

ART. XLVIII.—*Notice of the remarkable Marine Fauna occupying the outer banks off the Southern Coast of New England, No. 6; by A. E. VERRILL. (Brief Contributions to Zoology from the Museum of Yale College: No. LII.)*

Parasmilia Lymani Pourtales.—*Remarkable modes of growth and repair.*

POURTALES mentions that in this cup-coral the young bud out from the inside of the parent-calicles and burst them, by their normal growth. So that, afterwards, they remain attached to fragments of their own parents. This is probably an erroneous explanation of facts identical with some of those that I have observed. We have dredged this coral in considerable numbers, and of larger size than those described and figured by Pourtales. In each locality nearly all the specimens are attached, at base, to the inner surface of fragments, more or less old and discolored, of the same coral, as observed by Pourtales. Moreover, we have been able to collect a series sufficient to fully demonstrate that all these cases are instances of buds arising from the inner or septal surfaces of such specimens as have been accidentally broken or crushed. The coral is very fragile and has a tendency to split longitudinally into wedge-shaped segments when it breaks. Each fragment then has the power of developing from its still living internal tissues, and especially from the membrane (endoderm) covering the septa, one or more buds, which then grow up into cornucopia-shaped cups, like the parent. In many specimens a single large bud will start from near the distal end of a large piece; such a bud will grow up into a regular, more or less curved, circular or elliptical cup, with a thick base, continuous in part with the original fragment; the costæ and septa of the old fragment are perfectly coincident with the costæ and septa of the new coral on the outer or marginal side; examples of this kind, in all stages of development, were taken: one of these buds is 14^{mm} broad at base and 17^{mm} high on the proximal side, 7^{mm} high on the distal side; another is 13^{mm} broad at base and 23^{mm} high; another is 10^{mm} broad at base, 22^{mm} high, the circular calicle 14^{mm} broad; another is 6^{mm} broad at base, 44^{mm} high, the elliptical calicles 20 by 25^{mm}. In several cases two buds starting close together, from a single fragment, or from two imperfectly separated pieces, have grown together more or less completely, so as to produce a double calicle, the two halves either equal or unequal, and separated by a constriction, but with two septal centers and columellæ, and two distinct mouths. The largest example of this kind is 50^{mm}

high, the two calicles together, 40^{mm} across, each one about 20^{mm} broad. In one instance the base of a good-sized cup has been broken off, where about 6^{mm} in diameter; from the broken and ragged ends of the septa thus exposed three buds have started out, each 3 to 4^{mm} broad, with 24 to 36 septa; the old calicle appears to have been unaffected. In another instance a calicle that had developed, as usual, from a fragment, after it had grown 22^{mm} high was itself badly injured, so that half of the interior of the calicle died, but was not broken, but from the other half a large bud arose, nearly filling the old calicle by its new growth, and soon becoming larger than before the injury, so that on one side the cup is nearly regular and the costæ continues to the base, while on the other side the edge of the old calicle, with the old septa in place, appears in high relief, at about mid-height of the cup; in this case we have, as it were, three generations shown in one specimen: this example is 45^{mm} high, the calicle 25^{mm} broad. One of the most remarkable examples is a large cup, 50^{mm} high and 28^{mm} broad, in which the inner margin and distal portion of the septa are discolored, indicating that the soft parts within the edge of the calicle, and probably the tentacles, disk and stomach had been destroyed by access of mud, or some other accident, while the parts farther within the deep cup, or at least the membranes there covering the walls and septa, remained alive; from the edges and surfaces of the septa over thirty small buds have started out, varying in size and degree of development; the greater number form a partial circle, 10 to 12^{mm} from the margin, but others are scattered over the more interior parts of the cup, even to very near its base, the columella being nearly absent: the larger of these buds are about 5^{mm} in diameter, but some are not more than 2^{mm} , and many are just beginning to appear, and have slight walls and septa only on one side. In all cases the still living edges of the old septa serve as some of the septa of the new growth.

A number of large specimens were dredged, off Chesapeake Bay, in 57 fathoms (station 899) by Lieut. Z. L. Tanner, on the "Fish Hawk," Oct., 1880. It was dredged by our party, on the "Fish Hawk," off Martha's Vineyard, in 100 to 130 fathoms (stations 940, 949 and 1040), in 1881. It was more common and largest at station 940, in 130 fathoms. Off Florida,—Pourtales.

In speaking of *Flabellum Goodei* (p. 313), I have mentioned that it also has this same mode of budding from the inner surface of the fragments. Some of these phenomena have been noticed in other deep-sea corals, though not explained in the same way. Probably this will, hereafter, be found to be a common mode of increase in the case of various fragile cup-

corals. Indeed, I believe that the same explanation will apply to some of the ancient cyathophylloid corals, in which buds arise within and appear to destroy and supplant the parent calicle. Instead of such buds being the *cause* of the death of the parent-polyp, as has been supposed, I believe them to be due to the *result* of injury and the consequent effort of the tissues to *retain life* and repair injuries.

Restoration of the disk in Ophiurans.

That Ophiurans restore their rays with remarkable facility when broken, or entirely lost, is well known. In examining a large series of *Amphiura abdita* V., collected in the harbor at Noank, Conn., among eel-grass (*Zostera*), in 1874, I found several specimens in which the entire dorsal disk, with the contained viscera, had been lost and more or less restored, showing the various stages of the process. The dorsal disk of this species is soft and swollen, and is very easily detached. The arms are exceedingly long and slender and subject to frequent restorations. In some of the examples in which a new disk was forming, the scars are still plainly visible, on the bases of the arms, showing where the disk had been torn away, and its former size. In some of these the new disk, though perfect in form, had not grown to more than one-third, or one-half the diameter of the old one; in others it was nearly completed. These small disks connected with the full sized arms and jaws of the adult, give such specimens a very peculiar appearance. At first I mistook some of these for the genuine young.* But a more careful examination easily revealed their true nature.

In the same lot were specimens in which a portion of the edge of the disk, with one or two of the arms, had been destroyed, and afterwards restored. In a few instances two arms had grown out, in place of one.

* It is quite probable that *Amphiura macilenta* V., described in the February number of this Journal, p. 142, is really the true young of *A. abdita*. There are no *genuine young* of the shallow-water form known to me. The restored specimens, with small disks, appeared so different that, until I discovered their true nature, the identity of the two forms did not seem to me possible.

ERRATA.

Page 309, line 26, for *Ballicina*, read *Balticina*.

Page 313, line 7 from bottom, for S. O. Sars, read G. O. Sars.