

AMERICAN SCIENCE SERIES

ZOOLOGY

FOR

STUDENTS AND GENERAL READERS

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WITH NUMEROUS ILLUSTRATIONS.



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the disk, though it is produced from a Scyphistoma not more than half an inch in height. *Pelagia campanella* and a few other forms do not undergo this metamorphosis, but grow directly from the eggs.

Various boarders or commensals—viz., temporary non-attached parasites—live in or under the mouth-cavity or between the four tentacles of the larger Acalephs. Such is the little Amphipod Crustacean, *Hyperia*, which lives within the mouth, while small fishes, such as the butter-fish, swim under the umbrella of the larger jelly-fishes, *Cyanea*, etc., for shelter and protection. Besides small animals of various classes, the larger jelly-fishes kill by means of their nettling organs small cuttle-fishes and true fishes, the animals being paralyzed by the pricks of the minute barbed darts.

Order 3. Siphonophora.—These are so-called compound Hydroids, living in free-swimming colonies, consisting of polymorphic individuals, or, more properly speaking, *zooids*—that is, organs with a strongly marked individuality, but all more or less dependent on each other. A Siphonophore, such as *Physalia*, for example, may be compared to a so-called colony of *Hydractinia*, in which there are nutritive and reproductive zooids and medusa-buds. In *Physalia* there are four kinds of zooids—i.e. (1) locomotive, and (2) reproductive, with (3) barren medusa-buds (in which the proboscis is wanting), which, by their contractions and dilatations, impel the free-swimming animal through the water; in addition, there are (4) the feeders, a set of digestive tubes which nourish the entire colony. There are numerous genera and species (one hundred and twenty are known), whose structure is more or less complicated and difficult to understand without many figures and labored descriptions. We will select as a type of the order our *Physalia Arethusa* of Tilesius, or Portuguese man-of-war (Fig. 49), which is sometimes borne by the Gulf Stream as far north as Sable Island, Nova Scotia. It is excessively poisonous to the touch, and in gathering specimens on the shores of the Florida reefs we have unwittingly been stung by nearly dead, stranded individuals, whose sting burns like condensed fire and leaves a severe and lasting smart.

The colony or hydrosome of the Portuguese man-of-war consists of long locomotive tentacles, which, when the animal is driven by its broad sail or float before the wind, stretch out in large individuals from thirty to fifty feet. These large Hydra-like zooids are arranged in small groups, arising from a hollow stem communicating with the chymiferous cavity extending between the inner and outer wall of the float. The "feeders" are of two kinds, large and small, and are clustered in branches growing from a common hollow stem, also communicating with the chymiferous or body-cavity. L. Agassiz, whose description of this animal we are condensing, states that he has seen these feeders "gorged with food almost to bursting," but has never seen undigested food in any of the other organs. The medusa-buds (gonophores) arise from a third set of very small Hydras, but form very large clusters suspended between the clusters of feeders. These reproductive zooids resemble the locomotive zooids, but, like the feeders, have no tentacles. The medusa-buds, which are male or female, arise singly, either from the base of the reproductive zooids or from the stems which unite the latter. These buds, as in *Tubularia*, wither without dropping from their parent stock. It appears, then, that the floating hydrosome of a Siphonophore is like that of the fixed *Hydractinia* or *Coryne*, with the addition of locomotive zooids and a float, as seen in *Physalia*, *Verella*, or the swimming-bells of *Halistemma*.



Fig. 49.—*Physalia*, or Portuguese man-of-war.—After Agassiz.

The Siphonophores, as observed in *Agalma*, *Epibulia*, *Halistemma*, and other forms, arise from eggs which pass through a morula, planula, and gastrula stage. The further development of *Halistemma carum*, a Siphonophore native to the shores of New England, has been described by A. Agassiz as follows : In the earliest stage noticed the young looked like an oblong oil-bubble, with a simple digestive cavity. Soon between the oil-bubble and the cavity arise a number of medusa-buds, though without any proboscis (manubrium), since the medusa-buds are destined to form the "swimming-bells," which take in and reject the water, thus forcing the entire animal onward. After these swimming-bells begin to form, these kinds of Hydra-like zooids arise. In one set the Hydra is open-mouthed, and is, in fact, a digestive tube ; its gastro-vascular cavity connecting with that of the stem, and thus the food taken in is circulated throughout the community. These are the so-called "feeders." The second set of Hydras differ only from the feeders in having shorter tentacles twisted like a corkscrew. In the third and last set of Hydras the mouth is closed, and they differ from the others in having a single tentacle instead of a cluster. Their function has not yet been clearly explained. New zooids grow out until a long chain of them is formed, which moves gracefully through the water, with the float uppermost.

All the Hydroids in their free state as medusæ are more or less phosphorescent, and as much or more so after death, when their bodies become broken up, and the scattered fragments light up the waves whenever the surface of the ocean is agitated. From this cause the sea is especially phosphorescent in August and September, when the jelly-fishes are dying and disintegrating. These creatures serve as food for the whalebone whales, which swallow them by shoals.

The smaller species are abundant in the circumpolar seas, while in the tropics the Siphonophores are especially numerous, none occurring in the Arctic regions. The Hydroids are widely distributed, a species of *Campanularia* being common to the Arctic and Antarctic seas. The species occurring on the New England coast are in many cases

found in Northern Europe, being circumpolar in their range. A distinct assemblage of Sertularians, characterized by the large number of species of *Plumularia*, inhabits the Florida seas down to a depth of five hundred fathoms. Among the Discophora the Lucernariæ are arctic as well as temperate forms, while *Cyanea* is peculiar to the Northern Hemisphere. *Aurelia* and *Pelagia* are cosmopolites, while *Rhacopilus*, *Placois*, and *Lobocrocis* are peculiar to the Southern Hemisphere. The larger number of species are tropical and sub-tropical. As regards their bathymetrical distribution, while several species extend to the depth of five hundred fathoms, *Monocaulus* flourishes in gigantic proportions at the enormous depth of four miles.

The range in geological time of the *Discophora* extends to the Jurassic period (middle Oolitic), large species of jelly-fishes occurring in the Solenhofen slates. The genus *Hydractinia* first appeared in the Cretaceous period. Graptolites were common in the shales of the Potsdam period, so that if Graptolites are Acalephs, the latter are probably as old a type as any, being contemporaneous with trilobites, brachiopods, mollusks, worms and sponges.

CLASS I.—THE HYDROZOA.

Body in its simplest form a sac attached by the aboral end, composed of three cell-layers, with a mouth and gastro-vascular cavity, and in all cases, except Protohydra, provided with tentacles, which are hollow, forming continuations of the body-cavity. The body (hydrosome) usually differentiated into two sorts of zooids, nutritive (polypites) and reproductive (gonosomes), connected by a common stem or nutritive canal (cœnosarc), the gonosomes producing medusa-buds (gonophores), which on being set free are called medusæ (or medusoids) and are bisexual. In these medusæ the body is disk or bell-shaped, the jelly-like parenchymatous substance composing the disk constituting the mesoderm. From the gastro-vascular cavity four primary gastro-vascular canals radiate and anastomose with a marginal circular canal. No distinct organs of circulation, the blood being sea-water containing the chyme and a few colorless blood-corpuscles. A true nervous system rarely present, but when developed in certain medusoids, forming a*

* Agassiz saw in Rhizogeton, a form allied to Hydractinia, a gonophore which had discharged its contents, degenerating into a polypite or hydra, and its body elongating and developing tentacles. Allman observed the same thing in Cordylophora.