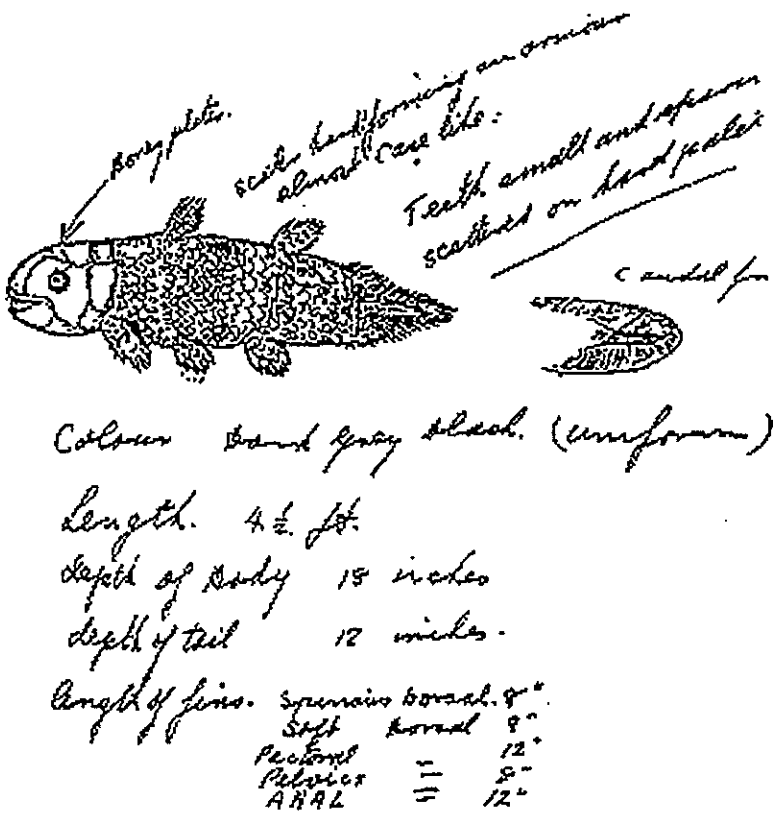

FIGURE 7.1 *Latimer's sketch and description of her mysterious fish.* This is a copy of the original sketch Marjorie Courtenay-Latimer sent to J. L. B. Smith on December 23, 1938. *Figure composed by Jamie Carroll.*

SEVEN

Miss Latimer's Extraordinary Fish

"Our brightest blazes of gladness are commonly kindled by unexpected sparks."

—Samuel Johnson (1709–1784)

December 22, 1938 was a sweltering day across South Africa. Marjorie Courtenay-Latimer was busy trying to put together a dinosaur skeleton she had excavated before the museum closed for the holidays.

Mid-morning, Marjorie received a phone call from the manager of the local trawler fleet — the *Nerine* had arrived at the docks and it might have caught some fish she might like for her collection. Marjorie was the first curator of the small East London Natural History Museum and had built up the small museum's collection of fossils, birds, fish, and other animals from scratch. "Oh dear," she thought, "so much still to do." Then she thought of how good Captain Goosen and the men of the trawler company had been to her over the years. Goosen had transported crates of specimens for her after an expedition to Bird Island, and he and his men collected live fish for the

museum's aquarium. The least she could do was go wish the crew Happy Christmas.

Marjorie put aside her dinosaur and went down to the dock. All of the crew was gone except one. She boarded the fishing trawler and eyed the fragrant mound of fish, sponges, sharks, and other creatures now baking in the heat of the sun. There was nothing special, and she was starting to leave when she spotted it. As she pulled away a pile of carcasses she saw, "the most beautiful fish I had ever seen. . . . It was 5 feet long and a pale mauve-blue with iridescent markings."

It was also unlike any other fish she had ever seen. It was covered in hard scales, had four limb-like fins, and a strange, puppy-dog tail. She knew it had to be preserved. The fish weighed 127 pounds, so getting the dead and decomposing creature back to the museum was no small matter. It took quite a bit of persuasion to get a taxi driver to allow it into his trunk.

