

VI. *A Description of the Madreporaria dredged up during the Expedition of H.M.S. 'Porcupine' in 1869 and 1870.—Part II.* By Professor P. MARTIN DUNCAN, M.B. (Lond.), F.R.S., President of the Geological Society.

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[PLATES XLIII.—XLV.]

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I. INTRODUCTION.

THE first part of this description of the corals dredged up by H.M.S. 'Porcupine,' under the direction of Dr. Carpenter, C.B., F.R.S., and Professor Wyville Thomson, F.R.S., was read on May 16th, 1871, and has been already published in the Transactions of the Society (vol. viii. pt. v.). A certain number of specimens remained undescribed on account of their admixture with other matters dredged up, and partly on account of their difficulty of determination. It was intended that not much attention should be paid to them until after more specimens of deep-sea corals should have been received, as it was manifestly desirable that one course of study should complete this by no means easy description and analysis of the corals of the deep sea. During the voyage of the 'Challenger' a considerable number of species of deep-sea forms of Madreporaria have been collected; but as it appears, from a communication to the Royal Society by Mr. Moseley, one of the staff of the 'Challenger,' that the species dredged up will be described by him, I think it best now to offer this concluding essay to this Society. The interesting and most valuable communication on the deep-sea corals dredged up by the 'Hassler Expedition,' written by Alexander Agassiz and L. F. de Pourtales, has been published since the first part of this essay appeared; and whilst my former communication was in the press I had the advantage of receiving Count Pourtales's descriptions of the deep-sea corals collected in the Gulf-stream Expeditions in 1867–1869. Both of these works have been of the greatest use to me. I include also some notes on some of the species already described.

## II. LIST OF NEW SPECIES, AND TABLE OF THEIR CLASSIFICATION.

*ZOANTHARIA SCLERODERMATA.*

## Section APOROSA.

Family **Turbinoliidæ.**

## Subfamily CARYOPHYLLIINÆ.

## Genus CARYOPHYLLIA.

- Species *Caryophyllia carpenteri*. ✓ No. 9 dredging, 539 fms.  
 — *simplex*. ✓ No. 9. „ „

## Genus BATHYCYATHUS.

- Species *Bathycyathus minor*. ✓ No. 17. „ 1095 fms.

## Subfamily TROCHOCYATHACEÆ.

## Genus PARACYATHUS.

- Species *Paracyathus insignis*. ✓ Mediterranean. 248 fms.  
 — *monilis*. ✓ „ 60 fms.  
 — *humilis*. ✓ „ „  
 — *inornatus*. ✓ „ „  
 — *africanus*. ✓ Tunis coast. 40 fms.  
 — *costatus*. ✓

## Subfamily TURBINOLIACEÆ.

## Genus GEMMULATROCHUS, gen. nov.

- Species *Gemmulatrochus simplex*. ✓ Mediterranean.

## Genus FLABELLUM.

- Species *Flabellum minus*. ✓ No. 16 dredging. 994 fms.

Family **Astræidæ.**

## Subfamily EUPHYLLIACEÆ.

## Genus BLASTOSMILIA, gen. nov.

- Species *Blastosmilia pourtalesi*. ✓ Mediterranean. Coral zone.

## III. DESCRIPTIONS OF NEW SPECIES, AND NOTES ON DESCRIBED SPECIES.

## Genus CARYOPHYLLIA.

CARYOPHYLLIA CARPENTERI, sp. nov. (Plate XLIII. figs. 28-31.)

The corallum is elongate, curved, and conico-cylindrical; the calice is slightly elliptical; and there is a mark of fracture at the base, the form having been adherent. There is an epitheca reaching to the calicular margin, hiding the costæ; and there are prominences on the external surface, which indicate irregular growth. The septa are barely exsert, are narrower than the costal ends, are not crowded, and are unequal. There are three cycles in six systems; and the pali, which are distinct, are placed before the secondaries. The septal laminae, especially of the secondaries, are wavy and bent in their course; and the tertiaries are smaller, but well developed. The columella is composed of one twisted process.

Height of corallum nearly  $\frac{4}{10}$  inch; diameter of calice  $\frac{1}{2}$  inch.

The specimen was dredged up with *Caryophyllia inskipi*, nobis, in No. 9 dredging, 2nd expedition of the 'Porcupine,' from a depth of 539 fathoms.

