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XVI.

THE ACTINIARIA OF TORRES STRAITS. BY ALFRED C. HADDON, M.A., D.Sc.,  
Professor of Zoology, Royal College of Science, Dublin.

(PLATES XXII. TO XXXII.)

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## XVI.

THE ACTINIARIA OF TORRES STRAITS. BY ALFRED C. HADDON, M.A., D.Sc.,  
Professor of Zoology, Royal College of Science, Dublin.

(PLATES XXII. TO XXXII.)

[Read NOVEMBER 17, 1897.]

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THE following account of the Actinaria which have been observed in the Torres Straits is based mainly on the collections made by myself in 1888-9, and supplemented by descriptions published by Saville-Kent in his magnificently illustrated books "The Great Barrier Reef of Australia," and "The Naturalist in Australia."

A large proportion of the species have been anatomically studied by Miss Alice M. Shackleton and myself, and I would like to take this opportunity of thanking her for her share in the following memoir. In our Paper, entitled "Description of some New Species of Actinaria from Torres Straits," and published in the *Proceedings* of this Society in 1893, we described twenty-four new species in addition to the ten new species of Zoantheæ previously published by us in the *Transactions* of this Society (vol iv., ser. II., 1891). One form, *Actinia citrina*, was carefully studied by Dr. A. Francis Dixon (now Professor of Anatomy at University College, Cardiff, S. Wales). I would also like to tender my thanks to my friends Mr. J. E. Duerden (Curator of the Museum of the Institute of Jamaica, Kingston, Jamaica, and formerly of this College); Dr. O. Carlgren of Stockholm; Prof. J. Playfair M<sup>c</sup>Murich of Michigan, and other colleagues.

In the present communication, fifty-five species are recorded from Torres Straits, of which five are now described for the first time; thirty-four were first described by Miss Shackleton and myself; eight by Saville-Kent; and the rest are species which occur elsewhere, and have been described by various zoologists. It is, however, probable that various other species will be recorded from this district in the future.

It will be seen that most of the groups of Actinaria are represented, the most noticeable gaps being the Edwardsiæ, Protactiniæ, Ilyanthidæ, Paractidæ, Dendromelidæ, and of the Phyllactidæ only one species is recorded. With regard to these, it is probable that certain members of most of the deficient groups will be eventually found here. No important tropical family is absent, and indeed very few tropical genera are unrecorded.

Finally, I should offer an apology for the delay in the appearance of this memoir. My attention has been increasingly drawn towards Anthropology, and I have allowed other interests to take precedence of this too long delayed Report.

A word of thanks and of praise is due to my friend Mr. Wilson, the clever scientific artist at Cambridge, who has translated my rough sketches into very excellent representations of the living forms—whatever defects may be subsequently shown to occur in them must solely be credited to me.

I have made a few allusions to genera which are not recorded from Torres Straits, partly to render this Paper more complete, and partly because I am starting once more on my travels, and it will be some years before I can return to my Actinarian studies. I have not given the full synonymy in most cases, as that will be found in the memoirs of Andres, M<sup>c</sup>Murrich, Carlgren, &c., to which I have so often referred.

SYSTEMATIC LIST OF THE GENERA REFERRED TO IN THIS PAPER.

ACTINIARIA.

Tribe I.—EDWARDSIÆ, Hertw.

Family.—EDWARDSIIDÆ, Andr.

Edwardsia, Quatr.		Edwardsioides, Danl.
Edwardsiella, Andr.		Milne-Edwardsia, Carlgr.

Tribe II.—CERIANTHEÆ, Hertw.

Family—CERIANTHIDÆ, M. Edw. & H.

Cerianthus, D. Ch.		Bathyanthus, Andr.
Saccanthus, M. Edw.		

Tribe III.—ZOANTHEÆ, Hertw.

Family.—ZOANTHIDÆ, Dana.

Sub-family—BRACHYCNEMINÆ, H. & S.

Zoanthus, Lam.		Palythoa, Lamx.
Isaurus, Gray.		Sphenopus, Steenstr.
Gemmaria, D. & M.		

Sub-family—MACROCNEMINÆ, H. & S.

Parazoanthus, H. & S.		Epizoanthus, Gray.
Gerardia, Lac.-Duth.		

Tribe IV.—PROTACTINIÆ, M<sup>c</sup>M. (Protantheæ, Carlgr.).

## Family—GONACTINIDÆ, Carlgr.

Gonactinia, Sars.		? Scytophorus, Hertw.
Oractis, M <sup>c</sup> M.		? Halcurias, M <sup>c</sup> M.
Protanthea, Carlgr.		

## Tribe V.—HEXACTINIÆ, Hertw.

## Order I.—ACTINIINÆ, M. Edw.

## Family 1.—ILYANTHIDÆ, Gosse.

## Sub-family.—HALCAMPINÆ, Kwietn. (Halcampomorphinæ, Carlgr.).

Halcampa, Gosse, p.p.		Ilyanthus, Forbes.
Peachia, Gosse (Siphonactinia, D. & K.).		? Eloactis, Andr.