Once back at her post, she showed off her catch to the museum's chairman, Dr. Bruce-Bays, a physician. He was a sarcastic man who was fond of calling Marjorie "Mistress Madge," and promptly dismissed the fish as an ordinary rock cod.

Marjorie ignored him and tried to find some way to preserve the hulk that was lying on her examination table. Always resourceful, if not unconventional, her first thought was the town's mortuary. So she put the fish on a cart and wheeled it down the street, much to the disapproval of East London's pedestrians out shopping on that hot day. The man in charge of the morgue was even more rattled and refused her on the spot. Marjorie appealed, "Ah, well, they're all asleep, and it's such a beautiful fish." He did not budge.

She next tried the cold storage company, but the man there was afraid the spoiling fish would ruin the food inside, so that too was out. She then thought of the taxidermist, who had known her since she was little and trained her in preserving and mounting animals. He had also never seen a fish like Marjorie's, and he helped her wrap it in formalin to buy some time.

But what was *it*? Virtually self-taught in natural history, Marjorie consulted all of the fish books that she had. None of her references showed anything like the new blue fish. She decided to call Dr. J. L. B. Smith, a chemistry lecturer

and amateur ichthyologist at Rhodes University one hundred miles away. Smith acted as honorary curator for small museums along the southern coast of the country. When she could not reach Smith by phone, she wrote him a brief letter the next day, enclosing a description and a drawing of the fish (see Figure 7.1).

Then Marjorie waited. Day after day went by without a reply from Smith. The fish started to decay and something more had to be done than her makeshift wrapping in preservative. She asked the taxidermist to preserve the scales and whatever else he could, but the innards would have to be tossed.

Smith did not see Marjorie's letter for eleven days, not until after the New Year. He was recovering from an illness, and when he finally had the chance to open the letter he was bewildered. He did not recognize the fish as South African, or from anywhere else for that matter. But then, Smith later recalled, "A bomb seemed to burst in my brain, and beyond that sketch and the paper of the letter I was looking at a series of fishy creatures that flashed up as on a screen, fishes no longer here, fishes that had lived in dim past ages gone, and of which only fragmentary remains in rocks are known."

Smith realized the letter was already eleven days old and worried he might be too late, he immediately wired Marjorie: "MOST IMPORTANT PRESERVE SKELETON AND GILLS FISH DESCRIBED."

Smith was stirred up by a possibility that his brain kept telling him was impossible. But Marjorie's sketch, and then some scales he received later, told him that this fish was a coelacanth, a member of a group of fish with paired fins thought to be closely related to the first four-legged vertebrates, *and thought to have been extinct since the end of the Cretaceous period, sixty-five million years ago.*

A month later, Smith went to East London to see the fish in person, which removed all of his doubts, as well as inhibitions. "Although I had come prepared, that first sight hit me like a white hot blast and made me feel shaky . . . I forgot everything else and just looked and looked, and then almost fearfully went close up and touched and stroked [it]."

It was time to tell the world.

A Living Fossil

J. L. B. Smith was perhaps nearly as peculiar a creature as the fish he stared at. He had a photographic memory, which no doubt helped him make the connection between Marjorie's rough sketch and fossils he had seen in the scientific literature. He could read sixteen languages and speak eight. He was absolutely devoted to Work. (Smith was fond of capitalizing the word when writing grade reports of his students.) He followed a strict, spartan diet, never eating meat with vegetables or bread with butter or cheese. He left no room in his life for luxuries or frills.

His passion was fish.

Smith certainly thought he was the right person for the job. He had long been convinced that he was destined to discover "some quite outrageous creature" and now here was the coelacanth fulfilling his premonition. The fish was sent, under police guard, to Smith's house for study. Smith issued strict instructions to his family on fish security: It was never to be left alone in the house, and in case of fire, the fish was to be the first saved. He spent every minute of the next several weeks studying every detail of the fish.

Smith was sure that the world of zoology was going to be electrified by the discovery. He also knew that, working far off the map of the world's scientific centers, he would have to get the story right the first time.

What was all the excitement about? Was the coelacanth "just" a strange fish that was mistakenly thought to be extinct? No, it was much more than that.

