

Scientists Pursuing Their Dreams

by Terry Miller Shannon

Jane **Goodall**

Dian **Fossey**

Birute M. F. **Galdikas**

Eugenie **Clark**



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Introduction

Jane Goodall, Dian Fossey, Birute M. F. Galdikas, and Eugenie Clark are four well-known scientists. They became famous by dazzling the scientific world with their discoveries of startling new facts about the animals they studied. Their lives and their ground-breaking work in science also fascinated the public.

In order to do their work, they sacrificed. Several did not have the type of home most people live in, with running water and electricity. Many of them gave up living in a community since the animals they studied lived in **jungles** far from civilization.

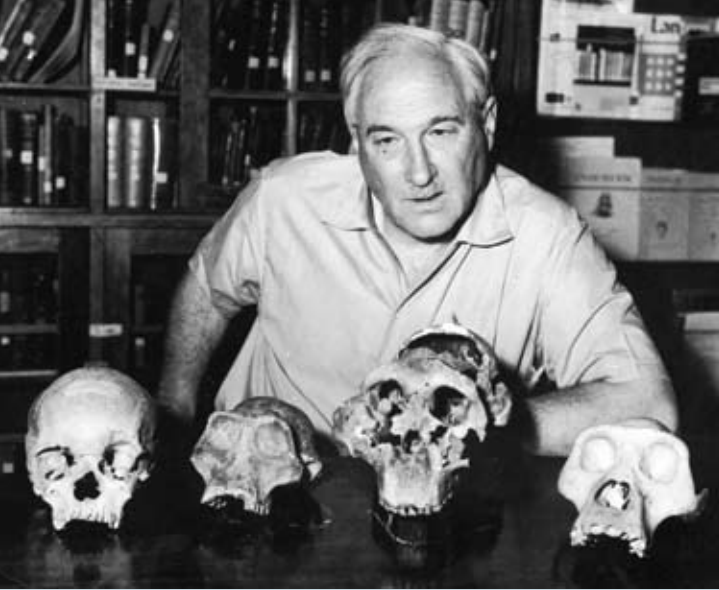
The living conditions, long hours, and hard work necessary for research projects could make family life difficult. The scientists who became mothers sometimes resorted to extreme measures in order to protect their children from wild animals. One built a big cage for her child to play in; another sent her son to live with his father in Canada.

These scientists faced a variety of dangers. The animals they studied sometimes threatened to attack them. Poisonous snakes slithered into their homes. In order to track their research animals, the women suffered insect bites, fevers, rashes, skin sores, and **leeches**.

At times, the scientists made enemies among the local people. This could be dangerous. In Dian Fossey's case, her struggles with neighboring people most likely led to her murder.

The scientists also faced **discrimination** in their work because of their gender. Each woman entered a field in which female scientists were rare. Many people did not expect them to be able to overcome the rough living conditions and hazards. Yet the scientists proved the people who doubted them wrong.

Three of the women, Goodall, Fossey, and Galdikas, had the same **mentor**, Dr. Louis Leakey. Leakey helped them set up their research camps and get the funding necessary for their work.



Around 1955: British anthropologist Dr. Louis S. B. Leakey (1903–1972) sits at a table with four skulls, including the skull of the world's earliest known man.

He believed their study of **primates** in the animals' native homes would help people understand where humans had come from. The three scientists were often called "Leakey's Angels."

Jane Goodall, Dian Fossey, and Birute Galdikas had much in common with the shark expert Eugenie Clark. All four women shared

traits they needed to succeed. The four women had determination, curiosity, courage, and a love of animals. They were able to sacrifice themselves, believing that what they would learn, and the knowledge they could contribute, was more important than a comfortable, easy life. They strived to balance the urge to have a family against the passion to make sense of the world through their research.

Each scientist's life story tells where she came from and what set her on her life's path. Each story is unique, but they are all fascinating.

Jane Goodall

The world knows Jane Goodall as the woman who became the major expert on chimpanzees. She has studied chimpanzee life in Gombe, which is in the area of Africa known as Tanzania, for decades. She began researching the wild chimpanzees in 1960 and, as of 2007, continues to lecture and write about them.

When she first began her research in Africa, Goodall was only 26 years old. How did such a young scientist learn so much about these wild animals? Where did she come from, and what inspired her to devote her life to studying the chimpanzee?

The Scientist As a Child

Jane Goodall was born on April 3, 1934, in London, England. She lived in a big house near the ocean. She spent as much time as she could outside. She loved to ride horses, and she enjoyed going to the beach. She liked spending time in the family's yard, which was large and wild. She watched the birds and read sitting high in a tree. Goodall went on many walks. She wrote notes on every creature she saw.

