

How a researcher discovered a completely undocumented whale

November 30 2016, by Shannon Fischer



Salvatore Cerchio, A85, and his research team were the first to spot Omura's whales in 2013 off the coast of Madagascar. Credit: Sal Cerchio

One evening in November 2013, the noted whale researcher Salvatore Cerchio sat down to dinner with his team of scientists on Nosy Iranja, a

small island known for its white sands and turquoise waters that's located off the northwest coast of Madagascar. As he took his seat, Cerchio could barely contain his excitement. He'd spent the better part a decade working in the general region of Madagascar, heading up research into the local population of dolphins and whales with the Wildlife Conservation Society, and he was pretty sure that, earlier in the day, he and his team had encountered six Bryde's whales, an exceedingly rare cousin of the humpback.

The Bryde's whale was the only species he could think of that was both common to tropical waters and small enough to fit the profile of what he'd seen. Cerchio, A85, recognized that he suddenly had a rare opportunity on his hands. Bryde's are a poorly known whale. They're fast and small, and a challenge just to find, much less study. A lot of the most basic questions surrounding them, like courtship and mating habits, were still unanswered. If everything worked out, Cerchio might be the one to discover the answers.

Seated for dinner at the Nosy Iranja Lodge, surrounded by coconut palms, Cerchio addressed his team. "Look around the table," he said. "Look at each other. Right now, you are looking at the people who know more about Bryde's [whales](#) in Madagascar than anybody on the planet."

Except they weren't. A subsequent review of the underwater video that his team had taken during the encounter led Cerchio to the realization that the whales in question were no Bryde's. They were something that Cerchio had never seen in his 30-year career. In fact, nobody had ever seen them alive and been aware of what they were looking at. These were the mysterious Omura's whales, an ancient species that scientists didn't even know existed until 10 years ago. If Bryde's had incomplete science, these whales had nothing. Every single question lay open for the asking. This wasn't merely a rare opportunity. Salvatore Cerchio had just won the scientific lottery.

In the late 1990s, five Japanese cetacean experts found themselves on a beach on Tsunoshima Island. They were very confused. Local residents had summoned them to evaluate an unusual whale carcass that had washed up three days prior, but nothing quite made sense. The animal had a coloring reminiscent of a fin whale, a head shape more like the blue whale and the body size of a Bryde's.

"I was at loss," recalled Tadasu Yamada, a researcher with the National Science Museum in Tokyo who'd led the trip. When the local media asked him which species it was, all he could say was that he wasn't sure. "And we were supposed to be specialists who traveled more than 500 kilometers to the site and did some kind of investigation," he told me. "And the answer was 'We don't know.' They were very surprised."

A week later, when DNA results came back, there was still more surprise: no known matches. Baffled, Yamada consulted his colleague, Shiro Wada, then a scientist at the Japanese Fisheries Research Agency.

Cetacean Mystery

Wada had by then spent two decades digging into old whaling pictures, genetic samples and archived skeletons. He'd been following a mystery that had haunted him since the 1970s, when he'd been doing basic research into the genetic markers of Bryde's whales—work that would allow them to be more easily identified. But there was something off about eight whale specimens he was investigating. Those whales had been identified at the time of their discovery as Bryde's, but Wada was convinced that they were actually a different, unknown species. He'd been trying to prove it ever since.

Now here was Yamada telling him about a strange whale that had washed up on Tsunoshima Island. Could this be an actual example of the unknown species that he suspected had been mistaken in the record

books for a Bryde's? Tests were conducted, and the body, bones and genetic markers recovered from the carcass all turned out to be a match for Wada's unidentified whale—this was his whale. So he, Yamada and a third colleague, Masayuki Oishi, from the Iwate Prefectural Museum, began to collaborate on research into what they decided to call the Omura's whale, named after a famed Japanese cetacean researcher.

Their first paper, which established the new species, appeared in 2003, followed by a handful of publications that delved into the whales' genetic roots and documented samples that had been misclassified in museums around the world. Omura's whales have often been mistaken for Bryde's, but the new research showed that the two species had diverged somewhere between 9 and 17 million years ago—longer ago than humans and chimpanzees went their own way. In 2007, Omura's whales were added to the International Whaling Commission's List of Recognized Species of Cetaceans. All this despite the fact that no one had ever knowingly seen one alive.



Salvatore Cerchio on Nosy Sakatia, a small island in the waters where his team discovered the mysterious, ancient species. Credit: Tufts University

To be in the presence of a whale is an incredible thing. Slick, prehistoric backs arc over the water, then slide noiselessly under with impossibly long bodies that roll on and on until, well after you've expected it, the moment ends and they disappear. Whales are massive and magnificent. We know that they exist, but they still strike us as something mythical, like sea monsters of lore. Out on a ship, a person can feel as though they're only a trivial visitor to these creatures' oceanic world. Spend an afternoon on a whale-watching tour and it's easy to see how someone could fall in love.

