

TERRESTRIAL GASTEROPODS.

Next to the insects no class of animals presents such a variety of families and species as the mollusks. While the majority of them inhabit the sea, a limited number abide in sweet water, and a few only live on dry land. These all belong to the order of Gasteropoda, and differ from the majority of other mollusks by being supplied with well developed pulmonary organs, enabling them to breathe atmospheric air. They may be divided into two groups—snails and slugs—the former of which are provided with a helical shell, while the latter are entirely naked shell, possessing instead of a shell only a calcareous deposit under the shield forming the fore part of the back. As the anatomical structure of both groups is identical we may describe them jointly. From the head protrude two pairs of tentacles, which have the form of the finger of a glove, and may be retracted and projected. The posterior pair carry the small black globular eyes. The tentacles are very sensitive to the touch and the eyesight is apparently very poor; the animal depends on its feelers, principally, for guidance. The mouth is located in the center of a thick muscular mass; in the upper lip lies embedded a crescent-shaped grooved plate, forming the upper jaw. Directly below and opposite to this is placed the tongue, which carries on its upper surface a disk lined with numerous transverse rows of teeth. In eating the snail grasps its food between the upper jaw and tongue, and rubs it to a smooth paste between the friction plates. By the peculiar motion of the tongue the paste is conducted into the œsophagus and stomach. On both sides of the tongue are situated the salivary glands, connected with the mouth by separate ducts. Behind the stomach is found a voluminous liver. This is traversed by the intestine, which turns, after leaving it, and leads to the anus located in the neighborhood of the branchial opening. Into the same opening are also emptied the secretions of the kidney, which is situated near the heart.

Two minute glands near the entrance of the œsophagus are the only organs that might be considered organs of hearing.

Respiration takes place through the branchial aperture, from which the air is conducted to the lung, a cavity nearly filled with a porous, spongy mass, from which numerous minute veins lead to the heart. The latter has two chambers, and by its pulsations sends forth the purified blood coming from the lung on its journey through the body, from which it returns again to the lung. The foot, or rather the ventricular plate bearing that name, is formed of powerful muscles, which propel the animal by alternate contractions and expansions.

Among the principal conditions necessary for gasteropodal life on dry land are moisture and warmth. If deprived of moisture by being, for instance, placed in a pasteboard box in a dry room, most snails will die soon. Instances are, however, on record in which snails have been kept, apparently dead, for months and even years, and revived again by the application of a little warm water. It is, therefore, natural that snails prefer moist spots, shady places under shrubs, trees, stones, etc. Many prefer to creep below the layer of leaves and moss covering the ground in forests, and some even live between the bark and wood of trees.

The most common family is that of *Helix*, of which alone nearly 5,000 species are known. They all have shells which have either the familiar form of the garden snail or are a little more elongated. The shells are generally wound from right to left, that is, when the mouth of the shell is placed to the right of the observer, the umbilicus turned toward the latter, the whorls will be seen to pass down from right to left toward the end. The whorls may either come into contact in the center and form a spindle, or may remain separated, forming a hollow shell. In some of these the umbilicus is closed, in some open.

The shell consists of about 5 per cent of animal matter, 90 per cent of carbonate of lime, and about 5 per cent of other mineral substances.

In our engraving are illustrated two of the commonest snails indigenous in Europe. The smaller ones are *Helix aspersa*, the common garden snail. It varies greatly in color and form, but is usually of a bright yellow color with brown

bands, or numerous irregular stripes. About forty different varieties are known. The larger snail is *Helix pomatia*, or the edible snail, which is very common throughout this country and Europe.

Some snails hibernate regularly. *Helix pomatia* either works its way into the ground or seeks refuge in a natural cavity, and proceeds at once to close the entrance of its shell by a cover formed of material similar to that of the shell. The cover, although not firmly attached to the shell, fits almost air-tight into it. In this state the snail remains throughout the winter, until the warm air of spring and the increased moisture of the soil call it into life again.

