

# Fins to Feet to Fancлубs: An (Old) Fish Story

*It jeers at fish unfossilized  
As intellectual snobs elite;  
Old Coelacanth, so unrevised,  
It doesn't know it's obsolete.*

—Ogden Nash

"I would hardly have been more surprised if I met a dinosaur on the street," J.L.B. Smith said later of the massively ugly, steel-gray fish brought to his laboratory in 1938. The renowned South African ichthyologist was considered egocentric, but was never given to hyperbole or easy amazement—particularly over fishes. He had, by that time, discovered and named more than 100 himself. But the sight of this fish, literally a living prehistoric monster, cost him his colonial British composure.

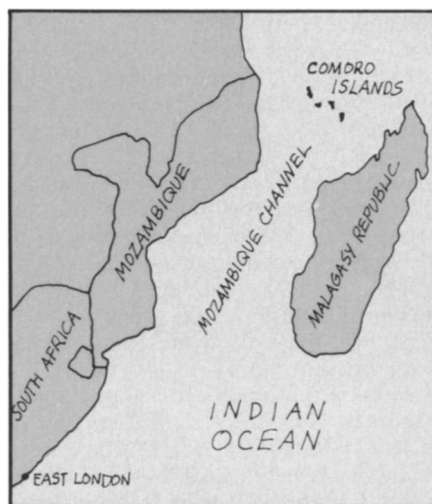
The specimen was discovered with some sharks brought in on a fish steamer to the port town of East London, South Africa. The curator of the local museum, Margaret Courtenay-Latimer, as was her custom, went to the docks to search for interesting additions to the museum collection. On this occasion, however, she found among the others a heavy, dirty, oil-dripping fish quite unlike anything she had ever identified with her dichotomous keys.

It looked suspiciously like the ancient fish that dragged themselves from the Devonian seas and up the phylogenetic scale to become amphibians. "But that's preposterous!" she thought, "the fossil record shows these creatures have been extinct for 70 million years." She sent a sketch to Smith, and was astounded—along with Smith and the rest of the post-World War I scientific community—to receive the news: The coelacanth (see-lakanth), lobe-finned ancestor to the four-legged animals, didn't, after all, die out with the dinosaurs.

There have been equally sensational finds throughout scientific history. The

A passion for coelacanths has led to expeditions to the Comores and the discovery of quintuplets at 50 fathoms

BY JANET L. HOPSON



Rosetta stone, for example. Radium. The Tasaday. These and a hundred other discoveries of the heretofore hidden have assumed pivotal importance in their respective disciplines. But the coelacanth, well, the coelacanth has given something unique to zoology besides its respectable share of information on the evolution of the tetrapods. The Rosetta stone has an honored place in the British Museum, but does it have an incorporated society dedicated to its protection? Radium begat radiology, but does it have an international postage stamp from the Comoro Islands? Do the Tasaday have a poet laureate, or a monthly newsletter or an opera? Well, the coelacanth, hulking and oily and ugly, has all these things. It has ignited the

imaginations of the formerly solemn and dispassionate, and has, in fact, quite clearly engendered a cult.

Smith himself was probably the first coelacanth devotee. After identifying Miss Courtenay-Latimer's fish from fossils (and naming it *Latimeria chalumnae* in her honor), he set out to find a second specimen. The shores of the Mozambique channel soon were plastered with reward posters. But his desire was unfulfilled until, in 1952, he was notified that a native fisherman from the Comores had caught one on his 200-meter fishing line.

The second coelacanth looked like the first: bony scales of steel-gray flecked with white, powerful jaws and teeth, fleshy lobed fins and double tail, the primitive lung characteristic of the subclass Sarcopterygia. It was a proper prehistoric monster too, huge and primal. Although it was a zoological sensation in the outside world, it was considered commonplace by the natives. Four or five "kombessah" or "mamé" were caught near that emerald archipelago each year and sold in the marketplace, dried and salted.