During the winter, she read in front of the fireplace. The books she read were mostly library books. When she read *The Story of Doctor Doolittle* by Hugh Lofting, a tale about a man who travels to Africa to help the animals he loves, Goodall decided she would go to Africa when she grew up.

While she read about the wild animals, she also watched the local ones. She started a club with other children to study squirrels, birds, and insects. The club made a camp in the yard. There, they could have a small fire and eat snacks. Her club kept snails as pets, which they raced. Goodall made her own nature magazines. She handed them out to her fellow club members.

by a guide. So she pleaded with the local game ranger to allow her to move around by herself. He agreed that, if she told her guide, Rashidi, where she was at all times, she could travel alone.

Every morning, she arose at 5:30. She ate bread and coffee. Then she hiked off to find chimpanzees. From one tall spot called the Peak, she could see the entire area. She watched chimps in



The Gombe Stream National Park is on Lake Tanganyika in Tanzania.

the trees. She watched from a distance, knowing that if she crept closer, the chimpanzees would vanish.

As time went by, she learned about the chimps' lives, bit by bit. She discovered that the chimps stayed in small groups of six or less members. Each group usually had a mother and children, plus two or three adult males. Groups sometimes joined together to pick fruit from one large tree.

After she had observed them for a while, Goodall figured out that all of the groups she had been watching were parts of a large community with about fifty members. They lived in the valleys in the area. She took samples of leaves, fruit, and flowers from the trees in which she saw the chimps eating.

Goodall watched and waited. As time went by, the chimps grew more used to her presence. Still, it took a year before she could creep to within one hundred yards of them.

In the meantime, she learned about the other animals in the jungle. Baboons were not afraid of the visitors and stole food from their camp. There were other kinds of monkeys, squirrels, mongooses, porcupines, seven types of poisonous snakes, rats, mice, buffalo, bush pigs, and leopards. She had a few up-close-and-personal meetings with two of the most dangerous jungle animals, a buffalo and a leopard—and lived to tell the tale.

Jungle Home

In fact, Goodall was becoming so comfortable in the jungle that she felt she was at home there. She carried equipment to make herself a cup of coffee during the day. She even slept up on the Peak, in order to observe the chimps early in the morning. She watched them make their beds in trees by bending branches out until they overlapped. Then they would make a twig cushion. The babies slept with their mothers until they were five or until new babies took their places.

Goodall's mother ran her own small health clinic, caring for local people who became ill. Patients came from far away in order

She also had a baby of her own in 1967, a son, Hugo, whom they nicknamed Grub. Of course, Goodall and her husband were very careful of Grub. Someone was always with him, and he had a sturdy protected area to play in. When Grub was small, Goodall did not work with the chimps. She did go to see them, but she left the information gathering to others. She'd work in her office in the morning. After lunch, she would play with Grub.

Goodall and her husband divorced in 1974. His work made him travel constantly, while Goodall felt she must stay at Gombe. In 1975, she remarried Derek Bryceson who was English. He was the Tanzania National Park director. Goodall and Bryceson had separate homes because of their work, but Bryceson flew to Gombe to see his wife. When Grub was nine, he went to live in England with Goodall's mother so he could attend school. He and Goodall spent vacations together. After five years of marriage, Bryceson died from cancer in 1980.

More Discoveries

Goodall discovered that the chimps carried out wars between groups. She observed a war that lasted four years, beginning in 1974. This was the first record of long-lasting war in animals other than humans.

Goodall made another discovery. Chimps could use political **coalitions**. Figan was a small chimp who had suffered polio and had one paralyzed arm. Yet he and his brother banded together to bring down the leader of the group so Figan could become the leader.

One night in 1975, **rebels** from another area kidnapped some of the Gombe students. Eventually, ransom money was paid to the rebels, and the kidnappers released the students. It was a reminder of how dangerous living in that area of Africa could be.

In 1977, Goodall began the Jane Goodall Institute for Wildlife Research, Education, and **Conservation**. The purpose of the institute, which is still active today, is to help chimpanzee researchers

as they work in the wild and to improve life for all animals and humans.

In 1987, Goodall and her staff watched another amazing breakthrough. A young female chimp named Spindle adopted a three-year-old orphan even though the youngster was not part of Spindle's family.

Continuing to Help

Goodall continues to be the director of research at Gombe as of 2007. She has a large staff at her research center, and she continues to help chimpanzees in many different ways. She set up homes for the care of hurt or orphaned chimps. She lectures and writes on the moral way to study chimps in a laboratory. She started a program called Roots and Shoots, which teaches students about wild animals and how to care for the environment.

