
Mollusks

The name Mollusca (*Mollusca*, soft-bodied) are one of the main groups of invertebrates, especially from the standpoint of paleontological study, is the assemblage contained in the phylum Mollusca. Among the 60,000 or more living species of mollusks are forms ranging in adult size from snails less than 0.5 mm. in length to the giant squids of Atlantic waters, which attain a length 16m. This cephalopod, with body 20 ft. long and tentacles which reach nearly 35 ft., is much the largest invertebrate known. Some mollusks are active swimmers, some float or drift passively about as planktonic organisms, some burrow into mud or sand, bore into wood or rock, or attach themselves solidly to almost any firm foundation, but most crawl about by means of a muscular organ of locomotion, called the foot.

Main Divisions of Mollusca:

Mollusca (*phylum*), invertebrates having typically bilateral symmetry of body organization, without segmentation; body covering (mantle) generally secretes a calcareous shell. Cambrian—Recent.

Amphineura (*class*), elongate body covered dorsally by eight-piece shell or naked; foot broad, head reduced, gills posterior but in some extending forward also along sides. Ordovician—Recent.

Scaphopoda (*class*), shell and mantle slenderly tubular, open at both ends, foot conical, no gills. Silurian—Recent.

Gastropoda (*class*), body generally asymmetrical in spirally coiled shell; head distinct, with one or two pairs of tentacles and pair of eyes; foot broad and *flat*, except in some nektonic forms (pteropods) which have winglike expansions. Cambrian—Recent.

Cephalopoda (*class*), shell external, internal, or none; large head with eyes, horny jaws, and many tentacles, fused with foot. Cambrian—Recent.

Pelecypoda (*class*), shell mostly consisting of bilaterally symmetrical valves hinged dorsally, with ligament; foot generally hatchet-shaped, pointed; head lacking; gills posterior. Cambrian—Recent.

Gastropods

Gastropods are one of the main divisions of the phylum Mollusca. They include animals which bear a coiled or uncoiled calcareous shell and others, called slugs, which have no hard parts. Originally, they were exclusively marine, but especially in Mesozoic and Cenozoic time, large numbers of them became adapted for life in fresh waters and in the air. The average size of shells belonging to the group, commonly called snails, is approximately 25 mm. (1 in.) in length or diameter, but fully grown adults of different kinds range from less than 0.5m approximately 60 cm. (2 ft.).

As illustrated by the common land snail, *Helix*, and shallow-water marine gastropod, *Buccinum* (Fig. 8-1, 1, 5), the animal is seen to be an elongate flat-soled organism which carries a spirally coiled shell on its back. The head is identified both by observing the creature's direction of movement and by the presence at one extremity of the body of paired tentacles, which are placed in the vicinity of the mouth, generally above it. They may bear eyes. The muscular sole or foot, on which the snail crawls, is not associated closely with the stomach, located inside the shell, and hence the name gastropod (*gastro*, stomach; *pod*, foot) is not really very appropriate. The tip of the spiral shell points backward and the opening into the largest, last-formed turn of the shell is in a forward position, directed downward.

