

Tealia tuberculata (Cocks).—A Study in Synonymy.

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With Plate XIX.

IN the Report of the Cornwall Polytechnic Society for 1851 Mr. W. P. Cocks described a species of sea-anemone under the name of *Actinia tuberculata*. He gave a small figure in illustration, but this was somewhat indefinite. His description is as follows:—"Body globular, light brown, densely covered with large greyish-white tubercles, the apex of each tubercle depressed; disc white; mouth large, lips thick, corrugated, and everted; tentacula numerous, large, obtuse, some bifurcated, others trifurcated. Diameter three and a half inches when contracted."

P. H. Gosse in his *British Sea Anemones and Corals*, 1860, quotes the above description, and adds that he had privately received further particulars from Mr. Cocks, namely, that the anemone was obtained thirteen miles south-west from Falmouth, attached to a valve of *Pecten maximus*, that it lived with Mr. Cocks for some months, that it was "bulky, rather loose in texture, when fully expanded covering the bottom of a large pan,—it had the appearance of a mammoth *Bellis*. It appeared to be extremely irritable, and upon the slightest provocation would throw off from its body a large quantity of thick glaire, which if allowed to remain produced a disagreeable smell. When contracted it had the appearance of a half-boiled sago pudding."

Gosse says he ventured to suggest that it might have been a large colourless deep-water specimen of *Tealia crassicornis*, but Mr. Cocks repudiated the identification while admitting the relationship; Gosse concludes that it *may* be distinct.

A species of anemone which is extremely common in deep water in the neighbourhood of Plymouth, off the south coast of Devon and Cornwall, and numbers of which have been brought to the Laboratory of the Association, is without doubt the species described by Cocks. Cocks' description is not as precise and detailed as the zoological definition of a species ought to be, but there are points in it which

apply so perfectly to the form I refer to that it is certain that my specimens belong to the same species as the specimen examined by Cocks. These points are (1) that the column is "densely covered with large greyish-white tubercles, the apex of each tubercle depressed;" (2) that the tentacles are "large, numerous, obtuse, some bifurcated, others trifurcated." This division of the tentacles does not occur in all specimens, and when it does occur is present only in two or three tentacles out of the whole number; it is confined to the extremity of the tentacle, which divides into two or three terminal portions, or bears a secondary tentacle growing from it almost at right angles. This branching of the tentacles is not therefore a constant character, and does not occur always on particular tentacles, but it is a kind of abnormal growth which has, so far as I know, only been observed to occur in this species. (3) Mr. Cocks' specimen was attached to a valve of *Pecten maximus*, and all the specimens I have received were attached to the surface (usually the inner) of single valves of large Lamellibranchs, most frequently valves of *Cyprina islandica* or *Pinna pectinata*.

Description of the species.—The size is large, ranging from 8 to 13 cm. in diameter of base and 2 to 5 cm. in height in the expanded condition. The tentacles are usually short and blunt with transverse stripes of colour. The disc is reddish or brownish in the centre round the mouth. The walls of the stomodæum are yellowish, wrinkled with longitudinal folds, and tumid. The directive or cesophageal grooves are very conspicuous, their surfaces are smooth and white, but at the upper end of each there is a slight projection of the oral disc which is distinguished by being more brightly coloured than the rest of the disc. The external part of the disc is of a light yellowish tint, but radiating striæ of red pass from the central coloured part to the bases of the tentacles, the base of each tentacle being enclosed by two such coloured striæ. The extent of the red-brown central area of the disc varies considerably,—sometimes it is absent altogether, sometimes it extends almost to the origin of the internal cycle of tentacles. This coloured area always disappears in specimens kept for some months in our aquarium, the whole disc becoming of a pale drab colour. The primary tentacles are distinguished by two milk-white bands, which lie within the red striæ enclosing the base of each, and which extend outwards from each primary tentacle to the most exterior cycle of tentacles, where they pass on to the adjacent sides of two tentacles belonging to this cycle. The tentacles are translucent with transverse rings of faint colour; the base is white; above this is a band of very faint red, then comes another band of white, then another band of red much more pronounced, and finally the tip is white. The tip of each ten-

tacle is perforated, and when a specimen is taken out of water and contracts forcibly, water is forced out of the terminal pores of the tentacles in streams with some force.