Biologists and paleontologists had long recognized three distinct groups of fish: sharks and rays; the so-called "ray-finned" fish, which included most familiar species (salmon, cod, eels, you name it); and the "lobe-finned" fish, which included lungfishes and, up until Marjorie's find, the extinct coelacanths.

The earliest coelacanth fossils date to the Middle Devonian period, about 380 million years ago. About 125 fossil species have been found that date up to the end of the Cretaceous period, sixty-five million years ago. The group was thought to have died out at the same time as the dinosaurs. What helped Smith recognize Marjorie's fish as a coelacanth from just her sketch was that

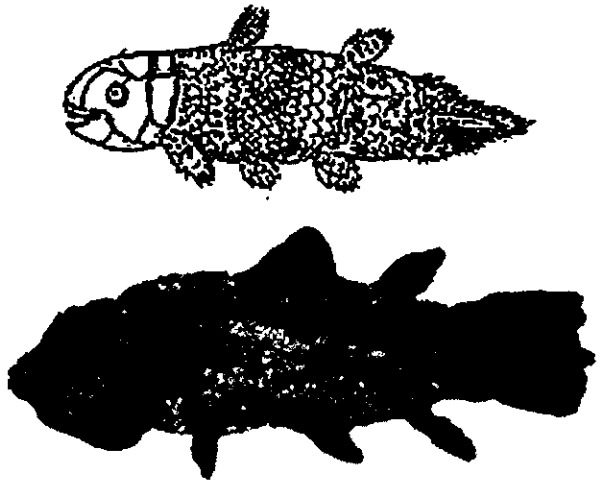

FIGURE 7.2 *A living fossil.*
Compare Latimer's sketch with a fossil coelacanth from 250 million years ago. Note the great similarity in body forms. *Figure composed by Jamie Carroll.*

the fish so closely resembled its extinct relatives (Figure 7.2). The body form of the coelacanth had changed relatively little over 380 million years, earning the new coelacanth the moniker of "a living fossil." (This does not mean that the living species was 380 million years old, but that it was descended from a series of ancestors extending back to this period.)

The coelacanth body parts of foremost interest, at the time of Marjorie's find and now, are its limb-like fins. The fundamental distinction between the "ray-finned" and "lobe-finned" fish is in how the fin attaches to the girdle of the main body. In ray-finned fishes, there are several bones that attach (Figure 7.3). But in lobe-finned fishes, the paired fins are attached via single bones, and these bones are in the same position as the humerus and femur of the limbs of four-legged vertebrates (tetrapods), including humans (see Figure 7.3). The way this single bone attaches allows for greater rotation of the limbs. During the late Devonian (360–380 million years ago) lobed fins evolved into the walking limbs of land vertebrates. Paired fins and certain bones within them are thus said to be homologous to tetrapod limbs and

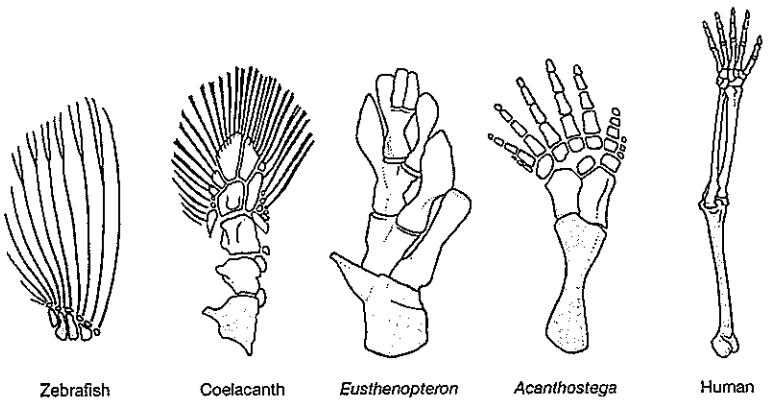

FIGURE 7.3 *Lobe-fins and the evolution of limbs.*
A pectoral fin of a zebrafish (a ray-finned fish); a pectoral fin of the living coelacanth *Latimeria chalumnae*; pectoral fins of the extinct lobe-fin *Eusthenopteron*; the hindlimb of the tetrapod *Acanthostega*; and a human arm. The homologous parts of the fins and limbs are shaded. *Drawn by Leanne Olds.*

bones — they are variations of structures that were present in a common ancestor. The discovery of the living coelacanth gave scientists, and the world, the opportunity to see in the flesh a fairly good approximation of what our fish ancestors looked like.