That is more or less what happened to Sal Cerchio in 1984. He was a 19-year-old junior at Tufts that year, majoring in marine biology, a choice influenced by boyhood vacations in old south Florida, when it was still loggerhead turtles and undeveloped coastline. On a bit of a whim, Cerchio signed up for a 12-week Ocean Research and Education Society (ORES) trip. The Tufts program involved six weeks of classroom work in Gloucester, Massachusetts, then another six to eight weeks of hands-on research on a 1908 three-masted barkentine ship called the Regina Maris. A poster on the biology department wall promised whales, and to a young student who hadn't yet found his passion, that sounded like a good time. "I was like, yeah, I like whales," Cerchio recalled. "I'll do that."

The Whale Listener

What he didn't know was that ORES was one of the most important whale research training programs in the world. Leading whale experts would come to either deliver lectures to students in Gloucester or sail on the Regina for their research. The program was shuttered years ago, but many of today's major whale scientists can trace their own roots, or those of a mentor, back to that ship. During Cerchio's winter in the

program, the Regina set sail for Silver Bank in the Dominican Republic to study humpback whales at their breeding ground. The scientists on board took notice of the young, New Jersey-born student, a city kid out on his first real adventure. Each night when the ship anchored, Cerchio would throw an underwater microphone—a hydrophone—into the sea and stretch out on the deck to listen as the famed humpback whale song streamed in through his Sony Walkman. In the mornings, he would retreat to the lab and transcribe the recordings by hand.

"I remember him there with headphones, listening to it, and talking about the structure of the song," said Phillip Clapham, a leading expert on large whales at the National Oceanic and Atmospheric Administration's Alaska Fisheries Science Center in Seattle. "For somebody that young to have picked that up and been able to understand and break down the song into themes and understand what he was listening to was really unusual."

Clapham, who was then a scientist with the Center for Coastal Studies on Cape Cod, immediately offered him an internship for the following summer. Cerchio accepted. That research into whale acoustics prepared him for his master's work at the renowned Moss Landing Marine Labs in California. After that, he began a Ph.D. in ecology and evolutionary biology at the University of Michigan. Over the next few years, Cerchio began to acquire a reputation as a risk-taker and adventurer—the kind of guy who would tackle massive research projects in order to answer foundational ecology questions that the field had simply stepped around until then, such as which male humpback whales got the girl, as it were, and what strategies they used to do it.

When Cerchio joined the World Conservation Society in 2004, he designed acoustic research programs in Angolan waters that turned up the first modern evidence of blue whales in the area. Then, in Madagascan waters, he uncovered whole treasure troves of undiscovered

diversity—reporting, in one place off the southwest coast, 14 different species of whales and dolphins that nobody'd had the slightest idea were swimming in those waters.

"He's a discoverer. He is a modern-day ocean explorer," said Chris Clark, a bioacoustics expert at Cornell University who helped pioneer the study of whale song with Katy and Roger Payne, and who took notice of Cerchio around the time that the younger researcher was beginning his work at Michigan. (Clark also taught Cerchio's future wife, Danielle Cholewiak, a respected whale researcher in her own right.) "If you give someone like Sal a chance, he's going to discover something."

The day after their discovery of six Omura's whales off the island of Nosy Iranja, Cerchio and his team spotted three more specimens, followed the day after that by a second encounter with a mother and calf from the first day. By the end of those three days, Cerchio and his team had collected seven skin samples (procured via a small crossbow that shoots biopsy darts) for genetic analysis, taken more video, and captured recordings of the Omura's song—a throbbing, low-frequency, broadband pulse that lasts about 10 seconds: Bom bom bom bom bom. "This was a new vocalization that had never been described before," Cerchio explained.

Excited, Cerchio called his friend and Wildlife Conservation Society colleague Tim Collins, who was in the Republic of Congo at the time. "Dude," Cerchio exclaimed, "I think I found Omura's!" He asked Collins to send him every paper about the whales that Tadasu Yamada and Shiro Wada had ever written. Collins dug up the material and forwarded it to Cerchio. After that, Collins said, "he sent me pictures and said, 'Yeah, damn it, I think we've got Omura's.' "

Cerchio and his team spent the next year collecting every bit of information they could about Omura's whales. Scouring their own

records, they discovered a few sightings in 2011 and 2012 of what had been marked as Bryde's whales but were, in retrospect, clearly Omura's. They also recorded a number of new sightings in 2013 and 2014. In all, they counted 44 encounters and recorded the songs of five different whales.



An Omura's whale surfacing. The white lower jaw distinguishes it from the Bryde's whale, another rare species. Credit: Sal Cerchio

They also discovered lots of information about how Omura's live. The whales, they found, seemed to swim alone—cruising at 12 miles per hour or so—but within singing distance of others, as though maintaining large personal-space bubbles. Mothers, however, tended to stick close to

their calves. And unlike their humpback cousins, which travel huge distances from feeding areas to breeding grounds, Omura's appeared to be homebodies, feeding and breeding, as far as Cerchio could tell, all in the same corner of the world. The team developed theories about everything from what the whales ate (zooplankton) to where they went when they occasionally made themselves scarce (a bit north and south of that same coastline) to the level of risk posed by the offshore oil and gas industries looking to expand into the area (high).