## Sub-family.—HALIANTHINÆ, Kwietn. (Halcampinæ, Carlgr.).

Halianthella, Kwietn.		? Andvakia, Danl.
Halcampa, p.p.		? Halcurias, M <sup>c</sup> M.

## Family 2.—ACTINIDÆ, Gosse (Antheadæ, Hertw.).

Actinia, Browne.		Bolocera, Gosse (Liponema, Hertw.; ? Sideractis, Danl.).
Anemonia, Risso (? Gyrostoma, Kwietn.).		Polystomidium, Hertw.
Condylactis, D. & M.		Macroactyla, n. g.
Antheopsis, Sim.		Myonanthus, M <sup>c</sup> M.
Actinioides, H. & S.		Antheomorphe, Hertw.

## Family 3.—ALICIDÆ, Duerd.

Alicia, Johns.		Bunodeopsis, Andr.
Cystiactis, M. Edw.		? Phymactis, M. Edw.
Thaumactis, Fowl.		

## Family 4.—PHYLLACTIDÆ, Andr.

Phyllactis, M. Edw.		Asteractis, Verr.
Oulactis, M. Edw. & H.		? Phyllodiscus, Kwietn.
Cradactis, M <sup>c</sup> M.		? Triactis, Klunz.
Diplactis, M <sup>c</sup> M.		
Hoplophoria, Wils. (? Viatrix, D. & M.).		

Family 5.—DENDROMELIDÆ, M<sup>c</sup>M.

Ophiodiscus, Hertw.		Lebrunea, D. & M.
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## Family 6.—BUNODIDÆ, Gosse.

Bunodes, Gosse.		Leiotealia, Hertw.
Aulactinia, Verr.		Urticina, Ehr. (Tealia, Gosse).
Izalactis, n. g.		Gyractis, Bov.
? Heteractis, M. Edw.		

## Family 7.—PARACTIDÆ, Hertw.

Paractis, M. Edw.		Actinernus, Verr. (Polysiphonia, Hertw.).
Paranthus, Andr.		Actinostola, Verr.
Anthosactis, Danl.		Pycnanthus, M <sup>c</sup> M.
Stomphia, Gosse.		Cymbactis, M <sup>c</sup> M.
Dysactis, M. Edw.		Kadosactis, Danl.
? Ophiodiscus, Hertw.		Kyathactis, Danl.
Tealidium, Hertw.		
Antholoba, Hertw.		

## Family 8.—SAGARTIIDÆ, Gosse.

## Sub-family.—AIPTASIINÆ, Sim.

Aiptasia, Gosse.

## Sub-family.—SAGARTIINÆ, Verr.

Sagartia, Gosse.		Cereus, Oken (Heliactis, Thomps.).
Cylista, Gosse.		Nemactis, M. Edw.
Gephyra, Koch.		

## Sub-family.—PHELLIINÆ, Verr.

Phellia, Gosse.		? Octophellia, Andr.
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## Sub-family.—METRIDIINÆ, Carlgr.

Metridium, Oken (Actinoloba, Blainv.).		Adamsia, Forbes.
Mitactis, H. & D.		Calliactis, Verr.
		Stelidiactis, Danl.

## Sub-family.—CHONDRACTINIINÆ, Hadd.

Actinauge, Verr.	Paraphellia, Hadd.
Hormathia, Gosse (Chondrac-	Phelliactis, Sim.
tinia, Lützk., Chitonactis,	? Stephanactis, Hertw.
Fisch.).	? Amphianthus, Hertw.
Chitonanthus, M <sup>c</sup> M.	? Ammonactis, Verr.

## Family 9.—MINYADIDÆ, Andr.

Minyas, Cuv.	Nautactis, M. Edw.
Stichophora, Brandt.	Oceanactis, Mos.
Plotactis, M. Edw.	

## Order II.—STICHODACTYLINÆ, Andr.

## Family 1.—CORALLIMORPHIDÆ, Hertw. (Corynactidæ, Andr.).

Corallimorphus, Mos.	? Capnea, Forbes.
Corynactis, Allm.	? Aureliania, Gosse.

## Family 2.—DISCOSOMIDÆ, Klunz.

Discosomoides, n. g.	Radianthus, Kwietn.
Discosoma, Leuck.	Stoichactis, n. g.

## Family 3.—RHODACTIDÆ, Andr.

Rhodactis, M. Edw. & H.	Ricordea, D. & M. (Homactis,
Actinotryx, D. & M. (Platy-	Verr. ; ? Phialactis, Fowl.).
zoanthus, S.-Kent).	Heteranthus, Klunz.

## Family 4.—THALASSIANTHIDÆ, Andr.

Cryptodendrum, Klunz.	Thalassianthus, Leuck.
Heterodactyla, Ehr.	Sarcophianthus, Less.
Actineria, Blainv.	Amphiactis, Verr.

