

A Note on *Balanophyllia regia*, the only Eupsammiid Coral in the British Fauna.

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With 2 Figures in the Text.

THE Eupsammiidæ are one of the most interesting families of the Madrepোরaria. They have an exceptionally wide range of distribution, being found alike in temperate and tropical seas. In the latter they were probably originally confined to deep water, where the majority of them still occur, but they have extended their vertical range (Yonge, 1930) and various species are now found on many of the coral reefs in the Indo-Pacific region. Thus *Dendrophyllia ramea* occurs in moderately deep water in the Mediterranean and has also been found in the English Channel off Roscoff (Lacaze-Duthiers, 1897), while other species of this genus are common near the surface on many of the Pacific coral reefs, the bright orange-coloured polyps of *Dendrophyllia manni* being, for example, very conspicuous on the fringing reefs at Kaneohe Bay on the Island of Oahu, Hawaii (Edmondson, 1929 ; Yonge, 1930).

It is characteristic of the Eupsammiidæ that they never possess zooxanthellæ, even when in association with true reef-building corals (Yonge and Nicholls, 1931 a) which always contain them. This fact was of great assistance in the course of work during the Great Barrier Reef Expedition on the significance of the relationship between corals and zooxanthellæ by providing a natural control to experiments on reef-building corals (Yonge and Nicholls, 1931 b ; Yonge, Yonge and Nicholls, 1932). The yellowish-green corpuscles which always occur in great numbers in the tissues of both *Dendrophyllia* and *Balanophyllia* are not algæ, as Boschma (1924) has suggested, but probably wandering cells containing masses of excrement.

Only one species of the Eupsammiidæ is contained in the British Fauna. This is *Balanophyllia regia*, a solitary cup coral, which was discovered by Gosse (1860) on the perpendicular sides of a rock pool at Ilfracombe on the north coast of Devonshire in 1852. Gosse called this "the scarlet and gold star-coral," and the specific name he gave it refers to "the royal

colours in which the animal is arrayed." This species was also found a little later by Charles Kingsley at Lundy Island. At Plymouth, as recorded in the Fauna List (1931), it was originally found by Mr. William Searle, the Laboratory collector, in May, 1906, on the vertical sides of a small cave at Sandway Cellar, Sandway Point, Cawsand. Specimens have frequently been obtained by him from the same locality since then, and a few were also found on the Renny Rocks in February, 1929.

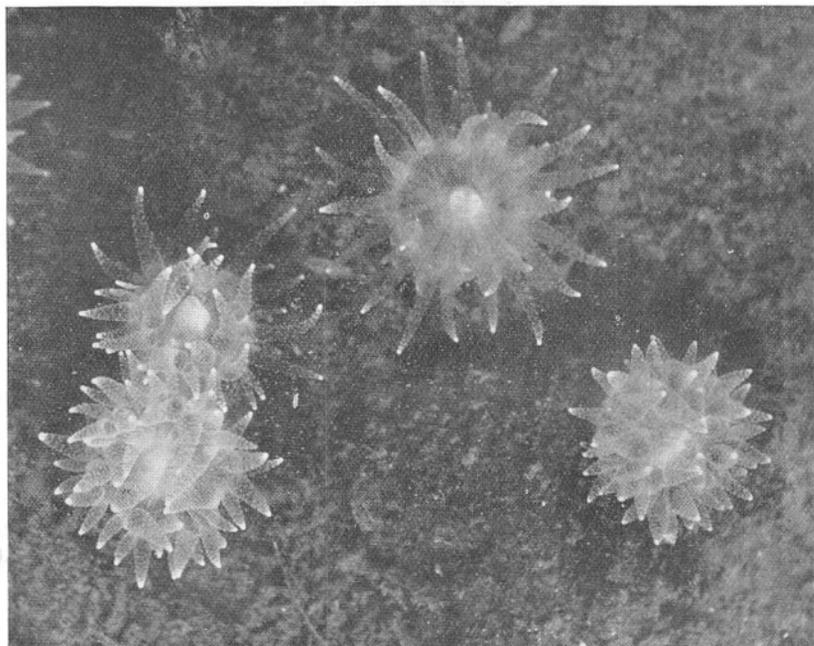


Photo. D. P. Wilson.

