Galaxy
SCIENCE FICTION

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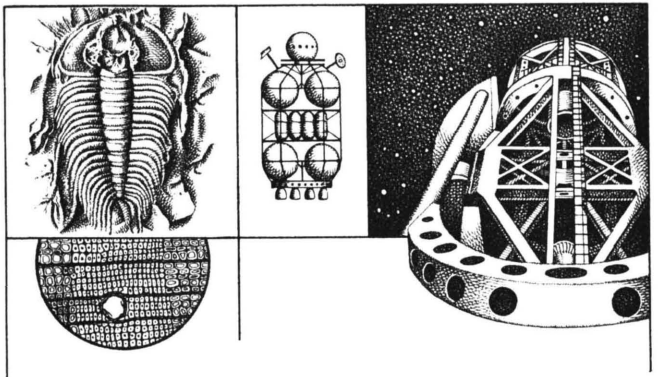

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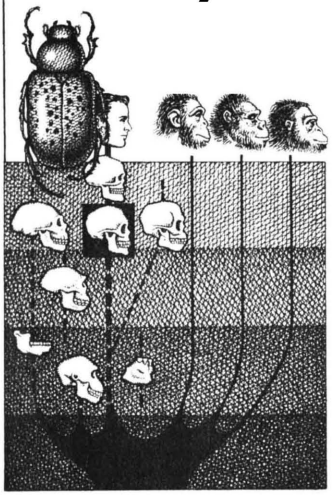


By WILLY LEY

WANTED — DEAD OR ALIVE

THOUGH STORIES of scientific discoveries never repeat precisely, they often have such a pronounced pattern that, in reading one story, one thinks that it is a retelling of another and it can happen that the mind is lulled into a kind of carelessness by the similarities and experiences a surprise when things suddenly take a different turn. As a case in point, I offer the stories of two "scientific" fishes. One event is

rather old, having occurred in the period from 1870 to 1895. The other is recent, so recent that it is, in fact, still current.

The first story began with the fact that a man was tired of farming. He was William Forster, who had owned a farm near the Burnett River in Queensland, Australia, for a number of years, but had retired and moved to Sydney. One day in 1869, he decided to pass the time at the Sydney Museum. There he saw specimens of all the unusual animals of Australia with which he was familiar. But there was something missing and he fell to talking about it with Gerard Krefft, the curator of the museum. Mr. Forster asked why the museum did not show the big fish that lived in the Burnett River.

GERARD KREFFT admitted that he did not know anything about a big fish in the Burnett River, but thought it quite likely that the museum might have specimens — not yet on exhibit, possibly—from other localities. He asked Forster to describe it and Forster did his best.

The fish was around five feet long and greenish in color, with a white belly, and had unusually large scales. It did not have a tail like other fish but more like an eel. Come to think of it, the shape of the body was also like that of an eel, a very fat eel, about as thick as a man's thigh. And it had four strong fins. Mr. Forster was certain about that, even though Mr. Keffrt had never heard about a fish with only four fins.

Forster added that the fish was edible. The white squatters in the area actually called it the Burnett salmon, while the natives had a name like *barramundi.* (In that Mr. Forster was wrong. The natives did have a name for the fish he had in mind, but it was *dyelleh. Barramundi* was the native name for an entirely different fish.)

The discussion ended with a promise by Mr. Forster to write to his cousin, who had taken over the farm, and ask him to send a few Burnett salmon to Mr. Krefft.

Early in 1870, a barrel arrived at the museum. It contained several Burnett salmon, strongly salted as a preservative against the heat of the southern-hemisphere summer. Curator Krefft pulled one of the specimens from the barrels and hefted it onto a table; the Burnett salmon proved to be a heavyweight.

He saw that William Forster had delivered a rather good description of the external characteristics. An expert would have done better only by attaching the proper technical terms to some of the external appendages. He

would have called the pointed fringe of fin material around the rear end a Diphyceral Tail (pronounced with capitals out of respect for its rarity) and he would have emphasized that the four fins were living examples of an up to that moment only theoretical concept, namely the *archipterygium* of Professor Karl Gegenbauer.

It was, in short, a limb which could evolve into a fish's fin or else could become an amphibian's leg.

