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# SOUTH AFRICAN ACTINIARIA AND ZOANTHARIA

BY

OSKAR CARLGREN

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WITH 3 PLATES AND 83 FIGURES IN THE TEXT

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The Actiniaria and Zoantharia of South Africa are rather imperfectly known. The first author who mentioned any Actiniaria from the waters of S. Africa was LESSON (1830), who in his report of the voyage of »la Coquille» described *Holothuria (Minyas) coerulea*, *Actinia dubia* and *Actinia (= Bunodosoma) capensis*, from the Cape of Good Hope. Three years later QUOY and GAIMARD (1833) gave a short description of *Actinia rubro-alba* taken by the expedition of »l'Astrolabe» from the same locality. Both *coerulea*, *rubro-alba* and *dubia* are very difficult to identify. MILNE-EDWARDS in his »Histoire naturelle des Coralliaires» (1857) added to the species mentioned above *Cystiactis reynaudi*, which may now be called *Bunodactis reynaudi*. A few more additions are given by VERRILL (1865, 1866, 1869) who described *Halocampa capensis* (referred by him in 1899 to the genus *Eloactis*, but probably belonging to *Haloclava*), *Cereus (= Anthothoe) stimpsoni* and *Megalactis (Corynactis) annulata*. STUDER (1879) identified wrongly a species dredged by the expedition of the »Gazelle», S.W. of the Cape Peninsula, as *Epizoanthus cancrisocius (= Studeri)* MART. Strangely enough the Challenger expedition, which dredged off the Cape Peninsula very numerous invertebrates new to science, obtained in this area only four Sea Anemones, namely *Zoanthus confertus*, VERR., *Corticifera (= Palythoa) tuberculosa*, KLUNZ., *Comactis flagellifera*, MILNE EDW., and *Aulactinia* sp. The three first species were certainly incorrectly determined by R. HERTWIG (1882, 1888); the two first were described also by ERDMANN (1885). Owing to the imperfect description the *Aulactinia* is impossible to identify, but it may possibly be identical with *Bunodactis (= Anthopleura) michaelsoni*, PAX. A new *Parazoanthus*, *P. capensis*, is mentioned by DUERDEN (1904) from False Bay.

Further contributions to our knowledge of the South African Actiniaria and Zoantharia are given by PAX in a series of papers (1908—1935). In a paper of 1907 and in certain others he handled a few species from South-West Africa; these papers may be included here as they treat of forms common on the South African coast. Unfortunately the determinations of PAX are usually quite unreliable. One and the same species is given different names in his papers, and on the other hand a single name often includes more than a single species, as we see from the following comparison between the determinations of PAX and those at which I have arrived after I have revised most of the species proposed by this author.

- PAX 1907. *Anemonia thelcteria*, n. sp. = *Pseudactinia flagellifera* (R. HERTW.).  
*Actinioides angrae-pequena*, n. sp. = { *Anthopleura michaelsoni* (PAX).  
*Anthothoe stimpsoni* (VERR.).
- PAX 1908. *Halocampa capensis*, VERR. = *Haloclava (Eloactis?) capensis* (VERR.).  
*Phymactis capensis* (LESS.) = { *Anthopleura michaelsoni* (PAX).  
*Bunodactis reynaudi* (MILNE EDW.).  
*Anemonia thelcteria*, PAX = *Pseudactinia flagellifera* (R. HERTW.).  
*Anemonia infecunda*, McM., p. p. = *Pseudactinia flagellifera* (R. HERTW.).  
*Actinioides angrae pequena*, PAX = { *Anthopleura michaelsoni* (PAX).  
*Anthothoe stimpsoni* (VERR.).  
*Paraphellia polyptycha*, n. sp. = *Anthothoe stimpsoni* (VERR.).
- PAX 1909. *Isaurus spongiosus* (ANDR.) = *Isaurus spongiosus* (ANDR.).
- PAX 1920. *Phymactis capensis* (LES.) = *Bunodactis reynaudi*, M. EDW. (specimen from Lüderitz Bay).  
*Bunodactis michaelsoni*, n. sp. = *Anthopleura michaelsoni* (PAX).
- PAX 1922, 1926. *Actinia anachoreta*, n. sp. = *Pseudactinia flagellifera* (R. HERTW.).  
*Actinia psapharoderma*, n. sp. = *Pseudactinia flagellifera* (R. HERTW.).  
*Actinia suspecta*, n. sp. = { *Pseudactinia flagellifera* (R. HERTW.).  
*Thoe neglecta*, CARLGR. = young *Anthothoe?*  
*Sagartia capensis*, n. sp. = *Anthothoe stimpsoni* (VERR.).  
*Sagartia problematica*, n. sp. = *Anthothoe stimpsoni* (VERR.)?
- PAX 1926. *Bunodactis gigas*, n. sp. = { *Bunodactis reynaudi* (M. EDW.).  
*Anthopleura michaelsoni* (PAX).  
*Bunodactis michaelsoni*, PAX = *Bunodactis reynaudi* (M. EDW.).
- PAX 1927. *Palythoa corti*, n. sp. = *Palythoa capensis*, HADD. and SHACKL.
- PAX 1935. *Palythoa nelliae*, n. sp. = *Palythoa nelliae*, PAX.

Lastly our knowledge of the Zoantharian and Actiniarian fauna of the South African Seas has been increased by the investigations made by the German Deep-Sea Expedition of 1898—99. In the reports worked out (1923, 1924, 1928) by the author of this paper on the Zoantharia and Actiniaria, the existence of several new species on the South African coast was recorded, viz., *Epizoanthus carcinophilus*, *Palaeozoanthus reticulatus*, *Halcurias capensis*, *Bolocera capensis*, *Liponema brevicirrata*, *Pseudactinia plettenbergensis* (= *flagellifera*), *Paractinostola capensis*, *Actinauge granulata*, *Phelliactis algoensis*, *Amphianthus capensis* and *Isophellia algoensis*.

During a visit to South Africa from Oct. 1935—Jan. 1936 I had the opportunity of collecting many invertebrates and of examining many Zoantharia and Actiniaria from different localities. I had hoped to obtain some Ceriantharia also, but the dredgings in False Bay yielded only parts of the oral disc of some large individuals belonging to this group of animals. Since in addition to my own material of Sea Anemones I have received collections containing South African species from other quarters, I decided to write a survey of the

Zoantharia and Actiniaria of the waters of South Africa. The examination of the new material has shown the existence of a considerable number of undescribed species there. Especially rich is the hitherto little known fauna of Sea Anemones at Durban, and it is to be supposed that more extensive examinations of the littoral fauna there and at other places will provide yet more species now to science.

The present paper is based on the following collections.

- (1) Those which I made during a visit to South Africa from Oct. 1935—Jan. 1936.
- (2) Those made by Professor T. A. STEPHENSON and his assistants, Mrs. ANNE STEPHENSON, Miss E. J. EYRE and Miss K. M. F. BRIGHT, at the University of Cape Town, during the years 1932—1937.
- (3) Those of Dr. TH. MØRTENSEN, in Kopenhagen, who visited South Africa in 1929.
- (4) Those of the South African Museum at Cape Town.
- (5) Those of the Swedish State Museum (Riksmuseum) at Stockholm (collectors: the Swedish explorer in South Africa J. A. WAHLBERG, the Swedish Eugenie expedition and DE VYLDER.)
- (6) Those of the Durban museum.

The collections numbered 5 and 6 were small and included only a few species not new to science. For the sake of obtaining data on the distribution of the species on the Atlantic coast of South Africa I have examined also the material of Sea-Anemones taken by the »Scotia» and »Discovery» expeditions. Of the species above mentioned, *Minyas coerulea*, *Actinia dubia*, *Actinia rubroalba* and *Aulactinia* sp.? are omitted from this paper. 33 species are apparently not previously described. Two new families and 5 new genera are created. A list of all the recorded species is given in the index at the end of this paper.

Facts of general interest are that *Halianthella annularis* carries its young in a circular fold surrounding the whole scapus, in contrast to the closely related *Halianthella kerguelensis*, which is provided with separate brood-pouches; and that the males of *Isanthus capensis* had embryos in their coelenteron, indicating that the species probably is a protogynous hermaphrodite. Worth mentioning also is the great variation in colour of many intertidal forms, and especially the appearance of the colour *blue*, so rarely present in European Actiniaria, in several littoral species. The distribution of the species, which is of zoogeographical interest, I will handle in a separate chapter after the descriptions of the species.

Before I proceed to describe the species it is my agreeable duty to express my gratitude to all who facilitated my investigations in S. Africa, and gave me material for examination. First I beg to thank Professor and Mrs. T. A. STEPHENSON most heartily for all kindness shown me and my wife during the time we were guests in their house at Kalk Bay, Cape Town. I am much indebted to Professor STEPHENSON also for handing over to me the material



of Zoantharia and Actiniaria which he and his assistants have collected; for notes, especially concerning the colouration of several common forms, and for planning my work so that I might get the best results from my researches in S. Africa. I thank him also for presenting me with other invertebrate material.

Likewise my best thanks to the director of the Fisheries Survey of South Africa, Dr. C. VAN BONDE, who at the end of December 1935 gave me a place in his laboratory at St. James and allowed me to accompany the Fisheries Survey ship »Africana» during two weeks, by which means I was able to make valuable collections.

I am also under obligation to Dr. J. NANNI, curator of the aquarium at East London, for a working place in the aquarium, for presenting me with several fishes and for all the kindness he and Mrs. NANNI showed my wife and me during our visit to East London. My cordial thanks to them.

I offer many thanks also to Dr. R. F. LAWRENCE of Pietermaritzburg, for his unselfish assistance during my visit to Durban, to the members of the staff of the zoological laboratory of the University of Cape Town, Dr. C. A. DU TOIT, Miss K. M. F. BRIGHT and Miss E. J. EYRE; and to the director of the museum in Port Elizabeth, Mr. G. A. PRINGLE.

I am very much obliged to the heads of South African museum, Dr. L. GILL and Dr. K. H. BARNARD, and to the director of the Durban museum, Dr. E. C. CHUBB, for the loan of material. I beg to express my best thanks also to the heads of the TRANSATLANTIC STEAMSHIP Co. in Gothenburg for the reduction of the fares to and from South Africa, to K. FYSIOGRAFISKA SÄLLSKAPET i Lund and to LÄNGMANSK FOND, which by grants have made my researches in the waters of South Africa possible.

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As to the nematocysts I have in this paper sometimes used the terminology of WEILL (1935). During my research in S. Africa I had not time to examine the nematocysts in the exploded state, and in the material preserved in formalin they were almost always unexploded, whence my statements about the types of the nematocysts are sometimes uncertain. It was especially difficult to distinguish the microbasic mastigophores from the microbasic amastigophores. As a result of this the terminology of WEILL is unfortunately less usable when one is dealing with preserved material.

Abbreviations in the text: C., CARLGRÉN; M., Dr. MORTENSEN; and S., Professor STEPHENSON and his assistants, Mrs. STEPHENSON, Miss BRIGHT and Miss EYRE.

Lastly, Prof. STEPHENSON has provided me with several pages (7—12) designed to assist zoologists in identifying the common anemones of the intertidal region in South Africa; and these I include here also.

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## A guide to the identification of the common intertidal species.

(By T. A. STEPHENSON.)

A considerable number of species is described in this paper, some of them occurring between tidemarks and others in deep water; some of them well known from numerous individuals, others known, as yet, only from isolated examples. This being so, it may be useful to zoologists working in South Africa (as distinct from specialists on sea anemones) if some indication is given as to which of the species described here are common and are likely to be met with on the seashore; and as to how these may be identified from their external characteristics. An attempt to provide this information is made in the following paragraphs. It should be remembered however that no identification of a sea anemone is »safe» until it has been anatomically confirmed, or confirmed by a specialist. Any consultation of these notes should therefore be followed by a study of the relevant full descriptions. It should also be noted that the summaries given refer to *typical adults*. The determination of young sea anemones is difficult, and can only be carried out accurately after considerable experience, if at all. For the benefit of any reader who is unfamiliar with the terminology applied to the parts of a sea anemone, a short glossary is provided here, but this applies to the present section of the paper only, and not to the anatomical part. [A full explanation of the technical terms applying to sea anemones will be found in vol. I of my book on the British sea anemones (Ray Society, 1928), an index to these terms being provided on pp. 143—8.]

*Acontia*. Threads, laden with nematocysts and usually white in colour, which are attached at one end to mesenteries inside the anemone, and are free at the other end. They can be partially expelled from the anemone's body through the mouth, or through pores in the wall.

*Cinclides*. Small perforations (or organised »soft spots» which will rupture readily) in the body-wall of an anemone.

*Column*. The more or less cylindrical body of the anemone, limited below by the edge of the base, and above by the edge of the oral disc.

*Disc*. The term »oral disc» or »disc» is applied to the plate of tissue which closes in the upper end of the cylindrical body, and bears the mouth in its centre and the tentacles on its outer part.

*Endocoelic tentacles*. Tentacles arising from any sector of the disc which roofs in an *endocoel*, the space between two mesenteries belonging to one and the same pair.

*Exocoelic tentacles*. Tentacles arising from any sector of the disc which roofs in an *exocoel*, the space between mesenteries belonging to different pairs.

*Fosse.* A ring-shaped groove or ditch which occurs in many anemones between the bases of the outer tentacles and a fold of the column wall, which lies a little below the margin of the disc, and which is known as the *parapet*.

*Hexamerously.* When tentacles are hexamerously arranged, their arrangement is planned on the basis of a 6-rayed star. In a typically hexamerous anemone there are 6 tentacles forming a circlet at a certain distance from the mouth, 6 alternating with these a little farther out, 12 alternating again with the first 12, still farther from the mouth; and so on.

*Margin.* Most properly applied to the actual line of junction between the disc and the column; but sometimes used for that region of the column which lies immediately below the edge of the disc, which should strictly speaking be termed *submarginal*. Sometimes used as a synonym of *parapet*.

*Marginal spherules.* See *spherules*.

*Parapet.* See *fosse*.

*Pseudospherules.* See *spherules*.

*Scapus.* Sometimes the column is marked out into externally distinguishable zones or regions, which are given names. The term *scapus* applies to the proximal part of the column in an adherent form where a differentiation of this nature is visible. Above the *scapus* the distal or submarginal region of the column is in some cases designated *scapulus*, in others *capitulum*, according to its anatomical nature; in certain cases both regions are present, the *capitulum* distal to the *scapulus*.

*Scapulus.* See *scapus*.

*Siphonoglyph.* An anatomically differentiated groove running down the throat (*actinopharynx*) of an anemone, from the mouth to the lower extremity of the throat, or beyond this. The openings of siphonoglyphs are often visible externally in expanded anemones.

*Spherules.* The column of an anemone may undergo local differentiation in various ways. Frequently smaller or larger evaginations of the wall are formed, which have the external appearance of warts or blisters (and in some species become compound). If these have a certain structure, including a differentiated area of ectoderm and frequently the ability to adhere to foreign bodies, but no special development of nematocysts, they are known as *verrucae*. If they are not adhesive but have special concentrations of nematocysts in the ectoderm, so that they become nematocyst-batteries, they are called *vesicles*. If such structures occur near the margin (on the *parapet* or in the *fosse*) and are provided with nematocysts of a special type, different from the ordinary ones found in the ectoderm of the column in general, they are known as *marginal spherules* or *acrorhagi*. Structures which resemble *acrorhagi* externally, but possess only ordinary nematocysts and not the special ones mentioned, are known as *pseudospherules* or *pseudo-acrorhagi*.

*Verrucae.* See *spherules*.

*Vesicles.* See *spherules*.

## Actiniaria.

It is an interesting fact that most of the common intertidal species belong to the family *Actiniidae*. This being so, the few forms belonging to other families will be dealt with first.

### I. Species belonging to families other than the Actiniidae.

*Anthothoe stimpsoni* (Sagartiidae). The commonest South African anemone possessing acontia, which it emits readily. A delicate species, usually small between tidemarks, very variable in colour, but as a rule with vertical stripes on the column. Column smooth, without vesicles or verrucae, sometimes with visible spots marking the positions of cinclides. Tentacles rather short, up to about 370, often much fewer; usually arranged hexamerously. Usually 2 siphonoglyphs. Recorded from Port Nolloth to Durban; of erratic occurrence, often abundant locally.

*Corynactis annulata* (Corallimorphidae). A small delicate species, often gregarious, occurring on Alcyonaria as well as on rocks, etc. Variable in colour, but often pink or pallid. Distinguished by its tentacles, which have knobbed tips, and are arranged in an unusual manner — the outer ones are longer than the inner; and single outer (exocoelic) tentacles alternate with short radial rows of (endocoelic) tentacles, each row containing 2—5 (often 3) tentacles. Recorded only for the west coast and False Bay; but may extend farther.

*Halianthella annularis* (Halcampidae). A good distinguishing feature is the presence of only 24 tentacles, hexamerously arranged. A small species, variously coloured. Column divided into a lower part (scapus) usually provided with an investment of cuticle and foreign matter; and an upper submarginal part (scapulus). Young, which are often present, carried in a circular invagination (brood-pouch) round the upper part of the scapus. Unusual among Halcampidae (which are usually burrowing forms) in having an adherent base. Recorded hitherto only from the west coast of the Cape Peninsula, but very common at certain localities.

### II. Species belonging to the Actiniidae.

In the family Actiniidae the number and arrangement of the tentacles are useful criteria. The adult number in *Anthostella stephensoni* is typically only 48, whereas all the other species have more, when adult; up to 96 in *Anthopleura michaelsoni*; up to 192 in *Actinia equina* and *Bunodosoma capensis*; up to at least 230 in *Pseudactinia flagellifera*; and up to at least 384 in *Bunodactis reynaudi*. In all the species so far mentioned the arrangement of the tentacles is typically hexamerous, and the animal normally has two symmetrically placed siphonoglyphs. In the remaining species the number of tentacles is more variable (exceeding 100 in adults of *Anemonia natalensis*, exceeding 200 in *Actinoides sultana*, exceeding 300 in *Pseudactinia varia*), and their arrangement more irregular; and the animals have a variable number of siphonoglyphs (1—10). Other useful criteria are the occurrence and arrangement of verrucae, vesicles, marginal spherules and pseudospherules. In *Actinia equina* marginal spherules alone are present, and they are situated in the fosse;

in the species of *Anemonia* and *Pseudactinia* spherules and vesicles are limited to the submarginal regions of the column, the lower parts being devoid of them; whereas in the species of *Actinioides*, *Bunodactis*, *Anthopleura* and *Bunodosoma* verrucae or vesicles are more widely distributed, though not necessarily covering the whole column. In *Anthostella stephensoni* the column has violet spots, but whether these are suckers, nematocyst batteries or other structures is not known.

*Actinia equina*. Of medium size, usually red. Column smooth, without verrucae or vesicles, with blue spherules in the fosse, up to 48 or more in number. Tentacles hexamerously arranged, up to 192, not very long. Two siphonoglyphs. Viviparous. Port Nolloth to Durban; rather erratically distributed and usually less common than in Europe.

*Actinioides sultana*. Of medium size, often occurring in sheets in shallow pools. Column with verrucae, most numerous distally, often with attached gravel. A single row of pseudospherules on the parapet. Tentacles not very long, irregularly arranged, up to more than 200. Siphonoglyphs 4—10. Colours commonly including grey, brown, green and violet, with white pseudospherules. Hitherto recorded only from Natal and Zanzibar; probably not reaching the South and West coasts.

*Anemonia natalensis*. Of small or medium size, often dark red. Column smooth, without verrucae, with spherules alternating with pseudospherules on the parapet. Tentacles of moderate length, up to more than 100. Siphonoglyphs 2—7. Common in pools, potholes and caves. Hitherto recorded only from Natal; probably not reaching the South and West coasts.

*Anthostella stephensoni*. Attains a fairly large size. Column with coloured spots (of unknown nature), and with prominent spherules, alternating with pseudospherules, on the parapet. Tentacles typically 48, hexamerously arranged, stout, of moderate length. 2 siphonoglyphs. Colour striking, and more constant than in most species, the following scheme being typical — base cream with orange radial lines; column primrose-yellow with bright violet spots and with orange vertical lines in the upper part; spherules yellow with a broad violet stripe which expands so as to occupy the whole apex of the spherule; tentacles cream; disc with radial scarlet lines; disc and tentacles with a pattern. Hitherto recorded as not uncommon from Table Bay to Gordon's Bay; actual distribution probably wider than this.

*Anthopleura michaelsoni*. Attains a large size. Column with verrucae, which are less numerous than in *Bunodactis reynaudi*, which become weakly developed or disappear on the lower part of the column, and which commonly have adherent gravel. In the fosse are 24—28 spherules. Tentacles large and long in well-grown specimens, up to 96, hexamerously arranged. 2 siphonoglyphs. Colour very variable, spherules often conspicuous — opaque pink, opaque white, etc. Port Nolloth to Durban; very common in at least part of this range.

*Bunodactis reynaudi*. Attains a larger size than any of the other intertidal species. Whole column covered with close-set verrucae, which give a moss-like appearance to the surface, and which commonly have adherent gravel. No

true marginal spherules, though the uppermost verrucae are very conspicuous, being often lobed and laterally compressed, and rising above the parapet. Tentacles not very long for the size of the animal, up to 384 or more in large specimens, hexamerously arranged. 2 siphonoglyphs. Colour very variable, often bright, and including blue. Port Nolloth to Durban; in many places incredibly abundant, sometimes filling entire pools; apparently reaches its maximum abundance on the west coast.

*Bunodosoma capensis*. Usually smaller than full-grown examples of *Bunodactis reynaudi* and *Anthopleura michaelsoni*. Column with vesicles over most of its surface, to which little if any gravel usually adheres. Conspicuous spherules in the fosse, up to 96 in number. Tentacles not very long, up to 192, hexamerously arranged. 2 siphonoglyphs. Colour very variable, often brilliant, including blue and violet; the vesicles either inconspicuous (the same as the ground-colour, or of a dull tint) or very conspicuous (e.g. bright violet-blue); the marginal spherules often conspicuous, e.g. orange, lilac, pink, crimson, white, cream. Recorded from Houtjes Bay in the west to East London in the east, but perhaps extending farther than this; often extremely common at low levels.

*Pseudactinia flagellifera*. Sometimes attains a large size. Greater part of column smooth; but at and a little below the parapet are vesicles, forming 1—5 horizontal rows (1—2 in small specimens), and producing a ruff-like appearance in large specimens. In the fosse are numerous spherules, sometimes absent in small individuals. Tentacles rarely covered by the column, long and large, up to 230 or more, usually hexamerously arranged. Usually 2 siphonoglyphs (rarely 1—3). Colour most often red — the whole animal red or orange of varying shades; but sometimes the column is brown, the tentacles green with purple tips; and there are other variants. Port Nolloth to Durban; common to very common.

*Pseudactinia varia*. Similar in colour and general appearance to *P. flagellifera*, but distinguished from it by having only a single ring of marginal vesicles, or at most a tendency to 2 rings, apart from the spherules in the fosse; and by the possession of a variable number of siphonoglyphs (1—9, usually 3—5) and an irregular arrangement of the tentacles, which may exceed 300 in large specimens. The species is as a rule smaller than *flagellifera*, between tidemarks. Recorded from the west coast of the Cape Peninsula to East London, and from St. Helena; perhaps actually extends farther.

### Zoantharia.

Along the temperate parts of the coast, at least from the Cape Peninsula to East London, the common intertidal Zoanthid is *Isozoanthus capensis*, which occurs under stones in pools, and elsewhere. It has small polyps with red tentacles. In the warmer water (the Natal coast near Durban) Zoanthids abound in the intertidal region, exhibiting a variety of species as well as great

abundance of individuals. In this region the species most readily identified is *Isaurus spongiosus*, which forms groups of curved, nodulated polyps, often in pools. Of the other species, two deserve special mention, and both of them form extensive sheets of polyps on the rocks at certain levels. The more widespread of the two is *Palythoa nelliae*, whose large polyps are brown when contracted; the other is *Zoanthus durbanensis*, with smaller polyps, commonly of a powdery grey-green colour in contraction.

## Actinaria.

### Tribus Corallimorphiae.

Actinaria with a flattened pedal disc but without basilar muscles. Column smooth, without vesicles, verrucae or spherules, its ectoderm sometimes with longitudinal muscles. No sphincter, or a rather weak endodermal one. Tentacles simple, knobbed or branched, rarely arranged in cycles, usually in radial rows, at least in the case of those communicating with the endocoels. Siphonoglyphs very weak or absent. Perfect mesenteries as a rule numerous, directives usually present. Longitudinal muscles of the mesenteries weak. Ciliated tracts of the filaments absent. Holotrichous cnidae in the epithelium always present. Solitary or connected by coenenchyme. Asexual reproduction frequent. For a further account of the tribus Corallimorphiae, see CARLGREN 1935, p. 16.

### Fam. Corallimorphidae.

Simple or gregarious Corallimorphiae. Longitudinal muscles in the ectoderm of the column present or absent. Tentacles simple, always distinctly knobbed at the apex. Not more than one tentacle corresponds to each exocoel; more than one is connected with at least the older endocoels.

### Genus *Corynactis*, ALLM.

Small Corallimorphidae often forming groups of individuals. Asexual reproduction by longitudinal fission usual. Form of the individuals variable according to state of contraction. Sphincter weak. Only a single tentacle communicating with each exocoel. All or most of the endocoelic tentacles arranged in radial rows. Outer tentacles larger than the inner ones, exocoelic tentacles largest of all. Tentacle-heads very distinct, without or with very weak longitudinal muscles, and provided with numerous nematocysts.

*Corynaectis annulata* (VERR.).

Pl. III fig. 5.

*Melactis annulata*, n. sp. VERRILL 1866, p. 50, Pl. 1, figs. 8, 8 a.*Corynaectis annulata*, VERR. VERRILL 1868, p. 74.

Pedal and oral disc wide, the middle part narrower. Sphincter weak, diffuse, with the strongest folds towards the margin, sometimes more circumscribed, when the lower part of it is weak. Number of tentacles in the radial rows varying from 2 to 5, in the larger specimens usually 3. Actinopharynx in the larger individuals with about 20 longitudinal ridges. On or two indistinct siphonoglyphs. Mesenteries up to about 80 in number, less than half of them perfect. One or two pairs of directives. Muscles of mesenteries weak. Holotrichous cnidae of the column  $36-41 \times$  about  $8.5 \mu$ ; those of the apex of the tentacles  $65-74 \times 15-17 \mu$ , numerous; those of the actinopharynx  $36-50 \times 11-14$  (19)  $\mu$ ; those of the filaments partly  $67-79 \times 24-26$  (29)  $\mu$ , partly  $36-46 \times 12-14 \mu$ . Microbasic mastigophores of the column partly  $36-38 \times 8.5-10 \mu$ , partly  $17-29 \times 5-6 \mu$ ; those of the apex of the tentacles partly  $48-58 \times$  about  $5 \mu$ , partly  $33-38 \times 4-4.5 \mu$ , both numerous; those of the actinopharynx  $24-29 \times 3.5-5 \mu$ ; those of the filaments  $36-48 \times 10-12 \mu$ .

*Colour.* Column light rose with a narrow ring of bright vermilion just below the tentacles at the margin. Mouth, disc and tentacles nearly white, tinged with rose (VERRILL). Column light blue-violet, the ring below the tentacles orange, distinctly visible when the tentacles are drawn in, tentacles almost colourless with the apex whiter, oral disc blue-violet, towards the mouth paler (individuals from Oude Kraal).

*Size.* Up to about 1.2 cm. high, oral disc up to 0.9 cm. in the preserved state.

*Localities.* Port Nolloth, several specimens, Nov. 1935, S.; Saldanha Bay, May 1904, Scotia exped., several specimens; July 1926, Discovery exped.; Cape Town, Febr. 1933, several specimens, S.; Oude Kraal, Kommetje, Oct. 1935, C. All from the intertidal area.

False Bay (Buffels Bay), 34-40 fm., numerous specimens, Jan. 1936, C. Previously known from False Bay, 15-20 fm., Oct. 1853, STIMPSON. The species, often many polyps together, lives on shells, stones or the skeleton of Octocorals.

I have examined the arrangement of tentacles in 6 specimens. Between the radial rows of tentacles communicating with the endocoels, an exocoelic tentacle is always present, and is not indicated here. The numbers of tentacles in the rows were:

(1) 4, 3, 2, 3, 3, 2, 4, 3, 2, 3, 4, 3, 3, 2, 2, 4, 2, 3, 3, 2, 2, 3, 3, 2, 3, 3, 4, 2, 3, 3, 3, 4, 2, 3, 2, 4, 3, 3.

(2) 3, 4, 3, 4, 3, 4, 3, 1, 4, 3, 4, 2, 4, 2, 3, 3, 4, 2, 4, 3, 2, 3, 4, 2, 3, 3, 3, 3, 2, 4, 2, 4, 2, 4, 2, 4, 3, 3, 2, 4.



(3) 2, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 1, 3, 2, 3, 3, 2, 3, 2, 3.

(4) 3, 3, 3, 3, 3, 3, 3, 2, 3, 3, 3, 3, 3, 3, 3, 2, 2, 3, 2, 3, 3, 3, 3, 3, 3, 2.

(5) 4, 4, 2, 4, 2, 5, 4, 4, 2, 5, 2, 4, 2, 3, 2, 3, 2, 2, 4, 1, 2, 2, 2, 3, 3, 2, 1.

(6) 2, 3, 2, 3, 2, 3, 3, 2, 3, 2, 3, 3, 3, 3, 2, 3, 2, 3, 2, 4, 3, 2, 3, 3, 4, 3, 2, 4, 2, 3, 2.

Specimens 1, 2 and 5 were from False Bay, nos. 3 and 4 from Cape Town, no. 6 from Port Nolloth. As we see, the number 3 in the rows was preponderant, except in the fifth specimen. The appearance of the species and of the sphincter is shown in figure 5 Pl. III and textfigure 1. I have cross-

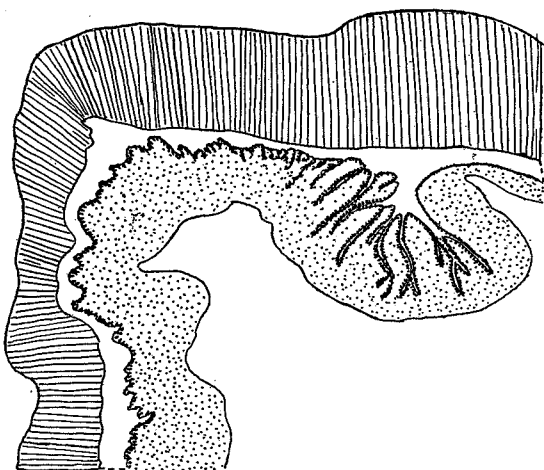


Fig. 1. *Corynactis annulata*, VERR. Sphincter.

sectioned two specimens in their upper part. One individual had 64 mesenteries, 30 of which were perfect, among them one pair of directives. The specimen numbered 6 had 15 perfect pairs, 5 on the one side of the two pairs of directives, 8 on the other. The very weak siphonoglyph in the first specimen had longer cilia than the other part of the actinopharynx.

*Remarks.* The species is closely related to *Corynactis carnea*, but is probably not identical with that species, among other reasons because the colour is different. If the two are identical the name *annulata* has priority.

#### Fam. Discosomidae.

Corallimorphiae of various sizes but never very large. Tentacles of various forms, simple or dendritic, never distinctly capitate, rarely strongly reduced, sometimes differentiated into marginal and discal tentacles of different appearance; arranged in radial rows, at least in the case of those communicating with the endocoels. With one or more mouths. Asexual reproduction frequent. Often living together in patches.

Genus *Rhodactis*, MILNE-EDW.

Discosomidae with tentacles of two sorts; a single row of small, cylindrical-conical tentacles at the margin, and radial rows of tentacles on the oral disc, the latter as a rule strongly branched. The branched tentacles most often arising from a central stalk, from pits on the disc. No naked area between the marginal and discal tentacles. Pedal and oral disc very wide, column and actinopharynx longitudinally ridged. Margin straight, not crenulate. Sphincter elongated, diffuse. Spirocysts probably absent. Upper part of the body capable of almost covering the oral disc. The individuals often live together in patches.

The above diagnosis is based on the species described here, which I have referred to *R. rhodostoma*, EHR., and on a species, probably identical with *R. howesii*, SAV.-KENT, from the collection of the Great Barrier Reef expedition. On the other hand *R. carlgreni*, WATZL., probably belongs to another genus. There is some doubt as to the tentacles around the mouth. EHRENBURG (1834) speaks only of branched tentacles on the disc and simple tentacles at the margin («tentaculis . . . in disco sparsis, palmatis, marginalibus simplicibus»). MILNE EDWARDS (1857), KLUNZINGER (1877) and SAVILLE-KENT (1893) state that there are simple tentacles also round the mouth. Regarding the figures of *R. rhodostoma* and *R. howesii* this statement seems to be correct, but I think that these simple tentacles are nothing but tentacles which have not yet developed any branches. In the two species I have examined I have found some simple tentacles among branched tentacles, round the mouth, as also some simple tentacles, sometimes with a very small projection, on the outer part of the disc; but as the histological structure of these simple tentacles agrees with that of the branched tentacles, while the *marginal* tentacles are provided with atrichous nematocysts, there is, I think, no ground for distinguishing more than two kinds of tentacles in this genus.

*Rhodactis rhodostoma* (EHR.).

Pl. III fig. 9.

*Metridium rhodostomum*, n. sp. EHRENBURG 1834, p. 39.*Rhodactis rhodostoma*, EHR. MILNE-EDWARDS 1857, p. 293; KLUNZINGER 1877, p. 88, Pl. 8, fig. 3.

Pedal and oral discs wide. Column with longitudinal ridges and furrows; margin not crenulated, with one row of tentacles, each provided at the apex with a battery of atrichous nematocysts. The principal part of the oral disc has radial rows of branched tentacles, each consisting of a short thick trunk surmounted by more or less numerous finger-like projections, the number of which varies considerably. The branches are most numerous in the middle of the oral disc, where their number can amount to 20—30; and in the inner part also there are rather freely branched tentacles. Near the margin the

processes are few, here and there occur simple tentacles provided with only a rudimentary branch, and among these are a few quite simple tentacles. Their ectoderm contains, as in the branched tentacles, microbasic mastigophores, while the atrichs are absent here. The radial tentacles, running out from the stronger endocoels, are extended over the whole disc, those from the younger endocoels occurring only in the outer parts of it. There is no naked area between the marginal and discal tentacles. The mouth is situated on a cone.

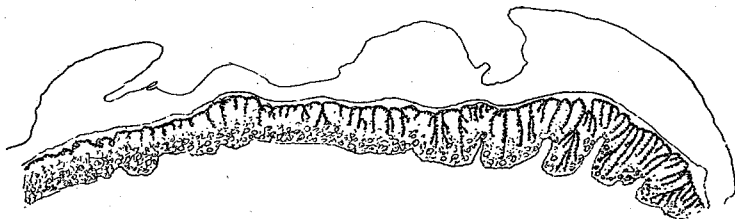


Fig. 2.

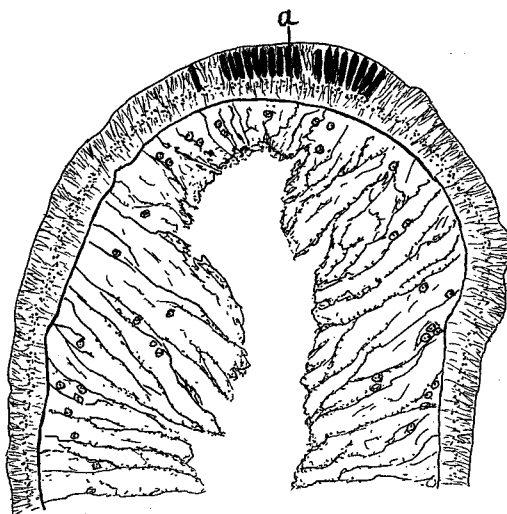


Fig. 3.

Figs. 2, 3. *Rhodactis rhodostoma* (EHR.). Fig. 2 Sphincter, fig. 3 Longitudinal section of a marginal tentacle a: atrichous nematocysts.

The nematocysts — (1) Holotrichs in the ectoderm of the column few, about  $31 \times 12 \mu$ ; in that of the actinopharynx a little more numerous,  $46-60 \times 17 \mu$ ; in the endoderm of the marginal tentacles  $58-65 \times$  about  $24 \mu$ ; in that of the other tentacles  $29-33 \times 10-12 \mu$ ; in the filaments  $108-144 \times$  about  $34-38 \mu$ , very numerous. (2) Atrichs in the ectoderm of the marginal tentacles  $22-36 \times 3-5(7) \mu$ , in the main collected in a nematocyst-battery at their apices. (3) Microbasic mastigophores in the ectoderm of the column few, about  $19-20 \times 5 \mu$ ; in that of the discal tentacles very sparse,  $17-24 \times 2.5-4(+5) \mu$ . Spirocysts, as it seems, absent.

*Colour.* According to EHRENBURG: Column greenish flesh-coloured. Oral disc olive-brown. Tentacles yellowish brown. Actinopharynx (mouth) rose. In formalin: Column almost colourless, actinopharynx colourless, tentacles greenish.

*Size* of largest specimen: breadth of oral disc about  $4 \times 2.5$  cm.; height of the column about 1.5 cm.; of another specimen, breadth about 2.8 cm., height 1.5 cm.

*Locality.* Durban (Isipingo) intertidal zone, 8 specimens, July 1936, S.

*Further distribution.* The Red Sea, Tor.

The appearance of the species I have shown in figure 9 Pl. III. I have sectioned the sphincter in two specimens. It was long and diffuse, somewhat stronger in one specimen (fig. 2) than in the other. A longitudinal section of the upper part of a marginal tentacle showing the nematocyst battery I have drawn in fig. 3. The actinopharynx was provided with very high ridges supported by thin processes of the mesogloea. One specimen examined had 124 mesenteries, 36 of which were perfect. The longitudinal muscles of the mesenteries were very weak and not folded, the parietobasilar muscles the same. Although the muscles of the mesenteries are very weak, the upper part of the column seems to be able almost to cover the tentacles. Probably this invagination is caused only by the contraction of the sphincter. There were numerous zooxanthellae in the endoderm. In the ectoderm of the column there were also rather sparse nematocysts  $16-18 \times$  about  $5 \mu$ , possibly these also were microbasic mastigophores, though the basal part of the thread was thinner than in other such nematocysts.

I have identified the specimens with *R. rhodostoma*, as the short description of that species, of which no holotype exists, seems to agree rather well with the description here given.

### Tribus Endocoelanthae.

Actiniaria with a flattened aboral end, but without basilar muscles. Column without vesicles, verrucae or spherules, its ectoderm usually with spirocysts. No sphincter. Tentacles arranged in two alternating cycles or in a peculiar way, sometimes with aboral swellings of the mesogloea on their aboral sides. One or two siphonoglyphs, to which more mesenteries than the directives are attached. Mesenteries, after development of the first 6 couples (12 mesenteries), appearing in the four lateral endocoels, with their longitudinal muscles oriented as in the directives. Ciliated tracts of the filaments present. Holotrichous cnidae absent.

