Notes on some Sagartiidæ and Zoanthidæ from Plymouth.

By

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Sagartia luciæ, Verrill.

THIS small species was described by Verrill in 1898, and first observed by Miss Verrill in 1892 near New Haven, U.S.A.

In 1902 Parker noted a number of new localities, and remarked upon its rapidly extending range on the American coast.

It has been known at Plymouth for a considerable period, being first observed in the Millbay Docks in 1896, and was identified by Mrs. Davenport in October, 1902. It was then to be found in the Cattewater, and I have lately observed it abundantly near high-water mark, under and upon stones in Rum Bay, and on Drake's Island in the Sound. It is thus extending its range here also in a quiet way.

It is certainly remarkable that this species should make its appearance on the American coast about 1892 and in Plymouth Docks in 1896. It is of course possible that it existed in both localities for some time previously, but it could hardly escape notice for long in a locality so constantly examined as Plymouth. As observed by Davenport (1903): "When the water becomes foul, or from other causes, it may voluntarily detach itself and float about the aquarium or hang upside down from the surface film." This I have also observed. Since it frequents docks, piers, and other situations, and near high-water mark, it is liable to become attached to the bottoms of ships, even floating to them in the still water usual in such places, and being very hardy, would survive a voyage, and again change its environment at the next port of call. It is significant that it was first noted at Plymouth in the Docks, and next in the Cattewater.

It is thus possible that it is not native to either the eastern coast of America or to South Devon, but was introduced into both areas about the same time.

In the Millbay Docks it lives upon the agglomerated masses of *Ascidiella aspersa*, which grow on the piles, valves of *Mytilus*, and upon one another, together with various *Polyzoa*, *Obelia longissima*, *Sycon coronata*, and colonies of *Botryllus*.

Height of column usually 5 or 6 mm., but I have seen adults when elongated as much as 10 mm. in height.

Column smooth, dull green, striped with orange-yellow.

Disk varies from semi-transparent greenish brown to dark green, with varying short lines or spots of greenish yellow at the base of the tentacles, and frequently one white radius.

Mouth generally raised on a cone.

Tentacles in multiples of twelve, 24, 36, 48, and 60 being observed in various individuals. Dull, semi-transparent, greenish in colour, or tinged with yellow or pink, sometimes a faint white ring near the tip.

Many of the conditions mentioned by G. C. Davenport, in "Variation in the stripes of *S. luciæ*," are observable here.

The anemone was in active subdivision on Drake's Island in early December, 1907, specimens being found with 4, 6, and 8 stripes more frequently than those with the normal 12.

Two large individuals, found on the same stone in Rum Bay, had the unusual number of 34 stripes, arranged in 17 pairs. One of these subsequently divided, and each of the resulting individuals had 17 stripes ($8\frac{1}{2}$ pairs).

Several small ones from Millbay were entirely without stripes.

I have observed one of these anemones seize and retain an amphipod of the same length as its own tentacles.

Sagartia coccinea, Gosse.

This species was named *coccinea* by Gosse, believing it to be identical with *Actinia coccinea*, Müller, Zool. Danica, 1776. Carlgren (1893) has shown, however, that the species really described by Müller was the *Stomphia churchiæ* of Gosse, which must hence be *Stomphia coccinea* (Müller), and the present species *Sagartia coccinea* Gosse.

It is to be found in abundance in the Cattewater, its presence there being in all probability due to trawl refuse, the majority being attached to the ascidian *Polycarpa pomaria*, and associated with other animals from the trawling grounds.

It however readily attaches itself to wood, leather, dead leaves, fucoids, and any other available material.

This species does not appear to be at all common, or at all events is seldom observed.

Base very irregular, generally lobed and twisted in a most peculiar manner. Fragments are constantly being split off, and speedily develop into fresh individuals.

Column very changeable in form. Surface finely corrugated, orange-buff with numerous yellowish white longitudinal lines, 12 of which are usually more prominent than the rest, paler about the base, and darker at the summit.

Disk as described by Gosse; the white radial lines and rich orange area about the tentacle bases.

Tentacles generally short and stout, but capable of considerable elongation. In many young specimens, 16 in number, 80 to 90 in the largest examined, they are colourless, with three broad white rings and marks at the base, as described by Gosse. Large specimens measured 12 mm. in diameter at the base. Height of column, 7–8 mm. Acontia emitted reluctantly and from the upper part of the column and the mouth; they are long and white. This species was seldom firmly attached, and could be removed from the ascidians, etc., with ease.

The following varieties were observed: (*a*) Some of the tentacles with two interrupted dark lines down their inner faces, somewhat as in *S. viduata*, but more to the front of the tentacles, not continuous, and never present on all the tentacles; (*b*) found upon water-logged wood, etc. Column perfectly transparent, the mesenteries showing as narrow white lines, the œsophageal region showing as an orange-red patch. The column of this form, tall and pillar-like, as in Gosse's figure, and the base less lobed. Height about 10 mm.

