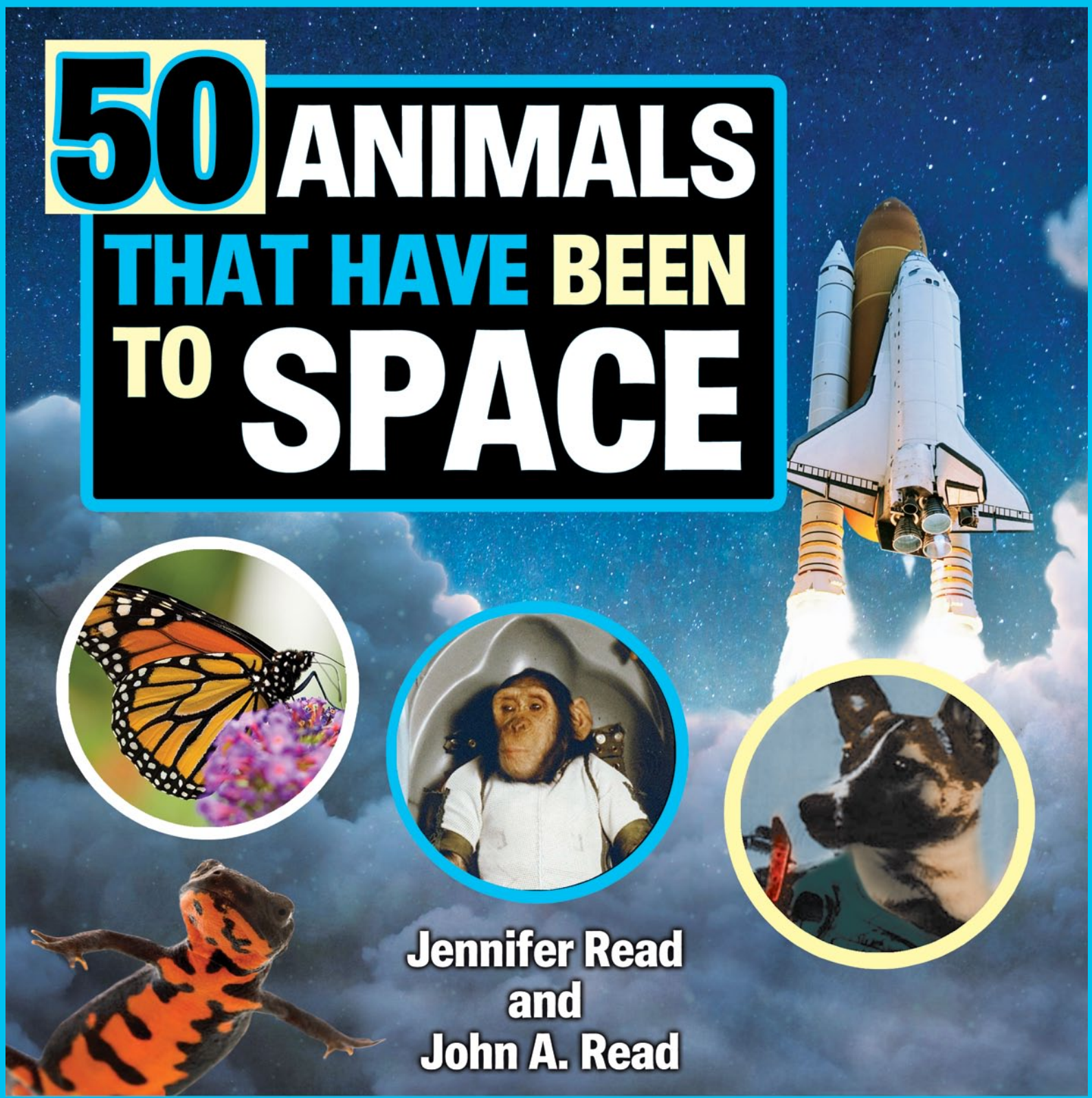
50 ANIMALS THAT HAVE BEEN TO SPACE



Jennifer Read
and
John A. Read

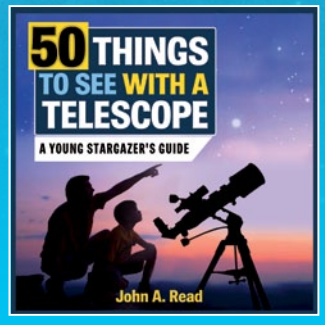
DISCOVER THE AMAZING STORIES OF THE ANIMALS WHO HAVE PIONEERED SPACE EXPLORATION!