### Fam. Halcuriidae.

Endocoelanthae of small or medium size. Tentacles arranged in a peculiar way; without thickenings on their aboral sides; up to about 70 in number. Oral disc not lobed. A single siphonoglyph. 6 or 10 pairs of per-

fect, fertile and filamented mesenteries. A variable number of smaller mesenteries in the distal part of the body. Only the 6 or 10 first pairs provided with distinct, well developed, diffuse to kidney-shaped retractors. Arrangement of the mesenteries cycloidal.

#### Genus *Halcurias*, Mc. Murr.

Column cylindrical, sometimes provided with ectodermal batteries of nematocysts. Tentacles in fertile animals typically arranged  $18(10+8)+10+16+8+16$ . Pairs of mesenteries  $10+8+16=34$ , only the first 10 fertile and with filaments and retractors. A variable number of the other mesenteries also perfect.

#### *Halcurias capensis*, CARLGR.

*Halcurias capensis*, n. sp. CARLGRÉN 1928, p. 132 (10), Pl. 2, fig. 4, textfig. 2.

Column cylindrical, its ectoderm without or with very few spirocysts, but with nematocysts arranged in batteries. Tentacles up to 68, more or less cylindrical. Arrangement of the tentacles as described above. Ectoderm of the actinopharynx with spirocysts. Retractors of the 10 first pairs of mesenteries very strong, with numerous high folds. Parietobasilar muscles weak. Nematocysts in large, fertile specimens: those of the batteries of the column  $31-38 \times 2.5$  to over  $2.5 \mu$ ; those of the tentacles  $24-29 \times 2.5$  to over  $2.5 \mu$ ; those of the actinopharynx partly  $22-26 \times$  over  $2.5 \mu$ , partly  $24-27 \times 4.5-6 \mu$ . Spirocysts of the tentacles  $19 \times$  almost  $2.5-47 \times 7 \mu$ .

*Colour.* Column yellowish or orange-coloured with small white spots. Tentacles, oral disc and actinopharynx orange.

*Size.* Height of the body up to about 2.2 cm., breadth of pedal disc up to  $2.2 \times 1.7$  cm.

The small specimen in the present collection was 0.45 cm. high and 0.35 cm. wide.

*Localities.*  $34^{\circ} 23' S.$ ,  $18^{\circ} 8' E.$ , 157 fm., small stones, 1 specimen, Dec. 1929, M.; Agulhas Bank,  $35^{\circ} 26.8' S.$ ,  $20^{\circ} 56.2' E.$ , 100 m.;  $35^{\circ} 16' S.$ ,  $22^{\circ} 26.7' E.$ , 155 m., German Deep-Sea Exped. This species has already been described by me in 1928. The present specimen was very small, the



Fig. 4. *Halcurias capensis*  
CARLGR.

number of tentacles 30, the retractors of the mesenteries considerably weaker than those of large and fertile specimens, but much stronger than those of *Halcurias minimus*. The nematocysts were also smaller. The basitrichs were  $29-34 \times 2(2.5) \mu$  in the column; in the tentacles  $22-26 \times 2-2.5 \mu$ ; in the actinopharynx  $22-26 \times 2(2.5) \mu$ . Moreover there were also broader nematocysts,  $17-23 \times 3-4(4.5) \mu$  in the column, and  $22-24 \times 4.5 \mu$  in the actinopharynx, which was also provided with spirocysts. The spirocysts of the tentacles were  $14 \times 2-36 \times 6.5(7) \mu$ .

### Tribus Nynantheae.

Actiniaria with a rounded or flat base, with or without basilar muscles. Column smooth or with outgrowths of one sort or another, rarely (and then especially in the uppermost part) provided with ectodermal muscles. Sphincter absent or present, endodermal or mesogloea. Tentacles simple or complex, commonly arranged in cycles, sometimes in radial rows. Mesenteries as a rule arranged in cycles, commonly hexamerously. Siphonoglyphs usually attached to directives, rarely to non-directives when directives are absent. Secondary mesenteries always develop in exocoels. The pairs of non-directives consist of two mesenteries whose retractors face one another. Mesenterial filaments always with ciliated tracts. Holotrichous cnidae as a rule absent.

### Fam. Edwardsiidae.

Nynantheae without basilar muscles. Body elongated, divisible at least into two regions, a long scapus provided with an »epidermis» and a short upper scapulus. Often there is also a rounded, naked physa at the aboral end and a very short, thin capitulum immediately below the tentacles. No sphincter or acontia. Mesenteries divided into 8 macro- and at least 4 microcnemes, the latter very weak and present in the uppermost part of the column only. Of the macrocnemes there are two pairs of directives and four lateral mesenteries whose retractors face the ventral directives.

### Genus *Edwardsia*, QUATREF.

Body divisible into physa, scapus, scapulus and capitulum, the aboral part (physa) short, ampullaceous, without nemathybomes. Scapus long, with batteries of nematocysts (nemathybomes) sunk in the mesogloea. Tentacles at least 12. 8 perfect mesenteries and at least 4 imperfect one in the most distal part of the body.

### *Edwardsia capensis*, n. sp.

Nemathybomes rather small, not projecting much above the surface of the scapus, arranged in 8 longitudinal rows. Scapulus deeply furrowed at the insertions of the mesenteries. Tentacles 18 (always?), rather long. Actinopharynx with 8 longitudinal furrows corresponding to the insertions of the mesenteries. Retractors of the perfect mesenteries diffuse, in the region of the ciliated tract rather well developed, with more than 20 folds, which are branched only in their outer and inner parts. The outer lamellar part of the macrocnemes is attached to the retractor not far from its outer edge. Parietal muscles in the region of the ciliated tract rather well developed, more or less triangular in outline, their folds a little branched. The extension of the parietal muscles on the column is of ordinary amount. Nematocysts of the

nemathybomes partly  $68-86 \times 5.5-6 \mu$ , partly  $67-72 \times 2.5 \mu$ ; those of the capitulum  $19-22 \times 2 \mu$ ; those of the tentacles  $22-24 \times 2.5 \mu$ ; those of the actinopharynx partly  $26-29 \times 6-6.5 \mu$ , partly  $34-37 \times 3.5-4 \mu$ , partly  $19-23 \times$  about  $2.5 \mu$ , common. Spirocysts of the tentacles  $14 \times 2$ —about  $24 \times 3.5 \mu$ .

*Colour.* Scapus grayish, capitulum and tentacles red-brown.

*Size.* Length 2 cm., breadth 0.2 cm., greatest length of tentacles 0.4 cm.

*Locality.* Off the mouth of False Bay, about 50 fm., together with *Hal-campa capensis*, Jan. 1936, 1 specimen, C.

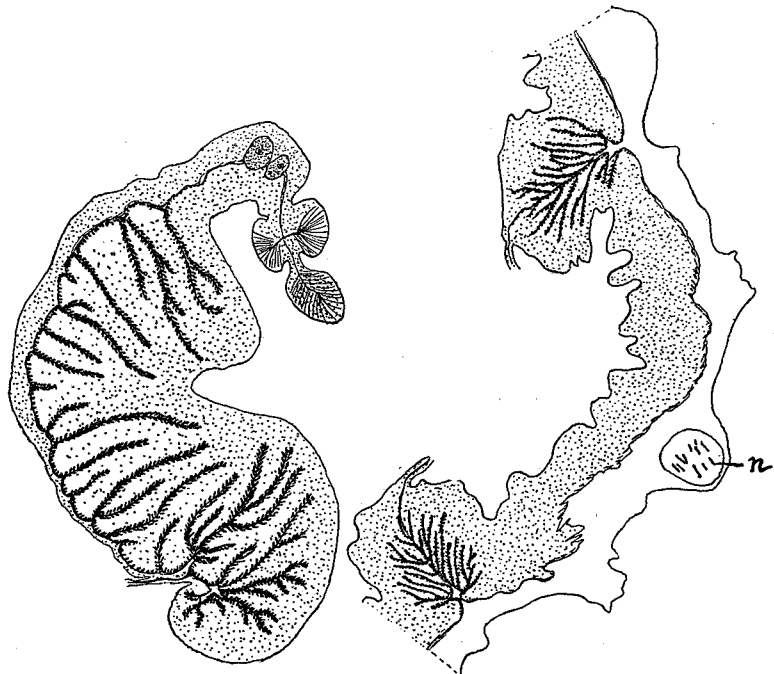


Fig. 5.

Fig. 6.

Figs. 5, 6. *Edwardsia capensis* n. sp. Fig. 5. Retractor of a mesentery in the region of the ciliated tract, fig. 6. Transverse section of a part of the column with 2 parietal muscles. n: nemathybome.

The physa was to a great extent invaginated, the actinopharynx evaginated above the bases of the tentacles. The organisation agrees with that of other species of *Edwardsia*. I have figured a transverse section of a retractor (Fig. 5) and a portion of the bodywall with two parietal muscles in the region of the ciliated tract (Fig. 6). A section through the upper part of the cnidoglandular tract shows the same appearance. The specimen was a female.

#### Fam. Halcampoididae.

Nynantheae without basilar muscles. Body elongated, either not differentiated into regions, but with the aboral end rounded and physa-like; or divisible into 3 regions, physa, scapus and capitulum. Column sometimes with

papillae or tenaculi. Usually no sphincter. Often only a single, well developed siphonoglyph. Mesenteries usually divisible into macro- and microcnemes; rarely only macronemes.

STEPHENSON (1922 and 1935) has placed *Ilyanthus*, *Eloactis*, *Peachia*, *Haloclava* and *Harenactis* in the family Ilyanthidae, separated from the Halcampoididae. For my part I think it is best to let the Ilyanthidae drop, because the organization of the type of the genus *Ilyanthus*, *I. scoticus*, is unknown, and there is much doubt whether this species can be referred to the same genus as *I. (Mesacmaea) stellatus*. Undoubtedly *Peachia*, *Eloactis* and *Haloclava*, and possibly also *Oractis*, are closely related to each other and form a group by themselves, but I think it is not necessary to separate them from the other Halcampoididae. If they must be separated, I propose to give the family the name Haloclavidae proposed by VERRILL (1899) instead of Ilyanthidae, and include only the four genera named in it. Here I refer them all together to one family. If we refer *Oractis* together with the others to the family Halcampoididae, the above diagnosis of the family must be somewhat altered (see CARLIGREN 1931).

#### Genus *Haloclava*, VERR.

Halcampoididae with the aboral end rounded, physa-like. Column cylindrical, with 20 longitudinal rows of ampullaceous papillae in its upper part. Tentacles 20, capitate at the apex, forming acrospheres. Inner tentacles a little shorter than the outer ones. A single broad siphonoglyph, forming no conchula, but prolonged aborally into a rather long hyposulcus. 10 pairs of macrocnemes. Spirocysts absent from the tentacles and oral disc.

#### *Haloclava capensis* (VERR.).

*Halocampa capensis*, n. sp. VERRILL 1865, p. 151; 1868, p. 319, Pl. 3, fig. 3.

*Eloactis capensis* (VERR.). VERRILL 1899, p. 42.

*Halocampa capensis* (VERR.). PAX 1908, p. 485.

Column elongated, rather slender, subvermiform, contracting by the involution of the summit. The twenty internal lamellae show through the wall and the spaces between them are subpapillose towards the upper part of the body. Tentacles 20, oblong, enlarged towards the tips, which are obtusely rounded.

*Colour.* Pale reddish, with flake-white dots and patches. Inner side of tentacles flake-white. Six of the tentacles (perhaps more) have the lower part of their inner surface of a dark brown colour, which gives the appearance of ocelli at their bases.

*Size.* Length in life 0.5 of an inch, diameter 0.12.

*Locality.* False Bay (Simon's Bay) 12 fms., sand, Oct. 1855, WM. STIMPSON.

I have not obtained this species. The description given above is that of VERRILL, 1868. There is some doubt whether the species belongs to *Eloactis*, which VERRILL (1899) suggested, or to *Haloclava*. This is dependent upon



how one interprets the subpapillose upper part of the body. The genus *Haloclava* has a row of small, *hollow* papillae between the insertions of the mesenteries in the upper part of the body, while *Eloactis* has numerous small *solid* papillae over the whole surface of the column.

#### Fam. Halcampidae.

Nynantheae without basilar muscles, with a commonly elongated, cylindrical body, most often divisible into three regions, physa, scapus and capitulum. Scapus often provided with tenaculi or papillae with numerous nematocysts. Sphincter mesogloea, simple or double. Mesenteries divisible into macro- and microcnemes. Macrocnemes as a rule six pairs; rarely only 8 macrocnemes present, arranged in the same way as the perfect mesenteries in *Edwardsia*.

#### Genus *Halcampa*, GOSSE.

Cylindrical Halcampidae with the body divisible into physa, scapus and capitulum. Scapus long, with tenaculi, to which grains of sand are often attached. A single, very small, mesogloea sphincter situated closer to the ectoderm than to the endoderm, and extending into the bases of the tentacles. Tentacles short, 8—12. No distinct siphonoglyphs. 8—12 perfect mesenteries, 2 pairs of directives. A second more or less complete cycle of imperfect mesenteries present, exceptionally absent. Perfect mesenteries fertile, with filaments and strong retractors; other mesenteries sterile and weak.

The diagnosis of the genus is here somewhat altered in as much as I now include forms lacking the second cycle of mesenteries in this genus. There is no doubt that the species described below belongs to *Halcampa*, although it has no microcnemes.

#### *Halcampa capensis*, n. sp.

Tenaculi weak. Tentacles 12, cylindrical. 6 pairs of mesenteries, all except those of the ventrolateral couple fertile and with retractors. No mesenteries of the second cycle present. Retractors, in the region of the ciliated tract, more or less kidney-shaped, with more than 20 folds, the middle and outer of which are branched. Parietal muscles, in the same region elongated, with rather few and short folds. Nematocysts of the tentacles  $12-13 \times 2.5 \mu$ , few; those of the actinopharynx partly about  $24 \times$  over  $2.5-3 \mu$ , opaque, few, partly  $24-26(29) \times 4.5-5(5) \mu$ , very numerous; those of the capitulum  $7 \times 2 \mu$ , often curved, common. Spirocysts of the tentacles  $19 \times 2-43(48) \times 4-4.5 \mu$ .

*Colour.* I have seen the single specimen only in an invaginated state. The column was colourless except at the distal end where the tentacles and capitulum were situated, where the colour was red-brown. To judge from the specimen after it was preserved in formalin the tentacles had red-brown transverse bands.

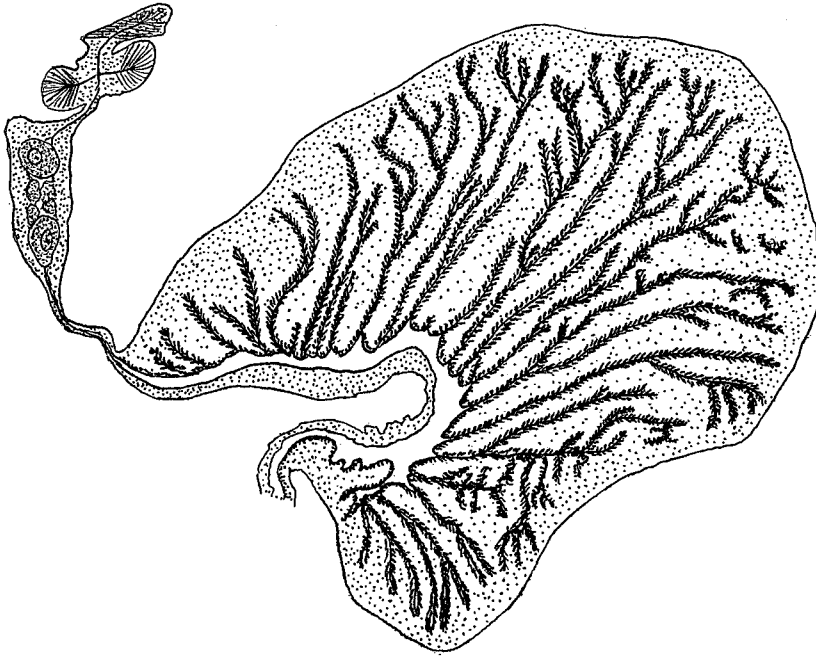


Fig. 7. *Halcampa capensis* n. sp. Section of the retractor of a mesentery in the region of the ciliated tract.

*Size*, in rather strongly contracted condition, with the tentacles drawn in: length 3 cm., breadth in the upper part 0.5 cm., that of the thinnest part 0.3 cm., length of tentacles about 0.35 cm., breadth 0.1 cm.

*Locality*. Off the mouth of False Bay, together with *Edwardsia capensis*, about 50 fm., 1 specimen, Jan. 1936, C.

The species agrees in its organization with other species of *Halcampa*. The size and situation of the sphincter, the thick, stratified mesogloea of the column, the presence of tenaculi, the indistinctly differentiated siphonoglyphs and other anatomical characters are characteristic features. The only difference is that the present species lacks a second cycle of mesenteries. I have sectioned the upper part of the body between the lower part of the actinopharynx and the beginning of the fertile region, as also the lowest part of the body with the physa; but in no slides have I found any traces of a second cycle of mesenteries. I have also previously (1911, p. 23) suggested that a reduction of the number of mesenteries possibly takes place in this genus. The mesogloea of the scapus was very thick, partly due to contraction of the animal; the capitulum thin and deeply

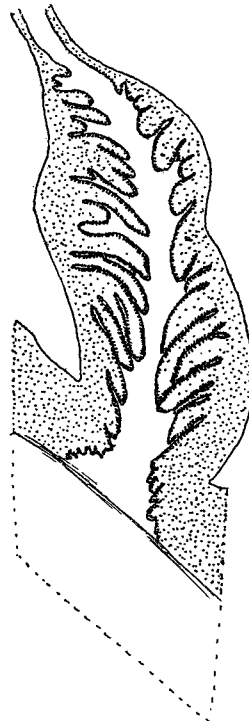


Fig. 8. *Halcampa capensis* n. sp. Section of a parietal muscle in the region of the ciliated tract.

furrowed at the insertions of the mesenteries. The specimen was a female. I have figured sections of a retractor and of a parietal muscle in the upper part of the reproductive region (figs. 7, 8).

Genus *Halcampaster*, nov. gen.

Halcampidae with smooth cylindrical body, without tenaculi, not divided into distinct regions. Sphincter very weak, mesogloea, close to the tentacles. Tentacles more than 12. Longitudinal muscles of the tentacles ectodermal. 2 siphonoglyphs. Mesenteries showing a tendency to pentamerous arrangement. Only 5 pairs (always?) of macrocnemes. Mesenteries more numerous than the tentacles.

The genus is closely related to *Parahalcampa* and *Cactosoma*.

*Halcampaster teres*, n. sp.

Column cylindrical, smooth, not distinctly divided into regions, without tenaculi. Aboral end round. Sphincter mesogloea, very weak, situated as in *Halcampa*. Tentacles 20—30 (or more?). Longitudinal muscles of the tentacles strong, radial muscles of the oral disc ectodermal. 2 distinct but weak siphonoglyphs, with long cilia. Arrangement of mesenteries irregular, with a tendency to be pentamerous, in as much as the dorsolateral pair of the first cycle on one side of the two pairs of directives is retarded in its development and is microcnemic. Thus there are only 5 pairs of macrocnemes, two pairs of directives and 3 pairs of non-directives. Retractors of the macrocnemes concentrated to circumscript, showing high, branched folds. Parietal muscles not very strong. Strongest microcnemes of about the same appearance as the parietal muscles of the macrocnemes. Nematocysts of the column partly 14—17 $\times$  about 3  $\mu$ , very numerous, partly 17—19 $\times$  about 4  $\mu$ , fewer, probably microbasic amastigophores, both types often a little curved; those of the tentacles 18—24 $\times$ 2.5  $\mu$ , sparse, basitrichs; those of the actinopharynx 22—24 $\times$  4  $\mu$ , probably microbasic amastigophores; spirocysts of tentacles 13 $\times$ 1.5—about 28 $\times$ 3  $\mu$ .

*Colour* unknown.

*Size* of the two largest specimens: (1) length 0.6 cm., greatest width 0.4 cm., narrowest width 0.2 cm. (2) length 0.8 cm., breadth 0.25 cm. (3) of the smallest specimen: length 0.4 cm., greatest breadth 0.2 cm.

*Locality*. East London (Shelly Beach), 4 specimens, July 1937, S.

The mesogloea of the column and the sphincter showed the same appearance as those of *Halcampa*. In the uppermost part of the column a few spirocysts occurred in the ectoderm. The tentacles were 20 in the smallest individual, in the two largest 26 and 30. Although it was very difficult to state the arrangement of tentacles in the irregularly contracted specimens, it may be supposed that the tentacles have a tendency to be pentamerously

arranged. This is the case with the mesenteries, the arrangement of which agreed perfectly in the two individuals sectioned. There were only 5 pairs of macrocnemes, among which two pairs of directives. The pairs of mesenteries were 18. On the one side of the directive axis 2 pairs of mesenteries were present, both macrocnemes belonging to the first cycle; and in addition to these 3 pairs of the second and 5 pairs of the third cycle—one of the ventro-lateral pairs was missing. On the other side there were two pairs of the first

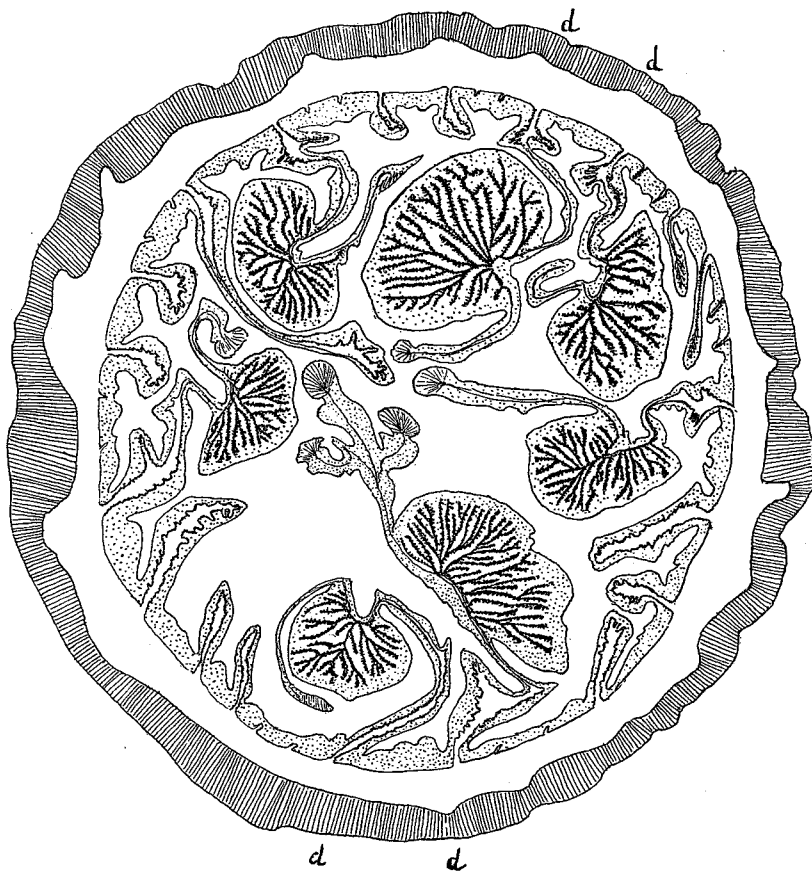


Fig. 9. *Halcamaster teres* n. sp. Transverse section of the body in its lower part.  
d: directives.

cycle but only the one pair was macrocnemic, and in addition 3 pairs of the second and one pair of the third cycle, the last situated close to the ventral directives. The orientation of the mesenteries was possible since one mesentery of the pair of lateral macrocnemes was considerably weaker than its partner in the proximal part of the body (see fig. 9). The single pair of microcnemes of the first cycle was not larger than the mesenteries of the second cycle. It is doubtful whether later on any rearrangement of the mesenteries takes place, so that in fertile specimens these microcnemes of the first cycle become transformed into macrocnemes. Both individuals examined were sterile.

Genus *Halianthella*, KWIETN.

Halcampidae with the body divisible into scapus and scapulus, the former with a cuticle, which is sometimes thin and easily deciduous. Aboral end rarely rounded, as a rule flattened into the form of a pedal disc, but without basilar muscles. Scapus without batteries of nematocysts. 2 sphincters, the upper rather short, lying close to the tentacles, the lower long. Tentacles rather long, the same in number as the mesenteries. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. 2 weak siphonoglyphs. 6 pairs of macrocnemes, 2 pairs of directives, 6 pairs of microcnemes.

*Halianthella annularis*, n. sp.

Pl. III figs. 2, 3.

Aboral end of the body flattened, adherent. Scapus with a very thin cuticle, easily deciduous. Upper sphincter at the base of the outer tentacles, rather short, reticular; nearer the ectoderm than the endoderm; lower sphincter long, reticular, with coarse muscle meshes. Tentacles 24, of ordinary length. Siphonoglyphs with longer cilia than those in the other parts of the actinopharynx, which is provided with 6 high ridges on each side of the siphonoglyphs. Retractors of the macrocnemes kidney-shaped to circumscribed, of the same appearance as in *H. kerguelensis*. Ova large. The young are carried in a single, circular pocket round the upper part of the scapus. Nematocysts of the scapus  $12-16 \times 1.5-2.5 \mu$ ; those of the scapulus  $12-17 \times 1.5-2 \mu$ , numerous; those of the tentacles  $14-19 \times 2-3 \mu$ , sparse; those of the actinopharynx partly  $17-22 \times$  about  $2.5 \mu$ , partly  $29-34 \times 4.5-5.5 \mu$ , numerous; those of the filaments partly  $18-23 \times 1.5-2.5 \mu$ , partly  $29-36 \times 4.5-5.5 \mu$ , a little broader at the basal end, rather common. Spirocysts of the tentacles  $17 \times 1.5-36 \times$  about  $3 \mu$ .

*Colour.* I have noted the following variations of colour. Column varying from flesh-colour to different shades of brown, the distal part often of a different tinge than the lower part, and with lighter spots. Colour of tentacles in 8 examples: (1) brown, somewhat paler at their bases (the column was dark brown); (2) red-brown, paler at the base than at the apex; below the apex an annulus of gray-white (the oral disc here was brown); (3) pale red brown with 2 transverse bands of cream colour nearer the distal end than the base; (4) brown-red; (5) the basal half brown, then a grayish annulus, the apex cream-white; (6) almost colourless; (7) red-brown with a light spot at the base and a transverse band two thirds from the base; (8) red-brown, gradually paler towards the apex; the outer tentacles with white spots at their bases. The actinopharynx was usually colourless, the embryos always red. The colour was situated in the endoderm.

*Size.* Length up to about 2.2 cm., breadth up to 0.9 cm.

*Localities.* Cape Peninsula (Oude Kraal), 6 specimens, March 1934, S.; Cape Peninsula (Kommetje), on stones, shells or algae in the intertidal zone, common, 1933, 1935, S.; Oct., Dec. 1935, C.

The species agrees in its organization very closely with *Halianthella kerguelensis*, but is certainly a distinct species, distinguished from *kerguelensis* by a more delicate body, weaker cuticle (sometimes lost as in the specimens from Oude Kraal), smaller nematocysts in the ectoderm of the scapulus and tentacles, and a different type of brood-pouch. It is true that we do not know of what type the brood-pouches were in the holotype of *kerguelensis*, although as I have pointed out (1928, p. 137) it is very probable that such structures were present in it; but in *Marsupifer valdiviae*, which is synonymous with

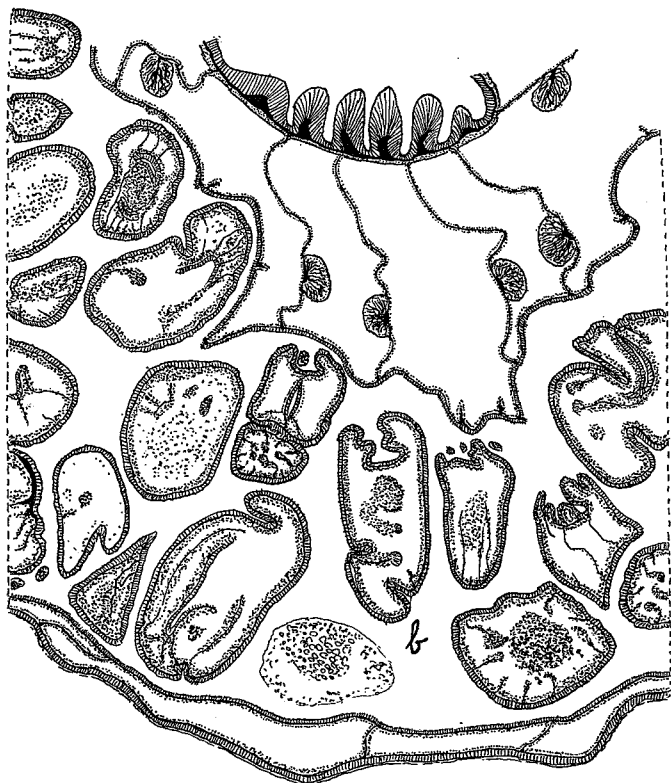


Fig. 10. *Halianthella annularis* n. sp. Transverse section of a part of the body in the region of the actinopharynx. *b*: brood-room with numerous larvae.

*kerguelensis*, there were 6 separate brood-pouches. In *annularis*, on the other hand, there is a single circular brood-pouch of the same type as the one which I have described in *Cricophorus nutrix*. As in that species, the presence of the brood-pouch is marked by a circular invagination round the upper part of the scapus. The broodpouch contained a very larger number of young (fig. 10).

I have made several maceration-preparations of the ectoderm of the column and tentacles in order to confirm whether the sizes of the nematocysts were constant. So far as I have found the nematocysts were always smaller than in *kerguelensis*. The ectoderm of the scapulus contained, in the main, supporting cells and cnidoblasts; in that of the scapus there were numerous gland-cells.

Fam. *Condylanthidae*.

*Nynantheae* the column of which is divisible into scapus and scapulus (*capitulum?*). Marginal pseudospherules sometimes present. Sphincter diffuse or circumscribed. Tentacles few. Longitudinal muscles of tentacles and radial muscles of oral disc mesogloal or ectodermal. 2 pairs of siphonoglyphs. Mesenteries divisible into macro- and microcnemes. Macrocnemes 6 pairs, with very strong circumscribed retractors. Basilar muscles distinct. *Acontia* absent.

Genus *Condylanthus*, CARLGR.

*Condylanthidae* with well developed pedal disc. Column divisible into scapus and scapulus, the former with a cuticle. No pseudospherules. Ectoderm of the scapulus with spirocysts. Sphincter weak, diffuse. Tentacles short, considerably fewer than the mesenteries. Longitudinal muscles of tentacles and radial muscles of oral disc mesogloal. Parietobasilar muscles of the macrocnemes very strong. Basilar muscles well developed.

*Condylanthus magellanicus*, CARLGR.

*Condylactis magellanicus*, n. sp. CARLGRÉN 1899, p. 15, fig. 7; 1927, p. 19, figs. 18—22; 1928, p. 140.

Body conical, with broad pedal disc. Tentacles 24—48. Actinopharynx long, with rather distinct siphonoglyphs. Pairs of mesenteries in 5 cycles, hexamerously arranged, the last cycle more or less complete. 12—24 pairs reach the distal end of the column, but the younger mesenteries are present only in the lower part of the body. Retractors of the 6 pairs of macrocnemes very strong, pinnate-circumscribed, present along the whole length of the mesenteries. Parietobasilar muscles richly branched, narrower but thicker in the upper part than in the lower, where they are very broad and form a deep fold peripheral to the retractors. Nematocysts of the scapus (10) 12—17 × about 2 μ; those of the scapulus 14—22 × almost 2—2 μ; those of the tentacles 18—24 × 2—2.5 μ; those of the actinopharynx partly 14—23 × 2—2.5 μ, partly 22—29 × 4.5—5.5 μ. The latter are microbasic mastigophores. Spirocysts of the tentacles 17 × about 1—53 × 3—3.5 μ; those of the scapulus 19 × about 1—43 × almost 3 μ.

*Colour* unknown.

*Size* of the present specimen in the preserved state: pedal disc 4 × 3.7 cm., height 2.5 cm.

*Localities*. Agulhas Bank, 10—12 miles W. of Cape Barracouta, 40—42 fm., 1 specimen, Dec. 1929, M.; 35° 16' S., 22° 26.7' E., 155 m.; 35° 10.5' S., 23° 2' E., 500 m.; 34° 33.3' S., 18° 21.2' E., 318 m, German Deep-Sea Exped.

*Further distribution*. Tierra del Fuego.

The specimen had 24 tentacles and about 130 mesenteries at the pedal disc. A more complete description has been given by me in 1927.

## Fam. Actiniidae.

Nynantheae with basilar muscles. Column smooth or provided with projections in the form of verrucae, marginal spherules, pseudospherules or vesicles. Sphincter absent or endodermal, diffuse or circumscribed. Tentacles simple or rarely with paired lateral enlargements. Mesenteries not divided into macro- and microcnemes. Perfect pairs of mesenteries more than six. Acontia not present.

Genus *Actinia*, BROWNE.

Actiniidae with very wide pedal disc and smooth, rather low column; a ring of simple or slightly compound marginal spherules (acrorhagi) in the deep fosse. These are commonly conspicuous but can be covered up by the margin in contraction. Sphincter weaker or stronger, diffuse, rarely with a tendency to be partly mesogloal. Tentacles of ordinary length, their longitudinal muscles ectodermal. Perfect mesenteries numerous. All stronger mesenteries save the directives fertile. Retractors of the mesenteries diffuse. Mesenteries at the pedal disc (limbus) more numerous than at the margin.

*Actinia equina*, L.

For references and synonyms see STEPHENSON, 1935.

Marginal spherules typically simple, sometimes more or less compound, in number up to 48 or more. Sphincter diffuse, with comparatively short folds, especially in its distal and proximal parts. Tentacles up to 192, hexamerously arranged in 6 cycles, the last cycle more or less complete. Siphonoglyphs rather broad, little if at all prolonged aborally. At least 12 pairs of mesenteries, mostly 24 (or more?) are perfect. Retractors of the mesenteries band-like, broad on the perfect mesenteries but with low folds, parietobasilar and basilar muscles well developed. Nematocysts of the column  $13-19 \times 1.5-2.5 \mu$ ; those of the tentacles  $17-24 \times 1.5-2.5 \mu$ ; those of the actinopharynx (14)  $17-29 \times (1.5)2-2.5 \mu$ ; those of the filaments  $10 \times 2$  to  $24 \times 4 \mu$ ; all basitrichs; those of the marginal spherules  $36-60 \times 3-5 \mu$ , atrichs. Nematocysts which are probably microbasic mastigophores occur in the actinopharynx ( $18-26 \times 4-4.5 \mu$ ) and in the filaments ( $17-24 \times 4-4.5 \mu$ ). Spirocysts of tentacles  $14 \times 1.5-29 \times 2.5-3 \mu$ .

*Colour* of the South African specimens. Red with blue marginal spherules (STEPHENSON, specimen from Still Bay); red, in the upper part darker, red-brown (CARLGRÉN, specimen from Durban). The commonest colour in South Africa is red (STEPHENSON).

*Size* of the largest specimen from Reunion rocks in preserved state: pedal disc 2.5 cm. broad; height 1.5 cm.; of the largest from St. James: pedal disc  $3 \times 2.5$  cm.; height 1.5 cm.

*Localities*. Port Nolloth, Nov. 1935, 5 specimens, S; Oude Kraal, June 1934, 2 specimens, S.; Cape at the light-house, Eugenie exped., 2 specimens;



St. James, April 1937, 3 specimens, S.; Still Bay, Jan. 1932, 8 specimens, S.; Port Elizabeth (Reef Bay), July 1936, 2 specimens, S.; East London (Shelly Beach), July 1937, 10 specimens, S.; Durban (Isipingo), July 1935, 1 specimen, S.; Nov. 1935, 4 specimens, C.; Durban (Reunion rocks), Nov. 1935, 9 specimens, C.; Durban, WAHLBERG, 1 specimen.

I have identified the South African species of *Actinia* with *A. equina*, because I cannot find any real difference between it and the North Atlantic form. When beginning my examination I had only small specimens from Still Bay at hand, and as the size of the nematocysts of the marginal spherules in these individuals agreed more with those of the Australasian *A. tenebrosa*, I suggested that they belonged to this species. Later, after examining large specimens from Durban and St. James, I cannot confirm this opinion.

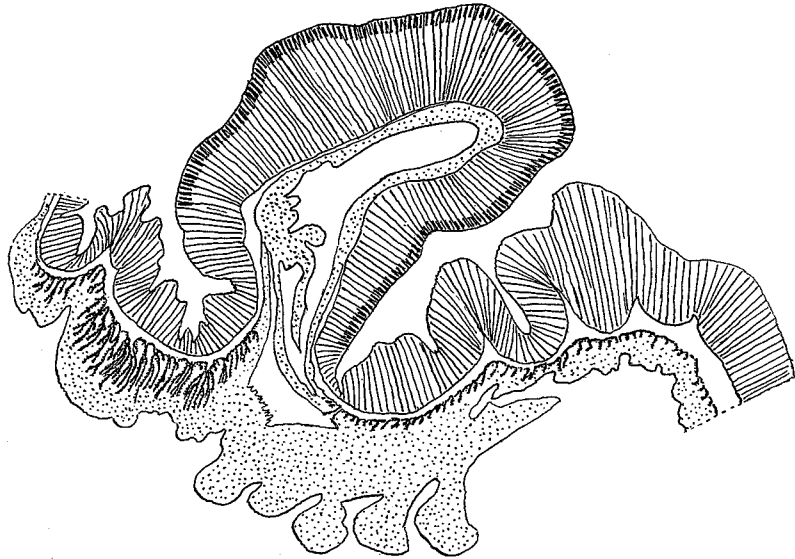


Fig. 11. *Actinia equina* L. Section of sphincter and marginal sphaerule.

The sphincter (Fig. 11) agrees very well, even in the details, with that of *equina*, as do also the size and structure of the nematocysts in the larger specimens. The size of the atrichs in the marginal spherules varies a little according to the size of the animal. Smaller individuals have commonly smaller (up to 40 to 50  $\mu$  long) atrichs than larger individuals. WEILL (1934) has found atrichs in other parts of the column, I have, however, not seen any such, either in South African specimens or in 2 specimens from Norway and Morocco which I have recently examined. WEILL mentions no atrichs in the column apart from those of the marginal spherules in *A. bermudensis*. Probably atrichs are present as a rule only in the marginal spherules of *A. equina*. Moreover, there are certain differences as to the breadth of the basitrichs and the length of the nematocysts of the filaments, between WEILL's specimen and those examined by me. Compare my statements above with those of WEILL (1934).

There were in large specimens 5 cycles of mesenteries and a more or less incomplete sixth cycle in the proximal part of the body only. A large specimen from Isipingo had about 130 tentacles but between 240 and 250 mesenteries at the base. Thus the mesenteries at the pedal disc were almost twice as many as those at the margin.

In conformity with *A. equina*, var. *mesembryanthemum*, the South African specimens are viviparous. In a rather small specimen from Still Bay there were several small young ones in the coelenteron.

#### Genus *Condylactis*, DUCH. & MICH.

Actiniidae with elongated body. Column smooth or provided with small verrucae in its upper part. Margin with a collar. No sphincter. Tentacles simple, rather long, hexamerously arranged; they can probably not be wholly covered by the upper part of the body(?); their longitudinal muscles are ectodermal. Most of the mesenteries perfect and fertile, except sometimes the directives. Retractors diffuse. Not more mesenteries at the base than at the margin.