The base of the specimen was fractured as the coral was removed from the sea-floor; and the section thus shown is very remarkable. The fracture is round, and shows the inside of the coral, being about  $\frac{1}{30}$  inch in diameter. The septal number is nearly complete there; and two of the primaries, Nos. 1 & 4, are united by a small columella; and pali exist before the secondaries of the complete systems.

This species, had it no epitheca, would evidently come within Pourtales's genus *Stenocyathus* (*op. cit.* No. iv. p. 9); and it is in the neighbourhood of my *Caryophyllia vermiformis* ('Deep-sea Corals,' p. 316).

The generic attributes and alliances of *Caryophyllia* are noticed in the Deep-sea Corals of the first voyage of the 'Porcupine' (Trans. Zool. Soc. vol. viii. pt. v. p. 309).

CARYOPHYLLIA SIMPLEX, sp. nov. (Plate XLIII. figs. 32-34.)

The corallum is long, bent, cylindrical, and increases in diameter towards the calice, which is circular in outline, and shallow. The columella is very small; the septa are complete in two cycles in six systems; and there are a few small septa of the third cycle in some systems. The primary and secondary septa are subequal, and extend far inwards; and the pali are like continuations of the primaries before which they are situated. The septa are not exsert. The epitheca is pellicular, and its ornamentation is of a chevrou pattern; and there are faint lines of costæ, which are slightly prominent here and there. The base is small, and presents a fracture of former adhesion.

Height  $\frac{3}{10}$  inch; breadth of calice  $\frac{1}{10}$  inch.

Locality. No. 9 dredging, 'Porcupine' Expedition; with *Caryophyllia carpenteri*, nobis, from which it differs in its epitheca, costæ, smaller columella, and septal number.

CARYOPHYLLIA POURTALESII, Duncan. Trans. Zool. Soc. viii. p. 317.

This species was described and figured in the former communication to the Zoological Society; and some specimens, which were not examined formerly, are now noticed, in order to explain some points of structure and its distinctness from some other species.

The pali in the fully developed corallite are well developed when the columella has only one twist, and are less so when this structure is more complicated; and this peculiarity has been noticed by Pourtales in *Caryophyllia formosa*, Pourt. The pali are thin and long, but not high; and they are placed before the third cycle of septa, being absent when the fourth and fifth orders are incomplete.

The species has, in external form, some resemblance to *Caryophyllia cornuformis*, Pourtales, and also in the costal arrangement; but this last species has four complete cycles of septa, and the pali are only placed before the secondaries, making it a very marked and peculiar member of the genus.

In order to establish the species *Caryophyllia pourtalesii*, I have again delineated some parts of the specimens, to show the relative size of the costæ and septa, and the size of the pali (Plate XLIII. figs. 1-7.)

Young specimens of the species:—

A young specimen was figured in the former essay (plate xlii. figs. 4-7); and I append the following remarks on another.

The young specimens, like the old, show that they were attached by a round base, which was fractured by the dredge. In the earliest stage there appear to be six primary septa, which are curved, united in two instances, formed of two laminæ, and united to a trabecular columella. Then a small secondary is found between each of them. At this stage the epitheca, which comes eventually to be beautifully granular, is readily separable from the costæ beneath, which are curved (Plate XLIII. figs. 11-14).

As the coral grows, the third cycle appears, and rapidly becomes complete. The septa are wide apart, reach far inwards, and have large papilla-like granules on their sides. The pali are not distinguishable in specimens  $\frac{2}{10}$  inch in height; but there are processes of the single columella which evidently are in relation with the secondary septa, where the tertiaries are complete in a system.

CARYOPHYLLIA INSKIPI, nobis.

This species was described in the first part of this essay (Trans. Zool. Soc. vol. viii. p. 316), but it was not delineated. A figure is now given; and the remarkably deep-seated columella, tall pali, and externally thick septa will be noticed (Plate XLIII. figs. 8-10).

CARYOPHYLLIA CALVERI, nobis. (Trans. Zool. Soc. vol. viii. p. 316.)

This beautiful coral was not figured in the former description of the deep-sea corals, as the specimen was mislaid; it has fortunately been found, and has been compared with its nearest ally, *Caryophyllia antillarum*, Pourtales (Zool. Results of Hassler Exped. i. p. 34). Both have a thick wall, and exert primary and secondary costæ; but the Barbadian form has them less so than the other, and its costæ are more developed. Probably they are races of the same species. One specimen,  $\frac{4}{10}$  inch, exhibits beautiful costæ, subequal, granular, and flat. (Plate XLIII. figs. 15-27.)