The column is of a yellowish-grey colour with scattered patches of red. It is closely beset with large bladder-like warts, which are arranged in vertical rows in close proximity to one another. The largest of these warts are on the margin of the column, while near the base they get smaller and gradually disappear. Each wart has from two to four white patches which are probably glandular. The warts have the power, probably due to these glandular patches, of attaching pebbles or sand to themselves, and to such objects they adhere with considerable tenacity, but this property is not often exercised in the natural condition, the surface of the column being almost always bare.

The base is usually expanded considerably beyond the column when there is room for it; when an animal on a somewhat small shell is left undisturbed in an aquarium the base soon extends on to neighbouring surfaces.

The tentacles are strongly retractile, that is, they can be contracted to a very small size towards their bases, and the margin of the column can be contracted so as completely to cover the tentacles and disc. When the animal is much irritated after the tentacles and disc have been retracted and covered by the column, the animal continues to contract and expel water from its interior until it becomes quite flat so that the walls of the column form a disc almost parallel to the base.

The principal peculiarities of the species consist in the number and arrangement of the tentacles. The primary tentacles, which as already mentioned are conspicuously distinguished from the rest by white bands enclosing their bases, are ten in number. These probably consist of two cycles of five, but there is nothing in the adult to indicate this. Having recognised these primary tentacles it is not difficult in the living animal to ascertain the arrangement of the other tentacles, in the space between any two of the primaries. It is found that in any specimen some of the intervals between two primaries possess a regular normal arrangement of other tentacles; this normal arrangement is seen in all the intervals on the right hand side in fig. 1. The normal arrangement consists in the successive subdivision of the space by tentacles, first into two halves, then into four parts, then into eight, then into sixteen. That is to say between the two primaries there is a tentacle of the second cycle with a pair of mesenteries corresponding to it; then on each side of this tentacle, *b*, there is a tentacle, *c*, of the third cycle, with a pair of mesenteries; then in the four spaces thus separated there

are four tentacles, *d*, of the fourth cycle each with a pair of mesenteries; and finally, there are eight tentacles, *e*, which have no mesenteries corresponding to them, but are between the pairs of mesenteries belonging to the other tentacles. Thus if this regular arrangement existed throughout the tentacular system the numbers would be 10, 10, 20, 40, 80, or 5, 5, 10, 20, 40, 80, in the successive cycles, and the total number would be 160. But in every specimen that I have examined the number and arrangement of the tentacles was abnormal in some of the spaces between the primaries. I have given diagrams showing the arrangement found in two specimens. In the specimen represented by fig. 1 the arrangement of the tentacles was normal in eight out of the ten spaces between the primaries. Two of the primaries opposite to each other can of course be distinguished as directives by their position opposite to the directive cesophageal grooves; and these two are further distinguished, as seen on dissection, by the fact that the muscles of their mesenteries are on the outer sides of the latter. In the diagram fig. 1, the two inter-primary spaces on the left of the upper directive tentacle have an abnormal number of tentacles. In each space there are two tentacles wanting; the deficiency is probably in the outer cycle (interseptal cycle). Thus the total number of tentacles in this specimen was 156 arranged thus: 10, 10, 20, 40, 76.

In the other specimen represented in fig. 2 the abnormality was much greater. Here only four of the spaces between the primaries possessed the normal number of tentacles. If we number the spaces from the upper directive tentacle round to the right, we find that in the first the arrangement is 1, 2, 3, 5; in the second 1, 2, 3, 7; the third is normal, 1, 2, 4, 8; in the fourth the arrangement is 1, 2, 3, 7; the fifth is normal; in the sixth the arrangement is 2, 3, 5, 9. Thus in this space there are four tentacles too many, the usual arrangement being altered from the beginning by the occurrence of two tentacles of the second cycle between the two primaries, instead of one. The seventh and eighth spaces are normal; in the ninth space the arrangement is 1, 2, 2, 4, a deficiency of six; in the tenth space the arrangement is 1, 2, 4, 6, a deficiency of two.

I have not examined the internal anatomy very minutely, but I have ascertained that in the existence of a very strong circular muscle, and in the large number of complete mesenteries this form agrees with *Tealia crassicornis*.

Synonymy.—It seems clear that this anemone is, on the one hand, not of the same species as *Tealia crassicornis*, and, on the other, that it is closely allied to that form. Gosse, as I have already mentioned, was inclined to consider Cocks' specimen as really belonging to *T. crassicornis*, and Andres, in his Monograph of the Actinæ,

therefore places the names *Actinia tuberculata*, Cocks, and *Tealia tuberculata*, Gosse, among the synonyms of *T. crassicornis*. This he was scarcely justified in doing, as he had never examined a specimen.

