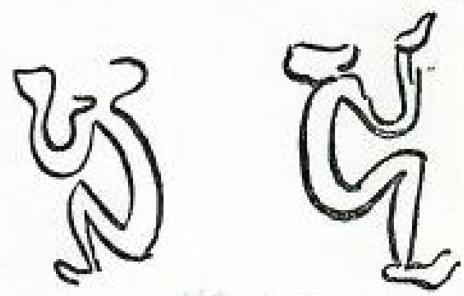

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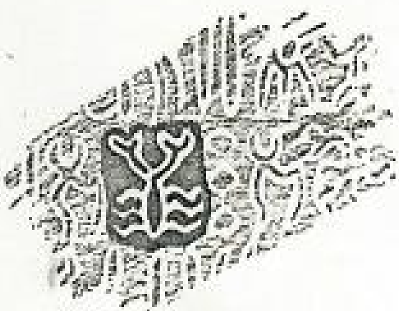

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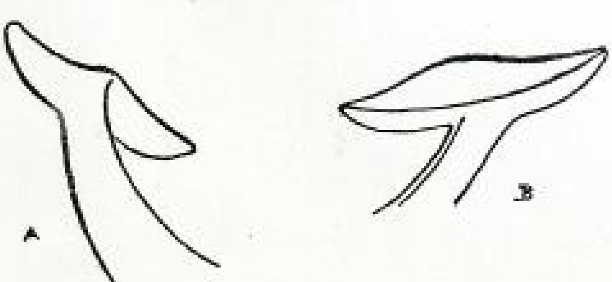

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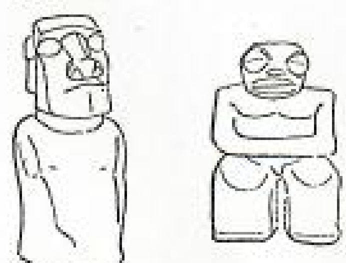

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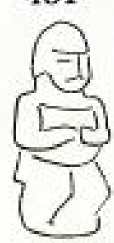

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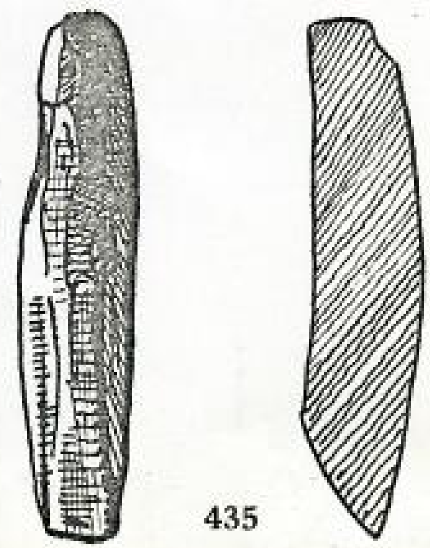

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Pl. 65

Pl. 66

Pl. 67

Pl. 68

Pl. 69

Pl. 70

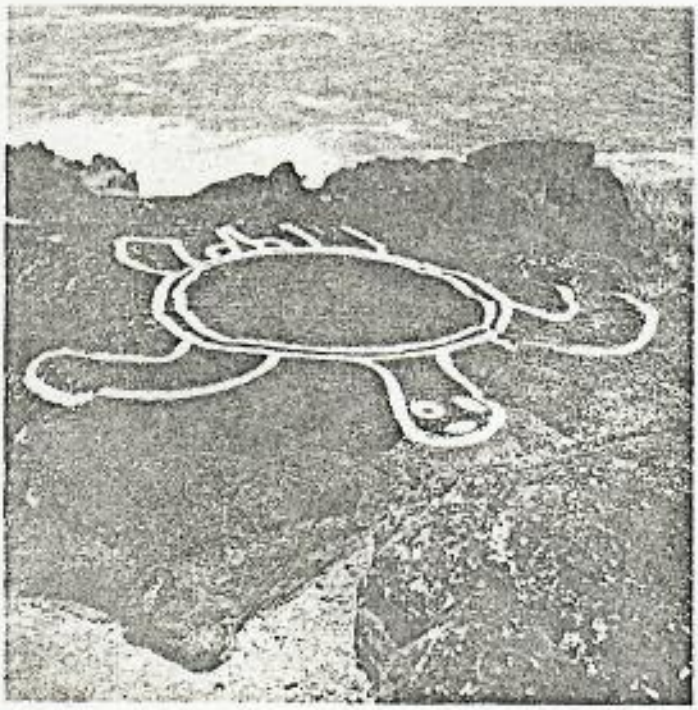
Pl. 71

Pl. 72

Pl. 73

Pl. 10

Pl. 11



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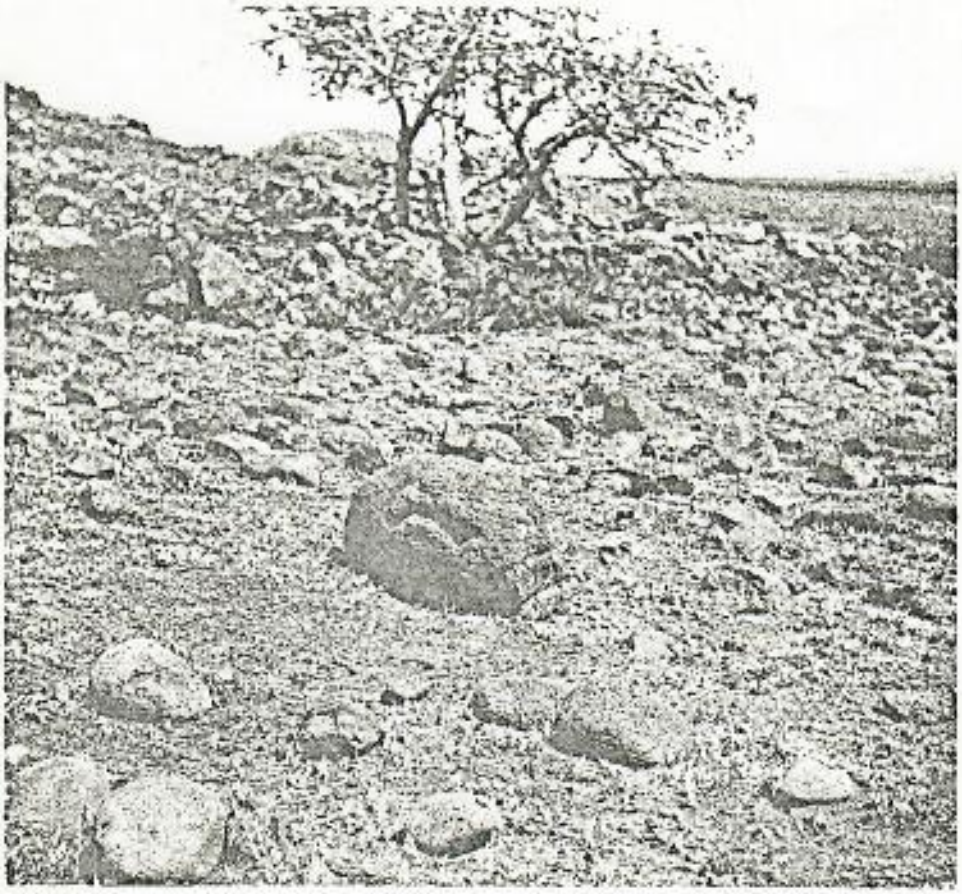

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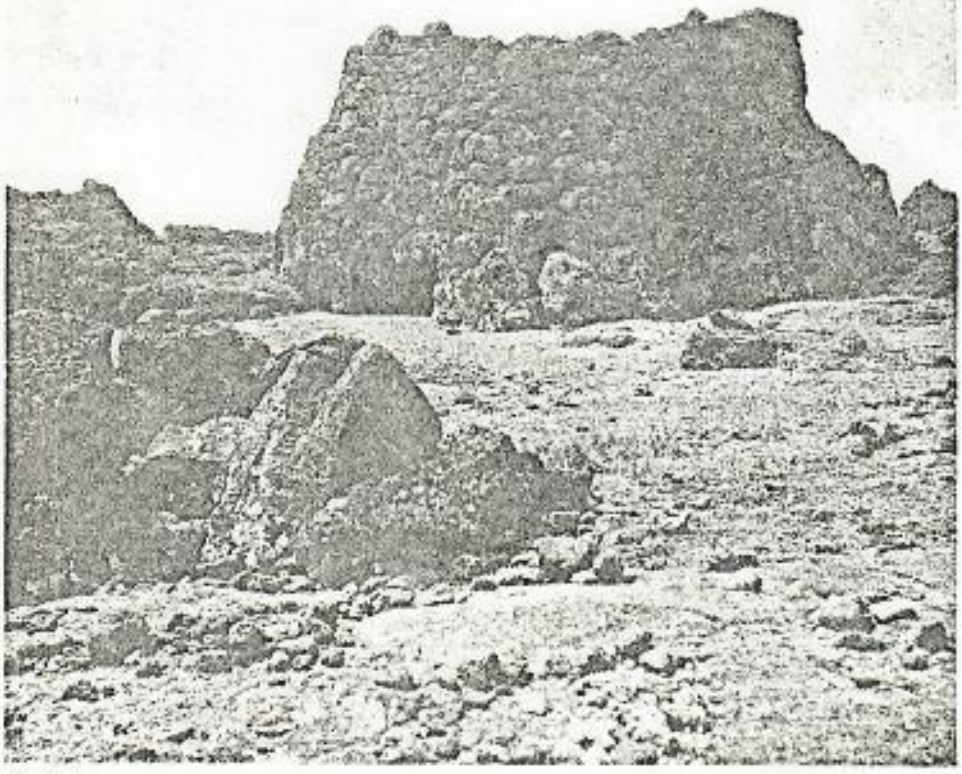

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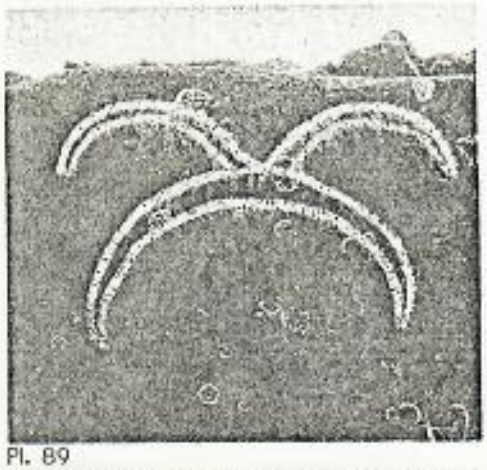

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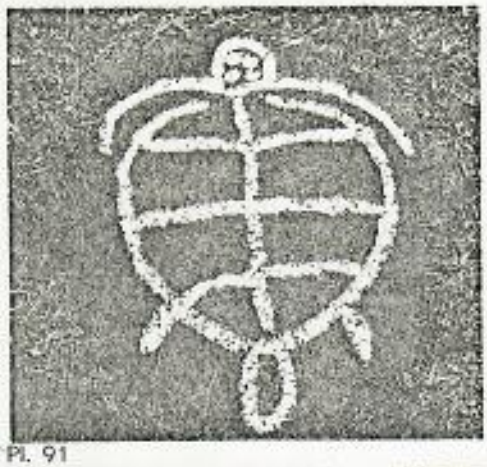

Pl. 91

Pl. 92

Pl. 93

Pl. 94

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Pl. 97

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Pl. 100

Pl. 101

Pl. 102

Pl. 103

Pl. 104

Pl. 105

Pl. 106

Pl. 107

Pl. 108

Pl. 109

Pl. 110

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Rapanui eyes are opened

"Eyes that look to the sky" has been one of the names by which Easter Island has been known to Europeans since the last century. Some have thought this referred to the extinct volcanic cones located at the corners of the triangular island, while others, more fanciful, have imagined that the phrase refers to the Islanders searching the skies for the return of their interplanetary ancestors.

Few considered that the term, *mata ki te rangi*, in the local language, might refer to the hollow sockets of the megalithic stone figures *(moai)* that are scattered over the landscape, many of them once proudly erected on huge stone altars *(ahu)*.

In all, there are about 800 of the figures around the island with, perhaps, another 200 yet to be located.

While Rapanui is one of the best known of the Polynesian islands, archaeology there is fairly recent, beginning with the Heyerdahl expedition in the mid-1950s. Due to the island's remoteness, travel to Rapanui in the past was expensive and time-consuming. For much of the last three decades what archaeology was done was dedicated to restoration, Professor William Mulloy of the University of Wyoming being the most prominent fieldworker on Rapanui until his death in 1978.

Two things have changed in recent years. Firstly, there are up to four flights per week (in summer) to the island between Chile and Tahiti, and, there is now a Rapanui archaeologist, trained in the United States, who can conduct his own research.

Sergio Rapu is that archaeologist and as well as being the curator of the Easter Island Museum, is (since February 1984) the governor of the province of Easter Island (see PIM May 1984).

Rapu's most notable fieldwork took place in 1979 when he led a team excavating Ahu Nau Nau, located at Anakena Beach, on the northeast coast of the island, some kilometres distant over rough roads from the main town.

Anakena is the island's largest white sand beach, but it is also the landing place of legend of the founding hero of the Rapanui, Hotu Matu'a. That same white sand had oozed over the ceremonial centre *(ahu)* and its toppled figures *(moai)*, hiding them not only from investigation but also from wind and water erosion. Moreover, unlike other such sites, much of the decorative stone was intact for study.

In the course of Rapu's investigations, he found that the *ahu* was more highly decorated than had been supposed. Subtle elevations gave the structure a slight lift at either end, making their association with up-turned canoes more pronounced than had generally been thought. Decorative stones around the main platform were in place for their size, as well as their color and shape. There seems to be evidence that the figures themselves may have been painted, and had inlaid ear plugs.

The large red scoria top knots, or "hats", at Anakena were of a more varied style as well.

The most startling finding though, was that the figures had

Sergio Rapu, Rapanui's emissary in Australia

Rapanui (Easter Island) is a long way from anywhere; souvenirs sold there proclaim it to be "the most remote island in the world".

But in early December of 1984, the first citizen of that tiny Chilean province, came to Australia.

Sergio Rapu is the first Islander to hold the position of governor of his island, and he was appointed to that post in early 1984; he is also the first non-military governor the place has had since the early part of this century.

Rapu is large in the Polynesian fashion, with a full smile and broad face, not at all like the angular moai figures for which Rapanui is best known. He is more than an appointed official, serving as well as host for visitors to his land, and able to converse with them in either Spanish or English.

The facility with English came about due to Rapu's association with Professor William Mulloy, the archaeologist who worked longest on the Island. It was Mulloy who sponsored Rapu to go to the University of Wyoming, where the Rapanui acquired not only a degree in Anthropology, but also Yankee-accented English, and his wife, Cindy.

Rapu is currently enrolled in the PhD program at the East-West Center, from which he received a master's degree a few years ago.

It is an irony of modern Chilean life that his American degrees are not recognised by the Chilean universities, a fact which cost him in salary during the time when he was curator of the local museum.

The possibility of a visit by Rapu to Australia was first mooted during the First International Congress on Easter Island and Eastern Polynesia, which was held on the island in September of 1984. (See PIM, October 1984.) At that time, there was a plan to send a Rapanui folklore team to the Festival of Pacific Arts, in Noumea. Given that he was to cross most of the Pacific to reach New Caledonia, a side visit to Australia seemed like a good idea.

Many other people thought so as well and when media, as well as scholarly, organisations heard about the visit, they were quick to fill up his brief eight-day stay.

Aside from making contacts with various museum and university people, he wished also to find out about sources of information on tropical agriculture for his island. In particular, he was seeking details on Australia's famous nut, the macadamia, and crop information on a kind of white maize which used to be used as pig feed by the English company, Williamson Balfour, in the first half of this century, when they ran the island as a large sheep ranch.

The first quest resulted in three macadamia plants carefully packed in a beer carton, for transport as hand luggage — an unusual souvenir. The Macadamia Nursery in Sydney kindly threw in a handful of raw nuts they happened to have on hand to boost the fledgling crop.

Pig feed remained a mystery, but various persons in Australia have undertaken

inlaid coral and rock eyes!

For some time, archaeologists had found pieces of concave coral slabs at ahu sites, but no one could figure out their purpose. Sonie had thought that they were fragments of decorations, possibly placed on the top knots or nearby around the altars. Their purpose was unknown.

Through a combination of luck and skill on a well-preserved site, Rapu found enough of the fragments to start him thinking. As he fitted the puzzle together, the general outline of an eye appeared.

The effect of placing this assemblage into the usually empty *moai* eye sockets was devastating.

Mata ki te rangi — they were the eyes that looked at the sky.

Though only enough fragments for a couple of the original eyes were found at Ahu Nau Nau, Rapu directed a temporary restoration of eyes for the other figures on the restored platform.

The Islanders, accustomed to their sightless ancestors, shivered with the thought that they may still be watching. Though trained in a rational, scientific tradition himself, even the archaeologist-governor finds their fully restored aspect disturbing, even threatening.

The hard work of carefully sifting through previous archaeological reports now goes on. Patricia Vargas and Claudio Cristino, of the University of Chile's research centre, are carrying on the methodical detailed work of survey at the moment and, already, they have discovered village sites, where none were thought to exist, and house types that were not well known in previous work. Other researchers, such as Britain's John Flenley, have evidence of exotic vegetation, while Australia's Johann Kamminga is working on the engineering problems of *moai* movement.

Slowly, the mysteries of Easter Island — the theme of so many books and articles — are being made understandable. In the case of the current work, what is found only enhances the wonder the casual visitor and resident Islander feel for Rapanui's complex past.

The Island is a monument to human achievement; an open-air museum showing how people on a sparse and remote island, with relatively small population, can survive and, even, flourish. — *Grant McCall.*

to find out about the matter.

Radio interviews ranged from a spot on the ABC's "Morning Extra" with Jane Singleton, to a more scientific discussion of recent archaeological discoveries with Halina Szepzik, of the ABC Science Unit. The Sydney educational FM station, 2SER, grabbed a general interview on the hop, just before Rapu was to address the anthropology staff of the Australian Museum.

University contacts included lunch with the University of New South Wale's Pro Vice-Chancellor, Professor Jarlath Ronayne, and a seminar in the department of anthropology of Sydney University.

Professor Jack Golson, of the department of prehistory at the Australian National University, invited Rapu to give a paper in Canberra, where other Pacific specialists interviewed him on his work.

A highlight was his attendance at the annual PIM Christmas lunch, where Rapu had the chance to meet not only the usual cast of editors, publishers (both past and present), but also people from the islands and a couple of Australian foreign affairs people. Bill Coppell, tape recorder at the ready (for his own program on 2SER) managed to grab a few minutes of interview time in between mouthfuls.

Governor Rapu of Rapanui (left) at PIM's Christmas luncheon in Sydney, December 6, 1984. PIM Publisher Garry Barker is at right.

There are a couple of loves of any Islander, especially a Rapanui, which will remain with Rapu for some time. The Sydney Fish Markets looked like the promised land, and he went from stall to stall, recalling the familiar and inspecting the novel, before purchasing a feastly quantity of delicacies. The other culinary attraction was the noisy and competitive Birkenhead Point meat markets, during the end of Saturday auctions of steaks and chops, sausages and pork.

Other diversions included a concert by "The First Australians" at the Opera House, and meals at Sydney's varied restaurants in Chinatown and Oxford Street.

The last day was spent quietly sipping soothing herbal tea and carefully packing for the journey home.

Rapanui relatives of Rapu's had a vague address of one of their number in Newtown and just before the Sunday departure, there was a hurried exploration of Church Street, but the only Polynesians there were Tongans going to prayer. Jose Teao was nowhere to be found.

By now, settled into summer with his young family, Australia must seem a long way away for Sergio; the hussle of downtown Sydney, and the planned calm of Canberra must form an odd memory.

Aside from promises of future collaboration from people in Australia, it looks as though at least two archaeologically-oriented trips are planned for this year. Professor Richard Wright, of Sydney University, is contemplating an Earthwatch visit, while the Australian Museum Society (TAMS) is investigating a trip to help with excavations and local museum organisation.

Rapanui's emissary to Australia did not succeed in making it to the cancelled New Caledonian festival, but he did touch the hearts and inspire the interest of the people he met in Australia. — Grant McCall.

THE MYSTERY OF EASTER ISLAND

THE STORY OF AN EXPEDITION

BY

MRS. SCORESBY ROUTLEDGE
HONOURS MOD. HIST. OXFORD; M.A. DUBLIN
JOINT AUTHOR OF
"WITH A PREHISTORIC PEOPLE: THE AKIKUYU OF BRITISH EAST AFRICA."

PRINTED FOR THE AUTHOR BY HAZELL, WATSON AND VINEY, LD.,
LONDON AND AYLESBURY
AND SOLD BY
SIFTON, PRAED & CO. LTD., 67 ST. JAMES'S ST.
LONDON, S.W.1

OUTLINES OF COAST AND POSITION OF PRINCIPAL MOUNTAINS, MAINLY FROM U.S.A. HYDROGRAPHIC OFFICE CHART NO. 1119.

POSITIONS OF CERTAIN LESSER MOUNTAINS, FROM EYE-SKETCHES BY THE AUTHOR.

HEIGHTS OF RANO AROI AND RANO KAO, FROM ADMIRALTY CHART NO. 1386.

HEIGHT OF RANO RARAKU, AS DETERMINED BY LIEUT. D. R. RITCHIE, R.N.

coma, and to the mental condition of the primitive jelly-fish; a vessel is always alive, always intelligent. The larger the craft, the more the vital functions are withdrawn from the common gaze; in a small yacht they are ever visible as an inseparable part of the whole. In wakeful nights and from hot cabins, it is only necessary to stumble up the companion to find the cool freshness of deck and waking companionship. Silhouetted against the sky, is the dark figure of the man at the wheel, somewhere in the gloom is the officer in charge, and for'ard, though invisible, is the watch on the look-out. The latest news of wind and progress are to be had for the asking; it is full of mystery and yet reassuringly practical.

The night *Mana* crossed the Equator is unforgettable; the yacht, borne along by the newly caught trade wind, raced through the water with the very poetry of motion. The full moon made a silver pathway over the sea and lit up not only the foam from the vessel's bows, but also her white sails, which were faintly reflected in the dark sea; the masts and rigging stood out black against the deep blue sky, while over all was the Southern Cross. What has been said of sunset from shipboard is still more true of moonlight and starlight nights. Then ocean and sky become a whole of marvellous beauty, and of majesty beyond human ken; always suggesting questions, always refusing the answer.

PART II

EASTER ISLAND

FIG. 61.

DIGGING OUT A STATUE.
For same image after excavation see fig. 69.

striking sight witnessed on the island was a fire on the hill-side; in order to see our work more clearly we set alight the long dry grass, always a virtuous act on Easter Island that the live-stock may have the benefit of fresh shoots; in a moment the whole was a blaze, the mountain, wreathed in masses of driving smoke, grew to portentous size, the quarries loomed down from above as dark giant masses, and in the whirl of flame below the great statues stood out calmly, with a quiet smile, like stoical souls in Hades.

The questions which arise are obvious: do these buried statues differ in any way from those in the workings above, from those on the ahu or from one another? were they put up on any foundation? and, above all, what is the history of the mountain and the *raison d'être* of the figures? In the hope of throwing some light on these problems we started to dig them out. It had originally been thought that the excavation of one or two would give all the information which it was possible to obtain, but each case was found to have unique and instructive features, and we finally unearthed in this way, wholly or in part, some twenty or thirty statues. It was usually easy to trace the stages by which the figures had been gradually covered. On the top was a layer of surface soil, from 3 to 8 inches in depth; then came debris, which had descended from the quarry above in the form of rubble, it contained large numbers of chisels, some forty of which have been found in digging out one statue; below this was the substance in which a hole had been dug to erect the image, it sometimes consisted of clay and occasionally in part of rock. Not unfrequently the successive descents of earth could be traced by the thin lines of charcoal which marked the old surfaces, obviously the result of grass or brushwood fires. The few statues which are in a horizontal position are always on the surface (no. 31, fig. 60), and at first give the impression that they have been abandoned in the course of being brought down from the quarries; as they are frequently found close to standing images, of which only the head is visible, it follows that, if this is the correct solution, the work must still have been proceeding when the earlier statues were already largely submerged. The juxtaposition, however, occurs so often that it seems, on the whole, more probable that the rush of earth which covered some, upset the foundations of others, and either threw them

down where they stood or carried them with it on top of the flood. These various landslips allow of no approximate deductions as to the date, in the manner which is possible with successively deposited layers of earth.

To get absolutely below the base of an image was not altogether easy. The first we attempted to dig out was one of the farther ones within the crater (no. 19, fig. 47); it was found that, while the back of the hole into which it had been dropped was excavated in the soft volcanic ash, the front and remaining sides were of hard rock. This rock was cut to the curvature of the figure at a distance of some 3 inches from it, and as the chisel marks were horizontal, from right to left, the workmen must have stood in the cup while preparing it: in clearing out the alluvium between the wall of the cup and the figure, six stone implements were found. The hands, which were about 1 foot below the level of the rim, were perfectly formed. The next statue chosen for excavation was also inside the crater (no. 107, fig. 47); it was most easily attacked from the side, and this time it was possible to get low enough to see that it stood on no foundation, and that the base instead of expanding, as with those which stood on the ahu, contracted in such a manner as to give a peg-shaped appearance; this confirmed the impression made by the previous excavation, that the image was intended to remain in its hole and was not, as some have stated, merely awaiting removal to an ahu (fig. 62).

The story was shown not only in the sections of the excavation, but in the degrees of weathering on the figure itself: the lowest part of the image to above the elbow exhibited, by the sharpness of its outlines and frequently of the chisel cuts also, that it had never been exposed, the other portions being worn in relative degrees. Traces of the smoothness of the original surface can still be seen above-ground in the more protected portions of some of the statues, such as in the orbit and under the chin (see frontispiece); but a much clearer impression is of course gained of the finish and detail of the image when the unweathered surface is exposed. The polish is often very beautiful, and pieces of pumice, called "punga," are found, with which the figures are said to have been rubbed down. The fingers taper, and the excessive length of the thumb-joint and nail are remarkable (fig. 72). The nipples are in some cases so pronounced that the natives

FIG. 63.

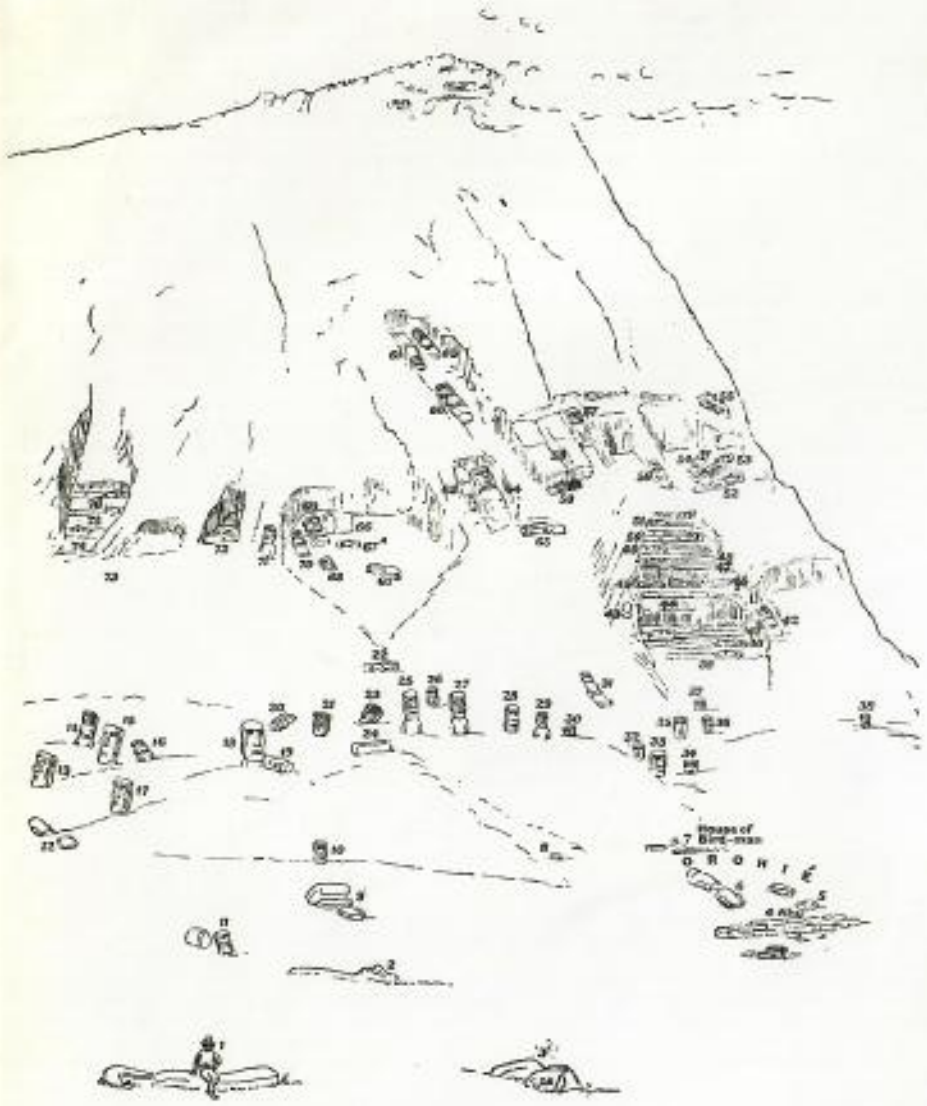
Showing scamped work in lower part of figure, no right hand carved, and surface only coarsely chiselled. [No. 36. Fig. 47.]

EXCAVATED IMAGES.

FIG. 62.