#### Genus BATHYCYATHUS.

BATHYCYATHUS MINOR, sp. nov. (Plate XLV. figs. 1-4.)

A small coral, adherent by a broad base to the costæ of a dead *Bathycyathus atlanticus*, nobis, has a circular calice, four cycles of septa, some of which are exsert, but all are largest at the costal ends. The costæ are very small inferiorly and granular. They increase in size as the form expands near the widely open calice.

The columella is small, and the pali are thin and long.

Height  $\frac{3}{10}$  inch; breadth of calice  $\frac{1}{4}$  inch.

BATHYCYATHUS MINOR, the young coral. (Plate XLV. figs. 7-9.)

This is a coral on the septum of an old *Bathycyathus*; and it is about  $\frac{1}{30}$  inch broad. It has a broad base, which slopes to the calice, the wall being low, and the six primary septa exsert.

The calice is open, and there are six primaries and six secondaries and a small columella.

A coral more advanced in growth is on the stem of a larger form; the septa are numerous, and the pali are irregularly distributed. (See the Plate.)

#### Genus PARACYATHUS.

PARACYATHUS INSIGNIS, sp. nov. (Plate XLIV. figs. 1-3.)

The corallum is attached by a moderate-sized base, above which there is a slight constriction; the general shape is conico-cylindrical, bent and with a widely open calice. The costæ are distinct to the base, are subequal, and each is multigranular. The calice is elliptical and open. The columella is very small, being composed of a few minute processes, and it occupies about one fifth of the calice. The septa are slightly exsert, largely granular laterally, and are moderately crowded. There are four perfect cycles in each of the six systems, and sometimes orders of the fifth cycle in some. The orders of the fourth and fifth cycles tend to approach the intermediate septa towards the inner margin and close to the pali. The septa are short, and reach inwards accord-



ing to their order. The pali are single, tall, sharply granular, not incised; and those of the tertiary septa are short and most distinct

Height  $\frac{7}{20}$  inch; breadth of calice  $\frac{5}{20}$  inch.

Locality, No. 19 dredging, in the 2nd expedition of the 'Porcupine,' 248 fathoms.

The small columella, septal number, large pali, the approach of the higher order of septa towards the next, and the costal structures separate this *Paracyathus* very readily. It belongs to the group with unlobed pali, and is easily distinguished from *Paracyathus pulchellus*, Ed. & H., and *Paracyathus strictus*, Philippi.

It differs from *Paracyathus agassizi* in the smallness of the calice, that of the last-named coral being large and the pali bilobed.

PARACYATHUS STRIATUS, Phil. (Plate XLIV. figs. 4-10.)

In the memoir on the deep-sea corals (No. iv. Illustr. Cat. Harvard Coll. 1871), Count Pourtales describes, with some hesitation, *Paracyathus confertus*, with costæ distinct to the base, not prominent and granular, calice oblong, concave; septa crowded, thin, entire, slightly exsert, in 5 cycles, but with considerable irregularity in some of the systems. Pali numerous, and difficult to distinguish from the papillæ of the columella; and he notices that specimens from the Azores do not differ from this form. In the description of the corals collected in the Hassler expedition, 1874, he notices (p. 38) that he has seen small specimens associated with his type which resemble *Paracyathus de filippi*, Duch. et Mich., of the West Indies; and he suspects them all to be of one species. With regard to the variation of the *Paracyathi*, he observes:—"The characters are very variable—the type figured in my Deep-sea Corals, pl. vi. figs. 11-13, passing into another with deeply sunk columella, the papillæ of which are partly twisted like those of a *Caryophyllia* or *Trochocyathus*, well-defined pali rising much higher, more exsert septa, and a more regular shape. This latter type is the most common at Barbadoes, the other in Florida. The great variability of these forms inclines me to believe that *Paracyathus agassizi*, Dunc., can scarcely be separated, especially from the West-Indian form." There is no doubt that the difficulty of discriminating the species of *Paracyathus* is very great; but, as a rule, the septal number, the size of the columella, the lobed or not lobed character of the pali, and perhaps the costal development are visible early in the coral-growth. I would rather therefore at present continue to maintain *Paracyathus agassizi*. The figure given by Count Pourtales of *Paracyathus confertus* shows distinctly the crowded septa with hardly any interseptal loculi, a large columella, and perfectly well-formed bilobed pali. But in the specimen which I received from him this character of the pali is not present, and the columella is deeply seated, the septa being crowded. Probably, then, there is more than one species of American *Paracyathus* with close septa. On comparing this last specimen with those obtained in the expedition of H.M.S. 'Porcupine,' some of which were figured in the former Memoir on Deep-sea Corals (Trans. Zool. Soc. vol. viii. pt. v.),

the closest resemblance was noticed between it and those described and figured as *Paracyathus striatus*, Philippi. A specimen of this species is in the collection of corals now under consideration; and as it is in a good state of preservation, it is delineated with the *Paracyathus* from 50–100 fathoms dredged by the Gulf-Stream Exploration Survey.