Jane Goodall has been on magazine covers and in movies and television shows. She has won many honors, including the Albert Schweitzer Award in 1987 and the Encyclopedia Britannica Award in 1989. Her life has been spent drawing humans and chimpanzees closer and sharing her hope that young people can make the world a better place.



Jane Goodall in recent years

Galdikas and Brindamour landed in Jakarta, the capital of Indonesia, in 1971, where they had to apply for licenses and do other paperwork. Soon, they had every permit they needed for their study camp, but they needed to decide where to set up the camp. Because orangutans had recently been sighted in the Tanjung Puting Reserve in Central Indonesian Borneo, they decided to set up camp there.

On the island of Borneo, in the jungle, they saw men hunting with blowguns. It felt as if they had wandered back into prehistoric times—as if the modern world did not exist. They were also shocked to find that several areas within the reserve were being logged. Although laws protected the animals within the reserve directly, logging itself was not illegal. Logging killed animals indirectly by destroying their habitat, or home.

Animals were becoming extinct or were endangered. Orangutans were one species that was highly endangered. One danger to their population was being captured. Many local people in cities illegally kept orangutans as pets. The pet orangutans were often crowded into filthy pens, an idea that broke Galdikas's heart.

Galdikas and Brindamour were escorted to their camping area, which they named Camp Leakey. They traveled by boat and canoe along the river. When they reached their site, they moved into a tiny, rustic cabin, where they would live for many years.

Galdikas hated Tanjung Puting at first. After all her dreams, waiting, and yearning, this was not what she had expected! Her Indonesian escorts accompanied her everywhere. She also had a very difficult time walking places; she could not keep up with the stronger men as they scrambled easily over fallen logs.

It rained all day, every day. The cabin was crowded. One escort tried to talk Galdikas into leaving, saying it was too dangerous for her to be there. But another one told her that he would support her if she started a captive orangutan **rehabilitation** program that would care for pet orangutans until they could be released into the wild.

Galdikas glimpsed wild orangutans as she paddled a canoe along the river with two of her escorts. It was a mother and her child. The two climbed high into the trees. Galdikas wanted to get out of the canoe to look at them, but one of her escorts would not let her leave the canoe. Still, that one brief look made her happy.

All of the escorts except one left. Mr. Yusuran would remain to help Galdikas and Brindamour. It rained and rained. Camp Leakey was just a few feet above swamps. Galdikas waded up to her armpits in swamp water all day in order to look for orangutans climbing high in the trees. Her skin shriveled, her toes went numb, and she shivered with the cold. But each brief peek



Map of Borneo, marked with Tanjung Puting Reserve, site of Camp Leakey



Galdikas with young orangutans

at an orangutan gave her hope that one day soon she would be able to actually follow an orangutan. If she could follow one until it became used to her presence, she could study it. That, of course, was her whole reason for being at Camp Leakey.

However, after being in camp for two months, Galdikas had still just barely glimpsed orangutans. It certainly wasn't for lack of trying. She spent all day, every day, searching for them, walking through the jungle with her notebook, binoculars, a machete to clear a path, and coffee. Although she saw their nests high

in the trees, she did not see the orangutans themselves for more than a few seconds.

Patience

Galdikas knew she would give the orangutans names, as Jane Goodall did with her chimpanzees. At that time, Goodall had studied the chimps for ten years. She was Galdikas's hero. For the time being, Galdikas gave the name Alice to the only orangutan she had

seen often enough to recognize. She named Alice's child Andy. But her brief peeks only made her feel discouraged and hopeless.

Meanwhile, she battled leeches that attached themselves to her. Leech bites can become infected. She also fought off clouds of mosquitoes and flies. Tiny ticks burrowed into her skin and huge spiders startled her. Fire ants bit Galdikas and her husband during the night, leaving painful sores.

Galdikas finally decided that an orangutan could hide easily in the jungle, but it would make noise as it traveled. So, she walked, stopped, and listened—sometimes for hours. Yet, she could not find orangutans to study. Was her quest a total failure?

As Galdikas and her husband walked through the jungle on Christmas Eve, she heard branches breaking and saw a large tree trembling. She saw an orangutan, an adult female with a baby on her shoulder climbing the tree. Galdikas was able to follow her, and she named the orangutan Beth.

Beth was not pleased by having an audience. She hooted and dropped leaves on the humans, but she did not run as the others had. She stopped to eat, high in the tree. As they watched, Beth began to build a nest by twisting branches into a circle and making a cushion of leaves.