Smith was convinced he would find the second and subsequent coelacanths in the Mozambique channel. This was curious insight; coelacanth fossils had been found all over the world. Those of the oldest, in fact, the 370-million-year-old subclass Rhipidistia, were found in Scotland, Norway and Canada—all parts of the northern primeval continent Laurasia. This was a land dotted and crossed by lakes and rivers, and subject to periodic drought. It was this environment that forced the ugly giants to crawl in search of water. Five-toed fins and other skeletal similarities to *Ichthyostega*, the earliest amphibian, bespeak their direct and ancient kinship, and make *Latimeria* the only living relative to the creatures that evolved into 80 trillion land animals.

During the Cretaceous, about 70 million years ago, coelacanths migrated to the deep oceans, and their recorded history vanished abruptly. But, as Courtenay-Latimer discovered, they did not die out. By now, 85 coelacanths have been pulled from the Indian Ocean, all near two of the four Comoro Islands. Why there alone, no one knows. The secrets of their habitat and life-style are still locked 300 fathoms below.

Perhaps there is something uniquely nurturant about the Mozambique channel. Or perhaps, as ichthyologist Richard Rosenblatt from the Scripps Institution of Oceanography suggests, it may be that the Islands of the Moon are one of the few places in the world where a large population of fishermen routinely fish with hand lines at great depths. But regardless of the conditions, the shadowy presence of the coelacanths has taken on new significance to the Comorans.

The four islands were French possessions until last July. Three are now independent, and the first months have been marked by struggles against disease and poverty and by political upheaval. The value of this scientific curiosity for publicity and tourism has not eluded the new governments. Besides accommodating research expeditions with the full extent of their meager scientific resources, they have issued a postage stamp commemorating a 1975 expedition by the California Academy of Sciences.

The French, however, were the first to take a fierce proprietary interest in coelacanths. Smith and his passion for a second specimen may have catalyzed some of the French possessiveness. When he received the news in 1952, he flew to the Comores and returned with the fish. The French were furious with this heist from a colonial possession, and barred Smith from returning. French scientists tightened their nationalistic net, and claimed the next 83 specimens. They have, consequently, published most of the anatomical data on coelacanths. Foreign scientists have been offered specimens only in the past 13 years, and sometimes with unwritten restrictions on competing research and at costs exceeding \$5,000 per specimen.

\* \* \* \*

*"Our advice to future coelacanth hunters is as follows: 1. Wait until the political future of the Comores is defined (this may require a year or so). 2. Request permission through the president of the Comores, listing the potential value of such a mission on a trade-off basis, e.g. publicity and tourism. 3. Bring everything that might be needed—make no assumptions about local availability of anything. 4. Bring lots of Kaopectate."*

The message, which appeared in the June 1975 issue of the SPOOF NEWSLETTER, was written by John E. McCosker after the latest expedition in his quest for a living coelacanth. McCosker is superintendent of the Steinhardt Aquarium in



Smith and Rand examine one quintuplet after posthumous delivery from coelacanth.

San Francisco, and SPOOF is the Society for the Protection of Old Fishes, Inc., an organization whose membership list includes more than 100 researchers from around the world who study coelacanths and their primal cousins (lungfish, ratfish, lampreys, hagfish, paddlefish, gars, sharks) as well as a few dozen light-hearted observers of the coelacanth cult and even a poet laureate, John Ciardi.

McCosker is absolutely dedicated to the proposition of bringing back a coelacanth alive, and mounted a major expedition in January 1975 in the Steinhardt research vessel to do so. He was, unfortunately, unsuccessful. "As soon as we arrived in the Comores," McCosker says, "the president of the Malagasy was assassinated, and they closed the only nearby airport where cargo 707's can land. Then everything went to pot. A serious drought had forced the coelacanths deeper, and none were caught. Then, there was a cholera epidemic that killed many of the fishermen. We had attracted a lot of fishermen this time, too," McCosker muses, more than 100 black Moslem fishermen working full time. "It was the reward. We offered a roundtrip, two-week pilgrimage to Mecca to the one who captured a live fish."

A live coelacanth, McCosker explains, would enable researchers to study swimming motions, to do chromosome karyotypes and to get fresh tissues. "Besides," he says, "we want one for display at Steinhardt. It would be like having a dinosaur in your zoo." Why has it been so hard to capture a live one, SCIENCE NEWS wondered, the pressure or temperature changes? "No," McCosker says, "the main problem is the custom of the native fishermen to beat them to death with clubs to avoid their vicious biting and snapping." It is very difficult—dangerous, even—to get one near a narrow, dugout canoe. "But for a trip to Mecca," he says,

"the natives are willing to risk it."

