No. VII.—THE HYDROIDS FROM THE CHAGOS, SEYCHELLES AND OTHER ISLANDS AND FROM THE COASTS OF BRITISH EAST AFRICA AND ZANZIBAR.

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(Communicated by Professor J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

(With Plates **24—26** and Text-Figures 1—6.)

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The two collections of Hydroids which form the subject of this report were received by Dr H. W. Marett Tims, M.A., M.D., from Professor J. Stanley Gardiner. Dr Tims however was only able to identify a few of the Sertularian forms (those initialled H.W.M.T. in the text below) before volunteering for military service and during his absence I was able to complete the report.

The specimens from British East Africa and Zanzibar were collected by Mr Cyril Crossland. I wish to express my indebtedness to Professor J. Stanley Gardiner for the original loan of the collections, to Dr Tims for handing over the material to me, and to Dr R. Kirkpatrick for his valuable help during the course of the investigations.

The combined collections form a large amount of material, obtained from a wide area, namely, from Pemba Island eastward to Chagos and southward to Mauritius, at depths down to one hundred and fifty fathoms. As found by previous investigators in collections from the more southern parts of this coast of Africa and from Madagascar, the majority of the species belong to the suborder Calyptoblastea. Billard, in material from Madagascar, records one Gymnoblast, *Eudendrium capillare*, in an entire collection of thirty-three species; Warren, in a collection from Natal, finds ten Gymnoblasts out of a total of thirty-five, while in the present collections twelve have been identified out of eighty-six species.

The identification of certain forms has frequently been very perplexing. In the case of some genera, e.g. *Sertularia*, the number of species already described is large, but the characters upon which new species have been established are often so slight and so variable that one cannot avoid the conclusion that many of the so-called species are either local or bathymetric variations. The number of species regarded in this report as new to science is relatively small. In cases where differences have appeared to be slight, specimens have been placed under that well-established species to which they seem most closely related, giving the points in which they differ from the type. Many of these differences may doubtless be attributed to the varying depths at which the specimens were living and to the influence of currents, for it is certain that these factors have a marked effect on the mode of growth of colonies. The value of measurements is probably over-estimated, since they like other minor factors tend to vary. The measurements given in this report are intended to serve as guides to the dimensions of the various forms in the definite localities, and need not necessarily apply to specimens from other localities. Through the kindness of Dr R. Kirkpatrick opportunity has been afforded for the examination of numerous type

specimens in the British Museum collections. This has greatly facilitated the work of specific identification in many instances.

The collections taken as a whole are representative in character, comprising forms from all the large families of the Hydroida, and ranging from minute epizoic species to large flourishing colonies, such as *Aglaophenia cupressina*, which reach a height of 25 cms. No new generic form has been discovered, but a number of new and interesting species, especially of Plumularians, are described.

The following eight species have also been recorded by Billard from Madagascar: *Hebella calcarata, Campanularia corrugata, Thyroscyphus vitiensis, Thuiaria lata, Th. interrupta, Idia pristis, Halicornaria ferlusi* (variety) and *Lytocarpus philippinus.*

Comparing with the records from Natal, it is found that six species are common to the two localities: *Sertularella tumida, Sertularia loculosa, S. linealis, Thuiaria tubuliformis, Antenella secundaria* (*A. natalensis*) and *Thyroscyphus æqualis.*

Twenty-five species occur in the Indo-Malayan region: *Corydendrium sessile, Pennaria disticha, Ectopleura pacifica, Eudendrium attenuatum, Hebella crateroides, H. calcarata, Thyroscyphus vitiensis, Campanularia corrugata, C. serrulatella, Gonothyrea longicyatha, Sertularia tenuis, S. turbinata, Diphasia digitalis, D. mutulata, Idia pristis, Synthecium tubiger, Plumularia spiralis, P. alternata, Antenella secundaria, Aglaophenia cupressina, Thecocarpus brevirostris, Lytocarpus hornelli, L. philippinus, L. singularis* and *L. phœniceus.*

Common to the present collections and the Australian fauna are 23 species: *Pennaria disticha, Eudendrium attenuatum, E. generalis, Perisiphonia exserta, Cryptolaria crassicaulis* var. *dimorpha, Hebella calcarata, Campanularia serrulatella, Sertularia brevicyathus, S. loculosa, S. marginata, S. tenuis, S. turbinata, Sertularella tumida, Diphasia digitalis, D. mutulata, Idia pristis, Thuiaria interrupta, Synthecium subventricosum, S. patulum, Antenella secundaria, Aglaophenia cupressina, Lytocarpus philippinus, L. phœniceus.*

The local distribution of the following additional species has been increased: *Eudendrium cochleatum, E. exiguum, Cryptolaria conferta, Campanularia cheloniæ, Sertularia cornicina, S. heterodonta, Sertularella conica, Synthecium reteum, Plumularia alternata, P. corrugata* and *Thecocarpus mammillatus.*

The species regarded as new include several very interesting forms. Among these are: *Halecium gardineri*, provided with sarcothecæ; *Sertularella thecocarpa*, in which the gonotheca arises from the lumen of the hydrotheca; *Synthecium dentigerum*, in which the wall of the hydrotheca is thickened to give a large inwardly-directed tooth; *Plumularia providentia*, bearing pinnæ on one side of the stem only; *P. multithecata*; *Cladocarpus alatus*, with extremely large lateral sarcothecæ applied to the margin of the hydrotheca; and (?) *C. plumularioides*, with an additional mesial sarcotheca on the internode above the hydrotheca.

The phenomenon of stolonisation has been observed in several instances. The ends of branches, occasionally of stems, may be produced in stolons; this occurs in *Sertularia loculosa, S. turbinata, S. marginata, Lytocarpus philippinus* and *Thecocarpus laxus.* In the first two, the stolons end in adhesive discs, similar to those figured by Thornely in

Sertularia lingulata. In *L. philippinus*, the stolons are simple, straight extensions of the pinnæ. In *S. marginata* a stem bearing hydrothecæ is given off from the stolon at some distance from the point of origin of the latter. The branch may in this case represent the beginning of a new colony, the stolon thus being propagative in function, while in the forms previously mentioned the function is probably that of fixation only. In *Synthecium dentigerum*, a stolon arises from the lumen of a hydrotheca.

The classification adopted is that of Hincks. The term sarcotheca has been used throughout to mean the cup into which the defensive zooids are retractile and the term sarcostyle to mean the soft tissues within the cup. This nomenclature is in accordance with the terms used for the larger cups and nutritive zooids, viz. hydrotheca and hydranth.

GYMNOBLASTEA.

1. *Eudendrium attenuatum* Allman, 1877. (3.)

Amirante, 36 and 39 fms.

2. *Eudendrium cochleatum* Allman, 1877. (3.)

Farquhar Atoll, off shells. Fragmentary colonies without cœnosarc and overgrown by a Campanularian are doubtfully referred to this species.

3. *Eudendrium exiguum* Allman, 1871. (3.)

Providence, 29, 50—78 and 50 fms. The colonies reach a height of 2 cms., are delicate, and have few branches. The basal portion of the stem is polysiphonic. Branches and secondary ramuli are provided with three or four annulations at their origin.

4. *Eudendrium generalis* von Lendenfeld, 1884. (48.)

Amirante, 36 fms.; Zanzibar.

5. *Bougainvillea ramosa* van Beneden, 1867.

Zanzibar.

6. *Bougainvillea* sp.

Amirante, 39 fms. This may be an attenuated form of *B. ramosa*, with which it agrees in character of branching, cessation of perisarc at the base of the hydranth, and the slight annulation at the base of the branches.

7. *Perigonimus* sp.?

Wasin, 10 fms. The specimens cannot be identified with certainty owing to the poor state of preservation of the hydranth. The hydrorhiza is creeping, the hydrocauli erect, simple, and faintly annulated at their origin.

8. *Corymorpha nutans* Sars, 1835.

Cargados, 30 fms.

9. *Podocoryne carnea* Sars.

Wasin.

10. *Pennaria disticha* Goldfuss var. *australis* Bale, 1884. (9.)

Zanzibar and Pemba. The annulation at the origin of primary and secondary branches, which is characteristic of this variety, is clearly marked. The main stem possesses two or three rings at the origin of the primary branches, while the latter have usually four rings

at their base and two or three immediately succeeding the peduncles of the hydranths. The peduncles themselves have four or five annulations at the base.

11. *Corydendrium sessile*, Ritchie, 1910. (59.)

Cargados, 30 fms.; Amirante, 28 fms. The thick and stunted growth of the colonies agrees with Ritchie's description. The stem is strongly polysiphonic and irregularly branched, the branches giving off secondary ramuli in the same plane. Hydranth tubes occur on the anterior face of branches and ramuli; they are wide, completely adnate on the posterior wall and provided with a smooth circular aperture directed upwards and slightly forwards. The hydranth is large and pyriform with scattered tentacles, which in a contracted state appear wide at the base and taper to a sharp point. The perisarc contains numerous sponge spicules. Gonosome absent.

12. *Ectopleura pacifica* Thornely, 1904. (64.)

Zanzibar. The species is represented by several large colonies growing on an alga. They agree in the main with the description given by Thornely, except that the basal processes mentioned by that author are absent. The inner whorl of tentacles is filiform. Mature gonophores showing the characteristic pair of tentacles are present.

Calyptoblastea.

13. *Halecium gardineri* n. sp. (Plate **24**, fig. 1.)

Salomon, Chagos, 60—120 fms. This interesting species is represented by a single large colony. The hydrorhiza forms a close network of ramifying tubes on an alga, and the wall is strengthened by internal peg-like thickenings of the perisarc. From the hydrorhiza are given off (1) erect stems not more than 0·8 cm. high and usually unbranched, (2) hydrothecæ, (3) sarcothecæ and (4) a male gonosome.

The hydrocaulus is regularly divided by annular constrictions, either transverse or slightly oblique. Processes near the upper ends of the internodes bear the hydrothecæ, the peduncles of the latter being separated from the processes by twisted joints. The peduncles are of very varying length; in the proximal part of the colony they are long and rugose, while distally they are short and smooth and widen gradually into the hydrothecæ. The margin of the hydrotheca is even, not everted, without the bright points so common in the Haleciidæ. Occasionally two hydrothecæ spring from the stem-process. Sarcothecæ occur most frequently on the hydrocaulus just above the stem-process, but are also present in other positions. They resemble the hydrothecæ in shape, but are much smaller. Those carried by the hydrorhiza are similar in form. The hydranth in a retracted state extends some distance beyond the margin of the hydrotheca and is provided with about eighteen tentacles. The sarcostyle is club-shaped, without tentacles. The single male gonosome is carried on a short thick stalk, is cylindrical in shape, its distal end circular and concave.

14. *Halecium halecinum* Linnæus, 1758.

Pemba and Zanzibar.

15. *Halecium minutum* Broch, 1903.

On *Bougainvillea* sp. from Amirante, 39 fms.; on *Eudendrium* sp., locality unknown.

16. *Zygophlax biarmata* Billard, 1906. (22.)

Amirante, 30—100 fms.; Providence, 50—78 fms.; Salomon, Chagos, 60—120 fms.; Seychelles, 20 and 37 fms. The colonies reach a height of 5 or 6 cms. The main stem is erect, rigid, polysiphonic almost to the tip. The pinnæ are irregularly alternate, in the same plane, and diverging at almost a right angle. The hydrothecæ are alternate, cylindrical, with a markedly convex dorsal wall, and spring from well-defined apophyses which bear two laterally placed sarcothecæ. In a few cases only one sarcotheca is present. The margins of the hydrothecæ and sarcothecæ show several reduplications. Gonosomes absent.

17. *Zygophlax recta* n. sp. (Plate **24**, fig. 2.)