The American form has four perfect cycles and none of the orders of the fifth cycle; it has 24 single-lobed tall pali, of which the tertiaries are the largest; the columella is deeply situated, and its papillæ are distinct and much smaller than the pali. The columella is oval and moderately large; and the costæ are subequal, rather flat, varnished-looking, and minutely cross-grained. (Plate XLIV. figs. 4–7.)

The Mediterranean forms are like the American, with the exception of the costal structures, which in the first are more prominent, less glazed, but still granular. There are four cycles of septa. (Plate XLIV. figs. 8–10.)

I propose, then, to include the coral so kindly given me by Count Pourtales with the Mediterranean *Paracyathus striatus*, Philippi, sp.

*PARACYATHUS MONILIS*, sp. nov. (Plate XLIV. figs. 11–13.)

The corallum has a broad base and open calice, which is not very shallow. The costæ are visible to the base in series of raised lines, with a row of large sharp granules. The columella is formed by a twist of ribbon-shaped sclerenchyma, and is small. The septa are not crowded, are distinct, and the primaries are the largest and the most exsert. They extend far into the fossa; there are four incomplete cycles, and all the laminae are granular. The smaller septa are rather wavy, and correspond to costæ larger than themselves, which do not reach far down. The pali are long, narrow, not prominent, and are placed before the tertiaries and some secondaries where the cyclical arrangement is incomplete. In young specimens with 24 septa the pali are placed before the primaries.

Height  $\frac{2}{10}$  inch; breadth of calice  $\frac{1}{10}$  inch.

Locality, 60 fathoms, seven miles off Rinaldo's Chair, Mediterranean.

*PARACYATHUS INORNATUS*, sp. nov. (Plate XLIV. figs. 14–16.)

The corallum is short, and the base is almost as wide as the calice. The costæ are absent, and are replaced by a plain glistening pellicular epitheca, marked with indistinct shagreen-looking granulations. The septa are not exsert, are numerous, slender, wavy, not crowded, and very unequal. Those of the last cycle are simple projections from the wall. The tertiaries project more inwards, and have a small palus before them as thin as they are. The secondaries are not to be distinguished from the primaries, are granular, and have a papilliform palus.

The columella is very small and trabecular.

Height  $\frac{4}{30}$  inch; breadth  $\frac{1}{10}$  inch.

Locality, Mediterranean Sea.

*PARACYATHUS HUMILIS*, sp. nov. (Plate XLIV. figs. 17-19.)

The corallum is small, with a wide base. The costæ are distinct, large, multi-granular, and subequal; inferiorly they are less separate, and the granular structure is more distinct. The septa are large, and the pali also, for the size of the calice; and the primaries are very exsert and arched, the tertiaries being higher than the secondaries. The pali are large and rather square, and are placed before two cycles of septa. There are three cycles of septa, some of the tertiaries being absent.

The columella is very deep and very small.

Height of corallum  $\frac{4}{30}$  inch; breadth of calice  $\frac{1}{2}$  inch.

Locality, Mediterranean Sea.

*PARACYATHUS AFRICANUS*. (Plate XLIV. figs. 20-22.)

The corallum is conico-cylindrical, with a base more than half the breadth of the calice. The calicular margin is thick, circular in outline, and the fossa is deep. The columella is very small, and the papillæ are distant and small. The septa are in six systems; and there are four cycles in most; but in a few the fourth and fifth orders are wanting or very slightly developed. The laminae are large, not crowded, largely granular at the sides, and extend inwards not quite one third of the diameter of the calice. The primaries are the largest, the most exsert, and are attached to the largest costæ; and all the others project beyond the wall in continuation with the costæ. The secondaries greatly resemble the primaries; and the tertiaries are smaller and less exsert than the rest. Pali are placed before the septa, except those of the higher orders; they are tall, moderately stout, simple, not excised; and those of the tertiary septa are the largest, and are broader than the septal end. All are granular, and slightly bent here and there. The costæ are distinct to the base in some places; but elsewhere there is a dense epitheca; where visible they are slightly spinulose externally, alternately large and small, but rather subequal. Near the calice they are more prominent than elsewhere.