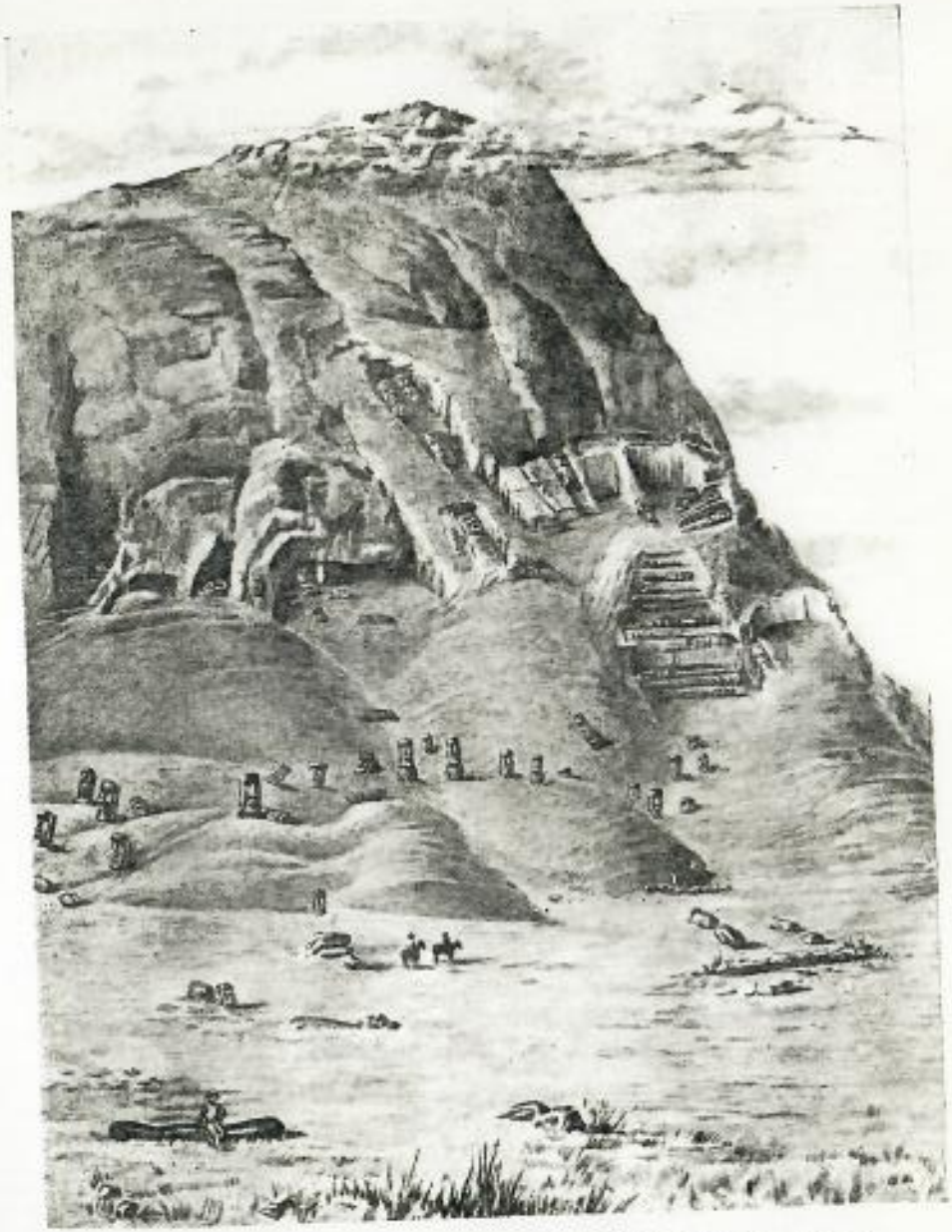
Showing effect of weathering and peg-shaped base. [No. 107. Fig. 47.]

FIG. 60A.



KEY TO DIAGRAMMATIC SKETCH.

FIG. 60.



EXTERIOR OF RANO RARAKU. EASTERN PORTION OF SOUTHERN ASPECT.

Diagrammatic sketch showing position of statues.

PROSTRATE STATUES, SOUTH-EAST SIDE, RANO RARAKU, AFTER EXCAVATION.

FIG. 73.

must have been comparatively recent, as an iron nail was found in it. Finally, a descent of earth had covered all but the noses, leaving them in the condition in which we found them.

This, though a satisfactory explanation as far as it went, did not account for the fact that the figures were facing the mountain, and here for once tradition came to our help. These images had, it was said, marked a boundary; the line of demarcation led between them, from the fissure in the cliff above right down to the middle statue in the great Tongariki terrace. To cross it was death; but as to what the boundary connoted no information was forthcoming; there seemed no great tribal division—the same clans ranged over the whole of the district. When, however, the line is followed through the crevice into the crater (fig. 47), it is found to form on both sides the boundary where the image-making ceased (no. 1 is a detached figure being brought down, not in a quarry), and was probably the line of taboo which preserved the rights of the image-makers. I was later given the cheering information that a certain "devil" frequented the site of my house, which was just on the image side of the boundary, who particularly resented the presence of strangers, and was given to strangling them in the night. The spirits, who inhabit the crater, are still so unpleasant, that my Kanaka maid objected to taking clothes there to wash, even in daylight, till assured that our party would be working within call.

Isolated Statues.—The finished statues, as distinct from those in the quarries, have so far been spoken of under two heads, those which once adorned the ahu and those still standing on the slope of Raraku; there is, however, another class to consider, which, for want of a better name, will be termed the Isolated Statues. It has already been stated that, as Raraku is approached, a number of figures lie by the side of the modern track, others are round the base of the mountain, and yet other isolated specimens are scattered about the island. All these images are prostrate and lie on the surface of the ground, some on their backs and some on their faces. These were the ones which, according to legend, were being moved from the quarries to the ahu by the old lady when she stopped the work in her wrath; or, according to another account, quoted by a visitor before our day, "They walked, and some fell by the way."

CHAPTER XV

NATIVE CULTURE IN PRE-CHRISTIAN TIMES

Sources of Information: History, Recent Remains, Living Memory—*Mode of Life:* Habitations, Food, Dress and Ornament—*Social Life:* Divisions, Wars, Marriages, Burial Customs, Social Functions.

It has been seen that any knowledge which exists on the island with regard to the origin of the monuments is of the most vague description, and it is therefore necessary, in the attempt to solve the problem, to rely principally on indirect evidence. It becomes in particular essential to collect all possible information about the present people; not only for its intrinsic anthropological interest, but in order to find if any links connect them with the great builders, or if we must look for an earlier race.

As a first step in the search the scientist naturally turns to the most ancient accounts which he can find describing the island, its inhabitants, and remains; these are not yet two hundred years old. The first European to see it was a Dutch Admiral named Roggeveen, who came upon it on Easter Day, 1722, during his search for another and mysterious island known as Davis or David's Island.[1] He concluded that it was not the place for which he was looking, christened it Easter Island, and went further afield. His ship lay off the north side of the island for a week, but only on one day did landing take place, and one or two of the party have left us short descriptions. There were, they say, no big trees, but it had a rich soil and good climate; there were sugar-cane, bananas, potatoes and figs, and the natives brought them a number of fowls, estimated varyingly

[1] An island was reported in lat. 27° by an English buccaneer named Davis in 1687. It was, he said, five hundred miles from the coast of Chile, low and sandy, and some twelve leagues to the west of it was seen "a long tract of pretty high land." The description in no way applies to Easter, with which it has sometimes been identified. The probability seems to be that Davis was out of his reckoning, as was by no means unusual in the case of the early mariners, and it has been suggested that the island he saw was Crescent Island, the high ground in the distance being the Gambier group. The latitude of Easter Island is 27° 8′ S., that of Crescent Island is 23° 20′ S.

from sixty to five hundred. One of the voyagers goes so far as to say that "all the country was under cultivation." As for the inhabitants, they were, they tell us, of all shades of colour, yellow, white, and brown, and wore clothes made of a "field product," evidently tapa. They were "painted," which apparently signifies tattooed, and it was the habit to distend the lobes of their ears so that they hung to the shoulders, and large discs were worn in them. "When these Indians," wrote Roggeveen, "go about any job which might set their ear-plugs wagging, and bid fair to do them any hurt, they take them out and hitch the rim of the lobe up over the top of the ear, which gives them a quaint and laughable appearance."[1]

The natives were extraordinarily thievish, stealing the caps from the seamen's heads, while one actually climbed into the port-hole of the cabin and took the cloth off the table. These habits gave rise to an unfortunate incident, as when the visitors came on shore, a scuffle took place over the sanctity of property, and the natives began throwing stones, on which a petty official gave the order to fire, ten or twelve natives being killed. The occurrence, however, was duly explained, and did not terminate amicable relations. We learn that at this time the great statues, of which this is of course the first report, were then, as has already been noted, standing and in place. The Dutchmen describe them as "remarkable, tall, stone figures, a good 30 feet in height," and notice that they have crowns on their heads; a clear space was, they said, reserved round them by laying stones. They have no doubt that the figures are objects of worship; the natives "kindle fires in front of them, and thereafter squatting on their heels with heads bowed down, they bring the palms of their hands together and alternately raise and lower them." Another observer adds, in connection with this worship, that they "prostrated themselves towards the rising sun." A great step would have been gained towards the solution of the problem if we could feel assured that these last remarks were justified and were not merely the result of imperfect observation.[2]

[1] Precisely the same habit obtains to-day among the Akikuyu in East Africa.

[2] For Roggeveen's description of the Island see *Voyage of Gonzalez*, Hakluyt Society, Series II., vol. xiii., pp. 3 to 26.

A statement of the evidence re Davis Island is given in the introduction to the same volume.

potatoes, bananas, sugar-cane, and taro. Animal diet formed a very small part of it, rats being the only form of mammal; but chickens played an important rôle in native life, and the remains of the dwellings made for them are much more imposing than those for human beings. They are solid cairns, in the centre of which was a chamber, running the greater part of their length; it was entered from outside by two or more narrow tunnels, down which the chickens could pass. They were placed here at night for the sake of safety, as it was impossible to remove the stones in the dark without making a noise (fig. 86). Fish are not very plentiful, as there is no barrier reef, but they also were an article of diet, and were bartered by those on the coast for the vegetable products obtained by those further inland. Fish hooks made of stone were formerly used, and a legend tells of a man who had marvellous success because he used one made of human bone. The heroes of the tales are also spoken of as fishing with nets. There are in various places on the coast round towers, built of stone, which are said to have been look-out towers whence watchers on land communicated the whereabouts of the fish to those at sea; these contained a small chamber below which was used as a sleeping apartment (fig. 87). Turtles appear on the carvings on the rock, and are alluded to in legend, and turtle-shell ornaments were worn; but the water is too cold for them ever to have been common, and Anakena is almost the only sandy bay where they could have come on shore.

The sole form of dress was the cloth made from the paper mulberry, and known throughout the South Seas as tapa; it was used for loin-cloths and wraps, which the Spaniards describe as fastening over one shoulder. Head-gear was a very important point, as witnessed by the way the islanders always stole the caps of the various European sailors. The natives had various forms of crowns made of feathers, some of them reserved for special occasions. Cherished feathers, particularly those of white cocks, were brought out of gourds, where they had been carefully kept, to manufacture specimens for the Expedition. The crowns are generally made to form a shade over the eyes, like the head-dresses of the images. Naturally, every effort was made to find the prototype of the image hats. No one recollected ever seeing anything precisely like it, but among the pictures drawn for us of various head-decorations was a cylindrical hat

FIG. 86.

HOUSE FOR CHICKENS.

FIG. 87.

A TOWER USED BY FISHERMEN.

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CHAPTER XVI

NATIVE CULTURE IN PRE-CHRISTIAN TIMES *(continued)*

Religion—Position of the Miru Clan—The Script—The Bird Cult—Wooden Carvings.

RELIGION

THE religion of the Islanders, employing the word in our sense, seems always to have been somewhat hazy,[1] and the difficulty in grasping it now is increased by the fact that since becoming Roman Catholics they dislike giving the name of "atua," or god, to their old deities; it only drops out occasionally. They term them "aku-aku," which means spirits, or more frequently "tatane," a word of which the derivation is obvious. The confusion of ideas was crystallised by a native, who gravely remarked that they were uncertain whether one of these beings was God or the Devil, so they "wrote to Tahiti, and Tahiti wrote to Rome, and Rome said he was not the Devil, he was God"; a modern view being apparently taken at headquarters of the evolution of religious ideas. Both these words, tatane and aku-aku, will be employed for supernatural beings, without prejudice to their original character, or claims to divinity; some of them were certainly the spirits of the dead, but had probably become deified; the ancestors of Hotu-matua were reported to have come with him to the island. They existed in large numbers, being both male and female, and were connected with different parts of the island; a list of about ninety was given, with their places of residence. No worship was paid, and the only notice taken of these supernatural persons was to mention before meals the names of those to whom a man owed special duty, and

[1] Our impressions on this head are confirmed by a remark of Brother Eyraud. "Though I have lived in the greatest of intimacy and familiarity with them, I have never been able to discover them in any act of actual religious worship."—*Annals of the Propagation of the Faith*, Jan. 1866.

invite them to partake; it was etiquette to mention with your own the patron of any guest who was present. There was no sacrifice; the invitation to the supernatural power was purely formal, or restricted to the essence of the food only. Nevertheless, the aku-aku, in this at least being human, were amiable or the reverse according to whether or not they were well fed. If they were hungry, they ate women and children, and one was reported as having a proclivity for stealing potatoes; if, on the contrary, they were well-disposed to a man, they would do work for him, and he would wake in the morning to find his potato-field dug, which, as our informant truly remarked, was "no like Kanaka."

The aku-aku appeared in human form, in which they were indistinguishable from ordinary persons. One known as Uka-o-hoheru looked like a very beautiful woman, and was the wife of a young Tupahotu who had no idea she was really a tatane. She lived with him at Mahatua on the north coast, and bore him a child. One very wet day she was obliged to leave the house to take fresh fire to the cooking-place where it had gone out. When she returned, her husband was angry that she had no red paint on her face, and, not heeding her explanation that the rain had washed it off, took a stick to beat her. She ran away, and he followed, till at last she sat down on the edge of the eastern headland, where there is now an ahu known by her name. When by and by he came up, she told him to go back and look after the child, and fled away like a rushing whirlwind over the sea and was no more seen.

Two other female tatane are reported to have lived together in a cave on the cliff-side of Paréhé,[1] whose names were Kava-ara and Kava-tua. They heard all men tell of the beauty of a certain Uré-a-hohové, a young man who lived near Hanga Roa; so they went down to see him, put him to sleep, and carried him on his mat up to their cave, where they left him. Before going away they told an old woman, also an aku-aku, that she was not to go and look into the cave. This she naturally proceeded to do, and, finding Uré, warned him to eat nothing the two tatane might give to him, supplying him herself with some

[1] The outermost of the three hillocks on the eastern volcano on which the Spaniards set up the crosses in 1770. Half of it has been worn away by coastal erosion (fig. 78).

chicken. When therefore his captors came back and offered him food, he only pretended to take it, and ate the chicken instead. They then went away again. The old woman came back, and said, "If cockroaches come, kill them; if flies come, kill them; but if a crab comes, do not kill it." Uré did as he was told, and killed the cockroaches and flies, which were other tatane; but the crab he did not kill, it was the old woman. Meanwhile for many days the father of Uré wept for him, till some men sailing under the cliff while fishing, heard a song, and looking up saw the missing man; but they would not go and fetch him, though the father gave them much food, for the cliff was steep and the cave difficult to reach. At last a woman volunteered for the task, and was lowered over the cliff in a net, and by this means succeeded in fetching Uré safely to the top. The history ends with his return to his home, and does not mention if, in correct fashion, he married his fair deliverer.

Aku-aku were not immortal. A man called Raraku, after whom the mountain is said to have been named, caught a big "heke," which seems to have been an octopus, in the sea near Tongariki and ate it, with the result that he went mad, and all people gave chase to him. He caught up a wooden lizard (fig. 117), and, using it as a club, ran amok among tatane across the north shore and down the west coast, killing them right and left; the names of twenty-three were given who thus met their fate.

Human beings, on the other hand, were liable to be attacked by tatane, more particularly at night, when there was risk, not only to their bodies, but also to their own spirits,[1] which were at large while they slept. It is still firmly believed that in dreams the soul visits any locality present to the thought. On one of the ahu is a rough erection of slabs, said to be the house of the aku-aku Mata-wara-wara, or "Strong-Rain." He had as a partner another aku-aku called Papai-a-taki-vera, and they arranged between them that Mata should bring on rain, while Papai constructed a house of reeds which was only there at night; then when the spirits of sleeping people, which were wandering abroad, became cold with the rain, they went into the house and the tatane killed them. The unfortunate sleeper waked in the morning feeling distinctly unwell, he lingered on for two or three

[1] The same word aku-aku was used for the spirit both of the living and the dead, or else the Tahitian "varua"; they were said to be equivalent.

days, and then died. It was not essential to life to have a soul, but you could not really get on comfortably without it. No knowledge survives of any belief or ideas with regard to a future state. The spirit, it was said, appeared occasionally for five or ten years after a man's death and then vanished.

Pan in the shape of tatane is by no means dead. Not only do such beings haunt the crater of Rano Raraku, but tales are told of weird apparitions at dusk which vanish mysteriously into space.

There were no priests, but certain men, known as "koromaké," practised spells which would secure the death of an enemy, and there was also the class known as "ivi-atua," which included both men and women. The most important of these ivi-atua, of whom it was said there might be perhaps ten in the island, held commune with the aku-aku, others were able to prophesy, and could foresee the whereabouts of fish or turtle, while some had the gift of seeing hidden things, and would demand contributions from a secreted store of bananas or potatoes, in a way which was very disconcerting to the owner.

There was practically only one religious function of a general nature; it was very popular and had a surprising origin. Attention was attracted on the south coast by a particularly long stoep of rounded pebbles measuring 139 feet, and obviously connected with a thatched house now disappeared. That, our guides said in answer to a question, "is a haré-a-té-atua, where they praised the gods." "What gods?" "The men who came from far away in ships. They saw they had pink cheeks, and they said they were gods." The early voyagers, for the cult went back at least three generations, were therefore taken for deities in the same way as Cook was at Hawaii. The simplest form of this celebration took place on long mounds of earth known as "miro-o-orne," or earth-ships, of which there are several in the island, one of them with a small mound near it to represent a boat. Here the natives used to gather together and act the part of a European crew, one taking the lead and giving orders to the others. A more formal ceremony was held in a large house. This had three doors on each side by which the singers entered, who were up to a hundred in number, and ranged themselves in lines within; in one house, of which a diagram was drawn, a deep hole was dug in the middle, and the

bottom of which was a gourd covered with a stone to act as a drum. On the top of this a man danced, being hidden out of sight in the hole.

In other cases, two, or perhaps three, boats were constructed inside the house, the masts of which went through the roof; these boats were manned with crews clad in the garments of European sailors, the gifts from passing vessels being kept as stage properties. Fresh music was composed for every occasion, and in one song, which was quoted, much reference is made to the "red face of the captain from over the seas." The position of chief performer was one of great honour, being analogous, on a glorified scale, to the leader of a cotillon of our own day. It was stated by an old man that his great-grandfather had so acted, and even the words sung were still remembered. Te Haha, a Miru (fig. 83), gave us to understand that he had been a great social success in his youth, and counted up three koro, and seven haré-até-atua at which he had been present. As he was a handsome old man, and was connected with the court of the chief Ngaara, his pride of recollection was very probably justified. Juan, mixing up, no doubt, recollections of a later date, gave a vivid representation on one of these spots of the pseudo-captain striding about and using very strong language, while he called upon the engineer to "make more smoke so that the ship should go fast."

The Miru Clan

On the border-line, between religion and magic, wherever, if anywhere, that line exists, was the position of the clan known as the Miru. Members of this group had, in the opinion of the islanders, the supernatural and valuable gift of being able to increase all food supplies, especially that of chickens, and this power was particularly in evidence after death. It has been known that certain skulls from Easter are marked with designs, such as the outline of a fish; these are crania of the Miru, and called "puoko-moa," or fowl-heads, because they had, in particular, the quality of making hens lay eggs (fig. 96). Hotu, the Miru, whose mother, it may be remembered, was the victim of a cannibal feast, made his own skull an heirloom, as "it was so extremely good for chickens," that he did not wish it to go out of the family. His son gave it

FIG. 96.

[Butterworth

A MIRU SKULL WITH INCISED DESIGN.

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FIG. 97.

ANAKENA COVE.
Hill on left has terraced summit.

to a relative, who was the father of an old man from whom we managed to obtain it. When the time came to hand it over to us, the late owner began to cling to it affectionately, and say that he "wept much at the thought of its going to England"; as, however, the bargain had already been completed, we remained obdurate, and at the time of writing Hotu resides with Ko Tori at the Royal College of Surgeons.

The Miru were unique in other ways; they were the only group which had a headman or chief, who was known as the "ariki," or sometimes as the "ariki-mau," the great chief, to distinguish him from the "ariki-paka," a term which seems to have been given to all other members of the clan.[1] The office of ariki-mau was hereditary, and he was the only man who was obliged to marry into his own clan. It was customary when he was old and feeble that he should resign in favour of his son. There are various lists of the succession of chiefs, counted from the first immigrant, Hotu-matua. The oldest lists are those given by Bishop Jaussen[2] and by Admiral Lapelin,[3] which contain some thirty names. Thomson gives one with fifty-seven. In our day there was admittedly much uncertainty about the sequence, but the number was said to be thirty,[4] and two independent lists were obtained. All these categories differ, though they contain many of the same names, particularly at the beginning and end.

The last man to fill the post of ariki with its original dignity was Ngaara; he died shortly before the Peruvian raid, and becomes a very real personage to anyone inquiring into the history of the island. He was short, and very stout, with white skin, as had all his family, but so heavily tattooed as to look black. He wore feather hats of various descriptions, and was hung round both back and front with little wooden ornaments, which jingled as he walked. When our authorities can remember him his wife was dead and he lived with his son Kaimokoi. It was not permitted to see them eat, and no one but the servants was allowed to enter the house. His headquarters were at Anakena, the cove on the island where, according to tradition,

[1] Evidence on this head was rather contradictory, but no Miru could be found, male or female, to whom the title was not given.

[2] "L'Ile de Paques," M. Tépano Jaussen, *Bulletin Géographique*, 1893, p. 241.

[3] *Revue Maritime et Coloniale*, vol. xxxv, p. 109.

[4] Thirty is, however, a very favourite number: cf. the folk-tales.

evolved the tablets there are two points worth noticing. Firstly, the Islanders are distinctly clever with their hands and fond of representing forms. Setting aside the large images, the carving of the small wooden ones is very good, and the accuracy of the tablet designs is wonderful. Then they have real enjoyment in reciting categories of words; for example, in recounting folk-tales, opportunity was always gleefully taken of any mention of feasting to go through the whole of the food products of the island. In the same way, if a hero went from one locality to another, the name of every place *en route* would be rolled out without any further object than the mere pleasure of giving a string of names. This form of recitation appears to affect them æsthetically, and the mere continuation of sound to be a pleasure. Given, therefore, that it was desired to remember lists of words, whether categories of names or correct forms of prayer, the repetition would be a labour of love, and to draw figures as aids to recollection would be very natural.

Nevertheless, the signs themselves have no doubt a history, which as such, even apart from interpretation, may prove to be signposts in our search for the origin of this mysterious people.

The Bird Cult

Knowledge of the tablets was confined to a few, and formed a comparatively small element of life in the island; the whole of social existence revolved round the bird cult, and it was the last of the old order to pass away. The main object of the cult was to obtain the first egg of a certain migratory sea-bird, and the rites were connected with the western headland, Rano Kao. Little has yet been said of this volcano, but, from the scenic point of view, it is the most striking portion of the island. Its height is 1,300 feet, and it possesses a crater two-thirds of a mile across, at the bottom of which is a lake largely covered with weeds and plant-life. On the eastward, or landward face, the mountain, as already explained, slopes downward with a smooth and grassy incline, and the other three sides have been worn by the waves into cliffs over 1,000 feet in height. On the outermost side the sea has nearly forced its way into the crater itself; and the ocean is now divided from the lake at this point by only a narrow edge, along which it would be possible but

ANA KAI-TANGATA.
site of cannibal feasts during bird rites.

FIG. 101.

FIG. 102.

PAINTINGS ON ROOF OF ANA KAI-TANGATA.

Top, a bird superimposed on a European ship.

managed, however, between us to get there three times in all. Once, when I was there without S., there was an anxious moment on re-embarking. No one quite knew what happened. Some of the crew said that the gunwale of the boat, as she rose on a wave, caught under an overhanging shelf of rock, others were of the opinion that the sudden weight of the last man, who at that moment leapt into the boat, upset her balance; anyway, this tale was very nearly never written. Once landed on the island, the surface is comparatively level and presents no difficulties; it is about five acres in extent, the greater part is covered with grass, and in every niche and cranny of the rock are sea-birds' nests. By a large bribe of tobacco one of the most active old men was induced to accompany us, and to point out the sites of interest. Later, we followed up the story at Raraku, and so little by little at many times, in divers places, and from various people was gathered the story of the bird cult which follows.

Not many sea-birds frequent this part of the Pacific, but on Motu Nui some seven species find an abiding-place. Some stay for the whole year, some come for the winter, and yet others for the summer. Among the last is a kind known to the natives as manu-tara[1]; it arrives in September, the spring of the southern hemisphere. The great object of life in Easter was to be the first to obtain one of the newly laid eggs of this bird. It was too solemn a matter for there to be any general scramble. Only those who belonged to the clan in the ascendancy for the time being could enter on the quest. Sometimes one group would keep it in their hands for years, or they might pass it on to a friendly clan. This selection gave rise, as might be expected, to burnings of hearts; the matter might be, and probably often was, settled by war. One year the Marama were inspired with jealousy because the Miru had chosen the Ngaure as their successors, and burnt down the house of Ngaara. This was, perhaps, the beginning of the fray when the old Ariki was carried off captive.

The fortunate clan, or clans, for sometimes several combined, left nothing to chance; in fact, as soon as one year's egg had been found, the incoming party made sure of their right of way by taking up their abode at the foot of Rano Kao—namely, at

[1] Sooty Tern.

FIG. 106.

W. A. M. & Co.] [Brit. Mus.

BACK OF STATUE FROM ORONGO, 1/8

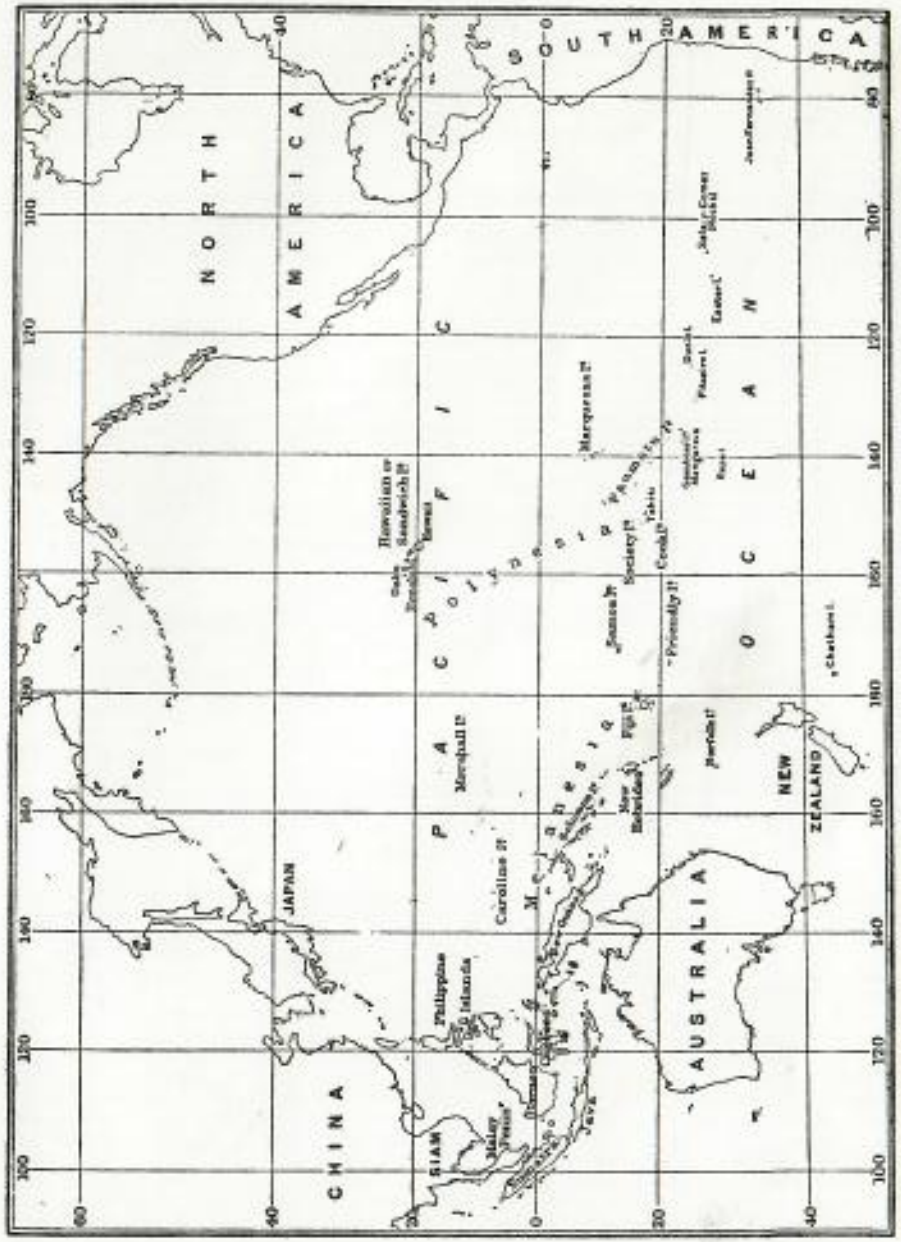
Showing raised ring and girdle, also incised figures of bird-man, 80, and Ko-Mari. (For front of statue, see fig. 32.)

skins, fuzzy hair, and thick lips, resembling to some extent the natives of Africa; this area is called Melanesia. Certain outlying islets are, however, populated by a different race, who possess straight or wavy hair and fairer skins. Eastward of a line which is drawn at Fiji this whiter race, called Polynesian, predominates, and the eastern part of the Pacific is known as Polynesia.

Broadly speaking, the theory generally accepted has been that negroid people are the earliest denizens, and that the lighter race came down into Melanesia through the Malay peninsula, and thence passed on through Melanesia in a succession of waves. A large proportion of the invaders were probably of the male sex, and took wives from amongst the original inhabitants. They absorbed in many ways the culture of the older people, but did not wholly abandon their own. It is suggested, for instance, that while as a whole the conquerors adopted existing religions, the secret societies, so often found in the Pacific, are connected with their own rites and beliefs, which were guarded as something sacred and apart.

It will easily be seen that the task of tracing these migrations is by no means simple. Canoes, carrying fighting men or immigrants, bent on victory or colonisation, passed continually from one island to another, and each island has probably its own very complicated history. The Maoris of New Zealand, for example, are a Polynesian race, but there are also traces there of a darker people. Absolutely negroid elements are found as far east as the Marquesas. Our servant Mahanga, whose features are of that type, came from the Paumotu Islands (fig. 89).

The marvellous feats of seamanship performed in these wanderings, often against the prevailing trade wind, would be incredible if it were not obvious that they have been actually accomplished. The loss of life was doubtless very great, and many boats must have started forth and never been heard of more. The fact remains, however, that native canoes have worked their way over unknown seas as far north as the Hawaiian or Sandwich Islands, and that somehow or other they reached that little spot in the waste of waters now known as Easter Island. The nearest land to Easter now inhabited, with the exception of Pitcairn Island, is in the Gambier Islands, about



1,200 miles to the westward; the little coral patch of Ducie Island, which lies between the two, is nearly 900 miles from Easter, and has no dwellers. It has been suggested that the original immigrants may have intended to make a voyage from one known island to another and have been blown out of their course. However this may be, a long voyage must have been foreseen, or the boats would not have carried sufficient provisions to reach so distant a goal. It is even more strange to realise that, if the mixture of races found among the islanders occurred after their arrival, more than one native expedition has performed the miracle of reaching Easter Island.

