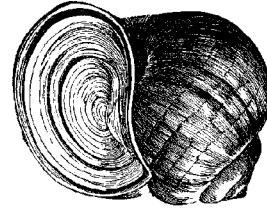
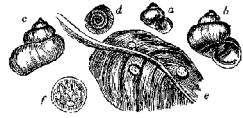


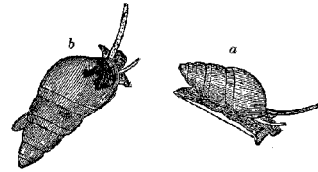
2702.—Doubtful Ampullaria.



2704.—Globosus Ampullaria.



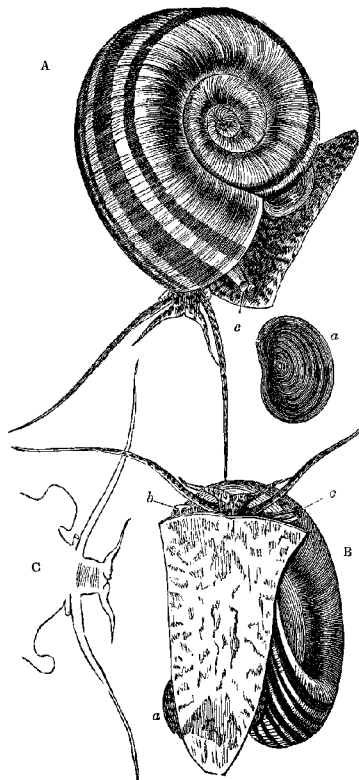
2698.—Valvata.



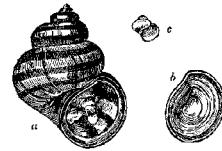
2699.—Minute Paludina.



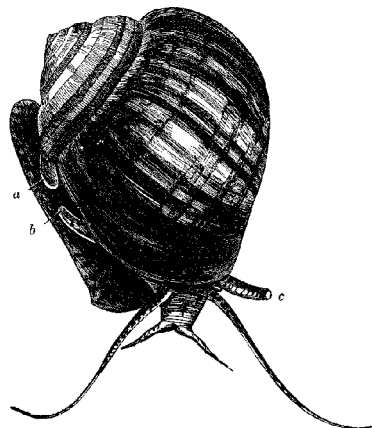
2697.—Valvata.



2708.—Ran's-horn Ampullaria.



2700.—Viviparous Paludina.



2701.—Doubtful Ampullaria.

We now proceed to the genus *Ampullaria*, containing the apple shells of collectors.

In this genus the shell is globular, ventricose, and umbilicated, furnished with an epidermis; the spire is very short, and the last whorl larger than all the rest put together.

The aperture is oval. The operculum is horny or Shelly. The mollusk has a large, shield-formed, delicate foot; the head is flattened, and terminated anteriorly by two buccal, tentacles; there are besides two very long tentacles supporting at their base the eyes raised on peduncles. There is a long respiratory tube or siphon, projecting to a considerable distance, formed by the mantle, but impressing no furrow on the lip of the shell. The branchial cavity is very extensive, and the upper boundary is doubled so as to form a great aquiferous sac. Habits fluviatile.

The *Ampullariæ* frequent the lakes and rivers of warm climates. Species of very large size have been found in Asia, Africa, and America, and especially in the southern portion of the latter. Olivier states that one is found in Lake Mareotis in company with marine shells.

These fluviatile shells were arranged by Müller in his genus *Nerita*; and Linnæus classed some under the genus *Helix*.

2701.-THE DOUBTFUL AMPULLARIA

(*Ampullaria dubia*). The animal is represented creeping: *a* is the operculum; *b*, the right siphon; *c*, the left siphon.

The same species is represented at Fig. 2702, so as to show the lower side of the foot; the animal appears in the act of ascending to breathe, and with the respiratory siphon protruded. *a* is the operculum; *b*, the right siphon; *c*, the left siphon.

2703.-THE RAMS-HORN AMPULLARIA

(*Ampullaria cornuarietis*). *Ceratodes fasciatus*, Guilding. *A* represents the animal creeping; *B*, the animal in a supine position; *a*, the operculum; *b*, the right siphon; *c*, the respiratory siphon; *d*, the head, tentacles, eyes at their base, and expansions at the side of the neck.

2704. THE GLOBOSE AMPULLARIA

(*Ampullaria globosa*). This species is said by Mr. Swainson to be an inhabitant of the rivers of India. The shell is represented as having the mouth closed by the operculum. In this species the margin of the aperture is thick and grooved.