Since the earliest days of flight and space travel, scientists have worked with animals to pave the way for human exploration. In 1783, a rooster, a duck, and a sheep were placed in a hot-air balloon, becoming the first living creatures to fly in an artificial vehicle. Since 1949, when a monkey became the first animal to reach space, many creatures followed, and most returned safely to Earth. Many experiments were designed by high-school students. From cats and dogs to chimpanzees, spiders, frogs, and even a colony of honeybees, this book tells the fascinating stories of 50 space missions featuring pioneering animals at the forefront of science.

JENNIFER READ grew up on a little horse ranch outside San Francisco. A passion for animals led her to an internship with American Humane's Film and Television Unit in Los Angeles, California, where she worked on movie sets with wolves, horses, and many other animals. Jennifer now lives in Halifax, where she rides horses with the Bengal Lancers, and is a board member at Shakespeare by the Sea.

JOHN A. READ always had a passion for aviation and space exploration but was an adult before discovering a love for astronomy. After writing his first book, *50 Things to See with a Small Telescope*, John retired from a career in corporate finance and returned home to Nova Scotia. He is now a telescope operator at the Burke-Gaffney Observatory, a board member of the Halifax Centre of the Royal Astronomical Society of Canada, and is studying astrophysics at Saint Mary's University.

ALSO BY JOHN A. READ



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Introduction

Throughout the history of aerial and space flight, scientists have wanted answers to some basic questions about flying: Could people survive high in the sky? Would they be able to breathe while travelling at speed? Could living creatures survive in space — beyond Earth's atmosphere? They were not willing to risk a human life to find out. For this reason, in the history of flight, animals were almost always the first to fly.

The history of animals in space can be traced to the Cold War and the Space Race. The difficult experiments, particularly where the animals did not come back, were conducted by the Soviet Union and the United States. These two countries were racing to get the first soldiers into space. From a military standpoint, space is the ultimate "high ground," and at the time it was thought that winning in space would mean winning on the ground.

Industrialized countries spend billions of dollars on research to stay ahead in the Space Age, and unfortunately animals have often played an important and sacrificial part in advancing this agenda. It is difficult to ignore the fact that many of the experiments included in this book would be considered inappropriate by today's standards.

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If you see this symbol it means that you can easily find the research online. It will be listed under **Research Papers** at the back of the book.

In the 1950s, animals often rode in V-2 rockets taken from the defeated German army.

This symbol indicates that videos about the experiment can be found on YouTube.

Animals at Work Today

Animals continue to play an important role in science. High-school students still dissect frogs and pigs, and at universities, biology and medical science students often work with monkeys. These students use the skills they learn from these **dissections** when they grow up to be vets, doctors, and biologists.

The animals in this book won't be the last animals in space. Animals help scientists understand how humans will survive in space both in terms of the physical and psychological challenges. This knowledge has applications on Earth, in medical research, and many other fields.

Within one or two hundred years, humans may even move out into the solar system to live permanently. Homes could be built in giant space stations that rotate to create their own gravity. Or perhaps humans will live on Mars within giant air-filled domes. In the future, people could even live on a moon of Jupiter, such as Callisto, where **radiation** exposure would be lowest. And maybe they will take their pets, too.

CHAPTER 1
Preparing for Space

First Flight in a Man-Made Vehicle

On September 19, 1783, at Versailles, France, a rooster, a duck, and a sheep were placed in a basket attached to a hot-air balloon. With a large crowd cheering them on, Joseph-Michel and Jacques-Étienne Montgolfier filled their balloon with hot air causing it to lift into the sky. The balloon, called *Set Le Martial*, had no heat source of its own, so as the air cooled it descended. The flight lasted about eight minutes and the animals landed safely.

Why the birds?