Mauritius, 1—100 fms.; Saya de Malha, 145 fms. The species resembles *Z. biarmata* in habit, but is more delicate. The hydrothecæ are relatively much longer in comparison with their diameters than in *Z. biarmata*. Proximally they are very narrow, and gradually increase in breadth towards the apertures. The dorsal wall is much straighter than in allied forms, and the margin is slightly everted. The sarcothecæ resemble those of *Z. biarmata*.

	Z. biarmata Billard	*Z. recta* n. sp.
Measurements: length of hydrotheca	300—315 μ	0·45—0·63 mm.
breadth of hydrotheca at base	—	0·07—0·08 mm.
breadth of hydrotheca at mouth...	50—85 μ	0·15 mm.
length of sarcotheca	70—120 μ	0·07—0·10 mm.
breadth of sarcotheca at mouth	35 μ	0·03 mm.

18. *Lafœa fruticosa* Sars, 1862.

Saya de Malha, 145 fms.

19. *Perisiphonia exserta* (Johnson), 1858.

Locality unknown. A very small broken fragment is referred doubtfully to this species.

20. *Cryptolaria conferta* Allman, 1877. (3.)

Providence, 50—78 fms. The species is represented by two fragmentary colonies, one of which consists of an unbranched stem bearing hydrothecæ of the typical cylindrical form, the other bearing a branch, the end of which is produced into an adhesive stolon.

21. *Cryptolaria crassicaulis* Allman var. *dimorpha* Ritchie, 1911. (61.)

Salomon, Chagos, 60—120 fms. In addition to the form of hydrotheca characteristic of *C. crassicaulis*, the specimen shows one hydrotheca which differs from the rest in that it arises separately from the stolon, is erect and completely free, and closely resembles in shape the hydrotheca of *Hebella*. The free hydrotheca is also considerably smaller than the typical form, as will be seen from the following measurements: length of free hydrotheca 1·02 mm.; breadth of same at mouth 0·22 mm.; length of adnate portion of typical hydrotheca 0·85—0·88 mm.; length of free portion of same 0·44—0·48 mm.; breadth of same at mouth 0·24—0·32 mm.

22. *Cryptolaria rectangularis* n. sp. (Plate **24**, fig. 3.)

Providence, 125 fms. The material consists of a part of a colony 0·7 cm. high and lacking both basal and distal portions. Fascicling tubes are few and limited to the proximal

end of the stem. Branches are irregular, or perhaps opposite, and polysiphonic for a short distance beyond their origin. The hydrothecæ are alternate, long and tubular, the proximal halves erect and adnate, the distal diverging at a right angle. The margin is smooth with several reduplications and circular aperture. A well-marked fold occurs in the lower wall of the hydrotheca at the point of divergence. Gonosomes absent.

This species differs from *C. angulata* Bale in the straightness of the upper wall of the hydrotheca in its divergent portion and in the absence of an internal thickening opposite the fold. Bale notes that in some instances the bend in the upper wall of *C. angulata* is wanting, but he regards the internal thickening as one of the diagnostic characters of his species. If it should be found that this thickening ever occurs in *C. rectangularis* or is occasionally absent from *C. angulata*, then the two species would probably be correctly regarded as varieties of the same form. *Measurements:* length of adnate portion of hydrotheca 0·35—0·4 mm.; length of free portion of same 0·41—0·54 mm.; breadth at mouth 0·15—0·19 mm.

23. *Hebella crateroides* Ritchie, 1909.

Farquhar Atoll, on *Eudendrium cochleatum*, off dead shells. A single hydrotheca and gonosome are present. The former is somewhat damaged but the latter corresponds in every way with Ritchie's description.

24. *Hebella cylindrica* (von Lendenfeld), 1884. (48.)

Locality unknown. The margin of the hydrotheca is well everted, more than in Bale's Australian form, and frequently with two or three reduplications.

25. *Hebella calcarata* (Agassiz), 1862.

Providence, 50—78 fms., on *Synthecium tubithecum*; Pemba, on *Thyroscyphus vitiensis*.

26. *Gonotha longicyatha* Thornely, 1904. (64.)

Cargados, 30 fms.; Saya de Malha, 150 fms.; Zanzibar, floating in the plankton. The colonies reach a maximum height of 1·5 cms. The branching is irregular and in a few instances the main stem is strengthened by downgrowths from the bases of the peduncles of the hydrothecæ. The peduncles are generally annulated throughout. The margin of the hydrotheca is produced into long needle-like points which are separated by alternating deep and shallow bays. In one specimen from Cargados the hydranths, although well extended, do not reach to the margin of the hydrotheca; they are provided with about eighteen tentacles. Numerous truncate gonothecæ of the typical form are present. The colony from the plankton shows a much more attenuated growth than the rest of the specimens and in it the bays of the margins of the hydrothecæ are less deep.

27. *Campanularia cheloniæ* Allman, 1888. (5.) (Plate **24**, fig. 4.)

Zanzibar. A large flourishing colony was obtained, growing on a shell of *Lepas* and reaching a height of 1·5 cms. The main stems arise at close intervals from the creeping hydrorhiza, giving off branches which are irregularly alternate and especially abundant near the distal end. The branches themselves give rise to secondary ramuli. The main stem shows five or six annulations at the origin of the branches and the latter the same at the origin of the ramuli. The ramuli are annulated throughout their entire length or at

the proximal ends only. The hydrotheca is cup-shaped with an entire margin, while the hydranth possesses about twenty tentacles. Long cylindrical gonothecæ are borne on short ringed peduncles arising in the axils of the peduncles of the hydrothecæ; at their distal ends are slightly marked collars and their mouths are concave.

The specimens under consideration differ from the type in their much greater height and in the presence of gonosomes. The latter are not figured in the "Challenger" forms which may have been immature. *Measurements:* length of hydrotheca 0·16—0·18 mm.; breadth of hydrotheca at mouth 0·18—0·2 mm.; breadth of same at base 0·07—0·08 mm.; length of gonotheca 0·40—0·45 mm.; maximum breadth of same 0·22 mm.

28. *Campanularia corrugata* Thornely, 1904. (64.) (Plate **24**, fig. 5.)

Zanzibar, 6 fms., on stem of a Plumularian; Wasin, 10 fms.; Cargados, 45 fms., on *Lytocarpus phœniceus* (Busk). The creeping hydrorhiza gives rise to erect, simple hydrocauli, which are annulated throughout their length. The perisarc is considerably thickened below the base of the hydrotheca. The latter is about twice as long as wide, with a simple, sinuous margin. The hydranth has about twenty tentacles. Gonosome absent. *Measurements:* length of hydrotheca 0·66 mm.; breadth of hydrotheca at mouth 0·44 mm.

29. *Campanularia ptychocyathus* Allman, 1888. (5.)

Amirante, 36 and 39 fms., the latter on a Polyzoan; Wasin, 10 fms., on an alga.

30. *Campanularia serrulatella* (Thornely), 1904. (64.)

Amirante, 29, 32 and 18 fms.; Cargados, 30 fms. The colonies show no definite main stem, only a basal portion giving rise to a number of branches which bear both secondary ramuli and hydranths. The proximal parts of the branches are in several cases strengthened by downgrowths from the peduncles of the hydrothecæ. The peduncles are of varying length, either annulated in the proximal and distal parts or throughout their length. The hydranth is slightly raised up above the diaphragm at the base of the hydrotheca, but this character is much less marked than in the description of the type specimen. Gonosomes of the typical form occur.

31. *Thyroscyphus æqualis* Warren, 1908. (70.)

Cargados, 45 fms.; Prison Island, Zanzibar, 8 fms. and shallower; Wasin, 10 fms. The diaphragm at the base of the hydrotheca is in the form of a continuous ridge and in this respect resembles that found in the Natal specimens. Ritchie regards this species as identical with *T. regularis*, specimens of which he described from the Mergui Archipelago (59). In these the diaphragm is in the form of a row of small chitinous prominences, not in a continuous ridge. The latter character appears to be constant in forms from the western side of the Indian Ocean and thus seems to be one of specific value.

	T. æqualis	*T. regularis* (Ritchie)
Measurements: maximum height of colony ...	20 cms.	—
distance between hydrothecæ	1·1—1·25 mm.	1·13—1·3 mm.
diameter of peduncle	0·14—0·15 mm.	·20 mm.
length of hydrotheca	0·85—0·9 mm.	·96 mm.
breadth of hydrotheca at mouth...	0·75 mm.	·63 mm.

32. *Thyroscyphus vitiensis* Marktanner-Turneretscher, 1890. (49.)

Amirante, 25—80 fms.; Pemba; Zanzibar, 0—2 fms. Examination of the type specimens of *Campanularia junceoides* Borradaile has shown that the latter is identical with this species.

33. *Sertularia brevicyathus* (Versluys), 1899. (69.) (Plate **24**, fig. 6.)

Amirante, 29 fms.; Cargados, 30 fms.; Saya de Malha, 150 fms.; Wasin, 10 fms.; Zanzibar, surface. The hydrocaulus is typically simple, corresponding to Nutting's description of the American form. The material includes, however, a pinnate variety from Saya de Malha. In this the basal part is wanting, but the hydrothecæ above are all strictly paired and contiguous in front. The pinnæ are given off at right angles and arise from processes of the stems immediately below hydrothecæ. The process is cut off distally by a slightly oblique node and is followed by an athecate internode of varying length. The latter is cut off distally by a splice-like joint and is followed by thecate internodes.

In the determination of this species the synonymy discussed by Bale has not been adopted. *S. brevicyathus* is considered distinct from *S. marginata* for the following reasons: (1) in *S. brevicyathus* the internodes are constantly of a much greater length; (2) in *S. brevicyathus* the hydrothecæ are much more robust; (3) the hydrothecal aperture in *S. brevicyathus* is directed almost straight outwards, whereas in *S. marginata* it is directed forwards and outwards—the arrangement of the pairs of hydrothecæ in relation to the colony as a whole is thus entirely different in the two cases; (4) in the method of branching the two species are very different. While in *S. brevicyathus* the pinnæ arise below one of a pair of hydrothecæ, in *S. marginata* they are given off below axillary hydrothecæ. Further, in *S. brevicyathus* the pinnæ are irregularly scattered and in *S. marginata* they are regularly alternating.

34. *Sertularia cornicina* (= *Dynamena cornicina* McCready, Gymnophthalmata of Charleston Harbour, 1858, p. 204). (H.W.M.T.)

Saya de Malha, 25 fms.; Wasin, 10 fms.; Zanzibar. Except for slight details, the specimens agree with Nutting's (52) description of the American forms. The Saya de Malha colonies are the most luxuriant. The internodes here are shorter than in Nutting's figure and the free portion of the hydrotheca reaches about one-third of the total length. The outer wall of the hydrotheca is thickened just below the margin, where it forms a very slight internal tooth. The basal teeth are clearly marked. The colonies from Wasin are less robust than the preceding and show longer internodes. Gonosomes arise from the hydrorhiza close to a hydrocaulus; the mouths are wider than in Nutting's figure. A short thick form, overgrown with *Hebella*, comes from Zanzibar. Nutting in his later work with some expression of uncertainty and "in the absence of good morphological characters" links this species with *S. complexa* Clarke, though he came to an opposite conclusion in an earlier paper; it seems that his former opinion is the more correct. The chitinous processes extending down from the base of the hydrotheca appear to furnish good and reliable morphological characters; it is therefore best to keep the two species distinct until specimens of one or other are found showing some hydrothecæ with and some without these processes.

35. *Sertularia cornicina* var. *pinnata* var. n.

Saya de Malha, 29 fms. Several specimens of a pinnate variety were obtained. The hydrocaulus is erect, divided transversely at fairly regular intervals. Each node bears a pinna from a process near its proximal end, and, in addition, three hydrothecæ, one axillary, two varying from opposite to alternate. The cauline hydrothecæ are generally adpressed to the stem, especially near the base of the latter, and in some cases the free divergent portion is so reduced as to be practically wanting. The stem diameter decreases suddenly near the distal end where the pinnæ cease, and here the hydrothecæ become contiguous and paired instead of widely separated and lateral. The first internode of the pinna is long, without hydrothecæ, and is cut off distally by a very oblique joint. The pinnæ are very apt to break off at this joint, leaving the stem with a number of spike-like lateral processes. The hydrothecæ and gonosomes are essentially the same as in the non-pinnate form.