But Professor Haddon* has done something much more surprising. He places, with a note of interrogation, *Tealia tuberculata* (Cocks), Gosse, as a synonym of *Actinauge Richardi*, Marion. This species is one of the sub-family Chondractininae, of Sagartian Actiniæ; Sagartian Actiniæ, according to Haddon's definition, being those which possess acontia, while the Chondractininae are distinguished by emitting the acontia by the mouth only. All the Chondractininae have six primary mesenteries. It is thus sufficiently evident that *T. tuberculata* does not belong to the Chondractininae, and is not, therefore, identical with *Actinauge Richardi*. But it must also be pointed out that there are sufficient indications even in Cocks' original description and Gosse's remarks that Cocks' species was quite different from *Actinauge Richardi*. In the latter species, Haddon states that the pedal disc is usually bent round ventrally so as to form a cup shaped concavity which is filled with sand. Cocks states that his specimen was attached to a valve of *Pecten maximus*. In *A. Richardi* Haddon states that the tentacles of the inner cycles have a well-marked swelling at their bases, and thinks that a misinterpretation of this character was the cause of Cocks' description of some of the tentacles in his specimen as bifurcated or trifurcated. This certainly shows very little respect for Mr. Cocks' powers of observation, and it is to be hoped that Professor Haddon will receive better treatment at the hands of his successors. Mr. Cocks describes the tentacles of his specimens as obtuse, those of *Actinauge Richardi* taper towards the extremity. The diameter of the latter species is 3 cm., that of Cocks' specimen three and a half inches.

The classification of the Actiniæ is still very uncertain and unsatisfactory. Gosse's definition of the genus *Tealia*, which is practically adopted by Hertwig in his Challenger Report, applies to the species here under consideration in all respects but one,—the tubercles of the column in *T. tuberculata* are arranged in vertical rows, not irregularly scattered; but these rows are not so widely separated nor so distinctly marked as in Bunodes. Andres adopts Gosse's definition, with the addition of the clause: Tentacles in decimal cycles, not duodecimal. In this I agree with Andres. For the present, therefore, I think that we may define the genus *Tealia* as follows: Tentacles numerous, in decimal cycles, short, or of moderate length, very contractile; margin completely covering the disc in contraction; a fossa between the margin and the outer tentacles,

* *Revision of the British Actiniæ*, see Trans. Roy. Dub. Soc., vol. iv, ser. ii.

column closely beset with numerous large, adhesive warts, which are largest on the margin; base extending beyond the column, no acontia or cinclides; size large, diameter exceeding the height; numerous complete mesenteries, circular muscle very thick and strong.

Of this genus there seem to be three species known: *T. crassicornis* (Müller), distinguished provisionally by the number of tentacles, 5, 5, 10, 20, 40; *T. tuberculata* (Cocks), distinguished by the ideal number of tentacles—5, 5, 10, 20, 40, 80, and by the irregularity of the tentacles in number and in shape; *T. bunodiformis* (Hertwig), described in the Challenger Report. *Tealia digitata* has been removed from the genus; it is a Chondractinia, one of the Sagartian genera.

There is one other described species which requires consideration in connection with the Genus *Tealia*, namely, *Bolocera eques*, Gosse. It is certain, I think, that *Bolocera eques* does not belong to the genus *Bolocera*; its characters, as described by Gosse (British Sea Anemones and Corals, 1860), are quite inconsistent with Gosse's own definition of *Bolocera*. The specific characters are, tentacles wholly retractile, white, encircled with a red ring; in these respects the tentacles agree with those of the genus *Tealia*. Gosse's figure gives only a few scattered warts, but his description says the column is "studded on the upper two thirds with numerous minute warts increasing in number to the margin; these are either prominent or level at the pleasure of the animal, and they have the power of attaching fragments of entraneous matter, which, however, seems rarely exercised." All this applies perfectly to *Tealia tuberculata* (Cocks); all the rest of Gosse's description applies equally to *Tealia tuberculata*, except the formula of the tentacles, which is given as 6, 6, 12, 24, 48, 48 = 144. If the tentacles are really thus arranged of course the form must be distinct from *T. tuberculata*, but considering the peculiar irregularity of the tentacles in the latter species and the unusual equality of the two outer cycles in Gosse's formula, it is possible that he made an error in the enumeration. I have little doubt myself that *Bolocera eques* is a synonym of *Tealia tuberculata*, and until someone has identified a specimen of *Bolocera eques* I shall hold this opinion. No one has yet identified *Bolocera eques*, except Gosse himself, who only saw two specimens, one from twenty-eight fathoms off the mouth of the Tees, the other from Banff.

