

Mystery Circles of the Andes

Why did the Inca build concentric terraces at Moray?

BY ROGER ATWOOD



The Inca built agricultural terraces in four circular depressions at the site of Moray. The largest depression (above) has a diameter of 600 feet.

FIELDS OF WAVING QUINOA AND BARLEY line the road on the way to Moray, an ancient Inca site a 90-minute drive from Cuzco, Peru. In the springtime, when I visited, the fields were erupting in a pastel galaxy of pink, purple, yellow, beige, and sky-blue, each color denoting the flower of a particular variety of pea, potato, or grain. The soil here is a rich mahogany red; the snow-capped Salcantay range seems to float in the distance.

When I arrived at the site, I left my car, walked a few feet, and suddenly found myself gazing into a

230-foot-deep abyss, one of the four enormous bowls lined with concentric stone terraces that are known collectively as Moray. It is a place that confounds everything one would expect to see in a site built by the Inca and it reminds us that despite decades of archaeological research, we really understand very little about them.

The Inca were fond of building settlements in precarious places—mountain saddles, ledges, valley walls—that made the most of their realm’s sublime mountain vistas. The Inca Trail offers a four-

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day string of such sites, ending with the most glorious of all, Machu Picchu, and its 360-degree panoramic view that makes you feel like a condor in flight.

Moray, by contrast, is an inward journey. The largest bowl is some 600 feet in diameter and its sides are arranged in 12 orderly terraces. It took me half an hour to reach the bottom by foot. Once there, I found myself at the center of a frozen whirlpool of concentric rings. The sensation was disorienting and mildly hypnotic, and it was heightened by the strange acoustics. Bird calls echoed loudly, and I could hear the voices of people 50 feet away. These auditory effects have inspired theories that Moray could have been some kind of amphitheater. Though travelers and scholars have long noted the site's strange morphology, its function in Inca times is a source of enduring mystery.

In 1975, John Earls, an Australian-born anthropologist from the University of Michigan, came up with a theory that has weathered the test of time better than most. That year he spent a few rainy weeks camping at the site with two other young researchers, Gary Urton and Irene Silverblatt. The team took soil and air temperatures all over the site's complex of circular terraces. Working with funds from the National Science Foundation, Earls continued taking data from Moray on his own for another year.

When he crunched the numbers, he found evidence for an intriguing theory. Soil temperatures on the lower terraces were significantly cooler than those on the higher ones, and some terraces received much more sunlight than others. The disparities from place to place seemed to mimic the various conditions that farmers would have found planting crops at different altitudes on the surrounding peaks.

That was Earls's answer: Moray had been an agricultural research center a place where Inca horticulturists conducted side-by-side experiments on different strains of maize, quinoa, potatoes, and other crops to find which grew best under different conditions. They then could have replicated the results all over the Inca realm, where food production was the state's responsibility. Moray was a giant laboratory.

Earls first reported his theory in a 1981 paper he coauthored with Silverblatt, now an anthropolo-

gist at Duke University. Earls expanded on the idea in books he published in Peru, the most recent one in 2006. His interpretation was widely cited in papers and books in the fast-growing field of pre-Hispanic agriculture. Now a professor at Harvard University, Urton referred to the theory in his 1982 study, *At the Crossroads of the Earth and the Sky*, about life and worship in the nearby hamlet of Misminay, whose residents had been growing crops in Moray and repeating stories about it that apparently dated to Inca times. Scholars had long known that Inca farmers developed hearty new strains of food staples, but Earls's theory seemed to open new insights into how.

Recently the Moray-as-laboratory theory has come under scrutiny, even from scholars who have cited it as fact over the years. No one has come up with a better theory about why the Inca built Moray, and no archaeologists have undertaken large-scale excavations at the site. But as our general understanding of Inca society has evolved—from a utopian vision of communal farming and benevolent autocrats, to a theocratic state whose rulers exercised an intensely coercive power over their people—so have notions about one of its most enigmatic sites. The idea that a place as striking as Moray, built by a society preoccupied with religious ceremony, could actually have been intended for something as humdrum as cross-pollination of pea shoots now seems suspect to many scholars.