#### *Condylactis natalensis*, n. sp.

Body elongated, forming a high cylinder, smooth, without any trace of verrucae. Margin forming a collar. Sphincter absent. Tentacles 48, rather long, conical, in the preserved state longitudinally furrowed. 2 well developed

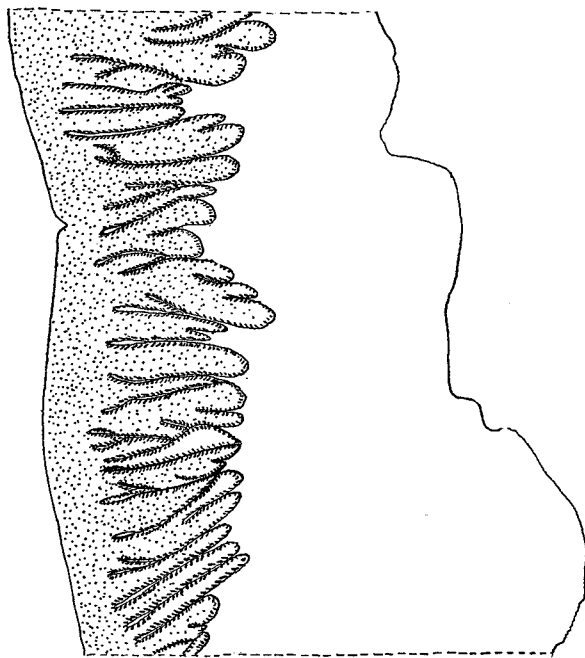


Fig. 12. *Condylactis natalensis* n. sp. Part of a directive mesentery in the lowest part of the actinopharynx.

siphonoglyphs, aborally prolonged. Actinopharynx rather short. All 24 pairs of mesenteries fertile,  $6+6=12$  pairs perfect, 2 pairs of directives. Retractors of the mesenteries diffuse, their folds rather low, and all of about equal height. Parietobasilar muscles distinct, forming a fold. Region of the filaments very long, extending almost to the bases of the mesenteries. Nematocysts of the column  $13-14 \times$  about  $1.5 \mu$ ; those of the tentacles  $14-24 \times 2(2.5) \mu$ , very numerous; those of the actinopharynx  $17-24 \times 2-2.5 \mu$ ; those of the filaments  $19-24 \times (2)2.5 \mu$ ; all probably basitrichs. Spirocysts of the tentacles  $14-24 \times 2$ — almost  $2.5 \mu$ , not numerous.

*Colour* when alive. White with longitudinal bright red lines. Tentacles red above, white below.

*Size* in the preserved state: length 4 cm., breadth about 2 cm., length of the inner tentacles 1.5 cm., length of the region of the filaments 2.5 cm.

*Locality*. Durban, probably littoral, 1 specimen. South African Museum.

The greater part of the pedal disc was invaginated. The tentacles can probably not be covered by the upper part of the body. The ectodermal longitudinal muscles of the tentacles were weak. The oral disc was wide, with the tentacles arranged at the margin. The upper part of the actinopharynx was irregularly folded, the lower part provided with numerous longitudinal ridges. The siphonoglyphs were aborally prolonged, the basilar muscles distinct. The specimen was a female. I have figured part of the retractor of a directive mesentery in the region of the lowest part of the actinopharynx (fig. 12).

#### Gen. *Actinioides*, HADD. & SHACKL.

Actiniidae with well developed pedal disc. Column with longitudinal rows of adhesive verrucae. At the margin, perforated pseudospherules (pseudo-acrorhagi). Sphincter very weak circumscribed or diffuse. Tentacles and mesenteries irregularly arranged (always?). Longitudinal muscles of the tentacles ectodermal. Usually more than two siphonoglyphs which may or may not be connected with directives. Retractors diffuse, weak. Distribution of the reproductive organs irregular. Not more mesenteries at the base than at the margin. Asexual reproduction probably frequent.

This diagnosis is only tentative, and is especially based on *A. sultana*, described below. STEPHENSON has supposed (1922, p. 271) that the genus is synonymous with *Bunodactis*. If in the genotype (*A. dixoniana*), there are marginal spherules (acrorhagi proper), and more mesenteries at the base than at the margin, the genus may lapse; but in that event we must create a new genus (I propose *Actiniogeton*) for *sultana*, and probably for certain other species referred to *Actinioides* by HADDON and SHACKLETON (1898). *A. sultana* certainly belongs neither to *Bunodactis* nor to *Anthopleura*. On the other hand *A. africana* is an *Anthopleura* and *A. angrae pequenae* is invalid since it covers at least two species, one of which is an *Anthothoe* (see p. 4). As to *A. ambonensis* and *A. haddoni*, described by KWIETNIEWSKI (1898), the latter is (ac-

ording to my examination of the holotype) an *Anthopleura* (the nematocysts of the marginal spherules were  $29-38 \times 3.5-4.5 \mu$ ), and the former can probably not be referred to the same genus as *sultana*. I have made maceration-preparations of the »Randsäckchen» in a piece cut from *A. ambonensis*, but there were no marginal spherules, and it is doubtful whether pseudospherules were really present. As to *A. spenceri*, I have examined the original slides, which unfortunately were thick and stained with borax carmine, so that it was very difficult to make out the presence of marginal spherules. Possibly there were pseudospherules. In that case the species may possibly be referred to *Actinioides*. The holotype must, however, be examined more closely before we can place it definitely.

#### *Actinioides sultana*, CARLGR.

*Actinioides sultana*, n. sp. CARLGRÉN 1900, p. 43, Pl. 1, figs. 12, 13.

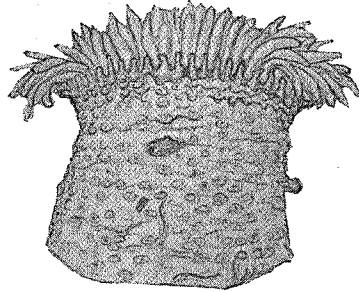
Pedal disc wide. Column cylindrical, in the expanded condition of about the same breadth and height, with longitudinal rows of adhesive verrucae which are more numerous in the distal part than in the proximal. At the margin numerous perforated pseudospherules, in a single row. Margin distinct, fosse shallow. Sphincter very weak, circumscribed. Tentacles rather short, in at least 4 cycles, but irregularly arranged; in large specimens more than 200, almost all of about the same size. When alive and in an expanded condition there was a gap between the outer and inner tentacles. Oral disc wide; at least its inner half without tentacles. Longitudinal muscles of the tentacles and even more the radial muscles of the oral disc, very weak, ectodermal. Mouth more or less circular. Actinopharynx with a variable number of siphonoglyphs, not connected with directives. Endoderm of the siphonoglyphs strongly thickened, with slender glandcells at its base. Mesenteries thin, irregularly arranged, at least half of them perfect. No directives. Retractors diffuse, the folds rather low and rather uniformly distributed on the mesenteries, parieto-basilar muscles not strong but situated on a projection of the mesogloea, basilar muscles rather well developed. Mesogloea of the ciliated tracts of the filaments with numerous cells. Propagation by longitudinal fission probably common. Nematocysts of the column  $14-17 \times 2-2.5 \mu$ ; those of the pseudospherules (13)  $14 \times 2 \mu$ ; those of the tentacles  $14-18 \times$  about  $2.5 \mu$ ; those of the actinopharynx (22)  $23-26 \times 3 \mu$ ; those of the filaments partly  $29-32 \times 2.5 \mu$ , partly  $19-22 \times 4.5-5 \mu$ ; spirocysts of the tentacles  $11-22 \times 1.5-2.5 \mu$ .

*Colour.* Column grayish or greenish, paler in its lower part, with the verrucae of about the same colour. Marginal pseudospherules opaque white. Outer tentacles white, especially in the middle, brown in their upper parts; inner tentacles brown shading into green, sometimes violet at the apex. Inner part of the oral disc green with brown radial lines; outer part with radial bands of alternating white and brown. Actinopharynx flesh-coloured, sometimes shading into lilac (CARLGRÉN). Column brownish flesh-coloured, marginal pseudospherules white. Tentacles brown with white apex. Oral disc brown,

green toward the mouth, with white elongated spots between the tentacles (specimens from Zanzibar).

*Size.* Large specimens in expanded well preserved state: 1 cm. high and broad, oral disc about 2 cm.

*Locality.* Durban (Reunion rocks), low water, numerous specimens, congregated closely together and forming carpets on flat rocks, Nov. 1935, C.; Durban (Isipingo) several specimens, July 1936, S.



The appearance of the species is shown in text-fig. 13.

I have re-examined the small, sterile holotype of *A. sultana* from Zanzibar, and there is no doubt that the specimens taken near Durban belong to this species. The size of the nematocysts agrees

very well. The only difference is that in the type the verrucae were small in comparison with the

large warts, to which fragments of shells were attached, in the Durban specimens. This is, however, of little importance, as we know that in different states of contraction the verrucae have different appearances, and sometimes do not rise above the surface of the body-wall. I have figured (text-fig. 14) a section of the sphincter and of a perforated

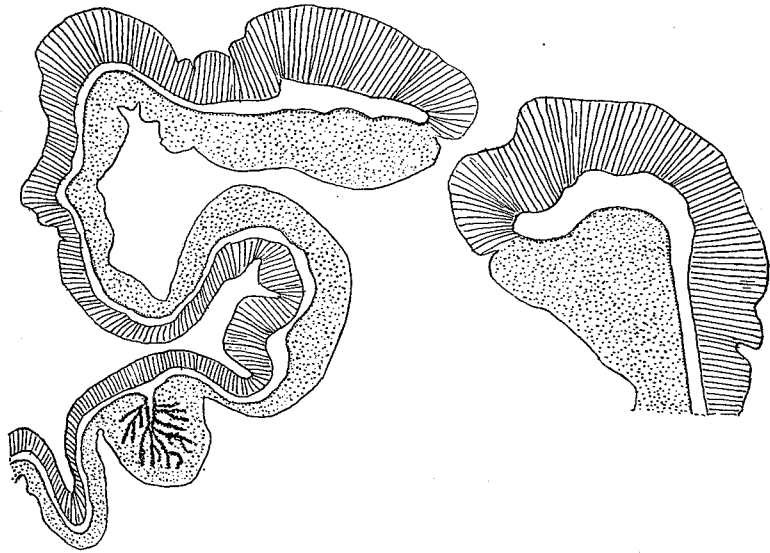


Fig. 14. *Actiniooides sultana* CARLGR. Section of the sphincter and a pseudospherule.

pseudospherule. The sphincter of the holotype showed the same appearance. The aboral prolongations of the siphonoglyphs were short or almost absent. The number of siphonoglyphs varied considerably. I have examined 6 specimens, 3 in sections and 3 by dissection. The former had 4, 10 (8 large and 2 small) and 5 siphonoglyphs respectively, never in connection with directives;

the latter 7, 9 and probably 8. One siphonoglyph in the third specimen examined was connected with 4 mesenteries. Text-fig. 15 shows a section of a siphonoglyph with part of the actinopharynx proper and some mesenteries. The mesenteries at the base and at the oral disc seem to be present in about the same number. I counted in one individual 190 tentacles and about 180 mesenteries at the base. There is, however, the possibility that a few mesenteries were overlooked by me. Thus, there are in any case not more mesen-

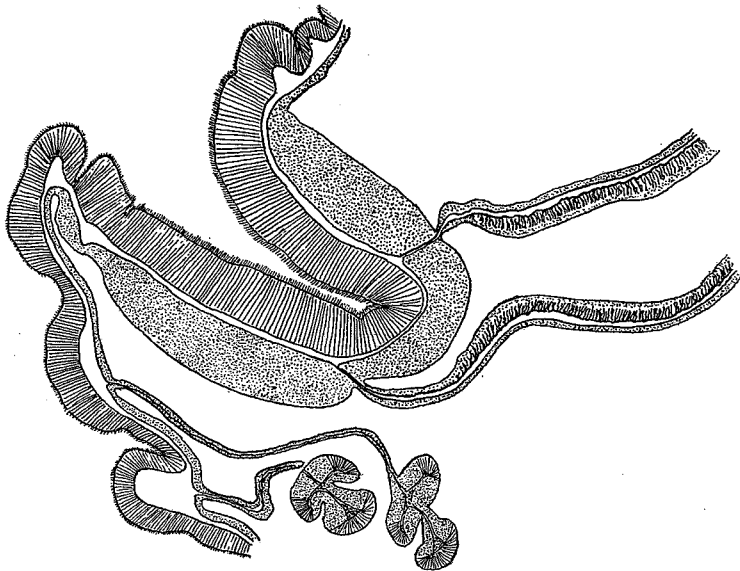


Fig. 15. *Actinioides sultana* CARLGR. Transverse section of a siphonoglyph and some mesenteries.

teries at the limbus than at the margin, whereas in *Bunodactis*, *Anthopleura* and several other Actiniidae the development of mesenteries is richer proximally than distally. The stronger mesenteries were fertile, but those attached to the siphonoglyphs seemed at least as a rule to be sterile. The ova were small. I think that the species propagates by longitudinal fission. In the material I collected there was one specimen certainly formed by such fission, and another example was divided from the pedal disc into two parts, the one thinner than the other; only in the uppermost part did the two pieces hang together.

#### Genus *Anemonia*, Risso.

Actiniidae with wide pedal disc and smooth body, which at the margin is provided with marginal spherules which are sometimes, in the smaller individuals, absent. Sphincter weak circumscribed diffuse, or rather well developed, diffuse. Tentacles usually long, not as a rule covered by the upper part of the column, their longitudinal muscles ectodermal. Siphonoglyphs in variable number, not always connected with directives. Perfect mesenteries numerous.

Retractors diffuse (always?). Gonads appearing from the first cycle onwards. More mesenteries at the base than at the margin.

There is some doubt as to the definition of this genus. The genus is not identical with *Isactinia* and *Anthostella* (see p. 38), but is more closely related to *Pseudactinia*, from which it separated by the presence of gonads on the mesenteries of the first cycle, and by its lack of the vesicles which, in *Pseudactinia*, are arranged in 1—5 horizontal rows. It is, however, doubtful whether, in *Anemonia*, small vesicles do not in fact occur in young individuals, before the atrichous nematocysts characteristic of the marginal spherules appear. In small individuals the atrichs are sometimes lacking. In the diagnosis I have here added, that the mesenteries are more numerous at the base than at the margin.

#### *Anemonia natalensis*, n. sp.

Pedal disc very wide. Column low. At the margin rather well developed marginal spherules, between them weaker vesicles. Fosse not deep. Sphincter diffuse, rather long. Tentacles rather long, up to more than 100. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal, the latter strong. Oral disc wide. Siphonoglyphs variable in number, 2—7, not connected with directives. Perfect pairs of mesenteries between about 23 and 28. No directives. Retractors diffuse, weak. Considerably more mesenteries at the base than at the margin. All stronger mesenteries fertile. Nematocysts of the column 13—22 × 2—2.5  $\mu$ ; those of the marginal spherules 31—46 × 5—5.5  $\mu$ , atrichs; those of the vesicles 17—23 × about 2.5  $\mu$ ; those of the tentacles partly 14—23 × 2  $\mu$ , partly 29—36 × about 3  $\mu$ ; those of the actinopharynx partly 22—31 × 3—4  $\mu$ , partly 16—22 × 4—5  $\mu$  (amastigophores or mastigophores). All nematocysts apart from those otherwise distinguished are probably basitrichs. Spirocysts about 19 × 3— about 40 × 4  $\mu$ .

*Colour.* (1) Brick red (S.). (2) Column dark purplish red, tentacles red with purplish tips. Some specimens have greenish tentacles (S.). (3) Tentacles lilac at their tips, greenish-gray with two bands of gray-white; actinopharynx red (C.). (4) Pedal disc red, column dark brown, tentacles somewhat paler (probably the same species as 1—3) (C.).

*Size* of the largest specimen of those numbered (1): pedal disc 1.2—1.3 cm.; height of column 0.9 cm.; breadth of oral disc 2.5 × 1.8 cm. in the expanded state. The other individuals from the same locality were of almost the same size. The specimens from Reunion rocks were respectively 0.4, 0.2 and 0.3 cm. high, the pedal discs respectively 0.7 and 0.6 cm. broad. A small species.

*Localities.* Durban (1) Isipingo, very common in pools and potholes, 5 specimens, June 1935, S. (2) Isipingo, very common among sponges and ascidians under overhanging surfaces, 7 specimens, July 1935, S. (3, 4) Reunion rocks, 2 specimens, Nov. 1935, C. (5) Durban, at the pier, 1 specimen, July 1929, M.

The ectoderm of the column was high, of similar structure in the individuals examined (1—4), with very numerous glandcells. At the margin there was a ring of vesicles, and on the inner side of many of them marginal spherules containing atrichs. Close to the vesicles the column was contracted and transversely folded. The nematocysts of the vesicles seemed not more numerous than in the other parts of the column, but were sometimes (not always) a little longer. The sphincter (Fig. 16) was in all 4 specimens examined of the same appearance and size; the smallest specimen had, however, a smaller sphincter. The number of siphonoglyphs varies. Two of the specimens (numbered 2) had 3 and 7 siphonoglyphs respectively. The larger individual from Reunion rocks was provided with 4; and one of the specimens numbered 1, with 2 siphonoglyphs situated close to each other. The mesenteries at the base were considerably more numerous than the tentacles. 2 specimens (1, 3)

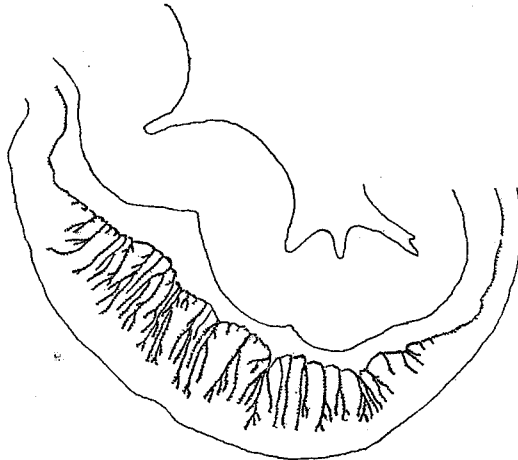


Fig. 16. *Anemonia natalensis* n. sp. Sphincter.

had about 174 and 182 mesenteries, but 104 and 114 tentacles. The perfect pairs of mesenteries were in 3 individuals 23, 24 and probably 28 (14 pairs in one half of the animal). An examination of one half of a fertile specimen seems to show that all the stronger mesenteries are fertile. The retractors of the mesenteries were weak, diffuse with short folds distributed over almost the whole surface of one side of the mesenteries, whence it is doubtful whether the body can completely cover the tentacles (all the tentacles were not drawn in). I have examined the nematocysts in 4 specimens (1—4). They showed very good agreement. The colour was connected with the endoderm which, apart from the innermost part, was pigmented. The pigment of the tentacles seems not to be uniformly distributed. In the preserved specimen marked 3, two transverse bands were not (or a little?) pigmented, in the tentacles. I have observed the same feature in several tentacles of the specimens numbered 2, or there was a single pigment-less band close to the base of the tentacle.

I have referred this species with much hesitation to *Anemonia* and not to *Pseudactinia*, because gonads are present on the mesenteries of the first cycle.



Genus *Anthostella*, nov. gen.

Column smooth with more or less distinct longitudinal rows of spots (nematocyst batteries or suckers?). Fosse slightly developed. At the margin large, club-shaped marginal spherules, between them pseudospherules (weak nematocyst batteries). Sphincter diffuse. Tentacles not very long, their longitudinal muscles ectodermal. Radial muscles of oral disc ectodermal. 2 siphonoglyphs. Mesenteries rather few, not more numerous at the base than at the margin. 2 pairs of directives. Mesenteries of the first and second orders perfect. All mesenteries save the directives and the weakest ones fertile. Retractors diffuse. Parietobasilar muscles rather strong, basilar muscles rather weak.

I thought at first that the species described below could be referred to *Anemonia*, but after examination of the genotype, *A. sulcata*, I have found that this is not possible. *Sulcata* has always considerably more mesenteries at the base than at the margin (confirmed on four, one large and three small, specimens). The numbers of tentacles with relation to those of the mesenteries at the base were namely 190 (246), 92 (148), 81 (120—130), 63 (138). The number of mesenteries at the margin is the same as that of the tentacles. Thus, the new genus proposed above cannot be identical with *Anemonia*, but is possibly identical with *Isactinia*, a genus which STEPHENSON (1922) considered to be a synonym of *Anemonia*. *Isactinia* is, however, distinct from *Anemonia*, since it has not more mesenteries at the base than at the margin (stated after re-examination of the genotype, *I. badia*). Since the sphincter is also different (circumscribed-diffuse in *Anemonia sulcata*, and elongate-diffuse in *I. badia*) the genera cannot be united. The species described below agrees more with *Isactinia* than with *Anemonia*, but there are some differences between them, whence I prefer, at least at present, to keep the new genus and *Isactinia* apart. If the spots on the column of *Anthostella* should be nematocyst-batteries or weak verrucae (suckers), such as those of *Sagartia elegans*, there is no doubt that we have to do with two distinct genera.

*Anthostella stephensoni*, n. sp.

Column pillarlike, rarely flattened, with very fine corrugations and with smooth spots arranged in more or less distinct longitudinal rows and extending from near the edge of the base to the margin. Fosse distinct but slightly developed. Corresponding to each endocoelic tentacle is a prominent, very large, club-shaped marginal spherule, on the margin. Between any two of these spherules is often one smaller pseudospherule. Sphincter diffuse, rather well developed. Tentacles hexamerously arranged, typically 48, stout at the base, tapering to blunt points, not very long, in the contracted state longitudinally sulcated. Their longitudinal muscles ectodermal, as also the radial muscles of the oral disc, arranged in a palissade-like manner. Oral disc wide. Actinopharynx with longitudinal ridges; 2 siphonoglyphs, rather narrow with

well developed aboral prolongations. Pairs of mesenteries 6+6+12, sometimes one pair (or few more?) of a fourth cycle in the distal part of the body. 2 pairs of directives. Mesenteries of the first and second cycles perfect, all mesenteries except the directives and the extra mesenteries, fertile. Retractors diffuse, their folds not very high; parietobasilar muscles well developed, forming a distinct fold; basilar muscles distinct but not strong. Nematocysts of the column 14—17×1.5—2  $\mu$ , not common; those of the marginal spherules

53—74×4.5—5  $\mu$ , atrichs; those of the pseudospherules 15—19×1.5—2  $\mu$ , rather numerous; those of the tentacles 19—23×2  $\mu$ , common; those of the actinopharynx partly 29—32×2.5—3  $\mu$ , partly 29—36×4—4.5  $\mu$ ; those of the filaments partly 17—19×5(6)  $\mu$ , partly 24—26× about 2.5  $\mu$ ; spirocysts of the tentacles 17—27×1.5—2.5  $\mu$ .

*Colour.* Spec. (1) according to notes of Prof. STEPHENSON. Base cream, with orange lines marking the mesenterial insertions. Column primrose yellow, with bright violet spots. In the upper part of the column orange lines run from the margin a little way down and then die out; they mark the mesenterial insertions. Marginal spherules (acrorhagi) yellow at the sides, with a

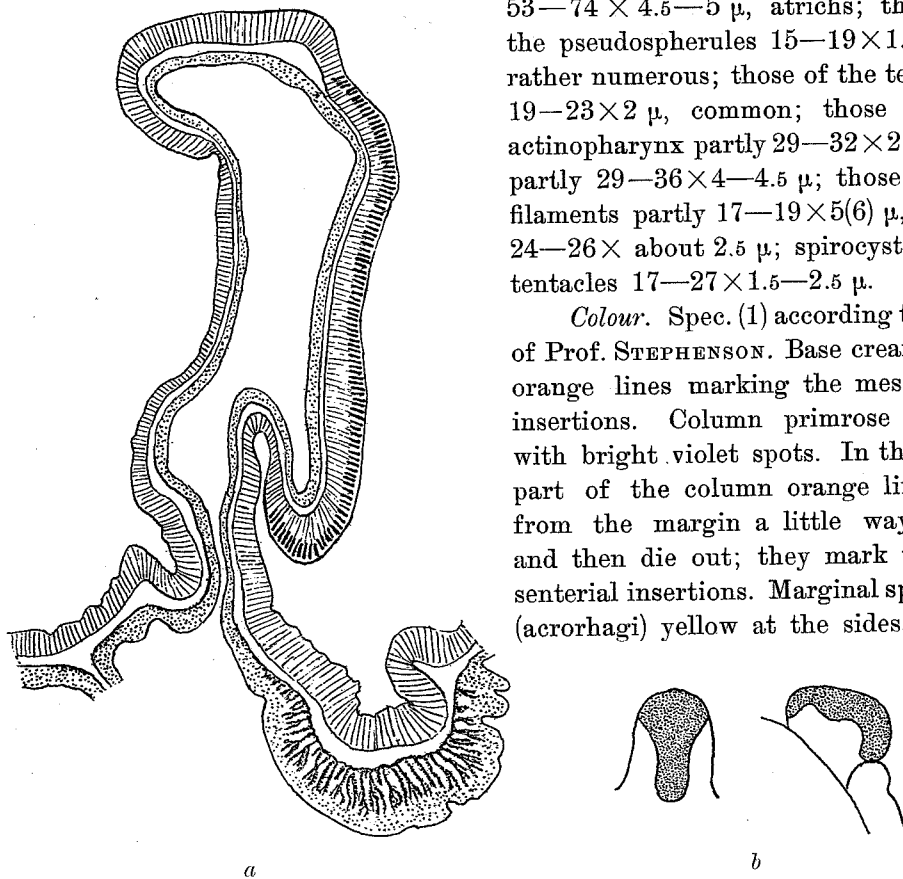


Fig. 17. *Anthostella stephensoni* n. sp. a. Section of the sphincter and of a marginal spherule. b. marginal spherule from above and from the side; dotted part violet, other parts yellow.

broad vivid median stripe of violet, which spreads out above and occupies the whole apex. Tentacles opaque cream, a little yellower at the tip, with a faint transverse band of lilac-gray partway up, and a faint gray median streak on the oral face; those of the fourth cycle a little different. Across the base of each tentacle a purple-gray bar, modified in the case of cycle 4; it subtends a median line onto its radius. Oral disc purplish-yellowish-gray with strong, thick, vivid, radial scarlet lines marking the insertions. 3 violet spots on the lip. The area of the disc peripheral to each primary and secondary tentacle is rich scarlet. Fosse orange-scarlet. Spec. (2) Column opaque white with

bright violet spots, marginal spherules as in spec. 1, tentacles opaque white, oral disc at the insertions of the mesenteries with radial scarlet lines extending almost to the mouth along the strongest mesenteries. Mouth at each siphonoglyph surrounded by a semicircular violet mark (notes by myself).

*Size* of spec. (1): Diameter of disc in expansion 7 cm. (STEPHENSON); of spec. 2 in contracted state: length 2 cm., greatest breadth at the margin 1.5 cm.; of spec. (3): length 3 cm., breadth 1.6 cm.

*Localities.* Table Bay (Melk Bosch), low-water, 1 specimen (No. 2), Oct. 1935, C. and S.; False Bay, St. James, 1 specimen (No. 3), Aug. 1936, S.; Smitswinkel Bay, in a rock-pool, 1 specimen (No. 1), Apr. 1933, S.; occurs also at Oudekraal and elsewhere in the Cape Peninsula and at Gordons Bay (STEPHENSON).

As to the coloured spots of the column, I have not been able to clear up their structure, because they have entirely disappeared in the preserved and rather strongly contracted column and I did not examine the spots in the single living specimen which I saw. I think that they can hardly be verrucae proper. At any rate they were not adhesive and there was no gravel attached to them; but possibly they may be nematocyst batteries. I have figured a section of a marginal spherule and of the sphincter (fig. 17 *a*), and the external appearance of a marginal spherule (fig. 17 *b* sketched by STEPHENSON). In the violet area of the marginal spherules the atrichous nematocysts were situated, the yellow area contained numerous extraordinarily large gland cells, and numerous small nematocysts of the same size as in the pseudospherules and the other parts of the column. The pseudospherules also had numerous large gland cells. The examination of a pseudospherule in a specimen from St. James showed that it contained numerous nematocysts (basitrichs) while the nematocysts of the column except those in the spherules were fewer. The tentacles were 50 in the second specimen, in one place 3 small tentacles instead of one larger one had arisen; in the third specimen 47. The first specimen was a little damaged at the margin, so that it was difficult to state the exact number of tentacles, probably there were 52. In the damaged area 3 tentacles were connected with the endocoel of the second order next to one of the pairs of directives; the middle tentacle of these three was reduced, and did not communicate with the endocoel. This was probably the cause of the development of 2 tentacles on its sides. In one of the lateral compartments 2 extra tentacles had arisen in connection with the origin of two mesenteries of a fourth cycle. The first specimen was fertile with well developed testes, the 2 other specimens seem not to be fertile. The anatomical examination was made in the main on the largest specimen. According to STEPHENSON, the species is lightly adherent.

#### Genus *Bolocera*, GOSSE.

Actiniidae with well developed pedal disc. Column elongated, smooth, without spherules or verrucae. Sphincter diffuse. Tentacles long, hexamerously

arranged, occupying only the outer half of the oral disc, provided with an endodermal sphincter at their base, by the contraction of which they may be thrown off; their longitudinal muscles ectodermal. Siphonoglyphs well developed. Perfect pairs of mesenteries more or less numerous, 2 pairs of directives. Retractors diffuse. Distribution of the gonads variable. Mesenteries not more numerous at the margin than at the limbus.

#### ***Bolocera capensis*, CARLGR.**

*Bolocera capensis*, n. sp. CARLGR 1928, p. 146, fig. 10.

?*Bolocera longicornis*, CARLGR. STEPHENSON 1918, p. 20, Pl. 1, fig. 2, Pl. 3, figs. 24—27.

Sphincter diffuse, elongated, with high, branched folds which sometimes showed a tendency to form humps. Tentacles up to 160 or more? Pairs of mesenteries of the fifth cycle originating earlier near the mesenteries of the third cycle than near those of the first and second cycles. All stronger mesenteries fertile save the directives. Nematocysts of the column partly 29—38× about 4 μ, partly 14—16× almost 3 μ, few; those of the tentacles 67—82× about 3.5 μ; those of the actinopharynx partly 41—50 × 4 (4.5) μ, partly 24—26 × 4.5—5 μ; those of the filaments partly 34—49 × about 4 μ, partly 17—21 × 3—4 μ, few, partly 24—27 × 4.5—5.5 μ. Spirocysts of the tentacles up to 67 × 4.5 μ.

*Colour.* The whole animal pink.

*Size* up to 5 cm. high and wide, in the preserved state. The specimens taken by me were all considerably smaller.

*Localities.* 34° 21' S., 17° 57' E., 178 fms., 4 specimens, Nov. 1929, M.; 33° 43.6' S., 18° 4.2' E., 106 m., German Deep-See Exped.; mouth of False Bay, about 50 fms., 8 specimens, Jan. 1936, C.; Agulhas Bank, Cape Barracouta W. 10—12 miles, 40—42 fms., 1 specimen, Dec. 1929, M.

I described this species in more detail in 1928. The nematocysts, all examined unexploded, seem to be of only 2 kinds, as in *Liponema*. The broader ones in the actinopharynx and filaments are microbasic mastigophores, or amastigophores, all the others are probably basitrichs.

#### **Genus *Liponema*, R. HERTW.**

Actiniidae with rather well developed pedal disc. Column low, smooth, without any sort of projections. Sphincter diffuse, sometimes with a tendency to be circumscribed. Tentacles short, extraordinarily numerous, very close-set, but arranged in cycles, occupying almost the whole oral disc and provided with an endodermal sphincter at their base, by the contraction of which they may be thrown off. Longitudinal muscles of tentacles ectodermal. Siphonoglyphs well developed. Perfect pairs of mesenteries numerous, 2 pairs of directives. Retractors diffuse. Distribution of the gonads unknown. Mesenteries more numerous distally than proximally.

**Liponema brevicirrata, CARLGR.**

*Liponema brevicirrata*, n. sp. CARLGREN 1928, p. 149, fig. 11.

Sphincter broad, its folds, however, low and almost all of the same height, but rather much branched. Tentacles considerably more than 400. Oral disc much broader than the pedal. Nematocysts of the column  $22-26 \times (2.5)3$ —over  $3 \mu$ ; those of the tentacles  $33-50 \times$  about  $3 \mu$ , very numerous; those of the actinopharynx  $35-43 \times (3.5)4 \mu$ , very numerous; those of the filaments partly  $23-25 \times 4-4.5 \mu$ , partly  $33-39 \times 5.5-4 \mu$ . Spirocysts of the tentacles  $25 \times 1.5-50 \times$  about  $3 \mu$ .

Colour unknown.

Size of the largest specimen: breadth of oral disc 5 cm., height of the strongly contracted column 1.5 cm., length of the inner tentacles 1.4 cm., their breadth 0.4 cm.

Locality.  $35^{\circ} 19.5' S.$ ,  $23^{\circ} 2' E.$ , 500 m., German Deep-Sea Exped.

This species is easy to identify because it recalls a »stichodactyline» form. The tentacles are extraordinarily closely crowded, so that it seems as if they should be arranged in radial rows and not in cycles. Because no nematocysts were exploded, I cannot certify the nature of the thread, but probably they all belong to the same category, apart from the smaller ones in the filaments. These have a very strong »hampe». Probably they are mastigophores. See also my paper of 1928.

**Genus Bunodactis, VERR.**

Actiniidae with well developed pedal disc. The whole or a part of the column with more or less distinct adhesive verrucae, which are often simple but sometimes lobed in the distal part of the body. Foreign bodies often attached to the verrucae. No marginal spherules present. Sphincter more or less circumscribed, sometimes circumscribed-diffuse. Tentacles rather short, simple, exceptionally with aboral swellings at the base. Longitudinal muscles of the tentacles ectodermal or meso-ectodermal. Commonly 2 well developed siphonoglyphs. Pairs of mesenteries usually numerous. Usually 2 pairs of directives. All stronger mesenteries fertile, sometimes the directives are sterile. Retractors commonly strong, more or less concentrated. The younger mesenteries grow from the proximal end upwards, whence the mesenteries are often more numerous in the proximal part than in the distal.

**Bunodactis reynaudi (MILNE EDW.).**

*Cystiactis reynaudi*, n. sp. MILNE EDWARDS 1857, p. 276.

*Phymactis capensis* (LESS.), pro parte. PAX 1908, p. 485, Pl. 25, figs. 1, 2, 1920, p. 30.

*Bunodactis gigas*, n. sp., pro parte. PAX 1926, p. 23, figs. 21 a, b, 22.

*Bunodactis michaelsoni*, PAX. PAX 1926, p. 22, Pl. 1, fig. 4, text-figs. 19, 20.

The whole column provided with extraordinarily numerous, very close-set verrucae, which give its surface a moss-like appearance. Verrucae in the lower

part simple, in the upper part lobed and laterally compressed. The uppermost ones rise considerably above the parapet. No marginal spherules. Sphincter circumscribed, strong, its folds very numerous, close-set and issuing from a thick but short principal lamella of the mesogloea. Tentacles slender, short, especially in comparison with the size of the animal, conical, very numerous, in large specimens up to about 384 in number, hexamerously arranged. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal, the former strong, the latter weak, 2 well developed siphonoglyphs, aborally prolonged. Numerous perfect pairs of mesenteries. 2 pairs of sterile (always?) directives. Retractors of the mesenteries band-like. Nematocysts of the lower part of the column partly  $22-35 \times 3.5-5 \mu$ , atrichs, few, partly  $14-19 \times$  almost  $2-2.5 \mu$ , partly  $10-12 \times 1.5 \mu$ ; those of the tentacles partly  $17-22 \times 2.5-3 \mu$ , opaque, partly  $17-22 \times 1.5-$  almost  $2 \mu$ ; those of the actinopharynx  $23-25 \times 2.5-3 \mu$ , partly  $17-19 \times 4.5-5 \mu$ , few (microbasic mastigophores or amastigophores?); those of the filaments partly  $41-60 \times 6.5-7(7.5) \mu$ , partly  $19-22 \times 3.5-4.5(5) \mu$ . Spirocysts of the tentacles about  $12-24 \times 1.5-2.5 \mu$ .

*Colour* very variable. Professor STEPHENSON, has given me notes about the pattern in 7 individuals. (1) Column and verrucae greenish-brown, the latter with pale tips. Tentacles translucent gray, with opaque white spots or bars on the oral face. Oral disc brown, with faint radial pale streaks. (2) Column olive green above, dull chestnut below. Verrucae with opaque pale apices. Tentacles unmarked, dark red-brown. Oral disc very wide, rich deep maroon-chestnut, unmarked. (3) Column olive green, browner below, the verrucae the same colour, without pale tips, sometimes darker than the ground-colour. Tentacles unmarked, opaque white. Oral disc deep olive brown, unmarked. (4) Base pale gray. Column moss-green, verrucae with paler tips. Tentacles maroon, unmarked. Oral disc orange-brown round the mouth with a delicate and regular pattern, further out, of opaque cream streaks (endo-coelic) and of lines darker than the ground-colour (insertion-regions). (5) Column blue, becoming bright cobalt above, tips of the verrucae paler. Tentacles translucent gray-blue, with opaque blue spots and bars on their oral faces. Oral disc deep blue-gray with a blue sheen, becoming deep cobalt round the mouth. General effect of flower blue with pale spots. (6) Column mossy green, verrucae with pale tips. Tentacles translucent grayish pink with a row of opaque pale pink spots or bars on the oral face of each. General effect quite a bright pink. Oral disc dark brown with faint paler radial streaks at the bases of the inner tentacles (specimens 1-6 from St. James). (7) Column olive green, tentacles spotted (specimen from Still Bay).

The individuals in the aquarium at East London were of about type 5.

*Size.* A very large individual preserved in formalin with the tentacles covered was 8 cm. broad and 5.5 cm. high, the inner tentacles about 1 cm. long.

*Localities.* South West Africa, Lüderitz Bay; Port Nolloth, 9 specimens, Oct. 1935, S.; Saldanha Beach, Discovery Exped.; Keits Bay, Saldanha Bay, shore, Scotia Exped.; Dassen Isl., 2 specimens, 1929, M.; Oude Kraal, 4 spec., Oct. 1935, C.; 1 spec., July 1934, S.; False Bay (St. James), 1 specimen,

Aug. 1932, S.; 1935, C.; Still Bay, 2 specimens, Jan. 1932, S.; Port Elizabeth (Beacon Point), 1 specimen, July 1936, S.; East London, several specimens, Dec. 1935, C.; East London (Bats Cave Rocks), 1 specimen, July 1937, S.; Durban (Port Natal), 4 specimens, about 1840, WAHLBERG. »The species is more or less common at all localities which we have visited, from Port Nolloth in the west to East London in the east. It is incredibly plentiful and infinitely variable in colour at some localities, and apparently reaches its greatest abundance in the colder water of the west coast, where it is commonly associated with *Mytilus crenatus* and *M. meridionalis*» (STEPHENSON).