The traditions of the present people do not, as has been seen, give very material assistance as to the composition of the crew nor how they reached the island. They tell us that their ancestors were compelled to leave their original home through being vanquished in war. This was a very usual reason for such migrations, as the conquered were frequently compelled to choose between voluntary exile or death; but to account for the discovery of the island they are obliged to take refuge in the supernatural and explain that its whereabouts were revealed in a dream. The story of Hotu-matua gives no suggestion that the island was already inhabited, save for one very vague hint. The six men who formed the first detachment of the party were told that the island as revealed in the dream possessed not only a great crater, but also "a long beautiful road." The Long Ears, who according to tradition were exterminated by the Short Ears, may have been an earlier race, but it cannot be claimed that the story tells us so. The two peoples are represented as coming together, or as living side by side on the island. The whole account is rendered more puzzling by the fact that, while the Short Ears are said to have been the ancestors of the present people, the fashion of making long the lobe of the ear prevailed on the island till quite recently.

It is noteworthy, however, that a legend exists elsewhere which definitely reports that the later comers did find an earlier people in possession. According to the account of Admiral T. de Lapelin,[1] there is a tradition at Mangareva in the Gambier Islands to

[1] *Revue Maritime et Coloniale*, vol. xxxv. (1872), p. 108, note. It is unfortunate that M. de Lapelin does not give us more details as to when and from whom the account was received.

the effect that the adherents of a certain chief, being vanquished, sought safety in flight; they departed with a west wind in two big canoes, taking with them women, children, and all sorts of provisions. The party were never seen again, save for one man who subsequently returned to Mangareva. From him it was learned that the fugitives had found an island in the middle of the seas, and disembarked in a little bay surrounded by mountains; where, finding traces of inhabitants, they had made fortifications of stone on one of the heights. A few days later they were attacked by a horde of natives armed with spears, but succeeded in defeating them. The victors then pitilessly massacred their opponents throughout the island, sparing only the women and children. There are now no stone fortifications visible at Anakena, but one of the hill-tops to the east of the cove has, for some reason or other, been entrenched (fig. 96).

Turning to more scientific evidence, we find that the Islanders have always been judged to be of Polynesian race, as indeed would naturally be expected from the easterly position of the island in the Pacific Ocean. They have certainly traces of that culture, and the great authority on the subject, Mr. Sydney Ray, has pronounced the language to be Polynesian. The surprise, therefore, which the results of the expedition have brought to the anthropological world, is the discovery of the extent to which the negroid element is found to prevail there both from the physical and cultural points of view.

Melanesian skulls are mainly of the long-headed type, while Polynesian are frequently broad-headed. A collection of fifty-eight skulls was brought back from Easter and examined by Dr. Keith. He says in his report: "The Polynesian type is fairly purely represented in some of the Easter Islanders, . . . but they are absolutely and relatively a remarkably long-headed people, and in this feature they approach the Melanesian more than the Polynesian type." A similar statement was quite independently made to the Royal Geographical Society on this head. In the discussion which followed the reading of a paper on behalf of the Expedition, Capt. T. A. Joyce of the British Museum, remarked that a few years ago he had examined the skulls brought back from Easter Island by the late Lord Crawford. "I then," he continued, "wrote a paper which I never published. It remained both literally and metaphorically a skeleton in my

TE PITO TE HENUA, OR EASTER ISLAND.

By Paymaster WILLIAM J. THOMSON, U. S. Navy.

THE DISCOVERY OF EASTER ISLAND.

The honor of the discovery of Easter Island is contested by several of the earlier voyagers in the Pacific. Spanish writers claim that the island was sighted by Mendana in 1566, but the account is by no means authenticated, and the records preserved are not sufficiently accurate to determine the exact track sailed over by that ancient mariner. Captain Davis is credited by Capt. William Dampier with being the first to sight the island, and Lionel Wafer, who cruised with that bold navigator, on board of the *Batchelor's Delight*, gives the following account of the discovery in the year 1687:

> Bound to the southward, in latitude 12 degrees 30 minutes and about 150 leagues off the coast, experienced a shock of earthquake, that was afterwards found to correspond with the destruction of Callao by earthquake. Having recovered from our fright we kept on to the southward. We steered south-and-by-east-half-easterly, until we came to latitude 27 degrees 20 minutes south, when about two hours before day we fell in with a small low, sandy island and heard a great roaring noise, like that of the sea beating upon the shore, right ahead of the ship. Whereupon the sailors, fearing to fall foul upon the shore before day, desired the captain to put the ship about, and to stand off until the day appeared; to which the captain gave his consent. So we plied off till day and then stood in again with the land, which proved to be a small flat island, without any guard of rocks. We stood in within a quarter of a mile of the shore and could see it plainly, for it was a clear morning, not foggy or hazy. To the westward about 12 leagues, by judgment, we saw a range of high land, which we took to be islands, for there were several partitions in the prospect.
>
> This land seemed to reach about 14 or 16 leagues in a range, and there came great flocks of fowls. I and many more of our men would have made this land and have gone ashore on it, but the captain would not permit us. The small island bears from Copiapó almost due east 500 leagues, and from the Galapagos, under the line, 600 leagues.

Unfortunately, none of the voyagers on board of the *Batchelor's Delight* were permitted to land upon this unknown island, nor is mention made in the narratives of monoliths or unusual structures that might have been observed from the short distance in which it is claimed they approached the shore. The apparent inaccuracy in the description of the appearance of the land may have been due to the peculiar bearing of the vessel, but it gives foundation to the claim of Admiral Rogge-

The petroglyphs of Easter Island

Antoni Pujador

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Spanish, born 12 April 1948. Export manager in a Catalan stainless steel manufacturing company. Educated in Spain; graduated from high school in El Aaiun in 1971.

Its monolithic statues or "moais" have made Easter Island famous throughout the world, and have earned for it the reputation of being the world's largest open-air museum. However, this island still harbours numerous mysteries that still remain to be be given an adequate explanation. For example, the open-air rupestrian (rock) art is, by far, one of the most specific and spectacular manifestations of the Rapa Nuian civilization. Throughout the whole of the 165 km² of the surface area of Easter Island one can encounter an astonishing number of rupestrian engravings or petroglyphs.

An uncharted wealth of petroglyphs

The island itself has been the site of a considerable number of ethnological and archaeological investigations over the years – starting with the expedition organized to the Island in 1913 by Mrs. Scoresby Routledge – which we consider to be the first of its type. However, the petroglyphs themselves seem to have systematically been left unstudied by the various investigators, despite the studies carried out by Mr. Henry Lavachery during the course of the Franco-Belgian expedition organized in 1934; this expedition even published a book on its findings although this is unfortunately very incomplete. In more recent times, praise should be expressed on the subject of the work done by Dr. Georgia Lee, of the Institute of Archaeology of the University of California in Los Angeles. Nevertheless it still remains that there is no complete catalogue of the Island's petroglyphs.

The project that we intended to carry out is designed to rectify this gap in our knowledge since we plan to make a study of the petroglyphs, compile our findings into a single publication and, having interviewed and questioned the elders of the island in order to obtain a thorough knowledge of ancient myths and traditions, to link each of these petroglyphs with the corresponding legends. There still remains time to undertake this effort.

A petroglyph of the god "Make-Make" in the Orongo area of Rapa-Nui.

Nonetheless, there are two very important facts that should be born in mind in this context. First, there is the natural erosion produced by the weather combined by the abrasion caused by animals who pasture freely all over the Island – all of which have had and are continuing to have an impact on the condition of the petroglyphs. Second, there is the onset of the tourist phenomenon which is now beginning to affect Rapa-Nui; in particular, in spite of the surveillance procedures that has been put in place, a certain amount of vandalism is still taking place, with a degree of systematic destruction by souvenir hunters, coupled with the activities of pseudo-scientists and the like.

Store of folk-lore still accessible

One feature that distinguishes Easter Island from the other islands of Polynesia and, in fact, from most other parts of the world where petroglyphs are to be found is the fact that on Easter Island – probably owing to the fact that it is one of the most isolated places – the elders of the population still have an extremely extensive knowledge of their ancestor's legends. We know that these people would be willing to collaborate with our team in order to relate to us and establish for posterity this important segment of their local culture.

In the petroglyphs, the Rapa Nuian people have developed and transmitted a form of behaviour standards – a kind of social organization. Consequently, thorough investigation of these petroglyphs will allow us to make a significant

advance in our knowledge of the cultural dimension of Rapa-Nui. Even more important than this, however, is the fact that we shall have recovered for science and posterity an irreplaceable heritage. We have, in fact, been working on the subject for several years now, but lack of resources and time availability have meant that the task has not yet been brought to completion.

In particular, we have localized 41 emplacements where petroglyphs are placed, and by completing this catalogue with sector Ana Kena, we will have studied and catalogued some 51 combined units in this sector. There are many places – such as caves in the cliff faces, etc., to which it is difficult to obtain access and which we have not yet had the possibility to research and for which suitable climbing equipment, boats, etc., will be necessary.

A valuable resource for future researchers

The task that lies before us is to finalize the work that has been done to date (both by ourselves and by other scientists who researched this field) and to compile the data for analysis using the appropriate methodology. Once we have finished compiling all the research that has taken place to date, the data will be analyzed using a standardized procedure that will allow comparisons to be made of data from different parts of the Island. Finally, we will record oral legends and traditions , relate them to the individual petroglyphs and publish our results.

We believe that if we are able to publish and compile all this material, the benefits which would accrue to archaeologists of the future would be enormous and we will have made a tremendous advance in extending our comprehension of the rupestrian art of Rapa-Nui. This would also mean a knowledge of the communities that were able to accomplish these achievements in almost complete isolation on Easter Island – thousands of kilometres from anywhere.

Statues on Rapa-Nui. Treasures such as these are highly exposed to vandalism, the elements and even to damage due to well-intentioned "technicians" making plaster casts for exhibitions in Europe and elsewhere.

Spirit of Enterprise

The 1990 Rolex Awards

Foreword by

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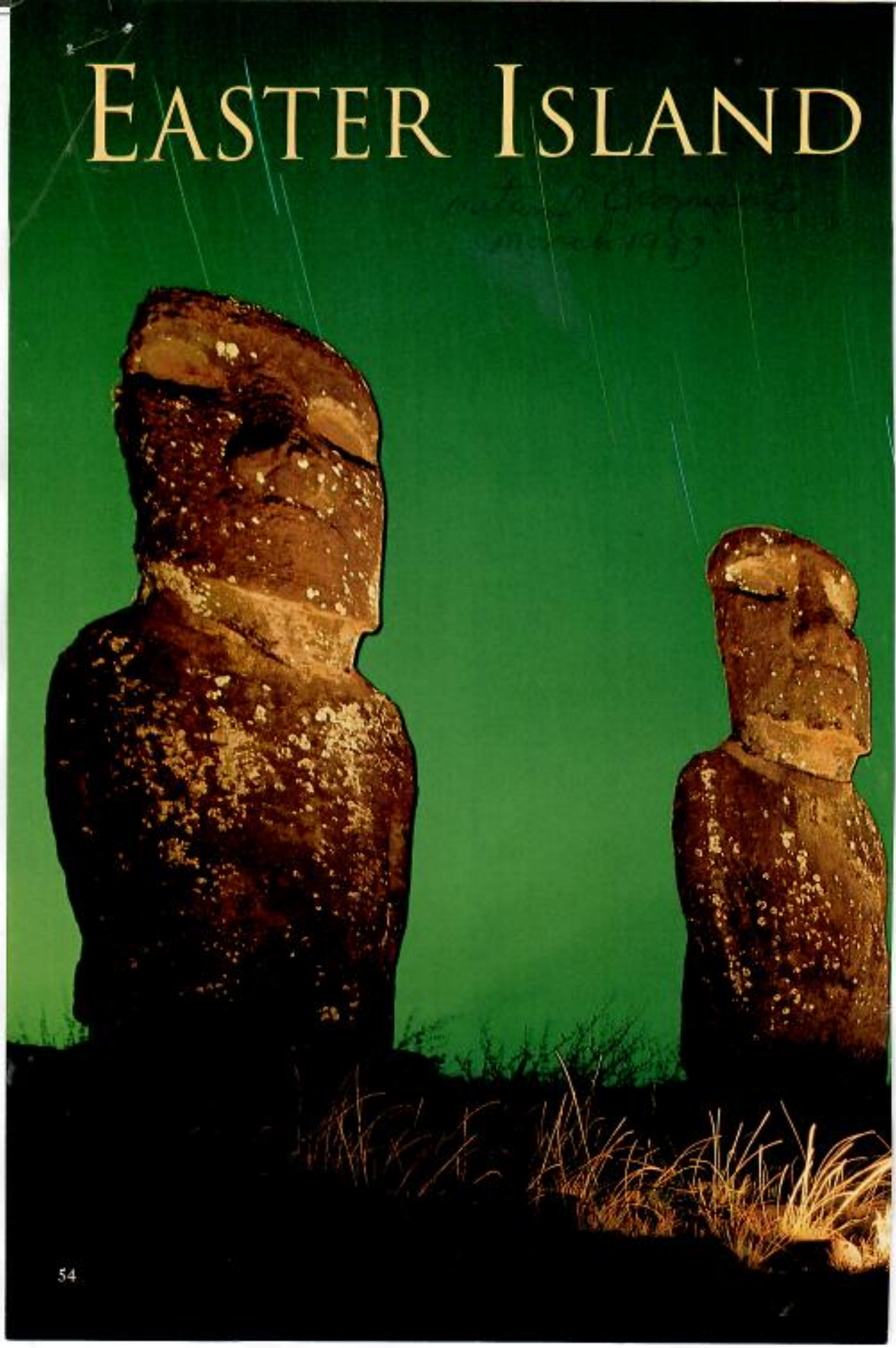
Edited by

David W. Reed

1990

BURI Buri Druck AG, CH-3001 Bern

EASTER ISLAND

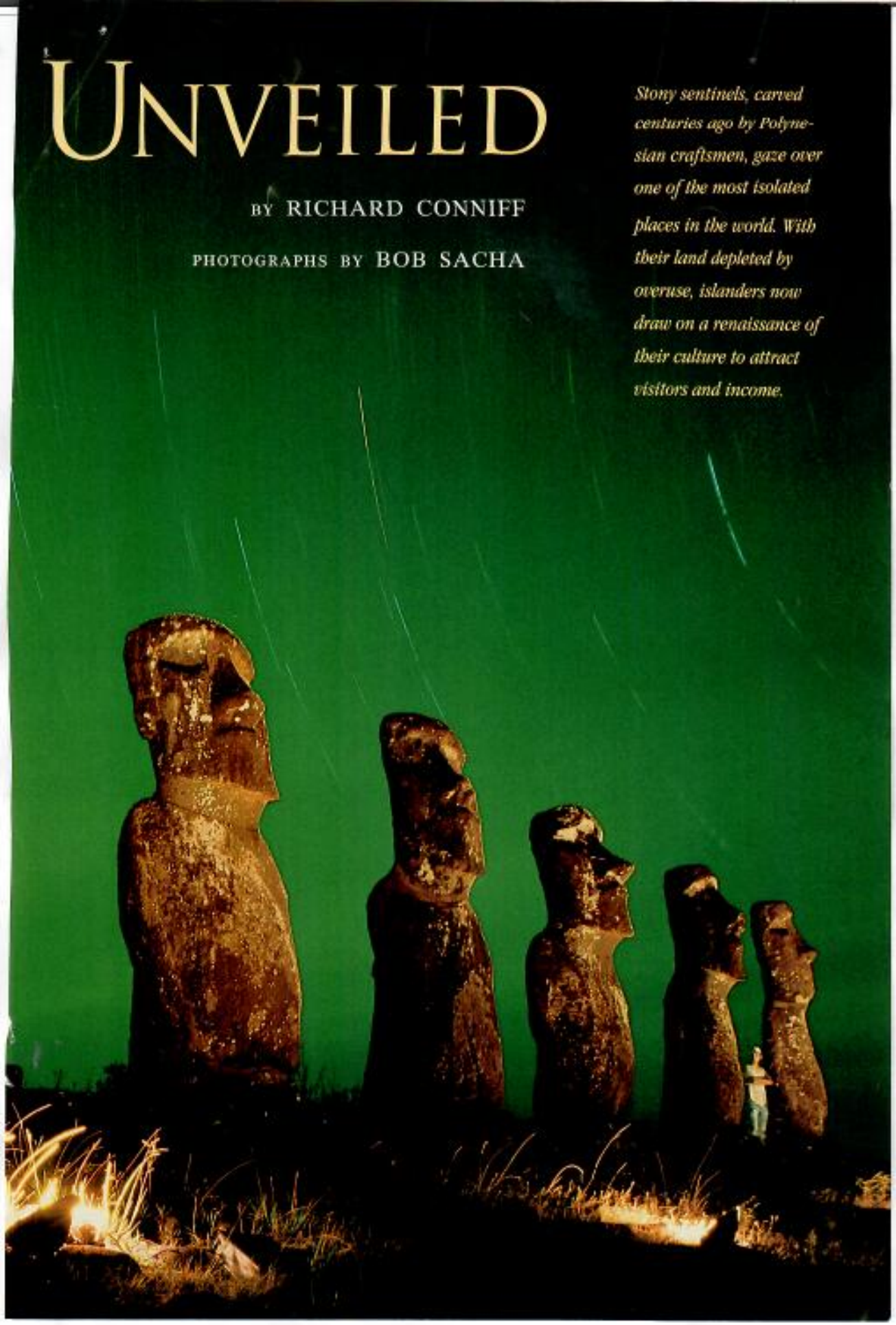


UNVEILED

BY RICHARD CONNIFF

PHOTOGRAPHS BY BOB SACHA

Stony sentinels, carved centuries ago by Polynesian craftsmen, gaze over one of the most isolated places in the world. With their land depleted by overuse, islanders now draw on a renaissance of their culture to attract visitors and income.



MARCH 1993

SHOULD YOU FIND YOURSELF someday seated with your legs over the edge of a cliff on the coast of Easter Island, you may notice, after a time, that the horizon bends not merely out ahead of you, as it does off any coast, but all around, encircling you. The clouds arch forward from the other side of the planet, and the ocean is almost pregnant in its curvature. You begin to get a sense of where you are: on a rock in the center of a vast circle of sea.

The nearest major population center in Polynesia, Tahiti, is roughly 2,600 miles west across the Pacific. In the opposite direction, it is about 2,300 miles to Chile, of which Easter Island has been a part since its annexation in the 19th century. Hence this grassy triangle of volcanic outcrop has been called the most remote inhabited island in the world.

What I felt, sitting on that cliff one evening, wasn't merely isolation. I had spent the day wandering on horseback with Felipe Teao, a 73-year-old fisherman whose zeal for island lore was largely untainted by its potential for attracting tourists. We had traveled past petroglyphs, earth ovens, human bone fragments, and obsidian flakes. We had passed the huge stone statues, called *moai*, for which Easter Island is famous. They lay everywhere along the coast, toppled onto their foreheads from the *ahu*, or ceremonial platforms, where they once stood shoulder to shoulder, backs to the sea, lording over each clan's narrow territory with jutting jaws and coral eyes. Teao had also pointed out a few boat-shaped ahu with their landlocked prows rising toward the sea, as if hungry for the world or for escape from the universe defined by the moai.

I had an eerie sense of having dropped in on the remnants of an improbable biological experiment, on roughly these lines: Take 50 or so people, move them thousands of miles from home to a small island with no terrestrial mammals and only about 30 native plant species, make water scarce and agriculture marginal, minimize the chances for escape or outside influence, and check back after, say, a millennium to see what results.

To glance at the treeless hills of the island now, you might not expect much. Yet local legend records that at a crescent beach called Anakena (map, pages 60-61), two large voyaging canoes provisioned with crops and poultry arrived under the command of a chief named Hotu Matu'a, whose descendants still inhabit the island and regard him with disarming familiarity. (Teao could point out, among other things, the rock Hotu Matu'a used as a toilet.) Researchers generally date the coming of settlers at about A.D. 400. In time this meager band of colonists would grow to perhaps 7,000 people. They would parcel up the island into small territories and ultimately turn on one another in the drawn-out paroxysms of societal and environmental collapse. Throughout, the islanders put their mark on every surface of the landscape, while the landscape in turn shaped their souls.

Having spent his life exploring Easter Island and eking out a living from it, Teao was one of the few islanders left to know it with that old intimacy. As we scrambled under rock overhangs to

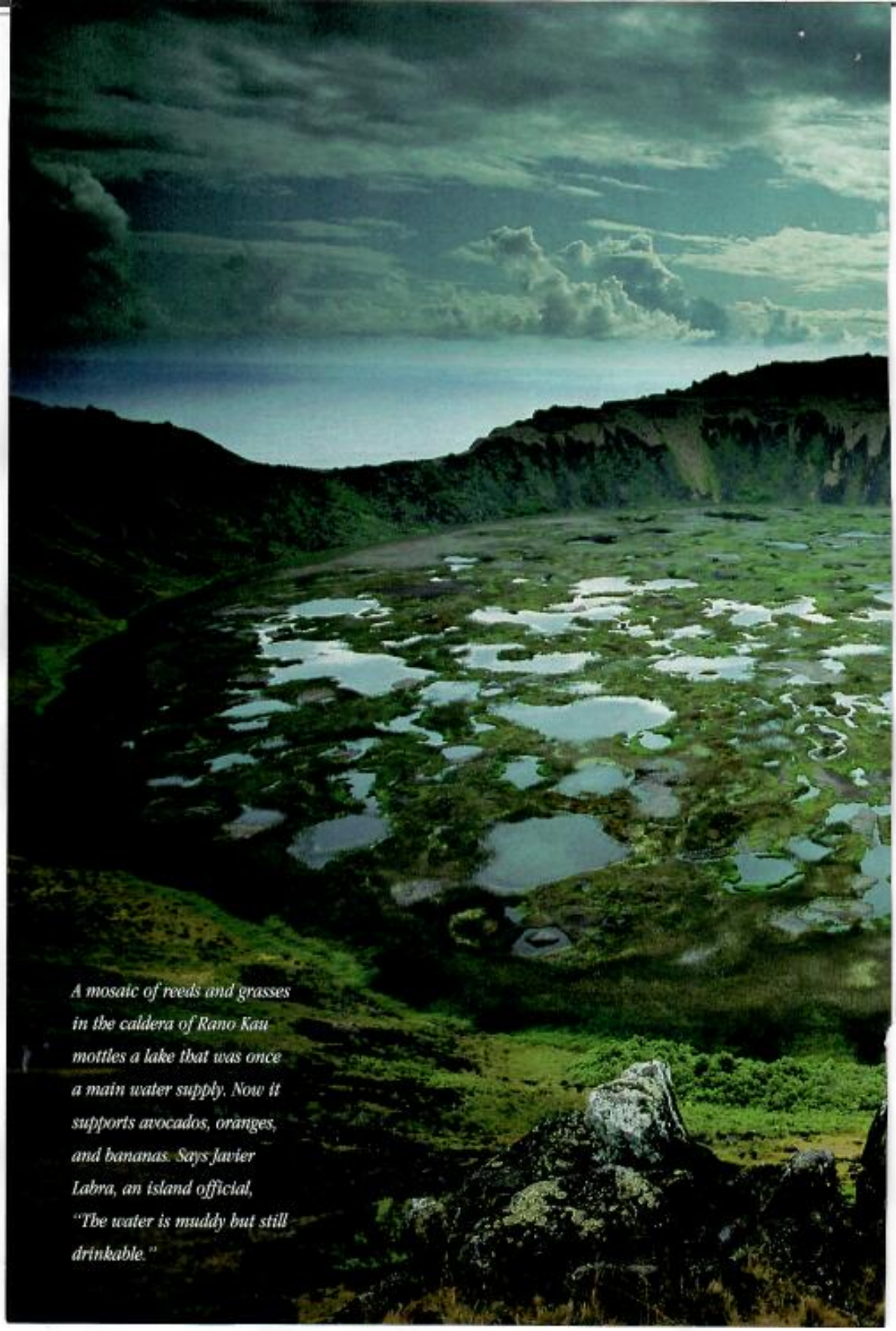
Grass skirts catch the wind as islanders, who call themselves Rapa Nui, welcome a tour group. The greeting is an innovation that stems from a heritage borne by Polynesian ancestors who sailed voyaging canoes across the Pacific.

Connecticut-based journalist RICHARD CONNIFF, whose most recent article for NATIONAL GEOGRAPHIC was "Blackwater Country" (April 1992), frequently writes on subjects of cultural complexity. BOB SACHA last covered the "Search for Columbus" (January 1992).

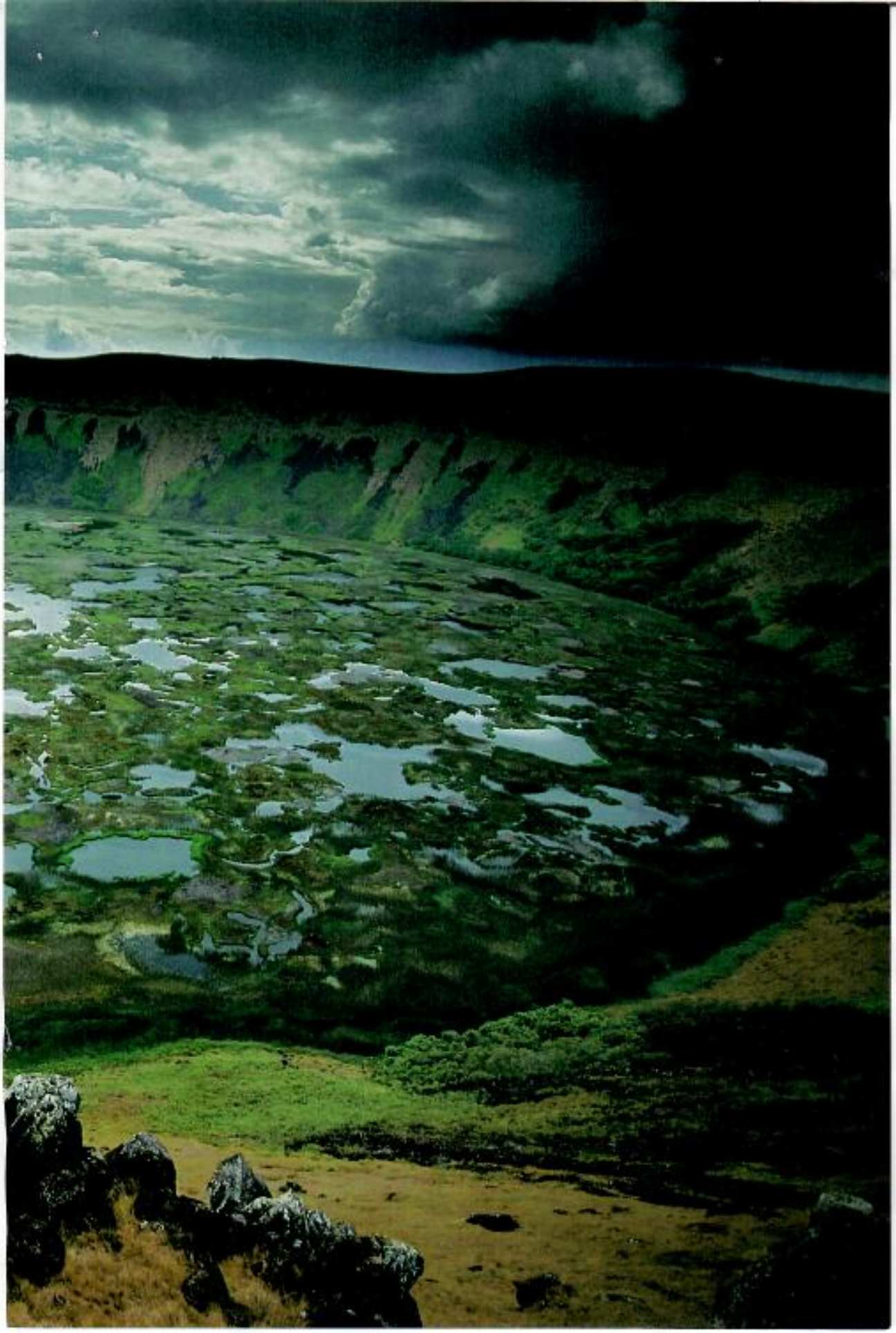
inspect petroglyphs, he recounted fragments of its bloody history. "Warriors used to be able to name any place where they killed a rival," he said at one point. Then he told a story about an inept warrior who killed only one enemy but cleverly butchered the corpse in four different places, naming each place after a body part. The names made Teao laugh with macabre admiration, shrewd exploitation of limited resources being an essential trait on the island.

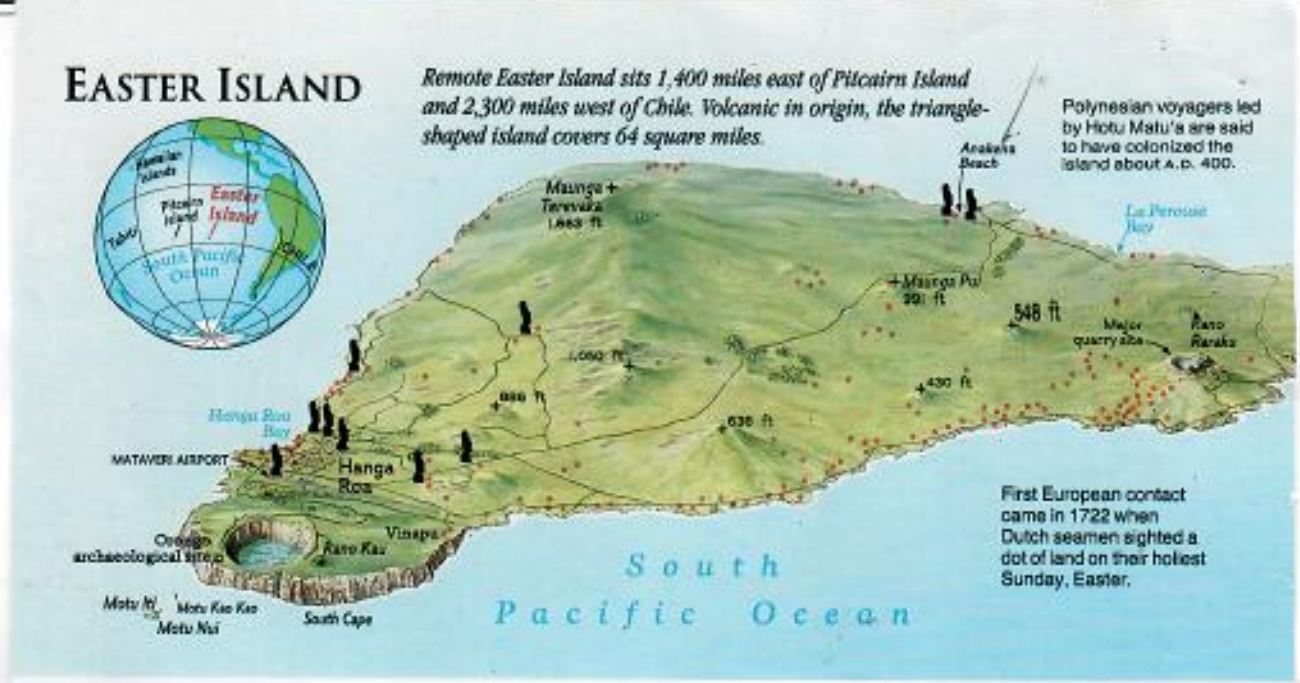
"I was diving at La Perouse after a storm," he remarked another time, "when I saw a skeleton come washing out with the tides, so I knew there had to be a cave there. . . ." What I felt listening to Teao wasn't so much the isolation of Easter Island but the richness of local knowledge and culture that isolation had produced.