Cerchio, in other words, was making a great deal of progress. But before he could begin publicizing his findings, he had to be absolutely certain that he was, in fact, dealing with Omura's whales. So in the fall of 2014, he sent the biopsies he'd collected to a friend from grad school, Alec Lindsay, a biologist at Northern Michigan University. Lindsay compared the samples to the DNA sequences that Wada and his team had published. The results came back on Christmas Eve. "I remember Sal receiving this text message from Alec," said Cholewiak, Cerchio's wife. "He couldn't stop reading it. He was like, 'Oh my God! Oh my God, I can't believe it, this is real!'"

Within weeks, Cerchio began assembling his observations into a science manuscript. In March 2015, he made his first public presentation of the work at a symposium sponsored by the Cape Cod–based Woods Hole Oceanographic Institute. Alessandro Bocconcelli, a research specialist at the institute, promptly suggested a collaboration and brought Cerchio on board at Woods Hole as a guest investigator. Then, in October of that year, the prestigious Royal Society published Cerchio's paper in the *Royal Society Open Science* journal. Suddenly, Cerchio was a star.

"Local researcher makes first-ever field observations of rare whale," wrote the Boston Globe. CNN contacted him for a video interview. BBC Earth ran a story, as did the Washington Post, the Huffington Post, and the Christian Science Monitor. "I've never received any kind of attention

like that," Cerchio said. Colleagues reached out, too, emailing their compliments and congratulations. "I admit to being very jealous," Collins told me. "Omura's, that's just, like a ghost. And I remember thinking, 'God damn it. How come he gets to see Omura's?' I mean Sal's been seeing [blue whales](#), and he saw a right whale one year in south Madagascar, and he's seeing melon-headed whales, amazing oceanic dolphins, and then he gets to add Omura's on top of it?"

"I feel like, for him, this has definitely been one of the major, if not the major highlight of his career," Cholewiak told me. "That he actually has found and is working on this first population of recognized Omura's whales has been really significant for him."

Beautiful—and Endangered

Not long ago, I visited Cerchio in his office at Woods Hole, where he now works with Bocconcelli. He'd also recently signed on as a visiting scientist with the New England Aquarium in Boston. He lives near Woods Hole and often works from home or from Madagascar, which is probably a good thing given the small size of his work space at the Institute. When I met with him, stacks of paper and thick binders lined the room and a rusted canister filled with scraps of metal left over from past experiments moldered in the corner. The office's single window overlooked the harbor. We sat at Cerchio's desk and, on his computer, he called up video his team had taken that day in 2013 when they'd first run into the Omura's whales. On screen, one of the whales surged toward us, mouth agape, then swerved left. She was beautiful—long and serpentine, with a distinctive watercolor wash of light and dark gray across her flank and back. Head on, the markings of an Omura's are unmistakable, with the right side of the jaw white, and the left much darker.

Watching the video, it was easy to understand why humans feel so

protective of whales, why we've enacted the Endangered Species Act and the Marine Mammal Protection Act to help save them. Yet whales, on the whole, are under greater threat today than ever before. They're hunted by whalers from countries such as Japan and Iceland; they continue to show up as accidental catch in fishing nets, and they are endangered by everything from climate change to seas made ever noisier by gigantic vessels. Some whales, in other words, are still very much at risk of joining the countless species that go extinct every year. Omura's, with their newly confirmed existence, are a point in the other column.

Cerchio told me that he expects to return to Madagascar this fall with the hope of beginning to answer the countless questions that remain about Omura's whales: how far they range, how they interact with each other, when they breed, what they eat in the thin tropical water. To collect the relevant data, Cerchio and Bocconcelli plan to suction-cup sophisticated microcomputers, known as D-Tags, to a whale, while another biologist, Matt Leslie, hopes to fly drones over the whales. Then there are the series of underwater microphones that have been recording the song of the Omura's since Cerchio planted them last fall.

Cerchio said he is also collaborating with Tadasu Yamada on a book chapter about the whales. Neither Yamada nor Wada has seen the Omura's in person, but Wada told me that it's been rewarding to see his early work contribute to Cerchio's success. "It was very exciting news," Wada said. "I like to express my respect to his great efforts."

As we sat in his office, Cerchio speculated on the ways his work could transcend the Omura's themselves to reveal new insights into related species of whales. But, he said, it's early days, and such hopes may not be realized. But even if they're not, he said, even if all his work does is bring to light the lives of a beautiful and previously unknown animal, that would be enough. "It's exciting as hell," he said. "Discovering things for the first time that no one else has had the opportunity to work

on—that's a thrill."

Provided by Tufts University

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