A very large individual had about 380 tentacles. I have examined the sphincter in specimens from different localities. It was strong (fig. 18). Sometimes the projection of the mesogloea, from which the muscle-folds run out,

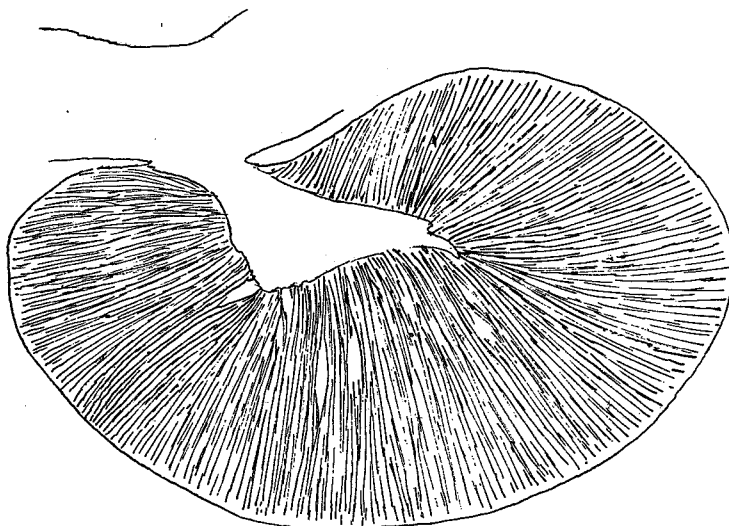


Fig. 18. *Bunodactis reynaudi* (MILNE-EDW.). Sphincter somewhat schematized.

was longer, sometimes shorter, but it was always thick. The retractors of the mesenteries were band-like. In one large individual they were narrower and of the same aspect as the one that PAX has figured for *Bunodactis gigas*, in another animal broader and of about the same appearance as figure 20 in PAX' paper (1926). The endoderm of the column was strongly pigmented.

There is no doubt that this large species is the *Cystiactis reynaudi* described by MILNE EDWARDS in 1857 from the Cape. MILNE EDWARDS' description of the genus and species »Corps entièrement couvert de tubercles . . . en forme phlyctenèmes sérées subseriales, et de grosseur médiocre» is distinctly in favour of such a supposition. The description cannot refer to *Anthopleura michaelsoni*, the verrucae of which are absent or indistinct in the lower part of the column, nor to *Bunodosoma (Phymactis) capensis*, which, like *Anthopleura*, is provided with marginal spherules. *B. reynaudi* is also identical with PAX' *Bunodactis michaelsoni* of 1926, but not with his *michaelsoni* of 1920 (see fig. 4, Pl. 1,

and the aspect of the sphincter, text-fig. 19, in PAX' paper, which certainly do not refer to *michaelseni* proper). It is also at least partly identical with *Bunodactis gigas* PAX, and partly with PAX' *Phymactis capensis* of 1908 and 1920 from Lüderitz Bay. As to *B. gigas*, it is probable that the 12 individuals examined by PAX include *B. reynaudi* as well as *Anthopleura michaelseni*. PAX notes that marginal spherules (Randsäckchen) were present; if this is correct the individual possessing the spherules may be *Anthopleura*; on the other hand the large size of the largest specimen of *gigas* decidedly suggests *reynaudi*. I have, however, not examined these specimens. It is doubtful whether the specimens of »*Phymactis capensis*» from Annobon and Walfisch Bay (PAX 1920) are *B. reynaudi*. In any case they are probably not *Phymactis capensis*. See also the account given below of *Anthopleura michaelseni*.

#### Genus *Anthopleura*, DUCH. and MICH.

Actiniidae with well developed pedal disc. Column with adhesive verrucae arranged in more or less distinct longitudinal rows. Marginal spherules present. Sphincter weak or strong, circumscribed or circumscribed-diffuse. Tentacles simple, hexamerously or irregularly arranged, their longitudinal muscles ectodermal or meso-ectodermal. Numerous perfect mesenteries, all the stronger ones fertile. Retractors of the stronger mesenteries diffuse, sometimes concentrated. Younger mesenteries growing from the proximal part upwards.

#### *Anthopleura michaelseni* (PAX).

*Bunodactis michaelseni*, n. sp. PAX 1920, p. 31, figs. 7, 8; not PAX 1926.

*Phymactis capensis* (LESS.) pro parte. PAX 1908, p. 485.

*Actinoides angrae pequenae*, n. sp., pro parte. PAX 1907, p. 79; 1908, p. 490, Pl. 15, figs. 5, 6.

*Bunodactis gigas*, n. sp., pro parte. PAX 1926, p. 22.

Column with longitudinal rows of simple, strongly adhesive verrucae, absent or indistinct in the lowest part of the body, numerous in the uppermost part, where short exocoelic rows of verrucae are intercalated. The uppermost warts rise above the parapet. In the fosse a ring of about 24—28 marginal spherules, corresponding to the endocoels. Sphincter circumscribed, of ordinary size, with the folds issuing from a principal lamella which is usually weakly developed, sometimes a little stronger. Tentacles up to 96, hexamerously (sometimes a little irregularly) arranged, large, stout but fairly long at the same time; in young individuals more slender. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal, arranged in a palissade-like manner. Actinopharynx of ordinary length, siphonoglyphs typically 2, considerably prolonged aborally. As a rule 2 pairs of directives. Retractors of the mesenteries band-like, diffuse. Nematocysts of the column partly 14—22 × 1.5—2.5 μ, basitrichs, partly 17—31 × 3—4.5 μ, atrichs; those of the marginal spherules 34—53 × 3—5.5 μ, atrichs; those of the tentacles 13—24 × 2—2.5 μ, basitrichs; those of the actinopharynx partly 12—31 × 2—3 μ, basitrichs, partly 20—32 × 2.5—4.5(5) μ,



microbasic amastigophors?; those of the filaments partly  $19-31 \times 3-6 \mu$ , microbasic amastigophors?, partly  $29-72 \times 4.5-7 \mu$ , partly  $19-24 \times 2.5 \mu$ , basitrichs; spirocysts of the tentacles  $12 \times 1$  to about  $24 \times 2.5 \mu$ .

*Colour.* There are many colour-varieties of this species. Professor STEPHENSON has noted the following. (1) Column mottled with pink and pale crimson below, then dull crimson-brown, then brown above. Verrucae of the same shade as the ground-colour, or slightly paler at the tip. Marginal spherules opaque pale pink. Inner tentacles rose-coloured, middle ones maroon, outer ones partly maroon and partly rose; some of them have one half of the tentacle (longitudinally) of each colour. Oral disc maroon with very little pattern—a little opaque cream near the tentacle-bases. (2) Column cream at the base with faint pink mottlings, then pale blue, then dark green. Marginal spherules opaque white, tinged with pink. Verrucae pale gray on the blue part of the column, the same as the ground-colour, or a little paler, on the upper part. Tentacles white, slightly gray towards the base. Oral disc yellowish brown with a bold pattern of radial gray lines. (3) Column grayish cream below, gray above, verrucae gray. Tentacles translucent pale gray, with a row of opaque whitish spots on the oral face, which has also a dim median longitudinal darker gray stripe, double in the distal part of the tentacle. The opaque spots, and also the space between the two lines, are tinged with rose. Oral disc brown with a star-like pattern in cream near the tentacle-bases. (4) Column as in (3), marginal spherules opaque white. Tentacles purplish gray, each with a median longitudinal stripe of vivid scarlet on the oral face. Oral disc scarlet, with fine radial gray lines and with one brown sector. (5) Column olive, darker above, verrucae dull red on the lower part, brownish like the ground-colour above. Marginal spherules rose. Tentacles purple-gray with a line of opaque whitish spots up the oral face of each, a crimson spot at the base and a faint median longitudinal darker stripe. Oral disc olive with a well marked pattern in brown and opaque cream. (6) Column mottled with rose and crimson below, dark brownish red above. Verrucae much the same as the ground-colour. Marginal spherules rose. Inner tentacles semi-opaque white, middle ones gray, becoming lavender towards the tip; outer ones more lavender, and each tentacle vertically divided—one longitudinal half translucent gray, the other more opaque and whiter. Oral disc deep chocolate-brown, unmarked. (7) Column pale crimson below, brown above. Marginal spherules opaque pink. Tentacles bright magenta, the inner ones with a narrow median stripe of scarlet down the oral face. Oral disc with a well defined pattern of brown and opaque cream, producing a many-rayed star-like effect. [1-7, individuals from Cape Peninsula (St. James and the Boulders)]. (8) Two had the column marked with dull red and green; in another it was wholly red. Two had pink marginal spherules, dusky white tentacles, the oral disc with radiating bands of colour (brownish and yellowish). (9) Column dull olive green. (10) Marginal spherules pale in colour. (11) Column and tentacles both dull white, distal part of the tentacles tinged with lilac. (12) Column in two specimens brownish pink with gray verrucae, in a third buff below, olive green

above, upper verrucae brown. Oral disc and tentacles with a pattern somewhat like that of *Sagartia troglodytes*. Tentacles white in one specimen, brown in another, pink in a third. Oral disc mainly brown in the one with brown tentacles, yellowish and brownish in the one with white tentacles. [8—12, specimens from Still Bay.]

I myself have noted the colour of some specimens from East London, Durban, Table Bay and Kommetje. (1) Column claygray, darker and more olive green above. Tentacles gray; at the bases of the 48 inner tentacles and the corresponding parts of the oral disc a rhombic crimson spot. Oral disc green-gray, insertions of the mesenteries olive, with the darkest colour at the base of the tentacles. (2) Column sepia-coloured with sepia verrucae, above; shading into blue with paler verrucae, below; spherules white. Tentacles sepia, each with a rather broad median longitudinal red stripe on the oral face. Oral disc sepia. [1—2, individuals from East London.] (3) Column yellowish red with the verrucae somewhat darker. Tentacles pink, in the contracted state shading into blue. Oral disc pink with radial olive stripes; at the bases of the tentacles on each side an olivegreen mark. Actinopharynx almost colourless. (4) Column reddish, marginal spherules somewhat paler, oral disc red, actinopharynx shading into red. [3—4, individuals from Reunion Rocks, Durban.] (5) Column pale yellow-salmon with longitudinal rows of brown spots below, verrucae brown, tentacles and oral disc grayish, almost colourless, the latter with indistinct white stripes along the insertions of the mesenteries, actinopharynx colourless (individual from Table Bay). (6) Column pink, tentacles pale grayish brown, oral disc brown, inner tentacles at their insertions on the oral disc enclosed by white. (7) Column pale red shading into brown and speckled with crimson. Tentacles opaque white, oral disc with yellowish and dark olive-green radial stripes. Inner part of oral disc shading into red-brown, actinopharynx colourless (individuals from Kommetje).

*Size* of large specimens in a somewhat contracted state: length up to about 5—6 cm., breadth up to about 4 cm. A large specimen from Shelly Beach, East London was 5.5×4.5 cm. broad, in the expanded uppermost part, the length was 3.5 cm. (the lower part of the body, however, strongly contracted). All individuals from Lüderitz Bay and Port Nolloth were small.

*Localities.* South West Africa, Lüderitz Bay; Port Nolloth, 12 specimens, Nov. 1935, S.; Saldanha Bay, Discovery exped.; Keits Bay, Saldanha Bay, shore, Scotia exped.; entrance Saldanha Bay, Scotia exped.; Table Bay, Robben Isl., 15—20 fms., 2 specimens, Jan. 1936, C.; Cape Town, on stones, several specimens, DE VYLDER, 1872; Oude Kraal, S.; 2 specimens, Oct. 1935, C.; Kommetje, Oct., Dec. 1935, 6 specimens, C.; Cape at the lighthouse, Swedish Eugenie exped., 1 specimen; False Bay (St. James), Oct. 1935, Jan. 1936, several specimens, C.; Apr. 1937, 4 specimens, S.; False Bay (Simonstown, The Boulders), S.; Still Bay, several specimens, Jan. 1932, S.; Port Elizabeth (Humewood), Oct. 1935, 1 specimen, C.; Port Elizabeth (Reef Bay), July 1936, 1 specimen, S.; East London, 2 specimens, Nov. 1935, C.; East London (Shelly Beach), July 1937, 3 specimens, S.; East London (Bats Cave Rocks), July 1937,

several specimens, S.; Durban (Port Natal), about 1840, 2 specimens, WAHLBERG; Durban (Isipingo Beach), July 1935, 2 specimens, S.; Durban (Reunion Rocks), 2 specimens, Nov. 1935, C.; 1 specimen, Durban museum. »The species is one of the commonest of South African anemones, and we have found it wherever the shore has been visited from Port Nolloth in the west to the Durban district in the east.» (STEPHENSON.)

Sphincter recalling that of *Bunodosoma capensis* (CARLGRÉN 1927). Sometimes the principal lamella is rather indistinct or thin and short, sometimes a little broader; but the sphincter is different from that of *Bunodactis reynaudi*. I have not seen the nematocysts in an exploded state, but I think that the identification of the basitrichs and atrichs is correct. As to the translucent nematocysts designated as microbasic amastigophores, they may possibly be mastigophores, but I have not seen any thread running out from the basal part (»hampe») in the unexploded nematocysts. The large and broad nematocysts of the filaments, narrower in the distal than in the basal part, stained strongly with methylene blue. Commonly they were opaque, and only a thin basal(?) thread was visible; but in some capsules a strongly coiled thread also. Probably they are basitrichs. They varied very much in size in different specimens. The atrichous nematocysts also varied as to size. Smaller individuals had usually smaller atrichs than larger individuals. The endoderm of the column was pigmented. In a specimen, about 3.5 cm. broad and 2 cm. long, from Shelly Beach, East London, the marginal spherules were absent altogether, as occasionally happens in *Actinia*, *Anemonia* and *Anthopleura xanthogrammica*.

As I have previously pointed out (1928, p. 171) the specimens which PAX (1908) has described as *Phymactis capensis* include also the species which he called *Bunodactis michaelsoni* in 1920. *Actiniodes angrae pequenae* (PAX 1907 and 1908) is invalid, since the description is based on two species, the one a Sagartid, *Anthothoë (Parathoë) stimpsoni*, the other *Anthopleura (Bunodactis) michaelsoni*, described by PAX, 1920. I have had the whole remaining collection of *Actinioides angrae pequenae* from 1907 and 1908, for examination. Of 24 1/2 individuals, 10 were *Anthothoë*, 14 1/2 *Anthopleura*. The marginal spherules PAX did not observe in the latter individuals. Curious also is his statement as to the siphonoglyphs, when he says »An manchen Exemplaren treten zwei Siphonoglyphen deutlich hervor. Ihre zahl ist jedoch keinenwegs konstant. Während sich bisweilen nur eine Schlundrinne sicher erkennen liess, konnte ich in anderen Fällen sogar 5 feststellen. Oft wird mangelhaftige Konserverierung dafür verantwortlich zu machen sein»!! In fact the specimens were well preserved. One specimen examined by me had 3 siphonoglyphs, 2 symmetrically situated and one extra one near one of the typical siphonoglyphs. Two individuals examined had a palmate circumscrip sphincter with a tendency to form a thin principal lamella. I have made a comparison between the size of the cnidae in young individuals of *Anthopleura* and in a specimen of *A. angrae pequenae*. They showed very good agreement. As to *Bunodactis gigas*, see the

account of *B. reynaudi*, p. 45. Whether *Bunodactis michaelsoni* (Pax 1924, p. 11) from the coast of Guinea belongs to this species is doubtful. I have not examined this specimen.

Genus *Urticinopsis*, CARLGR.

Actiniidae with well developed pedal disc. Column smooth, without verrucae or marginal spherules. Sphincter strong, circumscribed. Tentacles hexamerously arranged, short, about half as numerous as the mesenteries. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal or meso-ectodermal. Actinopharynx well developed, as also the siphonoglyphs. Mesenteries hexamerously arranged, more numerous in the proximal part than in the distal. At least 2 cycles of mesenteries perfect. Retractors of the mesenteries diffuse, not strong. Parietobasilar muscles forming a distinct fold. The first two cycles of mesenteries sterile.

*Urticinopsis crassa*, n. sp.

Pl. III fig. 8.

Pedal disc thin but very broad. Body conical, without verrucae, in the contracted state irregularly wrinkled, in the upper part with irregular ridges. The mesogloea of the column very thick (0.4—0.5 cm.) in the upper part of the body, somewhat thinner below the sphincter, diminishing in thickness toward the pedal disc. Sphincter well developed, endodermal circumscribed, the folds running out from a thick lamella of the mesogloea. The longitudinal muscles of the tentacles and radial muscles of the oral disc are ectodermal,

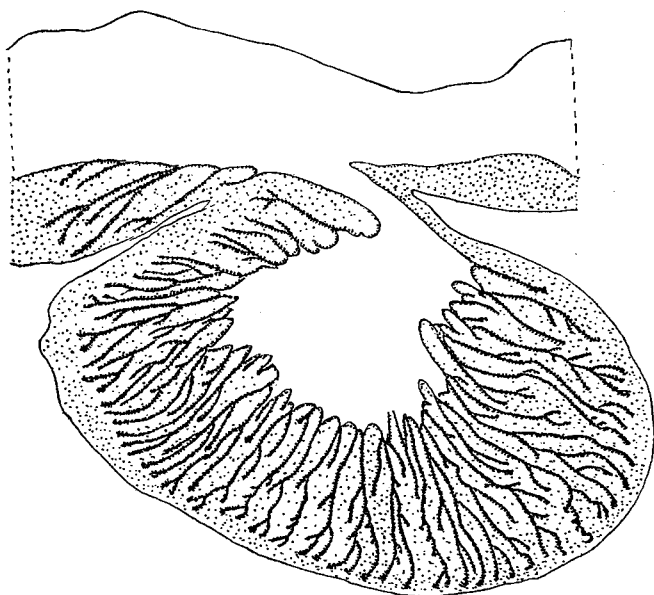


Fig. 19. *Urticinopsis crassa* n. sp. Sphincter.

the latter sometimes a little branched. Actinopharynx long, longitudinally sulcated, with 2 broad siphonoglyphs aborally prolonged. Pairs of mesenteries

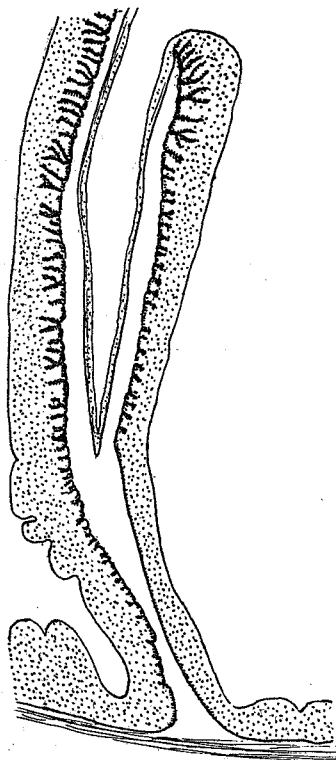


Fig. 20. *Urticinopsis crassa* n. sp. Transverse section of the outer part of a mesentery of the second cycle.

$6 + 6 + 12 + 24 = 48$  in the distal part; at the pedal disc an additional fifth cycle, the mesenteries of which are weak and lack filaments. Mesenteries of the three first cycles perfect, 2 pairs of directives symmetrically situated. The mesenteries of the first two cycles sterile, those of the third and fourth cycles fertile. Retractors diffuse, of ordinary development. The parietobasilar muscles form a sharp shelf on the stronger mesenteries, but are often not enclosed in the mesogloea. Basilar muscles well developed. Nematocysts of the column  $20.5-24 \times 2-2.5 \mu$ , sparse; those of the tentacles  $22-29 \times 2(2.5) \mu$ , very numerous; those of the actinopharynx partly  $30-38 \times 2.5$ —almost  $3 \mu$ , rather common, partly  $24-26 \times$  about  $5 \mu$ , microbasic amastigophors (?), rare; those of the filaments  $23-25 \times 4-4.5 \mu$ , sparse; spirocysts of the tentacles about  $19 \times 2.5$  to  $36 \times 4-5 \mu$ .

Colour unknown.

Size in contracted state: height of the body about 3.5 cm., breadth of pedal disc  $4.5 \times 3.5$  cm., that of the uppermost part of the body about 2.3 cm.

Locality. Cape Point N.E.  $\frac{3}{4}$  N., 39 miles, 310-560 fms., clay to green mud, 1 specimen, South African Museum.

The specimen was a male. The species is closely related to *Urticinopsis antarctica* but is distinguished from that species, among other features, by smaller nematocysts and by the ectodermal nature of the muscles in the tentacles and oral disc. The mesogloea of the stronger mesenteries, in *crassa*, showed no such marked thickenings as in *antarctica*. I have figured sections of the sphincter and of the outer part of one of the stronger mesenteries, showing the parietobasilar muscle (figs. 19, 20).

#### Genus *Bunodosoma*, VERR.

Actiniidae with well developed pedal disc. The whole or almost the whole column provided with rounded, uniform vesicles forming weak nematocyst-batteries. A ring of marginal spherules in the fosse. Sphincter well developed, circumscribed. Tentacles and mesenteries hexamerously arranged. As a rule 2 pairs of directives. Perfect pairs of mesenteries usually numerous. All stronger mesenteries, sometimes except the directives, fertile. More mesenteries at the limbus than at the margin.

**Bunodosoma capensis (LESS.).**

*Actinia capensis*, n. sp. LESSON 1830, p. 70, Pl. 2, fig. 4.

*Phymactis capensis* (LESS.), MILNE-EDWARDS 1857, p. 274; *Andres* 1883, p. 436;? PAX 1908, p. 485, *pro parte??*; 1920, p. 30, *pro parte*.

*Bunodosoma capensis* (LESS.), CARLGREN 1928, p. 169, figs. 24 a, b.

Body of ordinary size. Pedal disc very wide. Column provided with uniform simple vesicles, close-set, arranged in longitudinal rows and reaching almost to the limbus. A ring of large marginal spherules, up to 96 in number, in the fosse. Tentacles rather short, in large specimens up to 192, hexamerously arranged. Sphincter very strong circumscribed, richly branched, its folds running out from a thin principal lamella. Oral disc wide. Actinopharynx long, with numerous longitudinal ridges. 2 rather broad siphonoglyphs, sometimes asymmetrically situated, a little prolonged aborally. Pairs of mesenteries in the upper part up to 96, large specimens with a more or less complete sixth cycle in the lower part of the body. 2 pairs of directives. Most of the mesenteries perfect and fertile, directives sterile or fertile. Retractors of mesenteries diffuse. Nematocysts of the column partly  $17-25 \times 1.5-2.5 \mu$  common; partly  $17-20 \times$  about  $4.5 \mu$ , atrichs, sparse; those of the vesicles  $17-25 \times 1.5-2.5 \mu$ ; those of the marginal spherules  $41-60 \times 4.5-6.5 \mu$ , atrichs; those of the tentacles  $17-26 \times 1.5-2.5 \mu$ ; those of the actinopharynx partly  $17-29 \times 2-3 \mu$ , partly  $17-22 \times 3.5-5 \mu$ ; those of the filaments partly  $10-22 \times$  about  $2 \mu$ , partly  $17-29 \times 3-5 \mu$ , all the smaller ones probably basitrichs, the broader, microbasic mastigophors or amastigophors. Spirocysts of the tentacles  $12 \times 1.5$  to  $29 \times 2.5(3) \mu$ .

*Colour* very variable. Professor STEPHENSON has noted the colour in several individuals. (1) Base pale scarlet. Column orangebrown, vesicles the same with a dark brown spot on each. Marginal spherules orange. Oral disc and tentacles tawny orangered, unmarked but for very faint paler radial streaks on the disc. A scarlet area round the mouth. (2) Base flesh-coloured. Column brilliant violet blue, vesicles the same, each with a large deep violet spot. Marginal spherules pale lilac. Oral disc and tentacles diaphanous lilac, unmarked. Area of disc round the mouth soft vivid lilac-blue. (3) Similar to (1), but with more definite pale radial marks on the disc. Base pale orange. (4) Base drab-cream. Column greenish drab, vesicles the same, each tipped with a slightly darker spot. Marginal spherules flesh-pink. Disc and tentacles smoke-gray, unmarked. (5) Base pale crimson. Column same colour as the disc and tentacles. Marginal spherules pale crimson. Disc and tentacles dull deep rich purple-crimson. Area of disc round the mouth rich crimson. (6) Similar to (4), but upper part of column rose-red and all the shades a little different. Base pale rose. Oral disc with very faint radial red streaks, a drab ring round the mouth and then a red one. (7) Base pale crimson. Column crimson, each vesicle tipped with a large spot of brilliant deep blue. Marginal spherules pale crimson. Inner tentacles dusky orange, darker at the base; outer tentacles dark crimson-brown. Oral disc deep crimson. (8) Base pale

orange. Column orange-brown, vesicles tipped with deep bright blue. Marginal spherules bright orange. Oral disc and tentacles brownish orange, inner tentacles paler at the base. No pattern, but disc red round the mouth. (9) Base cream. Column pale gray, vesicles each tipped with dark gray. Marginal spherules opaque white, with a faint pink tinge. Tentacles pale gray, unmarked. Oral disc dark gray with opaque white radial streaks. (10) Base pale orange. Column scarlet, each vesicle with a small deep blue spot. Marginal spherules pink. Tentacles pale dull scarlet, inner ones paler at the base. No pattern. Oral disc gray-scarlet, scarlet round the mouth. (11) Base pale brown with orange flecks. Column wood-brown, vesicles the same. Marginal spherules brownish cream. Disc and tentacles brown except that the tentacles of the inner cycle have cream-coloured bases and there are very faint paler radial streaks on the disc. (12) Base pale orange with darker flecks. Column light greenish drab with maroon blotches. Vesicles the same as the ground-colour, with dark blue tips on the maroon parts and pale blue or grayish tips elsewhere. Marginal spherules opaque cream. Tentacles maroon. No pattern. Disc greenish gray. (13) Base flesh colour. Column flesh-pink above, the same below, with handsome maroon mottlings. Vesicles the same as the ground-colour, with grayish tips on the pale parts. Marginal spherules pale pink. Tentacles maroon with pale bases. Disc dark gray with a greenish tinge, unmarked. [All these individuals from St. James]. (14) Column, tentacles and disc all plain bright scarlet. Vesicles blue (individual from Still Bay). All specimens so far described were from the intertidal area.

An individual taken by me in Table Bay from a depth of about 15 fathoms had the column yellow with blue-violet vesicles. The pedal disc was almost always of another colour than the column.

*Size.* A well preserved specimen was 1.3 cm. at the base and 3.5 cm. high. The size of the species is in general smaller than that of *Anthopleura michaelsoni* (STEPHENSON).

*Localities.* South West Africa, Lüderitz Bay (?); Houtjes Bay, Scotia exped.; Table Bay, about 15 fms., 1 specimen, Oct. 1935, C.; Robben Isl., 15 fms., 5 specimens, Nov. 1935, Jan. 1936, C.; Cape Town docks, Scotia exped.; Oude Kraal, 3 specimens, Mar. 1934, S.; several specimens, Oct. 1935, C. and S.; False Bay (St. James) 4 specimens, Oct. 1935, C.; several specimens, S.; Still Bay, 6 spec., S.; Plettenberg Bay, German Deep-Sea exped.; Port Elizabeth (Humewood), Oct. 1935, C.; East London, 1 spec., Nov. 1935, C.; East London (Shelly Beach), 6 specimens, July 1937, S. »The species is more or less common at many places on the South African coast, where it inhabits most abundantly the lower levels of the shore and is commonly associated with the large simple ascidian *Pyura stolonifera*» (STEPHENSON).

The description of this species given by me in 1928 is here somewhat amplified. The sizes of the nematocysts and spirocysts I have measured in other specimens than those previously mentioned. In the ectoderm of the lowest part of the column I have found very sparse nematocysts, as far as I can see atrichs. It is doubtful whether they are component parts of this

ectoderm or whether they have stuck to it, and really belong to the marginal spherules. STEPHENSON mentions in his notes of this species that, when it is wholly expanded, the disc and tentacles have exactly the aspect of those of *Actinia equina*. He says that it can attach gravel to its vesicles, but only sparingly; and that it is often without gravel. I did not see any specimens with attached gravel. Probably the gravel sticks to the vesicles by means of mucus. An individual from Table Bay had 186 mesenteries at the base and 174 tentacles. PAX' *Phymactis capensis* is, as I have shown in 1928, *Anthopleura michaelsoni* (PAX' *capensis* forma *laevis*); it is identical also with *Bunodactis reynaudi* (PAX' *capensis* forma *typica* = *Bunodactis gigas* PAX, at least *pro parte*). Whether *Bunodosoma capensis* proper was also present in the collection from Lüderitz Bay is doubtful; I have only examined a few specimens of it. But as the species has not hitherto been taken in Saldanha Bay or at Port Nolloth, it is possible that the species does not occur on the coast of South West Africa. See also my description of the species, 1928.

#### Genus *Pseudactinia*, CARLGR.

Actiniidae with broad pedal disc and rather low body, at least in the contracted state. Column smooth, with 1—5 horizontal rows of vesicles (pseudospherules) at the margin, these forming nematocyst batteries. Inside the uppermost of them, in the fosse, a circlet of more or less strongly developed marginal spherules, which are sometimes absent in small individuals. Sphincter diffuse. Tentacles rather long; they can apparently not be wholly covered by the upper part of the column. Longitudinal muscles of tentacles ectodermal, radial muscles of oral disc ectodermal or principally ectodermal. Actinopharynx well developed. Number of siphonoglyphs very variable. Mesenteries hexamerously or irregularly arranged. Numerous perfect mesenteries. Directive mesenteries present or absent. Retractors of mesenteries diffuse. Parietobasilar and basilar muscles distinct. Distribution of the reproductive organs varying, the mesenteries of the first cycle apparently always sterile. More mesenteries at the limbus than at the margin.

The diagnosis of the genus *Pseudactinia* (CARLGR 1928) is here somewhat altered and amplified.

In my paper of 1928 I described two species, *P. flagellifera* (R. HERTW.) and *P. plettenbergensis*, CARLGR., but at the same time I suggested that an examination of more ample material might prove the two species to be identical. The present collection of *Pseudactinia* is very large, and taken in many localities. After a careful investigation of the whole material I have arrived at the result that two forms of this genus are distinguishable, both having the same types and about the same sizes of nematocysts, but separable in other ways, particularly by the number of siphonoglyphs and the presence or absence of directives. In the one form there are normally 2 symmetrically situated (rarely 1 or 3) siphonoglyphs, always connected with directives; in the other a variable number (1—9, usually 3—5) of siphonoglyphs, not attached



to directives. The two forms are usually somewhat different in colour but sometimes, where the individuals live together as at Oude Kraal and St. James, there was, so far as I can remember, little if any colour-difference. Now the question arises, are we dealing with two species? or do the forms without directives and with many siphonoglyphs arise by asexual reproduction from those having directives? There is little to suggest that the forms without directives arise from those with directives, since asexual propagation, whether it be longitudinal fission or the fragmentation of large pieces from the limbus, should at least sometimes result in the appearance of directives in the separated pieces (CARLGRÉN 1904). But in no case have I observed that any directive pair was present in the forms in which the siphonoglyphs were connected with non-directives. Neither Professor STEPHENSON nor I myself have observed that the form with directives propagates asexually. On the other hand it is possible that asexual reproduction occurs in the form without directives, though no such observations have been made up to the present. I think therefore that we have probably two species of *Pseudactinia* in the South African waters. This opinion is further supported by the fact that the two forms have a somewhat different distribution, if we may judge by the records hitherto available. The one occurs from Lüderitz Bay to Durban, the other is, as it seems, absent north of Oude Kraal, but present at several localities as far as Durban. In my paper of 1928 I mentioned that it was difficult to decide which of the species I called *flagellifera* and *plettenbergensis* was HERTWIG's species. As I could not at that time decide whether there were directives or not in the single specimen which I identified with *flagellifera* (a specimen which I did not wish to injure too much), my identification was based on the number of rows of vesicles, which seemed to be more in agreement with HERTWIG's specimen. I have now examined an individual with the same colour and pattern as my *flagellifera*, and this specimen had no directives but several siphonoglyphs. As HERTWIG mentions that he has observed directives in his specimen, the consequence of this is that my *plettenbergensis* is identical with HERTWIG's species, and that my *flagellifera* must have a new name. See also the further remarks under the two species.

#### *Pseudactinia flagellifera* (R. HERTW.).

*Comactis flagellifera*, DRAY., R. HERTWIG 1882, p. 28, Pl. 3, fig. 5, Pl. 6, fig. 6 (Not DRAYTON's species).

*Anemonia flagellifera* (DRAY.) R. HERTWIG 1888, p. 5.

*Actinia infecunda*, MC MURR. *pro parte*. MC MURRICH 1893, p. 146; HADDON and SHACKLETON 1898, p. 416.

*Anemonia infecunda* (MC MURR.), *pro parte*. FAX 1908, p. 489.

*Anemonia thelcteria*, n. sp. PAX 1907, p. 69; 1908, p. 488, Pl. 26, figs. 3, 4.

*Actinia anachoreta*, n. sp. PAX 1922, p. 76; 1926, p. 11, figs. 8, 9.

*Actinia psapharoderma*, n. sp. PAX 1922, p. 76; 1926, p. 12, figs. 10—12.

*Actinia suspecta*, n. sp., *pro parte*. PAX 1922, p. 77; 1926, p. 14, fig. 13, 14.

*Pseudactinia plettenbergensis*, n. sp. CARLGRÉN 1928, p. 157, Pl. 3, fig. 7, text-figs. 16, 17.

Pedal disc very broad. Column in the contracted state rather low. Vertical rows of vesicles running a little way down from the margin, each containing 1—5 vesicles. Smaller individuals have 1—2 vesicles in a row, very large specimens 4—5, close-set; the corona of vesicles then forms a ring-like band at the margin. Marginal spherules in smaller individuals sometimes not yet developed, in larger ones numerous. Sphincter diffuse, not strong. Tentacles conical, up to 230 (or more?), usually hexamerously arranged; but sometimes, when there are 1 or 3 pairs of directives, the arrangement is more irregular. Actinopharynx well developed, longitudinally ridged. Siphonoglyphs usually two, symmetrically situated, rarely 1 or 3, rather broad. Pairs of mesenteries up to 144 (or more?), more numerous at the base than at the margin. Directive pairs 1—3. Perfect pairs numerous in larger specimens, 48 or more. Retractors band-like. Mesenteries of the first and second cycles sterile, or sometimes some of those of the second cycle fertile, in large individuals the gonads occur only on the two youngest cycles. Nematocysts of the column  $18-25 \times 2-2.5 \mu$ , basitrichs; those of the vesicles  $18-31 \times 2-2.5 \mu$ , basitrichs; those of the marginal spherules  $31-50 \times 5-7 \mu$ , atrichs; those of the actinopharynx partly  $24-36 \times 2.5-3 \mu$ , basitrichs, partly  $17-25 \times 3.5-4.5 \mu$ , microbasic mastigophors. Spirocysts of the tentacles  $17 \times 1.5-43(48) \times 3.5 \mu$ .

*Colour.* (1) Red. (2) Red, oral disc with greenish radial stripes on the parts corresponding to the older tentacles, which at the base are encircled by white. (3) Column orange, oral disc, especially in its outer part darker, shading into olive, tentacles paler at the base, actinopharynx red. (4) A small specimen. Column yellowish brown. Tentacles opaque white, oral disc light olive-brown with an annulus of 24 indistinct pale rectangular spots corresponding to the tentacles of the third cycle, actinopharynx red. [Specimens 1—4 from Kommetje, notes by myself]. (5) Tentacles, oral disc, mouth and actinopharynx uniform rich crimson-scarlet without markings. Column a slightly browner scarlet, vesicles the same colour as the column, marginal spherules a lighter crimson-rose colour (large specimens from St. James). (6) Column and acrorhagi orange-brown. Tentacles yellowish green with bright magenta tips (specimen from the Boulders). [Notes on nos. 5 and 6 by Professor STEPHENSON].

*Size.* One of the largest specimens, not strongly contracted, was (in the preserved state) 4 cm. high, oral disc 7.5 cm. across, pedal disc  $7.5 \times 6.5$  cm. The smallest individual was 0.8 cm. high, oral disc 1.8 cm. and pedal disc 1 cm.

*Localities.* South West Africa, Lüderitz Bay, 0—10 m. (*Anemonia theleteria*); Porth Nolloth, 7 specimens, Nov. 1935, S.; Saldanha Bay, 1 specimen, Scotia exped.; 1 specimen, Discovery exped.; Keits Bay, 2 specimens, Scotia exped.; Houtjes Bay, 1 specimen, Scotia exped.; Table Bay (Melk bosch), 1 specimen, Oct. 1935, C. and S.; Oude Kraal, 4 specimens, Oct. 1935, C. and S.; Kommetje several specimens, Oct. 1935, C. and S., Dec. 1935, C.; St. James, 2 specimens, Oct. 1935, C. and S.; Simons Bay, 25 fms., Challenger exped.; German South Polar exped. (*Actinia anachoreta*, *psapharoderma?*, *suspecta*); The Boulders, 1 specimen, S.; Simonstown, S.  $60^{\circ}$  W. 4 miles, 11—16 fms.,

1 specimen, Dec. 1929, M.; Still Bay, 1 specimen, Jan. 1932, S.; Plettenberg Bay, 34° 7.3' S., 23° 27.8' E., not intertidal, German Deep-Sea exped.; Port Elizabeth (Humewood Beach), Oct. 1935, C.; 1 specimen, July 1936, S.; East London, Dec. 1935, C.; East London (Shelly Beach), 1 specimen, July 1937, S.; Port Natal, several specimens, about 1840, WAHLBERG; Durban, Durban Museum, 1 specimen.

When no depth is noted the individuals are from the intertidal zone.

The individuals of this species are as a rule larger than those of the following species, and those occurring in the intertidal zone seem to grow larger than those living deeper down. Commonly the horizontal rows of vesicles are one or two in the smaller individuals, larger specimens have more rows but only 3 of the largest ones from Saldanha Bay, St. James and Durban had 4—5. The siphonoglyphs were usually 2, in most cases symmetrically arranged. Of 34 specimens examined, only 2 had a single siphonoglyph and one had three. The perfect mesenteries are numerous.

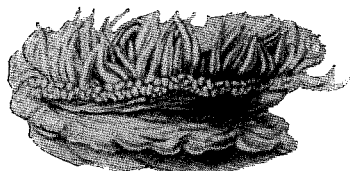


Fig. 21. *Pseudactinia flagellifera*  
(R. HETRW.)  $\frac{1}{2}$ .

PAX stated that only 12 pairs were perfect in *thelcteria*. This is certainly incorrect. I have examined two co-types of this form; one, which had 184 tentacles, was provided with 48 perfect pairs, the other, which was not so well preserved, about the same number. A third specimen, from Port Nolloth, had also 48 pairs. In a large specimen with 2 siphonoglyphs not symmetrically situated, from East London, the perfect pairs were 60, the imperfect about 60 also. Evidently PAX had not examined the insertions of the mesenteries in the uppermost part of the actinopharynx. PAX also stated that all mesenteries save the directives were fertile in *thelcteria*. This is, as far as I have seen, not the case. The mesenteries of the first cycle were sterile in the 5 specimens from different localities which I have examined; in three of them the mesenteries of the second order were also sterile. In one specimen of *thelcteria* one mesentery of the second cycle was fertile, in a specimen from Port Nolloth more than one mesentery of same cycle. In the large individual from East London the gonads were developed only on the two youngest cycles of mesenteries. The mesenteries at the base were more numerous than the tentacles in the specimens examined, but in some of them the difference was less marked (mesenteries and tentacles respectively 190—184; 198—176; 288—208). I have measured the nematocysts of several individuals. They showed good agreement, but usually the smaller individuals had smaller nematocysts than the larger ones. The marginal spherules were not yet developed in the small specimens of PAX' *Actinia suspecta* and *psapharoderma*. »Die Randsäckchen» which PAX mentions are vesicles (pseudospherules) containing not atrichs but basitrichs. I have not examined the »Randsäckchen» in *anachoreta* but since PAX notes that there were two siphonoglyphs and a regular arrangement of tentacles in this species, there is no doubt that it is identical with *flagellifera*. As PAX mentions that *suspecta* and *psapharoderma*

have directives, these forms may be the same species. *Anemonia theleteria* also, is undoubtedly synonymous with *flagellifera*. See also my description of *Pseudactinia* (1928) and the remarks made above under the genus.