"I don't know if he just imagined that [theory] out of his very wide experience and knowledge of the Andes," says Urton, referring to Earls. "To tell the truth, I read his subsequent studies and they didn't seem definitive. It never seemed to me that they supported his theory that it was an agricultural research station."

The site was certainly used for agriculture, he says. But, I asked him, why did its builders create such meticulous, uniquely circular terraces? What was the site's function, besides growing crops? Urton, one of the world's top authorities on the Inca, says it may have served a ceremonial function. "But beyond that, I don't know," he adds after a long pause. "The Inca took natural features and turned them into agricultural places in many areas. But at a certain point, your guess is as good as mine."

MORAY IS NOT MENTIONED in any chronicles by the colonial Spaniards, although it may have been known to them because the settle-



The Inca left these two depressions unfinished. At the bottom of the depression shown below archaeologists discovered stone tools that were abandoned just as the Spanish arrived.



ment of Maras, whose impressive colonial doorways are still standing, is only an hour's walk away. The site was unknown to the outside world until 1930, when it was spotted by a U.S.-Peruvian aerial survey team, the same expedition that found the Nazca lines on Peru's southern coast. "Few ruins have caused more speculation than the three circular depressions near Maras," wrote American archaeologist John Rowe in 1944. Ground surveys showed there were actually four depressions, or *muyus* (circles, in Quechua, the language spoken by the Inca). Moray's builders left two bowls unfinished, suggesting the place was still under construction when the Spaniards arrived. British geographer R. A. Donkin called the site "entirely unique," adding that "there must have been a considerable amount of excavation, if only to achieve the remarkable symmetry of form."

The bottom six terraces of Moray's deepest *muyu* are pre-Inca, probably dating to the era when the warlike Wari people ruled this part of the Andes, about A.D. 600 to 1100. The rest of Moray is believed to be Inca.

Like few other sites in the Andes, Moray has inspired vivid stories and oddball legends. Urton

says that a man in Misminay, a short but exhausting walk up a nearby mountainside, told him how during Inca times people covered the terrace walls with gold and silver sheets to trap the light of the sun and the moon and to keep the place perpetually illuminated. Another man told Urton the spirit of the eleventh Inca monarch, Wayna Capac (r. 1493–1527), still lived under the largest *muyu*.

Today the site has become popular with tourists inspired by New Age ideas. They arrive by the busload for esoteric ceremonies, the site's guardian, Jorge Huananca, told me. "They sleep all day in their tents and then at night they have their ceremonies. They're calling the UFOs, I guess," he says with a shrug.

Others have observed that Moray's design resembles male genitalia, suggesting the site was a giant fertility temple. They point out that the two largest bowls lie on either side of a phallic ridge, and might represent testicles. A supporter of this theory, Rosa Alicia Quirita, is one of the few researchers who has recently dug at the site. An archaeology student who works with the National Institute of Culture (known by its Spanish acronym

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INC) in Cuzco, Quirita found that layers of soil had been brought from elsewhere in Inca times and stacked on the ridge of the promontory—the “penis”—between the two main bowls. Down its middle, she found evidence of a small ditch. “As a theory, it sounds crazy, I know,” she says. “But that’s what we found.”

Against this backdrop, Earls’s theory that Moray served as an agricultural laboratory sounds appealingly logical, almost prosaic. A white-haired man with a bohemian air who has lived in Peru off-and-on since 1963, Earls now teaches at the Universidad Católica in Lima. He explains his theory with a mixture of data, inference, and deduction derived from a career of researching Andean history with an interdisciplinary background. Earls studied physics at the University of New South Wales and completed a doctorate in anthropology at the University of Illinois. He went on to focus on how pre-Hispanic societies used astronomy to aid agriculture. His articles are full of complicated charts and graphs based on close observations of astronomical phenomena, climate readings, and crop schedules.