Krefft then looked into the mouth of the creature and stated later that he did not believe his eyes. There were very few but very large teeth in this mouth, each one looking as if a set of teeth had grown together, and reminding the onlooker of the comb of a rooster.

Such teeth had been known as fossils, but nobody had been quite sure which kind of early fish had grown them; general suspicion centered around an ancient shark. The extinct fish to which these teeth once belonged had been called *Ceratodus*, or "horn-tooth." Now it was clear that it had not been a shark.

When Krefft dissected the fish, he found that, in addition to the normal gills, it also had a single lung. It was the fish that got into all the books as the Australian Lungfish, a veritable living fossil from the Middle Age of fish history.

KREFFT WAS so overwhelmed by the find that he did not even think it proper to give it another scientific name than the one attached to the fossil. He called it *Ceratodus Forsteri*, adding, as is customary, his own name.

Since then, pretty complete specimens of the fossil Ceratodus have been found. It turned out that the fossils of several hundred million years ago and the living form were not quite the same, so the Latin word for "new" was tacked on in front of the name and it became *Neoceratodus Forsteri* Krefft.

What had to be done next was to investigate the living fossil in the living state. Two one-man expeditions set out for the Burnett River to do just that. One consisted of Professor Spencer of Melbourne, who just spent his vacation on the project. The other one was Professor Richard Semon of Jena, Germany, who had traveled half-way around the Earth for the purpose, backed by the money of the Swiss manufacturer Karl Ritter.

Professor Semon, a direct pupil of Ernst Haeckel, was successful where Spencer was not, simply because *Neoceratodus* steadfastly refused to lay eggs

until after Professor Spencer's vacation was over. But Professor Semon's studies were interrupted, too, one day. No more eggs, no more fish within reach. The reason? The natives had eaten them!

Professor Semon had to wait for a full year—which he spent on islands between Australia and New Zealand—until the mating time of *Neoceratodus* came round again. Then, with natives who had been very strongly warned against eating the fish, he offered what to them were enormous rewards for bringing in the fish, and especially the eggs, alive. Observing the development of an individual lungfish from its egg would shed much light on the evolution of the species in the past.

It had been obvious all along that the lungfishes — there are three: one in South America, one in Africa and one in Australia, the Australian form being the largest and the most typical — were somewhere near the point where, in the distant past, the marine vertebrates, the fishes, had gone on land to become amphibians. But what had gone before? Where did the lungfishes fit in with the other fishes?

Mostly with the aid of fossils, the story could be reconstructed. The earliest known fishes, from the late Silurian and early Devonian period of 350 million years ago, were a strange lot. They were small, just a few inches long. Their organ of locomotion was their tail exclusively for there were no other fins. They also had no jaws and consequently no teeth. But they were heavily armored, with plate armor in front and scales over the tail section. Their main and possibly only enemy must have been the gigantic sea scorpions (eurypterids) of the same time, which were a good ten feet in length. No living representative of this type is left.

BUT SOME of these early fishes managed to become something else, presumably by leaving the river and going into the open sea. They developed jaws and paired fins and lost their armor, and speed became their protective device. We all know this type: the selachians, sharks in everyday English.

That they were an inherently successful development is shown by the fact that they are still with us, although the bad reputation of a few of them has confused the picture. The number of surviving species of sharks (and of rays, which are also selachians) is small and the number of individuals, too. Moreover, with a very few exceptions, the living forms are all rather recent types.

Above the sharks, we get two

main lines. One of them constitutes the endless multitudes of the living true, or bony, fishes. Another line led through an intermediary group to the first amphibians; the lungfishes are a group which branched off this intermediary group. They were near, but not in, the line of evolution of the amphibians and managed to survive mostly by being able to endure conditions which neither true fishes nor amphibians could tolerate.