Smith completed his first report on the fish and had claim to its naming rights. He called it *Latimeria chalumnae*, in honor of Marjorie Courtenay-Latimer and the Chalumna River near where it was caught. He submitted the report and a photograph of the fish to *Nature*, then and now a most prestigious scientific journal.

The press went crazy. They seized on the notion of a "living fossil" and likened the discovery of the coelacanth to that of finding a living dinosaur. News articles appeared throughout the world (Figure 7.4).

Marjorie's little East London Museum was famous. When Smith returned the fish to the museum, large crowds wanted to see the new wonder. Every museum coveted a specimen, perhaps too much so. One day Marjorie was given a letter to type by Dr. Bruce-Bays; it was an offer to sell the specimen to the British Museum of Natural History in London. Marjorie refused to type it,

FIGURE 7.4 *Marjorie with coelacanth.*
This picture circulated throughout the world.

and said she would resign rather than do so. Bruce-Bays relented, and the specimen is still on display today at the East London Museum in South Africa.

The museums were not the only ones to covet more specimens. Scientists worldwide wanted their own coelacanth to study, and Smith wanted at least another specimen in order to study the internal organs, which had been removed and disposed of before he could examine them. Many questions still remained. Where did the coelacanth live? Was it a deep ocean creature, as some believed, or a reef- and rock-dweller, as Smith surmised?

He, and everyone else, would wait a long time to see another coelacanth.

Wanted Dead or Alive

Shortly after the coelacanth circus, the outbreak of World War II preempted any expeditions to find more fish. But the passage of the years did nothing but intensify Smith's eagerness to get another specimen. And, over the years he had gained a great deal of prestige and influence. He convinced the South African government to put up the funds for a one hundred pound reward for anyone who caught a coelacanth and turned it over for scientific

study. Marjorie arranged a special coelacanth exhibition at her museum and gave the proceeds to Smith so he could have reward posters printed in French and Portuguese and distributed all over the East African coast.

On Christmas Eve 1952, Smith received a telegram from Dzaoudzi, a small islet in the Comoros Islands. The telegram was sent by Captain Eric Hunt, who wrote that he had a five foot coelacanth and had injected it with formalin.

Could it be? Fourteen years had now passed since Marjorie's electrifying letter. Did Hunt really have the right fish?

There was only one way to find out and that was to fly to the Comoros. But it was Christmas Eve, and the Comoros was a French territory more than fifteen hundred miles away. How would Smith get there and secure Captain Hunt's fish for South Africa?

Smith tried to reach various scientific and government officials, even the ministers of economic and internal affairs. They were all away. Precious time was slipping by. Smith received another cable from Hunt saying that local authorities were going to claim the specimen unless Smith showed up in person. Smith became, in his words, "Possessed." He decided to contact someone with clout — the prime minister, Dr. D. F. Malan. Smith reached the prime minister's wife, but she would not disturb him.

Just as Smith was about to give up, the phone rang. It was the prime minister. It just so happened that the prime minister had a copy of Smith's book *Sea Fishes* and recognized Smith's name. Malan figured Smith must be calling about something important, so he called Smith back. Smith unloaded the whole story — of the first coelacanth, the lost innards, the long search for another specimen, and now the possibility of a second fish. It was, Smith urged, a matter of national prestige to get this fish.

Malan ordered an air force plane to take Smith to the Comoros. It was not the sort of mission the crew expected. The journey from Durban to Mozambique and then to little Dzaoudzi was a long jaunt for the DC-3 in those days. The trip only keyed up Smith further.

At last, the plane touched down. Smith first had to deal with formalities and meet the French governor of the Comoros Islands before he could see Hunt. Smith could barely contain himself and as soon as he could, he jumped into a car to race to the dock. Hunt had the fish in a large, coffin-shaped box. Smith was at first frozen with fear that Hunt had the wrong fish and that all of their trouble had been for nothing.