Few archaeological sites in the world are as impressive as Easter Island, and none have evoked as much speculation or as much nonsense. The speculation has often turned on the premise that the Polynesians who still inhabit the island, people like Felipe Teao, could never have produced the solemn and imperturbable moai. Nor, to this way of thinking, could a "primitive" people transport



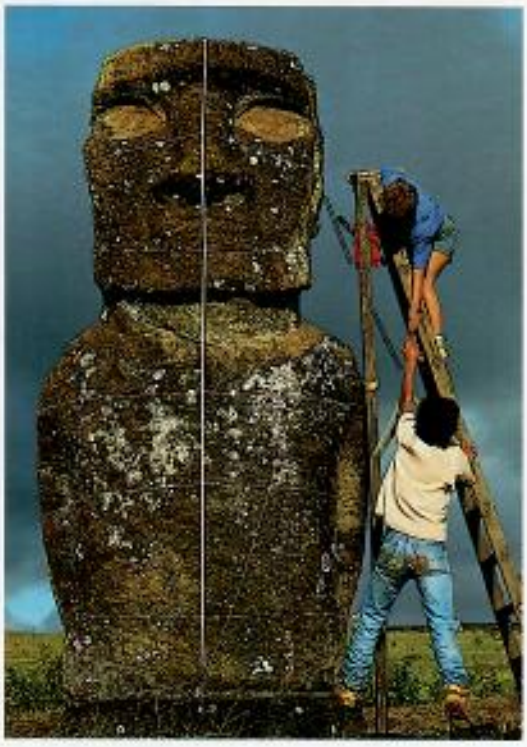
A mosaic of reeds and grasses in the caldera of Rano Kau mottles a lake that was once a main water supply. Now it supports avocados, oranges, and bananas. Says Javier Labra, an island official, "The water is muddy but still drinkable."





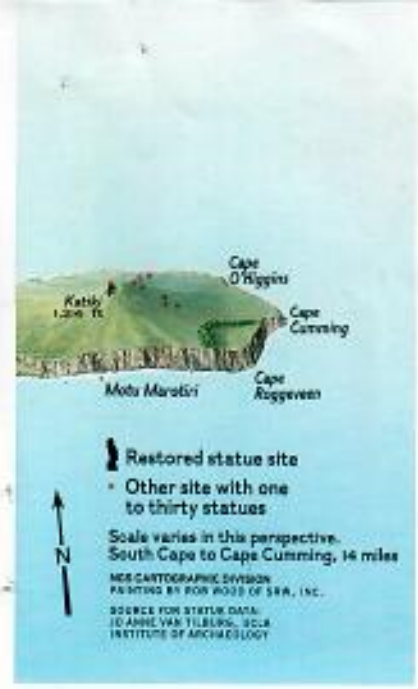
a 15-ton stone statue—much less hundreds of them—across the rock-stubbed landscape from the inland quarry at Rano Raraku to ahu along the coast.

One best-seller deemed it more plausible to attribute the giant statues to extraterrestrials equipped with antigravity machines (who inexplicably carved with stone picks). Somewhat more persuasively, author Thor Heyerdahl has argued in a series of books that the skilled stone carvers came from South America. In his view, Polynesians supplanted them little more than a century before Europeans discovered the island on Easter Sunday in 1722.



Heyerdahl's expedition in 1955-56 remains the watershed for world perceptions of Easter Island in this century. His team of researchers launched modern archaeology on Easter Island, and Heyerdahl, still acclaimed for having sailed the balsa raft *Kon-Tiki* from South America to Polynesia, won eager and enduring acceptance among the general public for his idea of the islanders' South American origin. But archaeologists have since accumulated ample evidence indicating that the founders of Easter Island's civilization were indeed Polynesians, and that their culture, including the great stone statues, was rooted solidly in Pacific island traditions.

Teao and I stopped for the night at a cave overlooking the northwest coast. The clouds above the rounded horizon of the mid-Pacific were puffy and placental, suffused with red by the setting sun. Teao set out breaded hooks from the rocks and came in with a mess of *nanue*, fish with succulent white flesh. We talked about old families and ancient beliefs. It seemed to me that local knowledge, ingenuity, and a Polynesian



knack for colonizing even the most inhospitable oceanic rock were the reasons the descendants of Hotu Matu'a survive today. I spread out my sleeping bag on the cliff and went to sleep to the sound of waves rolling in from nowhere.

TWO OR THREE TIMES A WEEK NOW, a commercial 767 touches down from the mainland, the squeal of rubber on concrete reiterating the end of the island's ancient sequestration. For much of this century Easter Island's calendar was divided loosely in half, six months spent preparing for the arrival of the annual supply ship and six months spent recounting the foibles of its passengers. For the islanders, regular air service represents liberation from old constraints.

For visitors, on the other hand, especially for those who cling to the illusion of an island floating outside the currents of time, it can be unsettling to peer from the window of the plane and spot a row of glistening monuments, like moai, only to recognize them on closer inspection as fuel storage tanks.

Modernization has brought 640 hotel and guesthouse beds, 530 motor vehicles, the telephone, and the fax machine to Easter Island. Almost all the island's 2,800 residents now live in the small town of Hanga Roa on the southwest coast, colonial authorities having moved the islanders there from their traditional territories in the 19th century. At night the phosphorescent blue of television sets, attended with something like devotion, illuminates the windows of the modest, one-story houses. Amber streetlights break up the mid-ocean gloaming. After the television station signs off at midnight, the discotheques come to life, and tourists mingle with islanders drinking pisco and Coke under the gaze of Day-Glo moai. The air reverberates almost till dawn with "Bette Davis Eyes" and a disco version of "Nothing Compares 2U."

The transformation of Easter Island dates from 1965, when a young schoolteacher wrote an open letter of protest to the Chilean government about conditions on the island. At that point, sheep far outnumbered people and had more freedom of movement; they grazed over almost 90 percent of the island. The islanders, known as Rapa Nui (a name of 19th-century origin meaning people of "Great Rapa"), were officially confined to Hanga Roa.

Islanders were rarely permitted to travel then, in part because of the parish priest's concern about the corrupting influence of the outside world. Their suppressed appetite for this influence was such that one islander born during World War II was nicknamed for the Führer ("*Hola*, Hitler," an acquaintance calls, and tourists' heads spin), while another was called London for the BBC shortwave opener, "This is London." The lure of freedom caused islanders in open fishing boats to sail away from the island nine times during the postwar years, most of them in the 1950s, when the Chilean Navy ruled with the help of occasional public floggings. Unaided by navigational equipment, three boats, including one piloted by Felipe Teao, ended up elsewhere in Polynesia, and a fourth on the Chilean coast; five disappeared.

The schoolteacher's protest led to the end of military rule and won Easter Island the civil status of any other community in Chile—along with the attendant bureaucracy imported from the mainland, apparently in part to guarantee a solidly Chilean

Taking the measure of a moai, *icon of chiefs and gods, UCLA archaeologist Jo Anne Van Tilburg proceeds with her investigations—more than ten years of documenting most of the island's one thousand statues. Using statistical analysis and computer imaging, she and colleagues from the University of Chile hope to answer questions that have perplexed many: Who carved the statues and why, and how were they transported?*

In antiquity's workshop, some 400 moai in various stages of completion rest on Rano Raraku's slopes, where American guide Peter Alden (below) adjusts his whimsical hat.

Rapa Nui carvers chipped at soft volcanic tuff with heavy stone picks to shape the moai, ancestor figures with powers to mediate between the people

and the gods. Workers used sledges, wooden rollers, and bark ropes to haul finished statues along special roads. They then erected them on ahu, *or stone platforms.*

For centuries some of the abu were used as burial chambers. Niko Haoa (left) peers for remains beneath an abu whose statue has tumbled.

presence. The start of regular air service in 1967 created a tourist industry, and the old cashless society of families sharing the work of farming and fishing began to break apart, replaced by the colder logic of commerce.

"Things are getting better, but people have gotten worse," said Jorge Edmunds, one evening over tea at the Hotel Victoria, which he owns. At 72 Edmunds was balding and urbane, in silver-rimmed glasses. "The old family union is gone," he said. In the old system, large extended families lived close together in compounds, cooperating to the extent that a woman with many children might give her newborn to a less fortunate sister. "Now each one is for his own convenience. Except for a few families that have stayed together: the Pakaratis, the Edmundses." Someone else at the table raised an eyebrow, the Edmunds family being among the most modern in its business interests. "A little," he admitted. *"No mucho."*

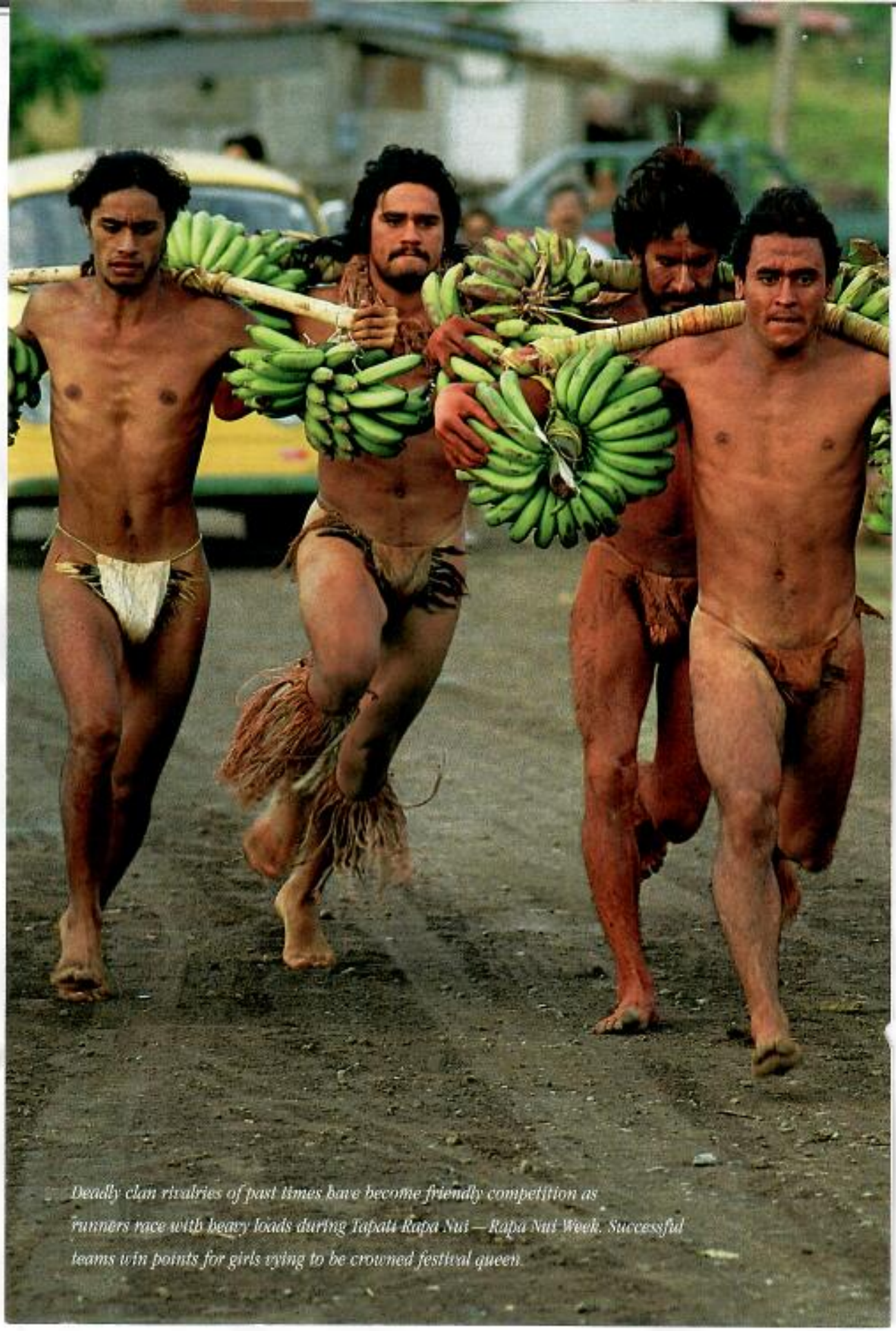
Another businessman then began eagerly chronicling improvements since the 1960s, when few houses had running water, much less telephones. But his tone also shifted subtly to ruefulness. "People were in the streets. Washing. Singing. It was a feast."

Few modern islanders would go back to that time, but they talk about it still with a sense of loss, and, like people recollecting a distant childhood, the conversation often turns on the powerful memory of food. Sheep were available for the taking in the 1950s, and chickens were as common as pigeons in a city park. Parties at which the meat was heaped in pyramids loom large in memory. "People used to go with carts to get food!" said Kiko Pate, the church choirmaster. "You can't imagine how beautiful it was."

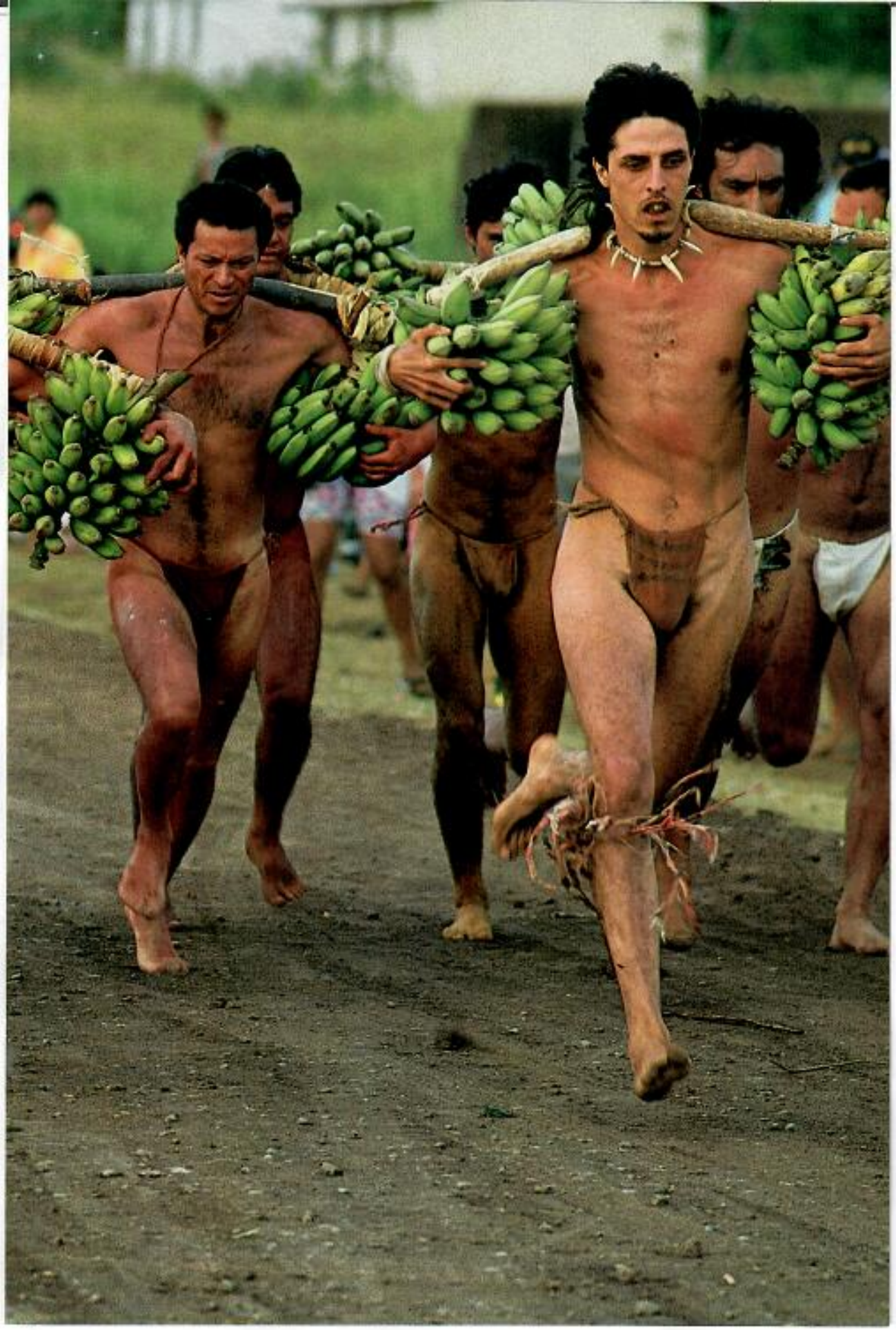
The sheep are gone now, fishing has fallen off, and agriculture is out of fashion (as well as being more difficult due to introduced pests). Baked bread is replacing the sweet potato as a staple food, and even chickens, which the Polynesians brought from Southeast Asia halfway around the world, arrive frozen from the mainland. "Now," Pate said, "everything is money, money."

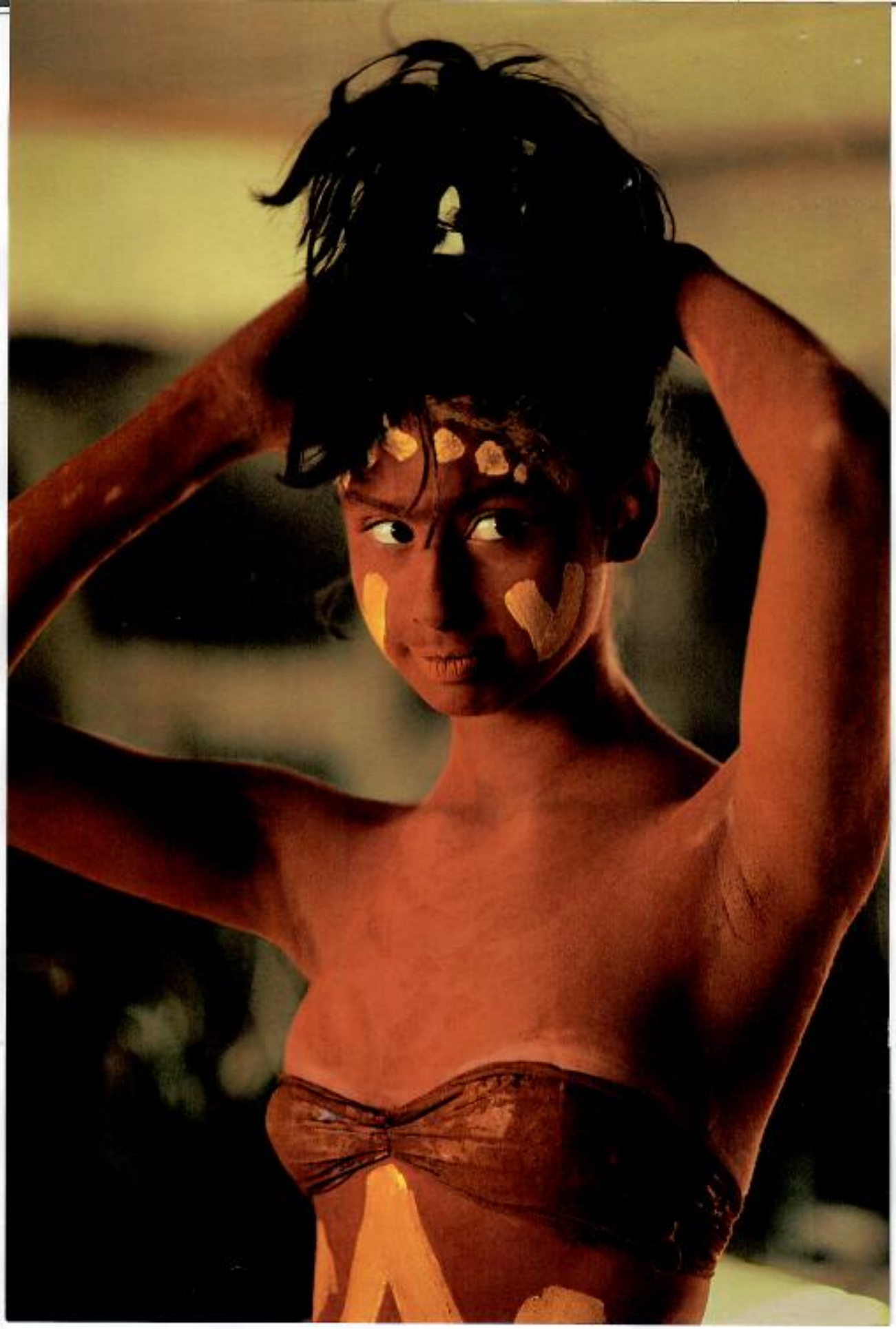
The sense of diminishing food is a handy symbol for the less tangible sense that spiritual sustenance is also diminishing as the Rapa Nui culture becomes watered down. Government workers and their families from the mainland, who account for nearly a quarter of the population, often serve as scapegoats for this change. "If you have a major, you have to have a captain," one islander said. "If you have a captain, you have to have a lieutenant." Thus with no serious crime, 30 uniformed officers and six investigators from the mainland poke around the island, and the solitary Rapa Nui among them is regarded by some as an informer. ("Just like his great-great-grandfather," Felipe Teao remarked, recounting a nasty piece of treachery committed by the policeman's family more than a century ago.)

But a certain outside influence was a cultural necessity for Easter Island. Rapa Nui incest laws are strict, and with everybody tracing their ancestry back to the same 30 or so couples who survived 19th-century Peruvian slave raiding and epidemics, legal romance had arrived at an impasse. A woman in her mid-40s told me that she grew up with only two eligible marriage partners on the island, both walleyed. For 15 years she has been seeing a man with whom she has a common ancestor in the past century, she said, and her



Deadly clan rivalries of past times have become friendly competition as runners race with heavy loads during Tapati Rapa Nui—Rapa Nui Week. Successful teams win points for girls vying to be crowned festival queen.





elders still hiss their phrase for incest: "Eating your own blood!"

Understandably many islanders seek mates outside the community, often resting their hopes on the "Easter Island passport," a catch phrase for their own exotic appeal in the eyes of wealthy tourists. In 1991 one such islander became the first HIV-positive Rapa Nui.

Mixed marriages abound. The children grow up in an atmosphere of freedom and safety. They surf on the big rollers of Hanga Roa Bay or draw circles in the dusty red streets for pitching marbles. Some of them work beside their elders in traditional pastimes. But like their parents they look increasingly to the outside world.

Many of today's parents were among the first Rapa Nui educated on the Chilean mainland in the 1970s, and having been ridiculed for their ignorance of Spanish, they are busily sparing their children the same fate. As a result, only one schoolchild in four now speaks Rapanui as a first language, down from three in four just 15 years ago. The grade school, which used to punish children for speaking their language, has responded by incorporating the island culture for the first time into its curriculum, with the help of a new textbook series in the Rapanui language. Some elders balk at the notion of culture as homework on an island where the culture once seeped from the very stones. Many modern parents, on the other hand, regard the local school as inferior. If they can afford it, they ship their children off to schools on the mainland, where they may have a better chance of succeeding in the modern world.

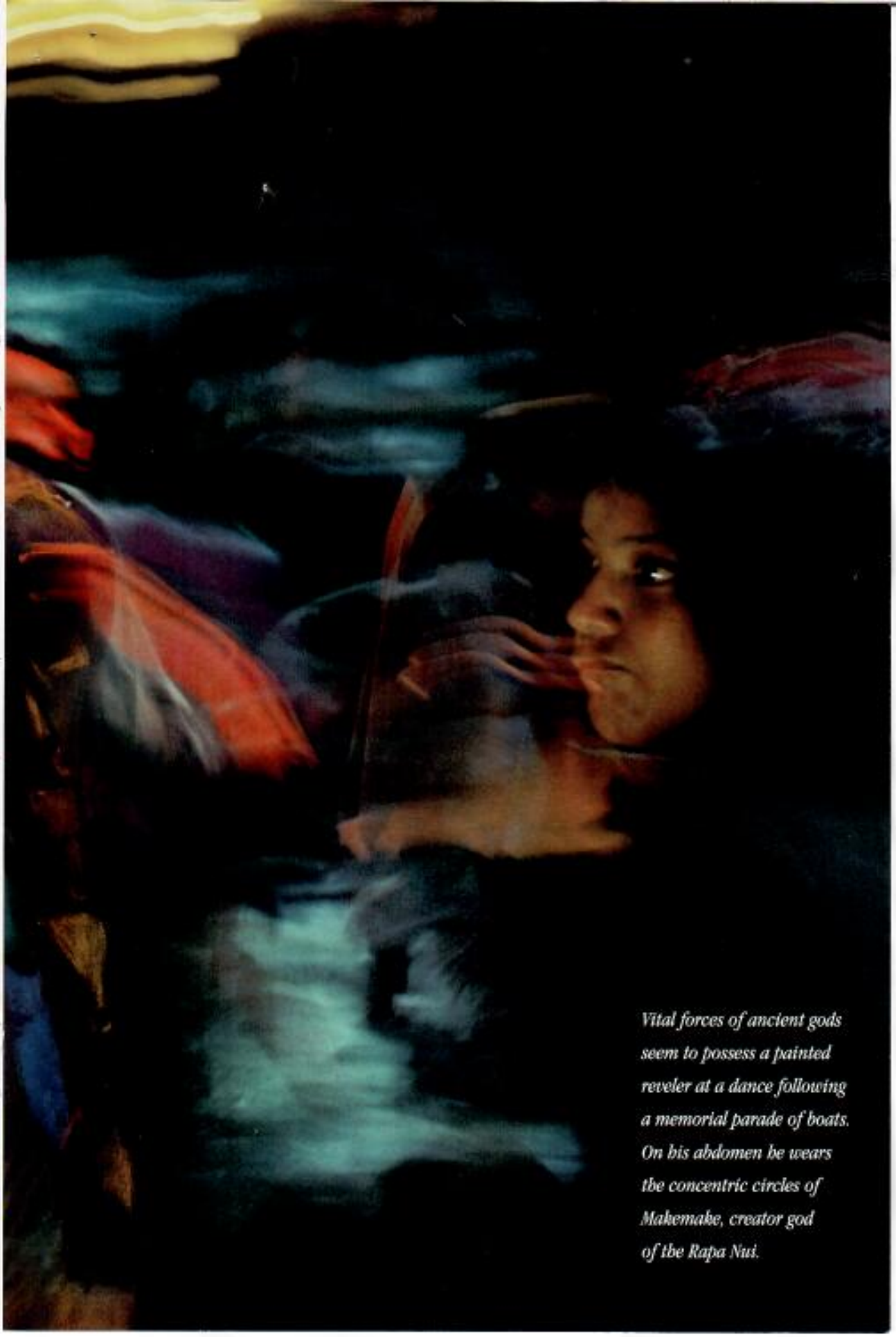
Painted from topknot to toe in the red pigment held sacred by her Rapa Nui ancestors, 13-year-old Kovira Avila Pakarati participates in a reenactment of the landing of Hotu Matu'a. A thousand and more years before Columbus, the Rapa Nui believe, the chieftain loaded canoes with artisans and crops and set out from "a great island to the west." After weeks at sea his party came ashore to settle Easter Island.

Kovira and other celebrants paddle along the coast in decorated boats to Hanga Roa, the island's only town. On landing, they chant, they dance, and they sing the songs of their forebears in the shadow of the moai.

THE FIRST TIME I VISITED THE PAKARATIS, one of the few families where children still grow up in the oral tradition, I met Amelia Tepano Ika, the materfamilias. A lively, toothless old woman with gray hair pulled back in an orange bow, she came out into the yard bent over her bamboo cane. Sitting in the shade of a *miro tahiti* tree, Amelia demonstrated *kai kai*, the traditional cat's cradle game of patterns formed with a loop of string around the fingers, accompanied by song. A great-granddaughter, just in from school, dropped a pink plastic Mickey Mouse lunch box on the grass and, taking out a loop of string to shape on her own fingers, stood behind and mouthed the words of the songs (pages 70-71).

Amelia picked out strands with her lips to bring order to the pattern and said that, over time, she had passed on 300 or 400 of these games to the young girls in her family. The string no longer moved smoothly on her stiffened fingers. Leaning against her, the great-granddaughter, whom Amelia had taught, began to reteach her, reaching in to adjust the strings or filling in the words when the old woman stumbled. Both of them formed a web of triangles, symbolic of their sex, and chanted about how the most beautiful woman on the island used to be chosen during an annual feast at the ceremonial site called Orongo. For a moment the culture lived in two voices together, one growing stronger, the other more frail.

I went out one day with Eva Pakarati, of whom an acquaintance had said, "She lives on another island, the old island." That island persists in *el campo*, the countryside, to which the islanders retreat when they tire of living with cars and discotheques and among neighbors who know their histories back to Hotu Matu'a. Eva, who was 61, went there daily, to gather seashells to string into



Vital forces of ancient gods seem to possess a painted reveler at a dance following a memorial parade of boats. On his abdomen he wears the concentric circles of Makemake, creator god of the Rapa Nui.

necklaces for the tourist trade or to eat fish with her sisters. She crossed the wet rocks by the sea with her light cotton skirt gathered up and flip-flops on her feet, effortless and agile as a girl.

Eva recollected traveling the island as a child with her father, who stopped at each prominent rock and made her repeat legends word for word as if they were part of a catechism. The sense of place was ingrained in her in a way almost unfathomable to an American. We passed a *komari*, a vulva etched in the stone. Representations of male or female genitals are found everywhere on the island, carved with characteristic candor as talismans of a family's reproductive strength. Eva flicked the ash of her cigarette at it as she strode past. "Our relative," she said.

The old familial territories of el campo afford the islanders a sense of being profoundly at home, the offspring of this komari and of this piece of earth. For some the appeal of family caves remains especially strong; in 1987 an old man set off hoping to climb into his cave and die there in the belly of his homeland (his body was

Tales of the old are preserved for the young as Amelia Tepano Ika and her great-granddaughter practice kai kai, *storytelling with string illustrations and chants. As most Rapa Nui children speak only Spanish, kai kai helps them learn the ancestral language as well as their traditions.*

recovered in open country and given a Christian burial). Another islander I talked with could remember being rushed out to his family cave as a child when the cry, "*Ko te miro!* A ship!" was shouted from house to house across Hanga Roa. He was hidden just as children had been during two turbulent centuries of sporadic visits by slave and merchant ships. Even in the 1930s, he said, some people "thought they were going to be killed by every ship that arrived."