Height  $\frac{3}{10}$  inch; breadth of calice  $\frac{3}{10}$  inch.

Locality: Coast of Tunis, 2nd exped. 'Porcupine,' in 40 fathoms.

*PARACYATHUS COSTATUS*, sp. nov. (Plate XLIV. figs. 23-26.)

The corallum is straight, cylindro-conical, with an attached base and a calice circular in outline and large. The costæ are distinct to the base, slightly rounded, sparsely but distinctly granular, unequal; and the highest are the primaries and those next to them. The calicular margin is circular, sharp; and the fossa is deep; the septa are very slightly exsert, and project but little into the calice; they are thin, separate, unequal, granular, and there is little difference between the primaries, secondaries, and tertiaries. The columella is large, slightly concave, and consists of trabeculæ ending in numerous papillæ. The pali are tall, not long, are distinct from the septa, stouter than these,



not bilobed, but ragged on their inner margin; and the largest are before the tertiary septa. There are four cycles of septa, and many members of the order of the fifth cycle.

Height of corallum  $\frac{1}{2}$  inch; breadth of calice  $\frac{3}{10}$  inch.

Mediterranean. Coral zone.

#### Genus FLABELLUM.

FLABELLUM MINUS, sp. nov. (Plate XLV. figs. 10-13.)

The corallum has a distinct base of attachment and is cylindro-conical and compressed superiorly. The epitheca is well developed, and is marked by close curved lines in festoons, which meet along longitudinal linear grooves that correspond with the inter-laminar space of each septum. The calice is elliptical, not deep, and the margin is sharp and thin. There are 16 septa, there being six primaries, six secondaries, and the tertiaries only developed in four half systems at the opposite ends of the long axis. The septa are wide apart, thin, granular, and slightly exsert.

The height of the corallum is  $\frac{5}{20}$ , and breadth of calice  $\frac{2}{10}$  inch.

Locality: 2nd expd. 'Porcupine,' 996 fathoms, No. 16 dredging.

This small *Flabellum* may not be full-grown; but its broad base (for its size) larger than that of the full-grown specimens of *Flabellum distinctum*, and its low septal number, when of the same size as the young of that species, indicate a satisfactory specific difference.

The species has some structural resemblance to *Flabellum woodsii* of the Crag, especially in the lines on the outside, which corresponds with the middle of the septa; but probably its nearest ally is *Flabellum siciliense*, Ed. & H., of the Sicilian Tertiaries.

#### Genus GEMMULATROCHUS, gen. nov.

The corallum is compound, is fixed by a broadish base, and is conico-cylindrical in shape. The wall is thick; and there is a well-marked epitheca, the costæ being rarely visible. The calice is very deep; and there is a rudimentary columella. The septa are stout. Budding takes place from the wall high up; and the buds ascend and frequently join by their walls to others of different corallites, so as to constitute a bush-shaped corallum.

GEMMULATROCHUS SIMPLEX, spec. nov. (Plate XLV. figs. 18-20.)

The parent corallite bears buds on opposite sides; it has a slight constriction above the base of attachment, a well-developed epitheca, and a rather elliptical calice. The septa are distinct, stout, granular, and short, not reaching far inwards; there are six systems; and the fourth cycle is incomplete in all but one. The primaries are the

largest and longest, but they are barely exsert; and the secondaries often have a tertiary united to them very low down in the very deep calice, near the rudimentary columella. The calicular margin is stout.

Height  $\frac{4}{10}$  inch; breadth of calice  $\frac{2}{10}$ -inch.

The buds are bent slightly; and the smaller ones have three cycles of septa.

The form resembles *Blastotrochus*; but the buds do not fall off, but remain to form the tuft-like corallum. It is a genus allied to *Smilotrochus*, Ed. & H., and *Onchotrochus*, nobis; but the gemmation and epitheca separate it.

Much resembling in its calice, except in the thick margin, *Cœnocyathus anthophyllites*; this species, however, has no pali.

Locality: Northern shores of Mediterranean, below tide-marks.