Then Smith opened the box. He knelt down to get a closer view. Tears were running down his face. He later recalled, "Fourteen of the best years of my life had gone in this search and it was true; it was really true. It had come at last."

Smith quickly regained his senses. He knew he had to get the coelacanth on the plane before the French authorities changed their minds about surrendering the fish. He also decided that it would be a good idea for the prime minister to be the first person to see the prize. After visiting the prime minister, Smith scooped up Marjorie and took the fish back to his laboratory.

There, Smith was delighted to dissect the beast. He found that the fish had no lungs and no air bladder as in other fishes, but had a swim bladder filled with fat. He also found evidence in the intestines that the coelacanth was a powerful predator. That and the fact that the fish was caught on a hand-held line in about twenty to thirty meters of water, just two hundred meters offshore, told Smith he was right about the coelacanth's lifestyle as a reef- and rock-dwelling predator — the fish was not a deep ocean species.

Many more coelacanths were caught in subsequent years, providing specimens for both scientists and museums. The fascination with this living fossil also inspired divers and ocean explorers to see it in its native habitat (Figure 7.5). Its swimming motion is particularly fascinating, as it moves its fins in alternating fashion — the right front fin with the left rear fin, the left front with the right rear — just as four-legged animals walk. Smith wrote a book about his adventure with coelacanths, dubbing the fish "Old Fourlegs."

With hours and hours of live observation, and many specimens caught over sixty years, one might think that scientists would have learned about all they could about coelacanths. Not quite.

Déjà vu?

In September 1997, Mark and Arnaz Erdmann were on their honeymoon, strolling through the seaside city of Manado on the northern tip of

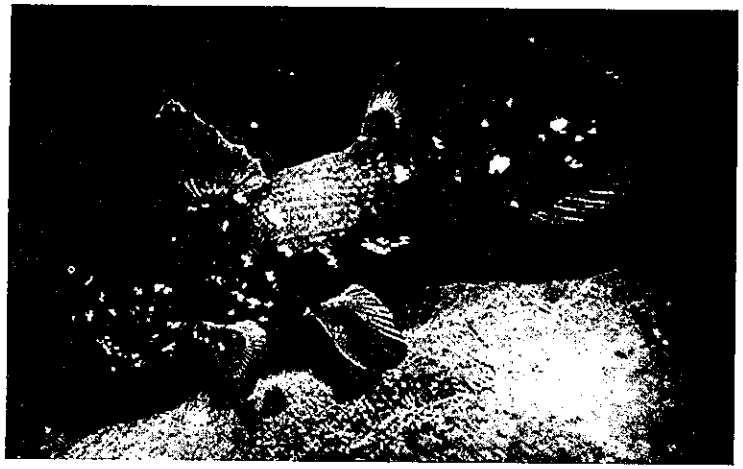

FIGURE 7.5 *A coelacanth in its native habitat.*
Photo from JAGO submersible, Jurgen Schauer and Hans Fricke.

Sulawesi — one of Alfred Wallace's favorite islands in the Malay Archipelago (today part of Indonesia). (See Chapter 2, Figure 2.2 for map.)

Arnaz noticed it first. In a fish cart being pushed by an older man, there was a large, strange fish. She pointed it out to Mark and asked what it was. Mark, who had recently earned his Ph.D. in marine biology, immediately recognized it as a coelacanth.

There was no doubt in Mark's mind. He had read J. L. B. Smith's book about coelacanths when he was a young boy, and the fish had caught his imagination. But he wasn't sure if anyone had ever seen a coelacanth around Indonesia, some six thousand miles from the Comoros Islands.

Mark wasn't sure what to do. Was this a big discovery? Should he buy the fish and take some samples back to his home in California? He did have his sampling kit with him. He decided to take some pictures and look into Indonesian coelacanths later when he had more time.

"It was the biggest mistake I ever made," Mark later realized. He shared his photographs with several experts, each of whom concurred it was a coelacanth, and pointed out that the fish had never been found anywhere near those waters before. One expert suggested that perhaps a fishing boat might have off-loaded its catch from African waters in Sulawesi in order to avoid regulatory problems?