## Family 5.—ACTINODENDRIDÆ, n. f.

Actinodendron, Blainv.	Acremodactyla, Kwietn.
Megalactis, Ehr.	Actinostephanus, Kwietn.

## Family 6.—PHYMANTHIDÆ, Andr.

Phymanthus, M. Edw.	Thelaceros, Mitch.
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[*Incert. sedis* : Physobrachia, S.-Kent.]

## LIST OF SPECIES OF ACTINIARIA FROM TORRES STRAITS.\*

CERIANTHEÆ, . . . *Cerianthus nobilis*, H. & S.

ZOANTHEÆ, . . . *Zoanthus Coppingeri*, H. & S.; *Z. Jukesii*, H. & S.; *Z. Macgillivrayi*, H. & S.; *Z. Australiæ*, (S.-Kent); *Isaurus asymmetricus*, H. & S.; *Gemmaria Macmurrichi*, H. & S.; *G. Mutuki*, H. & S.; *Palythoa Howesii*, H. & S.; *P. Kochii*, H. & S.; *P. cæsia*, Dana (?); *Sphenopus arenaceus*, Hertw.; *Parazoanthus dichroicus*, H. & S.; *P. Douglasi*, H. & S.

## HEXACTINILÆ—I. ACTINILÆ:—

Actiniidæ: *Actinia citrina*, (H. & S.); *Anemonia Ramsayi*, (H. & S.); *A. Kwoiam*, H. & S.; *Actinioides Dixoniana*, H. & S.; *A. Papuensis*, n. sp.; *A. Sesere*, H. & S.; *Macrodactyla aspera*, (H. & S.).

Aliciidæ: *Alicia rhadina*, H. & S.; *Bunodeopsis Australis*, n. sp.

Phyllactidæ: *Hoplophoria cincta*, (H. & S.).

Bunodidæ: *Aulactinia Gelam*, (H. & S.); *Izalactis simplex*, (H. & S.).

Sagartiidæ: *Sagartia Milmani*, H. & S.; *Sagartia plebeia*, n. sp.; *Phellia vermiformis*, n. sp.; *P. sipunculoides*, H. & S.; *P. Devisi*, H. & S.; *Calliactis Miriam*, (H. & S.); *Paraphellia Hunti*, H. & S.; *P. lineata*, H. & S.

Minyadidæ: *Stichophora torpedo*, (Bell).

## ,, II. STICHODACTYLINÆ:—

Corallimorphidæ: *Corynactis hoplites*, H. & S.

Discosomidæ: *Radianthus macrodactylus*, (H. & S.); *R. Malu*, (H. & S.); *Stoichactis Kenti*, (H. & S.); *S. Haddoni*, (S.-Kent): [? *Discosoma nummiforme*, Leuck; ? *D. rubroris*, S.-Kent].

\*The form described by Saville-Kent as *Physobrachia Douglasi* (cf. p. 498), is so imperfectly described that I do not know where to place it. It may prove not to be an Actinarian, but a Madreporarian coral. Kwietniewski has described *Gyrostoma Hertwigi*, from Thursday Island, as a type of a new family, and even of a new tribe, the Isohexactiniæ. I have stated on p. 420 that I believe this species to be a variety of *Anemonia Ramsayi* (H. & S.).

HEXACTINLÆ.—II. STICHODACTYLINÆ—*continued.*

Rhodactidæ: *Rhodactis Howesii*, S.-Kent; *Actinotryx bryoides*, (H. & S.); *A. mussoides*, (S.-Kent).

Thalassianthidæ: *Cryptodendrum adhæsivum*, Klunz; *Heterodactyla Hemprichii*, Ehr.; *H. hypnoides*, S.-Kent; *Actinaria dendrophora*, H. & S.

Actinodendridæ: *Actinodendron plumosum*, n. sp.; *A. glomeratum*, n. sp.; *Megalactis Griffithsi*, S.-Kent.

Phymanthidæ: *Phymanthus muscosus*, H. & S.

## ACTINIARIA, or MALACODERMATA.

Cœlenterata, with various kinds of tentacles arranged in diverse manners, and with usually numerous mesenteries which are mostly in some multiple of six. With no spicular or continuous skeleton. Body moving freely or adhering to supporting substances by means of suction of the pedal disk; rarely firmly fixed; animals usually solitary, rarely forming colonies.

## Tribe I.—EDWARDSIÆ, R. Hertwig, 1882.

Free-moving, non-colonial Actiniaria, with eight mesenteries, two pairs of which are directives; the remaining mesenteries are unpaired, and their retractor muscles all face the same way; all the mesenteries are fertile; tentacles simple, usually more numerous than the mesenteries.

## Family.—EDWARDSIIDÆ, Andres, 1880.

This family has recently been studied by Carlgren, and I have no new observations to record. I believe that my Swedish friend has now discarded his new family of Milne-Edwardsiidæ, but has two new genera to add to those given above.

No specimen of this tribe is recorded from Torres Straits.