Disk transparent, pinkish-white, white lines as usual; the orange area reduced to thin light red lines around the bases of the tentacles. Mouth orange. Tentacles with indistinct white rings. Reproduction by longitudinal fission would appear to take place in this species. One quite small one was noted, divided into two as far down as the centre of the column. Carlgren remarks in 1896: *Studien uber Nordische Actinien*, p. 96, *Sagartia undata, var. undata* β, "Möglicherweise ist diese Form identisch mit Gosse's (nicht Müller's) *S. coccinea*."

Lack of the necessary material and literature prevent an attempt to elucidate the relationship of the form with regard to the above, to *S. viduata*, to *S. herdmani*, and to *S.* (*Actinia*) *lacerata*, and I therefore retain Gosse's name.

Sagartia sphyrodeta, Gosse.

Specimens were examined from the Asia Shoal, Reny Rocks, and other localities. They all belonged to the *var. candida* of Gosse. His variety *Xanthopis* I have not yet met with here, though it occurs on the north Cornish coast.

Some of the specimens had a pale bluish or glaucous tinge on the column, and I have seen a variety near St. Ives in which this colour predominated on the column in darker and lighter bands. The tentacles, according to Gosse, number 48 (8+8+16+16). Fischer (1874) gives 8+8+16+32+64. The usual number at Plymouth is 64 (8+8+16+32), but a few have about 100. Their form is changeable. "They are usually spread horizontally, and have their tips bent frequently downwards" (Gosse, p. 73).

Sometimes they are much inflated, and curve in all directions, and are often very active. Both these conditions are most frequent in those dredged in the deeper parts of the Sound, and in such also the column is more pellucid and the tentacles more extensile than in the littoral form. I have observed one exhibit extraordinary activity, bending all the tentacle tips, and then straightening them again all together and at the same time.

The lines encircling the tentacle bases, usually dark brown, sometimes light purple, or only the inner cycles so encircled. They are frequently irregular, spreading out as a dark coloured area, or forming dark patches at the sides of the tenacles. Acontia freely emitted. Transverse sections showed the ectoderm to be well developed (especially in the oral disk), and the mesoglœa, though not markedly developed in the body wall, mesenteries, or tentacles, is also thicker in the oral disk, and the sphincter is strong, and shows numerous small cavities. The longitudinal muscle of the mesenteries well developed, the fibres dendritic.

Paraphellia expansa, Haddon.

This species is not uncommon on the Rame-Eddystone grounds, but I have only been able to examine one living specimen from that area, which had been in captivity for some time. When completely contracted, 20 mm. in diameter, and much flattened, the base spread out, sometimes smooth, and at others crenulated, the centre slightly elevated and much wrinkled. The form is very changeable, the flattened base being partly or wholly retracted, the column elevated, and the anemone then assumes the turban shape figured by Haddon, but this is rare.

This specimen does not progress by the usual creeping method, but by drawing in the flat base, inflating one side of the column, and falling over in that direction, thus turning upside down and resting on the partly expanded oral disk and tentacles. One side of the pedal disk is next inflated, and the anemone rights itself again, and so on. The body wall was covered by a thin horn-coloured coating of hardened mucous, in which a good many sand grains were embedded. Remains of an older and thicker coating could be made out. The thin coat was easily removed, and the animal expanded more freely in consequence. The whole base and column were then seen to be "translucent buff," but with no sign of the "pinkish or flesh colour" on the scapus, as in Haddon's Irish specimen. Tentacles $6+6+12+24+48=96$, one cycle more than in Haddon's examples. They were coloured as given in his plate and description, but varied in intensity, some being largely white, others with a wash of pale chrome, especially about the base. The brown terminal spot very weak or absent. The lateral spots of brown, in two or three pairs, well marked or almost absent.

Disk pale brown, with 12 somewhat darker areas radiating from the primary tentacles to the mouth, these areas bordered by double yellowish lines (single in Haddon's specimens).

From the bases of the secondary tentacles, and on a paler ground, lines of white dots run towards the mouth.

Mouth raised in a cone, lips pale, throat same, longitudinally ribbed, and banded with dark brown. Acontia freely emitted from the mouth.

I recently obtained seven specimens adhering to stones at extreme low water at Zennor, near St. Ives, Cornwall, and as this is a new habitat and locality for this species, a short description may be of interest. An abundant growth of *Laminaria* and several layers of stones having been removed, these anemones were found adhering firmly to the sides and lower faces of the stones, together with *Corynactis viridis* and *Caryophyllia*, etc. When contracted they resembled Haddon's figure (*Trans. R., Dublin Soc.*, Vol. iv., Pl. XXXII, Fig. 2), and were invested in a thick brown, wrinkled, bark-like coating, and the scapus proved to be pale flesh colour on its removal. In no case, while in my possession, was a flat or crenulate base to be seen. This is probably limited to specimens living on a sandy bottom. Disk tawny brown. The arrangement of lines and dots was more complicated than in either the Irish or Plymouth specimens, but on the whole was very similar. The tentacles 96 in the larger specimens; in these also there were slight variations of arrangement of tint and markings.