Along with the possibility of refuge, the sense of danger also persists in the countryside. *Aku aku,* good and evil spirits, are still thought to guard old family territories. Eva led me past their images carved into the flat rocky boundaries between clans. I saw nothing at first. Then the clouds shifted and the shadows changed, revealing sharks, skulls, octopus-like women, and other creatures. Eva told a story about a sister who found an ancient wood statue in the countryside one day and took it home. She died soon after, said Eva, having offended the spirits of the land.

AT SUNSET it was placid on the reed-fringed lake in the middle of the crater called Rano Raraku. Great stone statues stood on the slopes below the cliffs where they were carved, basking like sunbathers on the deck of a ship. Wandering along the cliffs, I could see across the low, western edge of the crater, to where a smoky haze drifted through the blue cinder cones at the other end of Easter Island.

The crater walls were inhabited by about 400 statues in various stages of completion, embedded in the stone where they were carved, face up, face down, canted over on one shoulder, so close together that visitors contemplating one moai often realize with a start that the grass they are standing on has grown up in the angular eye socket of another. As the evening light changed, nondescript rock walls suddenly revealed themselves before me as fully formed moai, the green lichen no longer obscuring the tubular noses, flared nostrils, and pursed lips. Walking alone here was like tiptoeing among sleeping giants.

Over the sound of the breeze on the cliff top, lifting and falling like human breath, a distant thudding reached me and grew louder. Spooked, I turned and saw two unsaddled horses gallop through a break in the opposite crater wall, trailing veils of dust. A hawk-like caracara soared watchfully over the rim of the crater and descended to perch on the brow of an upright moai. Then it was quiet again.

Here Thor Heyerdahl was inspired to write, "One thing is certain: This was not the work of a canoeload of Polynesian wood carvers who set to work on the bare rock faces when they landed merely because they could find no trees to whittle." On the contrary, at Rano Raraku, Heyerdahl and his team found some of their most impressive evidence for his argument that the culture came from South America: A petroglyph carved on the torso of a half-buried moai depicting a three-masted ship, which Heyerdahl considered a South American type, and the reeds in the crater lake, which he said had been introduced by South Americans, who used them for building just such ships.

Heyerdahl depicted Easter Island's civilization collapsing in racial conflict in which statue-carving Long Ears from South America were annihilated by menial Short Ears from Polynesia. Or

Preaching against television and nightclubs, Father Luis Riedl delivers a sermon on the feast day of the Immaculate Conception. Missionaries from Chile introduced Christianity in the 1860s, and today most islanders are Roman Catholic.

as Heyerdahl put it, "with the arrival of the genuine Polynesians, all cultural life came to an abrupt end."

The public embraced the ideas of the swashbuckling "Señor Kon-Tiki." Archaeologists, on the other hand, detected cultural bias in Heyerdahl's disparagement of Polynesians, and they began to pick holes in his argument. The three-masted ship, they said, was less likely to be a South American reed boat than a European square-rigger, like several others carved around the island after 1722. Moreover, the reeds themselves failed the test for importation by South Americans; pollen analysis demonstrated that they had been growing in Easter Island's crater lakes for at least 30,000 years.

The most comprehensive reply to Heyerdahl's arguments was the Easter Island Archaeological Survey, a cooperative Chilean-American effort begun in 1968 and now nearly completed. Survey teams sketched, mapped, and measured 19,000 features on the island, among them 240 ahu, 886 moai, 2,536 earth ovens, and

3,244 house foundations representing 15 centuries of occupation.

The results do not exclude the possibility of South American contact, but they make Polynesian origin far more likely. For example, Heyerdahl singled out one ahu, called Vinapu, and likened it to the stonework of Tiahuanaco, "the mightiest ruins in South America." But Tiahuanaco was the crowning achievement of an empire, while the ahu of Easter Island stood at the heart of local villages. Survey archaeologists found a far greater resemblance to the stone altars with raised slabs or posts common throughout Polynesia. Easter Island ahu differed from the general Polynesian pattern chiefly in that the human figures that stood on them were so large and sophisticated.

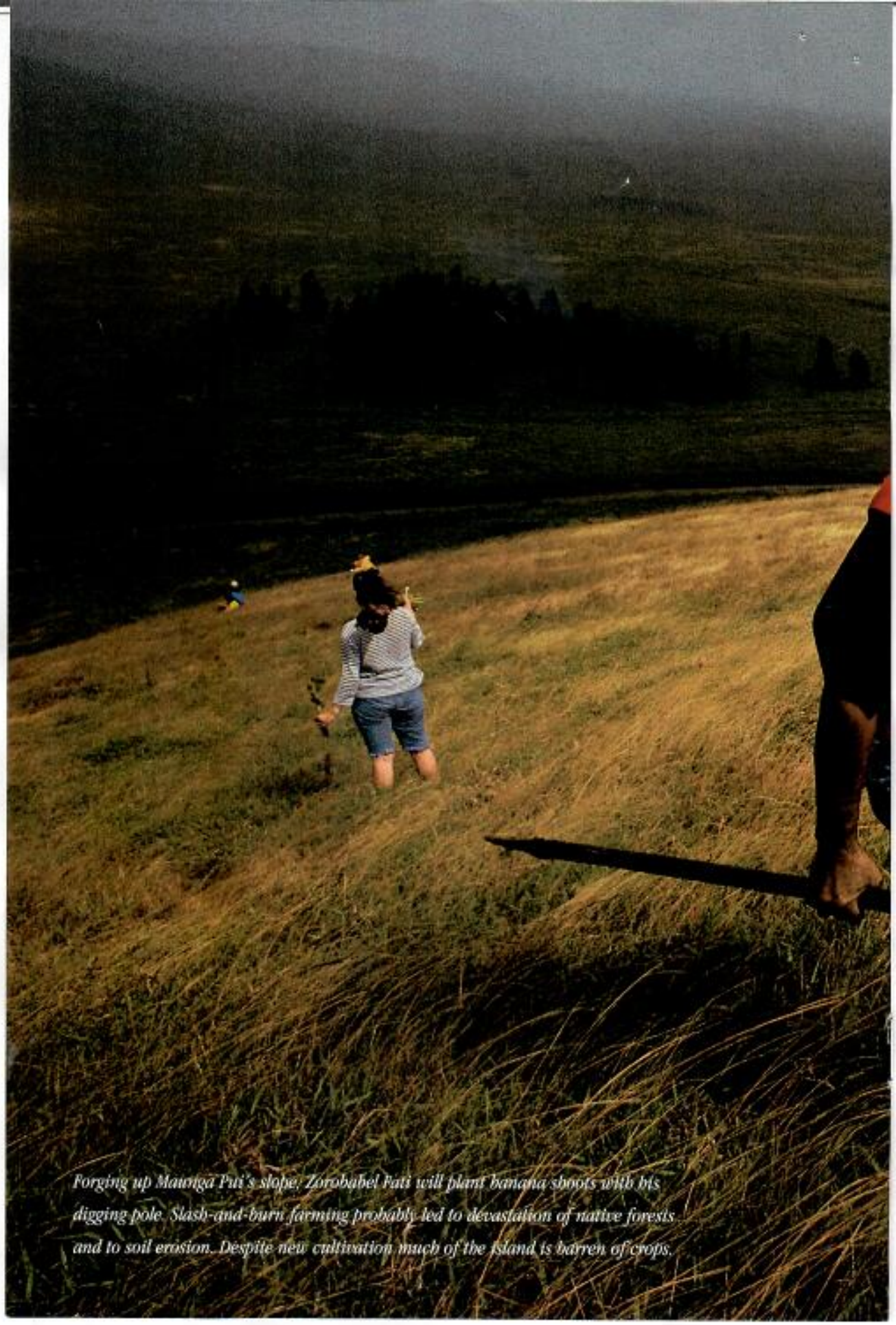
Heyerdahl's work also provoked a reconsideration of Polynesian voyaging. In 1976 a crew of Pacific islanders, organized by Ben Finney of the University of Hawaii, sailed a replica of a traditional double canoe from Hawaii to Tahiti and back. Apart from

Mixing European tradition with a novel touch, a Chilean groom removes his Rapa Nui bride's garter with his teeth. Since most islanders are related and local incest laws are very strict, many Rapa Nui seek mates from the mainland.

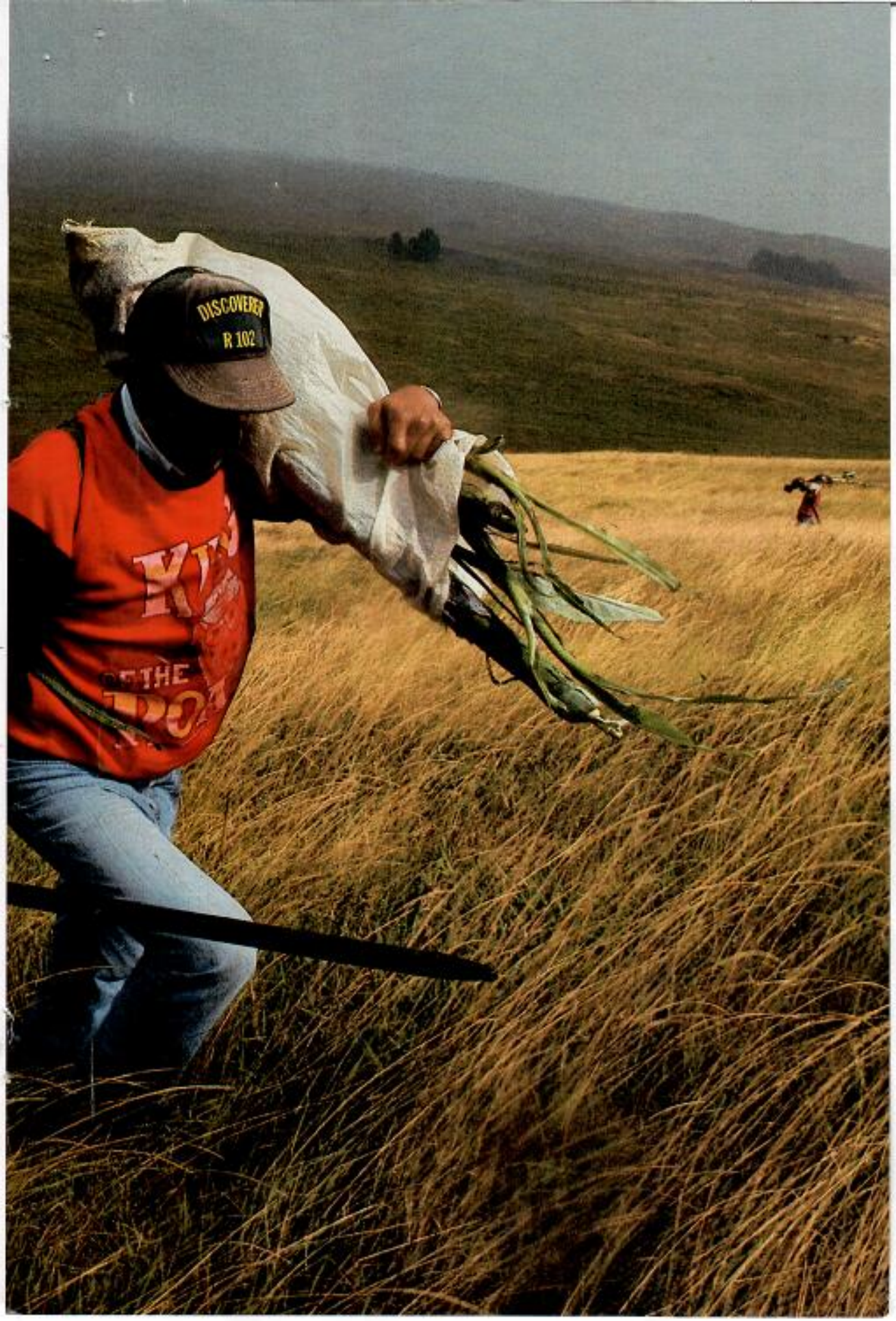
demonstrating the practicality of such a trip, Finney was interested in the strength of the Polynesian voyaging spirit.

The Polynesians were adept explorers and colonizers, and experience earlier in the Pacific had taught them that the best way to escape war or famine was to sail east, to windward, in search of new islands. They were apparently willing (as was Felipe Teao in the 1950s) to set out despite strong odds that they would not reach land.

Finney has estimated their probable rate of failure. While routine among colonizing species in the animal world, it is appalling for humans: Assuming that ten canoeloads of explorers, traders, and would-be colonists from different islands disappeared every year, with 25 people in each, 500,000 people may have died over the 2,000 years of Polynesian voyaging. And once, 50 people got to Easter Island. The archaeological survey has found no evidence to suggest that anyone else reached the island between the arrival of these first colonists and discovery by Europeans or to support the



Forging up Maunga Pui's slope, Zorobabel Fati will plant banana shoots with his digging pole. Slash-and-burn farming probably led to devastation of native forests and to soil erosion. Despite new cultivation, much of the island is barren of crops.


DISCOVERER
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notion of a clash between two cultures. Easter Island after A.D. 400 appeared to be a closed system with its own cultural evolution.

To get some hint of what the founders of this grand biological experiment faced, I went out one evening with Gerardo Velasco, a government agronomist with a passion for the botanical life of his adopted island. Velasco led the way over a cliff and down across huge pitted blocks of black volcanic rock; the sea crashed in below us and pitched a fine drifting mist overhead. At the foot of the cliff, he pointed out perfect cylindrical holes, some of them two or three feet in diameter, where the shape of ancient tree trunks had been preserved in the lava that flattened them.

"There's no doubt that these were palm trees, from the pattern of the bark there," Velasco said, "and then these tubes are so perfectly cylindrical."

Easter Island was, in fact, forested for most of its history, its present appearance to the contrary. Settlers gradually cleared the forest to plant the taros, yams, sweet potatoes, bananas, sugarcane, and paper mulberries they carried with them in their canoes. Wood, along with stone, also served as the artistic material in which the colonizers took their Polynesian heritage and slowly shaped it into the unique art of Easter Island.

Island carvers also quickly recognized the sculptural possibilities and relative permanence of the soft volcanic tuff from Rano Raraku, and the great epoch of carving moai and raising them on ahu began. Researchers explain this artistic flowering partly in terms of increasing mastery over the new environment: For a clan to produce a moai meant that it was able to maintain its carvers at Rano Raraku, to manufacture ropes from tree bark for lowering the statue from the cliff face, to cut down tree trunks for the sledges and rollers used in transporting the statue, and to feed scores of people as they hauled the statue home from Rano Raraku.

But Polynesians did not merely manipulate the environment; they sometimes destroyed it, and the island archaeological record is rich with species they caused to become extinct. On Easter Island, researchers believe that the growing population and rapid deforestation for agriculture and for the moai cult drove ancient rivalries to a high pitch, which in turn accelerated the rate of environmental destruction. Clans sometimes toppled their own aging statues to build bigger, better ones, their surfaces polished with coral. The new moai testified to the enduring strength of the clan. This monumental competition apparently continued until depletion of island resources made it insupportable, and the clans turned on one another in warfare and cannibalism. Legend records that the last palm was cut down during conflict in the 19th century.

AN AIR OF BLOODY HAVOC still hangs over the landscape from the period after 1500. While some of the moai have been resurrected by archaeologists, most still lie with their bases propped on the front edge of the ahu and their heads in the dirt. They peer at their neighbors from empty eye sockets, as if asking whether it is safe yet to get up again. In places they are littered like corpses after a battle: a broken head, thrown backward in the sand, with only the gaping nostrils exposed to the air or a figure buried in displaced rocks, with a green tendril feeling its way across the cheekbone.

Sunday catch, a prize yellowtail, lights the smile of Ruben Figueroa—and tempts one of his cats. The shoemaker, who moved to Easter Island from Chile in 1975, fishes with his friends on weekends from the island's rocky cliffs. Islanders rely on fish such as tuna, yellowtail, and mahi mahi as a prime food source.

Nor does the island want for human remains. I crouched down one afternoon to peer under a low rock overhang, and as I balanced there, my eyes adjusting to the darkness, I realized I was staring at a human skull, rolled on its side, its front teeth missing. I moved aside some debris and found the jaw lying nearby in a litter of ribs and femurs. It had the rounded "rocking chair" jawline characteristic of Polynesians, a trait anthropologist George Gill at the University of Wyoming recently identified in 48 percent of the Easter Island skulls he studied.

Physical evidence of cannibalism also occurs, along with legends that generally have to do with hunger rather than ritual, as if rival clans constituted a sort of free-ranging delicatessen. The evening I

climbed Rano Raraku, I paused among the monumental statues on the outside slope and looked out to Motu Marotiri, a high black pedestal of rock rising out of the sea off the southeast coast. I was haunted by the notion that the same deforestation that caused Rapa Nui civilization to cave in on itself had probably also cut off escape: No large trees meant no canoes capable of long-distance voyaging. Legend recalls that islanders frightened of rival clans swam out and sought refuge crowded on the barren rock of Marotiri. Even there the warriors organized raids to kill them and carry their corpses back to the main island, to be eaten.

For me the most disconcerting and unexpected aspect of Easter Island was the penetrating sensation at that moment that this brilliant civilization could have collapsed into such desperation. What happened to the Rapa Nui suggested that uncontrolled

growth and the impulse to manipulate the environment past the breaking point were not merely aspects of the industrialized world; they were the human condition. Thus the biological experiment on Easter Island went fatally awry.

WHEN THEY TALK ABOUT their heritage today, the name the Easter Islanders themselves invoke with greatest esteem, after Hotu Matu'a, is William Mulloy, a little-known archaeologist at the University of Wyoming who first came to the island with Heyerdahl. After a brief flirtation with the South American hypothesis, Mulloy began the research that produced persuasive evidence of the culture's Polynesian roots. He launched the archaeological survey and oversaw careful restorations, rebuilding stone houses and resurrecting toppled moai. Mulloy's work offered the islanders, for the first time in centuries, a glimpse of what they had been at the height of their civilization. His work gave the islanders a Rapa Nui identity to cling to in the face of the final influx of the outside world. "By restoring the past of his beloved island," a memorial plaque declares, "he also changed its future."

About Heyerdahl, on the other hand, the islanders tend to be ambivalent. His book *Aku-Aku* turns on his discovery that the islanders had secret family caves in which ancient stone carvings were still hidden, some of them, in his view, hinting at South American antecedents. By the power of his personal aku aku and the prestige of science, Heyerdahl persuades the superstitious natives to open the caves to him and sell the contents.

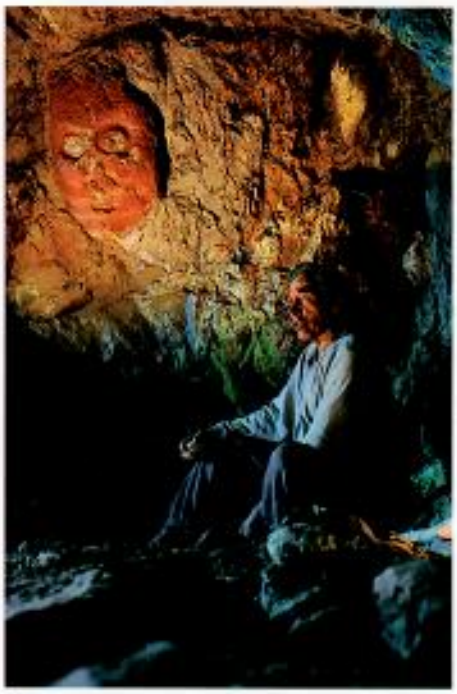
As I talked with the islanders, though, it turned out that they had their own version of events. "Thor knew I was a very good carver, and he came to see me," said one of them, a businessman now, in gold-rimmed glasses and a blue button-down shirt. "He asked me to take out of my cave all the ancient objects that I had there. I told him that I didn't have anything, but he insisted that I did."

I went away thinking about something another islander had said on the question of gullibility: "Thor Heyerdahl didn't trick the people here; they took advantage of what he wanted." They carved objects "to fit what he wanted to believe about the island."

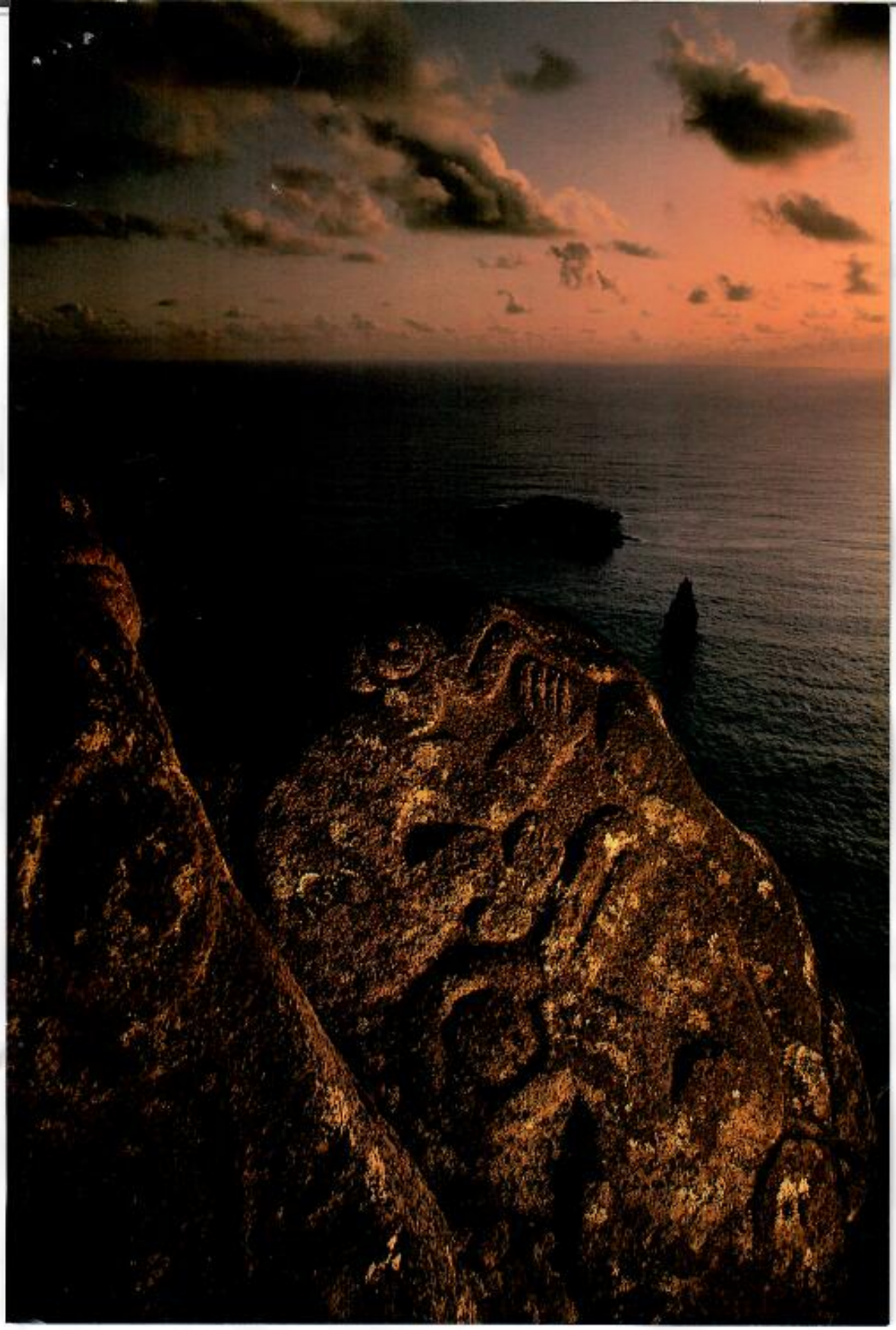
Heyerdahl argues that he could distinguish between the fake carvings and the authentic ones.

But the same islander reminded me that the Rapa Nui have a 1,500-year-old civilization. They have adapted and endured through settlement, warfare, famine, cannibalism, slave raids, smallpox, leprosy, military rule, and now tourism. Their lives are testimony that there is still strength in the confines of the island, and that they remain ingenious enough to exploit its limited resources, however circumstances may change. They know who they are and where they live.

"We have our history," said one. "We have our culture. We speak the Polynesian language." He smiled benignly. "If you brought a South American Indian here, he would starve." □



Perched on Orongo's cliffs, a petroglyph (right) recalls the ancient birdman cult. Each year the island chief whose representative retrieved the first egg of the sooty tern from nearby Motu Nui was named birdman. Contenders waited in caves like this, where a painted image glares above islander Felipe Teao. "My grandfather used to come here," he says. "I come back to honor him."



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Pacific Science (1987), vol. 41, nos. 1–4

Geographic and Marine Isolation: An Assessment of the Marine Algae of Easter Island[1]

B. Santelices[2] and J. A. Abbott[3]

ABSTRACT: The marine flora of Easter Island is one of the least known in the Pacific. Yet it appears as a most attractive flora because of its geographic isolation. This study reports the results of an expedition to the island, providing new records on the marine algal flora, giving the first description of the intertidal and shallow subtidal vegetation, and allowing for a first marine phytogeographic characterization of the island. There is a total of 166 taxa from this relatively small volcanic island to which 66 new records have been added. The marine algal flora of Easter Island appears rich and diverse as compared with that of other similar sized islands in the central Pacific and is monotonously similar in different habitats around the island. It is short and turfy in stature, composed mainly of species with wide geographic distribution in the tropics with a general affinity to the western Pacific. The previously reported 24% endemism of the marine flora is reduced to 14% by the current study, owing to the increased numbers of non-endemic taxa. In its Indo-Pacific relationship, the flora is similar in derivation to those invertebrates that have been studied.

Easter Island (27°07'S; 109°22'W), also known as Isla de Pascua, Tepito-Te Henua, or Rapa Nui, is one of the two Chilean geographic territories which does not fall within the influence of cold oceanic currents. Thus, the components of the marine algal flora can be expected to be quite different from those described for similar latitudes on the Pacific South American coasts (Howe 1914; Levring 1960; Dawson et al. 1964; Acleto 1973; Santelices and Abbott 1978; Santelices 1980).

In contrast to other islands in the central Pacific, Easter Island has a remarkably homogeneous topography and climate for most of its coastline. The island is small (106 km^2), triangular shaped, with a maximum length of 24 km and maximum width of about 12 km (Figure 1). Although it is hilly and relatively barren, maximum elevation is only 560 m above sea level. The coastline is characterized by cliffs with no beach and strand at their bases and an absence of sheltered bays. There are only three small sandy beaches characterized by coralline sand and surrounded by low cliffs (Anakena, La Perouse, and Ovahe; Figure 1). The winds are strong (normally 5–7 knots) and they change directions seasonally and daily. In January the predominant wind is E and SE, while in July it is NW, W, and SW. As a result, all parts of the island are exposed to storms and heavy swells at different times of the year. Data on other climatic elements (sunshine, relative humidity, cloudiness, precipitation, and temperature) show only small differences among the various points around the island. Therefore, the marine algal associations can be expected to be similar around most of the island, except in the few points where there are major topograhic changes.

Easter Island is one of the most isolated points in the Pacific Basin. It lies 4130 km west of the coast of Chile, almost equidistant from Antofagasta and Valparaiso. The nearest land to the east is Mas Afuera, an island in the Juan Fernández Archipelago about 3241 km away. The nearest land to the west is the uninhabited

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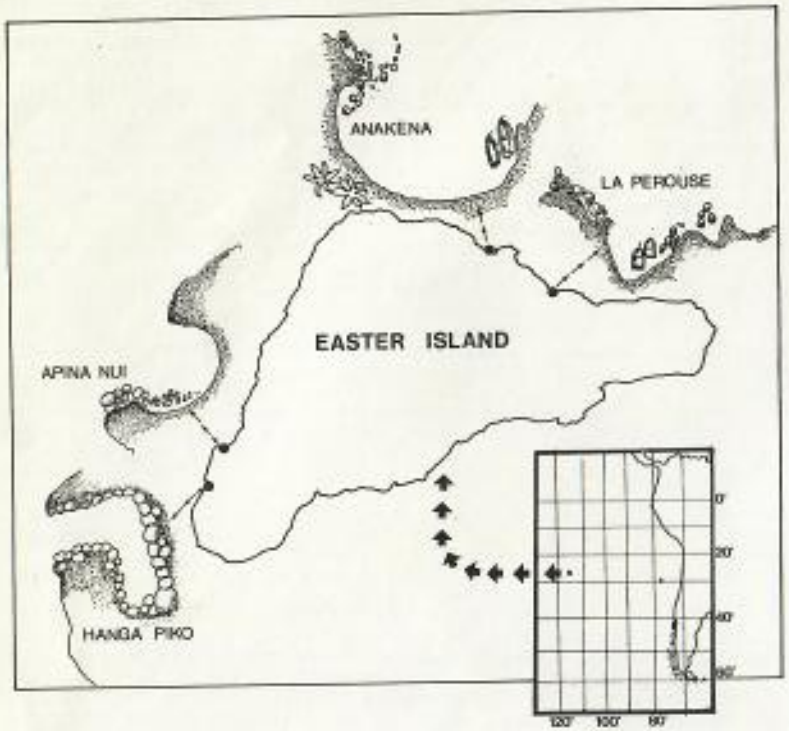

FIGURE 1. Map of Easter Island showing the study sites.

atoll Ducie Island 2315 km away, with Pitcairn Island 537 km further to the west. Algal collections at all of these sites would yield important insights into biogeographic relations, algal migration routes, and dispersion capacities.

So far, the knowledge of the marine algal flora of Easter Island is limited to two collections. The first was made by Skottsberg in intertidal habitats of a single locality (Hanga Piko) on the west side of the island. The sample included 20 "glasses" (volume not defined), a few herbarium specimens and a few stones with crustose coralline algae. The bulk of this collection was studied by Børgesen (1924) who identified 65 taxa, 24% of which were thought to be endemic. Later publications by Sjoestedt (1924), Petersen (1928), and Levring (1943) added one species of Phaeophyta, six species of Cyanophyta, and three species of calcareous Rhodophyta to the marine flora. In 1960, Etcheverry reported on 18 algal species collected by several people, adding four new records. Therefore, at present a total of 78 taxa of benthic algae is known for the island. This combined total includes seven species of Cyanophyta, nine Chlorophyta, 13 Phaeophyta and 49 Rhodophyta. The subtidal flora of the island is incompletely known.

Due to the limited amount of material collected by Skottsberg, Børgesen did not attempt to make biogeographic or ecological characterizations of the island in 1924. He noticed, however, that as expected from its geographic situation, the flora was clearly subtropical in nature with a few tropical species. In addition, he remarked that most of the individuals in the several species found were small, with a creeping habit that produced strong haptera or rhizoids by which these individuals fastened to the substratum. Most of the species were low tufts, or cartilaginous. Børgesen interpreted these features as adjustments to the very strong surf that continually beats the shores of this extremely exposed island.