Edwardsia, Quatr., 1842; Edwardsiella, Andr., 1884; Edwardsioides, Danl., 1890; Milne-Edwardsia, Carlgr., 1893.

## Tribe II.—CERIANTHEÆ, R. Hertwig, 1882.

Actiniaria, with numerous pairs of mesenteries so arranged that each mesentery of the one side of the directive mesenteries forms a pair with the corresponding one on the other side. A single anterior (or dorsal) cesophageal groove. The mesenteries at the anterior end of the polyp (on the dorsal side) are the longest,



gradually decreasing in size going backwards (ventrally); the two mesenteries attached to the bottom of the œsophageal groove (the directive mesenteries) are remarkably small, and are distinguished in this way from the other anterior (dorsal) mesenteries. Body-wall with strongly-developed ganglionic and longitudinal muscular layers.

Family.—**CERIANTHIDÆ**, M. Edw. et Haime, 1852.

Ceriantheæ with a double corona of tentacles, marginal principal tentacles and circum-oral accessory tentacles; posterior end of body rounded; with feeble transverse mesenterial muscles which are turned towards the directive mesenteries, the longitudinal muscles being turned away from them; no sphincter.

*Cerianthus*, D. Ch.; *Saccanthus*, M. Edw.; *Bathyanthus*, Andr.

**CERIANTHUS**, Delle Chiaje, 1832.

Cerianthidæ with an aboral pore; with a sheath consisting of mud, sandgrains, and nematocysts, in which the posterior (proximal) end of the polyp lies as if in a case.

*Cerianthus nobilis*, H. & S.

*Cerianthus nobilis*, Hadd. and Shackl., 1893, Proc. R. D. S. VIII., p. 118; Saville-Kent, 1893; "The Great Barrier Reef of Australia," p. 151, chromo pl. iii., fig. 7.

*Form.*—Body of great size, presence of a terminal pore not determined. Marginal tentacles long, tapering, in three cycles from about 160 to 170 in number, about 79 tentacles in the outermost cycle. Oral tentacles very numerous, much smaller than the marginal tentacles.

Tube, thick, rugose, gelatinous.

*Colour.*—Upper portion of body rich, deep brown; lower portion, creamy brown, with irregularly arranged, fine, longitudinal, brown lines, and one broad pale band. Marginal tentacles, deep flesh colour (No. 31 of Broca's skin colours), with a broad or narrow line down each side. Disk, with radial brown lines, one radius being pale with two dark brown marks at the base of the corresponding tentacles. Oral tentacles more yellow than the marginal tentacles; "inner tentacles usually pearl-grey; outer series most commonly pale lemon-yellow, varying to a dark red-brown or nearly black."—S.-K.

*Size.*—Length of body probably about 300 mm. ( $11\frac{3}{4}$  in.); of the preserved specimen 105 mm. Diameter of living body about 26 mm. (1 in.); of the preserved specimen 19 mm. Length of marginal tentacles about 80 mm. ( $3\frac{1}{4}$  in.). Length of tube about 345 mm.; average diameter of tube in middle 36 mm.

*Locality.*—Partially embedded in the mud on the fringing reef of Thursday Island and Warrior Island, Torres Straits, and at Port Darwin.

Saville-Kent found numerous young ones, about an inch in length, "enclosed, in some numbers, in the substance of the felt-like sheath of the parent polyps" in some specimens collected at Warrior Island.

Although no pore is visible in the preserved specimen, I do not hesitate to allocate this fine species to the genus *Cerianthus*, the great state of contraction of the more flaccid aboral end of the body would very well make it difficult to definitely assert the absence of a pore in spirit specimens.

The single example was not sufficiently well preserved to enable me to say much as regards the histology of this species. Thanks to the labours of Haime, von Heider, the brothers Hertwig, Jourdan, Danielssen, M<sup>c</sup>Murrich, and Carlgren, we have a very good knowledge of the minute anatomy of several members of the genus; M<sup>c</sup>Murrich ("Contributions on the Morphology of the Actinozoa: I. The Structure of *Cerianthus Americanus*," *Journal of Morphology*, iv. 1890: p. 131) gives a brief summary of the literature of the anatomy of the genus, and compares his investigations with those of other authors. More recently (1893, p. 201) he redefines the Tribe of *Ceriantheæ*, and describes a new species (*C. vas*) in which he could not discover any tentacles. Carlgren (1893, p. 239; 1894, p. 119) gives an account of *C. Lloydii*, and discusses the morphology of the group. I have adopted his definitions which are modified from those of Hertwig.

It is possible that this species is nearly allied to *C. orientalis*, Ver., from Hong-kong (Verrill, *Proc. Essex Instit.* iv. 1865, p. 151; *Ann. Mag. Nat. Hist.* xvi. 1865, p. 196; Andres, 1884, *Le Attinie*, p. 347).

