

## CORALS OF THE GENUS *FLABELLUM* FROM THE INDIAN OCEAN.

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(Plate XIII.)

Twenty years ago I received a number of specimens of Corals of the genus *Flabellum* from the Indian Museum, Calcutta. I compared them with specimens in the British Museum and in the Smithsonian Institute; Drs. Wayland Vaughan and Von Marenzeller as well as Dr. Alcock allowed me to consult with them as to the validity of the species. My report was drawn up, but the difficulties of the war and subsequent years delayed further action. I have now re-examined the collection and also the British Museum specimens, and I have to express my thanks to the late Professor Jeffrey Bell and to Captain Totton in respect to the latter.

The genus is almost cosmopolitan with its centre, as shown by variety of species and the numbers of specimens obtained, in the East Indies, especially in the Philippines. It occurs sparingly in the Atlantic, but Duchaissaing and Michelotti, Pourtalés and Vaughan do not mention it from the West Indies. So far as we can judge it is essentially a species of the higher land slopes, but several species are recorded down to 1,000 fms., 1,500 fms. being its present maximum depth. It has lived from the Eocene, in which there would appear to have been more species than to-day. There are plenty of varietal forms of each species, for their growth, as is that of all attached forms, is greatly influenced by the movements of the surrounding water and the consequent scouring, and by the rate of deposition of deposits. The outer wall is an epitheca, not covered by tissue, and it may be dissolved or abraded away by water movements, or rasped off by sea urchins and other organisms; the consequent reaction is seen in that the polyp deposits fresh corallum between the septal ends against this destruction, and the whole calicle becomes relatively dense and heavy. This pathological condition often results in seeming costae, whereas true costae cannot exist with an epithecate wall. These false costae are sometimes the now free outer edges of the septa, but as frequently this is reversed and the secondary corallum forms a convexity or ridge between the septa, the destruction of which has gone deeper.

Modern investigators have tended to restrict severely the number of species. They demand a suite of specimens, and they base their views on various measurements and on their correlation with each other and with counts of the septa of various sizes and the numbers of the same joined by trabeculae in a columella. These are all very well, but it has to be recognised that any character, such as teeth on the septal edges or even so minute as spines on the growth lines of the septa is sufficient if constant. However, marked septal teeth are

unusual in the genus and such of the latter characters, as are visible without sections of the septa, are so fluctuating that they must be assumed to be correlated with environment. Furthermore, the polyps of many forms of *F. rubrum* (or possibly of several species of this type of growth) exhibit practically no variation either in their gross anatomy or in their minute histology. In this connection the opinions of Vaughan are of especial value, for he has studied the range of both living and fossil species, and I am in essential agreement.

The method of reproduction of *Flabellum* is by internal fertilisation and the extrusion of planulae. The young coral is always attached by a narrow base, but the very old coral is nearly always freed either by breaking away or by the solution or destruction of its base of attachment. In some cases, especially of the *rubrum*-type of growth, there is a distinct scar left in which the septa are clearly visible though their interspaces are usually filled by secondary corallum. This suggests "multiplying asexually by transverse division from a fixed nurse stock" and a comparison with the method of reproduction of *Fungia*. It is difficult to imagine a withdrawal of the tissues in this rupture, the calicoblastic ectoderm being so closely attached to the corallum, but as any part of the polyp, if broken into, can form a cup, which will grow up into a fresh corallum, it seems reasonable to suppose that such a sexual reproduction can take place. Furthermore, I have examined specimens, evidently very recently detached and without corallum between the septa of the scar, the tissues of which showed rupture. Yet, in over 1,000 specimens examined, I have found no calicle that I can suggest to have been so formed from "a fixed nurse stock," and I can only ask future collectors to look out for such. In this connection I may mention that in a suite of 6 specimens of *Blastotrochus nutrix* Ed. and H. in the British Museum, so identified by Bruggemann, I discovered that most show traces of splitting or imperfect formation of corallum with bud formation at the sharp lateral edges of their flattened calicles. I suggest that the polyps of this genus—and also of *Rhizotrochus*—must be properly examined before its proposed absorption into *Flabellum*, based on corallum alone, can be accepted.