#### Genus BLASTOSMILIA, gen. nov.

The corallum is compound; and there are repeated gemmations from the wall of the parent corallite, and occasionally from the walls of buds. The corallites are conico-cylindrical, long, bent, except the parent; and the calice is circular in outline and deep. The wall is thin, and is covered with a granular epitheca, the rudimentary costæ being only visible close to the calices. The columella is rudimentary, but exists as trabeculæ from the septal ends. The septa are very thin, slightly exsert, not incised, project but little into the calice; and the primaries, and sometimes the secondaries, unite at the base of the fossa with the small deeply seated columella. There are six systems of septa; and the fourth cycle is usually incomplete in some systems.

The dissepiments are wide apart, and are formed at the bottom of the calice by the septal ends becoming oblique and wide and occluding the space below.

#### BLASTOSMILIA POURTALESI, sp. nov. (Pl. XLV. figs. 14-17.)

The corallum has a long parent corallite, with long cylindroid curved buds, curving more or less in oblique series. The septa are unequal, the primaries being larger than the secondaries; they are also slightly exsert. The costæ near the margin are broader than the septa; and the margin is unequally circular in young specimens, the intercostal spaces bulging out in elegant curves. The septa of the parent are in six systems; and the fourth cycle is in all of them; but there are only three cycles in the next in size.

The columella is small.

Height nearly  $1\frac{3}{4}$  inch; breadth of parent calice  $\frac{3}{10}$  inch.

Locality: Mediterranean, from red-coral zone.

Count L. F. Pourtales, in his admirable description of the Deep-sea Corals (Illustr. Catalogue, No. iv. p. 21), described and figured a coral, *Cœlosmilia fecunda*, Pourt., which evidently has the closest alliance with this *Blastosmilia*. He remarks, after describing his species, that the generic affinities are a little doubtful, and distinguishes

it from the Cladocoraceæ and from my *Onchotrochus* (Monog. Brit. Foss. Corals, 2nd series, part ii. No. 1, p. 4, 1869), and places it in the genus *Cælosmilia*.

This genus I carefully analyzed in the monograph just referred to (p. 5); and out of 15 species I have described six. It is a subgenus of the genus *Trochosmilia*; and I have never noticed gemmation from any corallite of any species.

Believing that the new genus is a good one, and that it is better to form one for the two species, I venture to include *Cælosmilia fecunda*, Pourt., in it, and to term it *Blastosmilia fecunda*, Pourt. The American species ranges from 63 to 315 fathoms, and affords another instance of the affinity of the West-Indian and Mediterranean marine faunas.

A further possible alliance is indicated in the affinities of the species with *Cænosmilia arbuscula*, Pourtales (Zool. Results of Haslar Expedition, pt. i. p. 39, 1874). The genus *Cænosmilia* is thus defined:—"This genus is formed to receive the *Parasmilia* propagating by germination, and thus becoming compound. Single corallites are typical *Parasmilia*." In the Supplement to the British Fossil Corals I described several *Parasmilia*, and was always impressed with the great costal development, and that of the endotheca and columella. But I never found one budding. The costæ in *Cænosmilia arbuscula* are, from the photographic reproduction given, not well developed, nor is the columella. Whilst clearly seeing the distinction between *Blastosmilia* and *Cælosmilia*, I cannot help thinking that the form described by Pourtales is very closely allied to mine.

#### IV. GENERAL REMARKS.

The numbers of the "dredgings" refer to those of H.M.S. 'Porcupine;' and their exact localities and temperatures are stated in the first part of this essay (Trans. Zool. Soc. vol. viii. p. 338).

The *Caryophyllia* now described are remarkable for their low septal number and slender shape. They have each an epitheca; and in *Caryophyllia simplex* it is beautifully marked with a chevron pattern. They come within a section of the genus of which the species *C. vermiformis*, Duncan, described in the former essay, is the type. They are not without affinities to Pourtales's *Stenocyathus*, from the other side of the Atlantic. They are both from deep water in the Atlantic, west of the British Channel.

*Bathycyathus minor*, sp. nov., is without those interesting alliances which rendered the other species with which it was found so interesting. It came from a great depth, off the south-west coast of Spain, in 1095 fathoms.

Six species of *Paracyathi*, all from the Mediterranean, are interesting for the beauty of their construction and their distinctness from the forms already described. The *Parathyathus striatus*, described in the first essay, I believe to be found also in the American part of the Atlantic. One of the new species is remarkable from its entire

want of costæ; and others have them moniliform or multigranular; and a partial epitheca is found in *Paracyathus africanus*. The bathymetrical range is great, or from 480 fathoms to a few feet below tide-mark.

