

Snails

Background:

Snails, which belong to the ancient group of animals called *mollusks*, originated in the primordial sea, along with the octopus, squid and the familiar clam. Some marine deposits contain snail fossils that are more than 500 million years old, and these fossils are some of the world's oldest with recognizable living descendants. Thus, the lowly snail, sometimes overlooked and best known for its "snail pace" is distinguished (if it could speak for its ancestors) for having seen the origin of fish, the invasion of the land by amphibians, the rise and fall of the great dinosaurs, the conquest of the air by birds and the dominance of the earth by mammals. During this time, snails became one of the most diverse and widespread of all animals and are surpassed only by the insects in their variety of living forms. One of their secrets of success is adaptability; snails can now be found in almost any permanent freshwater or marine environment, and some have also adapted to life on land.

Characteristics:

Snails easily are recognized by their spiral shells. Since most snails withdraw into their shells for protection, the shell must grow as the snail grows. Thus, the shell is spiral of increasing size. There are two styles of shells. In one, the spiral is in a flat plane like a coil of rope on the floor. However, since this kind of shell is cumbersome and difficult to transport, most snails have developed a more compact and easily carried shell with a cone-shaped spiral. But even this shell can be difficult to transport and maneuver among leaf litter and vegetation of the forest floor. Some snail species have resolved this problem by developing a smaller shell, and, in some cases, the shell is so small that it no longer serves a protective function. A few snails have carried shell reduction to the extreme and have no shell at all. The snail-like mollusks without shells are called slugs. Some people think slugs are snails that have lost their shells, but this is true only in the evolutionary sense. For those snails that have a shell, it is a permanent, living, growing part of the body that cannot be abandoned.

The part of the snail that protrudes from the shell is called the foot, but it actually includes most of the animal's body. The flat-bottomed muscular part of the foot secretes a thin film of mucous, which provides lubrication, protects the soft body from abrasion, and helps the snail cling to rocks, twigs and other surfaces as it glides along. The head, which is actually part of the foot, is equipped with tentacles—two pairs in most land snails and one pair in aquatic ones. One pair, always on top of the head, performs many of the snail's sensory functions. The second and smaller front pair, if present, is used for probing the surface ahead of the snail. The mouth is on the bottom of the head and contains a rasp-like tongue that is used to scrape off bits of food as the snail moves over surfaces like plants and rocks. Some of the snail's internal organs, such as the heart, kidneys and intestines, remain inside the shell even when the snail's foot is fully extended.

Many aquatic snails obtain oxygen through gills, but the system is not satisfactory for terrestrial forms. Land snails take air into a breathing chamber through an opening, the breathing pore, on the right side of the body just below the shell. This opening can often be seen on land snails when the foot is fully extended from the shell. Some freshwater snails also have an air-breathing chamber, so they must occasionally come to the surface of the water for air or circulate oxygen-rich water through the opening.

Reproduction:

There are several methods of reproduction in snails. Most terrestrial forms are *hermaphroditic*, that is each snail carries both male and female reproductive organs. When two of these snails mate, each receives sperm from the other. Then, each later produces eggs, which are laid among leaf litter, under a rock or log or in some other hidden place where eggs will stay moist until they hatch into tiny snails. Some aquatic snails are also hermaphroditic, but others are divided into males and females.

Snails (cont)

In at least one species, all of the young start life as males, but some transform into females as they mature. Most aquatic snails deposit their eggs in a gelatin-like mass on some submerged object. One type of snail, however, does not lay eggs, but rather gives birth to live young.

Whatever their method of reproduction, snails are primarily herbivores, feeding on a wide variety of vegetation including fungi and algae. However, they are opportunistic and will feed on the bodies of dead insects, earthworms and in the case of aquatic snails, dead fish.

Aquatic Snails in the Classroom

Aquatic snails are often kept in a classroom fish aquarium; but the fish usually receive most of the attention, while the snails are often overlooked or receive only superficial consideration. Keeping and studying snails as a separate classroom project, however, can provide an opportunity for students to focus their attention on one of the oldest, most diverse and unique groups of animals on earth, the mollusks. And since aquatic snails are easy to obtain and care for, such a project can be conducted in the classroom with minimum of equipment and expense.