***Pseudactinia varia*, nov. nom.**

*Pseudactinia flagellifera* (R. HERTW.). CARLGRÉN 1928, p. 153, Pl. 1, figs. 4, 5, Pl. 3, fig. 10, text-figs. 14, 15.

Pedal disc broad. Column in the contracted state low, with a single row of marginal vesicles. Rarely there is a tendency to form two rows. Marginal spherules present inside the vesicles, often strongly developed. Tentacles rather long, conical, irregularly arranged. Sphincter diffuse, weaker or stronger. Actinopharynx longitudinally ridged. Siphonoglyphs 1—9, usually 3—5, not connected with directives. Pairs of perfect mesenteries varying in number, up to 36 (or more?). No directives. A variable number of perfect pairs of mesenteries sterile. Retractors of the mesenteries rather weak, diffuse. Nematocysts of the column 19—27×2—2.5  $\mu$ , rather sparse; those of the vesicles 19—31×2.5—3  $\mu$ , numerous; those of the marginal spherules 29—48×5—6.5  $\mu$ ; those of the tentacles partly 24—38×2.5—3.5  $\mu$ , partly 14—26×1.5—2(2.5)  $\mu$ ; those of the actinopharynx 24—34×(2)2.5—3.5(4)  $\mu$ . Those of the marginal spherules are atrichs, all others basitrichs. Spirocysts of tentacles about 22×1.5 to 48×3.5  $\mu$ .

*Colour.* I have noted the colour of a few specimens (1) Column rose-coloured, tentacles rose with a longitudinal white band on their oral side, oral disc grayish, with the insertions of the mesenteries rose-coloured, actinopharynx rose-coloured (specimen from the Agulhas Bank). (2) colour as in (1), but the tips of the tentacles shading into violet and the oral disc pale rose-coloured (specimen taken by a trawler at East London). I call these varieties *rosea*. (3) Colour recalling that of (1) and (2), but the column and oral disc more red-brown, the marginal spherules and vesicles red. The longitudinal band on the oral sides of the tentacles shaded into greenish. Insertions of the mesenteries on the oral disc red (several individuals from the intertidal zone, East London).

*Size.* The species does not grow as large as *flagellifera*. The size does not usually seem to be larger than that of the specimen figured (fig. 22). An exceptional individual, however, was taken by a trawler off East London. Its oral disc was 8×7 cm. broad. The specimens from the intertidal zone are usually small.

*Localities.* Oude Kraal, several specimens, Oct. 1935, C. and S.; St. James, several specimens, Oct. 1935, C. and S.; 1 specimen, Jan. 1930, M.; False Bay, 34° 7.6' S., 18° 38' E., 15 fms., 1 specimen, Dec. 1929, M.; Agulhas Bank, 35° 29' S., 21° 2.5' E., German Deep-Sea exped.; Cape Barracouta W. 10 miles, 40—42 fms., 1 specimen, Dec. 1929, M.; Plettenberg Bay, 1 specimen taken by trawler, German Deep-Sea exped.; Port Elizabeth (Humewood Beach), several specimens, July 1936, S.; East London, intertidal zone, several specimens, Dec. 1935, C.; 2 specimens taken by trawler, Dec. 1935, C.; East London (Shelly Beach), several specimens, July 1937, S.

St. Helena, Rocky coast, several specimens, Jan. 1930, M.

I have examined a rich material of this form. In connection with the absence of directives the arrangement of tentacles was irregular. In 12 specimens the number of tentacles varied between 72 and 174, the largest individual examined (specimen taken by trawler, East London) had, however, more

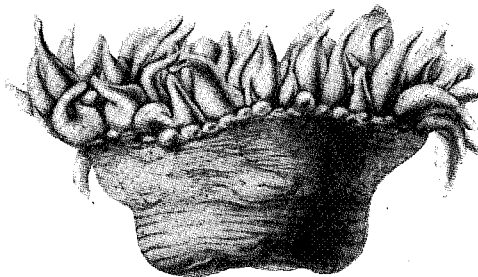


Fig. 22. *Pseudactinia varia* n. nom. †.

than 300 tentacles. The longitudinal muscles of the tentacles and radial muscles of the oral disc were ectodermal, rather strong, their folds arranged in a pallisade-like manner and sometimes branched at the tips. The number of siphonoglyphs varied considerably. In 28 specimens examined the number was as follows.

1 specimen	had	1 siphonoglyph.
3 specimens	»	2 siphonoglyphs.
9	»	3
5	»	4
5	»	5
2	»	6
1 specimen	»	7
1	»	8
1	»	9

Thus, of 28 specimens 19 had 3—5 siphonoglyphs. There was great variation as to the number of perfect sterile mesenteries and the number of mesenteries at the base and at the margin, as appears from the following comparison:

Locality	Approximate number of perfect pairs of mesenteries	Approximate number of perfect pairs of sterile mesenteries	Number of tentacles = that of the mesenteries at the margin	Number of mesenteries at the base	Number of siphonoglyphs
Oude Kraal . . . .	36	26	101	113	1
Still Bay . . . . .	35	12	109	136	4
East London . . . .	36	15	172	190	3
»    »    . . . . .	36	14	140	—	8
Cape Barracouta . .	33	9	115	184	4
St. Helena . . . . .	—	—	76	96	5

The specimen examined from St. Helena was sterile. The retractors were diffuse and band-like, especially on the stronger mesenteries, and distributed over the greater part of the surface of the mesentery. I have examined the nematocysts of the column in 4 specimens, those of the vesicles in 8, those of the marginal spherules in 10, those of the tentacles in 5 and those of the actinopharynx in 4. They showed good agreement in individuals of very different sizes. The smaller specimens had, however, smaller nematocysts than the larger ones. In the actinopharynx I have sometimes found a few nematocysts which were either microbasic mastigophors or amastigophors. See also the remarks on the genus, and my description of *P. flagellifera*, 1928.

Fam. *Isanthidae*, nov. fam.

Nynantheae with basilar muscles. Sphincter mesogloea. Mesenteries divisible into macro- and microcnemes. No acontia.

Genus *Isanthus*, n. gen.

*Isanthidae* with cylindrical body. Column smooth, without any kind of projections. Margin distinct. Tentacles and mesenteries the same in number, not numerous. 6 pairs of perfect, fertile mesenteries, their retractors kidney-shaped in cross-section.

*Isanthus capensis*, n. sp.

A small species. Column cylindrical, smooth, in the expanded state with longitudinal furrows corresponding to the insertions of mesenteries. Margin distinct. Sphincter mesogloea, alveolar, short but occupying the greater part of the thickness of the mesogloea. Tentacles 48, hexamerously arranged, of ordinary length, conical. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal, the latter very strong. Actinopharynx longitudinally furrowed, rather long. 2 distinct siphonoglyphs, without aboral prolongations. Pairs of mesenteries 24, 2 pairs or directives. Only 6 pairs perfect and fertile. Mesenteries of the second and third cycles sterile, without filaments or retractors. Retractors of the macrocnemes strong, in transverse section kidney-shaped, their folds branched, especially in the outer parts, all of about the same height. Longitudinal muscles of the mesenteries at their insertions on the body, folded. Parietobasilar muscles rather weak, but situated to a large extent on a strong fold of the mesogloea. Nematocysts of the column  $19-23 \times (3.5)4-4.5 \mu$ , common; those of the tentacles  $20-24 \times$  about  $2.5 \mu$ ; those of the actinopharynx partly  $17-19 \times 3.5-4 \mu$ , partly  $24-29 \times (4.5)5 \mu$ ; those of the filaments partly  $14-17 \times$  about  $2.5-3 \mu$ , partly  $24-27.5 \times 4.5-5 \mu$ , common. Spirocysts of tentacles about  $17 \times 1.5$  to  $36(38) \times 2.5 \mu$ .

*Colour*. Column colourless or grayish, tentacles grayish with 2 or 3 greenish transverse bands, the bases of the tentacles of the 2 oldest cycles provided on each side with a dark green or sepia-coloured mark, the marks joined or

almost joined in the middle line. Tentacles of the third cycle with a V-shaped mark at the base. Oral disc almost colourless; but a short distance from the mouth faint sepia-coloured arcuate lines form a circle round the mouth, and the outer part of the oral disc has radial arcuate sepia-coloured lines (fig. 23).

*Size* in the expanded preserved state up to 1.8 cm. long and 0.7 cm. broad.

*Localities.* Table Bay (Melkbosch), 1 specimen, Oct. 1935, C. and S.; Oude Kraal, 3 specimens, Jan. 1934, S.; Kommetje, several specimens, Oct. 1935, C. and S.; Dec. 1935, C. The species lives in sand between stones in the intertidal area.

Figures show transverse sections of the sphincter (fig. 24) and of a perfect and an imperfect mesentery (fig. 25). Of 5 specimens sectioned, 3 had *embryos in the coelenteric cavity*. Of these latter specimens one was sterile, the two other

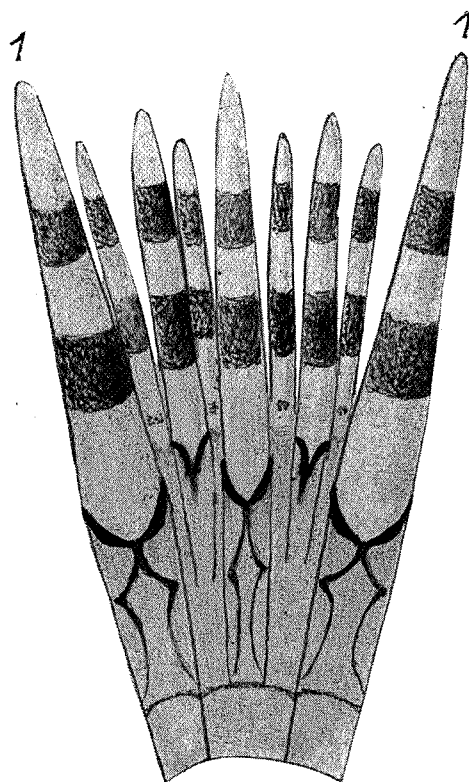


Fig. 23. *Isanthus capensis* n. sp. Tentacles and part of oral disc. 1, 1. tentacles of the first cycle.

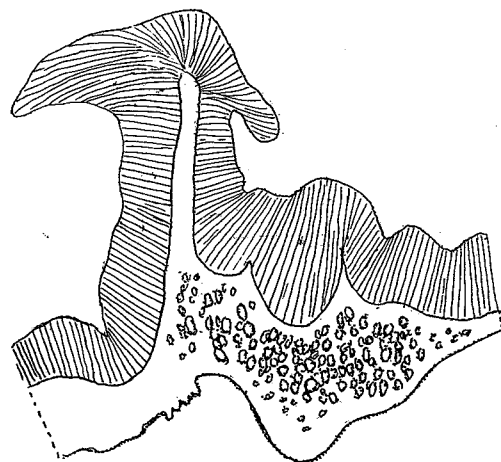


Fig. 24. *Isanthus capensis* n. sp. Sphincter.

*males with well developed testes.* Of the 4 embryos in the *Edwardsia*-stage present in the largest specimen examined, the largest was 0.35 cm. long and 0.3 cm. wide, the smallest 0.15 cm. wide and 0.05 cm. long. The presence of embryos in the males is very interesting, as we must suppose that the specimens in question were probably previously females. I have made similar observations (1934, p. 14) on *Hormathia (Chitonanthus) incubans* (GRAV.). This throws some light upon the case I have described (1924, p. 169) in *Actinia tenebrosa*. I mentioned in that paper that the females as well as the males had embryos in the coelenteric cavity and interpreted this fact as meaning that the embryos had possibly migrated into the males, as no traces of any

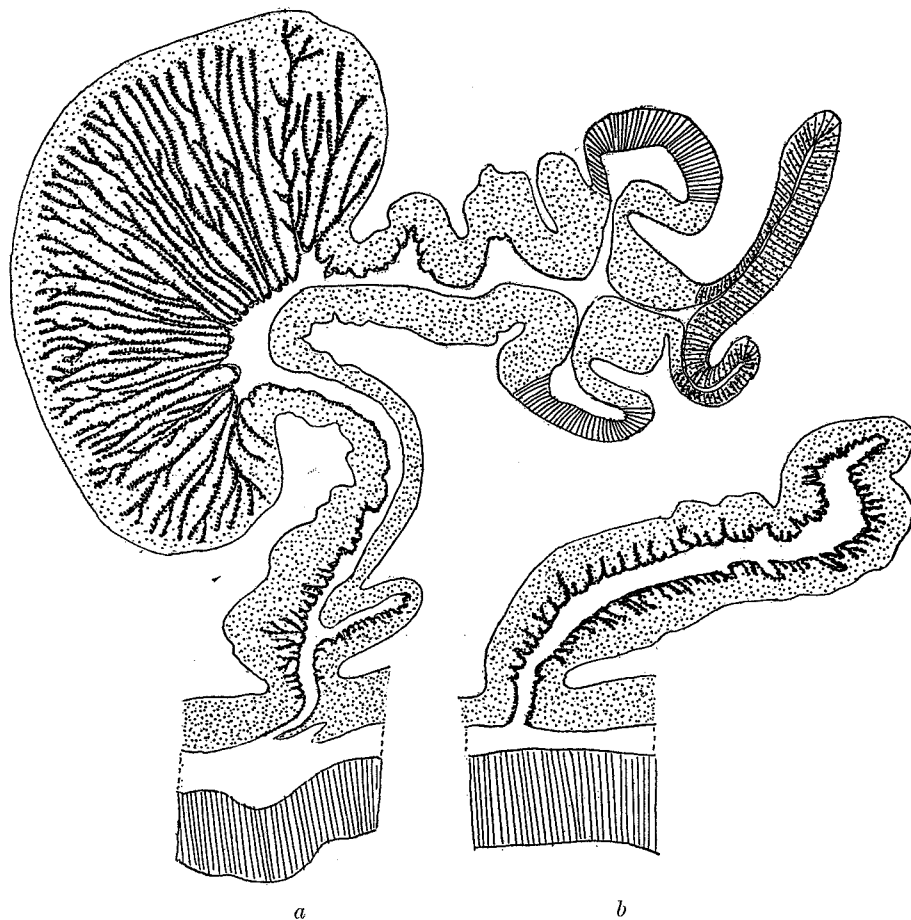


Fig. 25. *Isanthus capensis* n. sp. a) Transverse section of a mesentery of the first cycle in the region of the ciliated tract. b) Mesentery of the second cycle.

hermaphroditism could be found in the specimens, and the individuals of *Actinia* often live close to each other. Such a migration could perhaps be assumed in the case of the species described here, which lives in a similar manner to *Actinia*; but hardly for *Hormathia incubans*, which was dredged in rather deep water. It is therefore probable that we have to do with hermaphroditism, but whether proterogynous or protandrous only a direct study of the fertile periods can ascertain.

#### Fam. Actinostolidae.

Nynantheae with basilar muscles. Column commonly smooth, rarely tubercular, without verrucae or other hollow outgrowths. Sphincter mesogloea. Tentacles sometimes with nematocyst-batteries on their aboral side, where they are also sometimes thickened. Mesenteries not divisible into macro- and microcnemes. No acontia.



As there is no real possibility of determining the genotype of the genus *Paractis*, I proposed (1932, p. 261) to give the former family Paractidae the name Actinostolidae.

#### Genus *Anthosactis*, DAN.

Actinostolidae with well developed pedal disc. Column smooth, rather low, often longitudinally sulcated in the contracted state. Sphincter strong to very strong, mesogloea, alveolar, sometimes with a tendency to transverse stratification. Tentacles short, rather few, conical, robust, hexamerously or octamerously arranged, the outer tentacles only a little shorter than the inner ones. Longitudinal muscles of the tentacles ectodermal, strongest on the oral side of the base. Outer tentacles on their aboral side provided with a stinging-battery containing atrichous nematocysts, which are sometimes distributed along the whole aboral side, though more numerous at the base. Radial muscles of oral disc ectodermal to ecto-mesogloea. Actinopharynx short, with 2 distinct siphonoglyphs. 6, 8 or 12 pairs of perfect mesenteries. 2 pairs of directives. Retractors rather weak, parietobasilar muscles rather well developed. At least the younger mesenteries growing from the basal disc upwards. All stronger mesenteries fertile.

To the diagnosis of the genus given by me (1921, p. 190) I have here added details as to the distribution of the atrichous nematocysts and the growth of the mesenteries.

#### *Anthosactis capensis*, n. sp.

A small species. Column smooth. Sphincter very strong, occupying the whole mesogloea, alveolar with a tendency to transverse stratification. Tentacles 32, octamerously arranged, their longitudinal muscles ectodermal, arranged pallsade-wise. Atrichous nematocysts present on the whole aboral side of the outer tentacles, but more numerous at the base, not concentrated into a distinct battery, and occurring also in the ectoderm of the column. Radial muscles of oral disc between the insertions of the mesenteries rather strong, at the insertions weak. Siphonoglyphs distinct, their mesogloea thickened. Pairs of mesenteries  $8+8+16=32$ , the last cycle only present at the base. 8 pairs of mesenteries perfect, mesenteries of the first and second cycles including the directives fertile. Retractors of the 2 first mesenterial cycles diffuse, not strong, parietobasilar muscles situated on a distinct projection of the mesogloea. Atrichous nematocysts in the ectoderm of the column  $36-42 \times 8-9 \mu$ ; those of the tentacles  $34-41 \times 8-9(10) \mu$ ; other nematocysts in the tentacles  $19-24 \times 3-3.5 \mu$ ; spirocysts of the tentacles  $19-38 \times 2.5-4 \mu$ .

*Colour* unknown.

*Size* in the contracted state, with the tentacles wholly covered by the column: breadth at the base 1 cm., height of the body 0.5 cm.

*Locality.*  $32^{\circ} 23' S.$ ,  $18^{\circ} 8' E.$ , 157 fms., small stones, 1 specimen, Dec. 1929, M.

This species differs from other species in the genus in the relatively small atrichs of the tentacles, and their distribution. Even on the oral sides of the tentacles I have found a few such nematocysts, but they are in any case very

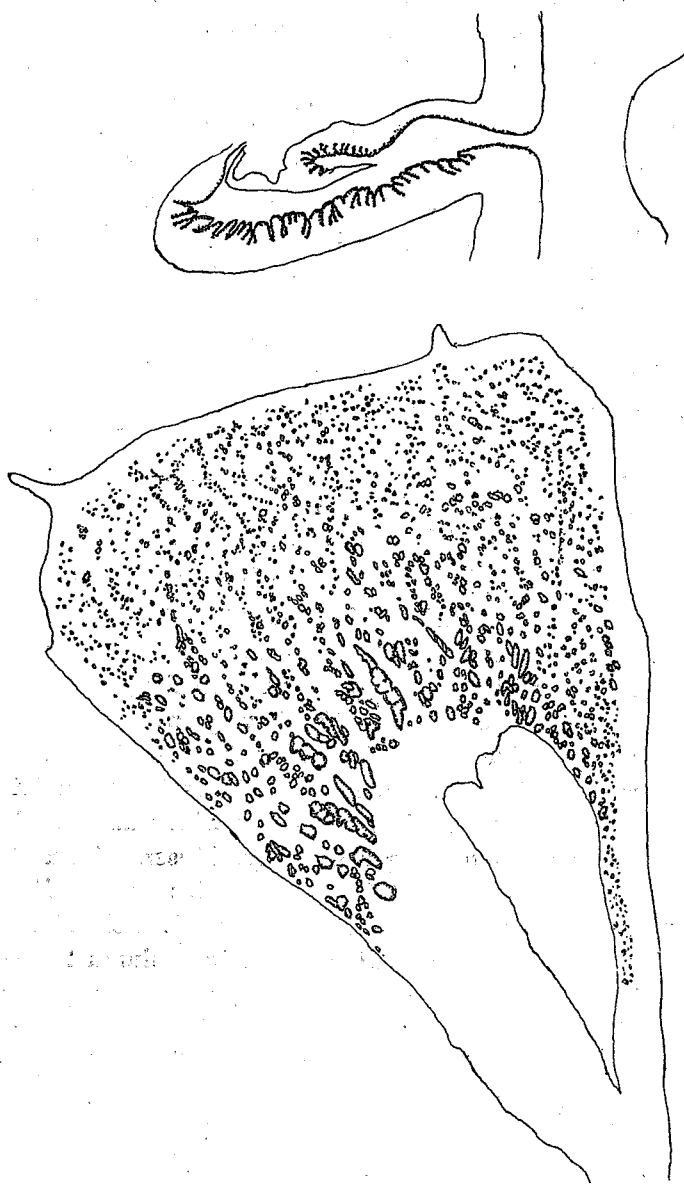


Fig. 26. *Anthosactis capensis* n. sp. Sphincter.

Fig. 27. *Anthosactis capensis* n. sp.  
Mesentery of the second cycle.

sparse there. I have seen the thread of the capsules in an exploded state, so there is no doubt that they are atrichs. I have figured the sphincter (fig. 26) and a mesentery of the second order in the reproductive region (fig. 27). The specimen was a female with very large ova.

Genus *Paraactinostola*, CARLGR.

Actinostolidae with the body, especially in larger individuals, cup-shaped, broad in the upper part, and here more or less distinctly lobate. Column thick, smooth or with weaker or stronger tubercles. Margin indistinct. Sphincter mesogloea, very weak in comparison with the size of the body, so that the tentacles cannot be wholly covered by the upper part of the body. Tentacles short, especially the outer ones, hexamerously arranged, in the contracted state irregularly rugose, with or without thickenings of the mesogloea at the base of the aboral side. Longitudinal muscles of tentacles and radial muscles of oral disc mesogloea. 2 broad siphonoglyphs. Mesenteries at the base fewer than those at the margin, and than the tentacles. 2 pairs of directives. The two mesenteries of one and the same pair, in the youngest cycles, are developed in such a way that the mesentery which has its retractor facing towards the newest mesenterial pair of the preceding cycle is more developed than its partner. Retractors diffuse. Parietobasilar and basilar muscles strong. Mesenteries of the 2 first cycles sterile. The fertile mesenteries have filaments. Large mastigophors microbasic in the ectoderm of the tentacles.

*Paraactinostola capensis*, CARLGR.

*Paraactinostola capensis*, n. sp. CARLGRÉN 1928 Pl. 1, fig. 3, text-figs. 30, 31.

Body cup-shaped or more cylindrical in the contracted state, uppermost part somewhat lobate in older individuals. Column smooth or irregularly furrowed. Sphincter reticular, often with a tendency to stratification, muscle-meshes small. Tentacles up to about 450, with or without very weak thickenings of the mesogloea on their aboral side. Longitudinal muscles of tentacles and radial muscles of oral disc divided into small meshes, the latter often interrupted at the insertions of the mesenteries. Actinopharynx with numerous longitudinal furrows. Siphonoglyphs much prolonged aborally. Mesenteries at the margin, and tentacles, more numerous than the mesenteries at the limbus, in the proportion 1:0.71—0.87. Mesenteries of the three or four oldest cycles perfect, those of the two oldest sterile. Nematocysts of the column  $20.5-22 \times 2.5 \mu$ ; those of the tentacles partly  $26-34 \times 2-2.5 \mu$ , numerous, partly  $38-50 \times$  about  $6 \mu$ , few, mastigophors microb.; those of the actinopharynx  $24-31 \times 2.5-$  almost  $3 \mu$ , numerous; those of the filaments partly  $27-30 \times 2.5 \mu$ , few, partly  $23-27.5 \times$  about  $4.5-5 \mu$ , numerous, microbasic mastigophors. All the narrower nematocysts basitrichs. Spirocysts of tentacles  $20 \times 1.5$  to  $72 \times$  about  $5 \mu$ .

*Colour.* Rose. Tentacles and oral disc orange. When the ectoderm of the column is lost, the body-wall is white.

*Size* of the largest specimen: height 8 cm., breadth of pedal disc 4.5 cm., that of the distal end 7 cm. — both discs somewhat invaginated. Of the smaller cylindrical specimen; height 7 cm., breadth 4 cm., pedal disc 3.5 cm.

*Localities.* Off Cape Point, 92 fms., 2 specimens, Jan. 1936, C.;  $35^{\circ} 10.5' S.$ ,  $23^{\circ} 2' E.$ , 500 m.,  $33^{\circ} 41.2' S.$ ,  $18^{\circ} 0.3' E.$ , 178 m., German Deep-Sea exped.

I have examined the largest specimen in the present collection as to the number of tentacles and mesenteries. It had 324 tentacles, and 230 mesenteries at the pedal disc; thus the relation was 1:0.71.

Fam. *Acontiophoridae*, nov. fam.

Nynantheae with basilar muscles and acontia. No sphincter. Mesenteries divisible into macro- and microcnemes. Acontia with two sorts of nematocysts, basitrichs and microbasic amastigophors.

Genus *Acontiophorum*, n. gen.

Pedal disc wide. Column smooth, with cinclides. No sphincter. Tentacles of ordinary length, hexamerously arranged. Longitudinal muscles of tentacles radial muscles of oral disc ectodermal. 2 siphonoglyphs. Mesenteries divisible into macro- and microcnemes, more numerous in the proximal part than in the distal. 2 pairs of directives. Macrocnemes, including the directives, fertile and with very strong retractors. Parietobasilar muscles very weak. Basilar muscles distinct.

*Acontiophorum mortenseni*, n. sp.

Tentacles  $6 + 6 + 12 + 24 = 48$ . Pairs of mesenteries 48, the last cycle present only in the lowest part of the body. 12 pairs of macrocnemes. Retractors of the macrocnemes diffuse, very strong, with high branched folds. The first cycle of microcnemes alone somewhat folded in their inner parts. Dioecious. Mesogloea of the column strongly stratified. Nematocysts of the column about  $14 \times 3.5 \mu$ ; those of the tentacles partly about  $14 \times 2.5 \mu$ , partly  $12-19 \times 3.4 \mu$ ; those of the actinopharynx partly  $24-26 \times$  about  $3.5 \mu$ , partly  $18-26 \times$  about  $2 \mu$ , partly  $13-17 \times 4.5-5 \mu$ ; those of the filaments partly  $14-24 \times 2 \mu$ , partly  $12-15 \times 4-5 \mu$ ; those of the acontia partly  $22-24 \times$  almost  $2.5 \mu$ , partly  $26-31 \times 4 \mu$ . Spirocysts of the tentacles  $10 \times 1.5$  to  $22 \times 3 \mu$ .

*Colour* in formalin: actinopharynx red-brown, the rest colourless.

*Size* in a very contracted state, with the tentacles drawn in: height 0.5 cm. breadth  $1.5 \times 1.3$  cm.

*Locality*. Agulhas Bank, 10-12 miles W. of Cape Barracouta, 40-42 fms., 1 specimen, Dec. '29, M.

The single specimen was very much contracted and the tentacles covered by the upper part of the column. The broad pedal disc was provided with a thick cuticle, and adherent fragments of shells. The column was smooth in its lower part, and furnished with 48 longitudinal furrows corresponding to the insertions of the mesenteries of the three first cycles; in its upper part very thick and rough, probably due to the strong contraction, but close to the tentacles, thinner. Its ectoderm was thin, its mesogloea strongly stratified, recalling the mesogloea of *Halocampa* and consisting of fibrillae intersecting each other at right angles. I cannot describe the arrangement of the cinclides,

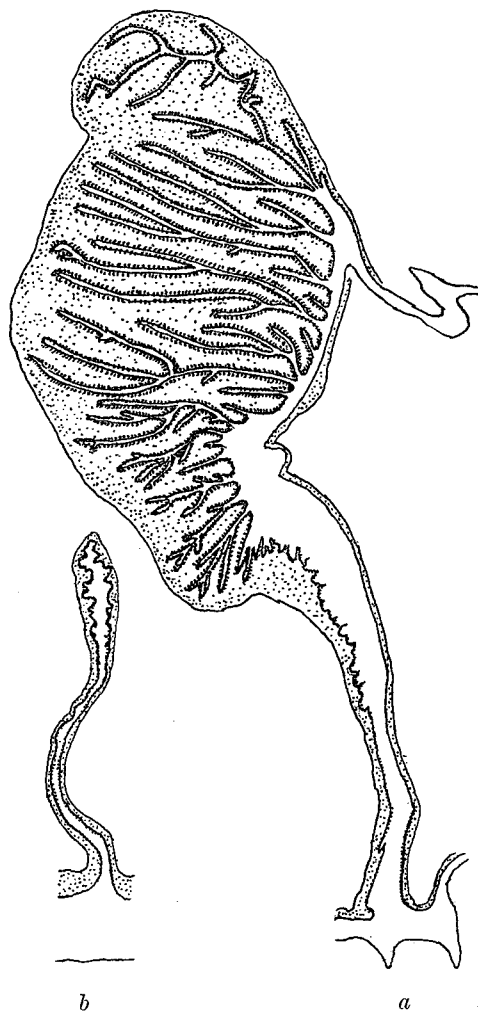


Fig. 28. *Acontiophorum mortenseni* n. sp.

a. mesentery of the second cycle.

b. mesentery of the third cycle.

but I have observed one cinclis formed by partly evagination from the endoderm and partly by invagination from the ectoderm. The circular muscle of the column was rather weak, and there is no trace of a sphincter. The tentacles were cylindrical or sometimes conical, according to the state of contraction. The actinopharynx seems to be long, but owing to the strong contraction of the specimen it was very irregularly folded and pressed together, whence it was very difficult to observe the siphonoglyphs. The mesenteries were probably 48 in the distal part, as there were 48 tentacles present; but at the limbus one cycle more was developed. The last cycle and probably also the next to the last, originate at the base, because the mesenteries of the latter cycle were narrower in their upper part. The mesenteries of the first 2 cycles were perfect and macrocnemic and had well developed ovaries, the others were microcnemes and lacked reproductive organs, filaments and acontia. I have figured mesenteries of the second and third cycles (Fig. 28). The acontia were rather strong, their mesogloea thick. The nematocysts were unexploded, those of the acontia rather opaque, but after staining with methylene their structure was fairly clear. I think that they were basitrichs and microbasic amastigophors.

#### Fam. Isophelliidae.

Nyantheae with basilar muscles and acontia. Sphincter mesogloea. Mesenteries divisible into macro- and microcnemes; the oldest microcnemes can, however, be provided with filaments and acontia. Acontia with 2 types of nematocyst, microbasic amastigophors and basitrichs.

#### Genus *Isophellia*, CARLGR.

Isophelliidae with elongated, more or less cylindrical body, divisible into scapus and scapulus. Scapus with tenaculi and cinclides. Sphincter mesogloea,

alveolar. Tentacles short, hexamerously arranged, more numerous than the mesenteries at the base. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. 2 siphonoglyphs and pairs of directives. Pairs of perfect mesenteries 6+6, the mesenteries of the second cycle, however, formed by pairs consisting of one perfect mesentery and of one imperfect or very weak perfect one, symmetrically oriented with relation to the directives. Retractors of the perfect mesenteries strong, concentrated, weaker on the 6 weaker mesenteries of the second cycle. Parietobasilar muscles weak or rather strong. The stronger mesenteries fertile. Acontia well developed.

***Isophellia algoaënsis*, CARLGR.**

*Isophellia algoaensis*, n. sp. CARLGRÉN 1928, p. 236, text-figs. 69, 70.

Sphincter rather weak. Tentacles up to 96 in number. Pairs of mesenteries in the lower part of the body only 24. Mesenteries of the first cycle and the 6 stronger ones of the second cycle equally developed; the 6 weaker mesenteries of the second cycle perfect only in their uppermost part. Retractors of the stronger perfect mesenteries with about 30—40 folds, which are very high and branched. Parietobasilar muscles weak. Mesenteries of the third cycle very weak. Nematocysts of the scapus 10—12×2 μ; those of the scapulus 11—12×2—almost 3 μ, numerous; those of the tentacles 14—17× about 1.5(2) μ; those of the actinopharynx partly 17—22×2 μ, partly 22—24××3—3.5 μ, partly 12—13×3 μ; those of the acontia partly 25—31×3—3.5 μ, partly 22—26×2 μ. Spirocysts of tentacles 12×1.5 to 19× about 2.5 μ.

*Colour* unknown.

*Size*: height of the body 0.9 cm. in an introverted state, the introverted part 0.5 cm., breadth of pedal disc 0.9 cm.

*Locality*. Algoa Bay, 33° 50.5' S., 25° 48.8' E., 40 m.?, German Deep-Sea exped.

I gave a more detailed description of this species in 1928.

**Genus *Telmatactis*, GRAVIER.**

Isophelliidae with elongated, more or less cylindrical column, divisible into scapus and scapulus. Scapus with a rough, wrinkled cuticle, without tenaculi proper. Scapulus short. No cinclides. Tentacles rather short, about the same in number as the mesenteries, their apex often more or less distinctly differentiated from their proximal part. Siphonoglyphs well developed. Only the mesenteries of the first cycle are typical macrocnemes, the 6 pairs of the second cycle and some of those of the third can, however, be provided with filaments and acontia. Retractors of the macrocnemes very strong, more or less kidney-shaped in cross-section. Acontia slender.

The genus *Telmatactis*, proposed by GRAVIER (1916) for *T. valle-flori* undoubtedly includes several, perhaps most of the species which have, at one time or another, been assigned to *Phellia*. Since, however, STEPHENSON (1929) has shown that the type of the genus *Phellia*, *P. gausapata*, has a different

organisation, it is necessary to give several so-called »*Phellia*» species another generic name. I use here the name given by GRAVIER, though it is possible that this name may have to be exchanged for an older one. I hope to return to this question in another paper. I have included in the diagnosis the difference between the structure of the apex of the tentacles and their proximal part. It seems to me that the description of *T. valle-flori* indicates the presence of such a differentiation in that species, as in the species described here. *T. (Phellia) decora* also possesses this differentiation.

***Telmatactis natalensis*, n. sp.**

Column cylindrical. Tentacles about 72, cylindrical, their apex at least in the preserved state somewhat capitate, longitudinally furrowed, their stalk with shallow transverse furrows. Sphincter strong, long, reticular-alveolar. 2 siphonoglyphs. Mesenteries in the region of the actinopharynx 72 ( $6 + 6 + 12 + 12 = 36$  pairs), the 12 pairs of the last cycle situated nearest the mesenteries of the second cycle. 6 pairs are macrocnemes, among which 2 pairs of directives; the other mesenteries are microcnemes but those of the



Fig. 29. *Telmatactis natalensis*, n. sp.  
Tentacle.

second cycle and some of those of the third have filaments and acontia. Retractors of the macrocnemes very strong, much branched, with a few principal branches separated by deep furrows. Nematocysts of the scapulus  $20-22 \times 2.5 \mu$ ; those of the apices of the tentacles  $48-67(72) \times 2.5 \mu$ , extraordinarily numerous; those of the stalks of the tentacles  $46-62 \times 2.5(3) \mu$ , numerous; those of the actinopharynx partly  $40-44 \times 7-8.5 \mu$ , microbasic amastigophores, partly  $26-29 \times 2.5 \mu$ , probably basitrichs, partly  $22-26 \times$  about  $4.5 \mu$ , few (microbasic mastigophors?), partly  $14 \times 1.5 \mu$ , few; those of the acontia partly  $48-54(60) \times 10-11 \mu$  (development-stages up to  $86 \times 12 \mu$ ), microbasic amastigophors, rather common, partly  $22-24 \times 2(2.5) \mu$ , rather opaque, basitrichs, numerous. Spirocysts of tentacles about  $20 \times 2$  to  $41 \times 3.5-4 \mu$ .

*Colour* in formalin. Scapus dirty yellow, other parts slightly reddish.

*Size.* Length 2.5 cm., breadth 2 cm., innermost tentacles up to 0.9 cm. long.

*Locality.* Durban (Isipingo Beach), July 1936, S., 1 specimen.

The external appearance of the animal and that of a tentacle are shown in figures 4 Pl. III, text-fig. 29. The mesogloea of the column was thick, the ectoderm of the scapus thin. The somewhat capitate tentacles had very weak longitudinal muscles if any at all, and a well developed »nerve»-layer, in the somewhat swollen apex; while the stalk was provided with a weaker »nerve»-layer and distinct, rather strong, mainly ectodermal muscles, forming coarse folds. In the apex the nematocysts were situated very close to each other, in the stalk they were more scattered, but also numerous. The sphincter was very long, and stronger in its lower and upper parts than in its long

middle part. It occupied only part of the thickness of the mesogloea, and was wholly separated from the endodermal muscles of the column. Its muscle-meshes showed a tendency to transverse stratification. The 6 pairs of macrocnemes were provided with large oral and marginal stomata, and very strong retractors showing a characteristic appearance in cross-section,

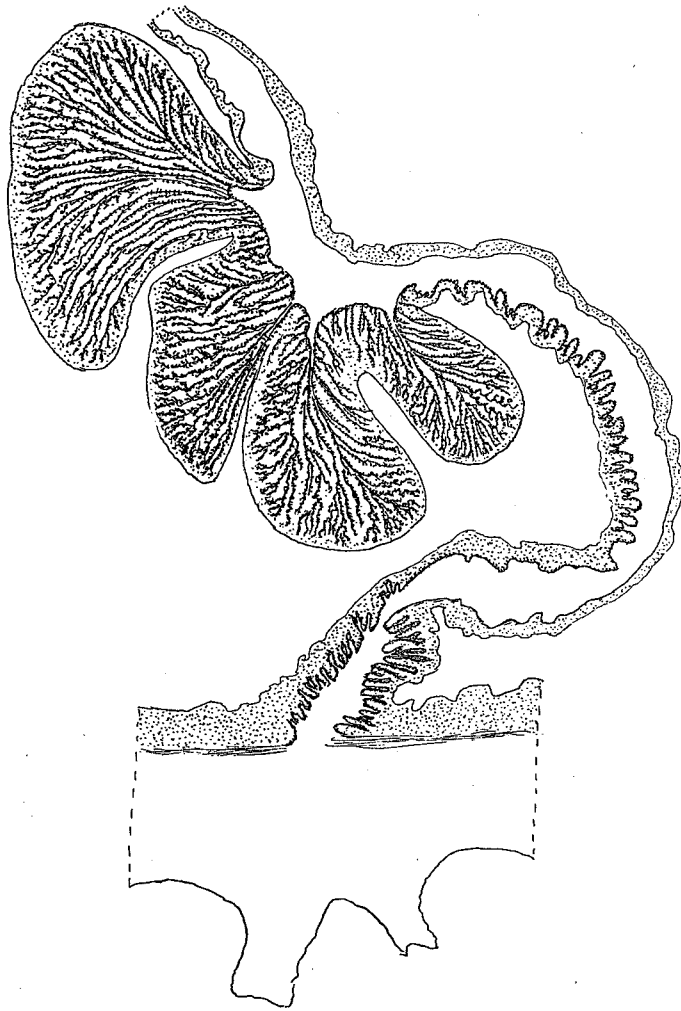


Fig. 30. *Telmatactis natalensis* n. sp. Transverse section of a mesentery of the first cycle in the region of the actinopharynx.

retractors showing a characteristic appearance in cross-section, with the muscle folds divided into 3—4 portions (fig. 30). Their parietobasilar muscles were rather well developed, but formed only a small projection on the mesentery. The mesenteries of the second to fourth orders are similar to the parietal parts of the macrocnemes. They

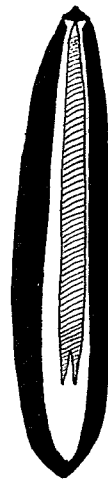


Fig. 31. *Telmatactis natalensis* n. sp. Microbasic amastigophor from an acontium.

were sterile and lacked retractors, both the mesenteries of the second order and at least some of those of the third had filaments and acontia. The specimen was a male. The large microbasic amastigophors in the actinopharynx and acontia were very thick-walled (fig. 31). I have seen these nematocysts in the exploded state.