Most of Milne Edwards and Haime's species of *Flabellum* fall under two types of growth represented by the species *rubrum* Q. & G. and *pavoninum* Lesson. A third type is represented by *F. japonicum* Moseley, *F. alabastrum* Moseley and *F. deludens* von Marenzeller and yet a fourth by *F. curvatum* Moseley and *F. multifore* Gardiner. All are represented in Indian Seas.

### **Flabellum pavoninum** Lesson.

(For literature and synonymy see Gardiner, *Marine Invest. in S. Africa*, II, p. 123, 1902; Vaughan, *Bull. U. S. Nat. Mus.*, LIX, p. 49, pl. i-iii; and Faustino, *Monograph Bureau of Science, Manila*, XXII, p. 43, 1927.)

I have seen a large number of specimens of this species including those in the U. S. National Museum which Vaughan described. I accept Vaughan's synonymy, but I do not agree that the species "can best be handled" by recognising varietal forms. I do not think they represent any elements in heredity, basing my views on my failure

to find any distinctions in the gross anatomy (polyp and corallum) of three of these "varieties" after my return from Washington in 1909.<sup>1</sup> I consider all to be growth-forms produced by environment, the chief variations of importance in which I deem to be (1) sedimentation, (2) food, (3) water movements and (4) depth and temperature, in this order—and I think that the localities from which specimens have been obtained supports this conclusion.

Yet, it is necessary to recognise that this may be an error and that we are dealing with several species overlapping in the appearances of their calices, distinguishable only by their polyp characters. This remark applies particularly to the typical form, var. *distinctum* Ed. and H., and var. *paripavoninum* Alcock, which are mainly separable by the angles of divergence of the lateral ends of their compressed coralla. The original type of Alcock's *paripavoninum* (*Madreporaria of the Investigator*, p. 21, pl. ii, fig. 3, 1898) is interesting in that it is a specimen which has been broken off its pedicle, in the scar 24 septa being distinguishable of which half meet in a pseudo-columella.<sup>2</sup> My doubt lies in the fact that Vaughan had a considerable suite of specimens of all three from the Hawaiian Island and Laysan, and Faustino of the first and last from the Philippines, apparently with very few intermediates. The special localities given show a wide range of depth and hence temperature, and in consequence the angles of the lateral edges of the *pavoninum* forms could only be correlated with sedimentation in respect to which we have no information.

*Localities* : (a) ZEV  $\frac{165}{7}$ , Sta. 239, 11° 49' 30" N., 92° 55' E., 55 fms., 9 specimens, 5 damaged, all rather dark coloured, bluish, shiny, shapes transitional between Vaughan's typical form up to his form *distinctum* (*loc. cit.*, pl. ii, figs. 3-5), size about the same : (b)  $\frac{3268}{9}$ , 6° 1' N., 81° 16' E., 34 fms., a single dead specimen, recently broken off its pedicle, with some *Lithothamnium* growing on its outsides, colourless corallum, near *distinctum*-form : (c) ZEV  $\frac{1887}{7}$ , Sta. 237, 13° 17' N., 93° 7' E., 90 fms., one specimen, dead, calice 31 mm. long by 19 mm. high, transition type to *distinctum*-form ; (d) ZEV  $\frac{774-7}{7}$ , Sta. 246, 11° 14' 30" N., 74° 57' 15" E., a single specimen, dead, calice 25 mm. long by 21 mm. high, shape towards *latum*-form : (e) ZEV  $\frac{5322}{7}$ , Andamans, 53 fms., a single living specimen of dark colour, calice 26 mm. long by 28 mm. high, very low arch to calicular margin, fairly compressed, slight wings on lower part, rather constricted just below calicular opening, a pathological specimen of *distinctum*-type : (f) ZEV  $\frac{5324}{4}$ , Sta. 389, 9° 1' 50" N., 75° 55' 50" E., 81 fms., 2 specimens—no. 1, dead, colour dark, calice 44 mm. long, 24 mm. wide, edge slightly ingrowing above, arch considerable, 24 mm. high, broken off from pedicle, scar 8 by 5 mm., whole corallum heavy and close to original *paripavoninum*-form ;—no. 2, also dead but cleaner, colourless, calice 42 mm. long, 23 mm. wide, rounded ends and no trace of wings, arch low, 42 mm. high, whole corallum very coarse,

<sup>1</sup> The polyps were examined by sections ; they were sufficient up to the point where histological study commences.