The name of the intermediary group from which both the lungfishes and the amphibians came is crossopterygians. In English, this is translated as "lobe-fins." The Germans are more careful when it comes to the translation of the Greek word *krossoi* and call them *Quastenflosser* or "tassel-fins." An especially vigorously flourishing tribe of the lobe-fins were the coelacanths ("hollow spines") with large heads, strong, almost limblike, fins and a curious double tail. They started later in the Devonian period, lived through the Carboniferous and the Permian periods and all through the three periods of the great reptiles, Triassic, Jurassic and Cretaceous, but becoming rarer and rarer as time went on. They petered out near the end of the Cretaceous period and the last of the crossopterygians was *Macropoma Mantelli.*

It so happened that Macropoma was the first fossil of a crossopterygian ever discovered. Sir Arthur Smith Woodward carefully reconstructed it.

MY SECOND fish story begins by reporting that a river called Chalumna empties into the ocean on the southeast coast of Africa, near a town called East London. Late in 1938, a trawler with a load of fish berthed in New London. Its captain phoned the curator of the local museum, Miss M. Courtnay Latimer, told her that he had caught a very curious fish, and maybe she would like to come to the wharf to look at it. Miss Latimer did and saw at first glance that, whatever it was, it was very curious, just as the captain had said.

There was an unwieldy fish with an enormous head, steel blue in color, with large blue eyes, large scales and peculiar fins. It was a little over five feet in length and, though the captain of the trawler did not know its name, he did know its weight: 127 pounds. He also remembered details of the catch.

It had been caught not very far offshore on December 22nd, 1938, with a trawler net — other contents: one and a half tons of shark and half a ton of redfish and kobs—in 40 fathoms of water. It had lived for three hours

after capture and had tried to bite the hand of the captain as he bent over to see whether it was alive.

The trawler captain had termed it a very curious fish. Miss Latimer spoke of it as a very primitive fish when she informed Dr. James Leonard Brierley Smith, ichthyologist at Rhodes University, Grahamstown, South Africa.

Dr. Smith hurried to East London, but meanwhile nature had taken its course. The trawler had not returned to shore immediately after this catch. Miss Latimer probably wrote at once, but time went by between her first look at the fish and Dr. Smith's arrival. And it was summer in the southern hemisphere. Miss Latimer had been forced to order the fish skinned and the skin mounted. She did save the skull, too, and the rest had to be thrown away.

But although all the internal and interesting parts were missing, Dr. Smith saw that *it was a coelacanth*!

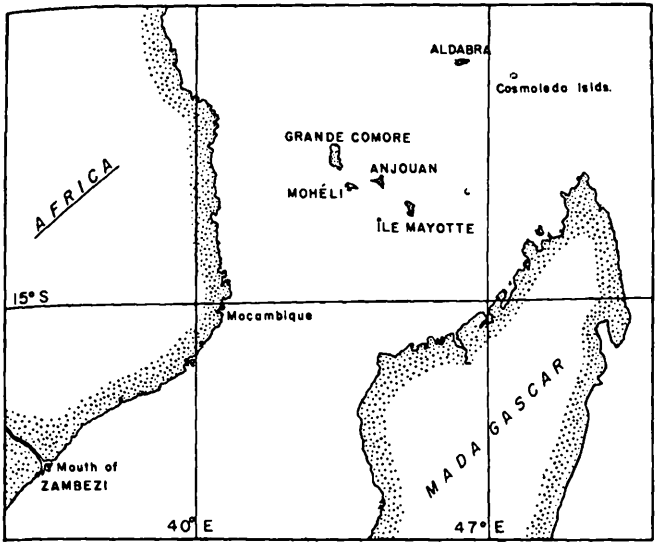
To honor Miss Latimer, who had saved what could be saved, he called it Latimeria and wrote down, for the journal *The Cape Naturalist*, the precise classification: Class: Pisces; Subclass: Crossopterygii; Order: Actinistia; Family: Coelacanthidae; Genus: *Latimeria*; Species: *chalumnae*, and added: "the genus and the species are new to science."

This was one of those major understatements which are occasionally made by people who want to avoid being called enthusiastic, for it was the biggest discovery in the whole natural history field since the finding of *Neoceratodus*.

A live brontosaurus in Lake Victoria would have been more spectacular, of course, but of lesser scientific interest. It certainly would have involved us, the observers, less because *Latimeria chalumnae* J. L. B. Smith is a representative of what constituted our own ancestry and a brontosaurus is not.

BUT THEN came a period of long frustration, for the Second World War was on. Fishing for food continued as usual, but the specimen off the mouth of the Chalumna River was evidently a stray.