The species is very similar to *T. valle-flori*, which, however has more mesenteries, and is in several respects imperfectly described. It seems to be distinct from *T. (Phellia) decora*, HEMP. and EHR.



Genus *Litophellia*, n. gen.

Isophelliidae with distinct basal disc. Column cylindrical, smooth, without tenaculi or cuticle. Cinclides present. Sphincter rather strong, mesogloea. Tentacles octamerously arranged. A single siphonoglyph. Mesenteries as many at the base as at the margin, divisible into macro- and microcnemes. One pair of directives. Retractors of the macrocnemes strong. Parietobasilar muscles weak. Basilar muscles and acontia present.

I have with some hesitation created a new genus for the species described below, because I have only a single sterile specimen of it.

*Litophellia octoradiata*, n. sp.

Mesogloea of the column rather thick. Cinclides occurring only in the endocoels of the second order? Sphincter reticular. Tentacles  $8 + 8 + 32 = 64$ . Actinopharynx long, with 16 longitudinal ridges. Siphonoglyph rather deep, somewhat prolonged aborally. Pairs of mesenteries  $8 + 8 + 16 = 32$ , the first cycle consisting of macrocnemes, the retractors of which are strong, concentrated, and form high and close folds. Nematocysts of the column partly  $12-17 \times 3-3.5 \mu$ , partly  $14-16 \times$  about  $2.5 \mu$ ; those of the tentacles partly about  $14 \times 3 \mu$ , partly  $14-17 \times$  almost  $2 \mu$ , usual; those of the actinopharynx  $24-29 \times 2-2.5 \mu$ , numerous; those of the acontia partly  $31-36 \times (3.5) 4 \mu$ , very numerous, partly  $26-31 \times$  about  $3 \mu$ , sparse; spirocysts of the tentacles  $12 \times 1.5$  to  $24 \times 3.5 \mu$ .

*Colour.* Column light salmon with a few reddish spots, the uppermost part, especially when contracted, olive-coloured; tentacles almost colourless, with irregular stripes of moss-green (when they are contracted a dark stripe is visible in the middle line), sometimes with one or two white spots towards the apex. At the bases of the oldest tentacles dark spots, which are also present in the inner part of the oral disc, but here irregularly distributed. The ground-colour of the oral disc was light salmon, the radius of the single directive compartment white, the actinopharynx red.

*Size* in the preserved state. Greatest length 0.8 cm., breadth of pedal disc 0.35—0.3 cm., that of the oral disc 0.3 cm.

*Locality.* Durban (Isipingo), intertidal zone, 1 specimen, Nov. 1935, C.

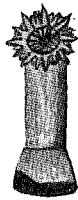


Fig. 32. *Litophellia octoradiata* n. sp.

Figure 32 shows the external appearance of the species. The column was, in the preserved state, provided with irregular longitudinal furrows, the margin was tentaculate. There were cinclides connected with some of the endocoels of the second order, but whether any occurred in other compartments also I cannot state, as the specimen was not very well preserved. The tentacles were conical, certainly short even when expanded, the outer tentacles considerably smaller than the inner ones. The actinopharynx was evaginated and the 16 ridges clearly visible. The retractors of the 8 pairs of

macrocnemes were very strong, concentrated and forming close folds. The microcnemes were weak, especially those of the youngest cycle, which in the middle of the body scarcely reach beyond the surface of the endoderm; at the margin and at the limb they were stronger. I have figured a section of the siphonoglyph with two directives and a non-directive (Fig. 33). In the

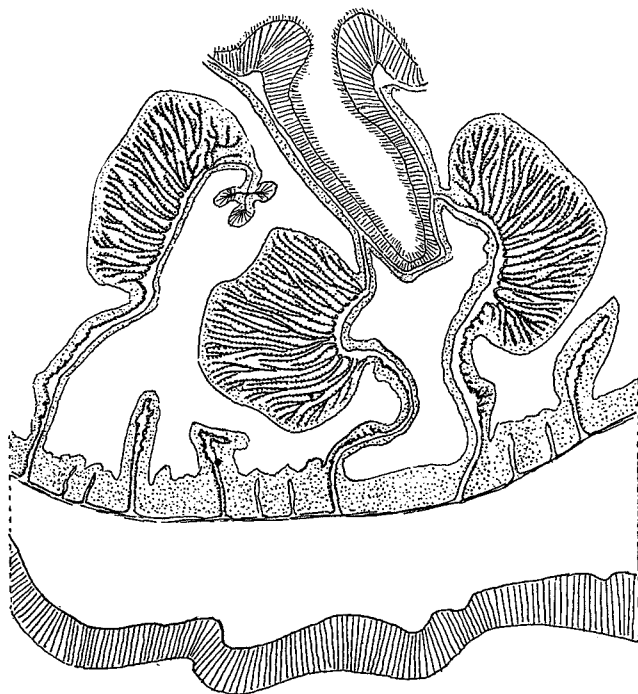


Fig. 33. *Litophellia octoradiata* n. sp. Transverse section of a part of the body in the region of the siphonoglyph.

figure may be seen also some mesenteries of the second and third cycles. There were no gonads developed but there is no doubt that they would appear on the macrocnemes. Although I have not seen the nematocysts of the acontia in an exploded state, I think that there is no doubt that the larger ones are microbasic amastigophors, the smaller basitrichs.

#### Fam. Aiptasiidae.

Nynantheae with basilar muscles and acontia. Uppermost part of the column provided with weak longitudinal muscles. Sphincter mesogloea, always weak, sometimes almost absent, whence the column cannot perfectly cover the tentacles in the contracted state. Mesenteries not divided into macro- and microcnemes. Pairs of perfect mesenteries 6, rarely 8, fertile. Fifth and sixth couples often weaker than the other mesenteries of the first cycle. Acontia with two types of nematocysts, basitrichs and microbasic mastigophors.

Genus *Aiptasia*, Gosse.

Aiptasiidae with smooth column, provided with cinclides which are commonly arranged in a girdle about the middle of the body. Sphincter mesogloal, very weak, margin tentaculate. Tentacles rather or very long, simple, always smooth, without any kind of projections. Upper part of the column unable wholly to cover the tentacles. Longitudinal muscles of the tentacles ectodermal. Siphonoglyphs present. 6 pairs of perfect mesenteries. Gonads appearing on the mesenteries of the first order. Acontia well developed, numerous.

*Aiptasia parva*, n. sp.

Pedal disc well developed. Column very thin, more or less cylindrical, with very numerous nematocysts arranged in groups. Cinclides (arrangement?) not situated on tubercles. Sphincter very weak, consisting of only a few muscle-meshes. Tentacles conical, rather long, hexamerously arranged, up to 70 (or more?). Oral disc wide. Actinopharynx not folded, 2 broad but not specially marked siphonoglyphs, 6 pairs of perfect mesenteries, 2 pairs of directives. In the lower part of the actinopharynx only 8 mesenteries perfect, arranged as are those of a specimen arising by laceration (always?). Mesenteries of the first and second order fertile and with filaments. Retractors of the mesenteries of the first and second orders concentrated into a small penon, forming high muscle-folds. Parietobasilar muscles weak. Acontia long and very numerous. Nematocysts of the column  $22-24 \times$  about  $4 \mu$ , extraordinarily numerous, basitrichs; those of the tentacles partly  $24-29 \times$  about  $4 \mu$ , microbasic mastigophors, partly  $26-36 \times 2.5-3 \mu$ , basitrichs, both sorts very numerous; those of the actinopharynx partly  $19-26 \times 3.5-4 \mu$ , partly  $17-12 \times$  almost  $2-2 \mu$ , both frequent; those of the acontia partly  $43-67(74) \times$  about  $6-7 \mu$ , microbasic mastigophors, very numerous, partly  $26-34(36) \times 2.5-3 \mu$ , basitrichs. Spirocysts of the tentacles  $12 \times 2$  to  $25 \times 4 \mu$ .

*Colour* of three individuals. (1) White; directive radii of the oral disc opaque white. Light olive-brown stripes enclose the bases of the inner tentacles. (2) Tentacles grayish yellow, oral disc brownish with grayish radial stripes, directive radii and the inner parts of the 4 other primary radii gray. (3) Column, tentacles and oral disc cream, tentacles with a red-brown band across the middle. At the bases of the 24 inner tentacles fimbriated brown-red stripes. Insertions of the mesenteries greenish.

*Size* of the largest specimen in a fully expanded, preserved state: length of the body 1.4 cm., breadth of the oral disc 0.4 cm., breadth of the pedal disc 0.8 cm.

*Locality.* East London, on a conglomeration of sand, together with *Isozoanthus capensis*; and on a colony of *Alcyonium*, several fertile specimens and several young ones, Dec. 1935, C.

The species had the same appearance and behaviour after stimulation as other species of *Aiptasia*. I cannot describe the arrangement of the cinclides,

which were not situated on elevations, but that they were present in approximately the same region as in other species of *Aiptasia* was suggested by an acontium which had been ejected through a cinclis. The ectoderm of the column was, especially in the lower and middle parts, provided with extraordinarily numerous nematocysts, apparently arranged in groups separated by

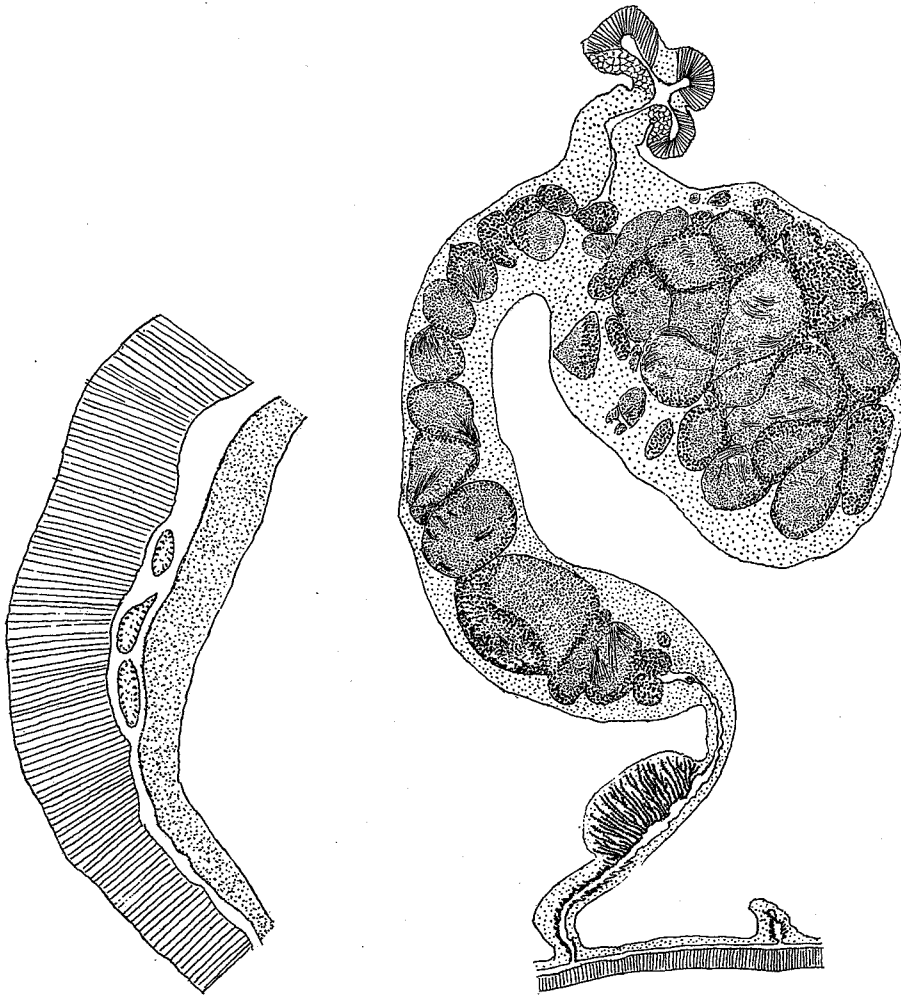


Fig. 34. *Aiptasia parva* n. sp. Sphincter. Fig. 35. *Aiptasia parva* n. sp. Transverse section of mesenteries of the first and third cycles.

smaller areas where the nematocysts were very sparse. The sphincter (fig. 34) was situated close to the tentacles, the number of which was about 60 in two specimens, in a third about 70. I have dissected and partly sectioned two individuals and made several slides of a third. All were fertile and had very well developed testes. The two individuals sectioned transversely had an arrangement of the perfect mesenteries, in the region of the lower part of the actinopharynx, similar to that which arises after laceration in *Aiptasia*

*diaphana*. That is to say, there were only 8 mesenteries, the 4 perfect lateral mesenteries being situated nearest the directives, while their partners were imperfect (see CARLGRÉN 1904, 1908). Probably these two specimens have originated by laceration. The number of mesenteries and tentacles seems to be about the same; in the middle of the body the mesenteries were fewer. The retractors of the mesenteries of the first and second order were of about the same size, the remaining mesenteries were very weak especially in the middle of the body. In figure 35 is illustrated a transverse section of a perfect mesentery in the region of the ciliated tract. I have measured the nematocysts of the acontia in 5 specimens. They were (1)  $50-64 \times 6-7 \mu$ ;  $29-34 \times 2.5 \mu$ . (2)  $48-67(74) \times$  about  $7 \mu$ ;  $26-31(36) \times 2.5(3) \mu$ . (3)  $43-60 \times 6.5-7 \mu$ ;  $22-34 \times 2.5-3 \mu$ . (4)  $48-55 \times 6.5-7 \mu$ ;  $26-29 \times$  about  $2.5 \mu$ . (5)  $41-58 \times 5-6 \mu$ ;  $22-24 \times$  about  $2 \mu$ . The »hampe» of the thread in the mastigophores was somewhat longer than the capsule.

#### Fam. Hormathiidae.

Nynantheae with basilar muscles and acontia. Sphincter mesogloal, strong. Mesenteries not divided into macro- and microcnemes. Commonly 6 pairs of perfect mesenteries, sometimes more, but they are never numerous. Perfect mesenteries usually sterile, rarely fertile. Nematocysts of the acontia basitrichs(?) (spirulae) only.

#### Genus *Calliactis*, VERR.

Hormathiidae with well developed pedal disc. Column not or only slightly differentiated into scapus (provided with a weak cuticle) and scapulus; often thick and with numerous ectodermal invaginations, which do not pierce the wall. Cinclides present (always?) in the proximal part of the column. Sphincter strong, mesogloal. Tentacles rather short, conical, more numerous than the mesenteries at the base, their longitudinal muscles ectodermal. Radial muscles of oral disc more or less enclosed in the mesogloea. 2 broad siphonoglyphs. Six pairs of perfect and sterile mesenteries, 2 pairs of directives. Retractors of the mesenteries rather weak, diffuse. Parietobasilar and basilar muscles weak or rather well developed. Often commensal with hermit crabs.

#### *Calliactis algoaënsis*, n. sp.

Pedal disc very wide. Column thick, with ectodermal invaginations, and at least in young individuals divisible into a slightly-marked scapus and scapulus. Cinclides? Sphincter long, strong, alveolar, transversally stratified, especially in the upper part, situated nearer the ectoderm than the endoderm, diminishing a little in width proximally, and rather truncate at the end. Tentacles hexamerously arranged, in large individuals up to 290, the outer tentacles considerably shorter than the inner ones. Radial muscles of oral disc more mesogloal than ectodermal, with the meshes here and there sunk deep



Fig. 36. *Calliactis algoaënsis* n. sp. Sphincter.

down in the mesogloea. Actinopharynx with 8 broad but rather flat principal ridges. Mesenteries in large individuals at the base only 96 (48 pairs); in the distal part a fifth and an incomplete sixth cycle present. Retractors weak, in their inner parts somewhat more strongly developed. Acontia very thin. Ova small. Nematocysts of the column partly  $13-14 \times 2.5-3.5 \mu$ , partly  $12-13 \times 2.5 \mu$ , partly  $7-10 \times 1.5 \mu$ ; those of the tentacles  $17-24 \times$  about  $2.5 \mu$ ; those of the actinopharynx partly  $23-26 \times (3.5)4.5-5 \mu$ , few, partly  $21-29 \times 2.5-3 \mu$ , numerous; those of the acontia  $29-38 \times (2.5)3-3.5(4) \mu$ ; those of

the filaments (15.5)17—19(22)×3—4.5  $\mu$ . Spirocysts of the tentacles 19×2.5 to 36× almost 5—5.5  $\mu$ .

*Colour* of three individuals from East London. (1) Column almost colourless or dirty yellow, with 12 broad longitudinal bands of brownish spots; at the base the bands are more numerous and narrower. Tentacles pale brown-red, shading into lilac, at the base almost colourless. Inner parts of oral disc opaque white between the light brown-red insertions of the mesenteries, especially on the stronger radii. Actinopharynx yellowish white (largest specimen). (2) Column with olive-brown spots, scapulus colourless, tentacles light brown-red shading into lilac, oral disc colourless with an opaque, partly discontinuous ring a little way from the mouth. (3) Scapus colourless with larger and smaller olive-brown spots, irregularly situated. Tentacles almost colourless, yellowish white when contracted, with 2—3 cross-bands of light red-brown. Oral disc colourless, with 6 groups of redbrown colour along the insertions of mesenteries, this being most strongly marked among the outer tentacles, where the colour extends also between the insertions. Actinopharynx colourless.

*Size* of two specimens from East London. (1) largest specimen in a fully expanded state, column 8 cm. long and 4 cm. broad, length of the inner tentacles about 4 cm.; when preserved, column 4.5 cm. long, in the upper part 2.5 cm. broad, at the base 5×3.5 cm. (2) smallest specimen, in the preserved state, height 1 cm., breadth of the very expanded pedal disc 1.5 cm., that of the distal end 0.6 cm.

*Localities.* Algoa Bay, 50 fms., 2 specimens in association with *Pagurus arrosor*, HERBST, South African Museum; East London aquarium, 3 specimens, Nov. 1935, C.

The smallest specimen was somewhat tuberculated, this being more distinctly apparent in the preserved state; the cuticle of the scapus was here also visible. I could not confirm the presence of cinclides in the live specimens. I have sectioned the sphincter (fig. 36) of three specimens, one from Algoa Bay, and the largest and the smallest from East London. All the sphincters showed good agreement, the stratification was, however, less distinct in the sphincter of the smallest specimen. I have measured the nematocysts of two specimens, those of the acontia in all specimens from East London and in one from Algoa Bay. They were (1) 31—36×3.5(4)  $\mu$ . (2) (30)31—34×3.5  $\mu$ . (3) 29—31×(3)3.5  $\mu$  (from the smallest specimen). (4) 34—38×2.5—3  $\mu$ .

#### *Calliactis polypus* (FORSK.) KLUNZ.

*Calliactis polypus* (FORSK.). KLUNZINGER 1877, p. 76, Pl. 5, fig. 3; CARLGREN 1900, p. 55, Pl. 1, figs. 3, 4 (other references cited here).

Pedal disc wide, often embracing shells inhabited by Pagurids. Column smooth, with the cinclides mostly arranged in a single row in its lower part. Margin tentaculate. Sphincter mostly reticular, transversely stratified especially in its upper part, alveolar in its most proximal part, diminishing downwards, its proximal end rather close to the endoderm, not truncate. Tentacles very

numerous, up to about 384, often fewer, hexamerously arranged. Radial muscles of oral disc meso-ectodermal. 2 distinct siphonoglyphs. Mesenteries hexamerously arranged, always more numerous at the margin than at the pedal disc. 2 pairs of directives. Retractors of the mesenteries diffuse. Parietobasilar muscles weak, basilar muscles rather well developed. Acontia numerous. Nematocysts of the column partly  $7-10 \times 1-1.5 \mu$ , partly  $14-19 \times 2.5(2) \mu$ , the latter few; those of the tentacles  $19-26 \times 2.5-2 \mu$ ; those of the actinopharynx  $20-25 \times 2-2.5 \mu$ ; those of the acontia  $17-22(24) \times 2.5 \mu$ ; spirocysts of the tentacles about  $17 \times 2$  to  $32 \times$  almost  $3.5 \mu$ .

*Colour* violet, which seems to agree with the colour of the specimen from Zanzibar. According to STUHLMANN (CARLGREN 1900) the colour is very variable. Column commonly grayish brown with brown spots flowing together, the proximal part decidedly violet. Cinclides white, acontia rose. Tentacles pale with light violet, rose or orange coloured spots. Oral disc brown, toward the mouth white. Lips red.

*Size* in the preserved state, with the tentacles covered by the column: largest specimens about 5 cm., broad at the base, height 0.5 cm.; when alive, breadth 4 cm., height 2-3 cm. (STUHLMANN).

*Locality.* Durban, 1 specimen, Durban museum; several specimens, South African museum.

*Further distribution.* Red Sea (Isl. Korab), EHRENBURG; Koseir, KLUNZINGER; Zanzibar, STUHLMANN.

All the specimens were flat, and the pedal disc very extended. I have examined the sphincters of 4 specimens, two from Durban, one from the Red Sea (collected by EHRENBURG) and one from Zanzibar. They varied a little, but in the most distal part they were always reticular, though sometimes the outer parts were more alveolar. As I have pointed out (1928, p. 198) the mesenteries were always more numerous at the margin than at the pedal disc. In one of the present specimens there were 184 mesenteries at the base, in one half of the same specimen 192 tentacles were present and the same number of mesenteries. I have examined the nematocysts of the acontia in 4 specimens from 4 localities, Durban, Zanzibar and the Red Sea (collected by STUHLMANN). The size was  $17-22 \times$  about  $2.5 \mu$ ,  $18-22 \times 2.5 \mu$ ,  $18-22(24) \times$  about  $2.5 \mu$  and  $18-22(24) \times 2.5 \mu$ . Since the specimens described by me from the German Deep-Sea expedition as *C. polypus* had larger nematocysts in the acontia and the actinopharynx, these specimens may now be referred to a new species, *C. valdiviae*. This species was also dredged from deeper water than *Calliactis polypus*.

#### Genus *Amphianthus*, R. HERTW.

Hormathiidae with broad pedal disc often elongated in the transversal or sagittal plane. Column smooth, or provided in its upper part with small mesogloecal papillae arranged in longitudinal rows. Cinclides occurring as a rule only in the directive endocoels, few in number (1-3 or more?), their



external opening often mounted on a papilla; in very young specimens cinclides are occasionally absent? Sphincter mesogloal, mostly strong. Tentacles rather robust, sometimes with mesogloal thickenings on the aboral side at the base, always fewer than the mesenteries at the limbus. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. 1—3 siphonoglyphs. Pairs of perfect mesenteries at least 6, their arrangement often irregular. 1—3 pairs of directives. Muscles of the mesenteries usually weak. The stronger mesenteries fertile, except sometimes the directives. Acontia well developed. Asexual reproduction frequent.

***Amphianthus laevis*, n. sp.**

Pl. III, figs. 6, 7.

Pedal disc very broad, sometimes drawn out into stolon-like formations. Column smooth, the insertions of the mesenteries clearly visible where the ectoderm has been lost. Cinclides 1+0 or 1+1. Sphincter extraordinarily strong, alveolar, its upper part occupying almost the whole mesogloea, diminishing downwards. Tentacles considerably fewer than the mesenteries at the base, up to about 65, not thickened at the base. Actinopharynx longitudinally folded, its mesogloea thick, especially in the ridges. 1—2 siphonoglyphs. Arrangement of the mesenteries irregular. 1—2 pairs of directives. Longitudinal muscles of mesenteries weak, parietobasilar muscles very weak. Distribution of the reproductive organs unknown. Asexual reproduction by tearing of large pieces from the limbus. Nematocysts of the column partly  $22-29 \times 3.5-4 \mu$ , partly  $19-22 \times$  about  $5 \mu$ ; those of the tentacles partly  $19-26 \times 3-4 \mu$ , sparse, partly  $14-17 \times$  about  $4 \mu$ , very sparse; those of the actinopharynx  $17-19(24) \times$  about  $3-4.5 \mu$ ; those of the acontia  $22-29 \times 2.5-4.5 \mu$ . Spirocysts of the tentacles about  $19 \times 2$  to  $50 \times 7 \mu$ .

*Colour.* When alive unknown; in the preserved state yellowish.

*Size* of the largest specimen; greatest height 0.9 cm., breadth 1 cm.

*Locality.* Off Cape Town? M.

The polyps were attached to a sponge, and were very close together. The pedal disc was very broad, flattened, in some of the animals it was drawn out into a stolon-like lamella on one side. Two specimens had a common pedal disc, and from one of these individuals a stolon-like extension ran out. This piece was about to separate from the parent, and become a new individual; the two edges of the extension were about to grow together (fig. 6 Pl. III). Other individuals also showed traces of the beginning of fragmentation. Thus there is no doubt that the species reproduces asexually by fragmentation of large pieces from the limbus. The sphincter is very similar to that figured by me for *A. capensis* (CARLGREN 1928, fig. 55, p. 224). The folds of the radial muscles of the oral disc were a little branched. I have sectioned the largest specimen and another somewhat smaller one. The largest specimen had only 7 pairs of perfect mesenteries, among which a single pair of directives, the other specimen 4 perfect pairs on the one side of the two pairs of

directives, on the other side two perfect pairs and two perfect mesenteries the partners of which were imperfect. The reproductive organs were hardly developed. I found in both individuals only a few small ova in certain mesenteries. The retractors were weaker than those in *A. capensis*. The mesogloea of the mesenteries was very thick outside the filaments. The acontia were well developed and thick. I have examined the nematocysts of the acontia in two individuals, the largest and one of medium size; they showed good agreement in size. The thinner nematocysts of the column and tentacles were probably basitrichs.

#### *Amphianthus natalensis*, n. sp.

Pedal disc broad. Column in the contracted state (with the tentacles covered) provided with up to 36 longitudinal ridges and furrows. On the ridges small, more or less distinct tubercles, which in the lower part are very small and visible only with the help of a strong lens. Cinclides 1 + 1. Sphincter strong, alveolar, in its lower part also rather broad, truncate at the lower end, its muscle-meshes very small. Tentacles up to about 120, considerably fewer than the mesenteries, not thickened on the aboral side at the base. Actinopharynx with few longitudinal furrows. 2 siphonoglyphs. Arrangement of the mesenteries rather regular. 2 pairs of directives. Perfect pairs of mesenteries more than 6, up to 12. Muscles of the mesenteries weak. Distribution of the reproductive organs unknown. Nematocysts of the column  $13-17 \times 4-4.5 \mu$ ; those of the tentacles partly  $17-22 \times 3.5-4.5(5) \mu$ , opaque, numerous, partly  $14-22 \times 2.5-3 \mu$ , rather numerous, partly  $(26)29-43(48) \times 3.5-4.5 \mu$ , opaque, often a little curved and occurring only at the apices of at least some of the tentacles; those of the actinopharynx  $17-19 \times 2.5-3 \mu$ ; those of the acontia  $34-48 \times 4.5-5 \mu$ . Spirocysts of the tentacles about  $19 \times 2.5$  to  $60 \times 7.5 \mu$ .

*Colour* when alive unknown.

*Size* of the largest specimen: length of pedal disc 1.7 cm.

*Locality.* Off Durban, 24 miles, 5 specimens, 440 fms., »Pieter Faure» collection, 1901, South African Museum.

The 5 individuals, 3 larger and 2 smaller, were attached to *Isidella sp.*? All were strongly contracted and the tentacles were not visible. The pedal disc was elongated in the direction of the stem of the

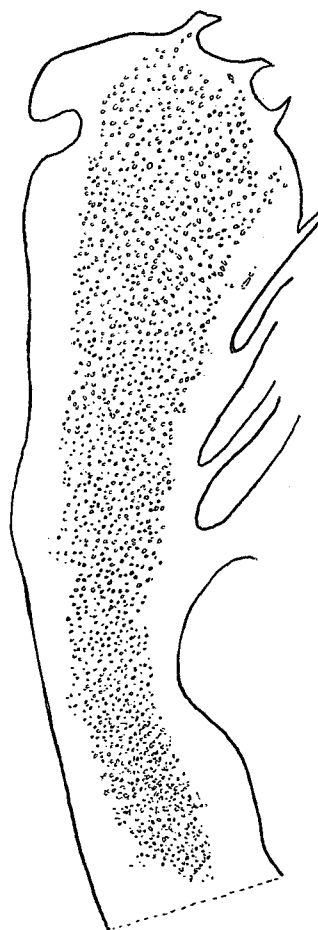


Fig. 37. *Amphianthus natalensis* n. sp. Sphincter.

octocoral. In the largest specimen the cinclides were at right-angles to the stem, in two others their position was more oblique. There were 1 + 1 cinclides in the 3 larger individuals. The sphincter (fig. 37) was strong, occupying distally most of the thickness of the mesogloea, and the lower part of the sphincter was about half as broad as the upper part. I have examined one of the largest specimens as to the number of tentacles and mesenteries. The number of tentacles was 120, that of the mesenteries at the limbus probably about 220, as I counted 110 in about half the animal. In the specimen examined there were 2 pairs of directives, and between them on one side 5 perfect pairs were present, on the other 5 perfect pairs and 2 single perfect mesenteries; thus in all 12 pairs and 2 single mesenteries were perfect. The large nematocysts of the tentacles varied rather much in length, in one individual measuring 29—48  $\mu$ , in another 29—38  $\mu$ , whilst in a third the few nematocysts were about 26—36  $\mu$  long. The sizes of the nematocysts of the acontia were, in 2 individuals, 38—48  $\times$  4—4.5  $\mu$ , and (34)36—41  $\times$  4—4.5  $\mu$ , respectively. The species is certainly identical neither with the species described above nor with *A. capensis*. It is apparently most closely related to *A. armatus*, but may be distinct from that species.

#### *Amphianthus capensis*, CARLGR.

*Amphianthus capensis*, n. sp. CARLGRÉN 1928, p. 223, text-figs. 55—57.

Pedal disc very broad. Column smooth. Cinclides 1 + 1 or 1 + 0. Sphincter alveolar, somewhat reticular, very strong, diminishing downwards. Tentacles without thickenings at their bases, in number up to about 110. 1 or 2 siphonoglyphs. Perfect pairs of mesenteries more than 6(7—9); there are also some pairs of mesenteries, of which the one mesentery is perfect, the other not. 1—2 pairs of directives. Considerably more mesenteries than tentacles. Muscles of the mesenteries weak. Acontia thick. Nematocysts of the tentacles partly 19—26  $\times$  2.5—3.5  $\mu$ , partly 16—26  $\times$  3—3.5  $\mu$ , the latter rather sparse and usually somewhat curved; those of the actinopharynx partly 17—29  $\times$  3—4.5  $\mu$ , partly 22—29  $\times$  about 3  $\mu$ ; those of the acontia 40—53  $\times$  5—6  $\mu$ . Spirocysts of tentacles 22  $\times$  2 to 48  $\times$  6.5  $\mu$ .

*Colour* unknown.

*Size.* Height of the body up to 1 cm., breadth of pedal disc up to 1.3  $\times$  1 cm.

*Locality.* Agulhas Bank, 35° 16' S., 22° 26.7' E., 155 m., German Deep-Sea exped.

*Further distribution.* E. of St. Paul, 38° 40' S., 77° 38.6' E., 672 m.

I described this species in more detail in 1928.

#### Genus *Actinauge*, VERR.

Hormathiidae either with a flat adherent base or with a cuplike base which encloses a cavity full of mud or small stones. Column divisible into scapus and scapulus, the former tuberculate and provided with a weaker or

stronger cuticle. Arrangement of the tubercles variable; sometimes they show a tendency to form longitudinal rows. Coronal tubercles mostly 12 or a multiple of 12, sometimes merging into the ridges of the scapulus. Scapulus usually with 12 ridges, which are sometimes broken up into tubercles. No cinclides. Sphincter strong, mesogloal. Tentacles 96 in number, or more, hexamerously arranged. All the tentacles or at least some of them more or less distinctly thickened on the aboral side at the base. Mesenteries and tentacles the same in number. Longitudinal muscles of tentacles ectodermal, radial muscles of oral disc ectodermal or more or less mesogloal, not decidedly stronger over the exocoels than over the older endocoels. 2 well developed siphonoglyphs. Pairs of mesenteries 48 or a few more, 2 pairs of directives. Six pairs of perfect and sterile mesenteries. Retractors of the mesenteries as a rule diffuse.

***Actinauge granulata*, CARLGR.**

*Actinauge granulata*, n. sp. CARLGR 1928, p. 201, Pl. 4, fig. 10, text-figs. 40, 41.

Pedal disc flat or cup-like, in the latter case enclosing mud or stones. Body-wall thick. Scapus with numerous, not large, sometimes rather indistinct tubercles arranged in longitudinal rows. Coronal tubercles merging into the 12 fairly well marked, broad longitudinal ridges of the scapulus. Each of these ridges is provided distally with several tubercles. Sphincter alveolar, strong, tending to be transversely stratified in its middle part, situated closer to the ectoderm than to the endoderm. Tentacles 96, as a rule with strong mesogloal thickenings on the aboral side at the base. Radial muscles of oral disc meso-ectodermal to almost ecto-mesogloal. Pairs of mesenteries 48. Retractors usually concentrated in the middle, forming close, branched folds. Parietobasilar muscles rather weak, not situated on a fold of the mesogloea. Acontia numerous. Ova small but numerous. Nematocysts of the scapulus  $15-23 \times 2.5-3 \mu$ ; those of the tentacles  $23-30 \times 2-3 \mu$ , very numerous; those of the actinopharynx  $31-38 \times 3.5-4 \mu$ , very numerous; those of the filaments  $18-24 \times 3.5-4 \mu$ ; those of the acontia  $29-34.5 \times 3.5-4 \mu$ . Spirocysts of tentacles  $19 \times 2$  to  $41 \times$  almost  $7 \mu$ .

*Colour* when alive unknown. In the preserved state, scapus grayish, actinopharynx and filaments partly purple.

*Size* in the preserved state up to about 7 cm. long and 5.5 cm. broad.

*Localities.* Lions Head (Cape Town), N.  $84^\circ$  E., 38 miles, 195-204 fms., 2 specimens, »Pieter Faure» collection, Apr. 1900, South African Museum;  $34^\circ 21'$  S.,  $17^\circ 57'$  E., 178 fms., 1 specimen, Dec. 1929, M.; Cape Barracouta,



Fig. 38. *Actinauge granulata*  
CARLGR. Natural size.

S. 4 miles, 35 fms., 1 specimen, Dec. 1929, M.; 35° 10.5' S., 23° 2' E., 500 m., German Deep-Sea exped.

This species was described by me (1928) from the material of the German expedition. I have examined the nematocysts of a specimen from the present collections. They were all unexploded but, I think that all nematocysts were basitrichs except those in the filaments, which were microbasic amastigophors? or mastigophors.

Genus *Phelliactis*, SIMON.

Hormathiidae with well developed pedal disc. Body often asymmetrical. Column divided into scapus and scapulus, the former with weaker or stronger cuticle and numerous irregularly arranged tubercles of varying size. Tentacles more than 100, fewer than the mesenteries, provided on the aboral side with strong thickenings of the mesogloea, arranged in 2 (or more?) more or less distinct cycles. Longitudinal muscles of the tentacles ectodermal. Oral disc wide, rarely forming two lobes. Radial muscles of oral disc ectodermal or meso-ectodermal, stronger over the exocoels than over the older endocoels. 2 well developed siphonoglyphs. 6—8 pairs of mesenteries, perfect and sterile. When more than 6 perfect pairs are present the supernumerary mesenteries often consist of single perfect mesenteries forming pairs with imperfect mesenteries. Pairs of mesenteries of the last cycle originating earlier nearer to the mesenteries of the first and second orders than to those of the third. Retractors of mesenteries diffuse, rather weak. Parietobasilar muscles distinct but weak. Acontia well developed.

*Phelliactis algoaënsis*, CARLGR.

*Phelliactis algoaënsis*, n. sp. CARLGRÉN 1928, p. 208, Pl. 4, fig. 5, text-figs. 45, 46.

Body not asymmetrical. Body-wall in its lower part with small tubercles, in its upper part with somewhat larger ones, irregularly distributed. Scapus with a well developed cuticle. Sphincter alveolar, not stratified, broad in its upper part, diminishing in breadth downwards, wholly separated from the endodermal muscles of the column, its muscle-meshes small. Tentacles 148, with strong thickenings at the base of the aboral side, their longitudinal muscles weak, ectodermal. Oral disc wide, with high ridges, its radial muscles as in the other species of the genus. Mesenteries somewhat more numerous than the tentacles. Perfect pairs of mesenteries 7 (6 + 1 of the second order), sterile. Arrangement somewhat irregular, since in one sextant a somewhat richer development of mesenteries has taken place. Nematocysts of tentacles 34—42 × 3—3.5 μ; those of the actinopharynx partly 34—41 × (3)3.5(4) μ, partly 29—35 × 4—4.5 μ; those of the acontia partly (38)41—46(50) × (3)3.5 μ, partly 16—19 × about 1.5 μ. Spirocysts of the tentacles 24 × 2.5 to about 55 × 6.5 μ.

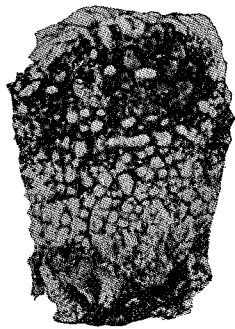


Fig. 39. *Phelliactis algoaënsis*, CARLGR.  
Natural size.

*Colour.* Unknown.

*Size.* Greatest height 5 cm., greatest breadth 3.4 cm., in the preserved state.

*Locality.* Algoa Bay, 33° 50.5' S., 25° 48.8' E., 40 m?, German Deep-Sea exped.

I described this species in more detail in 1928.

***Phelliactis capensis*, n. sp.**

Pl. III, fig. 10.