How to Obtain:

Aquatic snails are among the easiest animals to collect and keep in captivity. Almost any permanent body of water or permanently flowing stream will have a snail population. However, pond snails are easier to keep than stream snails because their habitat is simpler to duplicate in the classroom. Snails can be collected by searching through submerged vegetation or on the surface of any submerged object. The snails should be picked up gently as their shells are sometimes fragile and easily broken. Also, snails usually cling firmly to the substrate by their foot and will be injured if they are quickly pulled off. As soon as the snails are collected, they should be put in a container of the water from which they were taken. Enough water should also be collected to fill the container in which the snails will be kept. This will prevent the environmental shock that might occur if the snails were suddenly placed in water of a different quality. If possible, also collect a few pieces of the pond vegetation to decorate the snails' new home and provide them with a source of food.

If snail collecting is not practical, teachers can find aquatic snails and the plants needed for their habitat at local pet stores.

Caring for Aquatic Snails:

Housing: Aquatic snails can be kept in nearly any container that will hold water, but a transparent one will give students a good view of the snails, and one with a wide opening will allow for easy access. A 5- or 10-gallon aquarium is fine, but a quart or gallon wide-mouth jar or transparent plastic container also makes a good snail aquarium. However, the snails should not be overcrowded—three to six per quart of water (depending on their size) is okay. The container can be set up like a typical freshwater aquarium. Put 1 to 2 inches of sand in the bottom to anchor the plants and provide a natural substrate. After adding pond water to within 3-4 inches of top, gently push the plants into the sand and add snails. A loose-fitting cover will permit the snails from wandering out of the enclosure. To keep the plants healthy, place the aquarium where it will receive at least some indirect light each day.

Diet:

Aquatic snails and their habitat are easy to maintain. The snails will eat small amounts of fish food if provided, but since they are primarily herbivores, they will obtain sufficient food by grazing on the aquatic vegetation.

The only regular maintenance needed is to replace the water as it gradually evaporates with fresh pond water or aged tap water—water that has been allowed to stand in an open container for 24 hours.

Snails (cont)

Land Snails in the Classroom

Keeping land snails in the classroom, like studying aquatic snails, can provide the opportunity for students to experience a truly unique and interesting group of animals, the mollusks. And studying land snails in conjunction with aquatic snails can help students understand the important concept of animal adaptation to a specific environment.

How to Obtain:

Although adapted to terrestrial existence, land snails are susceptible to dehydration, so their activity is limited by the amount of available moisture. They tend to be most active at night when the humidity is higher and are most likely to be seen on the surface following a rainfall. Otherwise, they are usually found among leaf litter, under rocks or logs, or in other damp locations. During dry periods, land snails protect themselves by *estivating*, or withdrawing into the shell and sealing the opening with mucous until damp conditions occur.

Land snails are also available from some biological supply companies but usually not from local pet stores.

Caring for Land Snails:

Housing: A wide-mouthed quart or gallon jar, a transparent plastic shoebox or an aquarium that is arranged to simulate the natural environment is an ideal enclosure for land snails (and slugs). A cover is essential to maintain the necessary high humidity level and to keep the snails from escaping. However, some ventilation should also be provided, so the cover of the jar or shoebox should have holes punched in it. A few inches of moist soil will help maintain the humidity and provide the medium in which the snails can occasionally burrow and perhaps lay eggs. If the humidity becomes too low the snails will begin to estivate. However, they can be encouraged to become active again by adding a little water to the soil.

Diet:

Captive land snails will consume a variety of foods, but a diet of lettuce, carrots, apple or celery will meet their needs and is easy to provide. An entire carrot can be placed in the terrarium and, although for their size snails can consume a surprising amount of food, this will last for several days. If provided with such a food source, snails can go unattended for weekends and vacations as long as they have adequate moisture and are kept at an appropriate temperature.

Observations, Activities and Questions:

- Observe and describe a land snail or aquatic snail. Find the shell, foot, head, tentacles, eyes and breathing pore.
- Notice the bottom of a land or aquatic snail's foot when it crawls on the side of its container. How does it move? Can you see the mouth (try using a magnifier)? How does the snail eat?
- Using a magnifier, observe a cluster of aquatic snail eggs on a daily basis. Describe any changes that occur. How many individual eggs are there? How long does it take them to hatch?
- Flash a bright light on a land snail. How does it respond? Cast a shadow over a snail. How does it respond?
- Gently touch a land snail on one of its tentacles and then describe the snail's reaction.