The *Flabellum* is allied to the common form in the Sicilian Tertiaries, *Flabellum siciliense*.

*Gemmulatrochus simplex* is a species of a new genus formed to admit budding Turbinoliidæ without pali. The buds do not fall off, as in *Blastotrochus*, but remain attached to the side of the parent corallum, and grow.

The new genus *Blastosmilia* is a remarkable one, on account of the repeated gemmation from a parent, the presence of endotheca, and the rudimentary costæ and columella.

The remarks on *Caryophyllia calveri* and *C. pourtalesi*, species which were described in the former essay, are included in the notice of them in the description of the species.

These 12 species, added to the 30 described in the former essay, bring the number of species of deep-sea corals dredged up in the voyage of H.M.S. 'Porcupine' to 42. They include a large and predominating number of Turbinoliidæ; and there is no instance of any form possessing cellular exotheca or exothecal structures binding together the corallites, as in reef-builders. One of the species newly described is allied to a fossil form; and thus the alliances with the old coral faunas stand:—42 species found in the recent fauna; 9 of them lived in the Pliocene, 1 in the Miocene, 1 in the Cretaceous, and 5 of the species have alliances with the corals of former ages.

The *résumé* of the peculiarities of the deep-sea corals given in page 337 of the former essay is shown to be correct by the study of the forms described in this.



## DESCRIPTION OF THE PLATES.

## PLATE XLIII.

- Fig. 1. *Caryophyllia pourtalesi*, nobis: nat. size.  
Fig. 2. *Caryophyllia pourtalesi*, nobis:  $\times 5$ .  
Fig. 3. *Caryophyllia pourtalesi*, nobis: septum and pali, magnified.  
Fig. 4. *Caryophyllia pourtalesi*, nobis: calice,  $\times 5$ .  
Fig. 5. *Caryophyllia pourtalesi*, another specimen: nat. size.  
Fig. 6. *Caryophyllia pourtalesi*, another specimen:  $\times 5$ .  
Fig. 7. *Caryophyllia pourtalesi*, another specimen: calice,  $\times 5$ .  
Fig. 8. *Caryophyllia inskipi*, nobis: side view.  
Fig. 9. *Caryophyllia inskipi*, nobis: side view,  $\times 5$ .  
Fig. 10. *Caryophyllia inskipi*, nobis: calice,  $\times 5$ .  
Fig. 11. *Caryophyllia pourtalesi*: young specimens.  
Fig. 12. *Caryophyllia pourtalesi*: magnified 4 times.  
Fig. 13. *Caryophyllia pourtalesi*: calice,  $\times 4$ .  
Fig. 14. *Caryophyllia pourtalesi*: its base,  $\times 4$ .  
Fig. 15. *Caryophyllia calveri*, nobis: a corallum.  
Fig. 16. *Caryophyllia calveri*, nobis: a corallum,  $\times 3$ .  
Fig. 17. *Caryophyllia calveri*, nobis: a calice,  $\times 3$ .  
Fig. 18. *Caryophyllia calveri*, nobis: part of a calice,  $\times 8$ .  
Fig. 19. *Caryophyllia calveri*, nobis: its base,  $\times 3$ .  
Fig. 20. *Caryophyllia calveri*: another form.  
Fig. 21. *Caryophyllia calveri*, nobis:  $\times 5$ .  
Fig. 22. *Caryophyllia calveri*, nobis: its calice,  $\times 5$ .  
Fig. 23. *Caryophyllia calveri*, nobis: a section low down,  $\times 5$ .  
Fig. 24. *Caryophyllia calveri*, nobis: a common form, fractured at base.  
Fig. 25. *Caryophyllia calveri*, nobis: a common form,  $\times 3$ .  
Fig. 26. *Caryophyllia calveri*, nobis: a common form, calice,  $\times 3$ .  
Fig. 27. *Caryophyllia calveri*, nobis: a common form, fractured base,  $\times 5$ .  
Fig. 28. *Caryophyllia carpenteri*, sp. nov.: side view.  
Fig. 29. *Caryophyllia carpenteri*, sp. nov.: magnified.  
Fig. 30. *Caryophyllia carpenteri*: calice,  $\times 6$ .  
Fig. 31. *Caryophyllia carpenteri*: section low down,  $\times 5$ .  
Fig. 32. *Caryophyllia simplex*, sp. nov.: side view.  
Fig. 33. *Caryophyllia simplex*, sp. nov.: side view,  $\times 5$ .  
Fig. 34. *Caryophyllia simplex*: calice,  $\times 5$ .