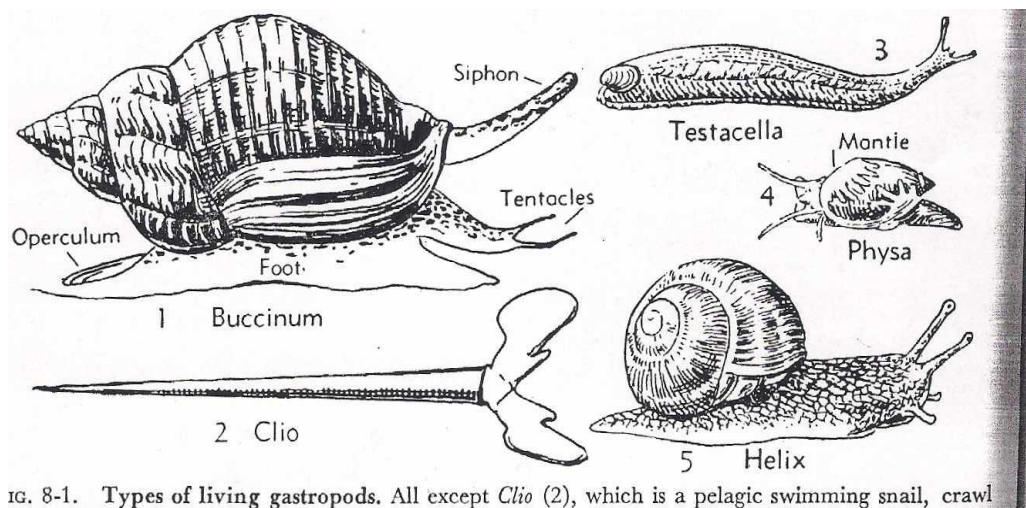


FIG. 8-1. Types of living gastropods. All except *Clio* (2), which is a pelagic swimming snail, crawl

FIG. 8-1. Types of living gastropods. All except *Clio* (2), which is a pelagic swimming snail, crawl about on their broad muscular foot, carrying the shell with its apex pointed obliquely or directly toward the rear. Most snails can pull themselves inside their shell, and many are equipped with a horny or calcareous lid (operculum) which fits over the aperture when the animal is inside. *Buccinum* (1) is a shallow-water marine gastropod. *Testacella* (3) and *Helix* (5) are terrestrial air breathers. *Physa* (4) is a fresh-water snail, which, like many marine forms, may extend the shell depositing mantle over the exterior of the shell (X1, except 2, X2).

HARD PARTS

Noncoiled Shells:

The most common sort of noncoiled gastropod shell has the form of an asymmetrical cone, elliptical or subcircular at the base and generally somewhat more steeply sloping on one side than the other. The outer surface may be marked simply by growth lines parallel to the rounded lower margin of the shell, by concentric folds or wrinkles, by radial ridges and grooves, or by combinations of these. The inside is smooth, except possibly for scars of muscle attachment.

Coiled Shells:

Gastropods generally possess coiled shells, and in most, the plan of coiling gives rise to or is associated with pronounced asymmetry of the body. This is shown by the torsion of soft parts in which the anus and gills have become shifted from their primitive position at the rear of the body to one in front.

Form of Shell:

Some features of the form of gastropod shells have been incorporated in reviewing their parts. Additional characters are important in classifying and describing this group of fossils.

Shells of low conical form which lack coiled whorls commonly are designated as **patelliform** (20; italic numbers accompanying the terms for shell form refer to Fig. 8-6), because of their resemblance to the cap-shaped *Patella*.

Coiled shells, as already noted, can be divided into groups according to their symmetry or asymmetry: planispiral shells having bilateral symmetry and conispiral and pseudoplanispiral shells which lack symmetry.

The asymmetrical coiled shells can be divided into two groups on the basis of the direction of their coiling: right-handed or **dextral** (1), and left-handed or **sinistral** (10), defined on the basis of the position of the aperture when held facing an observer with the apex of the shell pointed upward. Each of these two groups, in turn, contains two divisions: **orthostrophic** (2) shells, which spiral downward from the apex, and **hyperstrophic** (79) shells, which spiral upward (negative cones).

Both symmetrical and asymmetrical coiled shells are classifiable according to the tightness of their coiling: **evolute** (4), whorls not in contact; **advolute** (5), whorls barely in contact; **involute** (12), outer whorls moderately embracing next inner ones; and **convolute** (14), outer whorls completely embracing and concealing inner ones.

Conispiral shells are variously characterized according to the uniform or progressively changing profile of their spiral angles, as conical (22), **conoidal** (2.1), or **extraconical** (17); according to the increase of height with relation to the number of component whorls, as **multispiral** (7 or **paucispiral** (16); or according to the shape of the spire and body whorl, as **discoidal** (3), **pupaeform** (6), **turbiniform** (8), **ovoid** (15), **turreted** (18), **trochiform** (21), **biconical** (23), **fusiform** (25), **obconical** (26), and others. The shape of the aperture, whether having a continuous peristome (**holostomatous**, 9) or interrupted by a siphonal notch or canal (**siphonostomatous**, 27), is the basis for classifying shells. The presence or absence of an umbilicus and, among umbilicate shells, the open, partially closed, or completely sealed nature of the base are expressed by the descriptive terms **phaneromphalous**, **hemiomphalous**, **cryptomphalous**, and **anomphalous** (Fig. 8-7, 7—4). Some shells in which part of the whorls rise above the apex (origin of coiling) are provided with an **apical umbilicus**, and such a hollow may occur both in orthostrophic shells (Fig. 8-7, 5) and hyperstrophic ones (Fig. 8-6, 19).

