

Dr. John McCosker with one of several important finds from his expedition, a coelacanth. Its tissues and organs will be important to science. Photo by William Young, San Francisco Chronicle

## 360 Million B.C.

The McCosker Expedition has returned from an unprecedented five week search for the coelacanth -- a living fossil and a missing link between amphibians and fishes. Their tale is something to remember.

By  
Bob Behme

SAN FRANCISCO, CA - From the beginning the action read like the scenario for a spy picture, secret meetings, intrigue, political unrest and a frantic search for a rare prize.

The focal point was John McCosker's unprecedented attempt to capture live a coelacanth, a fish believed dead for 60

million years, and despite set-backs and disappointments, his story ended, as it should, happily. There is no living fish on display but there are new discoveries and perhaps an even more important point has emerged: a price tag. There is now an established price for the capture of one living coelacanth -- a round trip to Mecca.

### Five long weeks

On January 31st McCosker, Superintendent of San Francisco's Steinhart Aquarium and a team of 11 French and U.S. scientists and technicians, flew 12,000 miles across the Atlantic, Europe, North Africa and the Indian Ocean to the Comores, an archipelago off the eastern

mainland of Africa. For five weeks the team supervised native Moslem fishermen in the Mozambique Channel and dove themselves among uncharted coral reefs on research and photo missions.

In the end they returned with two frozen coelacanth and half a ton of coral fishes, many never seen before, and while the men missed the brass ring, the cap-

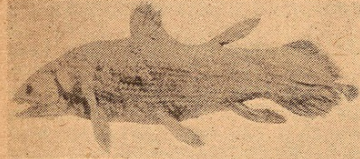
ture of a living fossil, they made important, undisputed contributions to ichthyology.

### A remarkable fish

The coelacanth, *Latimeria chalumnae*, dates back 300 million years to the Devonian Period, a time when the earth's crust sank to form basins and coral reefs in the U.S. There was vigorous plant life everywhere and fish were evolving rapidly into modern groups. Sharks were twenty feet long and the first amphibians were emerging to find safe bases on the developing land. The coelacanth is one link with those ancient amphibians.

Then, one group of fishes possessed anatomical features similar to the earliest amphibians. There were three sub-groups osteolepids, coelacanths and lungfish and the lungfish stood apart while the other two were closely related.

The lungfishes were freshwater animals and are still with us even though none of the five living specimens are similar to their Devonian ancestors. Osteolepids, also freshwater fish, lived but a short time. Fossils have been found in rocks no later than the Permian period, some 220 million years ago. Coelacanths, the only saltwater species, were far hardier, common through the late Cretaceous Period, a mere 60 million years ago. After that all three were considered to be extinct, known only from fossils.



One of the first Coelacanth

### A discovery

In 1938 the ichthyological world received an electrifying jolt. The captain of an African trawler, working off East London, South Africa, caught a strange fish. He gave it to the director of a remote back-country museum who, in turn, contacted Dr. J. L. B. Smith of Rhodes University. Smith, a leading expert on South African fishes, recognized it as a coelacanth. More to the point, Smith reasoned that if there was one there must be others.

And there were, but the living fossil proved elusive, which may explain why it has survived. It was fourteen years, almost to the month before a second specimen was caught, but it was the proof Smith needed. That fish had been found near Anjouan, the second largest island in the Comores and its location led Smith to the conclusion the waters of the Mozambique Channel were "home" waters for the species.

Until his death Smith spent much of his time attempting to catch further specimens and it is a tribute to the man that while he caught no fish, his location was right. 85 fish have been caught and more than one third have been hooked in an area off the southern end of Grand Comore, the largest island in the archipelago. This was to be headquarters for the McCosker expedition.

### Planning stages

McCosker's expedition began more than one year ago with planning and a research flight to the Islands last October. There McCosker met with French officials and Ahmed Abdallah, President of the independent republic. He learned that while his men would be welcome they could neither land nor fish without permission - a project which required weeks of effort and reams of paper.

As negotiations continued cameras

were readied, motion picture teams briefed and a special insulated fiberglass shipping case prepared. Its shell was covered inside with insulation and the device was fitted with a closed system of pumps and aerators backed by duplicates so the fish could make the trip to San Francisco safely.

### The expedition

On January 31st the expedition flew to Moroni, largest city on Grand Comore, and went immediately to Iconi, the village from which 18 coelacanth had been caught. Located in the south, on the lee of the island, it was the only protected area from which men can fish during the Monsoon Season, and the Monsoon has been the time when most coelacanth are caught.

The group coordinated fishing teams through Mohamed Ali Chabaane, who had supervised earlier research for Smith and others. Early problems centered on the Moslem fishermen, who were good but primitive. They used hand-rowed pirogues, primitive boats, and fished with hand lines and bent nails or wires.

To improve their chances McCosker brought 300 Mustad hooks, which were eagerly snapped up, yet there seemed little enthusiasm for the project. Then John's wife, Sandra McCosker, had an idea. She suggested a prize for the first fish brought back live - a free round trip to Mecca, the most important place in the lives of Moslems.