FIG. 1.—Group of four *Balanophyllia regia* in various stages of expansion. The fully expanded polyp shows the large mouth and oral disc and the tentacles with their slightly bulbous tips and opaque white spots. \times about 2.

Lacaze-Duthiers (1897), to whom we owe most of our knowledge on this species, found it both at Roscoff in the English Channel and at Banyuls in the Mediterranean. Like *Dendrophyllia*, the genus occurs also in the Pacific. *Balanophyllia bairdiana* was dredged by the Great Barrier Reef Expedition from a depth of 16 fathoms and was used, along with *Dendrophyllia*, as a check on experiments with reef-building corals. Boschma (1924) records the presence of a species of *Balanophyllia* on the lower surface of large colonies of reef-building corals in the Java Sea, while van der Horst (1922) records sixteen species taken by the Siboga Expedition at depths ranging from 9 to 580 metres.

Nine specimens of *Balanophyllia regia* were obtained for me from Cawsand by Mr. William Searle about the middle of March, 1930, so that I might compare their feeding reactions with those of *Dendrophyllia*. The observations made, which have been published elsewhere (Yonge, 1930), showed that, like *Dendrophyllia*, *Balanophyllia* has a relatively large mouth and oral cone, with two rows of tentacles which varied between 27 and 36 in number and have considerable powers of extension (see Figure 1). Large pieces of meat were readily seized by them and immediately swallowed. The ciliary currents were much weaker than those of reef-building corals (many of which live in regions where much silt is present) and carry material away from the disc and tentacles and are never concerned with food-collection as they are in certain reef-building corals. As noted by Lacaze-Duthiers, the tentacles when fully expanded are not conical and obtusely pointed as stated by Gosse, but long and slender with terminal knobs like *Caryophyllia*.

Balanophyllia regia lives for indefinite periods in captivity. The specimens collected in 1930 are still alive in the Laboratory after two years. On April 28th, 1930, four planulæ were found in the bottom of the bowl containing the corals. These were light orange in colour and pear-shaped with the mouth at the narrow end, and about 1 mm. long and 0.75 mm. wide at the broad end. They were about half the size and paler in colour than the planulæ of *Dendrophyllia manni* which I obtained in quantity at Honolulu, and which have been described by Edmondson (1929). The planulæ were transferred to a separate bowl and kept under observation. They settled at once to the bottom. The planulæ of *Dendrophyllia manni* swim near the surface for several days before sinking to the bottom. Since the planulæ of *Balanophyllia* were not actually observed at the time of extrusion by the adult it is impossible to say whether they have the same habits, but as the adults were kept under circulation it seems possible that the planulæ would have been carried away had they swum near the surface. This matter needs further investigation.

Although Edmondson reports that the planulæ of *Dendrophyllia* may take as long as thirty days to settle and metamorphose, one of the planulæ from *Balanophyllia* settled and fixed itself to the glass the day after it was obtained. The other three, though they remained alive for several days, failed to settle.

The young *Balanophyllia* was kept under observation and is still alive in the Laboratory after two years. Although the development of *Balanophyllia regia* has been described and figured by Lacaze-Duthiers, he does not record the actual time taken, and a short summary of my own observations may be of some value in extending and confirming his work.