Ampullariæ have at various times been brought alive to Europe. An able naturalist informs us that the first, as it would seem, were sent to Paris, by M. Caillaud, from the Nile. We learn that that naturalist, during his voyage to Meröe, collected several Egyptian mollusca, which he distributed generously among collectors. One correspondent had been anxious for the fluviatile mollusks found in the Nile. The person employed to collect these, after having gathered a large quantity of river mollusca, among which were some living *Ampullariæ*, put them all into a box of bran (son). This box was delayed on its road by the operation of the quarantine laws for four months, and, when it reached M. Caillaud, was in such a state, from the putrefaction of the greater part of its animal contents, that he hastened to throw the whole into the water. To his no small surprise, he found, a few hours after, the greater part of the *Ampullariæ*, which had been shut up with this mass of putrefaction, quietly creeping about upon the mud. He gave many individuals to M. Deshayes, who kept them alive from four to five months. The latter zoologist remarks that, since that communication, Mr. Sowerby, in the 'Zoological Journal,' and M. Quoy, in the 'Zoology of the Astrolabe,' have given the figures of many other species of *Ampullariæ*, several of which have been brought alive to Europe. We know of no other figures of *Ampullariæ* in the 'Zoological Journal' than those illustrative of a paper by the Rev. Lansdowne Guilding.

On the 29th of October, 1833, Mr. Cuming, so well known for the great additions which he has contributed to our knowledge of the mollusca by his collections from the west, and who has since been employed in the same laudable pursuit in the east, to the great enrichment of this department of zoology, brought to Mr. Broderip a specimen of *Ampullaria globosa*, expressing his opinion that it might be alive. Mr. Broderip immediately placed the specimen in a deep dish with some earth at the bottom, which was covered with New River water, and set it before the fire. On the 29th the animal gave no sign; but on the 30th it came forth and soon showed tokens of vigorous life. It was afterwards removed into a globular glass vase such as is used for gold and silver fish, with a good layer of earth at the bottom. The water and earth were changed periodically, and the animal continued to live in apparently good health for many weeks. Its death was probably occasioned by the difficulty of resisting the low temperature of the long cold winter nights, where there were no stoves, in short nothing beyond the ordinary fires of a dwellinghouse. The specimen is now in the museum of the Royal College of Surgeons.

M. Deshayes proceeds to observe that it became an object of inquiry how aquatic animals, unable to respire except by means of a pectinated bronchia, could remain alive so long out of the element apparently necessary to their existence. Nearly all the persons, he remarks, who occupied themselves with this phenomenon, thought that the animal on retiring into its shell carried with it a certain quantity of water, which could not escape owing to the retention of the operculum, which closes the aperture with great exactness. Others thought that the humid air carried upon the branchiæ was sufficient to keep up the respiratory action. "Wishing to know," continues M. Deshayes, "whether there were anything in the structure of the animal which could explain the singularity, we soon perceived that the upper wall of the branchial cavity was doubled, and formed a great pouch, the aperture of which was placed backwards, above the origin of the branchiæ. Plunged in the water, the animal has this pouch, constantly filled with the ambient liquid, and, on retiring into its shell and shutting itself up under its operculum, this bag still remains filled with water, and thus furnishes the necessary materials for the function of respiration. Everything leads us to believe that this is the only cause which permits the *Ampullariæ*, pectinibranchiated aquatic animals, to remain a long time out of the water without perishing, and this explains also how it happens that in certain lakes which are annually dry *Ampullariæ* are always to be found. When the great heats approach and they plunge themselves into the mud or sand, they preserve in their branchial sacs the quantity of water necessary for them during the whole time of drought."

This, as a writer observes, is one of those beautiful provisions which meet the naturalist everywhere. The tropical torrent and lake may yield to the dry season and burning sun, but the *Ampullaria*, secure in the possession of his water-bag, can afford, like the camel in the desert, to wait till the rains furnish a fresh supply, and again fill the parched channel.

With respect to fossil species of this genus, Mr. G. B. Sowerby states that he is not certain of the existence of any; several, he adds, are mentioned by Lamarck, in the 'Annales du Museum,' among the fossil shells of the environs of Paris; others, which are thought to be genuine, are found in the London clay at Hordwell, and in the mixed stratum between the two fresh-water beds at Headen Hill, in the Isle of Wight. M. Deshayes is of opinion that many fossil species, referred to *Natica*, ought to find a place in the genus *Ampullaria*.

M. Deshayes goes on to state that up to the time when he wrote (1838) there have hardly been found any fossil species of *Ampullaria* about which there is not some doubt. Those shells which he has retained in the genus, from the character of the aperture and the small thickness of the shell, are, he says, never met with except in marine formations, and one may always suspect that the animals which produced them were different from those of the *Ampullariæ* properly so called. As these species have the characters of *Ampullariæ*, and we have no means of ascertaining the analogy of the animals, we are obliged to have recourse to the characters of the shells and to determine from them alone. But a little time since, he remarks, the belief was general that fossil *Ampullariæ* belonged exclusively to the tertiary beds; but it is now known that this genus occurs through all the "terrains de sediment," for Mr. Sowerby has recorded a fine species in the transition beds, and M. Deshayes says that he knows many others in the oolitic series, and even in the lower chalk. (Last edition of Lamarck.)

The number of fossil species recorded by M. Deshayes in his tables is fourteen (tertiary). In the last edition of Lamarck the number is sixteen.

The genus occurs in the list of the fossils of Lower Styria given by Professor Sedgwick and Mr. Murchison in their valuable paper 'On the Structure of the Eastern Alps' ('Geol. Trans.,' vol. iii. second series), and in Mr. Mantell's 'Tabular Arrangement of the Organic Remains of the County of Sussex' (ibid.).