<sup>2</sup> There is an excellent specimen close to Vaughan's var *latum* Studer in the Cambridge Museum with a similar but much larger scar.

especially columella, considerably eaten into at base between the septa with extra deposition of corallum inside, comparable to Vaughan's pl. ii, fig. 1: (*g*) ZEV  $\frac{1250-1}{7}$ , Sta. 277, 5° 48' 15" N., 80° 56' E., 859-880 fms., alive when obtained but broken in dredge, remarkably similar to last but a rather smaller specimen.

To the above localities must be added Alcock's *paripavoninum*-form ("Investigator" *Deep Sea Madreporaria*, p. 21, pl. ii, figs. 3, *a*, *b*, 1898), a dead specimen off Pedro Bank, Laccadive Sea, 636 fms., admirably figured, scar 7 × 5 mm., not looking like an "accident" but rather a cutting off as in *Flabellum rubrum*, this remark also applying to (*f*, no. 1) above.

The "Sealark" collections contain specimens from Saya de Malha: C 4, 125 fms., 3; C 5, 125 fms., one much overgrown by "oysters"; C 6, 145 fms., 5 specimens, one broken off its attachment and showing in scar 24 septa joining in a columella. They approximate in size to the smaller S. African forms. All were dead, apparently recently killed, and white. Their septal edges are pleated and sides spiny. They belong either to Vaughan's *distinctum*-form or are intermediate between this and the typical. They come off a smooth sandy (glob. ooze) bottom.

The specimens described by Marenzeller as *Flabellum stabile* from Cape Verde Islands, 1694 metres (*Steinkorallen, Valdivia Exped.*, p. 273, pl. xvii, fig. 12, 1904) are certainly not widely separated from specimens (*f*, no. 2) and (*g*) above as well as from Vaughan's pathological specimen (pl. ii, fig. 1). I can find no evidence that Marenzeller has examined any considerable suite of *pavoninum* and I am disposed to think that his *F. stabile* as well as his *F. chunii* are synonyms of *F. pavoninum*.

*F. campanulatum* Holdsworth (*Proc. Zool. Soc.*, 1862, p. 198) from the Philippines may belong here, but the type specimens are not in the Museum of the Royal College of Surgeons, nor are there labelled specimens in the British Museum. Faustino suggested a re-examination, but, in the absence of types and of sufficient description, the species had better disappear from literature. I suggest the same course in respect to *F. nobile* Holdsworth as founded on dead material through the specimens still exist in the College.

### **Flabellum multifore** Gardiner.

Gardiner, *Fauna Geogr. Maldives and Laccadives*, p. 954, pl. xciii, figs. 28 and 29, 1905; Faustino, *Monograph Bureau of Science, Manila*, XXII, p. 57, 1927.

In addition to my suite of specimens from the Maldives, 24-28 fms., the "Sealark" obtained 1 specimen from Seychelles, F 7, 34 fms. When alive the polyp was green standing up on the corallum for over 2 cm. The calicle was 53 × 17 mm., rather pinched in the central part, vertical height at sides 34 mm. and at ends 15 mm. above its attachment, growth rings 6, septa 180, one stomodoeum. It is of rather less coarse growth than the Maldivian specimens.

Faustino had a suite of 15 specimens from the Philippines from 97 fms. His largest specimen is about the size of my largest specimen and is stated to have over 800 septa, whereas mine has only 302; surely a clerical error in the doubling of his numbers has crept in.

There are three well figured "Challenger" specimens of *F. curvatum* Moseley from the Rio de la Plata region, 600 fms.; they clearly belong to the same species group of the genus.