### Tribe III.—ZOANTHÆ, R. Hertwig, 1882.

Actiniaria with numerous perfect and imperfect mesenteries, and two pairs of directive mesenteries, of which the sulcar are perfect, and the sulcular imperfect. A pair of mesenteries occur on each side of the sulcular directives, of which the sulcular moiety is perfect, and the sulcar imperfect; a second similar pair occurs in one group (*Brachycneminæ*); or the second pair may be composed of two perfect mesenteries (*Macrocneminæ*). In the remaining pairs of mesenteries, in both groups, this order is reversed, so that the perfect mesentery is sulcar, and the imperfect is sulcular. The latter series of mesenteries are bilateral as regards the polyp, and arise independently (*i.e.* neither in pairs nor symmetrically on each side) in the exocœl on each side of the sulcar directives, in such a manner that the sulcular are the oldest, and the sulcar the youngest. Only the perfect mesenteries are fertile, or bear mesenterial filaments. A single sulcar, œsophageal groove is present. The mesogloea of the body-wall is traversed by irregularly

branching ectodermal canals, or by scattered groups of cells. The body-wall is usually incrustated with foreign particles. Tentacles simple, marginal. The polyps are fixed and generally grouped in colonies connected by a cœnosarc; the coelenteron of each polyp communicating with that of the other members of the colony by means of basal endodermal canals.

Family.—ZOANTHIDÆ, Dana, 1846 (with the definition of the Tribe).

Sub-family.—BRACHYCNEMINÆ, Hadd. and Shackl., 1891, p. 626.

Zoantheæ in which the sulcar element of the primitive sulco-lateral pair of mesenteries (cnemes) is imperfect.

### ZOANTHUS, Lamarck, 1801.

Brachycnemic Zoantheæ with a double mesogloæal sphincter muscle. The body-wall is unincrusted; the ectoderm is usually discontinuous; a well-developed ectodermal canal system in the mesogloæa. Dioecious or monœcious. Polyps connected by a thin cœnosarc.

#### *Zoanthus Coppingeri*, H. & S.

*Zoanthus Coppingeri*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 676; Pl. LXI., fig. 1–2; Pl. LXII., fig. 1; Pl. LXIV., fig. 1–4: Saville-Kent, "The Great Barrier Reef of Australia," 1893, p. 152,; chromo pl. iii., fig. 11.

*Form.*—Body smooth, pyriform when contracted, rather elongated when expanded. Polyps in clusters, the buds springing from the base of the polyps themselves; cœnosarc thin, incrusting.

*Colour.*—Pinkish below, greenish or bright green above, sometimes entirely pinkish, always with brown streak-like spots; disk burnt-sienna, with darker spots; rim of mouth brown; tentacles grey, with a single row of black spots; there is a black spot between each tentacle, each of which is continued as a black line on the capitulum. (Disk, various shades of green, dull or brilliant; tentacles, rich brown.—S.-K.)

*Dimensions.*—Height of contracted specimen 15 mm.; diameter of upper portion 5 mm.

*Locality.*—Fringing reef, Mabuiag.

**Zoanthus Jukesii, H. & S.**

*Zoanthus Jukesii*, Hadd. and Shackl., 1891. Trans. R. D. S. (2) iv., p. 678 ;  
Pl. LXI., figs. 3–5 ; Pl. LXII., fig. 2 ; Pl. LXIII., fig. 1.

*Form.*—Body short and thick ; body-wall smooth and delicate ; cœnosarc forming stolons.

*Colour.*—Body and stolon translucent grey, the endoderm shining through with a brown tint ; capitulum pink, with twenty-four dark lines ; disk brown, usually with pairs of pale lines (mesenteries) for inner cycle of tentacles ; mouth with greenish lip ; œsophagus grey ; tentacles, inner cycle green with dark marks on the oral aspect, outer cycle opaque pink ; all the tentacles with a dark spot at the tip ; the base of the tentacles of the outer cycle sometimes tinged with green.

*Dimensions.*—Height, 7–12 mm. ; diameter of disk, 6 mm.

*Locality.*—Fringing reef, Mer.

**Zoanthus Macgillivrayi, H. & S.**

*Zoanthus Macgillivrayi*, Hadd. and Shackl., 1891 ; Trans. R. D. S. (2) iv., p. 680,  
Pl. LXI., fig. 6 ; Pl. LXII., fig. 3 ; Pl. LXIII., fig. 2 ; Pl. LXIV., fig. 5–8.

*Form.*—Body transversely wrinkled below, smooth and slightly swollen above ; with a thick cuticle ; disk large ; cœnosarc forming a flattened stolon.

*Colour.*—Yellowish in alcohol.

*Dimensions.*—Height, 18 mm. ; average diameter of column, 3 mm. ; diameter of disk, 6.5 mm.

*Locality.*—Fringing reef, Mabuiag.

**Zoanthus Australiæ (Saville-Kent).**

*Acrozoanthus Australiæ*, Saville-Kent, 1893 ; “The Great Barrier Reef of Australia,”  
p. 154 ; fig. on p. 153 ; chromo pl. iii., figs. 4, 4A.