36. *Sertularia heterodonta* Ritchie, 1909. (57.)

Cargados, 24 fms.; Zanzibar. The colony from Cargados measures 6·3 mm. in height and is without gonosomes. The small portion of hydrorhiza present shows internal thickenings of floor and roof. The hydrocaulus is erect, unbranched, the basal portion lacking nodes and hydrothecæ; the hydrothecate region is separated from the basal by a splice-like joint. The first internode is short, the remainder long and slender and separated by transverse nodes. Occasionally an oblique node occurs close above a transverse one, so that short athecate internodes are formed. The hydrothecæ are paired, contiguous in front for about one-third their length, separated behind; the distal part diverges at a wide angle. The basal wall of the hydrotheca shows a small triangular tooth situated near the middle line, passing downwards into the cavity of the hydrocaulus, and a second larger tooth, also triangular, nearer the lateral wall and directed upwards into the cavity of the hydrotheca. A third peg-like thickening projects into the hydrotheca from the lateral wall a short distance above the base. The margin possesses three teeth, a large pair of laterals and a smaller superior median. The operculum is in three flaps. Below the margin the hydrothecal walls are produced into three internal thickenings, triangular in shape, and situated on the superior, inferior and abcauline walls. The margin shows several reduplications and in a few cases one or more of the internal processes are repeated. Gonosomes occurring in the Zanzibar colonies are borne singly, one on each hydrocaulus, immediately below the proximal pair of hydrothecæ. They arise from a short stalk, are truncate, with a wide aperture and a single-pieced operculum. The collar is short with a ring of chitinous knobs.

Measurements: length of athecate portion of stem 1·1 mm.; length of internodes 0·48—0·58 mm.; diameter of same near base 0·5—0·6 mm.; length of adnate portion of hydrotheca 0·10—0·12 mm.; length of free portion of same 0·15—0·18 mm.; diameter of hydrotheca at base 0·07—0·10 mm.; diameter of hydrotheca at mouth 0·05—0·06 mm.; length of gonosome 0·76 mm.; breadth of same at mouth 0·27 mm.

37. *Sertularia linealis* Warren, 1908. (70.)

Cargados, 24 fms.; Wasin. The specimens show the typical arrangement of the hydrorhiza in parallel rows on the frond of an alga, the rows being connected by transverse

anastomoses placed at right angles. The hydrocaulus is unbranched, regularly divided by constricted transverse nodes. The hydrothecæ, except in the case of the proximal pair, are contiguous in front for about one-third of their length, then diverging at a right angle. The margin is in two lateral waves and the aperture is directed outwards and slightly upwards. Beneath the margin the perisarc is thickened to give three internal teeth, superior, inferior and posterior in position. The base of the hydrotheca is thickened on the inner side.

38. *Sertularia loculosa* Bale, 1884. (9.) (H.W.M.T.)

Amirante, 22—85 fms.; Saya de Malha, 25 fms. The stems are in all cases unbranched. The specimens in the main resemble Bale's figures, the chief differences lying in (1) the more sharply pointed teeth of the hydrotheca, (2) the greater length of the internodes and (3) the absence of oblique nodes. In many cases the stem is produced beyond the hydrothecate region into a stolon, which terminates in a flattened, lobulated, adhesive disc.

39. *Sertularia marginata* (Kirchenpauer), 1864. (Plate **24**, fig. 7.)

Wasin, 10 fms. Several flourishing colonies reach a maximum height of 3·5 cms. The hydrocaulus is in every case pinnate and the ends of both stems and branches are frequently produced into stolons. In one case a small branch is given off from a stolon at a considerable distance from the origin of the latter. The stolon itself is unattached to any object, but may have been in the living state. The single gonosome arises immediately above the axial hydrotheca of a pinna, is sessile, truncate, with six strongly marked annulations, and produced distally into two lateral horns. This species, as has been pointed out above, is regarded as distinct from *S. brevicyathus* Versluys.

40. *Sertularia tenuis* Bale, 1884. (9.) (H.W.M.T.)

Saya de Malha, 25 fms.; Seychelles, 34 fms.; Cargados, 30 fms. The colonies are all of the non-pinnate variety, ranging from 0·8 to 1·3 cms. in height. Bale figures both simple and pinnate forms, which differ in the length of the internodes and in the angles of divergence of the hydrothecæ. Some specimens from Seychelles agree with the simple variety, but others are intermediate between the simple and pinnate types of Bale, the hydrothecæ being of the pinnate type while the lengths of the internodes approximate to those of the simple form. In the distal parts of the colony the hydrothecæ are generally less divergent than in the proximal.

Comparison of the forms leads to the conclusion that specimens obtained from the lower depths tend to grow stronger and to a greater height than those in more shallow water. Unfortunately Bale does not mention the depth from which his material was obtained. He draws attention to the fact that very slight differences exist between this species and *S. divergens* Lamouroux. From a comparison of the two figures given by him, there would appear to be less difference between the pinnæ of the two species than between the pinnate and simple shoots of *S. tenuis*. Again, the mere fact that "*S. divergens* has usually five or six pinnæ on each side of the stem," while, in *S. tenuis*, Bale only found from one to three pinnæ and sometimes entirely non-pinnate forms, does not appear to be a valid specific distinction, more particularly when note is taken of the fact that the gonosomes are identical. From these considerations there seems justification for the conclusion that the

differences between the two species are probably either local or bathymetric. It is suggested tentatively that the species be united with the retention of the specific name *divergens*, not merely on account of priority, but because the hydrothecæ of *S. tenuis*, more particularly of the simple variety, are more divergent than in *S. divergens* itself.

41. *Sertularia turbinata* Lamouroux, 1816. (H.W.M.T.) (Plate **24**, fig. 8.)

Amirante, 22—85 fms.; Centurion Bank, 10—12 fms.; Zanzibar.

The hydrocaulus is in every case simple and divided by transverse nodes. It is frequently produced into stolons which bear adhesive organs exactly similar to those of *S. loculosa*. The hydrothecæ are longer than in *S. loculosa* and divergent at wider angles. The character of the margin is doubtful since the perisarc is thin and the walls usually collapsed. The aperture is directed outwards and somewhat downwards as against outwards and upwards in *S. loculosa*.

42. *Sertularella conica* Allman, 1877, var. (Plate **24**, fig. 9.)

Zanzibar. A variety of this species is represented by a small colony, 1·2 cms. high. The hydrocaulus is erect, monosiphonic, unbranched except in one instance and showing faint indication of division by oblique nodes. The simple branch arises immediately below a hydrotheca. The hydrothecæ are adnate for about half their length, broad below, and taper somewhat in the distal diverging portion. They differ from the typical form in that the annulations are usually carried completely round the distal part of the hydrotheca instead of being limited to the upper side. The margin is in four deep bays, and the aperture directed outwards and upwards as well as slightly forwards. A single gonosome is present, arising from a short peduncle borne laterally near the base of the hydrocaulus opposite the hydrotheca. The body is ovate, annulated throughout its length, and provided with a short collar. The annulations are more deeply marked in the distal than in the proximal half.

Measurements: length of adnate portion of hydrotheca 0·365 mm.; length of free portion of same 0·35—0·4 mm.; diameter at mouth 0·13—0·17 mm.; length of gonosome 1·56 mm.; maximum diameter 0·8 mm.; diameter of collar 0·23 mm.

43. *Sertularella thecocarpa* n. sp. (Plate **24**, fig. 10.)

Centurion Bank, Chagos, 10—12 fms.

Several small colonies were obtained, growing on the fronds of an alga. From the creeping hydrorhiza are given off at close intervals erect stems, usually simple, rarely branched, reaching a maximum height of 0·6 cm. Oblique and twisted nodes occur at regular intervals in the proximal part of the stem, while distally they are less clearly marked. The single branch appears to arise from the lumen of an incompletely developed hydrotheca. The hydrothecæ are alternate, adnate for less than half their length; the walls are smooth and the aperture directed outwards and upwards. The margin has two large, sharply pointed lateral teeth, while the intervening parts are sinuous. In the taller stems the upper part of the hydrocaulus tends to be rugose, while the distance between the hydrothecæ is increased; the uppermost hydrotheca especially is frequently at a long distance from the one below. The fertile stems are more stunted than those without gonosomes. The latter are peculiar in that they arise from the lumen of the hydrothecæ.

One or two are borne on a stem near the base; they are about four times as long as the hydrothecæ, globose, deeply corrugated, the collars short and the apertures small. The presence of a gonosome, arising from the lumen of a hydrotheca, is accordingly not limited to the genus *Synthecium*, and therefore cannot be regarded as peculiar to that genus. The definition of *Synthecium* must therefore rest primarily on the growth habit and the hydrothecal characters and secondarily on the gonosome.

Measurements: length of internodes 0·27—0·34 mm.; length of adnate portion of hydrothecæ 0·17—0·20 mm.; length of free portion of same 0·23—0·26 mm.; breadth of hydrothecæ at mouth 0·12—0·14 mm.; length of gonosome 0·95 mm.; maximum breadth of gonosome 0·80 mm.

44. *Sertularella tumida* Warren, 1908. (70.)

Amirante, 29 fms.; Providence, 39 fms. The species is represented by fragmentary colonies only, varying in height from 0·5 to 1 cm. The stem is unbranched, sinuous, divided by faintly marked twisted nodes. The large hydrothecæ are adnate for half their lengths, while the distal portions diverge at a wide angle. The adnate portion is broad; the distal tapers towards the aperture. The margin is provided with four teeth, two lateral, one inferior and one superior. Below the margin are three prominent triangular teeth, projecting into the cavity of the hydrotheca; two are situated below the upper bays of the margin, the third below the abcauline tooth. *S. tasmanica* described and figured by Bale (15) may probably be regarded as a local variety of *S. tumida*, differing only in the straighter stem and abcauline wall of the hydrotheca.

45. *Thuiaria interrupta* Allman.

Zanzibar. The species is characterised by the arrangement of the hydrothecæ in groups of from four to twelve on the pinnæ and from three to five on the stem. A hydrotheca is carried in the axil of each stem-process bearing a pinna. As in Allman's type the hydrothecæ are provided with two lateral teeth. The longitudinal markings (sulci) of the stem mentioned by that author are absent.

46. *Thuiaria lata* Bale, 1881. (8.) (H.W.M.T.)

Amirante, 39 fms.; Cargados, 45 fms.; Saya de Malha, 47 fms.; Wasin, 10 fms.; Zanzibar. The hydrothecæ show some variation in arrangement and in the characters of the margins. In the specimen from Wasin, the hydrothecæ are very closely set and the marginal teeth not well marked. In the remaining colonies, and especially in those from Cargados, they are much farther apart and the teeth are very clearly seen. Numerous gonosomes occur in the Zanzibar colonies. In them no distinction can be drawn between undulating dorsal and smooth ventral edges, as in Bale's specimens. Longitudinal ridges occur in the distal portion, but these may be due to imperfect fixation. The apex is concave and oblique, being lower on the adaxial than the abaxial side.

47. *Thuiaria tubuliformis* (Marktanner-Turneretscher), 1890. (49.) (H.W.M.T.) (Plate **25**, fig. 13.)

Coetivy, Seychelles; Peros, Diego Garcia, and Egmont, Chagos; Farquhar Atoll; Zanzibar; Pemba. All from the shallow surface reefs.