Galdikas was able to watch Beth eat bark and fruit as they followed the orangutan for ten hours. Galdikas wrote down every detail in her notebook and collected bits of bark and fruit that Beth dropped. Galdikas was ecstatic—at last, she was able to study an orangutan!

The next morning, she returned to Beth's nest, where she experienced more happiness, because Beth and her baby, Bert, soon appeared. All that Christmas Day, Galdikas observed the mother and baby. She was amazed to see Bert sucking his thumb as many human babies do.

Day after day, Galdikas watched Beth and Bert. After five straight days of observing and note-taking while following Beth for twelve hours a day, often in the rain, Galdikas felt exhausted. Her

Eugenie Clark

Eugenie Clark is a famous **ichthyologist**. Her specialty is research on tropical poisonous fishes and the behavior of sharks. People call her “the Shark Lady.”

The Scientist as a Child

Clark was born Mary 4, 1922, in New York City. Her father died when she was a baby; she lived with her mother and grandmother. Her mother, who was Japanese American, taught Clark how to swim when she was just two years old.

Clark’s mother worked hard to earn money to care for her daughter. She sold newspapers at a newsstand in a big building in New York City. One Saturday, Clark’s mother had to work and her grandmother wasn’t able to watch her. Clark’s mother left her at the Battery Park Aquarium. She thought Clark would have more fun at the aquarium than she would sitting and waiting at the newsstand. That visit changed Clark’s life.

Clark wandered through the aquarium. She stared into the glass tanks, fascinated with discovering a whole new world. She continued to visit the aquarium Saturday after Saturday, no matter what the weather. Sometimes her best friend went with her, but usually she was alone.

Clark began reading about fish. She found out about a scientist who put on underwater gear in order to dive to the bottom of the ocean and observe the fish. Clark decided she would experience that someday, too. She was particularly fascinated with the aquarium tank holding the sharks that swam so gracefully. She wanted to swim with sharks eventually, also.

Meanwhile, she was able to persuade her mother to buy her an aquarium for their home. She picked out a variety of fish, including a bright clownfish. As time went by, Clark’s mother



Galdikas in her later years

orangutans and their environment. She gives lectures all around the world.

Galdikas has preserved Camp Leakey for decades. She continues to inform other scientists and the public about her research with the orangutans. In 1986, she started an organization called the Orangutan Foundation International, in which she is active. The organization promotes research and environmental activities. Her honors include awards such as Indonesia’s “Hero for the Earth,” the United Nations Global 500 Environmental Award, and the Eddie Bauer Hero for the Earth Award.

became intrigued with fish, too. They bought more and more fish, crowding their tiny apartment with fish tanks.

Clark even joined a community club for people who love fish and aquariums. She was the youngest member, but she learned how to write excellent notes about her fish, to keep track of when she bought them, their scientific names, and what happened to them. Clark also collected other animals, such as salamanders, snakes, and toads.

When Clark went off to college at New York City's Hunter College in 1938, she still wanted to learn all about fish, but she needed to learn about all animals in order to understand fish. In classes, she dissected, or cut up, dead animals to learn about what was inside of them.

Dead Animals in the Kitchen

A pet store owner gave Clark a dead monkey so she could dissect it. She was quite excited about this learning opportunity. She took it home and put it in the refrigerator to keep it until she could dissect it. When her grandmother was getting ready to make dinner that evening, she opened the refrigerator to see a dead monkey on the shelf. She screamed and ran out of the room. Later, she forbade Clark to bring any more dead animals into the house.

Her family put pressure on Clark to learn to be a secretary. Her grandmother thought it would be nicer for a young woman to study typing rather than to be cutting open dead animals. Her mother felt it would be a good backup plan to be able to work as a secretary if she couldn't work with fish for a while.



Eugenie Clark as a young woman

But Clark had a dream, and she was not going to get sidetracked with typing lessons. She wanted to be a scientist who studied fish. So she kept on working hard at college, learning all that she could about animals, especially fish.

Meanwhile, a neighbor grocery store owner killed a big rat in his store and offered it to Clark. She was excited to take it because she wanted to study the rat's skeleton. Luckily, no one was at home, so she started boiling the rat on the stove in order to remove its flesh. Suddenly, Grandma came home—and when she saw what was cooking, she was aghast. She told Clark she was no longer allowed to cook in the kitchen.

Under the Sea, at Last

After Clark graduated from college, she went to work as a research assistant to a well-known ichthyologist named Carl Hubbs. Equipment for exploring underwater was different in those days. People had to wear big heavy helmets with air hoses attached to a boat.