### **Flabellum deludens** Marenzeller.

*F. laciniatum*, Alcock, "Investigator" *Deep Sea Madreporaria*, p. 21, pl. ii, fig. 4, a, 1898.

*F. deludens*, Marenzeller, *Steinkorallen "Valdivia" Exped.*, p. 269, pl. xvii, fig. 10, 1904.

*F. deludens*, Vaughan, *Bull. U. S. Nat. Mus.*, LIX, p. 63, pl. iii, figs. 5, a-b, 1907.

The specific name *laciniatum* should disappear from literature as the material on which the species was founded by Philippi was too fragmentary for positive identification. I have compared the specimens with the British Museum specimens of *F. alabastrum* Moseley and I agree with Vaughan as to the distinctness of this species. The shapes of the coralla looked at from the side vary in a parallel way to Vaughan's *pavoninum*-form from *lamellulosum* through the typical to the *distinctum*-form. They have a tendency to be widely open in their transverse diameter, looking into the calices, but their ends are sharp.

*Localities.*—(a) ZEV  $\frac{1431}{7}$ , Sta. 280, 11° 29' 45" N., 80° 2' 30" E., 446 fms., two dark coloured specimens, largest length of calice 44 mm., breadth 34 mm., height 34 mm. : (b) ZEV  $\frac{5334}{7}$ , Sta. 392, 8° 43' 30" N., 76° E., 400 fms., two rather smaller and very delicate white specimens, apparently living when obtained : (c) spirit specimen ZEV  $\frac{2105}{7}$ , Sta. 322, 11° 26' 30" N., 92° 53' 45" E., 378 fms., a young specimen.

Alcock calls this species "a common inhabitant" of Indian Seas at 400—600 fms. The "Sealark" obtained two specimens from Saya de Malha : C 20, 300-500 fms., and C 4, 125 fms. The first specimen is 24 mm. along the base and the wings extend below the pedicle ; the height is 34 mm. In the species it occupies about the same position as the *lamellulosum*-form in *F. pavoninum*.

Other records are west of Sumatra, 614 and 660 metres (Marenzeller), Hawaii, 670-900 fms. (Vaughan). Faustino had a suite of specimens from 24 stations near the Philippines, 19 to 502 fms. ; he is evidently doubtful whether the species is not a synonym of *japonicum* Moseley which is not naturally a compressed species with sharp angles as this species almost universally is, in at least the young forms. I also found an unnamed specimen from Japan in the British Museum.

In the British Museum I have seen certain specimens labelled *F. laciniatum* reputed to be those of Duncan (*Trans. Zool. Soc.*, VIII, p. 322, 1873) ; they are not this species, which so far has not been found in the Atlantic.

*F. alabastrum* Moseley = *F. goodei* Verrill would seem to be related here, but it has not been obtained from Indian Seas. Vaughan mentions a suite of 170 specimens in the U. S. National Museum some of which I have seen. Young forms might be confused, but mature forms do not intergrade.<sup>1</sup>

<sup>1</sup> See also Vaughan, *Bull. U. S. Nat. Mus.*, LIX, p. 64, 1907.

**Flabellum japonicum** Moseley.

(Plate XIV, figs 1—6.)

*Flabellum japonicum*, Moseley, *Deep-Sea Madreporaria* ('Challenger'), p. 168, pl. vii, fig. 3, a, 1881; Wood-Mason & Alcock, *Ann. Mag. Nat. Hist.* (6) VIII, p. 449, 1891; Alcock, "Investigator" *Deep-Sea Madreporaria*, p. 23, 1898, and 'Siboga' *Exped.*, p. 32, 1902.

*Flabellum angulare*, Moseley, *Deep-Sea Madreporaria* ('Challenger'), p. 164, pl. vi, fig. 2, a, b; *F. apertum*, Moseley, *l. c.*, p. 167, pl. vi, fig. 7, a, c.; *F. conuis*, Moseley, *l. c.*, p. 165, pl. vii, fig. 6, a, b, 1881.