It is said that Dr. Smith, during the war years, asked his wife in the middle of the night, "Do you think Latimeria lives in the Mozambique Channel?" (the water separating Madagascar from Africa) and I, for one, am inclined to believe this story; I have done similar things myself. Life would have been much easier for Dr. Smith if he had known where Latimeria lived. Since he



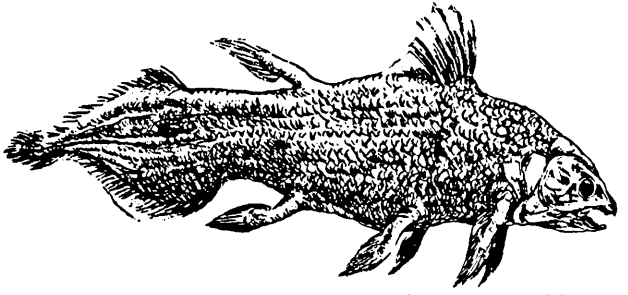
Area of distribution of the living coelocanths, the sea between the mainland of Africa and the northern tip of Madagascar.

didn't, he had to consider an enormous area.

The three languages spoken on the coastline of Africa are, going from south to north: English, Portuguese and French. Dr. Smith had pamphlets printed in large numbers in these three languages, offering a reward of £100 for a specimen.

He made collecting trips himself and, in December, 1952, had just come to Durban Harbor, South Africa, with many specimens of other fish, when he received a message from a trader plying the ocean between the African mainland and the Comores Islands: Grande Comore, Mohéli, Anjouan and Mayotte. Trader Eric Hunt reported that he had a second specimen!

Dr. Smith, worried that it might decay like the first before he got there, telephoned Daniel F. Malan, the Prime Minister of



The living coelacanth, Latimeria Chalumnae Smith.

the Union of South Africa, pleading for an airplane and pilot.

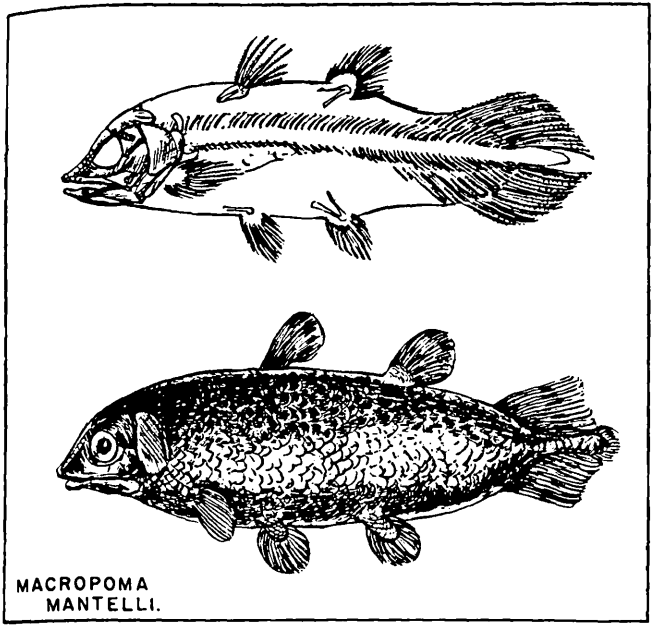
Prime Minister Malan is a champion of *Apaartheid* (segregation) and thinks that evolution is a question of belief instead of knowledge. Moreover, the telephone call arrived at midnight, when he was asleep.

In spite of all this, Dr. Smith won his point—the Prime Minister ordered at once that a Dakota plane (DC-3) and a military pilot be placed at Dr. Smith's disposition. He was flown to Trader Hunt's ship. High emotional strain and lack of sleep combined to put Dr. Smith's nerves on edge; when he saw the wrapped fish on board the small ship, he had to ask others to remove the wrappings for him. There was a large blue coelacanth with large blue eyes, with catlike teeth in its jaws—and it was undecayed!

Dr. Smith knelt down on the deck and wept.