*Zoanthus Australiæ*, . Haddon, 1895 ; Proc. R. D. S. VIII. (N.S), p. 346.

*Acrozoanthus Australiæ*, Saville-Kent, 1897 ; “The Naturalist in Australia,” p. 225 ;  
pl. xl.

*Form.*—Body smooth, about as broad as high, forming somewhat spherical knobs when contracted. The daughter polyps mainly bud from the base of the parent ; cœnosarc incrusting.

*Colour.*—Body dull green, inclining to pinkish, speckled with red-brown ; capitulum brilliant emerald-green ; oral disk dull orange, spotted with red-brown ; tentacles rich chocolate-brown, sometimes somewhat purplish.

*Dimensions.*—Diameter of expanded corona about 1 inch (25 mm.).

Commensal on a worm tube (said by Saville-Kent to be a species of *Nereis*; but it may be a species of *Eunice*. Cf. F. Buchanan, "Note on the Worm associated with *Lophohelia prolifera*," Proc. R. D. S. (N. S.), VIII., 1897, p. 432).

Found at low tide round the shores of tropical Australia.

The chief point of interest about this species is the habit it has of association with a tubicolous Annelid. It is evident that the growth of the *Zoanthus* annoys the worm, owing to its tendency to grow over the terminal orifice. In order to escape, the worm makes a fresh start in another direction, but usually in the same plane, and at a divergent angle of about 60°. Before it has added another inch to its dwelling tube, the polyp has once more overtaken it, and converted its front entrance into a *cul-de-sac*. This process is repeated again and again with great regularity. After about a score or so of obliquely ascending short branches, the polyp appears to be victorious in this zigzag race; for one generally finds that about this stage the tube is uninhabited, and the polyps sit on the closed apertures of the lateral and terminal branches.

Mr. Saville-Kent, when he first described this species, considered that the Zoanthean secreted the tube. In a previous correspondence I argued against this view, and subsequently I wrote a short Paper, in which I pointed out that branched worm-tubes were by no means unknown, although Mr. Saville-Kent had overlooked the fact. I there stated that, anatomically, the Zoanthean belonged to the genus *Zoanthus*; but that it was a new species. In his recently published book, Mr. Saville-Kent records the discovery of the worm which secretes the tube; and so that point is now settled. He still retains his own generic name for the polyp; but I have no doubt that it must lapse.

The anatomical characters of this species do not call for any special remark. The ectoderm cells are found as in *Z. Jukesii* and *Z. Coppingeri*; the cuticle is very feebly developed. The ectodermal canals in the mesogloea are numerous and large, and have a tendency to form a disconnected ring near the endoderm. The distal portion of the double sphincter muscle is much more powerful than the proximal, which alone serves to distinguish it from other Zoantheæ of Torres Straits.

#### ISAURUS, Gray, 1828.

Large brachynemic Zoantheæ, with a single mesogloecal sphincter muscle. The body-wall is unincrusted; the ectoderm discontinuous; ectodermal and endodermal bays and small canals in the mesogloea. Monœcious or dioecious. Polyps in small clusters or solitary.

**Isaurus asymmetricus, H. & S.**

*Isaurus asymmetricus*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 684; Pl. LXI., figs. 7–9; Pl. LXII., fig. 4; Pl. LXIII., figs. 4–6; Pl. LXIV., fig. 9.

*Form.*—Body elongated; upper portion of column with usually four, sometimes more, rather irregular rows of tubercles, arranged in such a manner that there is a longitudinal area free from them; tubercles rarely absent; the smooth side is somewhat shorter than the tuberculated, so that the body bends over to the former. The contracted capitulum exhibits radiating furrows. The polyps grow either singly or in small clusters.

*Colour.*—Whitish below, passing into brownish above; the darker portion variously mottled with cream, or greenish cream, and occasionally diversified with darker spots; tubercles somewhat pinkish.

*Dimensions.*—Average size of retracted specimens, 45 mm. in height; greatest diameter, 7 mm.

*Locality.*—On reefs and between channels.

**GEMMARIA, Duch. and Mich., 1860.**

Brachygnemic Zoantheæ, with mesogloæal sphincter muscle; solitary, or connected by cœnosarc; the body-wall incrustated with grains of sand and spicules; the ectoderm usually discontinuous, but may be continuous. Lacunæ and cell-islets are found in mesogloæa. Dicecious.

**Gemmaria Macmurrichi, H. & S.**

*Gemmaria Macmurrichi*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 688; Pl. LXI., fig. 11; Pl. LXIII., fig. 7.

*Form.*—Erect, rigid; upper portion of contracted specimen with minute radiating corrugations.

*Colour.*—Sandy.

*Dimensions.*—Height, 13 mm. (in spirit); diameter, 2–3.5 mm.

*Locality.*—Channel between Murray Islands, 20 faths.

Ectoderm discontinuous, no zooxanthellæ.