The typical character of the stem internodes, each carrying a branch and two hydro-

thecæ on one side and a single hydrotheca on the other, is only met with in some of the specimens. Very frequently the distal internodes and occasionally the proximal also bear a branch and three hydrothecæ on one side and two hydrothecæ on the other. In the colonies from Diego Garcia the general arrangement is three hydrothecæ on one side and four on the other. The hydrothecæ of the pinnæ show a marked tendency to become arranged in groups of from four to six. The cœnosarc in several cases contains a quantity of dark pigment. Where the hydranth is expanded it is seen to possess a flattened hypostome and about 24 tentacles. Gonosomes, present in the Egmont reef colonies, are of the typical form.

48. *Diphasia digitalis* (Busk), 1852. (36.) (H.W.M.T.)

Zanzibar and Wasin. In the proximal part of the colony the cauline hydrothecæ are widely separated in front, while the distal parts and on the branches they are contiguous. The proximal internodes are sharply defined and carry either a pair of hydrothecæ or a pair of hydrothecæ and a branch, while in the distal parts of the colony the nodes are less regular. There are uniformly two pairs of hydrothecæ between the alternating pinnæ. Gonosomes, which are numerous in one colony from Zanzibar, are borne on a short but definite peduncle arising from the back of the stem. They are ovoid and very large (not small as in Nutting's description of the American form), tapering at the distal end and beset with numerous spines. The orifice is flat and circular.

49. *Diphasia mutulata* (Busk), 1852. (36.)

Cargados, 45 fms.

50. *Diphasia varians*, n. sp. (Plate **25**, fig. 14.)

Amirante, 22—85, 29 and 25—80 fms.; Saya de Malha, 29 fms.; Zanzibar; Cargados, 45 fms. The colonies are all fragmentary and unbranched, reaching a height of 1·1 cms. The basal portion is without hydrorhiza and separated from the hydrothecate region by an oblique node. The remainder of the hydrocaulus is divided by transverse nodes placed at irregular intervals. One or more pairs of hydrothecæ are borne on each internode. The hydrothecæ are long, tubular, contiguous in front in the distal part of the stem only, and separated behind; generally less than one-quarter is divergent. Where more than one pair of hydrothecæ are borne on one internode, the pairs are closely apposed, the upper pair arising immediately above the point of divergence of the preceding pair. The margin is in two bays formed by two lateral teeth. The perisarc is thick except on the abcauline side of the hydrothecal margin, where it forms a thin collar connecting the two lateral teeth. The specimen from Amirante, 25—80 fms., is a stout form in which as many as ten pairs of hydrothecæ are carried by the first internode, while the remaining internodes carry a single pair. Very frequently, a second operculum occurs below the first, arising at the point of divergence of the distal part of the hydrotheca. A third operculum is occasionally present below the second. Marginal reduplications to the number of five may occur. The hydrothecæ of the colonies from Amirante, 29 fms., have longer divergent portions than the preceding. A distinct variety comes from Cargados; in this a small flap of perisarc projects in from the abcauline wall of the hydrotheca just opposite the point of divergence, and the presence of two opercula is constant.

51. *Pasythea heterodonta* n. sp. (Plate **24**, figs. 11, 12.)

Cargados, 24 fms., and three dredgings 30—45 fms. The colonies reach a height of 0·7 cm. The hydrocaulus is erect, unbranched, arising from a creeping hydrorhiza, and divided at irregular intervals, oblique nodes. The internodes bear one or more pairs of hydrothecæ, which resemble those of *P. quadridentata*. The proximal portion of each is contiguous in front, separated behind, the distal divergent at a wide angle and tapering towards the aperture; the margin has two lateral teeth and the operculum is in two flaps. Below the margin are two prominent triangular teeth projecting into the cavity of the hydrotheca. Gonosomes are borne singly immediately below the proximal pair of hydrothecæ of a stem; in shape they are ovate, with about five annular corrugations. A collar is wanting; the aperture is broad, circular, with a single-pieced operculum. Great variation is shown in the grouping of the pairs of hydrothecæ. In most cases the first one or two internodes bear only a single pair, the remainder having two pairs. At the distal end of the hydrocaulus a few stems have three pairs to an internode, the third pair arising between the second, causing the latter to divide more than normally, while the third pair is itself more erect than the others. The colonies from Cargados are remarkable, since in some cases as many as ten proximal internodes bear each only a single pair of hydrothecæ, the single pairs being followed by two or more groups of two pairs. In many instances three pairs are grouped together, while in a few cases a double pair is interposed between the single pairs. Generally speaking, the grouping is limited to the distal parts of the hydrocaulus. Proximally, where the grouping does not occur, the specimens would in many cases be taken for a species of *Sertularia*.

52. *Pasythea philippina* Marktanner-Turneretscher, 1890. (49.)

Pemba and Wasin.

53. *Idia pristis* Lamouroux, 1816. (H.W.M.T.)

Zanzibar. The pseudo-branching is similar to that described by Allman. The axial hydrothecæ are small, with the aperture directed upwards and backwards, while in the remaining hydrothecæ the apertures are directed backwards. No internal chambers such as Allman describes can be found at the base of the hydrothecæ. Gonosomes occur only on the proximal portion of the main stem below the pinnate portion. They agree rather with Bale's description, since the longitudinal ribs are few; they are not connected by transverse ridges as in the Australian specimens, but agree with the latter in being carried up past the shoulder. The rim of the collar is raised up all round so that the orifice appears to be sunken. Delicate markings pass down from the rim on to the collar.

54. *Synthecium dentigerum* n. sp. (Plate **25**, fig. 15.)

Centurion Bank, Chagos, 10—12 fms. A fragment, consisting of an unbranched stem 1 cm. high, regularly divided by transverse nodes. The internodes bear a pair of cylindrical hydrothecæ, adnate for more than half their length, the distal parts each diverging at a small angle. The inner basal corners of the walls are thickened to give small downwardly directed pointed teeth. A large triangular tooth extends into the cavity of the hydrotheca from the adcauline wall a short distance below the aperture. The margin is even, with several reduplications. A branched stolon issues from the mouth of one hydrotheca.

Allman figures a similar branch arising from a hydrotheca in *S. campylocarpum*; he regards it as abnormal but of interest in repeating in *Synthecium* a feature which constitutes the essential character of *Thecocladium*.

55. *Synthecium patulum* (Busk), 1852. (36.) (H.W.M.T.)

Centurion Bank, Chagos, 10—12 fms.; Amirante, 30—100 fms.; Wasin. In the Centurion Bank specimens the internodes are short and in consequence the hydrothecæ are closely approximated; the margins are deeply sinuate at the sides. Much longer internodes occur in the forms from the second locality; the margins are straighter and with reduplications. The colonies are overgrown with *Hebella*.

56. *Synthecium rectum* Nutting, 1904. (52.)

Seychelles, 37 fms.; Cargados, 45 fms.

57. *Synthecium subventricosum* Bale, 1914. (15.)

Amirante, 25—80 fms., and Zanzibar.

58. *Synthecium tubiger* Borradaile, 1905. (32.)

Amirante, 22—85, 34 and 20—44 fms.; Providence, 50—78 fms.; Cargados, 30 and 45 fms.; Saya de Malha, 29 fms.

59. *Synthecium tubithecum* (Allman), 1877. (3.)

Amirante, 20—44 fms.; Providence, 50—78 fms.; Cargados, 30 fms.; Wasin, 10 fms.

60. *Plumularia alternata* (Nutting), 1900. (51.) (Plate **25**, fig. 16.)

Amirante, 20—44 fms.; Seychelles, 44 fms.; Wasin, 10 fms.; Zanzibar. The hydrosome is similar in all essential characters to the American form. Considerable variation exists in the amount of flexure and length of the internodes of the different colonies. In the specimen from Amirante the two proximal pinnæ of the stem are paired, being carried on processes which arise from each side of the stem instead of from one side only. This proximal part of the stem is cut off from the remainder by an oblique node.

Gonosomes, here described for the first time, occur on the Zanzibar specimens. They are of two kinds. The first and most numerous is a small oval type, pedunculate, flat or slightly concave at the distal end, occurring on the proximal part of the main stem and on the pinnæ. Those on the main stem arise singly on the pinnæ below the hydrothecæ, or in pairs immediately above the cauline hydrothecæ. The peduncle is flanked by a pair of sarcothecæ. The total length of this small type is about twice that of the hydrotheca. One specimen, bearing small gonosomes, also carries near the apex of the main stem two large gonosomes, each arising below cauline hydrothecæ which do not subtend branches. The peduncles bear three sarcothecæ, situated either all on the anterior face or two on the anterior and one on the posterior. The length is about six times that of the hydrotheca, while the apex is broad and rounded.

61. *Plumularia corrugata* Nutting, 1900. (51.) (Plate **25**, fig. 17.)

Zanzibar. The colonies assume the form of plumose tufts 1·5 cms. in height and are thus much smaller than Nutting's American forms. Corrugations are present on the stem immediately above and below the nodes. The hydranths are provided with about twelve tentacles and are extended far beyond the hydrothecal margins; indeed, they appear to

be incapable of completely retracting into the cups. Gonosomes resembling the larger type of the American form are abundant. They arise immediately below the stem-processes, which bear the pinnæ, on the anterior face of the stem, not in the axils of the pinnæ, as is indicated by Nutting's figure.

62. *Plumularia crosslandi*, n. sp. (Plate **25**, fig. 18.)

Wasin, 10 fms. Several colonies were obtained growing on an alga. The creeping hydrorhiza gives off erect, unbranched, monosiphonic hydrocauli, which reach a maximum height of 0·9 cm. The hydrocauli are divided by oblique nodes. Proximally each internode carries two pinnæ, distally only one. The pinnæ are alternating, arising from large stem-processes, each of which carries a sarcotheca on the anterior face and a raised perforation just above the axil and is flanked by a pair of cauline sarcothecæ. The pinnæ are much constricted at their origin and are divided obliquely into hydrothecate internodes. The hydrothecæ are completely adnate, the apertures being directed upwards. The margin is produced into two large triangular teeth, lateral in position, while anteriorly it is rounded and is everted to form a lip, below which the wall is strongly thickened to form an internal triangular tooth. The infra-mesial sarcotheca arises from a protuberance below the base of the hydrothecæ, is long and tubular, reaching to half the height of the latter. The lateral sarcothecæ are carried on very slight peduncles and do not reach to the level of the apices of the lateral teeth. An additional mesial sarcotheca occurs above the hydrotheca near the upper end of the internode. The anterior wall of the internode is slightly thickened below the infra-mesial sarcotheca, below the base of the hydrotheca and above the supra-mesial sarcotheca.

Gonosomes arise singly in the axil of a pinna. The peduncles are well-defined and are flanked at the base by the pair of cauline sarcothecæ described above in connection with the stem-process bearing the pinna. In shape the gonosomes are cylindrical, the distal end being drawn out into four irregular expansions, disposed diagonally. An anterior face can be distinguished by the presence of two longitudinally directed ridges, while the posterior wall is smooth.

Measurements: length of internodes of hydrocaulus (proximal) 0·44 mm.; length of internodes of same (distal) 0·21 mm.; length of internodes of pinna 0·25—0·26 mm.; length of hydrotheca (to apex of lateral tooth) 0·13—0·14 mm.; breadth of same at aperture 0·11 mm.; length of infra-mesial sarcotheca 0·085—0·09 mm.; length of lateral sarcotheca 0·04 mm.; length of supra-mesial sarcotheca 0·04 mm.; diameter of hydrocaulus (proximal) 0·11 mm.; diameter of hydrocaulus (distal) 0·10 mm.

63. *Plumularia multithecata*, n. sp. (Plate **25**, fig. 19.)