SPECIMEN NO. 2 had been caught by a native, Ahmed Hussein, 200 yards off the island of Anjouan in 65 feet of water. The fish had struggled so hard that Ahmed Hussein had to bash its head in. The next morning, he took it to market, but before somebody else of equal ignorance bought it for soup, another native recognized it as the fish which was worth three years of normal income. The lucky fisherman and his canny informant lugged the fish over 25 miles of mountainous terrain to Trader Hunt's vessel.

Hunt, who had been handing out Dr. Smith's leaflets himself, sent a cable to the scientist, then sliced open the fish's sides and packed them with salt. After that,



The most recent fossil coelacanth, restoration of skeleton (above) and of external appearance (below). The restorations were made before the living coelacanth was discovered.

he found a medical officer, borrowed a syringe and five liters of formalin and injected them into the fish.

Dr. Smith now had the material to decide the two questions most important from the scientific standpoint: How were the jaws formed? And had the coelacanths progressed to the point of having livers?

En passant, he collected some information from the natives of the Comores Islands. They all knew the fish, which was brought to market occasionally. Their

own name for it was *combessa*. Its flesh turned into jelly when it was boiled. And, when alive, its eyes were luminous.

After examining Specimen No. 2 some more, Dr. Smith felt that this was a different species from No. 1. And so it happened that the anti-evolutionist Prime Minister had this fish named after him — it became *Malania anjouanae*, "Malan's fish from Anjouan."

Science did not have to wait for another dozen years for Specimen No. 3. It was killed by Houmadi Hassani off Anjouan in 650 feet of water on September 24, 1953. It was a smaller fish, weighing only 88 pounds, and it was brown with white spots. Because of this coloration, Houmadi Hassani's assertion that he had *the* fish was not believed at first, but a few hours after death, it turned blue.

It was flown in an old Junkers plane to Madagascar, for in the meantime, Professor James Millot in Paris had informed French officialdom about the scientific rarity in French waters, since both the Comores and Madagascar are French possessions. In fact, Professor Millot was waiting in Madagascar; he was not going to miss a chance to have a go at the next specimen that showed up. And he soon made a few scientific pronouncements.

The coelacanth apparently showed a very unusual amount of individual variation, in coloration as well as in placements of the fins. Hence Dr. Smith's new species, based on such minor differences, was unfounded. They were all *Latimeria chalumnae*.

Specimen No. 4 was taken near Grande Comore, the main island of the group, on January 29, 1954. In the morning of January 30th, Specimen No. 5 was brought in and, a few hours later, Specimen No. 6. But there was a wait of ten months for No. 7.

The scientists, especially the French, were overjoyed with the development, but they mourned one fact. One couldn't be sure about the very first specimen because so little of it was left, but all the others had been males.

AS IN the case of *Neoceratodus*, the scientific desire for fish eggs grew to outrageous proportions. Furthermore, six good specimens were enough to learn all about the anatomy of this survivor from the period preceding the so-called Age of Reptiles. Now one had to observe the live fish if one wanted more information.

The French had matched Dr. Smith's reward of one hundred pounds sterling all along and had paid it to the lucky fishermen — with public ceremonies. Now

they doubled the prize, but it had to be a live specimen to rate the bigger award.

Specimen No. 8 was brought in on November 12, 1954, by two fishermen, Zema ben Said Mohamed and Madi Bacari. The fish struck at a depth of 840 feet and it took more than half an hour to haul it in. Specimen No. 8 was brought in alive and turned out to be a female.

There was dancing all night in the village. The specimen was put in a swamped boat resting on the bottom in very shallow water and a fish net was stretched over the boat so that the catch could not escape. And anybody could see that the natives had told the truth all along: the eyes of the fish glowed strongly with a greenish-yellow light. The color of the live specimen was a very dark gray-blue. As it swam slowly about in its confined space, the pectoral fins made "curious rotating movements," to use Professor Millot's words.

Millot continued: ". . . the second dorsal and anal fins, likewise very mobile, served together with the tail as a rudder. After daybreak it became apparent that the light, and above all the sun itself, was upsetting the animal very much, so several tent canvases were put over the boat to serve as some kind of protection. But despite this precaution and the more or less constant renewal of the water, the fish began to show more and more obvious signs of distress, seeking to conceal itself in the darkest corners . . . at 14:45 hr. it was still swimming feebly; but at 15:30 hr. it had its belly in the air and only the fins and gill covers were making agonized movements."