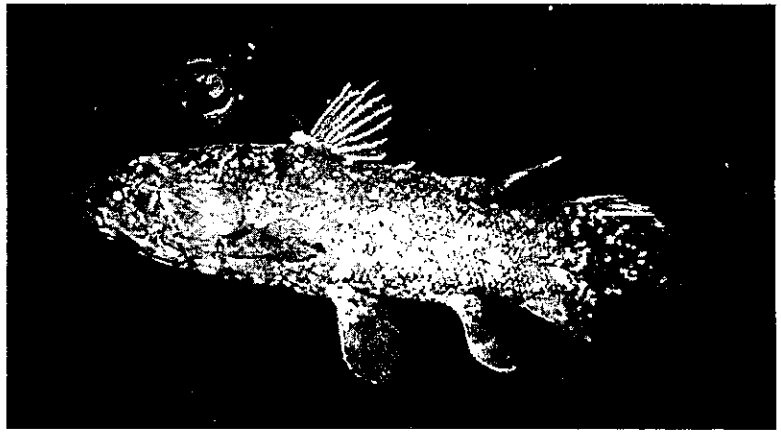

FIGURE 7.6 *The Indonesian coelacanth.*
Photo by Mark Erdmann, courtesy of Arnaz Mehta.

Mark consoled himself with the knowledge that he would soon return to Manado, where he could find the man with the fish cart and continue his investigation. But, once back in Manado, he had no luck at all finding the man or the fish. Thinking he may have missed a golden opportunity, he borrowed J. L. B. Smith's strategy and offered a reward and distributed posters of the fish to offshore fisherman. After some time passed and no coelacanth was turned in, Mark increased the reward. Then, one morning, almost a year after their honeymoon and the day in the fish market, Mark and Arnaz's boatman arrived, grinning.

Mark and Arnaz raced down to the beach where they found a fisherman holding a live coelacanth on a line in the shallow water. They guided the fish out into deeper water to revive it a bit. Arnaz jumped in with her diving gear and started swimming with the great fish. The fish was bleeding, and these waters had plenty of sharks, so the swim was a bit dangerous. But Mark and Arnaz had their proof (Figure 7.6). Coelacanths did live in Indonesian waters.

Two months later, *Nature* published Mark and Arnaz's discovery, and the coelacanth was again world news. It was not clear at first whether the Indonesian and African fish were the same species. They looked very similar in body form, but differed in color — the Indonesian form was brown with gold flecks.

Mark had one means of looking at coelacanths that J. L. B. Smith never had — DNA analysis. When the DNA of the Indonesian and African specimens were compared, they differed by 4.1 percent. This level of divergence is greater than that between chimpanzees and humans, and many other closely related species. The Indonesian coelacanth was a distinct species — Mark and Arnaz had found another living fossil.

Always Expect the Unexpected

Mark and Arnaz Erdmann's stroll through the Manado fish market and Marjorie Courtenay-Latimer's courtesy visit to the East London dock illustrate the role serendipity often plays in science. Marjorie recalled in an autobiographical note she penned some forty years later how several chance encounters led to her discovery:

> This story is one of the most astounding records of a woman's intuition, for:
> had I never gone to Bird Island;
> had I never met Dr. J. L. B. Smith who, of all the scientists I met as a young girl, struggling with meager funds in a small museum, always gave encouragement and never criticism;
> and had I not gone to the wharf to wish the men a Happy Christmas,
> there never would have been a coelacanth discovery in South Africa, on 22 December 1938.

It is true that discoveries are often quite accidental — occurring when least expected and turning up things that are not even remotely imagined. But, they would not be discoveries at all unless those who stumble upon something unexpected track down the meaning of what they have found.

CHAPTER QUESTIONS

1. "Living fossil" is a term that has been informally used to describe crocodiles, horseshoe crabs, ginkgo trees, and some other plants and animals. Are living members of these groups exceptionally long-lived species? How does the term "living fossil" apply to the coelacanth?

2. What is the significance of the structure of the coelacanth pectoral and pelvic fins?
3. What resemblances do you see between the fossil coelacanth and the fish sketched by Marjorie Courtenay-Latimer in Figure 7.2?

For more on this story, go to the *Into The Jungle* companion website at www.aw-bc.com/carroll.