## PLATE XLIV.

- Fig. 1. *Paracyathus insignis*, sp. nov.: nat. size.  
 Fig. 2. *Paracyathus insignis*: costæ,  $\times 7$ .  
 Fig. 3. *Paracyathus insignis*: calice,  $\times 7$ .  
 Fig. 4. *Paracyathus striatus*, Philippi, sp., American type, syn. *P. confertus*, Pourtales:  
 nat. size.  
 Fig. 5. *Paracyathus striatus*: costæ,  $\times 6$ .  
 Fig. 6. *Paracyathus striatus*: septum and bilobed pali,  $\times 6$ .  
 Fig. 7. *Paracyathus striatus*: calice,  $\times 6$ .  
 Fig. 8. *Paracyathus striatus*, Mediterranean type: nat. size.  
 Fig. 9. *Paracyathus striatus*: costæ,  $\times 6$ .  
 Fig. 10. *Paracyathus striatus*: calice,  $\times 6$ .  
 Fig. 11. *Paracyathus monilis*, sp. nov.: nat. size, on a long stone.  
 Fig. 12. *Paracyathus monilis*: side view, magnified.  
 Fig. 13. *Paracyathus monilis*: calice, magnified.  
 Fig. 14. *Paracyathus inornatus*, sp. nov.: a group.  
 Fig. 15. *Paracyathus inornatus*: side view,  $\times 7$ .  
 Fig. 16. *Paracyathus inornatus*: calice,  $\times 7$ .  
 Fig. 17. *Paracyathus humilis*, sp. nov.: on a stone.  
 Fig. 18. *Paracyathus humilis*: side view,  $\times 7$ .  
 Fig. 19. *Paracyathus humilis*: calice,  $\times 7$ .  
 Fig. 20. *Paracyathus africanus*, sp. nov.: on a rock with polyzoa.  
 Fig. 21. *Paracyathus africanus*: side view,  $\times 7$ .  
 Fig. 22. *Paracyathus africanus*: calice,  $\times 7$ .  
 Fig. 23. *Paracyathus costatus*, sp. nov.: nat. size.  
 Fig. 24. *Paracyathus costatus*: side view,  $\times 5$ .  
 Fig. 25. *Paracyathus costatus*: side view of septa,  $\times 5$ .  
 Fig. 26. *Paracyathus costatus*: calice,  $\times 5$ .

## PLATE XLV.

- Fig. 1. *Bathycyathus minor*, sp. nov.: side view.  
 Fig. 2. *Bathycyathus minor*:  $\times 4$ .  
 Fig. 3. *Bathycyathus minor*: part of the calice,  $\times 4$ .  
 Fig. 4. *Bathycyathus minor*: oblique view of fractured calice,  $\times 4$ .  
 Fig. 5. *Bathycyathus atlanticus*, nobis: showing exsert costæ and septa,  $\times 2$ .  
 Fig. 6. *Bathycyathus atlanticus*: the calice,  $\times 4$ .  
 Fig. 7. *Bathycyathus minor*: young specimen.

- Fig. 8. *Bathycyathus minor*: young specimen,  $\times 6$ .  
Fig. 9. *Bathycyathus minor*: the calice,  $\times 6$ .  
Fig. 10. *Flabellum minus*, sp. nov.: nat. size.  
Fig. 11. *Flabellum minus*: calice,  $\times 6$ .  
Fig. 12. *Flabellum minus*: side view,  $\times 6$ .  
Fig. 13. *Flabellum minus*: showing the septal median division,  $\times 8$ .  
Fig. 14. *Blastosmilia pourtalesi*, sp. nov.: corallum.  
Fig. 15. *Blastosmilia pourtalesi*: a broken calice.  
Fig. 16. *Blastosmilia pourtalesi*: margin of calice,  $\times 3$ .  
Fig. 16 a. *Blastosmilia pourtalesi*: a septum,  $\times 7$ .  
Fig. 17. *Blastosmilia pourtalesi*: calice,  $\times 5$ .  
Fig. 18. *Gemmulatrochus simplex*: nat. size.  
Fig. 19. *Gemmulatrochus simplex*: side view,  $\times 6$ .  
Fig. 20. *Gemmulatrochus simplex*: calice,  $\times 6$ .