This study reports on three aspects of the marine flora of Easter Island. First, the results of a new taxonomic survey made in September 1981, are analyzed; second, ecological observations made during the floristic survey at various intertidal and subtidal habitats are provided with special emphasis on the type of algal associations found. Finally, the floristic affinities and the patterns of geographic distribution of this marine algal flora are discussed. A first report on the floristic similarities between Easter Island and other Pacific localities has been published elsewhere (Abbott and Santelices 1985).

STUDY SITES

The island was visited between 30 August and 10 September 1981. In the first three days, a rough survey of the island and a search for collecting places was conducted, in order to define habitats to be investigated.

Most of the coastline was volcanic rock with only a few sandy beaches. There were no natural ports and the few bays found were small and not sheltered. Wind direction and velocity changed frequently, and the few bays were rough when directly exposed to prevailing winds. The slope of the coast was steep, and intertidal and subtidal platforms, or exposed coral reefs, were infrequent.

Four localities were selected for further study. They represent the most different intertidal and shallow subtidal landscapes.

a) LA PEROUSE. This is a small bay on the northern side of the island used as a port by local people. Three types of habitats were explored here: volcanic rocky outcrops and platforms exposed to surf and wind; sheltered shallow lagoons with boulders 40–70 cm diam where sand is accumulated; and subtidal rocky outcrops normally surrounded by sand (down to 10 m depth).

b) ANAKENA BEACH. This is a sheltered, horse-shoe shaped bay northwest of La Perouse. Anakena is one of the few sandy beaches on the island and has volcanic rocky outcrops lining both sides of the bay. The outer east side of the rocky outcrops is exposed to waves. The rocky front gradually changes into flat, protected rocks as one moves southward onto the sandy beach. Closer to the beach the rocky platform is interrupted by extended sandy areas. In addition to these platforms, collections at Anakena included subtidal algae on rocks down to 8 m depth.

c) APINA NUI. This is a rocky area on the west side of the island, near Hanga Piko, the area in which Skottsberg collected in 1917. The area is representative of exposed and semi-exposed rocky intertidal with adjacent shallow subtidal habitats. The rocky exposed habitat in Apina Nui is similar to La Perouse. Pools and lagoons in Apina Nui, however, are more exposed to water movement than La Perouse and they do not accumulate sand. The only intertidal-shallow subtidal pool dominated by cerebriform corals found in the survey occurred at this locality. The subtidal of Apina Nui (down to 8 m) is volcanic rocks without sand accumulations.

d) HANGA PIKO. This represents the most sheltered intertidal situation on the island. It is a channel 200 m long and 20 m wide, built at right angles to the sea, used as a dock for small and medium-size boats. Boulders and stones are abundant in the bottom of the channel and they gradually merge into typically subtidal rocky plat-

forms similar to those described for Apina Nui.

MATERIALS AND METHODS

Each locality was studied during two consecutive low tides, normally within the same day. In the first tidal period, efforts were made to collect as completely as possible. In the second period, attention was drawn to a descriptive, qualitative survey of the various types of habitats and algal associations found in each locality. Also during the second visit taxa missed the first time were obtained. Collecting in the intertidal and subtidal was performed simultaneously by two persons. There were no facilities on the island for the use of SCUBA equipment, therefore diving was limited to depths of less than 10 m. Profiles relating to low water levels were constructed from diving and intertidal notes, including depths derived from wrist gauges or by direct measurements. Vegetation abundance and associations were derived from subjective estimates. Due to time and logistic limitations, quadrat reading was not possible.

All material was preserved in a solution of 5% formalin in seawater and transported to Santiago where large specimens were prepared as herbarium specimens and small ones kept in preservative for future study. The latter have subsequently been prepared as slide material. Both herbarium specimens and slide material are preserved in the Sala de Sistemática, Pontificia Universidad Católica de Chile in Santiago.

This study is restricted to the benthic Chlorophyta, Phaeophyta, and Rhodophyta. Since different systems of taxonomy are used for Cyanophyta, it seems best to omit them at this time. Some crustose Rhodophyta also have been excluded from this study because they were not specially collected during the survey.

Floristic comparisons between localities in the island have been based on numerical analyses. The degree of floristic similarity was calculated using Sorensen's (1948) coefficient of similarity. The resulting matrices were subjected to cluster analysis employing the weighted pair method (Sokal and Sneath 1963; Mueller-Dombois and Ellenberg 1974).

Close to 75% of the species reported from the island (in this or previous studies) was considered for the analysis of geographic affinities. All taxa with doubtful taxonomic position or validity were excluded. The geographic distribution of each species considered in the analysis was checked in a major floristic account for key geographic areas (e.g.: Setchell and Gardner 1920, 1925; Børgesen 1925–1930, 1941–1948; Hamel 1930, 1931, 1939; Taylor 1937, 1942, 1945, 1960; Okamura 1936; Feldmann 1937; Levring 1941, 1960; Dawson 1952–1958; Chapman 1956; Lindauer et al. 1961; Dawson et al. 1964; Pham-Hoang 1969; Acleto 1973; Santelices and Abbott 1978).

For geographic comparisons a number of selected Polynesian islands were used. Many of these islands are still poorly collected for marine algae and few modern examinations of species names have been conducted for the few places for which there is a known flora. Moreover, the nomenclature is for the most part out of date. Nevertheless, useful comparisons can be made with several island groups: with Samoa (Setchell 1924) and Tahiti (Setchell 1926) representing volcanic land masses somewhat similar in size to Easter Island; with atolls such as some of the Marshall Islands, including Eniwetak (Dawson 1956, 1957); with a continental tropical marine flora exhibited by Nha Trang, Vietnam (Dawson 1959); and finally with Juan Fernández Islands (Levring 1941) off the coast of Chile which, though tropical in location (ca 34°S), is bathed by cold, oceanic waters of the Perú Oceanic (Humboldt) Current. Comparisons included species distribution patterns and calculation of similarity values between the flora of Easter Island and each of these localities.

RESULTS

Taxonomy and Evaluation of Flora

A total of 107 species of benthic algae was identified from collections from Easter Island. All records of Chlorophyta, Phaeophyta, and

TABLE 1

RECORDS OF TAXA FROM EASTER ISLAND. Chlorophyta. Localities included in this study are La Perouse (LP), Anakena (AN), Apina Nui (AP), and Hanga Piko (HP). Footnotes refer to taxa under earlier names

SPECIES	BØRGESEN 1924	ETCHEVERRY 1960	THIS STUDY LP	AN	AP	HP
Ulva lactuca L.	+	+	+	+	+	+
Enteromorpha						
clathrata clathrata (Roth) Grev.	–	–	+	–	–	+
clathrata crinita (Roth) Hauck	–	–	+	–	–	+
compressa (L.) Grev.	–	–	+	–	–	+
flexuosa (Roth) J. Ag.	–	–	–	–	+	–
intestinalis (L.) Link	–	–	+	–	+	+
linzaeta J. Ag.	–	–	+	–	+	–
salina Kuetz.	–	–	+	+	+	–
Chaetomorpha						
aerea (Dillw.) Kuetz.	–	–	–	+	+	+
linum (Muell.) Kuetz.	–	–	+	+	+	–
spiralis Okam.	–	–	+	+	–	–
Cladophora						
fascicularis (Mert.) Kuetz.	–	–	–	–	–	+
perpusilla Skottsb. & Levr.	–	–	+	+	–	–
socialis Kuetz.	+	+	+	–	+	–
Boodlea						
vitrata (Reinke) Lagerh.	+	–	+	+	–	–
Valonia						
ventricosa J. Ag.	+	–	+	+	+	–
Rhipidophyllon						
retinulatum (Asken.) Heydr.	+	–	+	+	–	–
Microdictyon						
japonicum Okam.[1]	+	–	+	–	+	–
Cladophoropsis						
herpestica (Mont.) Howe	–	–	+	–	+	–
sundanensis Reinh.	–	–	+	+	+	+
Rhizoclonium						
kookeri Kuetz.	–	–	–	–	–	+
Bryopsis						
hypnoides Lamour.	–	–	+	+	–	–
pennata Lamour.	–	–	+	+	+	+
Codium						
decorticatum Silva	–	+	–	–	–	–
spongiosum Kuetz.	–	–	–	+	+	+
Halimeda						
renschii Hauck[2]	+	+	+	–	+	–
tuna (Ell. & Sol.) Lamour.	–	–	+	+	–	–
Caulerpa webbiana Mont.	–	–	–	+	+	+
Acetabularia						
clavata Yamada	–	–	–	–	+	–
Dasycladus gaudichaudii Born. & Flah.	+	–	–	–	–	–
Total (30 taxa)	8	4	21	15	17	12

[1] As *Microdictyon umbilicatum*.
[2] As *Halimeda opuntia* Lamour.

Rhodophyta so far reported from Easter Island are included in Tables 1, 2, and 3. Reports of Cyanophyta have been excluded from these tables as this group of organisms have not been considered in this study. Also excluded from these tables are the report of Levring (1943) of *Lithothamnion mesomorphum* Foslie, *Porolithon crasperdium* Fos-

TABLE 2

RECORDS OF TAXA FROM EASTER ISLAND. Phaeophyta. Localities included in this study are La Perouse (LP), Anakena (AN), Apina Nui (AP), and Hanga Piko (HP)

SPECIES	BØRGESEN 1924	ETCHEVERRY 1960	THIS STUDY LP	AN	AP	HP
Ectocarpus						
breviarticulatus J. Ag.	+	+	–	–	–	–
chnoosporae Børg.	+	–	–	–	–	–
Giffordia						
duchassaingiana (Grun.) Tayl.	–	–	–	+	+	–
mitchelliae (Harv.) Ham.[1]	–	–	+	+	+	–
Feldmannia						
indica (Sond.) Wom. & Bail.	–	–	+	–	–	–
rhizoidea Hollen. & Abb.	–	–	–	+	+	–
Mesospora						
vanbosseae Boerg.	+	–	–	–	–	–
pangoensis (Setch.) Chihara	–	–	–	+	–	–
Ralfsia expansa J. Ag.	+	–	–	–	–	–
Elachista (?) sp.	+	–	–	–	–	–
Colpomenia						
sinuosa (Roth) Derb. & Sol.	+	+	+	+	+	+
Hydroclathrus						
clathratus (Bory) Howe[2]	+	+	+	+	+	+
Chnoospora						
fastigiata J. Ag.	+	–	+	–	–	–
Sphacelaria						
species	+	–	–	–	–	–
novae-hollandiae Sond.	–	–	+	+	+	+
tahitensis Setch.	–	–	–	+	+	–
Dictyopteris						
australis (Sond.) Ask.	–	–	+	–	–	–
delicatula Lamour.	–	–	+	–	–	–
repens (Okam.) Boerg.	+	+	–	–	–	–
Dictyota						
acutiloba J. Ag.	–	–	–	Hanga	maikihu	–
cervicornis Kuetz.	–	+	–	–	–	–
crenulata J. Ag.	–	–	+	+	–	+
Lobophora						
variegata (Lamour.) Wom.[3]	+	+	+	+	+	+
Padina						
australis Hauck	–	–	–	+	–	+
Zonaria						
crenata J. Ag.	+	+	–	–	–	–
stipitata Tan. & Noz.	–	–	+	+	+	+
Stypopodium						
flabelliforme W. v. B.	–	–	+	+	+	+
Sargassum						
skottsbergii Sjoest.	+	+	+	+	+	–
Total (28 taxa)	13	8	13	14	11	8

[1] As *Ectocarpus mitchelliae*.
[2] As *Hydroclathrus cancellatus*.
[3] As *Zonaria variegata*.

lie, and *Jania rubens* Lamour., collected by Skottsberg at Hanga Piko and a small collection made during our study at Tahai on the west side of the island, close to Apina Nui which contained eight species already included in Tables 1, 2, and 3 (*Ulva lactuca*, *Enteromorpha compressa*, *Cladophoropsis herpestica*, *Colpomenia sinuosa*, *Lobophora variegata*, *Zonaria stipitata*, *Sargassum skottsbergii* and *Gelidiella* sp.). The study of various taxa motivated taxonomic or biogeographic comments, which are included in Table 4.

Our collection includes 41 of the 65 taxa listed by Børgesen (1924). Most of the 24 species missing are either crustose calcareous algae not considered in this study or species likely to be overlooked in the field because of small size (e.g. *Ectocarpus* spp., *Elachista* sp., *Acrochaetium* spp.) or of crustose morphology (e.g.: *Ralfsia*, *Cruoriopsis*). All 17 species listed by Etcheverry (1960) have been collected again, with the exceptions of *Codium pocockiae* and *Dictyota cervicornis*. *Codium pocockiae* was identified by Silva (Etcheverry 1960) and collected at the low intertidal in Hanga Piko and Hanga Roa. Repeated visits to the same habitat failed to yield the species. The records of *Dictyota cervicornis* may never be verified. Although its taxonomic status is not well understood, we are reasonably certain that Etcheverry's identification is incorrect (see Table 4).

In addition to the 42 previous records, our collection contains 66 new records which includes 21 species of green algae, 15 brown algae and 30 species of red algae, giving a combined total from all reports of 144 species from Easter Island. Among these, 7 (4.9%) are Cyanophyta, 30 (20.8%) are Chlorophyta, 28 (19.4%) are Phaeophyta, and 79 (54.9%) are Rhodophyta.

Although a small number of specimens has yet to be identified to species level (Tables 1, 2, 3, and 4), we expect less than five taxa to be added as new records from these collections. The possibilities of increasing the number of endemic species to the island is therefore reduced. In light of these new findings the 24% of endemism proposed by Børgesen is likely to be reduced to less than 14% due to increase in number of non-endemic species found in the present study.

The R/P and R&C/P indices (Sorenson, 1948) calculated on the 144 species so far reported from Easter Island result in values of 2.8 and 3.9 respectively which are considered to be intermediate between cold-water or temperate floras and a tropical flora.

A floristic comparison between the four localities visited on the island indicates (Figure 2) that Anakena, La Perouse, and Apina Nui share close to 60% of the species found at each locality. Anakena and La Perouse have the closest floristic similarity especially when Chlorophyta and Rhodophyta are considered. Hanga Piko, an artificial dock, is the floristically most different locality. The difference, however, does not result from a unique flora for Hanga Piko but from a large reduction in the number of Rhodophyta and Chlorophyta as compared to the other sites. The floristic dissimilarity is slightly over 50%.

Ecological Observations

EULITTORAL VEGETATION: The eulittoral vegetation changes in relation to tidal height, exposure to wave impact, and presence of grazers. For descriptive purposes, ecological descriptions have been arranged in order of decreasing exposure to wave impact and an upper and a lower intertidal zone have been distinguished at each locality (Figure 3).

Exposed Localities: Both La Perouse and Apina Nui are exposed localities but most of the island coastline is equally exposed.

The upper intertidal shows a patchy vegetational cover which is abundant in some areas and absent in others. Patches are composed of short tufts of *Cladophora socialis*, *Giffordia duchassaingianus*, *Sphacelaria novae-hollandiae*, filamentous bluegreens, *Porphyra* sp., and short thalli of *Chnoospora fastigiata*. Upper intertidal pools are abundant especially at Apina Nui and they were monopolized by *Ulva lactuca*, *Cladophora perpusilla* and *Laurencia claviformis*. In the upper-most shallow tidal pools, *Lyngbya* sp. and diatoms are the dominant vegetation.

TABLE 3

RECORDS OF TAXA FROM EASTER ISLAND. Rhodophyta. Localities included in this study are La Perouse (LP), Anakena (AN), Apina Nui (AP), and Hanga Piko (HP)

SPECIES	BØRGESEN 1924	ETCHEVERRY 1960	THIS STUDY LP	AN	AP	HP
Goniotrichum						
alsidii (Zan.) Howe	–	–	–	–	+	–
elegans (Chauvin) LeJol.	+	–	+	+	+	–
Erythrotrichia						
carnea (Dillw.) J. Ag.	+	–	+	+	+	+
Erythrocladia						
hawaiiensis Borg.	+	–	–	–	+	–
subintegra Rosenv.	+	–	–	–	+	–
vagans Borg.	+	–	–	–	–	–
Porphyra sp.	–	–	+	–	–	–
Acrochaetium						
catenulatum Howe	–	–	+	+	+	–
dictyotae Borg.	+	–	–	+	–	–
moniliforme Rosenv.	+	–	–	–	–	+
rufiae Borg.	+	–	–	–	–	–
Yamadaella sp.	–	–	+	+	–	–
Galaxaura						
collabens J. Ag.	+	+	+	–	+	+
(smooth form)	+	–	+	+	+	–
paschalis Borg.	+	–	+	+	+	–
Asparagopsis						
taxiformis (Del.) Coll. & Herv.	–	–	–	–	+	–
Falkenbergia						
rufolanosa (Harv.) Schmitz	+	–	+	+	+	–
Gelidium						
pusillum (Stackh.) Le Jol.	+	+	–	–	+	–
Gelidiella sp.	–	–	–	–	+	–
Pterocladia						
capillacea (Gmel.) Born. & Thur.	–	–	–	+	+	–
Rhizophyllis						
pacifica Borg.	+	–	–	–	–	–
Peyssonnelia sp.	–	–	+	–	–	–
rubra (Grev.) J. Ag.	–	–	–	–	–	+
Cruoriopsis						
dezanonii Web. v. Bosse	+	–	–	–	–	–
Ethelia						
pacifica Web. v. Bosse	+	–	–	–	–	–
Lithothamnion						
sinense Fosl.	+	–	–	–	–	–
Lithophyllum						
rasile Fosl.	+	–	–	–	–	–
samoense Fosl.	+	–	–	–	–	–
Neogoniolithon						
myriocarpum (Fosl.) Adey[1]	+	–	–	–	–	–
Melobesia						
accola (Fosl.) Lem.	+	–	–	–	–	–
paschalis Lem.	+	–	+	–	–	–
Porolithon						
onkodes (Heydr.) Fosl.	+	+	–	–	+	–
gardineri (Fosl.) Fosl.	–	–	–	–	+	–
Amphiroa						
fragilissima (L.) Lamour.	+	–	+	+	+	+
yendoi Borg.	+	–	–	+	–	–
Jania tenella Kuetz.	+	–	+	–	+	–
Choreonema						
thuretii (Born.) Schmitz	–	–	+	–	–	–
Corallina sp.	–	–	+	–	+	–
Nemastoma sp.	–	–	–	–	–	+

TABLE 3 (continued)

SPECIES	BØRGESEN 1924	ETCHEVERRY 1960	THIS STUDY LP	AN	AP	HP
Predaea weldii Kraft & Abb.	–	–	+	–	–	–
Gelidiopsis						
acrocarpa (Harv.) Schm.	–	–	–	+	+	–
variabilis (Grev.) Schm.	–	–	+	+	+	–
Hypnea cenomyce J. Ag.[2]	–	–	+	+	+	+
esperi Bory	+	–	–	–	–	–
species[3]	+	–	–	–	–	–
Gracilaria sp.	–	–	–	–	+	–
Gymnogongrus inequicrassus Borg.	+	–	–	+	+	–
Botryocladia[4]						
skottsbergii (Borg.) Levr.	+	–	+	–	–	–
Champia						
parvula (C. Ag.) Harv.	–	–	+	+	+	–
species	+	–	–	–	–	–
Crouania attenuata J. Ag.	+	–	–	–	–	–
Ptilothamnion						
pluma (Dillw.) Thuret	+	–	+	–	–	–
subsimplex Gordon	–	–	+	+	–	–
Callithamnion						
paschale Borg.	+	–	+	–	–	–
Pleonosporium sp.	–	–	–	–	+	–
Carpoblepharis						
schmitziana (Reinb.) Okam.	+	–	–	–	–	–
Ceramothamnion codii Rich.	+	–	–	–	–	–
Corallophila (?) sp.	–	–	–	–	+	–
Centroceras						
clavulatum (C. Ag.) Mont.	–	+	+	+	+	+
Ceramium						
cruciatum Coll. & Herv.	+	+	+	+	+	+
skottsbergii Peters.	+	+	+	+	–	–
Laurencia						
claviformis Borg.	+	–	+	+	+	+
Chondria						
dasyphylla (Good. & Wood.) C. Ag.	–	–	–	+	–	+
repens Borg.	+	–	–	+	+	+
Polysiphonia						
species	+	–	–	–	–	–
savatieri Har.	–	–	+	+	+	–
scopulorum var. *villum* (J. Ag.) Holl.	–	–	+	+	+	–
Lophosiphonia						
cristata Falk.	–	–	–	+	+	–
Herposiphonia						
pacifica Holl.	–	–	+	+	–	–
tenella (C. Ag.) Ambronn.	+	–	–	–	+	–
species	–	–	–	–	+	–
Dipterosiphonia						
dendritica (C. Ag.) Falk.	+	–	+	+	–	–
Dasya						
villosa Harv.	+	–	–	–	–	–
species	–	–	+	–	–	–
Taenioma perpusillum J. Ag.	–	–	+	+	–	–
Nitophyllum sp.	+	–	–	–	–	–
Heterosiphonia						
wurdemannii (Bail.) Falk.	–	–	–	–	+	–
Total (76 taxa)	45	6	33	29	37	12

[1] As *Lithophyllum myriocarpum*.
[2] As *Cladacanthus spinellus*, Etcheverry (1960).
[3] As *Cladacanthus spinellus*, Børgesen (1924).
[4] As *Chrysymenia skottsbergii*.

TABLE 4

TAXONOMIC AND GEOGRAPHIC COMMENTS ON SELECTED SPECIES

Cladophoropsis herpestica
The presence of this species in Easter Island confirms its pervasive distribution throughout the South Pacific from temperate to tropical waters.

Microdictyon japonicum
Setchell (1929) referred to *M. japonicum* the material identified by Børgesen (1924) as *M. umbilicatum*. In general, thalli of *M. japonicum* show more delicate blades and the color is a lighter green than in *M. umbilicatum* even while bearing in mind that species of *Microdictyon* show relatively wide variation in such features. The Easter Island material strongly resembles *M. japonicum* as recognized in Hawaii.

Avrainvillea clavata
In the field this species can be found at the base of eroded corals together with crustose coralline algae, *Sphacelaria novae-hollandiae*, *Lobophora variegata*, and *Lophosiphonia cristata*, commonly between 1–1.5 m deep.

Dictyopteris repens
This taxon, and *D. delicatula* are relatively small in stature (as compared to *D. australis*, for example) and it may be that only one species is involved here.

Dictyota cervicornis
In the Caribbean, this is a well-marked species with one member of a dichotomy frequently short and spurlike and the margins occasionally with teeth. Neither of these features is shown in the illustrations of Etcheverry (1960), and none of the four specimens identified with *Dictyota* showed these features, either. This species is probably not in the Easter Island flora.

Padina australis
As interpreted by Allender and Kraft (1983) this species is closely related to *P. tenuis* Bory, differing in details of reproductive areas. Since our material was sterile, it is not possible to be certain as to specific attribution, but only to note that there is a 2-cell thick species in the flora.

Zonaria stipitata
Since first described by Tanaka and Nozawa (1962), this species has been collected, though not published upon, from widely different geographic areas in the Pacific. It has been reported recently by Chiang (1981) from Taiwan, and specimens (Herb. B. P. Bishop Museum) have been examined (Abbott, unpublished) from the Marquesas Islands (leg. J. Newhouse), Pitcairn Island, and New Caledonia (leg. P. McKown). The long, cylindrical stipes with hairy basal portions are distinctive. Depending upon the location of the sections through a blade, the sections may show a 3- or 4-layer medulla with a 1-layered cortex on each side. Womersley (1956) believed that Børgesen's recognition of *Z. crenata* from Easter Island was incorrect; we agree with this opinion. Etcheverry's (1960) identification of *Z. crenata*, as shown by his description and illustrations, is also in error. His plant is almost certainly *Stypopodium flabelliforme* which we found to be plentiful and at every station on the island. The 2-celled medulla that Etcheverry shows (Etcheverry 1960, pl. 4, fig. 2) is not that of *Zonaria* but characteristic of the upper portion of the blades of *Stypopodium* (Abbott 1977).

Yamadaella sp.
This taxon externally reminds one of a *Liagora* because of the pigmented hairs protruding through a calcium carbonate layer, or of a rigid *Galaxaura*. Internally, it is closer to *Galaxaura* because of its multiaxial medulla and large-celled cortex, which, however, is not differentiated between the outer (modified) "epidermal" layer and the colorless cortex of *Galaxaura*. Instead, the cortex is composed of pseudoparenchymatous filaments, and thus unlike either *Liagora* or *Galaxaura*. In terms of reproductive structures, it resembles *Liagora*.

Coralline algae
Lemoine in Børgesen (1924) reported upon more crustose coralline taxa than we found, which does not indicate a poor coralline flora but only that they were not collected. However, a special "parasitic" relationship with *Jania* is shown with abundant male, cystocarpic and tetrasporangial plants of *Choreonema thuretii*, known from the Atlantic coast of France, and Southern California south to Costa Rica (Abbott and Hollenberg 1976), and from the central Pacific (Taylor 1950).

Hypnea cenomyce
Species of *Hypnea* are hazardous to identify, even with large numbers of plants. Our collections, while common at all stations did not provide great variation. From the habit and branching pattern, and the encircling tetrasporangial sori, *Hypnea cenomyce* seems to be a better identification than some other species, including *H. asperi* of Børgesen (1924). We believe that *Caulacanthus spinellus* of Etcheverry (1960) is probably a species of *Hypnea*.

Gracilaria sp.
The small (3-cm tall), sterile plants found were too young to identify to species.

Botryocladia skottsbergii
This species is also known as *B. kuckuckii* (Weber van Bosse) Yamada and Tanaka (a synonym) from the central Pacific (Bikini Atoll), the western Pacific (Southern Japan into Indonesia), and Hawaii.

Pleonosporium sp.
Growing from the genicula of Corallina the plants were tetrasporangial.

Chondria repens
When first described, this was one of the endemic taxa, but it has since been reported from southern Japan, the Marshall Islands, and Hawaii and can be expected to be more widely distributed.

Taenioma perpusillum
Both tetrasporangial and spermatangial thalli were collected. As known elsewhere in the Pacific, it is a common component of turf.

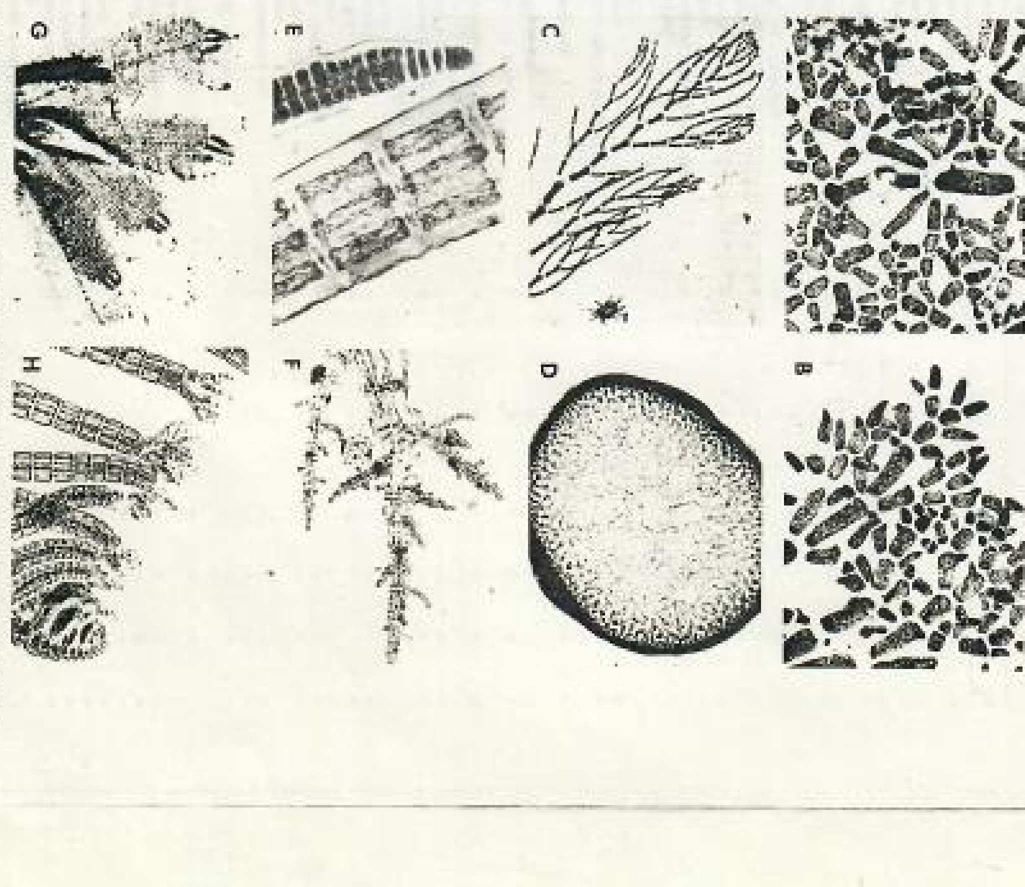

FIGURE 2. Selected species of benthic algae from Easter Island. *A*, *Microdictyon japonicum* from La Perouse (LP). *B*, *Rhipidophyllon reticulatum* from LP. *C*, *Callithamnion pauchale* from LP. *D*, Transection of *Gracilaria* sp. from Apina Nui (AP). *E*, *Polysiphonia scopulorum* v. *villum* from AP. *F*, *Dipterosiphonia dendritica* from Anakena (AN). *G*, Spermatangia of *Taenioma* from AN. *H*, *Herposiphonia pacifica* from AN.

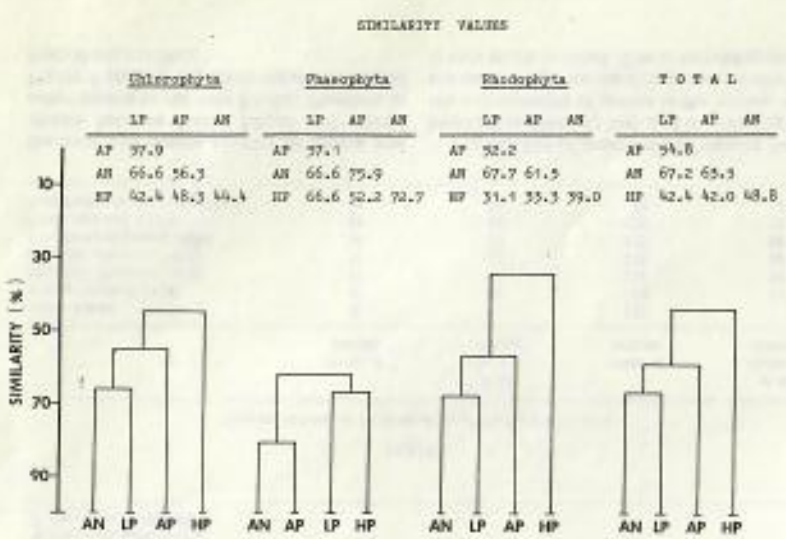

FIGURE 3. Floristic comparisons between four localities studied at Easter Island. LP: La Perouse; AP: Apina Nui; AN: Anakena; HP: Hanga Piko.