Zanzibar and Wasin. The colonies assume the form of delicate erect stems, reaching a height of about 2 cms. The stem is monosiphonic, unbranched, divided transversely into alternating long and short internodes. Each of the former bears a hydrotheca and a pinna and each of the latter a pair of sarcothecæ. The pinnæ arise alternately from long stem-processes which are cut off transversely at the distal ends. The first internode of the pinna is short and without hydrothecæ or sarcothecæ; the second is slightly longer and carries a sarcotheca on the anterior face. The remaining internodes are alternately hydrothecate

and non-hydrothecate as in the hydrocaulus. The hydrothecæ are tubular, expanding somewhat in the distal portion. The posterior wall is adnate for about two-thirds of its length, the remainder being free and directed outwards and upwards. Anteriorly the margin is produced into a median blunted tooth, inwardly curved; the lateral and posterior margins are sinuous. In side view, the posterior wall is seen to be compressed into a kind of groove, but this cannot be distinguished in a front view. The aperture is directed upwards and forwards. The infra-mesial sarcotheca is short, scarcely reaching above the base of the hydrotheca, and canaliculate. The lateral sarcothecæ are carried on peduncles which are applied to and extend slightly beyond the lateral walls of the hydrothecæ. The sarcothecæ themselves are very large and canaliculate, the apertures being directed inwards and forwards. The lateral and posterior walls are strengthened by a perisarcal thickening in the form of a U, the cavity of the U being directed towards the base of the sarcotheca. At the point of divergence of the hydrotheca from the internode arises a supra-mesial sarcotheca. This is canaliculate, short and broad, not reaching to the level of the posterior margin, and generally provided with a single aperture. Occasionally however the aperture is double. The cauline hydrothecæ resemble those of the pinnæ except in two points. First, the supra-mesial sarcotheca is always provided with two apertures. Second, the lateral sarcotheca which is on the pinna side is small and carried on the stem-process. The latter therefore corresponds to the peduncle of the opposite lateral sarcotheca. The non-hydrothecate internodes of both hydrocaulus and pinna are similar and carry a pair of canaliculate sarcothecæ on the anterior face. These resemble the infra-mesial in character. Gonosomes absent.

Measurements: length of hydrothecate internodes of pinna 0·25 mm.; length of non-hydrothecate internodes of same 0·09—0·1 mm.; length of hydrotheca (on abcauline side) 0·22—0·23 mm.; breadth of hydrotheca at mouth 0·16 mm.; length of infra-mesial sarcotheca 0·05 mm.; length of supra-mesial sarcotheca 0·03 mm.; length of peduncle and lateral sarcotheca 0·14 mm.; length of sarcothecæ of intermediate internodes 0·045 mm.

64. *Plumularia nova* n. sp. (Plate **26**, fig. 20.)

Zanzibar, on *P. alternata*. A minute epizoic form, the main stem adherent to the stem of *P. alternata*. The hydrocaulus is divided by indistinct nodes occurring at considerable intervals; from each internode, either about the middle of its length or nearer the upper end, arises a short free branch. The branches are obliquely jointed, the first internode quite short, without hydrotheca, the others much longer and bearing small cup-shaped hydrothecæ about the middle of their length. In most cases the branch consists of not more than three internodes, often of only two. The margin of the hydrotheca is even, the diameter of the mouth being about equal to the height. No sarcothecæ or gonosomes are present.

65. *Plumularia providentiæ* n. sp. (Plate **26**, fig. 21.)

Providence, 29 fms. The hydrocaulus is erect, monosiphonic and unbranched, reaching a height of 1·3 cms. The proximal part bears neither sarcothecæ nor pinnæ; distally the hydrocaulus is divided into long internodes by oblique joints. Immediately above the node arises a hydrotheca (immediately below a pinna) from a slight process, the pinnæ being

all on the same side of the stem. In addition, the cauline internodes bear two or three sarcothecæ in a single row on the side opposite the pinnæ. The latter are divided obliquely into long internodes, each of which carries a hydrotheca immediately above the node, then a row of two or three sarcothecæ. The hydrothecæ are campanulate, adnate for about two-thirds their lengths. The margin is even and the aperture directed upwards and forwards. The infra-mesial sarcotheca does not reach above the base of the hydrotheca. Two pairs of lateral sarcothecæ are present; one pair is pedunculate, the peduncles being applied to the wall of the hydrotheca; the second pair is shorter and arises on the inner side of the base of the peduncle of the previous pair. The cauline hydrothecæ are similar in every way to those of the pinnæ. Internal thickenings of the wall of the hydrocaulus occur just above and below the nodes, while in the pinnæ a similar thickening is present below the distal sarcotheca of an internode.

66. *Plumularia quadridentata* n. sp. (Plate **26**, fig. 22.)

Pemba. The colony consists of several long, slender, slightly branched stems arising from a rooting hydrorhiza, and reaching a height of about 25 cms. The basal part of stem and branches is slightly fascicled. Beyond the supporting tubes the stem is faintly segmented by transverse nodes and bears neither hydrothecæ nor sarcothecæ. Pinnæ arising alternately occur at fair intervals. The basal part of each pinna is unsegmented and without hydrothecæ or sarcothecæ; beyond this region oblique nodes occur regularly. Each internode bears about the middle of its length a hydrotheca and immediately behind this a pinnule from a well-marked process. The hydrothecæ of the pinna are subtended by infra-mesial, lateral, and supra-mesial sarcothecæ, and are similar to those occurring on the pinnules, as described below. The pinnæ are divided by regular slightly oblique nodes. The basal one is short, without hydrothecæ or sarcothecæ, the remainder longer, provided each with a hydrotheca and related sarcothecæ. The hydrothecæ are cylindrical in shape, of almost equal diameter throughout, and adnate for more than two-thirds of their length. The aperture is directed upwards and forwards. The margin is provided with four teeth, anterior, posterior, and lateral in position, separated by deep bays. The infra-mesial sarcotheca is short, scarcely reaching the base of the hydrotheca. The laterals are borne on long peduncles and reach well beyond the hydrothecal margin. The supra-mesial sarcotheca is small, not reaching the level of the posterior hydrothecal tooth. Gonosomes are absent.

Measurements: breadth hydrotheca at mouth 0·20—0·21 mm.; length along anterior border 0·23—0·25 mm.; length infra-mesial sarcotheca 0·045—0·055 mm.; length supra-mesial sarcotheca 0·04 mm.; length free portion of lateral sarcotheca 0·09—0·10 mm.

67. *Plumularia setacea* (Ellis), 1755.

Zanzibar.

68. *Plumularia spiralis* Billard, 1913. (30.)

Seychelles, 37 fms. The specimen differs from Billard's description in that the internal thickenings above and below the nodes completely encircle the internodes and are not restricted to the adcauline side. The margin of the hydrotheca is slightly everted anteriorly and the lateral sarcothecæ are longer. An almost complete thickening occurs at the base of the stem-process bearing the pinna. There are present in this position two axillary

sarcothecæ, median raised perforations, while the third sarcotheca is borne higher up on the process than figured by Billard. A single cauline sarcotheca is present between the consecutive pinnæ.

69. *Plumularia wasini* n. sp. (Plate **26**, fig. 23 and Fig. 1.)

Wasin, 10 fms. The colony is in the form of plumose tufts, 3 cms. high. The hydrocaulus is monosiphonic, divided transversely at long intervals; the basal portion is provided with two lateral rows of sarcothecæ. The internodes of the pinnate region carry two lateral rows of sarcothecæ and a varying number of pinnæ, arising alternately. The pinnæ are divided into hydrothecate and non-hydrothecate internodes by alternating transverse and oblique nodes. The non-hydrothecate internodes bear two median sarcothecæ on the anterior faces, except in the case of the first internodes, on each of which only one is present. The hydrothecæ are large, campanulate, free from their pinnæ for more than half their length. The margin is even and the aperture directed upwards and forwards. The infra-calycine sarcotheca is small, not reaching above the base of the hydrotheca; the laterals are pedunculate, the peduncles being applied to the walls of the hydrothecæ, while the sarcotheca itself reaches to the level of the margin. A median supra-calycine sarcotheca occurs at the point of divergence of the hydrotheca from the internode. A triangular thickening of the anterior wall of internode occurs immediately below the infra-mesial sarcotheca, while smaller ones are present on the opposite face of the oblique node and above and below the transverse nodes.

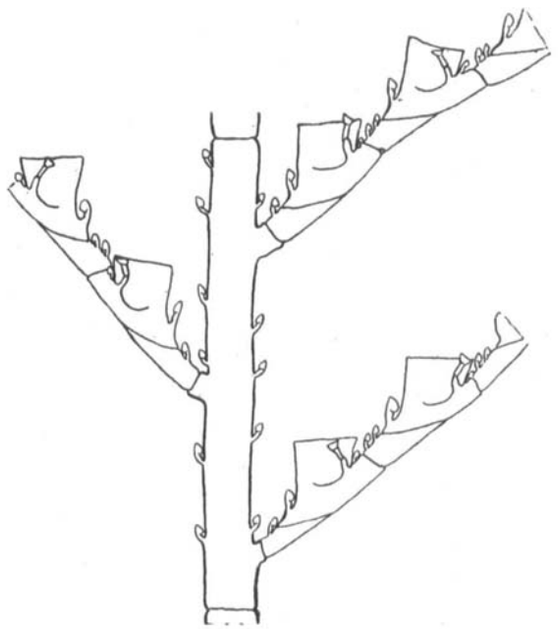

Fig. 1. *Plumularia wasini* n. sp., × 20·6.

Gonosomes arise just below a hydrotheca near the proximal end of a pinna; they are pedunculate, tapering below, and expanding distally. The apertures are broad, circular and flat with single-pieced opercula attached to the adcauline sides. A pair of sarcothecæ is present just above the peduncle on the abcauline surface.

Measurements: length of hydrotheca 0·12—0·15 mm.; breadth of hydrotheca at mouth 0·21—0·23 mm.; length of cauline sarcothecæ 0·09 mm.; length of infra-mesial sarcothecæ 0·08 mm.; length of lateral sarcothecæ 0·07 mm.; length of supra-mesial sarcothecæ 0·05 mm.; length of gonosome 0·7 mm.; maximum breadth of gonosome 9·53 mm.

70. *Antenella secundaria* (Linnæus), 1788.

Cargados, 45 fms.; Centurion Bank, 10—12 fms.; Saya de Malha, 47 fms.; Wasin, 10 fms.

71. *Aglaophenia cupressina* Lamouroux, 1816.

Cargados, 12 and 10 fms., and Zanzibar. The specimen from Zanzibar is much more lax in habit than the remaining colonies. This is due to the fact that the fascicling tubes are less strongly developed and reach only a short distance along the pinnæ.

Much variation is shown in the character of the hydrothecal margin (compare Bale's Australian forms.)

72. *Aglaophenia delicatula* (Busk), 1852. (36.)

Amirante, 35 fms., and Wasin. The aperture from the mesial sarcotheca into the hydrotheca, a point which could not be determined in Bale's Australian forms, is here clearly seen, and is situated immediately below the point of divergence of the sarcotheca from the hydrothecal wall.

73. *Aglaophenia minuta* Fewkes, 1881.

Cargados, 45 fms.

74. *Thecocarpus brevirostris* (Busk), 1852. (36.) (Plate **26**, fig. 24.)

Amirante, 20—44 and 30—100 fms.; Cargados, 45 fms.; Farquhar Atoll, surface; Saya de Malha, 47 fms.; Praslin, reef; Seychelles, 31 fms. With the exception of the Praslin specimens, the colonies differ from the type in the fact that the hydrothecæ are less recurved and in consequence possess apertures which are directed more upwards and less forwards. The mesial sarcotheca is almost constantly much shorter than in the typical form and is provided with a short free portion. In Bale's specimens from Fiji the cauline sarcothecæ are stated to "be provided with a wide free distal margin"; here they almost always possess two distinct openings. The mature gonosome consists of seven alternating costæ on each side and except for the greater size conforms to Bale's description.

75. *Thecocarpus mammillatus* (Nutting), 1900. (51.)