Classification:

1- Amphigastropoda (*Subclass*), shells symmetrical, noncoiled or planispirally coiled; mantle cavity and gills located in posterior, primitive position (*Amphi*, on both sides, referring to symmetry). Cambrian—Permian, ?Triassic.

2- Prosobranchia (*Subclass*), cap-shaped or conispiral shell with mantle cavity and gills in a figure of eight (*proso*, forward; *branchia*, gills). Cambrian-Recent.

3- Opisthobranchia (*Subclass*), shell reduced in size, commonly internal or absent; mantle cavity

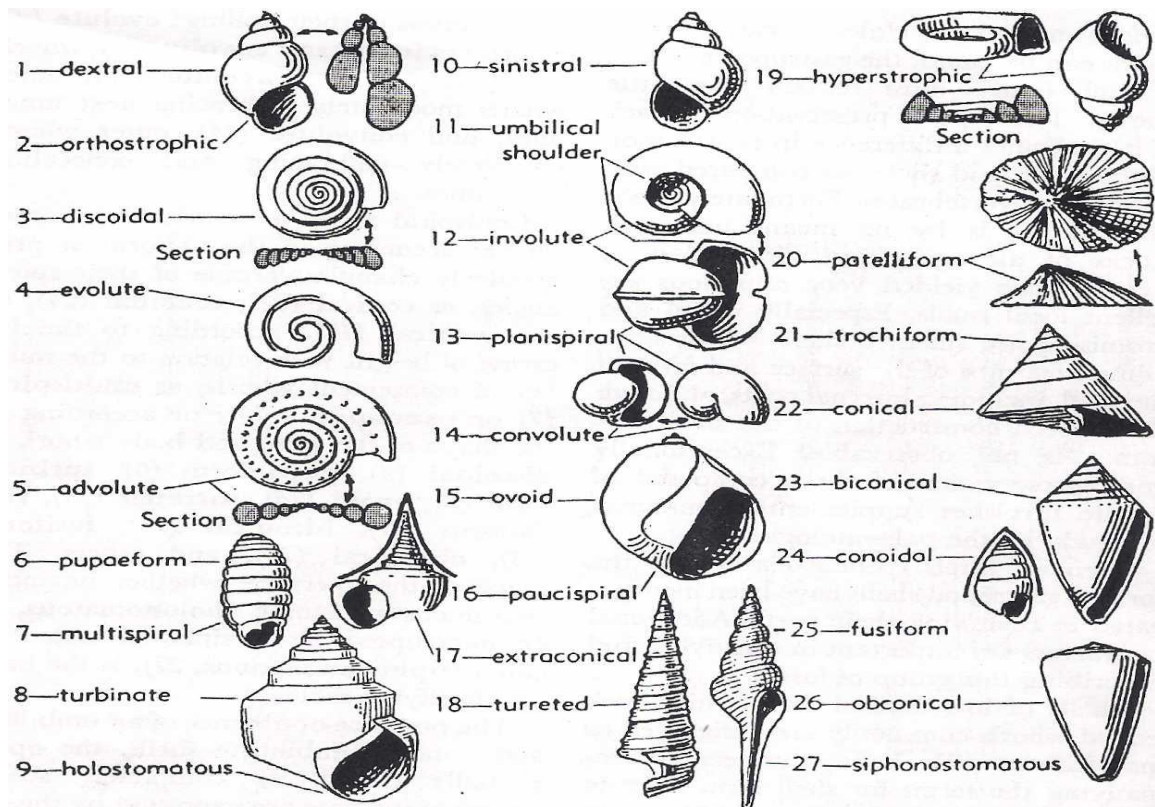


Fig. 8-6. Form of gastropod shells. Most commonly used descriptive terms applied to snail shells are illustrated with accompanying cross-indexed explanations.

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