The low intertidal and shallow subtidal is devoid of erect frondose algae and covered by a pink crustose coralline algae. The rocks have variable densities of red sea urchins (1–10 individuals/m^2) in sizes ranging from 3 to 10 cm in test diameter and living in holes bored into the rocks. Erect, frondose algae are abundant in areas with reduced densities of sea urchins. There, *Sargassum skottsbergii* dominates between 0 and 2 m deep, sometimes completely covering the rock surface. Rounded cushions of *Hypnea esperi* and *Cladophora socialis* are common among the haptera of *Sargassum*. Short tufts of ectocarpoids and of *Sphacelaria novae-hollandiae* are frequent epiphytes either on *S. skottsbergii* or on *Cladophora*.

In the rocky platforms there are shallow subtidal (1–2 m deep) pools with boulders and large rocks. The algal associations found may also depend on the intensity of water movement. In pools with frequent water exchange there is no sand accumulation between boulders. In the upper intertidal levels of stones and boulders (about 0.5 m above low water levels), small rosettes of *Ulva lactuca* and cushions of *Hypnea spinella* are common. In deeper levels, the vegetation is turf-like, dominated by *Amphiroa fragilissima*, *Jania tenella*, *Laurencia claviformis*, and *Corallina* sp. In deeper positions of the pools, (2–3 m below low water) this surf community is replaced by an algal association dominated by *Pterocladia capillacea*, *Gelidiopsis scoparia*, *Valonia ventricosa*, and crusts of *Lobophora variegata*. *Sargassum skottsbergii* can be locally abundant at these depths and becomes larger and most abundant with increasing depth.

More sheltered shallow subtidal pools (e.g. at La Perouse) show sand accumulation among boulders. Here the lowest level of vegetation (±2 m below zero level) is formed by individuals of *Sargassum skottsbergii* and medium-sized individuals of *Zonaria stipitata* and *Stypopodium lobatum*. Between boulders with large amounts of sand, two different types of associations can be found. One is turf-like, formed principally by *Amphiroa fragilissima*, *Jania tenella*, *Gelidium pusillum*, and *Pollothamnion plumo*. The other is cushion-like formed by *Hypnea cenomyce*, *Colpomenia sinuosa*, and *Hydroclathrus clathratus*. The upper level of vegetation in the boulders (0.5 m above low water) contains bands of *Ulva lactuca* and *Enteromorpha clathrata*.

Sheltered Localities: The only sheltered intertidal habitats found on the island are the southward extension of the rocky outcrops lining Anakena Beach and the artificial dock built in Hanga Piko.

The low intertidal of the sheltered rocky outcrops of Anakena is dominated in cover and biomass by elongated and branched thalli of *Sargassum skottsbergii*. The level immediately above is dominated by *Ceramium skottsbergii*, *Ulva lactuca*, *Hydroclathrus clathratus*, *Centroceras clavulatum* and *Colpomenia sinuosa*. Sand accumulates on and around these rocky outcrops. Closer to the sandy beach, the continuity of the rocky platforms is interrupted by extended sandy areas. *Codium spongiosum*, *Gelidiopsis scoparia*, and large mats of *Ceramium skottsbergii* are the most conspicuous organisms on these rocks.

The sheltered dock of Hanga Piko contains boulders and stones with luxuriant growth of *Ulva lactuca*, *Chaetomorpha linum*, *Enteromorpha compressa*, *Enteromorpha intestinalis*, *Bryopsis pennata* (often represented by detached free-floating rounded cushions), large mats of *Caulerpa webbiana*, *Centroceras clavulatum*, and several species of *Polysiphonia*. In the shallow subtidal, long plants of *Sargassum skottsbergii* heavily loaded with epiphytes are common.

SUBTIDAL VEGETATION: Below 2–3 m deep the vegetation in all the localities visited is dominated by *Sargassum skottsbergii*, *Zonaria stipitata*, and *Lobophora variegata*. At La Perouse, the subtidal rocky platforms (4–8 m deep) have, in addition, good representation of *Microdyction japonicum* epiphytic on *Zonaria* and *Lobophora* and scattered individuals of *Galaxaura collabens*. In Tahai-Apina Nui, the subtidal has, in addition to the three brown algae, abundant *Asparagopsis taxiformis*. The subtidal vegetation at Anakena is fully dominated by *Lobophora variegata* and *Sargassum skottsbergii* while the deeper end of the dock in Hanga Piko (4–7 m deep), has abundant representation of *Dictyota crenulata*, *Padina australis*, and *Galaxaura collabens* in addition to *S. skottsbergii*, *L. variegata*, and *Z. stipitata*.

Geographic Relations

FLORISTIC AFFINITIES: The benthic algal flora of Easter Island comprises five groups of species with different patterns of geographic distribution (Table 5). About 35.6% of the flora (36 species) are species with wide distribution in both temperate and tropical waters. About 23.8% (24 species) are species of wide distribution in warm waters, many of which have been reported from localities in the Central Pacific, the Caribbean, and the Indian Ocean. Twenty-one species (20.7%) have a west Pacific (Indo-Pacific) pattern of distribution. Some of these species are restricted to a few islands in Polynesia; others are present also in Malaysia, northern Australia, Vietnam, Japan, and a few reach northern New Zealand.

A fourth group is represented by 14 endemic species (13.9%), most of them Rhodophyta. No endemic species of Chlorophyta have been reported for the island and only three Phaeophyta are recognized as endemic.

The fifth group is composed of six species found only in a few other localities in addition to Easter Island. One of these is biogeographically interesting because it corresponds to a species also found in Juan Fernández (*Cladophora perpusilla*). Four other species have been found in California (*Feldmannia rhizoidea*, *Fosliella paschalis*, and *Callithamnion paschale*) and California and Japan (*Chaetomorpha spiralis*) and could result from the same taxonomist (I. A. Abbott) working both floras. The sixth case in this group is rather puzzling and is represented by *Codium poceckiae*, reported previously only from South Africa.

COMPARISON OF MARINE FLORAS FROM SELECTED ISLANDS: Data in Table 6 indicate

TABLE 5

EXAMPLES OF PATTERNS OF GEOGRAPHIC DISTRIBUTION OF BENTHIC ALGAE REPORTED FROM EASTER ISLAND

GROUP 1	GROUP 2	GROUP 3
SUBCOSMOPOLITAN OR OF WIDE DISTRIBUTION IN TEMPERATE AND TROPICAL WATERS	WIDE DISTRIBUTION IN WARM WATERS	WEST PACIFIC PATTERN OF DISTRIBUTION
1. *Ulva lactuca*	1. *Valonia ventricosa*	1. *Cladophora socialis*
2. *Enteromorpha compressa*	2. *Caulerpa webbiana*	2. *Microdictyon japonicum*
3. *Chaetomorpha aerea*	3. *Codium spongiosum*	3. *Cladophoropsis herpestica*
4. *Bryopsis hypnoides*	4. *Hydroclathrus clathratus*	4. *Dictyopteris australis*
5. *Giffordia mitchelliae*	5. *Lobophora variegata*	5. *Padina australis*
6. *Ralfsia expansa*	6. *Sphacelaria novae-hollandiae*	6. *Zonaria stipitata*
7. *Colpomenia sinuosa*	7. *Asparagopsis taxiformis*	7. *Lithophyllum somoense*
8. *Goniotrichum pusillum*	8. *Porolithon solubile*	8. *Predaea weldii*
9. *Pterocladia capillacea*	9. *Hypnea esperi*	9. *Botryocladia skottsbergii*
10. *Centroceras clavulatum*	10. *Gelidiopsis variabilis*	10. *Chondria repens*

GROUP 4	GROUP 5	
ENDEMIC TO EASTER ISLAND	SHORT RANGE DISTRIBUTION	DISTRIBUTION ELSEWHERE
1. *Ectocarpus chinoporus*	1. *Cladophora perpusilla*	1. Fernández
2. *Sargassum skottsbergii*	2. *Chaetomorpha spiralis*	Japan, California
3. *Mesophyra vanbosseae*	3. *Codium pocochise*	South Africa
4. *Erythrocladia vegae*	4. *Feldmannia rhizoidea*	Central California
5. *Acrochaetium discoideum*	5. *Foslella paschalis*	California, Revillagigedo
6. *Gelasaura paschalis*	6. *Collithamnion paschale*	California and Gulf of California
7. *Erbella pacifica*		
8. *Amphiroa yendoi*		
9. *Ceramium skottsbergii*		
10. *Laurencia claviformis*		

TABLE 6

NUMBER OF SIMILAR TAXA FROM SELECTED PACIFIC ISLANDS

	TOTAL # GENERA	# OF COMMON GENERA	TOTAL # SPECIES	# OF COMMON SPECIES
Easter Island	85		135	
Samoa (Setchell, 1924)	43	31	67	13
Marshalls (Dawson, 1956)	75	42	141	30
Eniwetak (Dawson, 1957)	91	55	176	30
Nha Trang (Dawson, 1959)	98	53	132	18
Tahiti (Setchell, 1926)	68	46	125	33
Juan Fernández (Levring, 1941)	64	30	94	9

the total and shared number of genera and species between Easter Island and several other islands in the west Pacific. Numbers in Figure 4 refer to similarity values calculated from these numbers.

The number of genera shared among these localities is relatively high and is testimony to the commonality of genera in the tropics. On the other hand, the number of species shared is very much reduced. This is surprising since

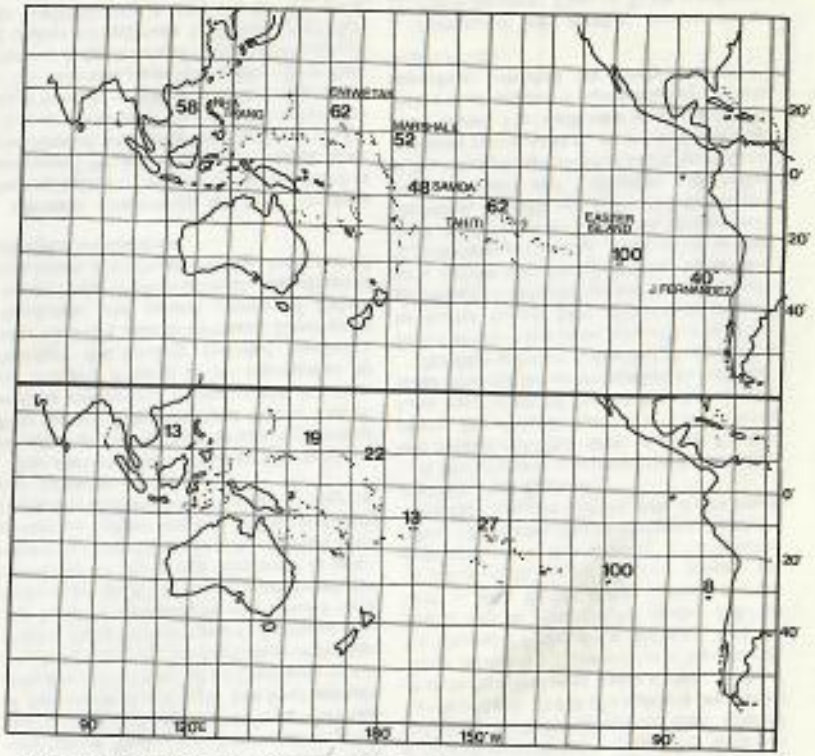

FIGURE 4. Similarity values between the marine algal flora of Easter Island and six other locations in the central Pacific. Values in upper map are based on genera; those in the lower map are based on species of algae.

79.2% of the flora of Easter Island is composed of species with wide distribution either in temperate and warm waters (group 1; Table 5), in warm waters (group 2; Table 5), or in the west Pacific (group 3; Table 5).

The similarity values between the flora of Easter Island and other localities in the west Pacific decreases as distance increases. However, even the most remote western locality considered (Nha Trang) maintains a higher similarity value than the nearby eastern Juan Fernández.

DISCUSSION

The results add 66 new records to the marine algal flora of Easter Island, giving a first description of the intertidal and shallow subtidal vegetation and allowing for a first phytogeographic characterization of the flora.

Although there are essentially only two major collections from Easter Island, that by Skottsberg (Bargesen 1924) and the one in this study, we believe that except for deep subtidal algae and coralline algae, the bulk of taxa is

now known for this remote volcanic island. The resulting list of 135 species of marine algae from Easter Island compares the flora favorably to the number from the more intensively collected Southern Marshall Islands (Dawson 1956) and Eniwetak in the Northern Marshall Islands (Dawson 1957) where 149 and 192 taxa respectively have been reported. Earlier collections from Bikini and the Northern Marshalls (Taylor 1950) yielded about 150 species. Intensity of collecting in the Marshall Islands makes those reports among the best known in the Pacific islands for useful comparison with collections from Easter Island and elsewhere. The larger high islands which should show a richer number of species have not been collected as thoroughly as the low Marshall Islands, and the conclusions on distribution patterns that apply to marine and terrestrial organisms and flowering plants (Kay 1980) cannot be applied to the marine algae at this time. From Pitcairn Island in the immediate west, only 21 species are reported by Tsuda (1976) and no other island or island group has been examined carefully for algal species, except Tahiti which is imperfectly known with 123 species reported (Setchell 1926). To the east of Easter Island, cold oceanic currents, whose major thrust is to the north, are likely to prohibit transfer of all but the hardiest of algal propagules. Therefore the diversity of the Juan Fernández marine flora cannot be compared because it is rather temperate in character with a high degree of endemism (32%).

From the ecological point of view, the vegetation of Easter Island appears as rather monotonous, having a similar construction in most localities visited. The high floristic similarity values found when comparing the flora of the subjectively estimated "most different" habitats in the island are good evidence of this. This observation explains why the small collection by Skottsberg at a single locality included such a large number of species that now represent over 50% of the total number of taxa known for the island.

Except for the beds of large *Sargassum skottsbergii* which are ubiquitous in the low intertidal and subtidal, the algae of Easter Island are in general short and turfy, more characteristic of coral atolls of the central Pacific than of volcanic islands. Børgesen (1924) also made this observation and interpreted the low stature, the presence of strong rhizoids and haptera in many of the species, or the crustose morphology of many others, as morphologies that allow adjustments to the very strong surf that continually beats the shores of the island. This is probably true, but herbivory should not be ruled out without further experimental evidence. Sea urchin densities are high at exposed localities, their abundance being correlated with absence or extreme patchiness of vegetation. In the most sheltered habitats visited, where sea urchin densities were low, frondose algae reached larger sizes, the vegetational cover was much less patchy, and algal cover could frequently reach 50–75%.

The pattern of geographic distribution shown by the marine algal flora of Easter Island indicates a high representation of species with wide geographic distribution and a surprisingly low representation of species with short-range distribution or endemic to the island. The high representation of species of wide distribution could be explained because of the geographic isolation of Easter Island. The island is so remote that it can be reached only by species with very good dispersion and colonization capacities which, because of these capacities, are common algae found everywhere. This is contrary to the common expectation that remote and isolated localities necessarily contain unique marine floras.

The low degree of endemism (14%) shown by the flora of Easter Island is equivalent to those found by Fell (1974) for echinoids and by Garth (1973) for brachyurans. These results, however, contrast with 27.3% of endemism found by Randall (1976) for fishes, 28% found by Holthuis (1972) for decapod macrurans, 33% reported by Wells (1972) for scleractinian corals, or the 24% described by Rehder (1980) for mollusks. These results tend to suggest different speciation velocities for different groups and this might be true also for the seaweeds, as clearly Phaeophyta and Rhodophyta have significantly higher representation of endemic species than the Chlorophyta at Easter Island. Still the values

of endemism shown by the two groups are relatively low (about 14%). No definite answer can be given at this time as little is known on speciation rates of benthic algae. However, perhaps the small size of the island habitat coupled with the absence of habitat heterogeneity has allowed for little diversification of the species. Perhaps reproduction of these species in Easter Island is mainly by asexual means and therefore speciation is slow. Or perhaps the repeated volcanic activity in the past has destroyed the oldest endemic vegetation.

It should be noted that the low degree of endemism (14%) shown by the marine algal flora is based on 144 taxa, whereas for most marine animal groups, the base number is less than seven in all groups known except for fishes, mollusks, and brachyurans. Thus, two species of six scleractinian corals reported by Wells (1972) are endemic (33%); of the four barnacles, two or 50% are endemic (Newman and Foster 1983). Altogether, the animal groups that have been studied from Easter Island show between 14–50% endemism, and Rehder (1980) offers these numbers as support for the distinct Rapanuian biogeographic district first recognized by Schilder (1965), and more recently by Newman and Foster (1983). From that viewpoint, the degree of endemism of the marine flora would also contribute to define a Rapanuian biogeographic district.

The numerical analyses of species further characterize the flora of Easter Island as having a general affinity with islands in the West Pacific and almost no relationship with islands in the East Pacific or continental Chile, regardless of distance. The affinities with the west are likely to be higher when the presently poorly known islands of the Society and Tuamotu archipelagoes are examined for algae. By contrast the flora of Easter Island has almost no relationship to the marine flora of Juan Fernández, probably due to the isolating effect of the low temperature of the Perú Current. Thus, it is suggested that islands in the west have been the species source for Easter Island with only limited floristic exchange with the east. These results do not support the inclusion by Udvardy (1975) of Juan Fernández in the Southeastern Polynesian Province of Gressitt (1961) and Usinger (1963). This biogeographical province, as defined by Gressit includes Easter Island southwest to Rapa (approximately 3500 km distant, near 145°W). Both Gressitt and Usinger placed Juan Fernández in the Neotropical Province, which from the algal view point seems to be correct.

In conclusion, the marine algal flora of Easter Island can now be characterized as rich and diverse as compared with that of other islands of similar size in the central Pacific, monotonously similar in different habitats around the island, short and turfy in stature, composed mainly of species with wide geographic distribution, reduced endemism, and with a general geographic affinity with the west Pacific.

ACKNOWLEDGMENTS

We appreciate the economic support of Vicerrectoría Académica and Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, which allowed the first author to visit Easter Island in September 1981 and the second author to visit Chile in the summer of 1983. Our special gratitude to Vicerrector Hernán Larraín, to the Dean Dr. Jorge Lewin and to chairman Dr. Patricio Sánchez for much support during this enterprise. The help of Antonio Larrea during the visit to the island as diving and collecting partner, photographer, and illustrator proved critical for this study and is acknowledged with gratitude. Also appreciated is the help provided by Governor Ariel González for facilities and especially transportation. To César Aguilera and his family our deep appreciation for help and hospitality while staying on Easter Island.

LITERATURE CITED

ABBOTT, I. A. 1977. On the identity of *Zonaria hawaiiensis* (Phaeophyta), (Dictyotales). Bull. Jap. Soc. Phycol. 25(Suppl.) : 1–8.

ABBOTT, I. A., and G. J. HOLLENBERG. 1976.

Marine algae of California. Stanford University Press, Stanford, 827 p.

ABBOTT, I. A., and B. SANTELICES. 1985. The marine algae of Easter Island (Eastern Polynesia). Proc. Fifth. Intern. Coral Reef Congress 5:71–75.

ACLETO, C. 1973. Las algas marinas del Perú. Bol. Soc. Peruana de Bot. 6:1–64.

ALLENDER, B. M., and G. T. KRAFT. 1983. The marine algae of Lord Howe Island (New South Wales): The Dictyotales and Cutleriales (Phaeophyta). Brunonia 6:73–130.

BØRGESEN, F. 1913–1920. Marine algae of the Danish West Indies, Parts 1–2 and vol. 2. Dansk. Bot. Arkiv. 158 p., 40 p., 498 p.

BØRGESEN, F. 1924. Marine algae from Easter Island. In: C. SKOTTSBERG [ed.], The Natural History of Juan Fernández and Easter Island 2:247–309. Göteborg, Sweden.

BØRGESEN, F. 1925–1930. Marine algae from the Canary Islands. Danske Vidensk. Selskab. Biol. Meddel. 5(3) I:1–123; 6(2) II:1–112; 6(6) III:1–97; 9(1) 1–159.

BØRGESEN, F. 1941–1948. Some marine algae from Mauritius. K. Danske Vidensk. Selsk. Biol. Meddel. 1940. 15:1–81; 1941, 16(3): 1–81; 1942, 17(5):1–64; 1946, 20(6):1–64; 1948, 22(12):1–55; 1950, 18(11):1–45; 1952, 18(19):1–72; 1953, 21(9):1–62.

CHAPMAN, V. J. 1956. The marine algae of New Zealand. J. Linn. Soc. Lond. Bot. 55: 333–501, pls. 24–50.

CHIANG, Y. M., and H. N. CHOU. 1980. The occurrence of *Zonaria stipitata* on the southern coasts of Taiwan. Jap. J. Phycol. 28:165–167.

DAWSON, E. Y. 1953–1963. Marine red algae of Pacific Mexico. Part I (1953) Allan Hancock Expedition 17:1–239, 33 pls. Part II (1954) Ibid 17:241–397, 44 pls. Part IV (1961) Pacific Naturalist 2:191–341. Part VII (1962) Allan Hancock Pacific Expedition 26:207, 50 pls. Part VIII (1963) Nova Hedwigia 6:401–481.

DAWSON, E. Y. 1954. Marine plants in the vicinity of Nha Trang, Vietnam. Pac. Sci. 8:373–470.

DAWSON, E. Y. 1956. Some marine algae of the Southern Marshall Islands. Pac. Sci. 10:25–65.

DAWSON, E. Y. 1957. An annotated list of marine algae from Eniwetak Atoll, Marshall Islands. Pac. Sci. 11:92–132.

DAWSON, E. Y., C. ACLETO, and N. FOLDVIK. 1964. The seaweed of Perú. Nova Hedwigia Beih. 13:1–111, 80 pls.

ETCHEVERRY, D. H. 1960. Algas marinas de las islas oceánicas chilenas. Rev. Biol. Mar. 10:83–132, 6 pls.

FELDMANN, J. 1937. Recherches sur la végétation marine de le Méditerranée, le côte des Albères. Rev. Algol. 10:1–339, Figs. 1–26, pls. 1–20.

FELL, J. 1974. The echinoids of Easter Island (Rapa Nui). Pac. Sci. 28:147–158, Figs. 1–3.

GARTH, J. 1973. The Brachyuran crabs of Easter Island. Proc. Calif. Acad. Sci., Ser. 4, 39(17):331–336, Figs. 1–6.

GRESSITT, J. L. 1961. Problems in the zoogeography of Pacific and Antarctic insects. Pac. Insects Monogr. 2:1–94.

HAMEL, G. 1930. Floridées de France. Rev. Algol. 1:278–292; II, ibid 427–457; V, ibid 61–109.

HAMEL, G. 1931. Chlorophycées des côtes françaises. Rev. Algol. 5:1–54, 381–430; 6:9–73.

HAMEL, G. 1939. Pheophycées de France. 432 p., 7 pls., Paris.

HOLTHUIS, L. B. 1972. The Crustacea Decapoda Macrura (The Alphaeidae excepted) of Easter Island. Zool. Meded. (Leiden) 46:29–54, Figs. 1–2, 2 pls.

HOWE, M. A. 1914. Marine algae of Perú. Mem. Torrey Bot. Club 15:1–185, pls. 1–68.

KAY, E. A. 1980. Little worlds of the Pacific. An essay on Pacific basin biogeography. H. L. Lyon Arboretum Publ. N° 9, 40 p. Univ. Hawaii Lyon Arboretum.

LEVRING, T. 1941. Die meeresalgen der Juan Fernández Inseln. In: C. SKOTTSBERG [ed.], The Natural History of Juan Fernández and Easter Island 2:613–670. Almqvist and Wiksells, Göteborg, Sweden.

LEVRING, T. 1943. Einige corallinaceën von der Oster-Inseln. In: C. SKOTTSBERG [ed.], The Natural History of Juan Fernandez and Easter Island 2:759. Almqvist and Wiksells, Göteborg, Sweden.

LEVRING, T. 1960. Contributions to the marine algal flora of Chile. Lunds Univ. Arsskr. N. F. Avd. 2. 56:1–83., 22 figs.

LINDAUER, V. W., V. J. CHAPMAN, and N. AIKEN. 1961. The marine algae of New Zealand II: Phaophyceae. Nova Hedwigia 3:129–150, 73 figs.

MUELLER-DOMBOIS, D., and H. ELLENBERG. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, New York, 547 p.

NEWMAN, W. A., and B. FOSTER. The Rapanuian faunal district (Easter and Sala y Gómez): In search of ancient archipelagos. Bull. Mar. Sci. 33:633–644.

OKAMURA, K. 1936. Nippon Kaiso-Shi. Tokyo, 964 p. + 11 (in Japanese).

PETERSEN, J. B. 1928. Marine Cyanophyceae from Easter Island. In: C. SKOTTSBERG [ed.], The Natural History of Juan Fernández and Easter Island Vol. 2, part IV, N° 14. Almqvist and Wiksells, Uppsala, Sweden.

PHAM-HOANG, H. 1969. Marine algae of South Vietnam. Trung-Tam, Saigon, 555 p. (in Vietnamese).

RANDALL, J. E. 1976. The endemic shore fishes of the Hawaiian Islands, Lord Howe Island and Easter Island. In: Colloque Commerson 1973, O.R.S. T.O.M. Travaux et Documents, Vol. 47.

REHDER, H. A. 1980. The marine mollusks of Easter Island (Isla de Pascua) and Sala y Gómez. Smithson. Contrib. Zool. N° 289, 167 p.

SANTELICES, B. 1980. Phytogeographic characterization of the temperate coast of Pacific South America. Phycologia 19:1–12.

SANTELICES, B., and I. A. ABBOTT. 1978. New records of marine algae from Chile and their effects on phytogeography. Phycologia 17:213–222.

SCHILDER, F. A. 1965. The geographical distribution of cowries (Mollusca: Gastropoda). The Veliger 7:171–183.

SETCHELL, W. A. 1924. Vegetation of Tutuila Island. Carnegie Inst. of Wash. 10:1–188.

SETCHELL, W. A. 1926. Tahitian algae. Univ. Calif. Publ. Bot. 12:291–324.

SETCHELL, W. A. 1929. The genus Microdictyon. Univ. Calif. Publ. Bot. 14:453–588.

SETCHELL, W. A., and N. L. GARDNER. 1920. The marine algae of the Pacific coast of North America. Part II Chlorophyceae. Univ. Calif. Publ. Bot. 8:139–174, pls. 9–33.

SETCHELL, W. A., and N. L. GARDNER. 1925. The marine algae of the Pacific coast of North America. Part III Melanophyceae. Univ. Calif. Publ. Bot. 8:383–898, pls. 34–107.

SJÖSTEDT, L. G. 1924. Ein neues *Sargassum* von der Osterinseln. In: C. SKOTTSBERG [ed.], The Natural History of Juan Fernández and Easter Island Vol. 2, pp. 311–314. Almqvist and Wiksells, Göteborg, Sweden.

SOKAL, R. R., and P. H. A. SNEATH. 1963. Principles of numerical taxonomy. W. H. Freeman and Company, San Francisco, 359 p.

SORENSEN, T. 1948. A method of establishing groups of equal amplitude in plant sociology based on similarity of species content. K. Danske Vidensk. Selsk. Bid. Skr. 5:1–34.

TANAKA, T., and K. NOZAWA. 1962. Some notes on the genera *Padina* and *Zonaria* in the Southwestern Islands of Japan. Mem. Fac. Fish., Kagoshima Univ. 11:179–187.

TAYLOR, W. R. 1937. Marine algae of the Northeastern coast of North America. ix + 427 p., 60 pls. Ann Arbor, Michigan.

TAYLOR, W. R. 1942. Caribbean marine algae of the Allan Hancock expedition 1939. Allan Hancock Atlantic Exp. 2:1–193.

TAYLOR, W. R. 1945. Pacific marine algae of the Allan Hancock expeditions to the Galapagos Islands. Allan Hancock Pacific Exp. 12:528 p., 100 pls.

TAYLOR, W. R. 1950. Plants of Bikini and other northern Marshall Islands. Univ. Mich. Studies, Sci. Ser. 18:227 p.

TAYLOR, W. R. 1960. Marine algae of the Eastern Tropical and Subtropical coasts of the Americas. Univ. Mich. Press, ix + 870 p.

TSUDA, R. T. 1976. Some marine benthic algae from Pitcairn Island. Rev. Algol. N. S. 11: 325–331.

UDVARDY, D. F. 1975. A classification of the biogeographical provinces of the world. IUCN Occ. Pap. No. 18. Morges, Switzerland.

USINGER, R. L. 1963. Animal distribution

patterns in the Tropical Pacific. In: J. L. Gressitt [ed.], Pacific Basin Biogeography p. 255–262. B. P. Bishop Museum, Honolulu.

Wells, J. W. 1972. Notes on Indo-Pacific scleractinian corals, Part 8, Scleractinian corals from Easter Island. Pac. Sci. 26: 184–190, Figs. 1–3.

Womersley, H. B. S. 1967. A critical survey of the marine algae of Southern Australia II. Phaeophyta. Aust. J. Bot. 15:189–270.

Pacific Science (1987), vol. 41, nos. 1–4

Distribution of *Onchidium damelii* Semper (Gastropoda, Onchidiidae)[1]

R. Kenny and A. Smith[2]

ABSTRACT: The pulmonate gastropod *Onchidium damelii* Semper has a widespread tropical Indo-Pacific intertidal distribution. The present study examines some environmental factors in relation to the local distribution and density of the species in a tropical mangrove region.

Tidal regime, floral zonation, substrate particle size and organic content, and temperature relationships were investigated.

O. damelii shows habitat preference rather than a zonal (tidal pattern) distribution within the mangroves; population density is associated with substrate particle size and organic content. Considerable differences in size of individuals were noted between populations, probably related to available organic matter and feeding time.

Animal temperatures were correlated with substrate temperatures and do not appear to influence distribution patterns.

The shell-less gastropod family Onchidiidae is widely distributed, particularly in the tropical and sub-tropical Indo-Pacific (Hoffman 1929; Allan and Bell 1947; Dakin et al. 1952), predominantly inhabiting the intertidal zone of rocky, mangrove, and estuarine shores.

The ecology of the family has been largely neglected. Arey and Crozier (1921) included observations of habitat in their description of the behavior of *Onchidium floridanum* (Dall), and Fretter (1943) gave some ecological information in her study of the functional morphology of *Onchidella celtica* Forbes and Hanley. Various aspects of the ecology of *Onchidium verruculatum*[3] Cuvier were discussed by McFarlane (1979).

The only statement traced concerning a mangrove onchiid is Dakin's paper (1947) describing very briefly the habitat of *Onchidium damelii* Semper on the New South Wales coast.

The present comments are the result of a study of the distribution of *Onchidium damelii* in a tropical mangrove locality at Magnetic Island (Queensland, Australia).