Soon after capture several ejected shells of *Homalogyra atornus*, which is abundant on the rocks there.

P. expansa thus appears to have a fairly wide range on the western coast, and to be variable in colour and form.

Epizoanthus couchii, Johnston.

Zoanthus couchii, Johnston, 1838; Gosse, 1860.
Epizoanthus couchii, Haddon and Shackelton, 1891.

A colony dredged on December 6th, 1907, from Duke Rock, Plymouth Sound, consisted of fifteen polyps of various sizes attached to a stone. Cœnenchyme thin and irregular. The larger polyps 15 mm. in length, gradually widening toward the summit. Encrusted with sand. The lower $\frac{2}{3}$ of the column was weak, less encrusted than the summit, and incapable of supporting the upper portion. The upper $\frac{1}{3}$ contractile, and this gives these polyps a "knobbed" appearance. If irritated, the whole column stiffened somewhat, but usually lay bent over, the summit resting on the stone. The half-grown polyps all showed more or less narrowing about the base, but those of 2–4 mm. are the same thickness throughout.

Fresh polyps appear to arise as small mound-like swellings in the cœnenchyme. Small isolated individuals were also to be observed on the same stone.

Disk concave, olive with white lines. Mouth elevated. Lips opaque white. Tentacles 24 to 28, in two cycles, fairly long and transparent. Tips rather blunt and white. Marginal teeth, 12 to 16. In some cases well developed; in others less so.

Lives well in confinement; very timid, contracting at the least vibration.

Epizoanthus (?) rubicornis (Holdsworth).

Zoanthus rubicornis, Holdsworth, 1861.
Epizoanthus (?) rubicornis, Haddon and Shackleton, 1891.

Haddon and Shackleton (1891), p. 653, say: "This species has apparently not been met with since its discovery, and we are unable to do more than recast Holdsworth's description. We have no doubt that this species is an Epizoanthus."

I have examined two preserved colonies, marked "Five miles south-west of Rame Head, September, 1902."

Colonies unattached. From their conformation they would appear to have lain free on a sandy bottom, the polyps all being bent slightly upward.

Colony (a) consists of two large primary polyps growing from a centre, away from one another, and in the same plane; two secondary polyps arising in a similar manner at right angles to the first pair, and two smaller tertiary polyps arising from the bases of the primary pair.

Colony (b) is formed upon the same plan, but is more irregular in growth, and consists of seven polyps.

Greatest length of colony (a) 40 mm., largest polyp 20 mm. in length, and 5 mm. in width at the summit, and 3 mm. at the base.

Breadth of colony 22 mm., the polyps 10 mm. long. Tertiary polyps 5 mm. Measurements of (b) very similar.

In both colonies there were swellings at the base of the secondary polyps, indicating further branching.

Body wall strongly incrusted with sand, a few folds on or below the summit of the larger polyps.

Capitular ridges, 15 or 16, not strongly developed. Spaces between the ridges unincrusted.

Disk not visible. Tentacles partly retracted, stout, and white, 26 visible in one and 24 in another. Mr. A. J. Smith informs me that they were of an orange-red when fresh.

These specimens are evidently identical with that described by Holdsworth, and which was also obtained in the neighbourhood of Plymouth.

An anatomical examination was not attempted, as owing to the amount of incrusting sand, and the fact that the specimens had been five years in formalin, the result would be certain failure, to judge by an experience with *E. incrustatus*, besides mutilating the colonies. Fresh and less incrusted examples must be awaited and hoped for.

In the meanwhile I agree with previous writers as to the close affinity of this form with *E. couchii*.

Parazoanthus dixoni, Haddon and Shackleton.

One colony, preserved in alcohol. The label reads: "Millbay Channel, December 1st, 1902."

This colony, which consisted of over 50 polyps, had evidently been torn off a rock by the dredge, as fragments of stone and *Balanus* were found still adhering to the cœnenchyme.

Greatest length of colony 35 mm., breadth 27 mm. Height of largest polyps 10 mm., diameter 4 mm. Cœnenchyme soft, spongy, and abundant. Polyps rather crowded. Body wall slightly wrinkled, owing to the contraction of the polyps.

The whole colony bears a strong resemblance to that figured by Haddon and Shackleton, *Revis. Brit. Actiniæ*, Pt. II, Pl. LVIII, Fig. 37.

Polyps stout, contracting somewhat toward the summit, where they again enlarge. Margin rounded, with 16 to 18 well-developed ridges. Disk and mouth not visible.

Tentacles difficult to enumerate, almost all being retracted. Thirty were visible in one large polyp, fairly stout, and dull white in colour. Colony sand colour.

A transverse section shows the ectoderm and nematocysts, encircling sinus and canals, endoderm, etc., to be as described by Haddon and Shackleton. The incrustations, consisting of sand grains, spicules, etc., were, however, more numerous than in their specimens.

The specimens described by the above-mentioned authors were obtained off the coast of Kerry, Ireland, in 70–80 fathoms. The Millbay pit, from which the present colony was probably obtained, has a depth of from 12 to 17 fathoms.

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