

degrees of light or darkness. Of reef-making Corals, or those that grow in plantations, an account has already been given.

Echinoderms are solely marine species, and they are found at all depths and temperatures. Crinoids of the genus *Pentacrinus* (Fig. 30, page 58), and allied to Liassic kinds, with species of *Rhizocrinus*, *Bathycrinus*, etc., live at depths above 100 fathoms to below 1000, many where the temperature is below 40° F. Sea-urchins (Echinids) of the *Cidaris*, *Diadema*, and *Ananchytes* families, related to Cretaceous types, occur at similar cold depths. A. Agassiz states that the deep-sea fauna of the West Indies includes 5 Jurassic genera of Echinids, 10 Cretaceous, 24 early Tertiary, and 4 of the later Tertiary.

Brachiopods of the Terebratulid type, much like Oölitic and Cretaceous forms, occur at all depths, down to 18,000 feet; and *Discina*, from the surface to cold depths exceeding 12,000 feet, but the most below 3000 feet; *Crania*, at 600 to 1200 feet. *Lingula* occurs in shallow waters. Species of the genera *Atretia*, *Discina*, and *Waldheimia* and others occur beneath the Gulf Stream at depths of 9000 to 9600 feet.

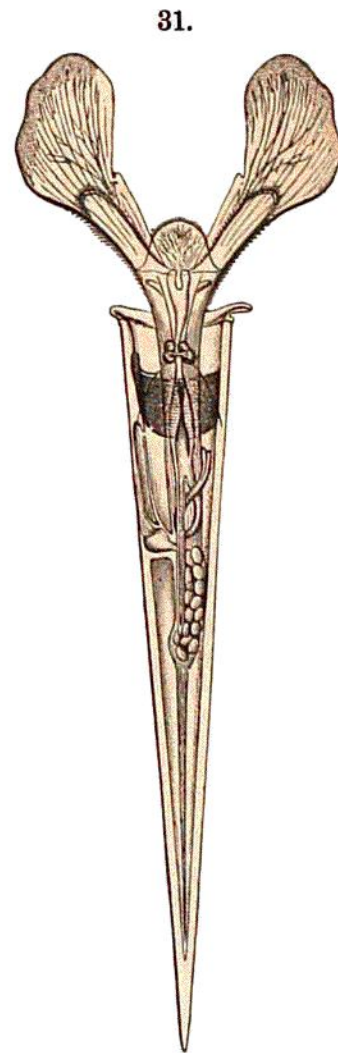
Under Mollusks: Pteropods are pelagic species, and live mostly near the surface. Their shells occur in large numbers in the bottom deposit at depths mostly from 500 to 1500 fathoms in the West Indies and some parts of the Pacific. The form in Fig. 31 of a Mexican Gulf and Atlantic species is much like that of many ancient Pteropods. Deep-sea Gastropods are usually small. The genus *Pleurotomaria* has only four living species known; and *P. Adansoniana* lives at a depth of 1200 feet. *Trigonia* is a shallow-water genus. The *Nautilus*, the last of the Cephalopods having external shells, is restricted to tropical and sub-tropical seas.

Among Worms, the Serpulidæ occur at great depths, species having been obtained by the "Challenger" at depths of nearly 18,000 feet.

Some of the abyssal species of Crustaceans have been shown to range from pole to pole. The large spiny crabs of the genus *Lithodes* are probably among them. One of the species, *L. Agassizii*, from a depth of 1000 fathoms underneath the Gulf Stream, is reported by Verrill (1884) as *over three feet broad*. Many of the deep-sea Crustaceans, according to S. I. Smith, are remarkable for the large size of their eggs. In some of the Eupaguri (Soldier-crabs), the eggs are 8 times the usual size (volume).

The only surviving species of the Trilobite and Eurypterid line are two of the genus *Limulus*, — one in eastern North America, and the other in the China seas. Crustaceans are found mostly at depths less than 3000 feet; 2 only out of 100 Brachyurans dredged off the United States were from depths greater than 3000 feet; but 30 out of 60 Macrurans were from greater depths, 13 of them from below 6000 feet, and some at depths of 12,000 feet; and one gigantic blind species, *Phoberus cæcus*, is over 2 feet long. One Isopod, *Bathynomus giganteus*, occurs *eleven inches long*; in compensation for dark depths it has compound eyes comprising 4000 facets (Milne-Edwards).

*Fishes*. — The existing Ganoids — Sturgeons included — live only in fresh waters, and are confined to America, Africa, and Australia. North America has 3 species of the genus *Lepidosteus*, and Africa 2 of *Polypterus*; and of the related Dipnoi, which are, as the name implies, two-way breathers, they having lungs as well as gills, Queensland, northern Australia, has 2 species of Cera-



Pteropod, genus *Styliola*. × 5.  
A. Agassiz.