Wasin, 10 fms., and Zanzibar. The trophosome agrees in all essentials with Nutting's description of the American form. The discovery of the gonosome places the species in the genus *Thecocarpus*. The corbula is very long, consisting of about fifteen alternating leaflets on each side. At their origin the leaflets are narrow; a sarcotheca is borne at the point of divergence from the rachis and a second just beyond the origin on the proximal edge of each leaflet. A short distance beyond their origin the leaflets widen out and become partly fused at their edges. A large triangular space is left between the successive leaflets; this is partially closed by a modified hydrotheca in connection with which are a pair of lateral sarcothecæ. Smaller additional gaps are left between the leaflets further from the rachis. The distal border carries a row of five canaliculate sarcothecæ, and, in addition, the lower margin of the proximal pair of leaflets carries a sarcotheca on the outer edge and two more on the lower margin immediately beyond the point of origin. One or two slightly modified hydrothecæ are present on the rachis below the corbula.

76. *Thecocarpus laxus* (Allman), 1876. (2.)

Cargados, 30 fms.

77. *Thecocarpus* sp. Wasin. In the absence of the hydrosome this species cannot be identified with certainty. A single large corbula only is available for examination. It consists of a rachis bearing near the base five consecutive hydrothecæ and beyond these nineteen pairs of alternating leaflets. The basal hydrothecæ are short and broad. The aperture is directed upwards and forwards; the margin has eight blunted teeth, and a small keel is present on the anterior wall; posteriorly the wall is thickened to form an incomplete intrathecal septum. The infra-mesial sarcotheca is almost completely adnate, reaching to about

half the height of the hydrotheca, while the lateral pair do not overtop the margin. The corbula is completely closed except for a slight gap between the basal and second leaflets. Arising from the rachis are, proximally, a fan-shaped appendage bearing usually five sarcothecæ on its upper edge, a hydrotheca of the same size as those on the base of the rachis with a pair of lateral sarcothecæ, of which the one on the distal side is small, and distally, the leaflet, bearing from seven to ten sarcothecæ on the anterior margin. The basal leaflet is smaller than the rest, and bears five rather irregularly placed sarcothecæ on the front edge and three on the posterior. Total length of corbula 7·6 mm. by breadth 1·0 mm.

78. *Cladocarpus alatus* n. sp. (Plate **26**, fig. 25 and Fig. 2.)

Cargados, 30 fms., a single specimen.

The colony is delicate, reaching a height of 10·5 cms. The hydrorhiza is rooting, consisting of a polysiphonic axis which gives off numerous branches, the latter being again subdivided. The hydrocaulus is erect, unbranched, polysiphonic in the proximal portion, the fascicling tubes not completely surrounding the axial, but leaving the latter exposed on the anterior face. A single row of sarcothecæ is borne on the exposed face from a short distance above the base. Pinnæ are restricted to the distal 3 cms. of the stem and are carried on well-marked processes arising from the antero-lateral face of the stem. The processes are provided with a sarcotheca at the base and are cut off transversely at the distal end. Between the pinnæ the stem has about four cauline sarcothecæ in one row on the anterior side. No trace of nodes can be seen.

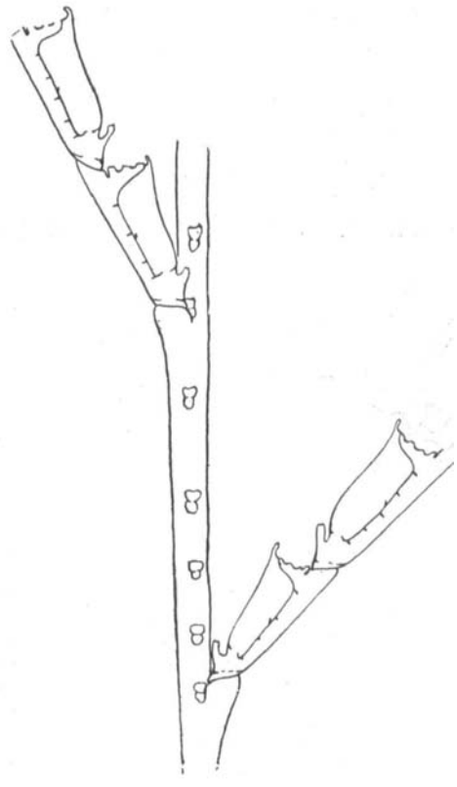

Fig. 2. *Cladocarpus alatus*, × 20·6.

The pinnæ are divided into regular internodes by oblique joints. The hydrotheca is long and tubular, expanding slightly in the distal portion. The margin is provided anteriorly with a large blunted tooth, inwardly curved, while laterally it is obscured by the fusion with it of the lateral sarcothecæ. These sarcothecæ are in the form of large processes arising from the distal part of the internode and reaching in the majority of cases almost to the median tooth of the hydrotheca. On their upper margin they carry near their origin a large aperture, directed upwards and raised above the level of the remainder. Further in, nearer the anterior face of the hydrotheca, are two or three more apertures directed upwards, the innermost one on a level with the hydrothecal margin. The edges of the openings are in all cases crenate. The hydranth thus emerges between two series of sarcothecal apertures. Below the base of the hydrotheca is a single median sarcotheca, not reaching above the base of the hydrotheca, tubular in shape, with a small terminal and a large lateral aperture; the edges of the apertures are crenate. A ring of sharply pointed teeth occurs

round the entrance into the hydrotheca, and a small flap of perisarc is present about half-way up the adcauline wall, projecting into the hydrothecal cavity. The internodes of the pinnæ have from four to seven internal thickenings, one at the base of the hydrothecæ, one at the base of the processes, and two or three in between. Gonosomes absent.

The length of the alate processes is subject to some variation. In the hydrotheca the typical lateral process is developed on one side, while on the other it stops after the second aperture. The lateral margin of the hydrotheca is thus exposed and is seen to be perfectly straight. In another instance the process stops on both sides after the third aperture about half-way along the lateral wall. In several cases the third and fourth apertures are confluent, resulting in a slit-like opening.

Measurements: distance between hydroclade-bearing processes 1·05—1·10 mm.; length of internodes of pinna 0·55—0·6 mm.; length of hydrotheca to base of median tooth 0·38—0·49 mm.; length of median tooth 0·04 mm.; breadth of hydrotheca just above base 0·13 mm.; breadth of hydrotheca at mouth 0·18 mm.; length of mesial sarcotheca 0·05 mm.; length of lateral sarcothecal processes 0·15 mm.; length of proximal aperture of process 0·03 mm.

79. (?) *Cladocarpus plumularioides* n. sp. (Fig. 3.)

Cargados, 30 fms.

The material, which is tentatively referred to a new species, is fragmentary, consisting of a main stem and four pinnæ. The stem is monosiphonic, the distal and proximal parts being absent. Transverse nodes occur at intervals and are obscurely marked. The cauline internodes bear a pinna from a process near the distal end; three sarcothecæ are present between the pinnæ and one always occurs immediately above and in contact with the hydrocladial process. The pinnæ are alternate, divided by slightly oblique nodes; the internodes bear a hydrotheca with infra-mesial and lateral sarcothecæ, also a single median sarcotheca a short distance above the hydrotheca. The hydrothecæ are tubular, long, with a sinuous margin and an anterior blunted, inwardly curved tooth. The infra-mesial sarcotheca is very short, not reaching the base of the hydrotheca, and with a wide terminal aperture. The lateral sarcothecæ are similar in character and do not overtop the lateral margins of the hydrotheca. The internodes are provided with more or less well-developed internal thickenings opposite the bases of the hydrotheca and the lateral sarcotheca and one or two between. In one instance a non-hydrothecate internode, bearing only a sarcotheca, is interposed between two typical internodes.

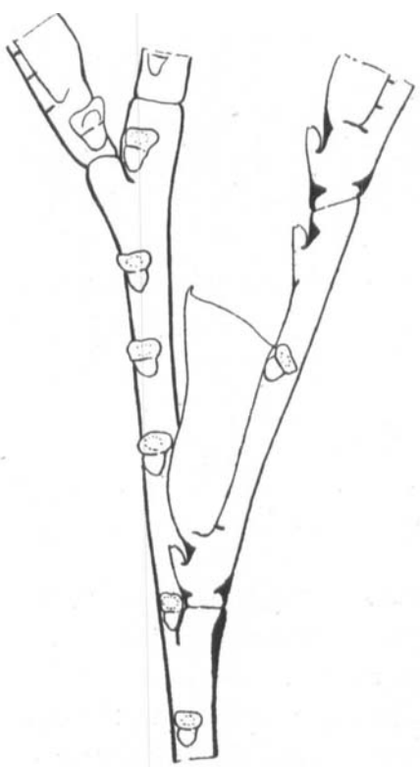

Fig. 3. *Cladocarpus plumularioides* n. sp., × 41·3.

Gonosomes are absent. In the absence of the gonosome this species is referred to the genus *Cladocarpus* on account of the form of the hydrothecæ and the sarcothecæ. It resembles however the

genus *Plumularia* in the presence of a sarcotheca above the hydrotheca on the same internode.

Measurements: length of stem internode 0·85 mm.; length of hydrocladial internodes 0·90—1·15 mm.; length of hydrotheca 0·53—0·62 mm.; breadth of hydrotheca at base 0·08—0·09 mm.; breadth of hydrotheca at mouth 0·22—0·24 mm.; length of infra-mesial sarcotheca 0·12—0·13 mm.; length of lateral sarcotheca 0·11 mm.; length of supra-mesial sarcotheca 0·11 mm.

80. *Lytocarpus hornelli* Thornely, 1904. (65.) (Plate **26**, fig. 26 and Fig. 4.)

Amirante, 25—80 and 29 fms.; Praslin.

The first specimen from Amirante reaches a height of 4·5 cms. The main stem is fascicled for the greater part of its length and bears alternate branches at regular intervals and secondary alternating pinnæ. Transverse sections of the proximal part of the stem show five large tubes and three smaller, the latter being arranged in a tangential series and continued in this manner into the distal part. The most anterior of the three tubes bears pinnæ only, while the branches arise from the larger tubes. The branches are regularly divided by transverse nodes, each node bearing a pinna from a process near its proximal end. Cauline sarcothecæ are present at the base of each stem-process and mid-way between the process and the next node. The hydrothecæ are tubular with their axes parallel to the long axes of the pinnæ. The margin is simple, everted anteriorly and the aperture directed forwards and upwards. The infra-mesial sarcotheca is tubular, with a long divergent portion directed outwards at a wide angle; there are two apertures, terminal and lateral. The lateral sarcothecæ are similar to the infra-mesial and considerably overtop the hydrothecæ. The internodes are provided with two internal thickenings, one opposite the base of the hydrotheca, the other at the base of the lateral sarcothecæ. Gonosomes absent.

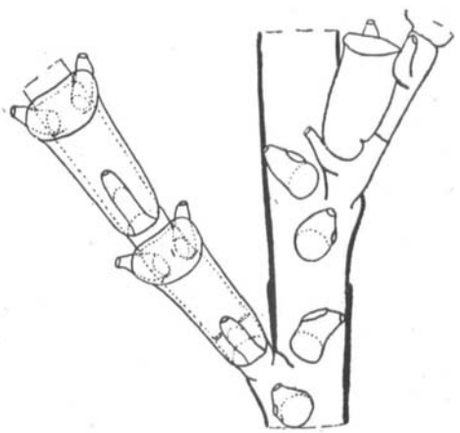

Fig. 4. *Lytocarpus hornelli.* Hydrocaulus and base of pinnæ; hydrothecæ, anterior view; × 41·3.

The specimens under consideration differ from the Ceylon type in the greater length and much greater angle of divergence of the mesial sarcothecæ and in the absence of "strings of nematophores" between the upper branchlets.

Measurements:	Ceylon	Amirante
Length of hydrothecate internodes	0·32—0·35 mm.	0·27—0·28 mm.
Length of entire mesial sarcotheca	0·18—0·2 mm.	0·21—0·22 mm.
Length of free portion of mesial sarcotheca...	0·5 mm.	0·8 mm.
Length of lateral sarcothecæ	0·11 mm.	0·12—0·13 mm.
Length of free portion of lateral sarcotheca...	0·4 —0·5 mm.	0·4 —0·5 mm.
Breadth of hydrotheca at mouth	0·11—0·12 mm.	0·13—0·14 mm.
Length of hydrotheca at mouth	0·25—0·27 mm.	0·24—0·25 mm.

