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Science Action Labs

Science Discovery by Chance
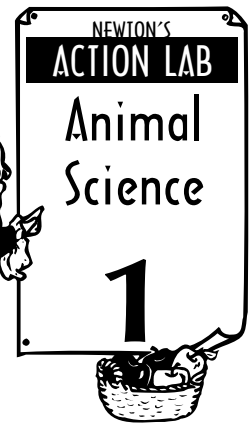
Careful Observation Helps Scientists

Newton Note: This lesson has no activities or experiment for you to do. It is a reading lesson about a great scientist who accidentally made an important discovery.

The time was 1914 during World War I. Young Dr. Alexander Fleming was desperately trying to save the war wounded. But most of his patients died painful deaths due to bacterial infections he was helpless to prevent.

Dr. Fleming decided to learn more about deadly bacteria. One of his first discoveries was that body fluids, such as tears, were able to fight infectious bacteria.

Dr. Fleming studied bacteria by growing them on dishes spread with agar. Agar is like a "soil" upon which bacteria will grow if food, light and heat conditions are right.

One day Dr. Fleming noticed mold growing on his bacteria dishes. It wasn't supposed to be there. It must have fallen on the plates from the air when he lifted the lids to inspect them.

Normally a scientist would throw away bacteria dishes that were spoiled. But as Dr. Fleming observed the spoiled plates, he made a startling discovery. The fuzzy green mold had killed the bacteria growing near it. Could something in the mold be useful in controlling disease bacteria?

By World War II, Dr. Fleming's accidental discovery had saved thousands of wounded from infections. It was now called penicillin. The best penicillin was being prepared from a mold found growing on a rotten cantaloupe.

Dr. Fleming's science training prepared him for his chance discovery. On accepting his Nobel prize in medicine, Dr. Fleming gave this advice. "Never neglect any appearance or happening which seems to be out of the ordinary."

Newton Note: Many other great discoveries were made accidentally by alert scientists. Modern rubber tires were invented this way. So were many of the early discoveries of radium and radiation.

NEWTON'S ACTION LAB
Animal Science 2

Animal Wonders

The Bat as a Hunter

Naval ships use **sonar** to locate enemy submarines. Sonar sends out sound waves that bounce off submarines.

Bats also use sonar to find their prey. A bat normally sends out sound waves of 10 to 20 pulses per second. When a bat locates a target, it speeds up the sound pulses to 200 per second. This enables the bat to expertly locate its food source.

Bats have extremely sensitive ears. They pick up sounds that echo from the prey. Even when there are hundreds of bats sending out sonar waves, a bat can pick out its own sound.

Some species of bats can use their sonar to find fish under the water's surface. This is an extraordinary feat that scientists have not been able to duplicate.

The Complicated Squid
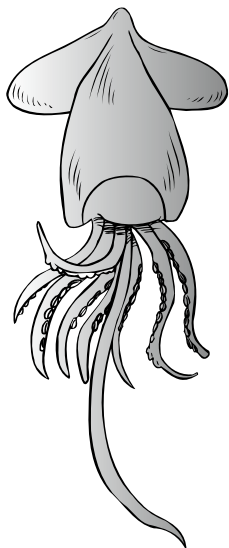
Fish are the most numerous animals in the sea. Squids are the second most numerous. Squids seem soft and helpless, but they have many ways of protecting themselves. Here are some of their defenses.

1. They can quickly expel water and spurt away from an enemy.

2. They use their tentacles and beaks as weapons.

3. They have light systems for seeing in the darkest part of the ocean.

4. They have light organs that glow.

5. They can change their color.

6. They can excrete a black ink-like substance to confuse an enemy.

Name _____

When squids emit their ink, two things happen to help them escape an attacker. The ink hardens into a squid-like object in the water. The squid itself becomes colorless.

Squids normally swim by means of fins. In times of danger, squids fill their upper body with water and expel it out through a funnel-like opening. The squid can rocket up, down or sideways in a split second.

The Firefly Code

Firefly Beetle

Fireflies produce their light in a way not completely understood by scientists. The abdomen of a firefly has a chemical called **luciferin**. Luciferin combines with oxygen in a chemical reaction that emits light.

Fireflies use their flickering lights for mating purposes. Each specie of firefly gives off a light that can differ in intensity, duration, pattern and color. A female firefly sends out a signal unique to its species. A nearby male firefly responds to that signal and flies in to mate. One species of female firefly acts like the black widow spider. After it attracts a poor male firefly, they mate and then she kills him.
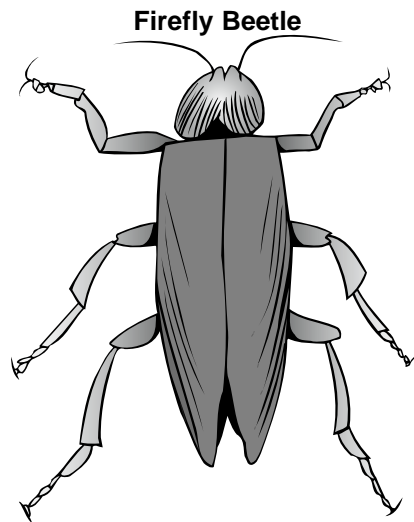
Newton Wants You to Research More Animal Wonders

Bats, squids and fireflies are truly animal wonders. Newton wants you to discover more animal wonders on your own. You'll find amazing things that moths, owls, ants and apes can do. Your written and oral report on **one** amazing animal is due on _____. Here are some helpful hints for your animal wonder report.

1. The length should be from two to four pages.

2. A picture or drawing should be included.

3. Try to report on a very unique or special animal.

4. Use imagination, humor and audiovisual aids.

NEWTON'S
ACTION LAB
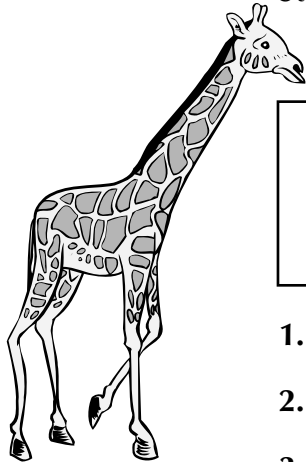## Animal Science
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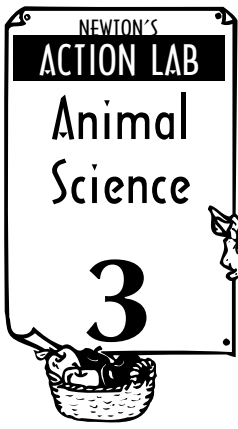
Super Animals: How Do Humans Compare?

Comparing Animal Sizes

This lesson compares you, as a human, to other animals. You are not the biggest or fastest creature.

Study the animal size chart.

AVERAGE MALE MAMMAL SIZE

Spider Monkey	2′ (0.61 m) long	Camel	10′ (3.05 m) long
Red Fox	4.5′ (1.37 m) long	Elephant	12′ (3.66 m) tall
Gorilla	6′ (1.83 m) tall	Giraffe	13′ (3.97 m) tall
Lion	8′ (2.44 m) long	Hippo	15′ (4.58 m) long

1. Select 10 students at random.

2. Find out their heights in inches.

3. Add the 10 students' heights together. _____ total height

4. Divide the total inches by 10 to find the **average** height and round off to the nearest whole number. _____ average height in inches

5. Divide the average student height by 12 to get the height in feet.

Example: Your 10 students total 640 inches. Dividing by 10 gives you an average of 64 inches. Divide by 12 (inches in a foot) to get a rounded average height of 5.3 feet.

Which animal on the chart is closest to your average student height? _____