Body slightly assymmetrical, the one side somewhat shorter than the other. Body-wall thick, with rather large tubercles, which become flatter below, and disappear in the lowest part. Sphincter about 1.8 cm. long, entirely separated from the endodermal muscles of the column, broad in the upper part, diminishing downwards, alveolar with a tendency to stratification. In the middle and lower parts, its muscle-meshes are of ordinary size, close-set towards the endoderm, scattered towards the ectoderm; in the upper part they are rather irregular. Tentacles 148, on their aboral sides with very strong thickenings which usually embrace two thirds of the length of the tentacle. Longitudinal muscles of tentacles ectodermal, weak, arranged pallisade-wise in the part of the tentacle which is not thickened. Oral disc wide, with radial ridges, at least in the preserved state. Ridges over the stronger endocoels with very weak ectodermal radial muscles, those over the exocoels with strong meso-ectodermal ones. Actinopharynx with about 24 ridges and furrows. Siphonoglyphs a little prolonged aborally. Mesenteries at the base 176 or more. 6 pairs + 2 single mesenteries of the second order perfect, the latter situated on either side of the one directive pair, with their retractors facing the directives, and forming pairs with imperfect mesenteries. In the upper part of the actinopharynx there were 150 mesenteries. 4 sextants had 12 mesenteries of the first to fifth cycles, the last being developed only near the mesenteries of the first and second order. In the 2 sextants containing the single perfect mesenteries there were mesenteries of the fifth cycle also near those of the third cycle. The single specimen was sterile. Nematocysts of the tentacles 36—47 × 2.5—3 μ, rather common; those of the actinopharynx partly 43—52 × almost 3 μ, partly (34) 38—43 × 4.5—5 μ; those of the filaments partly 41—43 × 2.5 μ, common, partly 19—22 × almost 2 μ, few, partly 34—36 × 3.5—4.5 μ; those of the acontia partly 37—48 × 2.5—3.5 μ, very numerous, partly 17—23 × about 2 μ, sparse. Spirocysts of the tentacles 24 × 3 to 55(60) × 6(8.5) μ.

*Colour* unknown.

*Size.* Height about 5.2—7.5 cm., breadth about 5.5 cm.

*Locality.* Cape Point, N.E.  $\frac{3}{4}$  N., 39 miles, 310—560 fms., clay to green mud, 1 specimen, South African Museum.



## Fam. Sagartiidae.

Nynantheae with basilar muscles and acontia. Sphincter mesogloea, usually strong. Mesenteries not divided into macro- and microcnemes. Commonly 12 or more perfect pairs of mesenteries, which are usually fertile. Acontia with two types of nematocysts, microbasic amastigophors and basitrichs. Cinclides often present on the column.

Genus *Phellia*, Gosse.

Sagartiidae with the pedal disc broader than the oral. Column divided into scapus and scapulus, the former with strong tenaculi provided with a thick cuticle and forming papilla-like elevations. Sphincter strong, long, mesogloea. Tentacles considerably fewer than the mesenteries. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Siphonoglyphs variable in number. Mesenteries usually irregularly arranged, as also the directives, the number of which varies. More mesenteries in the basal part than at the margin. Perfect mesenteries with strong retractors and rather well developed basilar muscles. Imperfect mesenteries without retractors, the stronger of them with filaments. Perfect mesenteries and at least the strongest of the imperfect, fertile. Asexual reproduction probably always common.

The genus *Synphellia* is synonymous with *Phellia*, as stated by myself (1928, p. 236) and STEPHENSON (1935).

*Phellia aucklandica* (CARLGR.)

*Synphellia aucklandica*, n. sp. CARLGRÉN 1924, p. 230, text-figs. 32—35.

*Phellia aucklandica*, CARLGR. CARLGRÉN 1928, p. 236; STEPHENSON 1935, p. 371.

Pedal disc broad. Cuticle of the tenaculi strong. Sphincter not distinctly stratified, not occupying the whole thickness of the mesogloea, consisting of small but numerous rather close meshes. Tentacles 48 to almost 70. Siphonoglyphs distinct but not strong. Retractors of the directives in smaller specimens often strongly concentrated or kidney-shaped (in transverse section); in older specimens more diffuse, forming numerous high folds and resembling in appearance those of the other perfect mesenteries, the retractors of which show a distinct tendency to divide into two portions of about the same size. Parietobasilar muscles forming a distinct fold on the mesenteries. Mesogloea of the imperfect mesenteries strong. Nematocysts: microbasic amastigophors of the scapulus  $14-18 \times 2-3.5 \mu$ ; those of the tentacles  $12-17 \times 3-3.5 \mu$ ; those of the acontia  $26-34 \times$  about  $3.5 \mu$ ; basitrichs of the tentacles  $17-22 \times 2.5 \mu$ ; those of the actinopharynx  $19-24 \times 2.5(3) \mu$ ; those of the acontia  $31-43 \times 4-4.5 \mu$ . Spirocysts of the tentacles about  $14 \times 1$  to  $29 \times 3 \mu$ .

Colour reddish.

Size of the largest individual in the contracted state: breadth of pedal disc  $1.8 \times 1.2$  cm.; that of the upper part 0.5 cm., height 1.2 cm. Of the



smallest individual: breadth of pedal disc 0.7 cm., that of the upper end of the body 0.4 cm., height 0.9 cm.

*Locality.* Cape Peninsula, Oude Kraal, on the side of a rock at low-water mark, 3 specimens, July 1934, S.

*Further distribution.* Auckland Islands.

I have identified the individuals taken at Oude Kraal with *Phellia* (*Synphellia*) *aucklandica*, as the largest specimen of the holotypes shows good agreement with the smallest of the present specimens. The retractors of the directives were of the same appearance in both, as also those of the non-directive perfect mesenteries, though the folds of the present specimen were more numerous. In the largest individual these folds were considerably multiplied (fig. 40) but in all the perfect non-directives the retractors were partially subdivided into two portions. The sphincters were also of similar structure. I have sectioned two of the Oudekraal specimens. The one had 66 mesenteries in the distal part, about 115—120 at the limbus — I could not ascertain the exact number as the limbus was somewhat damaged at two places. 7 pairs of mesenteries were perfect, 2 pairs on the one side, 3 on the other side of the two pairs of directives. The other and smallest specimen had only 4 pairs of mesenteries perfect, two of which were directives situated close to each other.

For further details see my description of the species in 1924.

#### Genus *Anthothoë*, nov. nom.

Sagartiidae with well developed pedal disc. Column smooth, with cinclides, which are sometimes indicated by small elevations. Margin distinct. Sphincter strong, mesogloéal, wholly separated from the endodermal muscles of the

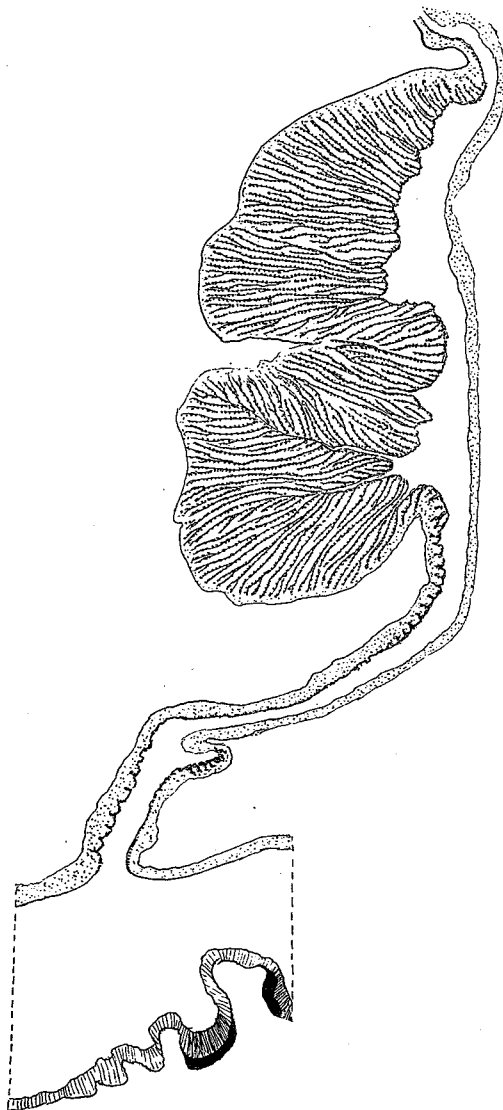


Fig. 40. *Phellia aucklandica* CARLGR. Transverse section of a perfect mesentery in the region of the actinopharynx.

column. Tentacles numerous, rather short, the inner considerably longer than the outer, hexamerously arranged. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Oral disc broad. Typically two siphonoglyphs and two pairs of directives. Mesenteries numerous, about the same in number as the tentacles. At least 3 cycles of perfect mesenteries. At least the first cycle of mesenteries sterile. Retractors of the mesenteries diffuse, band-like. Parietobasilar muscles, weak, basilar muscles distinct. Acontia numerous, long.

As the genus *Parathoë*, created by me in 1928, is preoccupied by a Crustacean, I propose the name *Anthothoë* for it. The diagnosis is somewhat altered here with regard to the distribution of the reproductive organs (see below).

#### *Anthothoë stimpsoni* (VERR.).

*Cereus stimpsoni*, n. sp. VERRILL 1868, p. 53.

*Parathoë stimpsoni* (VERR.). CARLGRÉN 1928, p. 233, Pl. 2, fig. 1, text-figs. 66, 67.

*Actinioides angrae pequenae*, n. sp., *pro parte*. PAX 1907, p. 79, 1908, p. 490.

*Paraphellia polyptycha*, n. sp. PAX 1908, p. 493.

*Sagartia capensis*, n. sp. PAX 1922, p. 89; 1926, p. 43, figs. 42, 43.

?*Actinia suspecta*, n. sp., *pro parte*, PAX 1922, p. 77; 1926, p. 14.

?*Thoë neglecta*, n. sp. CARLGRÉN 1928, p. 253, fig. 83.

?*Sagartia problematica*, n. sp. PAX 1922, p. 90; 1926, p. 46, fig. 45.

Pedal disc wide. Column smooth with more or less distinct longitudinal furrows corresponding to the insertions of mesenteries. Cinclides formed chiefly as evaginations of the endoderm, occurring in vertical rows towards the middle of the body; in certain states of contraction they are situated on small papillae (fig. 41). Sphincter long, reticular, proximally more alveolar, at the margin occupying most of the thickness of the mesogloea. Tentacles and mesenteries in large individuals up to about 370, in smaller specimens about half as many or fewer, usually typically hexamerously arranged. Longitudinal muscles of tentacles and radial muscles of oral disc well developed. Actinopharynx with numerous longitudinal ridges. Typically 2 rather well developed siphonoglyphs, rarely a single one only. Numerous pairs of mesenteries perfect, in large specimens the first 3 and at least part of the fourth cycle perfect. Retractors band-like, with numerous richly branched folds of about equal height. Parietobasilar and basilar muscles rather weak. Distribution of the reproductive organs somewhat irregular, but at least the first cycle of mesenteries sterile; in very large individuals, however, the three oldest cycles are sterile. Nematocysts of the column partly  $12-19 \times 3-4.5(5) \mu$ , common, partly  $10-14 \times$  about  $2 \mu$ , few; those of the tentacles partly  $22-29 \times 3.5-4.5 \mu$ , partly  $19-26 \times$  about  $2-2.5 \mu$ , partly  $14-20 \times 1.5-2 \mu$ ; those of the actinopharynx partly  $22-29 \times (3) 3.5-5(6) \mu$ , partly  $25-34 \times 2-3 \mu$ ; those of the acontia partly  $43-91 \times 5.5-9 \mu$ , microbasic amastigophors, partly  $24-35 \times 1.5-2.5 \mu$ , basitrichs; those of the filaments partly  $10-26 \times 4-5.5(6) \mu$ , partly  $15.5-19 \times$  almost  $2-2 \mu$ ; spirocysts of tentacles  $14 \times 1.5$  to  $31 \times 4(4.5) \mu$ .

*Colour* very variable; but longitudinal stripes on the column, frequently of a different colour from the parts between them, are usually conspicuous.

I have noted the following variations. (1) Column with longitudinal stripes of orange, blue and green; tentacles gray shading into blue, paler at the base; oral disc gray-blue with radial gray-black stripes, especially distinct along the stronger mesenteries; parts of the oral disc sometimes colourless; actinopharynx brownish (several individuals). (2) Column light flesh-coloured with pale longitudinal stripes of ochre; oral disc rose-coloured with stripes as in (1), tentacles as in (1). (3) Column with longitudinal stripes of orange and blue-green; tentacles pale blue-green; oral disc dark blue-green, round the mouth blue-green, in certain other parts dark mossy green; actinopharynx shading into orange. (4) Column with indistinct light brown stripes; tentacles reddish brown; oral disc opaque blue-white with indistinct radial lines, at the bases of the stronger tentacles a W-like spot. (5) Column pale gray with almost olive-green longitudinal stripes. (6) Tentacles yellowish brown; oral disc red-brown. (7) Column white; inner half of the tentacles orange, outer half white; oral disc orange. (8) Column colourless with opaque white stripes along the insertions of the stronger mesenteries; tentacles orange with white tips; oral disc opaque white. (9) Column pale flesh-coloured, below the tentacles olive-green with the longitudinal stripes light olive-brown; tentacles as in (8) or more gray-green, with traces of orange on some tentacles. (10) Column dirty brown with indistinct bluish longitudinal stripes; cinclides grayish; tentacles greenish; oral disc brownish with narrower and broader grayish radial stripes. (11) Column yellowish with white longitudinal bands; tentacles grayish; oral disc yellowish red, among the tentacles olive-coloured. (12) Column white with green-blue and yellowish brown longitudinal stripes and bands; tentacles greenish; oral disc with radial bands of white, salmon and dark green, the latter corresponding to the inner tentacles. (13) Column with indistinct longitudinal bands and stripes of white and brown; tentacles and oral disc as in (11). (14) Column with indistinct stripes of white, dark-green and yellowish brown; tentacles greenish; oral disc as in (12), but the green bands paler. (15) Column almost colourless; tentacles grayish brown, at the bases of the tentacles darker stripes. [Specimens 6 and 7 were from a depth of 10—15 fms. in Table Bay, all the others from the intertidal zone; nos. 1—5 from Melk Bosch, 8—9 from Oude Kraal, 10—15 from East London. According to STEPHENSON the individuals from Still Bay were greenish, the column striped.]

For further notes on colouration see VERRILL (1868) and CARLGRÉN (1928).

*Size* of the largest specimens from a depth of 40—42 fms., in strongly contracted state, breadth  $6.5 \times 4$  cm., height about 2 cm. A small specimen from the same locality was  $0.8 \times 0.6$  cm. broad and 0.4 cm. high.

The individuals from the intertidal zone never appear to reach the large size attained by some of those taken in deeper water.

*Localities.* South-West Africa, Lüderitz Bay (*Paraphellia polyptycha*; *Actiniodes angrae pequenae, pro parte*); Porth Nolloth, 14 specimens, Oct. 1935, S.; Saldanha Beach, Discovery exped., 10—4 fms.; 3 specimens, PIETER FAURE collection, South African museum; Keits Bay, Saldanha Bay, Scotia exped.; Houtjes Bay, shore, Scotia exped.; Dassen Island, several specimens, 1929, M.;

Table Bay (Melk Bosch), numerous specimens, Oct. 1935, C. and S.; Robben Island, 15—20 fms., 1 specimen, Jan. 1936, C.; Table Bay, 10—20 fms., several specimens, Oct. 1935, C.; Cape Town, several specimens, 1872, DE VYLDER; 1929, M.; Oude Kraal, 8 specimens, Oct. 1935, C. and S.; Cape of Good Hope, 20 fms., STIMPSON; False Bay, 34° 7' S., 18° 38' E., 15 fms., 1 specimen, Dec. 1929, M.; Gordons Bay 8—9 fms., several specimens, Dec. 1929, M.; Still Bay, 4 specimens, Jan. 1932, S.; Agulhas Bank, Cape Barracouta S. 4 miles, 39 fms., on shell of *Pinna*, 1 specimen, Dec. 1929, M.; Cape Barracouta W. 10 miles, 40—42 fms., 2 specimens, Dec. 1929, M.; Port Elizabeth (Reef Bay), 4 specimens, July 1936, S.; Algoa Bay, 20 m., on *Pinna*, German Deep-Sea exped.; East London, several specimens, Nov. 1935, C.; East London (Bats Cave Rocks), several specimens, July 1937, S.; Durban (Isipingo), 11 specimens, July 1936, S. When no depth is noted the individuals are from the intertidal zone. *Anthothoe stimpsoni* is one of the very common South African anemones, but is somewhat erratic in distribution, being sometimes present in incredible abundance over a limited area, and scarce or absent in a similar area close by. It tends to occupy more or less sheltered positions such as the sides or undersides of stones, the roofs of caves, crevices in pools, etc.; but is not confined to such places». (STEPHENSON.)

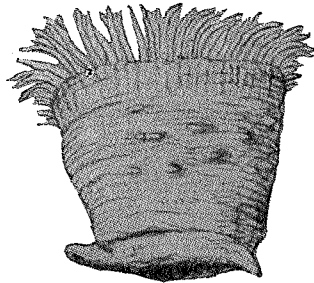


Fig. 41. *Anthothoe stimpsoni*  
CARLGR. ?.

The elevations on the column connected with the cinclides were usually not visible, but in certain states of contraction of the body-wall they became more or less distinct, sometimes quite conspicuous (fig. 41). I have observed them in individuals from different localities, together with individuals whose column appeared perfectly smooth. As to the arrangement of the cinclides, there were sometimes 2 or 3 in one compartment. The siphonoglyphs were usually 2, symmetrically arranged, but occasionally only a single siphonoglyph seems to occur.

The mesenteries were hexamerously arranged. In fertile individuals at least the mesenteries of the 3 first orders were perfect, in large individuals the mesenteries of the fourth order also. The distribution of the reproductive organs seems to vary. In the large individuals taken by the German Deep-Sea expedition the mesenteries of the three first cycles were sterile, the others fertile. Of 10 individuals examined from the intertidal zone at Melk Bosch, 8 were sterile, 2 fertile. The examination of half of each of the latter specimens showed that in one the mesenteries of the first 2 cycles were sterile, but at least some of those of the third cycle fertile. In the other, provided with a single pair of directives, some of the mesenteries of the third order were again fertile, as also a single mesentery of the second order. Thus it seems as if the reproductive organs in smaller individuals develop on the mesenteries of the third cycle (and exceptionally even on some of those of the second cycle — but it must be remembered here that the individual in

question had a single pair of directives only, and was therefore not symmetrical), but that later, in large individuals, when these mesenteries unite with the lower part of the actinopharynx, the gonads appear first on the mesenteries of the fourth cycle. In any case the mesenteries of the first cycle and possibly those of the second seem to be sterile in this genus.

No nematocysts were exploded, but the broad nematocysts in the acontia were certainly, and those in the actinopharynx probably, microbasic amastigophors; the broader ones in the other organs either mastigophors or amastigophors. All the narrower ones were certainly basitrichs. I have examined the nematocysts of the acontia in 15 individuals from different localities. Smaller individuals had smaller capsules, especially in the case of the amastigophors—about 43—70  $\mu$  in small individuals; 79—91  $\mu$  in the largest; about 55—84  $\mu$  in those of medium size. In the size of the basitrichs there was less difference between smaller and larger individuals. I have examined the nematocysts of the column and tentacles in 3 specimens, those of the actinopharynx in 4.

As I have already pointed out (p. 48), several of the specimens determined by PAX as *Actinoides angrae pequenae* are nothing but *Anthothoë stimpsoni*. »*Paraphellia polyptycha*» PAX also belongs to this species. I have examined the holotypes, the nematocysts of which agree very well with those of *stimpsoni*. PAX says that the column had »ein warziges Aussehen» owing to the contraction. The tubercles were actually the elevations belonging to cinclides. The sterile *Sagartia capensis* PAX, *S. problematica* PAX and *Thoë neglecta*, CARLGR., are probably also young forms of *Anthothoë stimpsoni*.

## Zoantharia.

### Fam. Parazoanthidae.

Zoantharia the mesenteries of which are of the macro-(macrocnemic) type. Sphincter endodermal.

#### Genus Isozoanthus, CARLGR.

Parazoanthidae the column of which is incrustated. Ectoderm of the column and coenenchyme usually continuous. Cells, cell-islets and sometimes lacunae in the mesogloea of the column. A continuous canal system or »encircling sinus», in the columnar mesogloea, absent. Dioecious. Polyps either solitary or connected with each other by coenenchyme, which as a rule is slightly developed.

#### *Isozoanthus capensis*, n. sp.

Pl. II fig. 12.

Polyps more or less cylindrical, connected with each other at the base by a flat coenenchyme, rather sparsely set. Upper end, in the contracted state

of the polyp, rounded or somewhat square. Ridges of the scapulus visible only in the expanded state. Incrustation consisting of sand, spicules, diatoms and thread-algae, usually not strong, chiefly occupying the ectoderm; but here and there a few particles are enclosed in the mesogloea. Ectoderm of the scapus continuous. Mesogloea of the column rather thick, with more or less numerous branched cells sometimes collected into groups, but without lacunae or »encircling sinus». Sphincter endodermal, rather well developed, diffuse. Ectoderm of the actinopharynx high, sometimes with about 14 longitudinal folds. Siphonoglyph with strong cilia, its mesogloea, however, not much thickened. Mesenteries 28—36. Perfect mesenteries with small retractors in their middle parts; in their lower parts thick at the insertion, thin towards the free edge. Ciliated tracts of the filaments distinct. Holotrichs (gyrocnaidae) of the column 17—22(26)×7—8(10)  $\mu$ , rather common; those of the tentacles (17)19—22(27)×7—8  $\mu$ ; those of the actinopharynx 17—22× about 7  $\mu$ , few; those of the filaments 22—26×7—7.5  $\mu$ , rather common; microbasic mastigo-

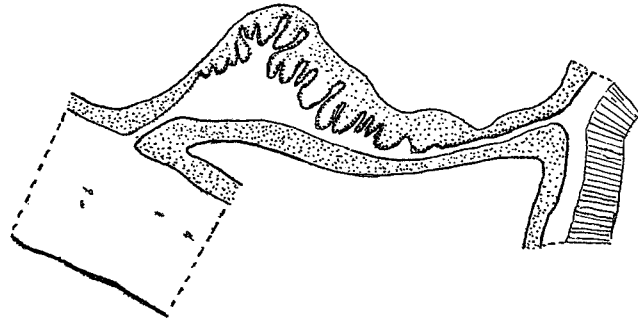


Fig. 42. *Isozoanthus capensis* n. sp. Transverse section of a directive mesentery in the lower part of the actinopharynx.

phores of the tentacles 13—17× about 2.5—3.5  $\mu$ ; those of the actinopharynx 17—22×3—3.5  $\mu$ , those of the filaments about 22×3  $\mu$ , few; cnidae broader at the basal end and with distinct basal thread (microbasic amastigophors?) in the filaments 15—22×3—4.5  $\mu$ . Spirocysts of the tentacles 13—22× almost 2—3.5  $\mu$ , numerous.

*Colour.* Scapulus, tentacles and actinopharynx red, scapus and oral disc the same colour but paler. Sometimes the red colour is only indicated.

*Size* of two large polyps from Oude Kraal: (1) length 1.7 cm., breadth 0.4 cm. (2) length 1.3 cm., breadth 0.5 cm.

*Localities.* Cape Peninsula (Oude Kraal), many specimens, Oct. 1935, C and S; False Bay (Simonstown, Froggy Pond), Oct. 1935, C and S; Still Bay, many specimens, Jan. 1934, S; Port Elizabeth (Reef Bay), several specimens, July 1936, S; East London, several specimens, Dec. 1935, C; (Shelly Beach, Bats Cave Rocks East London), many specimens, July 1937, S. All from the intertidal zone. The species is common (STEPHENSON).

I have sectioned 8 polyps. The number of mesenteries was 30, 30 (14+16), probably 32 (specimens from Still Bay), 36 (18+18), 34 (16+18), 32 (16+16),

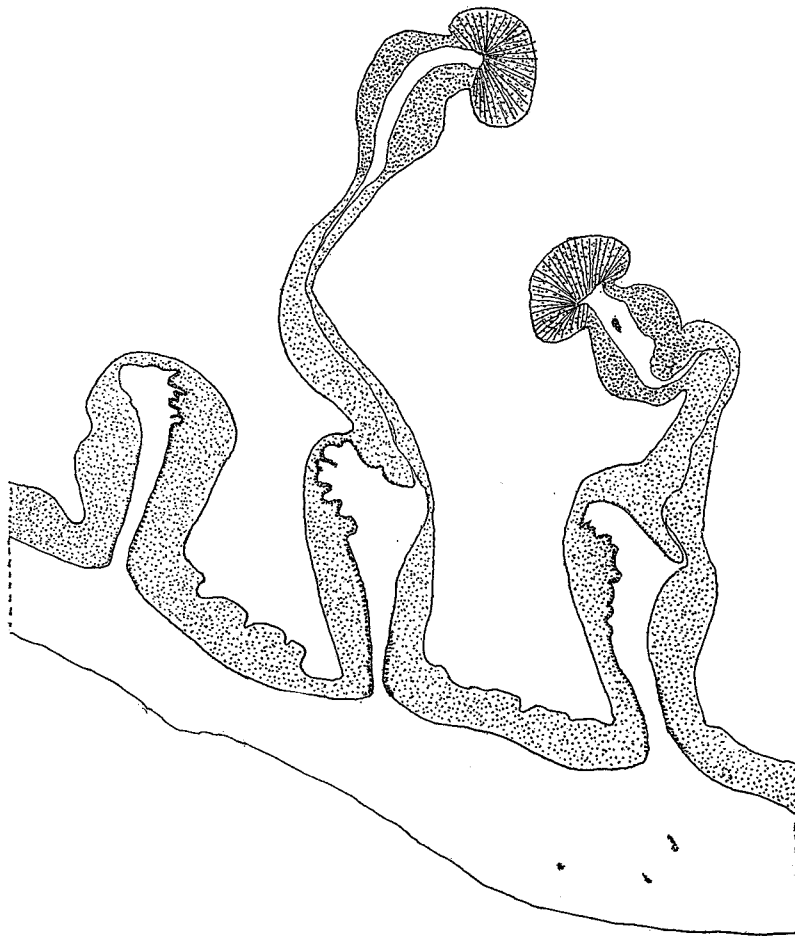


Fig. 43. *Isozoanthus capensis* n. sp. Transverse section of 2 macromesenteries and of a micro-mesentery below actinopharynx.

30 (14+16, specimens from Simonstown) and 28 (14+14, specimens from East London). The arrangement of mesenteries was irregular in one individual, in that the first metamesentery on the one side, though imperfect, had filaments, and the corresponding mesentery on the other side was perfect instead of imperfect. One individual sectioned from Still Bay was a male. The figures show transverse sections of a directive mesentery at the level of the lower part of the actinopharynx (fig. 42) and of two perfect mesenteries and one imperfect one in the region of the cnidoglandular tract (fig. 43).

#### *Isozoanthus giganteus*, CARLGR.

*Isozoanthus giganteus*, n. sp. CARLGR. in Chun, 1903, p. 520; 1923, p. 301, Pl. 1, figs. 4, 5, 15, Pl. 6—8, figs. 1—3, Pl. 9, figs. 3, 4, text-figs. 22, 23 A—T 25 a—g—28.

A very large solitary species. Body elongated, considerably broader in its upper than in its lower part. Basal end flat or rounded, distal end

rounded, the opening fissure-shaped when the tentacles are covered by the column. Incrustation consisting of various foreign bodies. Ridges of the scapulus indistinct. Ectoderm of the column discontinuous, mesogloea of the body-wall with scattered cells and small to medium-sized cell-islets. Actinopharynx longitudinally ridged. Siphonoglyph strong, hyposulcus well developed, long. Mesenteries numerous, about 58—65 in large individuals. Perfect mesenteries with well developed retractors, imperfect mesenteries comparatively weak apart from the imperfect directives, which have differentiated retractors. Ova

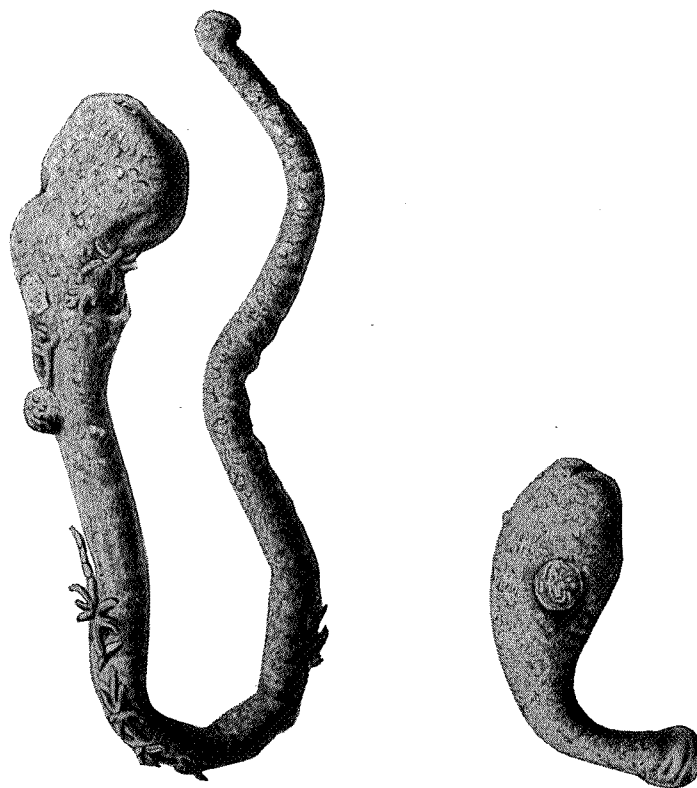


Fig. 44. *Isozoanthus giganteus* CARLGR.  $\frac{1}{2}$ . Natural Size.

large. Embryos develop in the coelenteric cavity. Holotrichs of the ectoderm of the column partly  $31-41 \times 12-14 \mu$ , partly  $19-22 \times 9-10 \mu$ ; those of the actinopharynx  $41-55 \times 17-19 \mu$ ; those of the filaments  $41-65 \times 17-19 \mu$ ; microbasic mastigophors in the ectoderm of the scapulus  $17-22 \times 4-5 \mu$ ; those of the tentacles  $17-22 \times 4 \mu$ ; those of the actinopharynx  $26-31(34) \times 4 \mu$ ; spirocysts of the tentacles up to about  $31 \times 3 \mu$ .

*Colour* unknown, in the preserved state dirty grey.

*Size.* Length up to 19 cm., greatest breadth 0.2 cm., least breadth 0.5 cm. A small specimen from East London was 1.1 cm. long, the greatest breadth 0.5 cm. the least 0.35 cm.



*Localities.* Agulhas Bank, 35° 26.8' south, 20° 56.2' east, 100 m., 35° 49' S., 21° 2.5 E., 86 m., German Deep Sea exped.; Cape Infanta N.E. by N. 15 miles, 48 fms., 1 specimen, 1929, M.; East London taken by trawler, 1 specimen, Dec. 1929, C.

Figures 44 show the external appearance of two polyps. A detailed description of the species was given by me in 1928. I have examined the small specimen from East London. It had only 44 mesenteries. The imperfect micro-directives had distinct retractors in the region of the actinopharynx

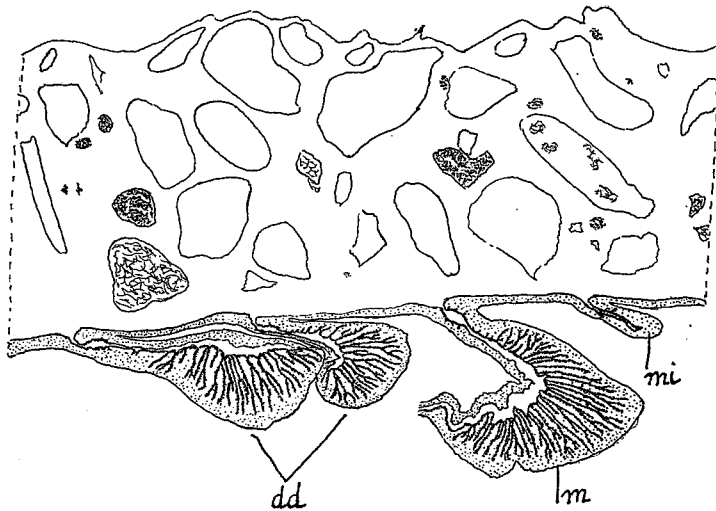


Fig. 45. *Isozoanthus giganteus* CARLGE. Transverse section of the column and of 4 mesenteries on the level of actinopharynx. *dd.* directive micromesenteries, *m.* macromesentery, *mi.* common micromesentery.

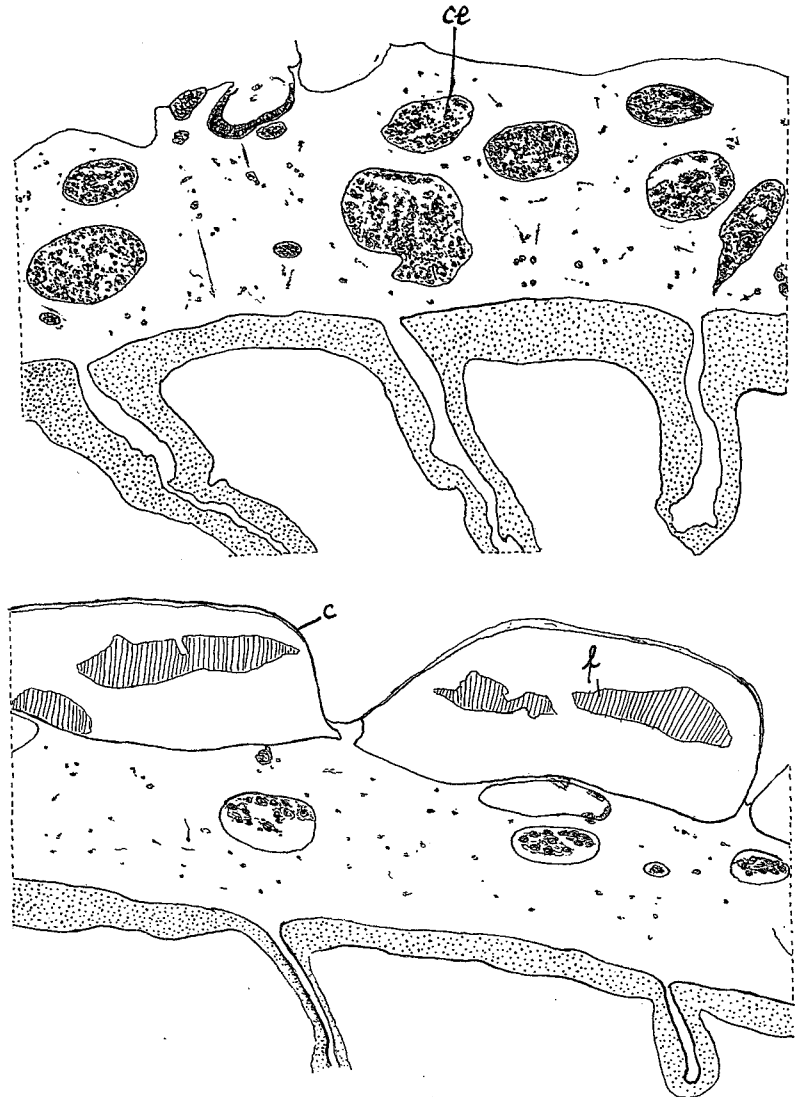
(also found in the individual from Cape Infanta) while the other imperfect mesenteries were very weak (fig. 45). The strong retractors of the perfect mesenteries were situated near the column, the inner parts of these mesenteries were very thin. The fissure-shaped opening when the upper part of the column is drawn in, seems to correspond to the directive plane (always?). The nematocysts were somewhat smaller, in parts, than in large individuals. The holo-trichs of the scapulus were partly about  $31 \times 12-14 \mu$ , partly  $19-24 \times$  about  $8-10 \mu$ ; those of the filaments (48)  $53-60 \times 19-24 \mu$ ; the microbasic mastigophors of the scapulus  $12-17 \times 2.5-3 \mu$ ; those of the tentacles  $17-18 \times$  about  $4 \mu$ ; those of the filaments (17)  $22-24 \times 4-4.5 \mu$ .

#### *Isozoanthus gilchristi*, n. sp.

Pl. I fig. 1.

Polyps when fully expanded elongated, somewhat broader distally; in the contracted state shorter, more cylindrical. Ridges of the scapulus 17-20, strong, richly incrustated, visible only in the expanded state of the polyp. Coenenchyme thin or rather thin, but inextensive, so that the polyps usually

are set rather close to each other. Column and coenenchyme strongly incrustated with sand. Ectoderm of the scapus discontinuous, without zooxanthellae. Mesogloea of the column with numerous cells and with rather numerous, often large lacunae, but without »encircling sinus». Sphincter endodermal, of



Figs. 46, 47. *Isozoanthus gilchristi* n. sp. Transverse sections of the column.  
c. cuticle, ce. cell-islets, f. fragments of ectoderm.

ordinary development. Siphonoglyph distinct, with long cilia, its mesogloea thickened, hyposuleus distinct. Mesenteries 36—40, thin, without distinct retractors, imperfect mesenteries rather weak in their lower parts. Ciliated tracts of the filaments well developed. Mesenteries without pigmented cells or canals. Holotrichs of the column partly  $39-42 \times 14 \mu$ , partly  $15-17 \times$  about  $8.5 \mu$ , both apparently sparse; those of the tentacles  $14-19 \times 8-8.5 \mu$ ,

sparse; those of the actinopharynx  $17-19 \times 8.5-9 \mu$ , sparse; those of the filaments partly  $36-43 \times 14-17 \mu$ , rather numerous, partly  $17-20 \times 8-10 \mu$ , rather few; microbasic mastigophors of the tentacles  $17-20 \times 2.5-3.5 \mu$ , rather common; those of the actinopharynx  $17-23 \times 2.5-4 \mu$ ; those of the filaments about  $22 \times 4 \mu$ , few; cnidae broader at the basal end and with distinct basal thread (microbasic mastigophors?) of the tentacles  $24-29 \times 6-7 \mu$ , few; those of the filaments  $18-24 \times 4.5-5.5 \mu$ , rather common; spirocysts of tentacles about  $14 \times 2.5-29 \times 5 \mu$ . Holotrichs of the mesenteries  $19(22) \times 9-10 \mu$ .

*Colour.* In alcohol, tentacles red.

*Size* in the preserved state: largest polyp 1.7 cm. long and 0.5 cm. broad.

*Locality.* Table Mountain (Cape Town), E. by S.  $\frac{1}{2}$  S., 25 miles, 190 fms., green sand, several specimens attached to small stones or shells and to concretions of sand, South African Museum.

The lacunae in the mesogloea of the column were situated closer to each other in the contracted than in the expanded polyps. In different parts of the column the number of lacunae varies. The figures 46, 47 show two transverse sections of the scapus, with the outer parts of some mesenteries. The number of the ridges on the scapulus was, in 10 polyps, 17, 17, 17, 18, 18, 18, 19, 19, 19, 20; 4 polyps examined had 36 (18 + 18), 38 (20 + 18), 40 (20 + 20) and 40 mesenteries. A specimen sectioned was a male.

#### Genus *Parazoanthus*, HADDON.

Parazoanthidae usually forming larger or smaller colonies. Column incrustated, its ectoderm continuous, its mesogloea provided with a continuous canal-system or »encircling sinus»; sometimes also with ectodermal canals, cell-islets and lacunae. Dioecious. Polyps connected with each other by a thin or rather thin coenenchyme.

#### *Parazoanthus capensis*, DUERD.

Pl. I fig. 4.

*Parazoanthus capensis*, n. sp. DUERDEN 1907, p. 80, Pl. 11.