Tealia tuberculata occurs most commonly in this neighbourhood, in about thirty fathoms, to the west of the Eddystone; it is especially common on the shelly ground off the Dodman Point. It is frequently taken in the Cattewater, but it owes its presence there to the fact that the trawlers often carry their "scruff" to the Cattewater and throw it overboard after they have anchored.

Fig. 1.

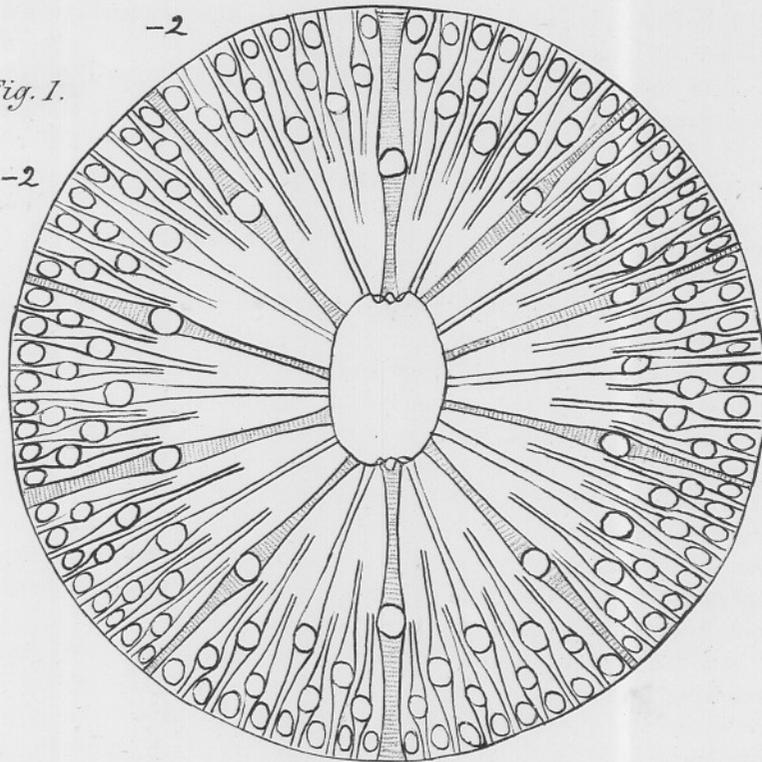
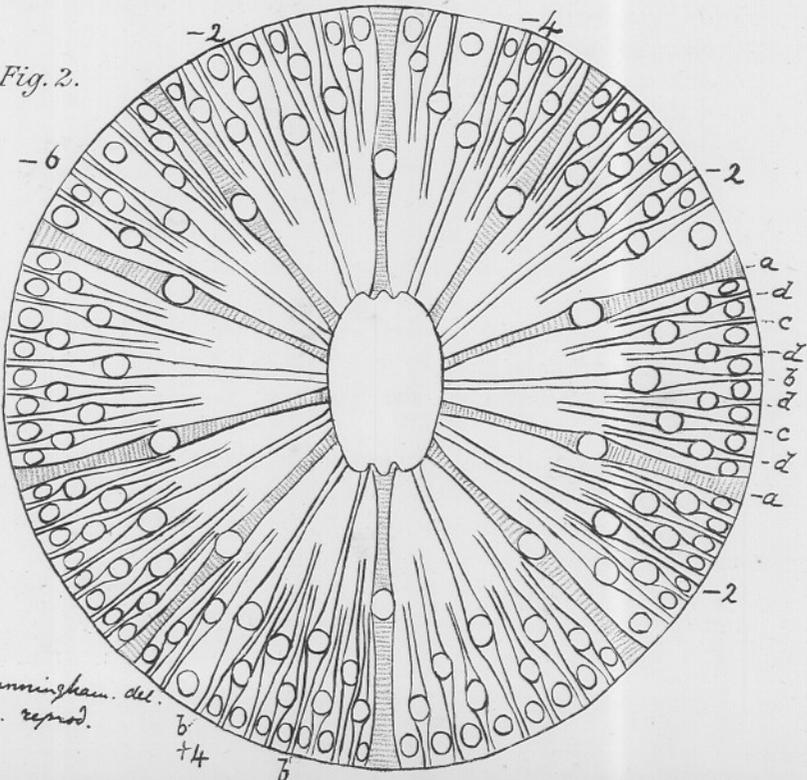


Fig. 2.



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E. C. B. reprod.