In previous studies of mangrove fauna from Magnetic Island, Macnae (1966) listed *Onchidium damelii* only and Shanco (1975) listed two *Onchidium* spp (not identified). Bretnall's (1919) key, based on male reproductive structures, was used to establish the identity of the study species as *O. damelii*, in the present observations.

Locality

The mangrove area studied is located at Cockle Bay on the west coast of Magnetic Island (lat 19°11'S, long 146°50'E) approximately 8 km offshore from Townsville, Australia. This mangrove stand has been described as typical of the northeastern Australian mangrove flora (Macnae 1966; Spenceley 1982a).

The mean annual air temperature at Townsville is 24.4°C, ranging from a mean maximum of 28.2°C to a mean minimum of 20.6°C. Highest temperatures occur in January and lowest in July (Oliver 1978; Spenceley 1982a). Variations in sea water temperatures parallel the trends of the air temperature fluctuations, with maximum temperatures recorded in January (mean 31.2°C) and minimum records from July (mean 21.8°C) (Kenny 1974).

[1] Manuscript accepted July 1985.
[2] Zoology Department, James Cook University of North Queensland, Townsville, Queensland, 4811.
[3] Nomenclature changed from *O. peronii*; McFarlane, pers. comm.

GHB

May 16, 1989 F/SWC2:GHB

Dr. B. Santelices
Departmento de Biologica Ambiental
de Poblaciones
Facultad de Ciencias Biologicas
Pontificia Univesidad Catolica de Chile
Santiago, Chile

Dear Dr. Santelices:

I recently had the opportunity to read your excellent article in Pacific Science concerning the marine algae of Easter Island. The information that you and Dr. Abbott published on this subject is of interest to me in relation to the herbivorous green turtle, Chelonia mydas. To my knowledge, very little is known about the modern-day occurrence of sea turtles at Easter Island, either nesting ashore or feeding in the coastal waters. However, as you are probably aware, sea turtles play a significant role in the cultural heritage of Easter Island (i.e., petroglyphs and stone "observation towers" at Anakena Beach).

During your field sutdy at Easter Island, I wonder if you sighted sea turtles or heard any information about their occurrence. Several years ago I wrote to Governor Sergio Rapu about the past and present status of sea turtles (copy of letter enclosed). Unfortunately, I never heard back from him and therefore am uncertain if my letter was ever delivered.

I would greatly appreciate hearing from you if you have any knowledge whatsoever about sea turtles at Easter Island. Thank you in advance for your assistance.

Sincerely,

George H. Balazs
Zoologist

Enclosure

Resent 10/31/86

NOAA, National Marine Fisheries Service
SWFC Honolulu Laboratory F/SWC2
2570 Dole Street
Honolulu, HI 96822-2396

March 4, 1985 F/SWC2:GHB

The Honorable Sergio Rapu
Governor
Easter Island
South Pacific

Dear Governor Rapu:

I am writing to inquire about the past and present status of sea turtles at Easter Island. I have read in a recent article in Pacific Islands Monthly that you have extensively studied the archaeology of Easter Island. In a review of the literature, I see that large numbers of turtle petroglyphs occur on Easter Island, as well as stone observation towers said to have been used to watch for turtles. I presume that the petroglyphs depict sea turtles, as I am not aware of any land turtles having been introduced to the island. Do sea turtles lay their eggs on Easter Island at the present time? If so, I would be interested to learn what species are present and their level of abundance. Do the people of Easter Island use turtles for food or any other purposes? Are there any objects made of sea turtle shell or bone in the Easter Island Museum? I understand that Anakena Beach, on the northeast coast, is the island's largest white sand beach. Are there many other beaches, either of white or black sand, where sea turtles could come ashore to nest?

I am sending several articles about sea turtles that I thought you would find interesting. Also enclosed is an identification poster of the various species. I look forward to hearing from you at your earliest convenience.

Sincerely,

George H. Balazs
Wildlife Biologist

cc: Balazs
HL

June 9, 1988 F/SWC2:GHB

Dr. Yosihiko Sinoto
Bishop Museum
1525 Bernice Street
Honolulu, HI 96817

Dear Dr. Sinoto:

I am writing to request your assistance in obtaining information on the past and present status of sea turtles at Easter Island. I recently read the interesting article in the Star-Bulletin newspaper about your work at Easter Island in collaboration with Governor and archaeologist Sergio Rapu. I wrote to Governor Rapu a few years ago concerning my interest in Easter Island's sea turtles, but am uncertain if he ever received the letter (copy attached). Any help that you can provide in obtaining answers to the intriguing questions I have posed would be most appreciated.

Sincerely,

George H. Balazs
Zoologist

Attachment

GHB:ey
cc: Balazs
HL

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION:—

A. AGASSIZ. V.[1] General Report on the Expedition.
A. AGASSIZ. I.[2] Three Letters to Gen. M. Brown, U. S. Fish Com.
A. AGASSIZ and H. L. CLARK. The Echini.
F. E. BEDDARD. The Earthworms.
H. B. BIGELOW. The Medusæ.
R. P. BIGELOW. The Stomatopods.
S. F. CLARKE. VIII.[3] The Hydroids.
W. E. COE. The Nemerteans.
L. J. COLE. The Pycnogonids.
W. H. DALL. The Mollusks.
C. R. EASTMAN. VII.[4] The Sharks' Teeth.
B. W. EVERMANN. The Fishes.
W. G. FARLOW. The Algæ.
S. GARMAN. XII.[5] The Reptiles.
H. J. HANSEN. The Cirripeds.
H. J. HANSEN. The Schizopods.
S. HENSHAW. The Insects.
W. H. HOYLE. The Cephalopods.
C. A. KOFOID. III.[6] IX.[7] The Protozoa.
F. KRUMBACH. The Sagittæ.
B. VON LENDENFELD and F. URBAN. The Siliceous Sponges.
H. LUDWIG. The Holothurians.
H. LUDWIG. The Starfishes.
H. LUDWIG. The Ophiurans.
—— The Actinaria.
G. W. MÜLLER. The Ostracods.
JOHN MURRAY. The Bottom Specimens.
MARY J. RATHBUN. X.[8] The Crustacea Decapoda.
HARRIET RICHARDSON. II.[9] The Isopods.
W. E. RITTER. IV.[4] The Tunicates.
ALICE ROBERTSON. The Bryozoa.
B. L. ROBINSON. The Plants.
G. O. SARS. The Copepods.
F. E. SCHULZE. XI.[10] The Hexactinellidæ.
H. B. SIMROTH. The Pteropods and Heteropods.
E. C. STARKS. Amœnia.
TH. STUDER. The Alcyonaria.
T. W. VAUGHAN. VI.[4] The Corals.
R. WOLTERECK. The Amphipods.
W. McM. WOODWORTH. The Annelids.

[1] Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 23 pp.
[2] Bull. M. C. Z., Vol. XLVI., No. 6, July, 1905, 4 pp., 1 pl.
[3] Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.
[4] Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 21 pp., 3 pls.
[5] Mem. M. C. Z., Vol. XXXIII., January, 1906, 80 pp., 26 pls.
[6] Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.
[7] Bull. M. C. Z., Vol. L., No. 4, November, 1906, 35 pp., 4 pls.
[8] Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 26 pp., 25 pls.
[9] Bull. M. C. Z., Vol. L., No. 6, February, 1907, 45 pp., 16 pls.
[10] Mem. M. C. Z., Vol. XXXV., No. 2, August, 1907, 56 pp., 9 pls.
[11] Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.
[12] Bull. M. C. Z., Vol. LII., No. 1, June, 1908. 14 pp., 1 pl.

Bulletin of the Museum of Comparative Zoology
AT HARVARD COLLEGE
VOL. LII. No. 1.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUT. COMMANDER L. M. GARRETT, U. S. N., COMMANDING.

XII.

THE REPTILES OF EASTER ISLAND.

BY SAMUEL GARMAN.

WITH ONE PLATE.

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CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
JUNE, 1908.

No. 1. — *Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in charge of* ALEXANDER AGASSIZ, *by the U. S. Fish Commission Steamer "Albatross," from October*, 1904, *to March*, 1905, *Lieutenant Commander* L. M. GARRETT, U. S. N., *Commanding.*

XII.

The Reptiles of Easter Island.

By SAMUEL GARMAN.

To give an approximately complete idea of the Herpetology of Easter Island it is necessary to consider and to introduce provisionally into our list of species a number of marine tortoises and a sea serpent, which range throughout Polynesia and the tropical and the temperate portions of the Pacific and the Indian oceans, but which have not yet been taken or known directly from the island by the scientist. The snake has the better claim to attention, having been secured a short distance from the shores and positively determined. The tortoises, of which our knowledge depends wholly upon tradition or other evidence of the natives, cannot be satisfactorily identified, and if they might be, they would add little or nothing in answer to questions relating to the origin or the evolution of the fauna. This leaves as the main dependence in this study two species of small lizards, a third and larger one, the existence of which is asserted by the islanders, having, if it exists, escaped capture. From the material gathered it appears that these lizards were not originally derived from the nearer islands to the westward, in the direction of Samoa and the Fijis, but from the Hawaiian Islands to the far northwestward. We can go no further until possessed of more material. That the Hawaiian Islands and Easter Island may both have obtained the species from some other locality is possible, but of that we have as yet no proof, while it can be said that the affinities of the species from the two localities are markedly direct. Drifting from one to the other being put aside as improbable, Hawaiian lizards may have

been carried to Easter Island in several ways; they may have been landed from some vessel passing, toward the straits or to round the Cape, on its way to the Atlantic, — as we suppose some of the same species have been taken to both western and eastern coasts of South America, — in times more recent than the arrival of the islanders now in occupancy, or the saurians may have been brought with the natives when they came. Ethnologists having failed, so far, to determine the original home of the people from racial characteristics and language, or from their art as seen in the sculptures, and tablets, etc., the hypothesis is permissible, from even so attenuated a thread of evidence as that supplied by the reptiles, that when the men came the lizards came with them. Beyond this it might be possible to account at once for the undifferentiated condition of the species and for the lack of energy and of art in the present inhabitants of Easter Island by a further supposition that the makers of the images and the tablets were swept away by the latest eruption of the volcano, and that their successors with the lizards are the result of a subsequent migration from the Hawaiian Islands or thereabout, an indirect route for the reptiles, as for man, from central Polynesia.

At the first glance various features of Easter Island combine to make the study of its fauna appear to be one of particular attractiveness to the naturalist: such are position, origin, isolation, extent, diversity, and climate; it lies near the middle of the South Pacific (Lat. 27° 10′ S.; Lon. 109° 26′ W.); it originated as a volcano, without connection with other land; it has an area of about thirty-four square miles; it possesses plains, hills, and mountains (to 1700 feet), and it is covered with vegetation. A sense of disappointment comes upon one when in the course of his investigations he realizes how much the island lacks ago, that its birth has been too recent for the evolution of species and varieties in a fauna of its own, when he decides that what is possessed it has borrowed in times not very remote and that he must direct his attention to the route by which it was brought. Possibly more than one start was made by flora and fauna to be destroyed by later activity of the expiring volcano; at any rate eruptive evidences confine the natural history within comparatively narrow limits of time. All of the literary history is decidedly new; it begins with Davis's alleged discovery, 1686, though the little he contributes to knowledge is not positively located and may have pertained to some other islet. Roggewein, April 7, 1722, discovered the island, named it, and furnished a general description with some information concerning people and customs. That the early writers say nothing about reptiles is not to be interpreted as if owing to non-existence but merely to non-observance; several of their statements are repeated here. Why the tortoises should have escaped their notice so completely does not appear; shells and skulls are always in evidence where tortoises are consumed. Captain James Cook, 1774, in his second voyage, gives many details relating to the island and its inhabitants. In regard to the forests the condition apparently had become worse. His men saw "not an animal of any sort and but very few birds." "They have a few tame fowls, such as cocks and hens, small but well tasted. They have also rats, which, it seems, they eat; for I saw a man with some dead ones in his hand; and he seemed unwilling to part with them, giving me to understand they were for food. Land birds there were hardly any; and sea birds but few; these were, men of war, tropic, and egg birds, noddies, terns, &c. The coast seemed not to abound with fish; at least we could catch none with hook and line, and it was but very little we saw amongst the natives." Vol. I, p. 288. La Pérouse, 1786, made additions to the fauna in the sheep, goats, and pigs he left. He says: "La côte m'a paru peu poissonneuse, et je crois que presque tous les comestibles de ces habitans sont tirés du règne végétal." Beechey, who visited the island in 1825, like his predecessors, found the people and their sculptures of first interest. He decided that the natives were "allied in language and customs to many islands in the South Sea," in none of which were such images. He tells us there was not a quadruped on the island in Roggewein's time, and adds, "nor has any one except the rat ever been seen there," Vol. I, p. 56. When discovered, the island is said to have "abounded in woods and forests, and palm branches were presented as emblems of peace; but fifty years afterwards, when visited by Captain Cook, there were no traces of them left." What is known of the fauna through the early literature contains nothing satisfactory on the herpetology. In Thomson's narrative, 1891 in the Smithsonian Report for 1889, there is matter of more pertinence. This article has more general information than those which preceded it. From it we get a better idea of the plant and animal life. Of animals there were on the island at this time, according to this author, neat cattle, rough little horses, many sheep, some rats, a few large and wild cats, some dogs, and some domestic fowls. "There are no quadrupeds peculiar to the island except several varieties of rodents." No small land birds, "only the tropic or man-of-war bird, petrels, gulls, and a variety of aquatic birds." The following concerning

the fishes is quoted in contrast with the statements of Cook and La Pérouse: "Fish has always been the principal means of support for the islanders, and the natives are exceedingly expert in the various methods of capturing them. The bonito, albicore, ray, dolphin, and porpoise are the off-shore fish most highly esteemed, but the swordfish and shark are also eaten. Rock-fish are caught in abundance and are remarkably sweet and good. Small fish of many varieties are caught along the shore, and the flying-fish are common. Eels of immense size are caught in the cavities and crevices of the rock-bound coast. Fresh-water fish are reported to exist in the lakes inside of the craters, but we did not see any of them." Of particular interest in the present writing are the statements concerning tortoises. The author does not explain why he classes them with his fishes rather than his reptiles. "Turtles are plentiful and are highly esteemed; at certain seasons a watch for them is constantly maintained on the sand beach. The turtle occupies a prominent place in the traditions, and it is frequently represented in the hieroglyphics and also appears on the sculptured rocks." Other notice occurs in the translations of the tablets: "What power has the Great King on the land? He has the power to clothe the turtles in hard shell, the fish with scales, and protects every living thing. All hail the power of the Great King who enables us to overcome the defense of the turtles, fish, and all reptiles." Elsewhere it is said that Hotu-Matua and his three hundred, arriving on the island, from land to the eastward, subsisted for the first three months entirely upon fish, turtle, and the nuts of a creeping plant found growing along the ground. And in the account of Machau's arrival with six companions, two months before Hotu-Matua, we learn that on the second day after arriving this party found a turtle on the beach near Anakena, and one of the men was killed by a blow of its flipper in trying to turn it over. At the point Ahunkapu, Mr. Thomson says, "Upon the extreme point we found another one of those round towers, built for the purpose of observing the movements of turtles on the beach." Concerning other reptiles an item is given on page 459: "Small lizards are frequently seen among the rocks; the natives claim that a large variety is not uncommon, but we saw nothing of it. No snakes exist." Small reptiles, no doubt, would find food in the several varieties of butterflies, the myriads of troublesome flies, the fleas that were worse than the flies, the mosquitoes about the water tanks, the cockroaches two inches long with antennæ to correspond, infesting every house on the island, and the peculiar variety of snapping beetle which "made its appearance every evening just before

sundown, appearing suddenly and vanishing with daylight," and which compelled other visitors to stuff their ears with paper.

Confining attention exclusively to the reptiles, it is found that besides the snake and the lizards collected by the "Albatross" there are five or six that may reasonably be expected to figure in later reports. Of these the larger not uncommon variety of lizard is the most indefinite and uncertain. The other four or five are marine tortoises. What is known of the wanderings of these creatures leads to anticipation of the discovery of any or all of the species of the Central Pacific at one time or another on Easter Island. Apparently the notices quoted above indicate that by one or more of the species the island has been adopted as a breeding-place, and that the return to it is regular at a particular season of the year. Unless there are grassy feeding-places near enough in the vicinity the species of the genus Chelonia will probably not be of the regular visitors but of the erratic and accidental. In compiling the list of species to be expected, those recently described from the Chilian coasts by Dr. Philippi have not been introduced, one reason being that they have not been sufficiently distinguished from the species of the Middle Pacific, and another being the unlikelihood of any species crossing from the South American shores through the Humboldt current, 900 miles in width, setting to the northward, and the additional 1200 miles of barren, comparatively foodless waters, pointed out by Mr. Alexander Agassiz, making more than 2000 miles separating the continent and the Galapagos islands, on east and north, from Easter Island. Atlantic species of these tortoises have not yet been shown to be able to pass either Magellan's Strait or south of the Cape, while it is to be expected that species from the Panamic region work their way southward along the coasts of America, reasons both for hesitation in regard to acceptance of Dr. Philippi's species as different from the Polynesian species until proved to be distinct by close comparisons.

Including the tortoises, the Easter Island Reptilia belong to the Chelonia, the Ophidia, and the Sauria.

CHELONIA.

DERMOCHELIDAE.

Dermochelys schlegelii.

TRUNK OR LEATHER BACK.

Sphargis mercurialis Temm. & Schl., Fauna Jap. Rept., 1838, p. 10.
Sphargis schlegelii Garman, Bull. 24 U. S. Mus., 1884, 288, 301.

This species ranges from Japan southward in the Pacific and the Indian ocean. *Sphargis angustata* Philippi may on comparison prove to belong to this species; it is more likely to be thus than that the Atlantic species should pass the straits of Magellan.

CHELONIIDAE.

Caretta olivacea.

LOGGERHEAD.

Chelonia olivacea Eschscholtz, Zoöl. Atlas, 1829, pt. 1, p. 3, pl. 3.
Caretta olivacea Stejneger, Bull. 58, U. S. Mus., 1907, 507.

Localities given for this species are Japan, China, Bonin Islands, Philippines, Bismarck Archipelago, Calcutta, Indian Ocean, Malabar, and East Africa. This is one of the most variable of the marine tortoises. Of five specimens before me two have six costal shields on each side, one has five on one side and six on the other, two have six on one side and seven on the other. Of the same individuals three have two pairs of prefrontals each, and two have each two pairs of prefrontals and an azygous shield in the same area. The specimen having six costal shields on one side and seven on the other agrees in the same respects with that figured by Eschscholtz; none of these individuals agree with it in either shapes or numbers of prefrontals. In the same list the dorsal shields number from six to eight.

Chelonia japonica.

GREEN TORTOISE.

Testudo japonica Thunberg, Svensk. Vet. Ac. Nya Hand., 1787, vol. 8, 278, pl. 7, fig. 1.
Chelonia japonica Schweigger, Prodr. Mon. Chelon., 1814, 21.

Reported from Japan, Bonin Islands, Formosa, New Guinea, Moluccas, Malay Peninsula, Penang, Bengal, India, and Indian Ocean.

Chelonia depressa.

GREEN TORTOISE.

Chelonia depressa Garman, Bull. Mus. Comp. Zoöl., 1880, vol. 6, 124.

The locality given with the type of this species is North Australia. Whether it was a wanderer there has not yet been determined. Though very distinct from *C. japonica* in the adult stage, it may be much more closely allied to it in the young, in which case identification of small specimens may present some difficulties.

Eretmochelys squamosa.

HAWK BILL OR SHELL TORTOISE.

Eretmochelys squamata Agassiz, Contr., 1857, vol. 1, 382 (not *T. squamata* Gmelin).
Caretta squamosa Girard, U. S. Expl. Exp. Herp., 1858, 442, pl. 30, figs. 1–7.

Except to the westward and the north the distribution of this tortoise is but partially indicated by the following localities: Japan, Formosa, China, Singapore, Sulu Seas, Moluccas, Bengal, Indian Ocean, Zanzibar, Mauritius, Sunda Islands, Torres Straits, Bismarck Archipelago, Southern Pacific Ocean, Society Islands, Isle de Carmen, Gulf of California. Eight specimens show no variations in costals and frontals. In eight specimens of *E. imbricata*, from the Atlantic, there are three which vary from the normal, of four costals each side and two pairs of prefrontals; one of the three has five costals each side, and two pairs and an azygous prefrontal; another has four costals one side and five the other; and the third has five prefrontals, that is, two pairs and an azygous shield.

OPHIDIA.

HYDRIDAE.

Hydrus platurus.

Anguis platura Linné, Syst., 1766, Ed. 12, 371.
Hydrus platurus Boulenger, Nat. Fauna Ind. Repr., 1890, 397.

Scales on the body hexagonal, juxtaposed, irregular and imbricated on the tail. Longitudinal rows fifty-six; transverse rows three hundred eighty-three on the body, plus fifty-three on the tail. Labials eight on one side, nine on the other; infralabials eleven on each side. A diamond-shaped interparietal, not in contact with the frontal. About sixteen rows of scales on the back are black; below the black a yellow band, from around the snout on the supralabials, passes along each flank, occupying about six rows of scales; below the yellow bands, starting from the chin on the infralabials and along the flanks on each side a band of black, four to six scales in width, continues for about two-thirds of the length beyond which

the bands are broken into large rounded spots, five or six, which extend downward into the series on the lower edge of the tail. Between the large spots on the upper edge of the tail and those on the lower edge there are irregular smaller spots of black. The belly to within a short distance from the vent is dingy yellowish; on the gular region there are several spots of brown. The peculiar coloration of this specimen represents an extreme phase of a variation from which, in collections made in Panama and San Miguel, Colombia, for the John E. Thayer Expeditions, we have the intermediates grading into the common black-backed, yellow to brownish-yellow-bellied, spotted-tailed form, without lateral bands of black or brown, common throughout Polynesia. This sea serpent was taken in Lat. 26° 36′ S.; Long. 105° 57′ W., about fifty miles northeast of Easter Island. It has been directly compared with numerous specimens, from China, Gulf of Siam, Singapore, Borneo, Java, Bay of Bengal, Society Islands, and Panama, without discovery of characters on which to base so much as a variety.

SAURIA.

GECCONIDAE.

Lepidodactylus lugubris.

Figs. 1-6.

Platydactylus lugubris D. & B., Erp. Gén., 1836, vol. 3, 304.
Lepidodactylus lugubris Fitzinger, Syst. Rept., 1843, 28.

The Easter Island specimens of this little Gecko are ashy to light brownish-gray. Whether intense or faint, the markings are distinct on all. The brown band from the rostral plate through the eye to the shoulder is bordered above by a white streak that is more distinct on the head behind the eye. Each of these specimens has an elongate small spot of brown or black on the occiput. In most cases there are small elongate spots of brown immediately above the tiny bunch at each side of the neck and above the shoulder. The usual pattern on the back from behind the head to the thighs is made up of seven to eight transverse zigzag streaks of brownish, each edged behind by a white one. These lines make a sharp angle forward where they cross the vertebral line. Toward the hips the border becomes darker or black, showing a series of black spots at each side of the median line at the base of the tail, and the white bands become wider and more distinct. In some examples the white band through the eye is more or less faintly indicated along the entire flank, and is bordered above and below with darker lines that start respectively from the top of the eye and from the ear. From a point below the eye, above the angle of the mouth, a narrow light-edged streak of brownish extends backward toward the throat. The head is light brown, mottled with darker; the labials, chin, and throat are whitish, freckled with light brown. The tail has about ten transverse bars of white separated by light brown bands, in each of which, at each side of the median line, a spot of black is common. Posteriorly on the tail the spots of black become less dark and more fused. The lower surface of the tail is white. In several individuals there is an indefinite band of brownish from eye to eye across the forehead; in some one or two less definite bands cross the snout. On Easter Island specimens the bunches, as we may call the tiny swellings at each side of the neck, are large and apparently made of two portions, a small posterior and a larger anterior, which latter on some of the larger examples extends somewhat below the throat. In the young these bunches are not to be seen. Specimens from Samoa, collected by Dr. W. McM. Woodworth, differ from the preceding in having the spot on the occiput and in having the bunch at each side of the neck smaller, rounder, nearer the shoulder, and farther from the ear. Others from the Fiji show the neck bunches still further reduced in size, so much so as to make them hardly perceptible. One from Mangareva is much darker than the Easter Island representatives; it has fewer transverse bands on the body, but has the occipital spot and those above the bunches; the latter are small and placed far back; on the snout there is a mark shaped like a horseshoe, open forward; a band from eye to eye curves forward, and behind it there is another curving backward. Our specimens from Oahu confirm the remarks made by Dr. Stejneger as to being more robust; they indicate existence of a probable variety (*roseus*). Those from the Marshall Islands are like them. Individuals from Oahu have very large bunches on the neck, extending from shoulder to ear, and towards the nape and middle of the throat; they have numerous and large black spots on the middle of the back (old specimens, probably). Such specimens were described by Cope, 1868, under the name *Peropus roseus*; at most they represent only a variety of *Lepidodactylus lugubris* D. & B., 1836. *Gekyra occulta*, hitherto not credited to the Hawaiian fauna, was also secured on Oahu. Maui specimens of *L. lugubris* are less robust, are smaller, and the bunches are like those of Easter Island, small and far back. On one of them the bunches are hardly noticeable. The spots are absent from the middle of the back, but are distinct above the shoulders and hips. On an Ebon, Marshall Islands, specimen the bunches are in longitudinally connected groups of three; on others from Apaiang, Gilbert Islands, the bunch is near the shoulder and far from the ear.

The figure of the type furnished by the "Voyage au Pole Sud," Plate 1, Fig. 1, does not present a very correct idea of the markings, as but few are indicated. Those shown are situated as in the greater number of individuals, yet on those which show the spots so distinctly there is, on most examples, a larger number of markings that are quite as characteristic which are not traced in the figure. The drawing shows the two black spots on the neck, a couple of the spots on the base of the tail, a small spot on the occiput, and a number of dark spots irregularly scattered over the body; it has none of the six or seven transverse bands of brownish edged with light between shoulders and thighs and continued in the ten or more bands across the tail, in each of which there is usually a dark spot at each side of the vertebral line.

The Easter Island form appears to be more closely allied with the Hawaiian than with those obtained from islands more directly to the westward.

SCINCIDAE.

Cryptoblepharus poecilopleurus

Figs. 7-12.

Ablepharus poecilopleurus Wiegm., N. Act. Cas. Leop., 1835, vol. 17, 266, pl. 18, fig. 1.

Cryptoblepharus poecilopleurus Wiegm., l. c., 304.

Excepting in the tendency to vary there appears to be little by which we can separate Easter Island representatives of this species from those taken on certain of the Hawaiian Islands. The latter are regarded as typical of the species. Originally the description was drawn from an individual procured on the islands near Pisagoma, Peru; it in all probability was, like the one reported by Boulenger from Bahia, Brazil, an accidental or a descendant of one that had been carried far from the home of the species. *C. poecilopleurus* is likely to have sprung from *C. boutonii* and to have originated in or near the Hawaiian Islands. The parent form possessed a smaller number of rows of scales and had but four labials in front of each suborbital; or, in a general way, it had a smaller total number of scales on the individual. *C. nigropunctatus* from the Bonin Islands stands closer to *C. boutonii*; its scale rows number from twenty-four to twenty-six, and it has but four labials. A large specimen of this form measures about five and three-fourths inches in total length, the body two and one-eighth; the lateral streaks are very indistinct and the entire upper surface are freckled with brown and with silvery white. A couple of specimens from Wake Island must also be placed among those nearer *C. boutonii*. Their differences from one another are of enough interest for description here: — one of them has twenty-eight rows of smooth scales and has no supranasals between the internasal and the nasals; the other has twenty-six rows of faintly grooved scales, has a supranasal on each side, formed by a longitudinal division of the nasal, and has the tail forked near the end in such a manner as to make it appear that the deformity was congenital; each of them has four labials. From these localities southward the number of scale rows decreases. It is to the southwest that the species with fewer rows of scales predominate, the numbers decreasing until on *C. ruticus* there are but twenty. More distant allies from West Australia have sixteen rows and three labials. *C. crinicus* from Meala and Naikobu, of the Fijis, has twenty-two rows of scales and four labials. *C. heteropus* from Gilbert Islands exhibits a variational tendency similar to that of *C. poecilopleurus* from Easter Island, but it has a smaller number of rows of scales. Comparing nine specimens from the latter locality with the same number from the Hawaiian Islands, it will be seen that a slight divergence has set in which continued, with isolation, selection unnecessary, for a sufficient period will account for a new variety and eventually a new species, an offshoot from *C. poecilopleurus*. Eight of the nine from Easter Island have 28 rows of scales each, one has 30; two have 4 labials on each side, five have 5 on each side, and two have 4 on one side and 5 on the other; six have normal prefrontals, that is, the prefrontals are in contact between frontal and internasal, two have an azygous prefrontal with the regular prefrontals in contact, and two have the azygous separating the prefrontals. Of nine Hawaiian individuals seven have 28 rows of scales each, two have 30; five have 4 labials on each side, two have 4 on one side and 5 on the other, one has 3 on one side and 4 on the other, and one has 5 on each side; eight have normal prefrontals and one has an azygous shield separating the prefrontals. The Easter Island specimens show an increase in the number of scales on the head; those from the Hawaiian Islands a slight decrease. In the labials alone the four on each side in front of the suborbital, as seen in the greater number of the Cryptoblephari, are represented by an average of four and two-thirds in the Easter Island specimens noted above, and on the Hawaiians by an average of little more than three and nine-tenths. If such averages may not be accepted as differences sufficiently tangible for the establishment of the variety, *poecilo*, they may at least be said to indicate the process of forming new species by means of hereditary tendencies in variation. There is nothing to separate the two localities in the coloration; the redness of the end of the tail is apparent on some. Among the specimens collected by Dr. H. B. Bigelow are some very dark ones, slaty on the belly, on which the light lines are almost invisible; these are marked "taken under rocks," a locality which probably accounts for the difference in color, the species undergoing considerable changes on removal from light to darkness or the reverse. There is nothing in the structure to distinguish the dark ones from the light ones as represented in Fig. 7.

EXPLANATION OF PLATE.

FIG. 1. *Lepidodactylus lugubris* D. and B. Easter Island. One and one-half times natural length.
FIG. 2. Lower view of chin scales.
FIG. 3. A young specimen. Mangareva Island. About one and one-half times natural length.
FIG. 4. Side view of head.
FIG. 5. Lower view of foot.
FIG. 6. Specimen showing a new tail growing from the top of the base instead of, as usually, from the broken end. Suva, Viti Levus Island.

FIG. 7. *Cryptoblepharus poecilopleurus* Wiegm. Easter Island. Enlarged one-sixth of the length.
FIG. 8. Upper surface of snout.
FIG. 9. Upper surface of head of a second individual.
FIG. 10. Upper surface of head of a third specimen.
FIG. 11. Side view of head.
FIG. 12. Upper surface of the head of a fourth example showing, with figures 8–10, the variations in squamation.