The 8 'Challenger' specimens of Moseley's *F. apertum* were all dead when obtained and partially decomposed, perhaps with extra lime deposits from the surrounding water on the corallium, giving a peculiar opaque appearance. The 'Challenger' figure on p. 168 is  $1\frac{1}{2}$  times natural size, and is the largest specimen of station 145. All the drawings are accurate in respect to numbers of septa but bad. The specimens from station 3 are negligible being too much decomposed for identification. They are clearly referable to *japonicum*, the very delicate septa of cycle V having usually been destroyed in most systems.

There is no doubt that the younger specimens under consideration are indistinguishable from the single form described by Moseley as *F. angulare* as direct comparison showed them to be similar in all respects but hexamerous instead of pentamerous.

The single 'Challenger' specimen of Moseley's *conuis* is alike in all respects to similarly fast-grown specimens of *japonicum* of about the same size such as (d) mentioned below. The latter is rather more open, viz., less conical, than the type and it has the same 4 cycles of septa. There are indications of wrinkling in the septal sides of this and many forms but in no case so marked as in Moseley's specimens; this character becomes progressively less marked with the thickening of septa which takes place as the growth attains its maximum.

The present specimens might be described under any of the above names, but they are still more clearly referable to *japonicum* of which there are a series of forms with a correct figure and a good description. I should not term the types wedge-shaped and the description of an "opaque white epitheca etc.," is incorrect, the appearance described being due to the decay of the epitheca, which stands up as a "glistening and polished" wall above. Only 4 of the supposed 8 'Challenger' specimens could be found (1929). I note a few points of difference from the suite of specimens before me:—

- (a) The transverse section of the corallium of any level varies from round to oval and nowhere can be termed "wedge-shaped."
- (b) The septal ridges, so-called 'costae' of Moseley, are not well-marked in the "Challenger" specimens that I have seen, though they are clearly shown in the figured specimen; the present specimens generally, if undamaged externally, have 12 marked ridges essentially similar to those shown in the figure.
- (c) Most of the present specimens are not much corroded, but two have lost nearly all their ribs, for the corrosion particularly takes place outside, on the lines where the septa run into

the epitheca, in some cases the septal ridges being even replaced by grooves.

- (d) The centre of the corallum is filled in to a very varying degree in different specimens by false columellar corallum, varying from fused thickenings of septal sides and ends to masses of anastomosing trabeculae of varying coarseness. The adjective "fascicular" used by Moseley can scarcely be applied even to the 'Challenger' specimens.
- (e) The present specimens in spirit showed tentacles over all the septa, but in only one specimen can all the tentacles over each cycle of septa be recognised. Usually the tentacles over the septa of cycle V are most clearly seen, being most external and the last to contract, and then progressively those over cycles IV, III, II and I. Each tentacle ends in a white knob.

In all other respects the present specimens agree with Moseley's type, and of the above points (a—d) are of little specific importance, being easily explicable. The difference noted under (e) may be due to different methods of preservation being employed but Moseley's fig. 12 on pl. xvi is a bad diagram.

The type of *F. conuis* Moseley has likewise 4 cycles of septa.