**Gemmaria Mutuki, H. & S.**

*Gemmaria Mutuki*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 689; Pl. LXI., fig. 10; fig. 1, p. 690.

*Form.*—Nearly cylindrical; upper portion of retracted specimens with a large number (24–30) of fine radial ridges, which are continued some way down the

column; lower portion of column wrinkled in spirit specimens. Basal gemmation occurs.

*Colour.*—Greyish white in spirit.

*Dimensions* (in spirit).—Height, 10–12 mm.; average diameter, 4.5 mm.

*Locality.*—Mabuiag.

Ectoderm continuous, zooxanthellæ present.

#### PALYTHOA, Lamouroux, 1816.

Brachyenic Zoantheæ with a single mesogloæal sphincter muscle. The body wall is densely incrustated. The ectoderm is continuous (?); the mesogloæa contains numerous lacunæ, and occasionally canals. Dicecious. Polyps immersed in a thick cœnosarc, which forms a massive expansion.

#### *Palythoa Howesii*, H. & S.

*Palythoa Howesii*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 693; Pl. LXI., fig. 13; Pl. LXIII., fig. 8.

*Form.*—Polyps scarcely projecting above the surface of the cœnosarc when contracted, and then, in most cases, only one side is prominent. Cœnosarc thick, incrusting; the polyps are arranged in indefinite, roughly parallel rows; owing to the partial immersion of the polyps, the prominent portion of contiguous polyps have a tendency to form zigzag lines; the whole surface is very rigid and tough.

*Colour.*—Sandy.

*Dimensions.*—Average diameter of polyps 7 mm.

*Locality.*—Fringing reef, Thursday Island.

#### *Palythoa Kochii*, H. & S.

*Palythoa Kochii*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 694; Pl. LXI. fig. 12; Pl. LXIII., fig. 9.

*Form.*—Polyps projecting slightly above the surface of the cœnosarc in contraction; cœnosarc incrusting, of moderate thickness. Polyps so crowded as to usually have a polygonal contour; twenty capitular ridges and furrows; tentacles forty in number.

*Colour.*—Cœnosarc finely speckled buff and cream; disk very finely dotted with brown and opaque white; capitular ridges white.

*Dimensions.*—Diameter of polyps about 5 mm.

*Locality.*—Fringing reefs, Thursday Island, and Mabuiag.

***Palythoa cœsia*, Dana. (?)**

*Palythoa cœsia*, Dana. (?) Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv.; Pl. LXI. fig. 14; fig. 2, p. 696; Saville-Kent, "The Great Barrier Reef of Australia," 1893, p. 152, chromo pl. iii., fig. 1.

*Form.*—Polyps slightly projecting above the surface of the cœnosarc when contracted; cœnosarc incrusting, of moderate thickness; polyps large, not crowded, of rounded contour; about twenty capitular ridges.

*Colour.*—Greyish white in spirit specimens. (Varying shades of rich creamy yellow, the minute tentacles being a "more distinct brown," S.-K.)

*Dimensions.*—Diameter of polyps about 9 mm.

*Locality.*—Reefs, Torres Straits.

**SPHENOPUS, Steenstrup, 1856.**

Free, solitary, brachynemic Zoantheæ, with a single, very long, mesogloæal sphincter muscle. The body-wall is incrustated. Cell-islets present in the mesogloæa.

***Sphenopus arenaceus*, Hertw.**

*Sphenopus arenaceus*, Hertw., 1882. Voy. H. M. S. "Challenger," Zoology; Rep. on Actiniaria, p. 120; Pl. II., fig. 10; Pl. XIV., fig. 8; and Supplement, p. 52; Hadd. and Shackl. 1891. Trans. R. D. S., p. 697.

*Form.*—Pyriform, non-pedunculate; tentacles small, pointed, about sixty in number, in two cycles; thirty perfect and thirty imperfect mesenteries.

*Colour.*—Brown-red (in spirit).

*Dimensions.*—Length, 45 mm.; breadth, 28 mm.

*Locality.*—Prince of Wales Channel, 6 faths. ("Challenger," Station 187.)

No characters are given, except the colour, by which this species can be distinguished from *S. marsupialis*, Steenstr.

**Sub-family II.—MACROCNEMINÆ, Hadd. and Shackl., 1891.**

Zoantheæ in which the sulcar element of the primitive sulco-lateral pair of mesenteries (cnemes) is perfect.

**PARAZOANTHUS, Hadd. and Shackl., 1891, p. 653.**

Macrocnemic Zoantheæ with a diffuse endodermal sphincter muscle. The body-wall is incrustated. The ectoderm is continuous. The mesogloæa contains ectodermal canals, an encircling sinus, lacunæ, and cell-islets. Dioecious. Polyps connected by their cœnosarc.



**Parazoanthus dichroicus, H. & S.**

*Parazoanthus dichroicus*, Hadd. and Shackl., 1891; Trans. R. D. S. (2) iv., p. 698; Pl. LXI., fig. 15; Pl. LXII., fig. 5; Kwietniewski, 1897, Abhandl. Senckenberg. Naturf. Gesellsch. xxiii., p. 341. (Ternate.)