81. *Lytocarpus philippinus* (Kirchenpauer), 1872.

Cargados, 24—35 fms. (in 5 dredgings); Providence, 50—78 fms.; Saya de Malha, 150 fms.; a piece in plankton, off last bank; Zanzibar. As has been noted in previous records, the trophosome is subject to much variation. The Zanzibar colonies especially are noteworthy on account of the small angle of flexure of the hydrothecæ, in consequence of which the aperture is directed upwards more than normally. The character of the hydrothecal margin and the length of the sarcotheca generally show differences in detail. The structure of the gonosome on the other hand is remarkably constant. In the specimen from plankton the internodes are longer than usual and the ends of the pinnæ are produced beyond the hydrothecate portion into long, slender stolons which are slightly swollen at their terminations.

82. *Lytocarpus philippinus* subsp.

Salomon, Chagos. The subspecies is represented by a few broken colonies about 3 cms. high. It differs from the typical *L. philippinus* in the following characters: (1) the smaller angle of curvature of the hydrotheca and the consequent different direction of the aperture; (2) the more strongly developed and longer infra-mesial sarcotheca; (3) the incipient nature of the intrathecal ridge, its development never exceeding that of a thickening of the anterior wall, but this thickening varying in degree in different hydrothecæ; (4) the occurrence of one gonangium only on the phylactocarp, the rachis being short and extending only a little way beyond the gonangium.

83. *Lytocarpus phœniceus* (Busk), 1852. (36.)

Amirante, 22—85, 36, 39 and 12—18 fms.; Cargados, 45 fms.; Praslin, reef; Wasin; Zanzibar. As in previous records, the character of the hydrotheca shows a certain amount of variation in details. In the Wasin form the hydrothecal margin possesses irregular blunted teeth; the lateral sarcothecæ are adnate to the hydrothecæ, with their long axis parallel to that of the mesial sarcotheca. The colony shows a quantity of dark pigment in the tissues. The Cargados specimen most nearly resembles Bale's figure of the variety from Gloucester Passage, but differs in the presence of three internodal thickenings. Three similar thickenings occur in the colonies from Zanzibar, but here the hydrothecal margin is merely sinuous. In the remaining colonies the hydrocladial internodes almost constantly possess two internal thickenings. At the base of each pinna are two sarcothecæ, also a perforation on the stem-process which bears the pinna.

84. *Lytocarpus singularis* Billard, 1913. (30.)

Providence, 50—78 fms.

85. *Halicornaria ferlusi* Billard var. *brevis* n. var. (Plate **26**, fig. 27 and Fig. 5.)

Wasin, 10 fms., four colonies. The maximum height is 18 cms. The hydrorhiza is rooting, monosiphonic, showing branching and anastomosing twigs. The hydrocaulus is erect, rigid and unbranched, and strengthened in the proximal part by upgrowths from the hydrorhiza. These upgrowths are branching and closely applied to the hydrocaulus. Above this region the hydrocaulus is simple, circular in section and with very thick perisarc. The proximal part of the stem is without pinnæ; the cladophores, from which the pinnæ

have fallen, appear as thick-walled, rounded projections, occurring almost to the base of the stem, through the region of the fascicling tubes. The hydrocaulus is regularly divided by oblique nodes, the consecutive nodes slanting in opposite directions and very well marked, giving a rigid appearance to the proximal part of the colony.

Fig. 5. *Halicornaria ferlusi* var. *brevis* n. var. Portion of hydrocaulus and pinnæ, with gonosomes in end view, × 26·6.

The pinnæ are alternating, borne on the stem-processes which arise from the antero-lateral face of the internodes. The processes are provided with three large wing-like sarcothecæ with four or five apertures, the sarcothecæ being anterior, posterior, and ventral in position. The pinnæ are divided by transverse nodes. The hydrotheca is cup-shaped, with the aperture directed upwards and forwards. The margin has a small median anterior tooth and a second similar one postero-lateral in position, while between the two the margin is slightly sinuous. The posterior wall is extremely thick, and the opening into the base surrounded by a ring of pointed teeth. The infra-mesial sarcotheca is completely adnate, overtopping the hydrotheca for a short distance. The distal end is trifid, the median portion being longer than the lateral. The lateral sarcothecæ are in the form of wing-like processes similar to those of the stem and opening by four or five apertures.

Gonosomes arise from the anterior face of the stem-processes which bear the pinnæ. On the entire colony they form two long rows on the front of the stem, their extreme whiteness showing up against the brown of the pinnæ and stem. They are pedunculate, truncate, with the mouth aperture sunken. The mouth is circular, surrounded by a double ring of highly refractive discs.

Measurements: length of hydrotheca 0·23 mm.; breadth of hydrotheca at mouth 0·19—0·20 mm.; length of mesial sarcotheca 0·30—0·32 mm.; length of gonosome 0·85—0·87 mm.; maximum breadth 0·7 mm.

86. *Halicornaria longicauda* Nutting, 1900. (51.)

Amirante, 36 fms.; Seychelles, 20 fms. The colonies show the type of branching described by Ritchie, *i.e.*, a main axis bearing alternating hydrocladia and incompletely surrounded by hydrorhizal tubes which at intervals turn off and become branches. Three cauline sarcothecæ are present at the base of the hydrocladia, two anterior and one posterior in position. The aperture of the hydrotheca is directed upwards and forwards; the margin has distinct teeth, the postero-lateral one being large and directed upwards and outwards. The posterior margin is sinuous. The mesial sarcothecæ are all of the short type of Ritchie, with a thickened anterior wall.

87. *Halicornaria hians* (Busk), 1852. (36.)

Providence, 50—78 fms.

88. *Halicornaria copiosa* n. sp. (Plate **26**, fig. 23 and Fig. 6.)

Amirante, 22—85, 36 and 20—44 fms.; Wasin, 10 fms. The species is represented by several large and well-developed colonies, the largest reaching a height of 26 cms. and an expanse of 20 cms. The main stem and branches are strongly fascicled almost to their extreme ends. The primary branches arise from the main stem at irregular intervals, while the axial tube also bears ultimate pinnules on its anterior face throughout its length. The primary branches give rise to secondary and tertiary ones, while all bear pinnules similar to those carried by the main stem. The ultimate pinnules consist of three or four segments, and arise from distinct processes of stem or branch; these processes are flanked by two sarcothecæ.

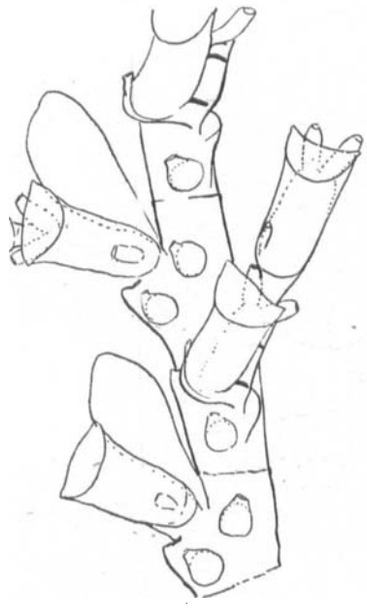

Fig. 6. *Halicornaria copiosa*. Secondary branch, showing pinnules and gonosomes, × 41·3.

The pinnules are divided transversely by very constricted nodes. The hydrothecæ are tubular, with the aperture directed upwards and forwards; the margin of each is provided with a large triangular lateral tooth. The adnate portion of the infra-mesial sarcotheca reaches to about half the height of the hydrotheca, while the divergent portion is very short, with terminal and lateral apertures, and a third aperture into the hydrotheca. The lateral sarcothecæ are tubular, directed upwards and slightly overtopping the hydrothecæ. The internodes are provided with two or three internal thickenings, also a thickening below the base of the hydrotheca on the abaxial side.

Gonosomes arise just above the base of the proximal hydrotheca of a pinnule; they are oval in shape, with indistinct peduncles passing imperceptibly into the body of the gonosome. In the young forms the apex of a gonosome is distinctly convex, but more flattened when older and with an operculum consisting of a single flap.

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EXPLANATION OF PLATES **24—26.**

PLATE **24.**

Fig. 1. *Halecium gardineri* n. sp.
A, × 20·6. B, C, showing varying position of sarcothecæ, × 41·3; D, male gonosome, × 41·3.

Fig. 2. *Zygophlax recta* n. sp.
A, portion of colony, × 16; B, single hydrotheca with two lateral sarcothecæ, × 41·3.

Fig. 3. *Cryptolaria rectangularis* n. sp., × 27·3.

Fig. 4. *Campanularia chelonicæ* Allman, × 20·6.

Fig. 5. *Campanularia corrugata* Thornely, × 20·6.

Fig. 6. *Sertularia brevicyathus* (Versluys), pinnate variety.
A, × 16·6; B, × 20·6.

Fig. 7. *Sertularia marginata* (Kirchenpauer).
A, × 16·6; B, × 20·6.

Fig. 8. *Sertularia turbinata* Lamouroux. End of stolon, × 27·3.

Fig. 9. *Sertularella conica* Allman, var., × 16·6.

Fig. 10. *Sertularella thecocarpa* n. sp.
A, colony showing branch and collapsed gonothecæ, × 27·3; B, gonotheca, × 27·3.

Figs. 11 and 12. *Pasythea heterodonta* n. sp.
11. A, proximal part of colony, × 20·6; B, distal part, × 20·6.
12. Gonosome, × 20·6.

Plate 25.

Fig. 13. *Thuiaria tubuliformis* (Mark.-Tur.). Part of colony from Egmont reef, × 16·6.

Fig. 14. *Diphasia varians* n. sp.
A, colony from Saya de Malha, × 20·6; B, colony from Amirante, × 20·6; C, distal portion of hydrotheca of colony from Cargados, × 41·3.

Fig. 15. *Synthecium dentigerum* n. sp.
A, portion of colony, showing stolon, × 16·6; B, hydrothecæ, × 41·3.

Fig. 16. *Plumularia alternata* (Nutting).
A, small type of gonosome, × 20·6, axillary hydrotheca omitted; B, large type of gonosome, × 20·6, axillary hydrotheca omitted.

Fig. 17. *Plumularia corrugata* Nutting, × 41·3.

Fig. 18. *Plumularia crosslandi* n. sp.
A, portion of hydrocaulus with pinnæ, × 41·3; B, base of pinna with front view of hydrotheca, × 83·3; C, gonosome, anterior face, and D, gonosome, posterior face, × 41·6.

Fig. 19. *Plumularia multithecata* n. sp.
A, hydrocaulus and base of pinna, × 41·3; B, lateral view of hydrotheca, × 83·3; C, anterior view of hydrotheca, × 83·3; D, posterior view of internode, × 83·3.

Plate 26.

Fig. 20. *Plumularia nova* n. sp., × 20·6; on *P. alternata* (Nutting).

Fig. 21. *Plumularia providentiæ*, n. sp. A, × 20·6; B, × 41·3.

Fig. 22. *Plumularia quadridentata* n. sp.
A, lateral view of hydranth, × 20·6; B, anterior view, × 20·6.

Fig. 23. *P. wasini* n. sp.
A, hydrotheca, × 41·3; B, gonosome, × 20·6.