*Localities.*—(a) ZEV  $\frac{5335}{7}$ , Sta. 242, 17° 27' N., 71° 41' E., 56-58 fms., one specimen, measuring length  $\times$  breadth of calice, 60  $\times$  46 mm.,  $\times$  vertical height of corallum,  $\times$  53 mm., outside considerably corroded and no marked septal ridges, no columellar tissue; (b) ZEV  $\frac{2162}{7}$ , Sta. 321, 5° 4' 8.5" N., 80° 22' E., 660 fms., one, 51  $\times$  37  $\times$  29 mm., rather a wide open form, little corroded, septal ridges well marked, thick anastomosing trabeculae from septal edges forming a conspicuous false columella; (c) ZEV  $\frac{1238-45}{7}$ , Sta. 275, 8° 27' N., 75° 35' E., 771-731 fms., 6 specimens measuring 52  $\times$  42  $\times$  32 mm., 43  $\times$  33  $\times$  30 mm., 31  $\times$  28  $\times$  15 mm.; 24  $\times$  23  $\times$  13 mm., 29  $\times$  26  $\times$  17 mm., and 26  $\times$  23  $\times$  15 mm., all with septal ridges, smaller specimens four cycles of septa and shape approaching *F. apertum* Moseley in side view—last two specimens dead when obtained, corallum opaque and appearing thickened, giving a still closer resemblance to the same species—columella various, first specimen merely thickened edges of septa fused; (d) ZEV  $\frac{772}{7}$ , Sta. 256, 7° 58' N., 79° 23' E., 937 fms., one, 35  $\times$  31  $\times$  22 mm., general resemblance to *F. conuis* Moseley in all respects except that it is lower and therefore appears more open; (e) ZEV  $\frac{1248-9}{7}$ , Sta. 273, 12° 47' N., 73° 44' 45" E., 870-823 fms., two, 47  $\times$  40  $\times$  35 and 17  $\times$  13  $\times$  14 mm., larger specimen much corroded as (a) above and no septal ridges, smaller specimen showing a tentacle over each septum; (f) ZEV  $\frac{1751-5}{7}$ , Sta. 306, 9° 20' N., 75° 24' E., 930 fms., five, measuring 37  $\times$  30  $\times$  25 mm., 25  $\times$  21  $\times$  16 mm., 17  $\times$  12  $\times$  10 mm., 18  $\times$  17  $\times$  9 mm., and 18  $\times$  15  $\times$  7 mm., last two specimens showing septal cycles I and II markedly distinct; (g) ZEV  $\frac{1757-60}{7}$ , Sta. 307, 7° 28' 30" N., 76° 26' 30" E., 888 fms., four, 41  $\times$  35  $\times$  27 mm., 36  $\times$  31  $\times$  22 mm., 33  $\times$  27  $\times$  25 mm., and 22  $\times$  23  $\times$  22 mm.,

The depth range of the species is from 56 to 1250 fms., the latter *F. angulare* Moseley, 'Challenger' specimen. This latter is the only certain record from the Atlantic, having been obtained off Nova Scotia. The species appears to be common in Indian Seas and probably ranges widely in the Indian and W. Pacific Oceans.

*Note on a polyp*:—The smallest specimen from (g) above was cut into sections. It had 12 large septa (cycles I and II), trabeculae from which shared in the formation of the columella, and 12 further conspicuously thick and broad septa (cycle III); there were only traces in low ridges of septa cycle IV. The two pairs of directive mesenteries are well marked and the first 24 septa are all entocoelic; as yet there is no formation of any further mesenteries, but these may form subsequently as the sections reveal the fact that the 12 septa of the second size are visible in the sections below their bounding mesenteries. I think all these mesenteries reach the stomodaeum. There are tentacles over all the septa, but those over the first 12 septa are so tightly pulled down as to be only recognisable by their batteries of nematocysts. The tentacles over the next 12 septa are partially invaginated and there are indications in nematocyst batteries of a further cycle of tentacles. The stomodaeum is so pulled out that it is difficult to see where the peristome merges into the stomodaeum and the latter into the filaments, all three parts having the same histological elements. The mesenterial filaments have fewer nematocysts than usual and their lower ends are not free or extrusible as acontia. There is indication of a good miscellaneous diet, as seen by sponge and other spicules and chitin remains. Ova occur very low down in a few of the primary mesenteries, and there are a few free eggs and planulae in the coelenteron.

Allied to this species is Moseley's 'Challenger' *F. patagonicum* which has not since been recorded. Few of the type-specimens are larger than the smallest of the present series of *japonicum*; their growth is more cup-like. The edges all show some scalloping between the tops of the septa. Four cycles of septa is a definite character and at present must be so regarded and not a size matter. More important is the tooth-ing of the septal edges especially where they fall to the columella. The ridges and granules on the septal sides are much more marked than in *F. japonicum*. At present the species must be regarded as good, but may conceivably prove to be a growth-form of *F. japonicum*.