*Form.*—Body short, incrusting with sand and spicules; capitulum with about eighteen distinct ridges; cœnosarc incrusting a specimen of *Plumularia Ramsayi*.

*Colour.*—Body and cœnenchyme grey; capitulum pale yellow.

*Dimensions.*—2–2.5 mm. high; 1.25–1.5 mm. in diameter.

*Locality.*—Channel between Mer and Dauar, about 20 faths.

**Parazoanthus Douglasi, H. & S.**

*Parazoanthus Douglasi*, Hadd. and Shackl., 1891; Trans. R. D. S., (2) iv., p. 700; Pl. LXI., figs. 16–22; Pl. LXII., fig. 6.

*Form.*—Body when growing on Hydroids often somewhat long, and relatively narrow, but when growing on a flat surface usually short and thick; capitular ridges not well marked; texture gritty; cœnosarc incrusting.

*Colour.*—Sand colour.

*Dimensions.*—Largest specimens, 8–9 mm. in height; 2–2.5 mm. in diameter; the shorter specimens growing on flat surfaces, 3–5 mm. and 2 mm. respectively.

*Locality.*—Albany Pass, 10 faths.

**GERARDIA, Lac.-Duth.**

Macrocnemic Zoantheæ with a diffuse endodermal sphincter muscle. The body-wall is incrusting. The ectoderm is continuous. The mesogloea contains ectodermal canals, an encircling sinus, and cell islets. The cœnosarc secretes a well-developed, much branched, horny skeleton.

*G. Savalia.*

The Zoanthean affinities of this interesting form, which was usually regarded as allied to the Antipatharia, were first demonstrated by Carlgren ("Ueber die Gattung Gerardia, Lac.-Duth." Öfvers. Kongl. Vet. Akad. Förhandl., Stockholm, 1895, p. 319). He pointed out that the only distinction between this genus and Parazoanthus was in the secretion of a black, branched, horny, cœnenchyme. From some slides that were prepared by the late Dr. George Brook, I have been able to confirm Carlgren's statements. The only doubt in my own mind is whether the cœnenchyme is really secreted by the polyps, or whether they merely utilise the skeleton of a dead Gorgonian.

**EPIZOANTHUS**, Gray, 1867. (Not recorded from Torres Straits.)

Macrocnemic Zoantheæ, with a single mesogloal sphincter muscle. The body-wall is incrustated. The ectoderm is usually continuous, but may be discontinuous; cell-islets in the mesogloea. Diœcious polyps, connected by cœenchyme, which may be band-like, incrusting, or greatly reduced, as in the free form.

*Platyzoanthus mussoïdes*, Saville-Kent, 1893; "The Great Barrier Reef of Australia," p. 155, with figure.

It is unfortunate that Mr. Saville-Kent has allowed his enthusiasm for novelties to run away with his discretion, and at the same time to indulge in the reprehensible practice of publishing new genera and species without diagnosing them. A glance at the outline sketch given by the author is sufficient to show that the supposed new type is no Zoanthean at all. The description is too imperfect to allow of certainty of identification, but the form is probably a species of *Actinotryx* (cf. p. 480).

I have brought my earlier studies on the Torres Straits Zoantheæ up to date, and for the sake of convenience I have retained the original order. Taking the mesenteries into consideration, the *Brachykneminae* may be regarded as slightly more primitive than the *Macrocneminae*; on the other hand *Parazoanthus* has the simplest sphincter muscle and *Zoanthus* the most complex; this would, therefore, reverse the order given above. If we regard the *Brachykneminae* as having retained the more primitive arrangement of the mesenteries, then the mesogloal position of the sphincter muscle has been independently arrived at in the two groups. One genus (*Parazoanthus*) of the higher group (*Macrocneminae*) having retained the primitive diffuse endodermal sphincter, while one genus (*Zoanthus*) of the lower group (*Brachykneminae*) has acquired a double mesogloal sphincter.

I would call attention to two recent papers—one by Mr. Duerden and myself (Trans. R. D. S., 1896, p. 139), in which five new species of Zoantheæ are described, and the other by Mr. Duerden (Trans. R. D. S., 1898, p. 329)—in which he deals with the Zoantheæ of Jamaica.

Tribe IV.—**PROTACTINIÆ** (M<sup>c</sup>Murrich, 1891) = **PROTANTHEÆ**  
(Carlgren, 1891).

Actiniaria "with twelve primary mesenteries; with one, or a pair, or two pairs of secondary mesenteries on each side of the sagittal axis, the increase in number of the secondary mesenteries occurring from the dorsal towards the ventral side." (M<sup>c</sup>Murrich, 1891: "The Phylogeny of the Actinozoa," p. 161.)

"Anthozoa, with twelve primary mesenteries, of which eight at least are perfect, and which are arranged in pairs; the longitudinal mesenteries of each