Earls stands resolutely behind his theory about Moray. “It’s the only explanation that’s got any coherence,” he says. “More than the actual empirical evidence is the fact that the Inca state was interested in growing maize. Potato harvesting was left to individuals.” Pollen tests have suggested that the dominant crop at Moray in Inca times was maize, used mainly to make ceremonial chicha beer. “At every stage in Andean history,” he says, “the size of the maize kernel grows suddenly, not gradually. With random hybridization, it would grow more gradually. The only explanation is that they were experimenting. This would have helped them standardize maize production.”

Andean farmers today are continually dabbling with crops, he adds. “I’ve seen peasants creating new terraces and planting every conceivable crop and seeing what grows best, everything from potatoes to guavas to sugar cane. They’re constantly experimenting.”

Indeed, farmers near Moray grew crops in its terraced circles as late as the 1970s, before it was turned over to INC authorities to be preserved as a national cultural site. One farmer, Aurelio Yucra, was only a child at the time, but he told me how villagers from Misminay planted crops suitable for the

conditions on each terrace. “They would cultivate casava at the bottom and potatoes at the top,” he says.

Moray may never have been put fully into operation, says Earls. “They may have put a few terraces into cultivation and then found that it didn’t work. Or it may have been abandoned. I think when they heard the Spaniards were coming, they dropped their tools and ran.” Earls developed the scenario of fleeing farmers after Australian archaeologist Ken Heffernan discovered abandoned Inca stone tools in one of Moray’s two unfinished bowls.

Despite Earls’s work, the Moray-as-laboratory skeptics have grown into a kind of school. One of them is a Colorado-based hydraulics engineer Ken Wright, who has investigated ancient irrigation systems at Mesa Verde and Machu Picchu. He reviewed Earls’s data on Moray and conducted his own survey of the site. In a presentation at the Institute of Andean Studies meeting in Berkeley in 2006, Wright bluntly announced that the available evidence did not support Earls’s theory. The temperature variations that Earls documented would not have occurred in Inca times, according to Wright, because crops could not have grown on the terraces without extensive irrigation. And the water from irrigation would have flattened out soil temperature fluctuations to almost zero, says Wright, who mapped and photographed the extensive Inca irrigation system at the site with a group of INC archaeologists who also disagree with Earls’s theory. All four bowls have their original water-delivery systems largely intact, with canals descending from the surrounding heights. But today only a trickle of water flows, as the rest has been diverted to nearby fields—making the terraces much drier than they were in Inca times, and thus skewing Earls’s data, Wright says.

The site was “a civil-engineering marvel, a masterpiece of landscaping,” Wright told me, but “I could not come to the same conclusion as Earls.”

Earls remains unfazed. “Go feel the difference in soil temperatures for yourself. Six, seven, eight degrees—you can practically feel it with your finger,” he says. “Listen, if I’m wrong I’d like to know it. But only strong archaeological and climatic work is going to show that.”

Understanding Inca agriculture is one thing, but getting into the minds of ancient people is

another entirely—yet that’s what a full understanding of Moray may require. It may be a mystery too inscrutable for temperature charts and pollen tests to solve. “Moray probably also had a ceremonial function,” says Earls, but scholars may never fully understand how ceremony related to agriculture. “It’s just not in our way of thinking.”

They lived fewer than 500 years ago, barely a wink of an eye in archaeological terms, yet the Inca remain strangely beyond our grasp. Their main tool for recording information, the knotted string device known as the *kipu*, has never been deciphered. We don’t know for sure how they used their most famous site, Machu Picchu. The long-held belief that Quechua acted as a lingua franca for their

empire is now under scholarly assault. Scholars even still disagree about what ultimately caused their society to collapse. Was it Spanish guns and horses? Smallpox? Or perhaps a network of alliances between Spaniards and rival Indians?

“There is something in their way of thinking that is very alien to us,” says Urton. “Most of your natural intuitions don’t serve you well looking at Inca sites. It’s hard for us to know how they thought.”

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