### **Flabellum rubrum** Q. et G.

*F. rubrum*, Gardiner, *Marine Investigations S. Africa*, II, pp. 125-52, pls. i-iv, 1902; Harrison & Poole, *Proc. Zool. Soc.*, 1909, p. 899.

For *F. stokesi*, Ed. et H., *vide* Gardiner, *l. c.*, p. 131; also Alcock, *Journ. As. Soc. Bengal*, LXII, p. 138, 1893.

*F. crassum et rubrum*, Bourne, *Report Pearl Oyster Fisheries, Ceylon*, pp. 196-200, 1905.

I don't think there is any use in my dealing with Bourne's attack on, and misrepresentation of, the methods adopted in my paper cited above; Bourne dealt with 5 specimens only, while I had actually examined over 700 specimens which he could have examined. I hesitated to regard *stokesi* as a synonym of *rubrum*, and the collection before me



is not sufficiently large to cause me to alter my position, although I could not find any differences in the polyps of the two "species."

In 1898, in 1901 and again in the present year I examined the British Museum collection which contains 41 items, 120 specimens, of the growth-form of *rubrum*—*stokesi*. Bruggemann identified these with the species *stokesi* E. & H., *rubrum* Q. & G., *elongatum* E. & H., *spheniscus* Dana, *aculeatum* E. & H., *debile* E. & H., *crassum* E. & H., *bairdi* E. & H., *profundum* E. & H., *crenulatum* E. & H., *candeanum* E. & H., *spinosum* E. & H., *elegans* E. & H., while he evidently intended to describe six new species to which he gave the names *amethystinum* (whole corallum of a beautiful strong amethyst colour), *lewisi*, *ayleni*, *belcheri*, *laeviusculum* and *angustum*. Among the specimens are forms from New Zealand whence came the original types of Quoy and Gaimard. Seven of the above "species" were represented in Capt. Sir Edward Belcher's collection from Malacca. Apparently Bruggemann considered *affine* E. & H. = *spheniscus* Dana as he labelled some of the latter "types of *F. affine*," "types" being used as meaning typical. I do not agree with Bruggemann's views as indicated above, but I have pleasure in recording them as they are always worthy of careful consideration.<sup>1</sup>

Of the British Museum specimens 26 coralla in form approach *stokesi*, 66 *rubrum* and 15 are doubtful; 13 young or attached forms are omitted. The present collection contains 20 specimens from 7 localities. Of these most approach *stokesi* in mode of growth, wings or processes from side of corallum, size of scar, etc. Superficially, they can be roughly divided between *rubrum* and *stokesi*, but the more carefully they are examined the more difficult the division becomes. I have searched for and cannot find differences in the characters Bourne suggests (*loc. cit.*, p. 200) and I have to confess my inability to differentiate between the two forms.

#### Localities.

Mark.	Station.	Position.	Depth.	No.	
774-7 ZEV— 7	246	Lat. N. 11° 14' 30". Long. E. 74° 57' 15".	68—148 fms.	4	<i>rubrum</i> .
3268 — 9	not given	Lat. N. 6° 1'. Long. E. 81° 16'.	34 fms.	9	"
5327-8 ZEV— 7	387	Lat. N. 15° 25'. Long. E. 93° 45'.	40—49 fms.	2	v. <i>stokesi</i> .
1636 ZEV— 7	291	Lat. N. 26° 22'. Long. E. 56° 10'.	49—48 fms.	2	"
8793 — 6	not given	Andamans.	not given		
5344 ZEV— 7	not given	2mi., N. Gt. W. Tares.	40 fms.	1	"
5895 ZEV— 7	not given	Snod I., Andamans.	not given	1	"

<sup>1</sup> I am indebted to the late Professor Jeffrey Bell, who in 1901 kindly worked out for me the authorship of the names and labels of these specimens in the British Museum.

The species is evidently of wide distribution throughout the Indian and W Pacific Oceans. No certain specimen has as yet been recorded from the Atlantic. Its depth range is 0—100 fms. I obtained specimens from the Maldives, but none from the island groups between this archipelago and Madagascar; I can find no record from any locality distant from continental areas.