Specimen No. 8, four feet and nearly eight inches long and weighing almost precisely 90 pounds, had lived for about 20 hours, counting from the moment of its striking the baited hook. Unfortunately, the fish did not carry any eggs. But quoting Millot once more:

"Two principal conclusions emerge from the corroborated statements made by local observers and myself: (1) the extreme photophobia of *Latimeria* — the sunlight seemed literally to hurt it; (2) the exceptional mobility of the pecundulate fins, correlated with the wealth of musculature which is revealed by anatomical studies. The pectorals, in particular, can move in almost any direction and show themselves capable of assuming practically every conceivable position."

BECAUSE OF the sensitivity to sunlight, an "aquarium" for *Latimeria* will probably have to take the shape of a wire-net cage at the bottom of the sea,

at least 200 feet below the surface, which can be lifted to, say, 30 feet from time to time to enable scientists in aqualungs to study the fish and take photographs.

Professor Millot has promised that "all about *Latimeria*" will be told in a four-volume work now in preparation. But the last volume of this work will certainly not be sent to the printer until a few more things have been done.

One is to observe mating and spawning, if at all possible. If that does not work out, the scientists want to have at least one bunch of eggs which can be hatched and a few young will then be killed off for careful dissection at intervals of a few days. Richard Semon did that with *Neoceratodus* eggs.

The comparison between the two should be most interesting and enlightening. Since the young in their early stages always resemble their ancestors, such a study may teach us just where *Latimeria* ties in with fossil forms and possibly even enable us to arrange the fossil forms in an evolutionary sequence.

Another observation that would be of the greatest interest would be to find where the fish actually lives. The first specimen was evidently a stray, because all the others were taken in the vicinity of the Comores Islands — usually, but not always, in fairly deep water. If one could establish where the fish lives, it could be a clue for its survival in just this area. If they prefer caves it might also be that the biggest specimen stay in their caves.

The first one, weighing 127 pounds, is also the largest one so far. Most of the others weighed 100 pounds or less. But the natives swear that in the past, when nobody yet cared, specimens weighing 225 pounds were brought to market once in a while.

Finally, it is not established that the fish lives only near the Comores Islands. It has not yet been found near the Cosmoledo Islands, or near the Seychelles Islands, some distance to the northeast from the Cosmoledos. On the other hand, nobody has been strenuously looking around these islands and we have seen that, in spite of strenuous looking, many years passed between Specimen No. 1 and No. 2.

Moreover, such living fossils have a habit of surviving in widely separated areas, a fact that can be easily explained. Originally they had a worldwide distribution and then managed to hang on in a few places, becoming extinct in the in-between areas.

Marsupials, for example, survived mainly in Australia. But they also live in the Americas.

ANOTHER LIVING fossil, just as old as *Latimeria* and *Neoceratodus*, the horseshoe crab survives along the Atlantic shores of the United States. The only other place it can be found is in the waters around the Moluccas on the other side of the Earth. The point I'm leading up to is that there is a little bit of very feeble evidence for a primitive fish of large size in the Gulf of Mexico.

In 1949, a woman in or near Tampa, Florida, ran a small shop selling souvenirs to tourists. She made many of them herself and her raw material consisted often of fish scales, which she bought from local fishermen. One day in 1949, a fisherman sold her a gallon can full of scales. They had the same size as the scales of a large tarpon—about that of a silver dollar—but they looked different.

Being curious, she mailed one of the scales to the National Museum in Washington, D. C., where it was passed on to the fish expert, Dr. Isaac Ginsburg. Dr. Ginsburg knew several things instantly:

One: he had never seen such a scale before. Two: no fish with such scales was known to live in the Gulf of Mexico. Three: there had never been even a rumor of a large unknown fish from those waters. Finally: the fish which grew this scale was a very primitive type, possibly a crossopterygian.

He at once wrote to Tampa requesting information on the whereabouts of more scales, the place where the fisherman had been fishing, the appearance of the fish from which the scales were taken. He never received a reply.

Nothing is known, therefore, except that there must be something unusual in the Gulf. We may get still a third fish story of the type of the two just told, right in our own waters.

— WILLY LEY