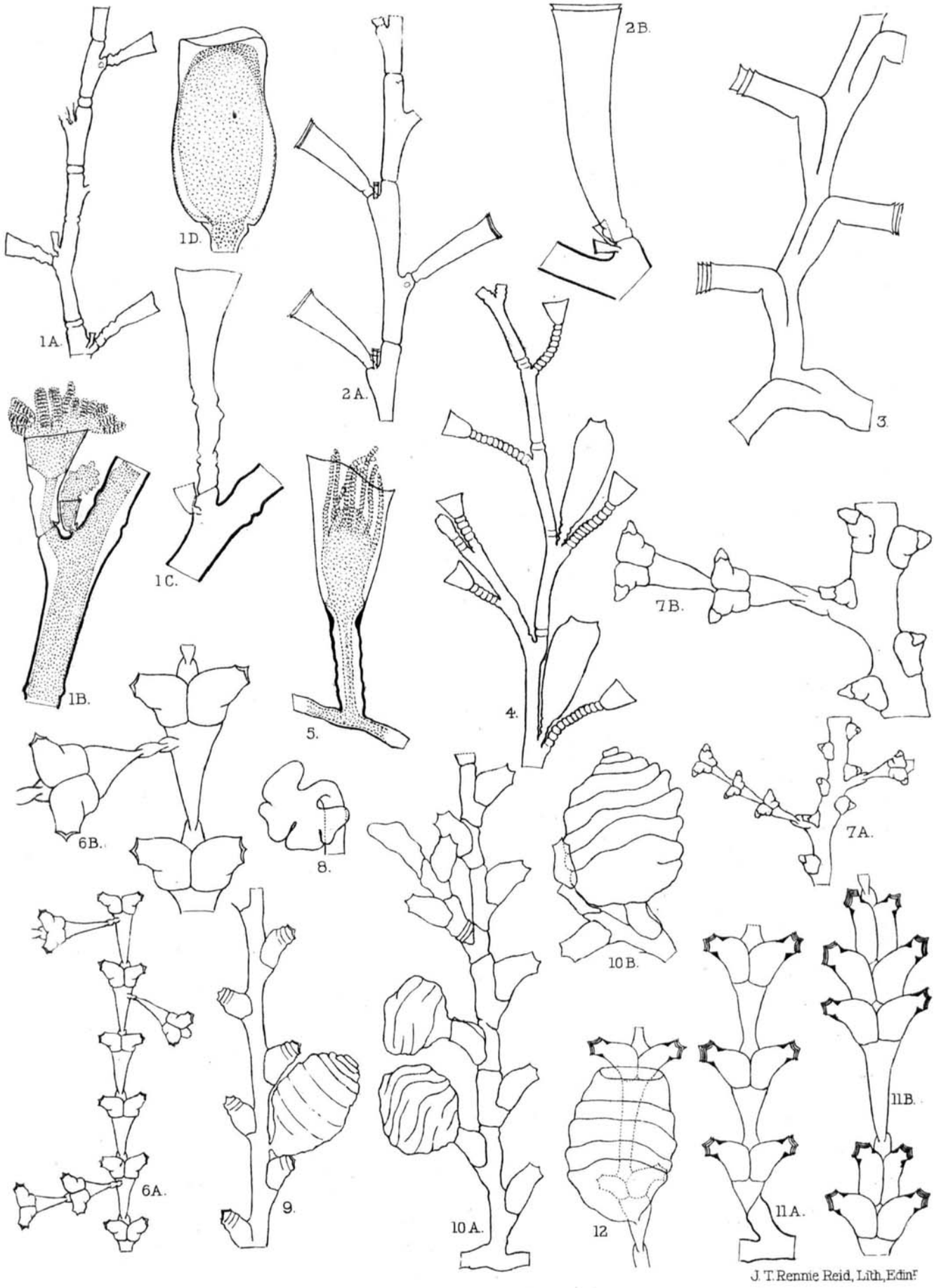
Fig. 24. *Thecocarpus brevirostris* (Busk).
A, specimen from Cargados, × 41·3; B, hydrocaulus and base of pinna, × 41·3; C, corbula, × 20·6.

Fig. 25. *Cladocarpus alatus* n. sp.
A, hydrothecæ, showing variations in length of lateral sarcothecæ, × 41·3; B, lateral sarcotheca with two apertures, × 41·3.

Fig. 26. *Lytocarpus hornelli* Thornely. Hydrothecæ, lateral view, × 41·3.

Fig. 27. *Halicornaria ferlusi* Billard var. *brevis* n. var.
A, hydrothecæ, lateral view, × 40·3; B, hydrotheca, anterior view, × 40·3; C, gonosome, lateral view, × 21·6.

Fig. 28. *Halicornaria copiosa* n. sp. Lateral view of hydrothecæ, × 40·3.



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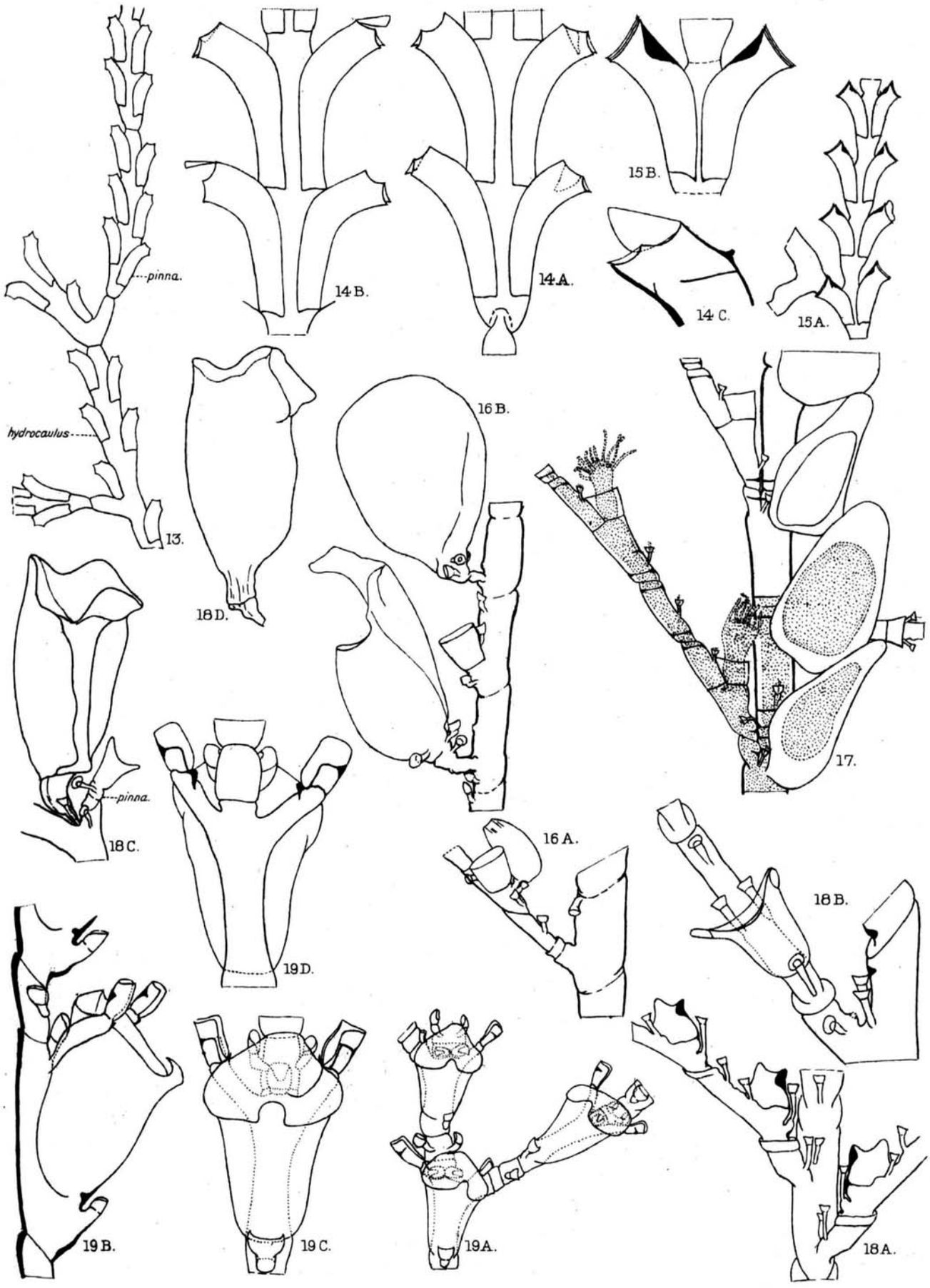

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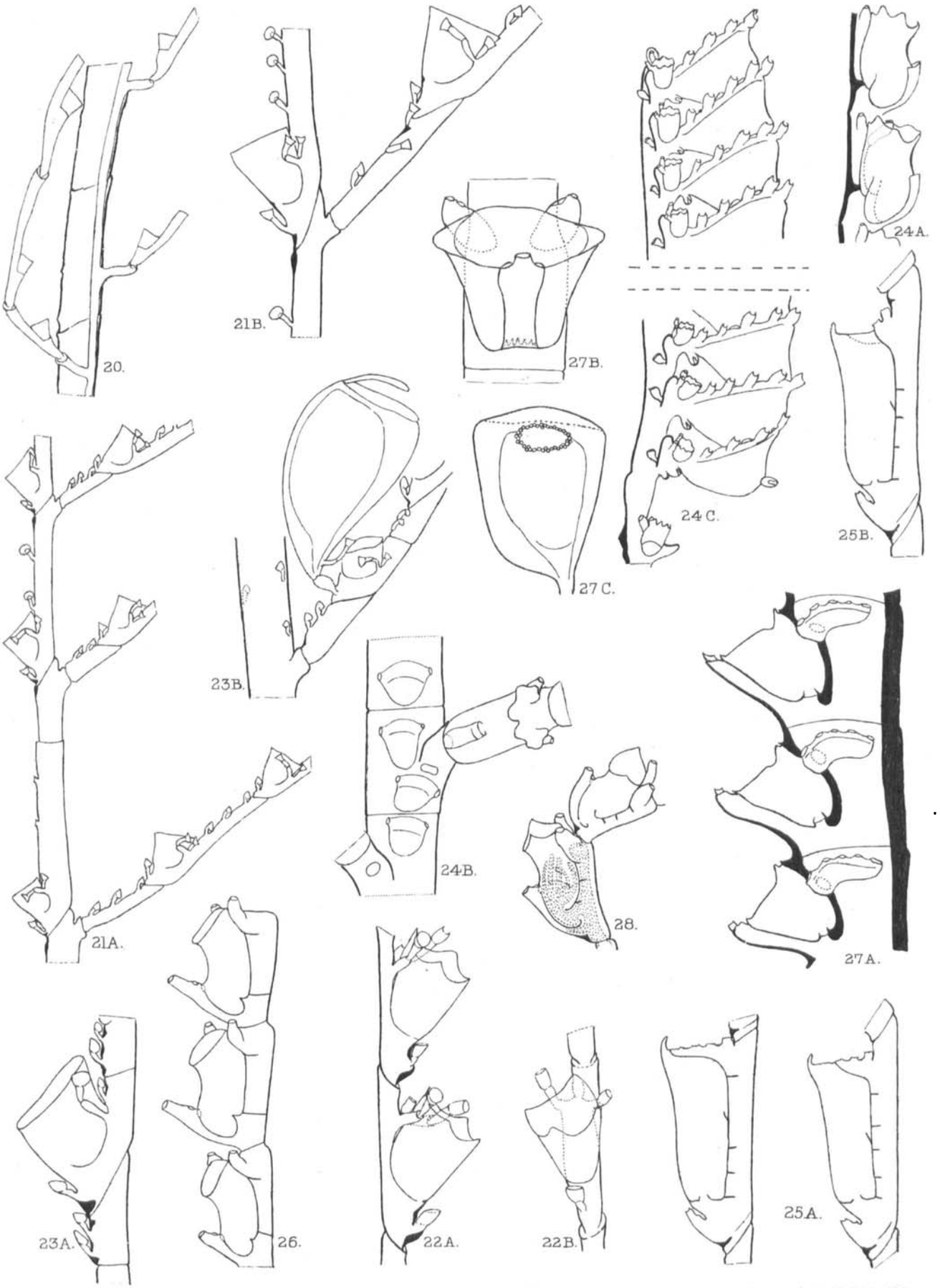

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