The newly settled coral was round and very flat with a diameter of 1.2 mm. After one day the twelve mesenteries were plainly seen and also

the twelve tentacles which consisted of minute stumps. The diameter at the base was now about 2 mm. owing to the rapid spreading out of a thin, colourless layer around the periphery. When meat juice was given the mouth opened widely and the whole polyp expanded, the fragments being drawn in by the cilia lining the stomodæum without any assistance from the rudimentary tentacles. After two days the tentacles were appreciably larger and with greater powers of contraction away from the

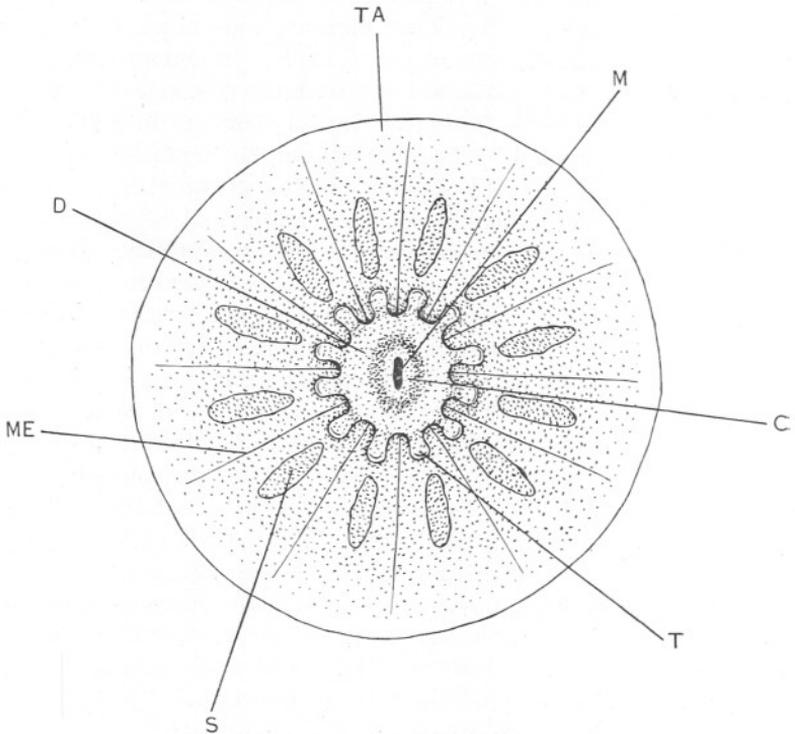


FIG. 2.—Appearance of young polyp, 26 days after fixation. $\times 34$. C., oral cone; D., disc; M., mouth; ME., mesentery; S., septum; T., tentacle; TA., transparent area round periphery of base.

mouth, a relatively large disc being thus exposed. After this development took the form of an increase in the length and power of the tentacles, the raising of the height of the polyp and the appearance of the twelve septa above the basal plate and between the mesenteries. At the end of sixteen days a piece of meat about one quarter the size of the polyp was swallowed with ease, the oral cone extending greatly and the column reaching a height equal to the diameter of the base which still remained about 2 mm. The tentacles were a little larger but still of little use. After twenty-six days the coral had the appearance shown in Figure 2. Meat was readily

swallowed when placed on the disc, and the elongating tentacles were now of definite assistance. The diameter of the base was 2.5 mm. and the twelve septa were very clearly seen.

At the end of 38 days the animal was in all respects a fully formed polyp. The tentacles could expand to over 1 mm. and were very transparent with the characteristic opaque spots upon them. They could seize and hold meat tenaciously. The diameter of the base was about 4 mm. and the outer ends of the septa were bifurcate. The coral was not examined again until it was nearly six months old, when it was found to have increased its diameter to 5 mm. and its tentacles from twelve to twenty-four. These now consisted of six large ones separated by groups of three smaller ones. Apart from the fact that it has increased its diameter to 6 mm. and that its tentacles can now extend to a length of 5 mm. and are all approximately of the same size, the coral remains in the same condition at the present time (Feb. 26th, 1932). It is possible that growth would have been quicker in the sea than in the circulating water in the Laboratory where food is not so abundant.

This note has been written to draw attention to a very interesting member of the British fauna and to the especial interest of the Eupsammiid corals, and also to emphasize the fact that there is at Plymouth not only an imperforate coral, *Caryophyllia Smithii*, but also a perforate coral, *Balanophyllia regia*, some knowledge of the breeding period of which has been obtained. In conclusion, I wish to thank Mr. D. P. Wilson for the beautiful photograph reproduced in Figure 1.

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