Plans are in the works now for another expedition, probably during the monsoon season (December to March) of 1977. Monsoons seem to bring the coelacanths up to shallower water to feed. "Our plan is to be in the area with walkie-talkies, then race out when a fisherman gets one on his line. We'll send down divers with nets to trap it and put it into our life support system—a self-contained polyurethane box with a pumping system that will fit into the belly of a 707." With some luck and a funding agency, one will be captured next time, he says, "but heaven only knows what will be happening in the world during the monsoon of 1977."

\* \* \* \*

Not to return empty-handed, McCosker bought two frozen coelacanths last January and brought them back for dissection and display. One went to Dick Rosenblatt at Scripps and the other remained at the California Academy. Under the leadership of George and Susan Brown at the University of Washington at Seattle, SPOOF served as a clearinghouse for requests by several research groups for coelacanth tissues.

Various biochemical studies are now underway, including one by Scripps biochemist Norman Hall. He has submitted to SCIENCE magazine an analysis of the enzyme creatine phosphokinase in coelacanth tissues; a study designed, he says, to give insights into the evolution of the vertebrates and the permanence of certain biochemicals.

The most exciting bit of coelacanth research, though, is some belated midwifery that revealed the fish's secret sex life and reproductive habits—and inspired, in turn, the creation of a zany opera. The discovery was made at the American Museum of Natural History in New York last September. The museum had obtained a

Am. Museum of Nat. History/New York

huge female (5'3", 150 pounds) from a French doctor in the Comores in 1962, but had kept it, literally, on the shelf for 13 years. At first, says museum ichthyologist C. Lavett Smith, "We were bound by a gentleman's agreement not to publish until after the French had finished their anatomical work. We could have dissected it as long as 10 years ago, but it was the only specimen in the Western Hemisphere, and we didn't want to mess around with it. I guess," he says, "we were treating it as an art object instead of a working scientific specimen."

"We're kicking ourselves now, though," he says, because the coelacanth turned out to be a gravid female, the only yet caught. Smith and hematologist Charles S. Rand delivered from the grayling, preserved carcass four baby *Lati-merians*, and then, a week later, a fifth one with the help of museum zoologists Bobb Schaeffer and James W. Atz. A foot-long each and perfect, miniature adults, their posthumous nativity confirmed that the coelacanth is ovo-viviparous (gives birth to live young). Internal fertilization by males is thus called for, and although an intromittent organ has not been found, the team, in their Dec. 12 SCIENCE report, corroborates an earlier hypothesis that a male cloaca flanked by two pairs of erectile caruncles (claspers) might serve the purpose.

Rand, a biologist at Long Island University in Brooklyn, was inspired to write an opera for his fellow spoofers. He calls it "A Coelacanth's Lament, or Quintuplets at 50 Fathoms Can Be Fun." If nothing else unique, the opera is a mixture of parody-on-libretto and coelacanth anatomy, sung to Gilbert and Sullivan tunes or recited with clavichord accompaniment. One wonders if G.&S. would even recognize their "Wandering Minstrel I": "A fallen maiden I—a toy of passing fishes

*Fulfilling all their wishes  
With ovo-vivi-parity  
With ovo-vivi-parity. . . ."*

\* \* \* \*

Ogden Nash showed an uncanny sense of scientific prediction in his "Ode to a Coelacanth." That creature, when Nash wrote the quatrain, certainly did not suspect "it's obsolete," but then neither did zoologists, until now. Recent biochemical studies on enzymes and hormones in McCosker's laboratory and others, indicate that it may not be as closely related to the amphibian-progenitor as formerly believed. "This evidence," McCosker says, "pushes him off to our great-grand cousin, rather than our great-grandfather."

The coelacanth's reputation may not survive, but his cult, one suspects, will live on. "I really hate to admit this new evidence," McCosker says. "It may make it tougher to get my next expedition going." □

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