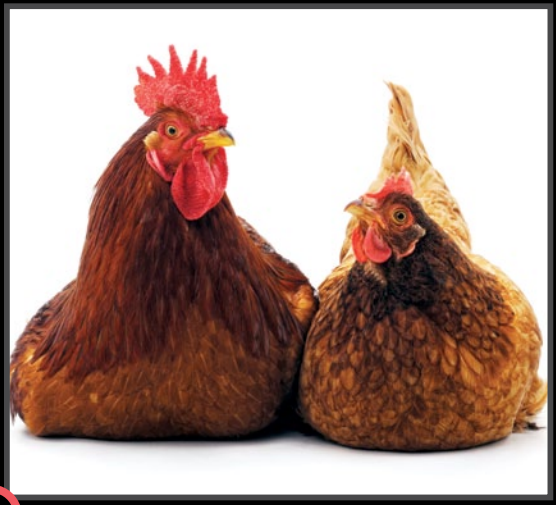
The sheep was chosen to represent a human, the duck because it is used to flight, and the rooster because it is a non-flighted bird.

Montgolfier Brothers

Date: September 19, 1783
Species: Rooster, duck, and sheep
Objective: Prove hot-air balloon flight
Launch Vehicle: *Set Le Martial* Montgolfier Balloon
Maximum Altitude: 457.2 m (1,500 ft)

First Animals to Ride a Rocket

Two chickens named Adam and Eve became the first animals to fly in a rocket. They arrived safely at their destination and were then donated to the Calcutta Zoo, India. Inventor Stephen Smith had modified the rocket to provide **ventilation**, **stabilization**, and shock absorption. There was no parachute, a soft riverbank was used for landing the rocket. A snake named Miss Creepy rode a separate rocket. Her only companion was an apple. Both the snake and the apple arrived safely.



Stephen Smith (1891–1951), a dentist, policeman, and customs official, believed that rockets were the best method for delivering mail.

Rocket Delivery

Date: June 29, 1935
Species: Chicken and snake
Objective: Rocket power
Launch Vehicle: Rocket made by the Oriental Fireworks Company
Distance: 1 km (3,281 ft)
Principal Investigator: Stephen Smith

Rocket mail

Stephen Smith launched the first ever mail rocket on September 30, 1934. The rocket he used was made by a local fireworks company. Smith also used a rocket to send relief to an area that had been devastated by an earthquake.

III High Altitude Balloons

Cosmic radiation was one of the many concerns about sending a person into space. Once again animals went first. Black mice were often used because it was discovered that cosmic particles would turn their black hairs white. These flights also aided the development of life-support systems.

US Air Force: Project Manhigh

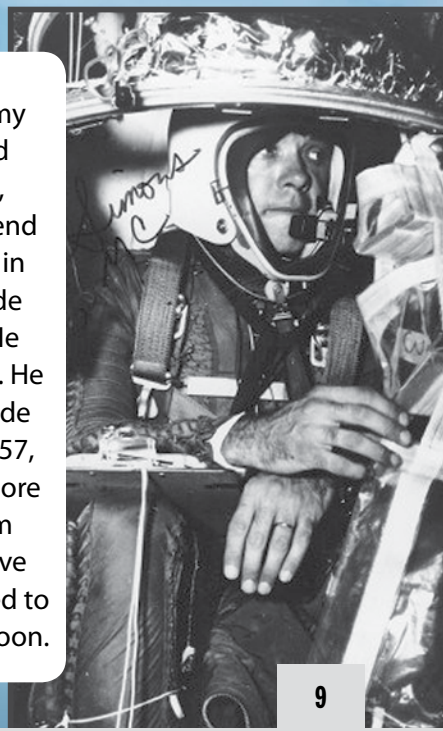
Date: 1950s
Species: Rats, mice, dogs, cats, monkeys, rabbits
Objective: Study cosmic radiation and controlled artificial environments
Launch Vehicle: Moby Dick and Manhigh balloons
Maximum Altitude: 90,000 ft
Principal Investigator: US Air Force and Dr. David Simons

Radiation

Electromagnetic radiation is light at different wavelengths, i.e., microwaves, radio waves, x-rays, ultraviolet, etc. When we talk about radiation in space, we're often talking about atomic nuclei either trapped in Earth's magnetic field or moving quickly as a cosmic ray.

High altitude balloon.

Black mouse with white hairs due to exposure to cosmic rays.



Dr. David Simons, army officer and physician, didn't just send animals up in high altitude balloons. He went up, too. He set an altitude record in 1957, soaring to more than 31 km (19 mi) above Earth attached to a helium balloon.