In extremely dry weather, or on cool days, snails which do not hibernate retire into their shells; remaining for a while near the entrance, the salivary glands secrete a viscid mucus, which soon forms a partition, closing the shell entirely. As the exterior surface is exposed to the air, the viscid mass dries and forms a thin membrane, which is kept elastic by the moisture exhaled from the snail. As respira-

In Switzerland, Bavaria, Württemberg, and Austria, snail culture at one time attained considerable importance. They were raised in numerous gardens; at Ulm alone over ten millions were annually raised, and shipped partially to Austria. Although this industry has now nearly disappeared, snails are still eaten in large quantities in Austria. They are collected in the fall and kept between layers of oats for use. The snails most esteemed in those countries are *H. pomatia*, *aspersa*, and *hortensis*.

Snails are of great importance as an article of food and commerce in Italy, where numerous kinds are consumed in large quantities. The principal seat of the snail trade is Palermo, but all larger cities have numerous establishments dealing in them, and in some places snail growing and snail hunting form distinct trades. Snails are extremely cheap, and this accounts for their enormous consumption. In the "flying" street kitchens a plate of snail soup can be had for one or two soldi, and this, together with a handful of macaroni and a slice of watermelon, forms the daily repast of the average Italian lazzarone.

To the second group of terrestrial gasteropods, *Limacidae*, belong our common slugs. They have no shell, but a calcareous deposit of more or less firmness in the shield covering the neck may be regarded as the rudiment of the shell. Anatomically the slug corresponds to the shelled snail, except that the entrails, which in snails are contained in a bag extending into the interior portion of the shell, are, in the slugs, contained in the main body, which is ordinarily covered by the mantle.

Slugs are divided into two sub-families—*Arion* and *Limax*. *Arion rufus*, as a representative of the former, is very common throughout Europe, about five inches long and of variable color, generally black or reddish-brown. Similar in appearance and size is *Limax ater*, or road slug of Europe; it is generally black or dark-brown, and very common. This species is represented in the engraving.

Angora Goats Turned to Profit.

The San Francisco correspondent of the *Baltimore Sun* reports a more hopeful prospect for those who have invested so largely in the raising of Angora goats on the Pacific coast. Hitherto these animals have not been profitable owing to the lack of a market for mohair. He says:

The owners of some thousands of these goats, before abandoning the enterprise, concluded to try some way to utilize them. They established experimental works in San José, the beautiful garden city, fifty miles south of San Francisco. After much experiment and vexatious discouragement they have now a flourishing factory, with fifty hands, over one half women. "The Angora Robe and Glove Company" have founded a new and very profitable industry. They have a large tannery, and they have created an unlimited demand for goat skins, till now of no paying value. Their goods, like the woolen fabrics of the coast, challenge comparison with like goods in any part of the world. We have a vast domain of mountain land, with evergreen shrubbery for goat pasture and a climate that is their paradise. What we sadly

want is diversified agriculture and manufacturing industry. There is scarcely anything combining these qualities that we cannot raise on this coast, and the crowning success we record will doubtless encourage others in other directions.

Plain Talk to Southern Idlers.

Under this heading, the *Mercury*, of Meriden, Miss., gives some very pointed advice to Southern women, and winds up with a little advice to Southern boys. We quote the letter, premising that from the best of our information and belief, the women of the South have been more prompt to throw off the old prejudice against honest labor than the young men have. The *Mercury* says:

"Our Southern boys must be bred to trades instead of professions, be taught to prefer the plow handle to whittling on the streets and sunning themselves in front of grog shops. Work is the only, open sesame, to the cave where wealth is deposited. Industry and frugality is the great need of the South, but these will not be seen until false pride disappears and self-help takes its place."



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tion does not entirely stop, there is necessarily going on a constant interchange of air and moisture, the former flowing in, the latter out. When the air becomes moist and warm, as on approach of rain, the air entering the shell carries back the moisture exhaled, the body of the animal, which was wrinkled up and retired to the innermost portion of the shell, swells gradually, until the diaphragm is torn, and the animal resumes its usual mode of life. The period through which this sleep extends varies greatly with exterior conditions.

As might be inferred from the low state of development of the eyes, light is only of secondary importance to the well being of snails; they seem to prefer shady, dark spots.

Snails are used as an article of food. Among the ancient Romans they were esteemed as a great delicacy. Special gardens were devoted to breeding them. Pliny relates of Fulvius Lippinus as one of the principal snail park owners, who is also said to be the discoverer of a delicious pate of grape juice, wheat flour, and other ingredients with which snails were served.