Clark was excited about finally getting to be under the sea with her beloved fish. She took lessons to learn how to work the helmet. She also learned to tug on the air hose to communicate with people in the boat. Then she put on her helmet, jumped off the boat, and walked on the ocean's floor, where a fish swam up to look right into her eyes. Clark loved it.

As she explored the ocean, noticing not only the fish but the rocks and plants, she noticed she couldn't breathe well. She started feeling faint. Something was wrong. She pulled on her air hose, but she only had the strength to pull once—and one tug meant "I'm okay."

Then she was on her knees, trying not to pass out while water seeped into her helmet. With her last bit of strength, she pushed the helmet off her head and floated to the surface, where people on the boat helped her up. Later, she found out there was a leak in her air hose. To prove she wasn't afraid, Clark dove back into the water again as soon as her hose was fixed.

other fish died. She wondered what would happen to a shark that touched the Moses sole liquid. When she put sharks in with a Moses sole, they swam rapidly away from it. If she put other fish near the Moses sole, then put the other fish near the sharks, the sharks swam away from them.

Could the Moses sole poison be used to keep sharks away from an area? Clark put bait on lines for sharks, but in between the other fish she hung Moses sole fish. At night, Clark and her assistants dove into the ocean to watch. The sharks ate all the fish on the lines except the Moses sole.

The Moses sole poison was so good at **repelling** sharks that a sunscreen company asked to put it in its waterproof sunscreen so swimmers could avoid sunburn and shark bites at the same time. The liquid even stops the spread of poison in people who have been bitten by poisonous snakes and scorpions.

In 1981, Clark was diving on the Baja coast when a whale shark swam by. She grabbed hold under his fin and went for a ride while a *National Geographic* photographer took pictures. She was completely unafraid, especially because the shark didn't dive deep. She only let go when she realized she had lost track of time. She was concerned about how much air she had in her tank and if she could find the boat.

Continuing Her Work

In 1992, Clark retired from her job as a professor at the University of Maryland. Clark continued making groundbreaking discoveries about sharks. She never quit being curious about them. For example, in 1996, she was stunned to hear of a female whale shark with 300 shark babies inside of her.

Clark married Henry Yoshinobu Kon in 1997. They moved to Sarasota in 1999, where she began working at her old laboratory, now called the Mote Marine Laboratory. Kon died in 2000.

Clark began a new study in 1998 when she and her research team discovered a shy fish, called a convict fish. It gets this name

because it is striped like some prisoners' uniforms. They watched as tiny fish disappeared into an opening in the coral reef and then a snake-like head appeared from it. Clark couldn't identify the fish at the time. After she realized they were convict fish, she filmed the babies bursting forth from the floor of the ocean and from coral reefs in order to feed.

While the babies are out eating, the adult fish clean their home by spitting dirt, sand, and gravel outside their burrows. The babies return, swimming into the adults' mouths. The grownups grow to be around two feet in length . . . but how? They never leave their holes in order to eat. Clark wondered if the babies were feeding their parents by vomiting into their mouths. The project continued as of the year 2007.



Papua New Guinea, Dr. Clark's favorite diving spot

Clark's passion for her underwater world is very strong. In 2004, at age 82, she dove in Papua New Guinea. Her air tank came loose as she jumped into the water. It smashed her heel, cutting open a **tendon**. But Clark didn't let an injured foot stop her. She completed her 90 minute dive anyway.

Afterward, as the doctors prepared to stitch up her tendon, they discovered she had lung cancer. She had **chemotherapy** treatments and was told she must not dive. She was also informed that she had six months or less to live—a prediction she proved wrong. Her cancer is in remission, which means the symptoms have lessened, and she can dive again.

As of 2007, at age 85, Clark had made more than 6,000 dives, including 70 deep-water dives. She has won many awards, includ-



Eugenie Clark observing a shark

ing honors from the National Geographic Society, the Underwater Society of America, and the Explorers Club. When asked which of the known 370 types of shark is her favorite, she says they are all fascinating to her. But she admits to liking whale sharks and six-gill sharks. She is also particularly fond of lemon sharks because they are the ones she trained.

In 2007, Clark planned to present research papers at conferences and to dive in order to conduct research in Papua New Guinea, and La Paz, Mexico. Age and illness have not slowed her much, although she says she will dive only once a day now that she is 85, instead of the four or five times a day she used to do. Even after more than fifty years of adding to what scientists know about sharks and other fish, she pursues her research projects with excitement. One of her 2007 projects was a paper about a swell shark, which fills with air when in danger. Clark expects to never stop diving.



Clark holding a shark's jaw

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