It worked. On the following morning every available fishermen, several hundred from Iconi and other villages, were beating the waters with new Mustad hooks.

For weeks the men worked with no success then, suddenly one day, a fisherman had a strike. He knew it was coelacanth at the end of his hand line because he had caught one before and remembered the way it fought. He handled it gently, trying to pry the fish upward from great depths, but it tugged, pulled and stubbornly resisted and suddenly his line was limp. The coelacanth had thrown the hook.

### And extra prizes

If the expedition failed in terms of capturing its goal, it was unbelievably successful in other areas. While diving twelve miles off shore McCosker discovered an uncharted coral plateau fifty feet below the surface. It was bright with exciting colors, surrounded by three to four hundred varieties of tropical fish in schools almost tail to tail. McCosker realized some of those fish were unknown to science.

And below the plateau, first seen at a depth of 200 feet, McCosker discovered a prize worth the cost of the expedition - an unexpected member of the family *Anomalopidae*. Natives knew them, caught them and called them "petit Peugeot" because cells beneath their eyes glowed brightly like the headlights of the small French car for which they were named.

Little is known about the group called "Headlight Fishes" and scientists currently recognize three genera with only four living species. Those McCosker had seen were *Photoblepharon palptratus*, known from a few specimens caught off Bali and Indonesia and most recently, in the Red Sea, but never in the Indian Ocean.

Here the fish were plentiful and here, for the first time was an opportunity to study these shy fish in their habitat.

*Photoblepharon* have a membrane beneath the eye which works like a shutter. The light emitting organ, McCosker believes, is "on" constantly, used for communication and feeding. The shutter controls the times it is seen or hidden. McCosker has seen the tiny, shy fish swimming a few inches above bottom, catching prey with the aid of their lights.



When it became obvious the team could not return with a coelacanth, the men decided to return with as many tropical fish as possible, and when the plane landed in San Francisco, they had collected more than 300 kilo, about half a ton. 30 to 50 of these will turn out to be new species or variations not yet described by ichthyologists.

Most importantly, McCosker captured 40 living *Photoblepharon* and a dozen Indian Ocean garden eels, taken from the only sandy bottom near the island. When the plane landed 25 of the small fish and most of the eels were alive. Half of the fish were immediately put into a special darkened tank for the public to see. The remainder are being held for distribution to scientists at Scripps and UCLA. The eels? They, too, are on display.

### The time ahead

The expedition also returned with two frozen coelacanth which have great importance. The fish had been caught before the team arrived and were purchased for \$500. Their tissues and organs will be shared with scientists and may help answer a number of questions: whether current coelacanth are like their fossilized ancestors or have changed; and if they are duplicates, the cells may tell how the fish have prevented genetic changes and mutations during the 360 million years they have been on earth.

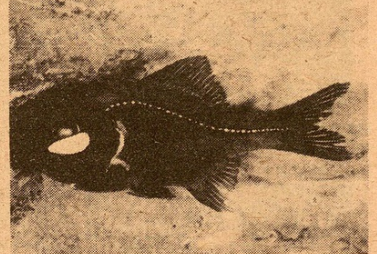
### A last meal

The McCosker team has one other dis-

inction. On their last days on the island, Mohamed Ali Chabaane offered several members a dinner of cooked coelacanth. The fish had been sliced thin and fried with a little white wine and Chabaane asked, "How do you like it?"

McCosker ran his tongue over his lips, then said, "Its a little oily, like deep sea bass, but not bad."

Will the expedition return? John McCosker is silent on that point. The fish his team collected will keep taxonomists and others busy for years and it is obvious the team now knows more about coela-



*Photoblepharon palptratus*

canth than any other 11 men in the world. The man who finally catches a living fossil will find his task has been made easier by factors the McCosker Expedition discovered.

And while these statements are true, it seems to many that in one way or another, McCosker, young, talented and tenacious, may still become the man who ends up with the brass ring - a living coelacanth in his aquarium. AI

## Expedition Participants

Dr. John McCosker, Superintendent, Steinhart Aquarium; Dr. Michael Lagios, Research Pathologist and Research Associate of California Academy of Sciences, and a member of the unsuccessful 1972 international expedition; Dr. Daniel Robineau, research biologist at the Musee National d'Histoire Naturelle of Paris; Mr. Al Giddings of Sea Films Inc., who will produce a documentary film of the coelacanth and the Comores Islands along with diver/cameraman Charles Nicklin; Mr. Lester Gunther, Associate of the Steinhart Aquarium; Ms. Sandra McCosker, ethnographer and diver; Dr. Francois Debuissy, Scientific Officer of the Comores Archipelago; Mr. John Breeden, electronics expert to aid in musical recordings; Dr. Sylvia Earle Mead, research algologist and previously head aquanaut in U.S. Tektite saturation diving project; Mr. Dave Powell, Curator, Steinhart Aquarium.