Coenenchyme flat, thin. Polyps small, usually set sparsely, in the contracted state almost cylindrical, with the uppermost part somewhat thicker than the lower, and the upper end more square than rounded. Ridges of the scapulus 12-14, distinct in the larger polyps. Ectoderm of the coenenchyme and column continuous, mesogloea of the column rather thin, with few lacunae, but with a well developed »encircling sinus». The incrustation, consisting of sand and sponge-spicules, strong but restricted to the outer half of the mesogloea. Sphincter endodermal, weak. Tentacles 24-28. Ectoderm of the actinopharynx thicker than the mesogloea, somewhat sulcated longitudinally. Siphonoglyph well developed, its mesogloea more or less thickened, hyposulcus distinct. Mesenteries 24-28, thin, a little thickened at their insertions. Muscles of mesenteries weak. Ciliated tracts of the filaments present but very short. Holotrichs of the column  $24-26 \times 12-14 \mu$ , rather common; micro-

basic mastigophors of the tentacles  $19-24 \times$  almost  $2-2.5 \mu$ , common; those of the actinopharynx  $19-22 \times 2.5-3 \mu$ ; those of the filaments (17)  $19-22 \times 2.5-3 \mu$ , common; cnidae broader at the basal end and with distinct basal part to the thread (microbasic mastigophors?), of the tentacles  $17-24 \times$  about  $4-4.5 \mu$ ; those of the actinopharynx  $19-23 \times 3.5-4.5 \mu$ ; those of the filaments  $14-19 \times 4-5 \mu$ . Spirocysts of tentacles  $12 \times 2$  to  $22 \times 4 \mu$ .

*Colour.* According to DUERDEN the coenenchyme and column were pale yellow. The specimens collected by me were colourless.

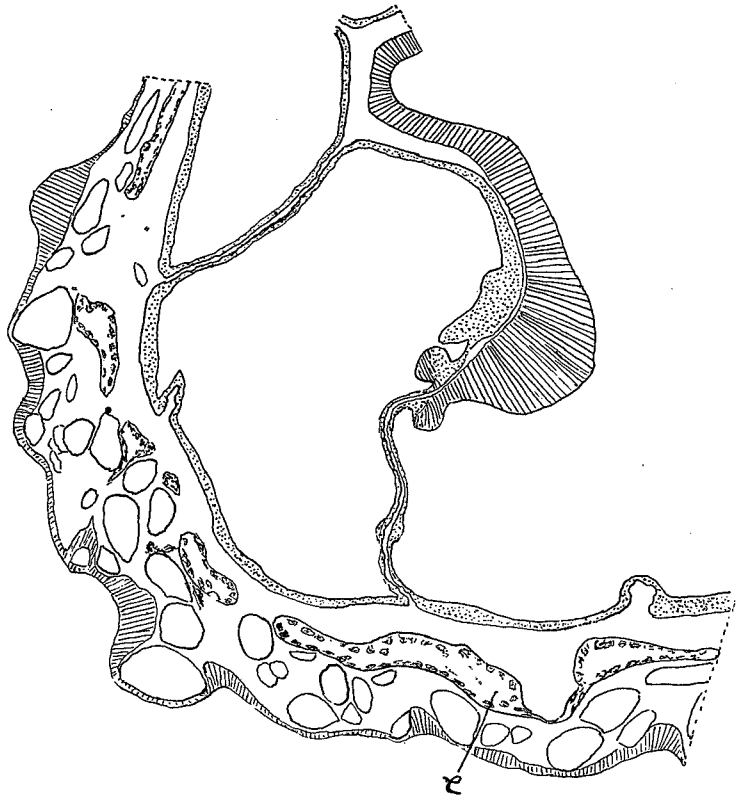


Fig. 48. *Parazoanthus capensis*, DUERD. Transverse section of a part of the body. e. canals (»encircling sinus»).

*Size*, in the expanded state, 0.4 cm. long (DUERDEN), in the contracted state up to 0.3 cm. high and 0.3 cm. wide.

*Localities.* False Bay, about 34 fms., Jan. 1936, several specimens on sponges attached to a shell of *Pinna C.*; Agulhas Bank, 4 miles S. of Cape Barracouta, many colonies on a large sponge, Dec. 1929, M. Previously taken in False Bay, also on a sponge.

Figure 48 shows a transverse section of part of the column and actinopharynx. The ridges of the scapulus were, in 3 polyps, 12, 12 and 13 in number. Three polyps examined had 24 (12+12) mesenteries. DUERDEN states that the »the mesenterial filaments are apparently devoid of any ciliated bands.» As far as I can see it is not so, as very short ciliated tracts are present.

Moreover, I doubt very much whether statements that the filaments lack ciliated tracts in certain small species of Zoantharia are correct. DUERDEN says that the »column contains numbers of large oval nematocysts in addition to the usual narrow kind.» I have found only holotrichs.

#### Fam. Epizoanthidae.

Zoantharia the mesenteries of which are of the macro-(macrocnemic) type. Sphincter mesogloea.

#### Genus Epizoanthus, GRAY.

Epizoanthidae with incrustated column and coenenchyme. Ectoderm of the column continuous or discontinuous. Cell-islets and lacunae often present in the mesogloea of the body-wall. Only the macrocnemes fertile. Dioecious polyps as a rule connected by coenenchyme, which may be band-like, incrusting or greatly reduced as in the free forms. Often commensal with hermit-crabs.

#### *Epizoanthus carcinophilus*, CARLGR.

*Epizoanthus carcinophilus*, n. sp. CARLGRÉN 1923, p. 283, Pl. 2, figs. 1—4, Pl. 4, fig. 5, text-figs. 16, 17.

A species forming a carcinoecium. Carcinoecium small or of moderate size, with a single large ventral polyp and a few (up to 7 or more) marginal polyps, weakly incrustated. Dorsal polyp absent. Marginal polyps rather short, cylindrical, in the contracted state conical. Ridges of the scapulus indistinct, in number 24—30 or rather more. Ectoderm of the scapus and coenenchyme thin, discontinuous. Mesogloea of the coenenchyme and column with small or medium-sized groups of cells, sometimes forming lacunae. Canal-system in the lip of the carcinoecium situated nearer the inner than the outer side. Sphincter elongated, not specially strong; reticular, but here and there the muscle-meshes are separated by strong, transverse bands of mesogloea; not occupying the whole breadth of the mesogloea. Siphonoglyph distinct, hypsulcus well developed. Number of mesenteries 48—64. Holotrichs of the coenenchyme and column 24—29 × 8—9  $\mu$ , rather sparse, absent from the ectoderm of the tentacles and actinopharynx and from the filaments. Microbasic mastigophors in the ectoderm of the coenenchyme and column 24—29 × about 5  $\mu$ , numerous; in that of the tentacles 22—26 × about 3  $\mu$ , rare; in that of the actinopharynx 31—36 × 4.5—5  $\mu$ , rather common; those of the filaments 22—26 × 3—3.5  $\mu$ . Microbasic mastigophors? in the filaments about 24 × 6  $\mu$ , rare. Commensal with *Parapagurus pilosimanus* and *P. bouvieri*, STEBB.

Colour unknown.

Size of the largest carcinoecium: length 3.5 cm., breadth 3 cm.

Localities. 35° 16' S., 32° 26.7 E., 155 m.; 35° 10.5' S., 23° 2' E., 500 m., German Deep Sea Exped.; East London, taken by trawler, depth?, 1 colony, Nov. 1935, C.

I have previously (1923) described this species in detail. Here I have given some supplementary notes.

*Epizoanthus similis*, n. sp.

Pl. I fig. 5.

A species forming a carcinoecium. Carcinoecium with up to 13 polyps, without a ventral polyp. Polyps cylindrical, sometimes a little thicker above, the upper end in the contracted state truncate. Ridges of the scapulus (14) 16—18. Incrustation, consisting of sand-grains, extraordinarily strong, filling up the whole mesogloea. Ectoderm of the scapulus very high, that of the scapus high, continuous. Sphincter strong, long; in its upper part occupying almost the whole mesogloea, and reticular, forming large, close meshes; diminishing aborally and here becoming alveolar. Tentacles 28—36. Actinopharynx with about 14 longitudinal ridges, siphonoglyph distinct, its mesogloea thickened, hyposuleus distinct. Mesenteries 28—36. Perfect mesenteries very thin, imperfect mesenteries very weak, extending into the coelenteron but little beyond the endoderm, longitudinal muscles of the perfect mesenteries very weak. Canals in the outer lip of the carcinoecium situated in the middle of the lip. Holotrichous cnidae in the ectoderm of the scapus  $19-22 \times 8.5-10 \mu$ , rather sparse; those of the tentacles  $19-22 \times 10 \mu$ , rare; those of the filaments  $18-19 \times 8.5-10 \mu$ , very rare; microbasic mastigophors in the ectoderm of the scapus  $17-19 \times 2.5-3.5 \mu$ , common; those of the actinopharynx  $18-22 \times 2.5-3 \mu$ ; microbasic mastigophors? in the filaments  $14-17 \times 4-5 \mu$ . Spirocysts of the tentacles about  $17 \times 2.5-26 \times 5 \mu$ .

Commensal with *Eupagurus* sp.?*Colour.* Colony when alive greyish, otherwise colourless, C.*Size* of the smallest carcinoecium, inclusive of the polyps,  $0.8 \times 0.5$  cm., of the largest carcinoecium with 13 polyps,  $2 \times 1.2$  cm.*Localities.* Cape Point, about 50 fms., 3 colonies, Jan. 1936, C.; Cape Point S.  $11^\circ$  W., 6 miles, 27 fms., sand, 2 colonies, Dec. 1929, M.; False Bay (Buffels Bay), 30 fms., 9 colonies, Dec. 1929, M.

The species is very similar to *Epizoanthus incrustatus* which is only known from the North Atlantic, and it is doubtful whether it would not be more correct to regard the present species as a variety of *E. incrustatus*. The only important difference seems to be in the structure of the sphincter, which in *similis* is divided into more close meshes than in *incrustatus*. For comparison I have figured the sphincters of both species (figs. 49, 50). Altogether I have examined 14 colonies. The smallest had 4 polyps, the largest 13 (fig. 5 Pl. 1). As to the manner in which new polyps arise, it seems to agree rather well with what HADDON and SHACKLETON have described in *E. incrustatus*, in that of the three first polyps, two usually appear more or less dorsally on each side of the opening of the carcinoecium, and one more dorsally than the other two. Sometimes, to judge from the size of the polyps, the middle polyp and the left-hand one are more or less retarded in their development, while the right-hand polyp is always large—the colony being oriented in such a manner that the outer lip of the carcinoecium is directed upward and towards the observer.

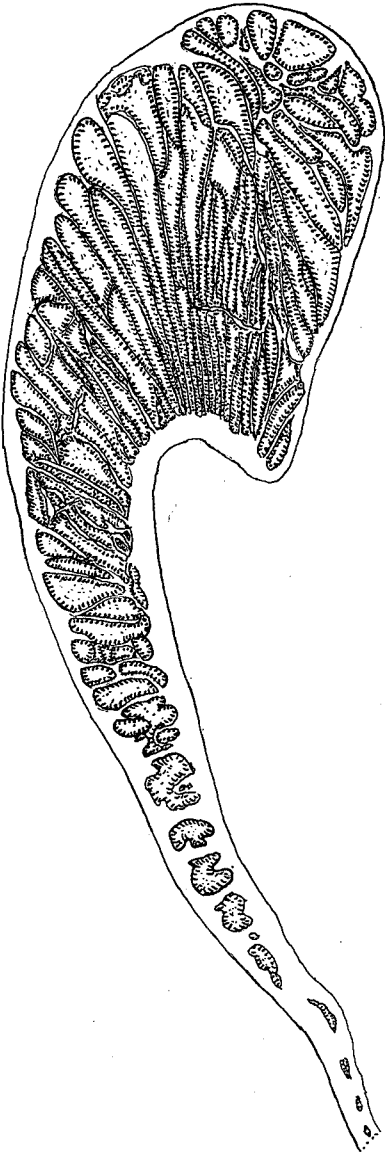


Fig. 49. *Epizoanthus similis* n. sp.  
Sphincter.

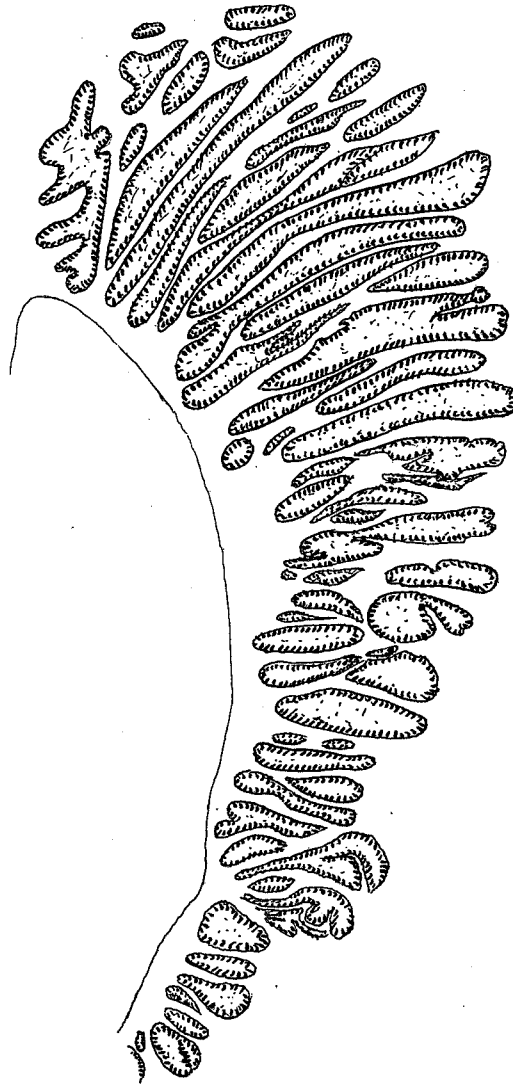


Fig. 50. *Epizoanthus incrustatus*. Sphincter.

#### ***Epizoanthus studeri*, CARLGR.**

*Epizoanthus cancrisocius*, MART., pro parte. STUDER 1879, p. 547; HADDON and SHACKLETON, 1891, p. 633; PAX, 1908, p. 485.

*Sidisia cancrisocia*, STUD. LWOWSKY 1913, p. 602.

*Palythoa brevis*, DUCH., pro parte. ANDRES, 1883, p. 532; 1884, p. 318.

*Epizoanthus studeri*, n. nom. CARLGR., 1923, p. 265, Pl. 1, figs. 1, 13, 14, Pl. 2, fig. 10, Pl. 4, fig. 1, textfigs. 5 a—h, 6, 7.

A species forming a carcinoecium, which is of moderate size and rather strongly incrustated. Without a ventral polyp, or with one or more irregularly

arranged. Without distinct marginal polyps; dorsal polyps irregularly arranged. Polyps cylindrical to conical, scapular region in the contracted state not truncate. Ridges of the scapulus distinct, in large polyps 21—28. Ectoderm of the column continuous, thick. Mesogloea of the column with small scattered cells. Endodermal canals in the free margin (outer lip) of the carcinoecium situated in the middle of the coenenchyme. Sphincter short but strong, reticular, occupying almost the whole width of the mesogloea. Siphonoglyph well developed, its mesogloea thickened. Hyposulcus distinct. Mesenteries 42—48 or rather more. Holotrichs of the coenenchyme and column  $23-26 \times 10-12 \mu$ , sparse; those of the filaments  $17-24 \times 7-10 \mu$ ; microbasic mastigophors of the coenenchyme and column  $19-22 \times 2.5-3 \mu$ , rather common; those of the tentacles about  $17 \times 2.5-3 \mu$ , few; those of the actinopharynx (19)  $22-26 \times 3-3.5 \mu$ ; nematocysts broader at the basal end, with a strongly armed »hampe», microbasic mastigophors (?), in the actinopharynx  $17-20 \times$  about  $4 \mu$ ; in the filaments  $14-19 \times 5 \mu$ . Spirocysts of the tentacles about  $20 \times 2.5$  to  $36 \times 4.5 \mu$ .

Commensal with *Parapagurus dimorphus*, STUDER.

*Colour.* Coenenchyme slate-grey, body-wall red, sometimes the whole colony rose, C.

*Size* of the carcinoecium up to 5.2 cm. long and 3.5 cm. wide. Diameter of the largest polyps 0.8—1 cm., height 0.6—0.8 cm. in the contracted state.

*Localities.* Table Mountain in W., 92 fms., several colonies, Jan. 1936, C.; Lion's Head, Cape, E.  $\frac{1}{4}$  N., 15 miles, 94 fms., 2 colonies, M.; off Cape Town,  $33^{\circ} 41.2' S.$ ,  $18^{\circ} 0.3' E.$ , 178 m.;  $33^{\circ} 43.6' S.$ ,  $18^{\circ} 4.2' E.$ , 106 m., German Deep Sea Exped.

*Further distribution.* Bouvet Island.

In maceration-preparations of the filaments with parts of the mesenteries, I have found elongated, often somewhat curved nematocysts. They were  $31 \times 5 \mu$  to  $41 \times 7 \mu$  in size, the basal end always narrower than the distal, the wall of the capsule broad and thick, the thread strongly coiled. As the thread lacks a basal »hampe» the nematocysts could be nothing but atrichs or holotrichs. No capsules were exploded but as the thread seems to be armed (ascertained in a thin-walled capsule), I think we have to do with a singular form of holotrich.

### *Epizoanthus tubae*, n. sp.

Pl. II figs. 5, 6.

A solitary trumpet-shaped species of considerable length, slender in the lower part, thick in the upper, a little thickened at the base. Incrustations, consisting almost entirely of sand, extraordinarily strong, occupying the whole mesogloea of the column. Ridges of the scapulus strong, but not visible in the contracted state of the polyp. The depression at the distal end of the contracted polyps, not round but fissure shaped, sometimes resembling a mouth with swollen lips. Ectoderm of the scapus probably discontinuous, with cuticle



of ordinary development. Mesogloea of the column rather thick, with rather large lacunae. Sphincter very strong, alveolar, occupying almost the whole mesogloea in its upper part, diminishing gradually in width downwards. Actinopharynx with longitudinal ridges, chiefly consisting of mesogloea, its

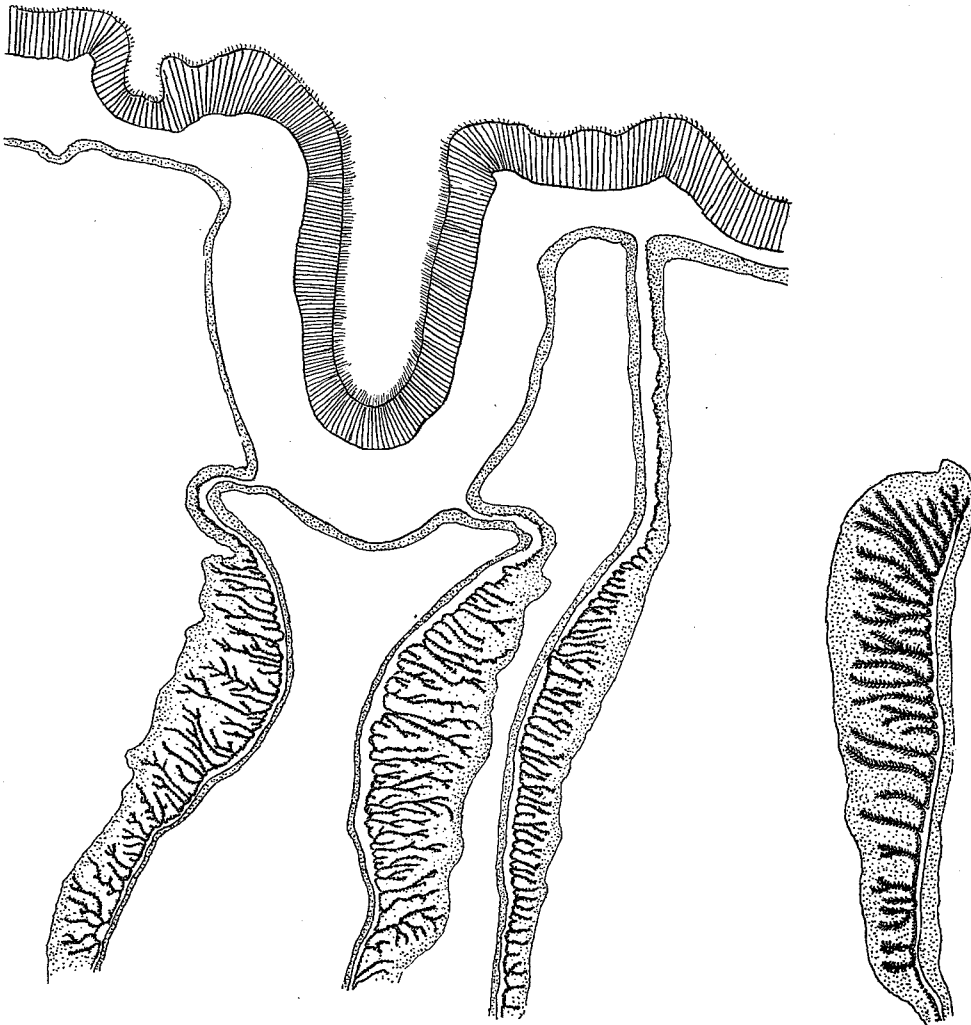


Fig. 51. *Epizoanthus tubae* n. sp. Transverse section of the siphonoglyph and of the inner parts of three macromesenteries.

Fig. 52. *Epizoanthus tubae* n. sp. Transverse section of a microdirective.

ectoderm a little higher than that of the siphonoglyph. The latter well developed, deep, its mesogloea thick, hyposulcus very long, of about the same length as the actinopharynx. 26—36 mesenteries. Perfect mesenteries with well developed diffuse retractors, imperfect mesenteries weak except for the microdirectives, which have distinct retractors, which are however weaker than those of the perfect directives. Ciliated tracts of the filaments well developed.

Holotrichs of the column partly 17—19(22)×7(8.5)  $\mu$ , numerous, partly (26)29—34×(10)12  $\mu$ , sparse; those of the actinopharynx 60—65×24—26  $\mu$ , very rare; those of the filaments 55—67×22—24  $\mu$ , very rare; those in the endoderm of the mesenteries 60—67(72)×24—26(28)  $\mu$ , not rare; large holotrichs also in the endoderm of the column; microbasic mastigophors of the tentacles 17—23× about 4.5  $\mu$ , not numerous; those of the actinopharynx 23—24×4—5  $\mu$ ; those of the filaments 23—24×4.5—5  $\mu$ , numerous; spirocysts of the tentacles about 14×2 to 24×4  $\mu$ .

*Colour* in the preserved state: column yellowish, due to incrusting sand.

*Size* of the largest specimens. (1) 5 cm. long, 0.6 cm. wide in the upper, 0.2 in the lower part. (2) about 5.5 cm. long and 0.7 cm. wide in the upper part.

*Localities.* Off Durban, 29° 47' 30" S., 31° 11' 45" E., 35 fms., 1 specimen; 29° 54' 40" S., 31° 22' 10" E., 39 fms., 1 specimen; 29° 54' 25" S., 31° 9' 45" E., 68 fms., several specimens, Aug. 1929, M.

Of the several specimens one was attached to a coral, another to a conglomeration of sand, the others were free. To the upper part of one individual two Ascidians were fastened. Owing to the very strong incrustation it was very difficult to get good slides of the scapus. After desilicification, the ectoderm was more or less in pieces, for which reason I am not sure whether the ectoderm of the scapus really was discontinuous, but it seems so. The mesogloea also was disintegrated, but here and there part of it remained. It seems to be provided with few cells, and there were rather large lacunae. Three individuals examined had 26 (13 + 13), 34 and 36 mesenteries. Characteristic for the species are the well developed diffuse retractors on the perfect mesenteries, and still more the fact that the microdirectives have well developed retractors, while the other imperfect mesenteries lack these. In these respects the species agrees with *Isozoanthus giganteus*, which like the present species, is a very elongated Zoantharian. The development of strong retractors seems here, as in the elongated Actiniaria, to be related to the prolongation of the body. Figures 51, 52 show transverse sections of the siphonoglyph, with three pairs of perfect mesenteries (fig. 51), and of a microdirective in the region of the actinopharynx (fig. 52). The outer parts of the mesenteries are not figured. One individual examined was provided with very large ova, the largest about 0.1 cm. in diameter, in the mesenteries. In two ova sectioned there was a connection between the endoderm and the ovum such as that which I have described (1923, p. 321) in *Isozoanthus giganteus*. Probably the development of the embryos takes place in the coelenteric cavity, as in that species.

#### Genus *Palaeozoanthus*, CARLGR.

Epizoanthidae the column and coenenchyme of which are incrustated. Mesogloea of the column almost homogeneous, with sparse cells. Imperfect mesenteries well developed, fertile like the perfect ones. Dioecious. Coenenchyme flat, very thin.

**Palaeozoanthus reticulatus, CARLGR.**

*Palaeozoanthus reticulatus*, n. sp. CARLGRÉN 1928, p. 470, textfigs. 54 a—d.

Polyps low, but broad, scattered on the flat, very thin coenenchyme, which is provided with a canal-system forming a delicate network. Furrows of the scapulus probably about 24. Ectoderm of the column continuous. Sphincter mesogloeal, in its upper part reticular, broad, with large muscle-meshes, diminishing gradually downwards and becoming alveolar. Tentacles and mesenteries about 24. Actinopharynx short, siphonoglyph distinct, hyposulcus present. Incrustation not strong, chiefly consisting of foraminifera. Nematocysts of the scapus  $26-29 \times$  about  $5 \mu$ ; those of the tentacles  $19-25 \times$  almost  $3$ —about  $4 \mu$ ; those of the filaments  $24-29 \times 4.5-5 \mu$ . Spirocysts of the tentacles about  $15-22 \times 2-2.5 \mu$ .

Colour unknown.

Size. Polyps up to 1 cm. wide and 0.2 cm. long in the contracted state.

Locality. Agulhas Bank,  $35^{\circ} 16' S.$ ,  $22^{\circ} 26.7' E.$ , 155 m., 1 colony on *Fusus rubrolineatus*, German Deep Sea Exped.

Figure 53 shows the external appearance of the colony. Unfortunately I cannot clear up the nature of the nematocysts, as I have no polyps at hand for examination. See also my description of the species given in 1928.



Fig. 53. *Palaeozoanthus reticulatus* CARLGR.

**Fam. Zoanthidae.**

Zoantharia the mesenteries of which are of the micro-(microcnemic) type. Sphincter mesogloeal, single or double.

As I have previously remarked (CARLGRÉN 1937), it is very difficult to distinguish the species of the genera of Zoantharia from one another. This is especially the case in the genera *Palythoa* and *Zoanthus*, both of which are certainly rich in species. As I suggested that the different appearance of the canal-system in the various species of the genera just named would give useful characters for the differentiation of the species, I closely examined the canal-system in the mesenteries of *Palythoa* and in the column of *Zoanthus*, for the first time, in 1937. For the present paper I have made several more extensive examinations of these canals; in *Palythoa* in the lower parts of the mesenteries, from about the end of the filaments to the base; in *Zoanthus* in the upper part of the column on about the same level as the actinopharynx. These examinations have shown clearly that the appearance of the canal-system is more or less different in the species, and can be used for the diagnosis of a species. It is true that in one and the same species variations do occur; and

that a strong contraction of the column can impart a somewhat different appearance to this system than in a more expanded polyp; but on the whole, I think, the appearance of the canal-system in each species is rather constant. But in order to get as good an idea as possible of the typical appearance it is necessary to make preparations of more than one polyp of a species (CARLGREN 1937, p. 185), or of several mesenteries in a single species.

As to the nematocysts, I refer to my paper of 1937.

#### Genus *Palythoa*, LAMX.

Solitary or colonial Zoanthidae, the polyps of which are united by a coenenchyme which varies in thickness but is sometimes very massive. Aboral ends of the free polyps never rounded. Body-wall always incrustated. Ectoderm of the scapus continuous or discontinuous. Mesogloea of the column with cells, cell-islets and lacunae, but without a continuous canal-system. A single sphincter. A richly developed canal-system in the mesogloea of the mesenteries. Dioecious or monoecious.

#### *Palythoa nelliae*, PAX.

Pl. I, figs. 6—8.

*Palythoa nelliae*, n. sp. PAX 1935, p. 513, textfigs. 1—3.

Polyps in the contracted state cylindrical or swollen at the distal end, rather close set. Coenenchyme flat, rather thick, like the lower parts of the polyps strongly encrusted with grains of sand. Incrustation of the upper part of the column weaker, occupying about the outer half of the mesogloea, which contains numerous rounded, rather uniformly distributed lacunae. Ectoderm of the scapus probably continuous. Zooxanthellae numerous in the endoderm as well as in the ectoderm, apart from that of the actinopharynx, where they are absent. Ridges of the scapulus 30—33. Sphincter long, mesogloea, forming a row of muscle-meshes. Tentacles 60 to about 70 in large polyps. Siphonoglyph well developed, its mesogloea strongly thickened, hyposulcus long. Mesenteries 60—about 70, their aboral ends, especially in large polyps, often strongly thickened. Mesenterial canals at the base, in smaller polyps, not much divided; in large polyps strongly developed, with many transverse canals separated from each other. Dioecious. Ova large. Ciliated tracts of the filaments very well developed. Holotrichs of the column  $46-50 \times 19-21 \mu$ , rather rare; those of the actinopharynx  $46-48 \times 18-20 \mu$ , rather rare; those of the filaments  $48-50 \times 23-26 \mu$ , few; those of the mesenterial canals  $45-60 \times 19-24 \mu$ , rather numerous; microbasic mastigophors in the ectoderm of the column  $24-31 \times$  about  $4 \mu$ , rare; in that of the tentacles  $24-26 \times 4-5 \mu$ , common; in that of the actinopharynx  $26-36 \times$  about  $3.5-4 \mu$ , numerous; in the filaments  $(43)48-60(65) \times 4-5 \mu$ . Microbasic mastigophors (?) in the filaments  $23-34 \times 4.5-5 \mu$ ; spirocysts of the tentacles  $17-26 \times 2.5$ —about  $4 \mu$ . Holotrichs absent in the ectoderm of the tentacles.

*Colour* of polyps when alive. (1) Column light brown, tentacles dark brown (coffee-brown), sometimes with a green apex; oral disc coffee-brown, actino-

pharynx colourless (CARLGRÉN). (2) Fawn rim (scapulus), dark brown tentacles. Green disc with a lighter green ring round the mouth (EYRE). (3) Fawn rim, green tentacles, brownish green disc (EYRE).



Fig. 54. *Palythoa nelliae* PAX. Canal system of a large polyp in the lowest part of a perfect mesentery. I. inner side of the mesentery.

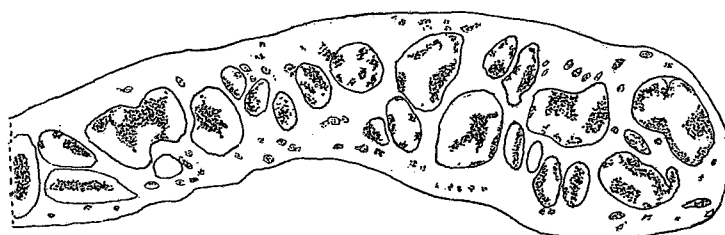


Fig. 55. *Palythoa nelliae* PAX. Transverse section of a perfect mesentery in its lowest part showing the irregular arrangement of the canals.

Size of two large polyps in the contracted state: (a) 5 cm. long and 1.3 cm. wide, (b) 4 cm. long and 0.8 cm. wide (the widths measured in the distal part). The smallest specimens were about 0.7—0.8 cm. long and 0.5 cm. wide.

Localities. Durban (Isipingo Beach), several colonies, Nov. 1935, C.; several colonies, July 1935, S.; Durban (Reunion Beach), 1 colony, June 1932, S.; Durban (The Bluff), 1 colony, Aug. 1929, M.; Port Natal, about 1840, WAHL-

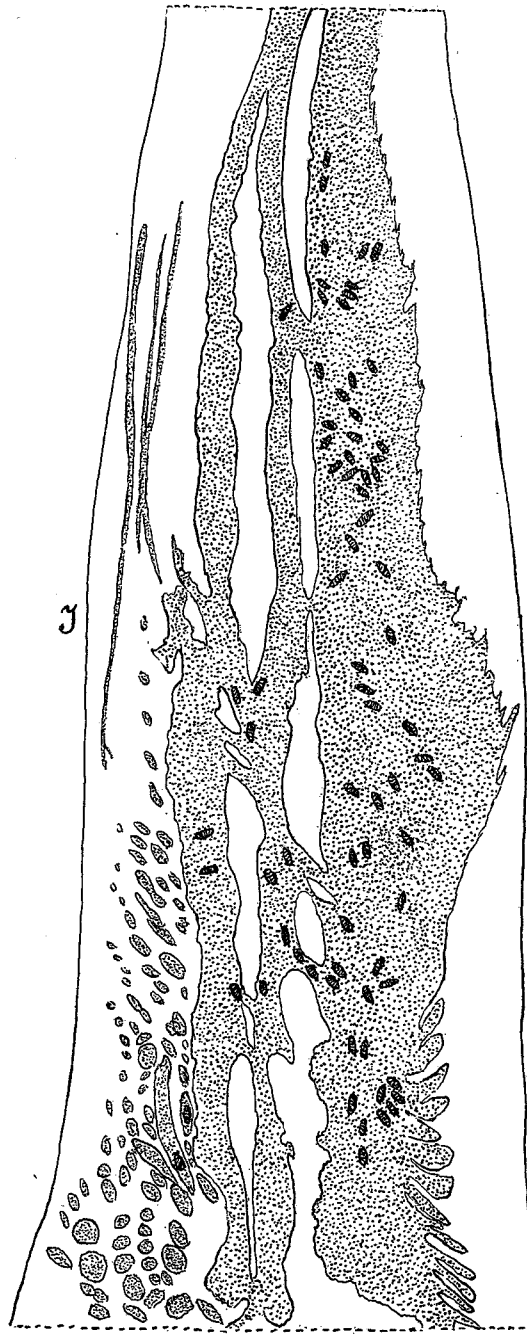


Fig. 56. *Palythoa nelliae* PAX. Canal system of a middle-sized polyp in the lowest part of a mesentery.  
I. Inner side of the mesentery.

in addition to longitudinal canals, not all visible in figure 54, because the canals do not lie in the same plane, as we see from figure 55, which shows a trans-

BERG, 2 colonies. All from the intertidal zone. »The species is extremely common at Isipingo and Reunion Beaches, forming large sheets, usually at low levels on the shore.» (STEPHENSON). The individuals form large colonies, sometimes covering two thirds of a square meter or more. I examined one such colony more fully. The polyps were of very different sizes. On the one side, there were very large polyps of about the same size and appearance as those figures by PAX, 1935; then polyps of ordinary size (figs. 6, 8, Pl. I), and on the side opposite the large polyps, smaller ones (fig. 7, Pl. I). The last seemed, however, to be full-grown, as they had about the same number of ridges on the scapulus as the large polyps. As far as I could determine the difference in the size of the polyps was only due to the fact that the largest polyps were the oldest and that the colony had grown from one side towards the other; because the smaller polyps were not so situated that one could imagine that they had received less nourishment than the larger polyps. The appearance of the mesenteries also supports such a supposition, in that their lower parts were considerably more thickened in the larger than in the smaller polyps, and the canals in the mesogloea were more numerous. I have given figures of the canals in the mesenteries, below the aboral ends of the filaments, and close to the base of the polyp. In the largest polyps there were numerous almost transverse canals, in

verse section of base of a perfect mesentery. The canals of the medium-sized and smaller polyps showed another aspect (figs. 56, 57), but it is very probable that the rounded lacunae (on the left hand in figure 56), in the medium-sized polyps, have developed into the transverse canals in the largest polyps. I have examined the canals in numerous mesenteries, and on the whole the canal-system was of the same type throughout, though there were several differences in detail. In the upper parts of the mesenteries the canals were, as usual, concentrated in the outer parts of the mesenteries, as we see in figure 58, which shows a piece of a mesentery between the actinopharynx, oral disc, and column. The coenenchyme and the lower parts of the column particularly,

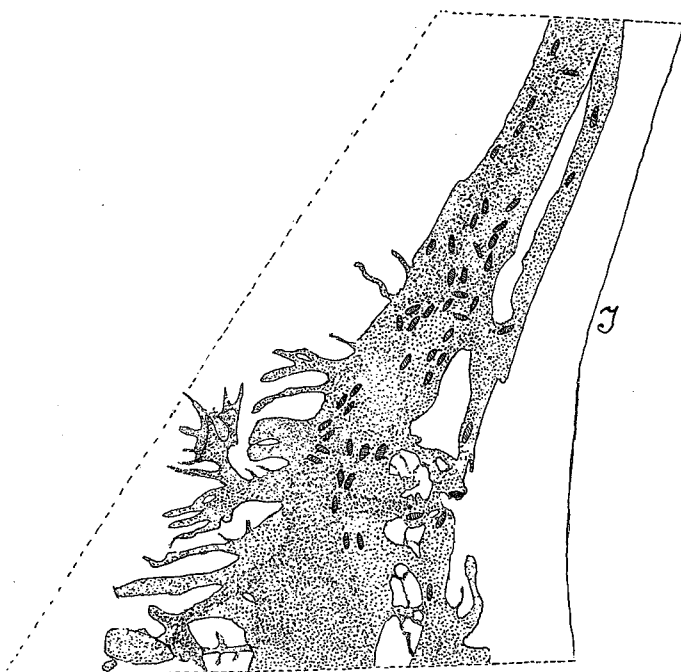


Fig. 57. *Palythoa nelliae* PAX. Canal system in the lowest part of a small polyp.  
I. inner side of the mesentery.

were considerably more strongly incrustated in the smaller than in the larger polyps. The description is based in the main on the polyps collected by myself.

There is no doubt that the species described here is *Palythoa nelliae*, though the statement of PAX (1935) as to the nematocysts and their size is curious to say the least of it. PAX writes: »Neben Spirociden von 12  $\mu$  Länge treten '(in dem Ektoderm der Körperwand)' nur ganz vereinzelt Gyrociden von 22  $\mu$  Länge auf.» I have never found any spirocysts in the ectoderm of the column, and it is hardly to be supposed that such are present there. The length of the »Gyrociden» (holotrichs), was 46—50  $\mu$ . Possibly PAX observed »Craspedociden» (microbasic mastigophors), which seem to be very rare; I have found a few, in size 24—31  $\times$  about 4  $\mu$ . Moreover, PAX

states that the ectoderm of the tentacles has »sehr vereinzelt stäbchenförmige Gyrociden von 26 und 35  $\mu$  Länge.» The »Gyrociden» are never »stäbchenförmig» in the Zoantharia. Undoubtedly he is referring to »Craspedociden». The same holds good for PAX' »Gyrociden» in the actinopharynx. Also the statement of PAX that there were spirocysts in the upper part of the actinopharynx is doubtful.

There is a species, *Palythoa multisulcata*, described by me from Zanzibar, which is at least closely related to, though probably not identical with, *P. nelliae*. I have examined the nematocysts of *multisulcata*, and these showed good agreement with those of *nelliae*. The holotrichs of the column in *multisulcata* were 48—50 $\times$  about 22  $\mu$ ; those of the actinopharynx 46—55 $\times$  about

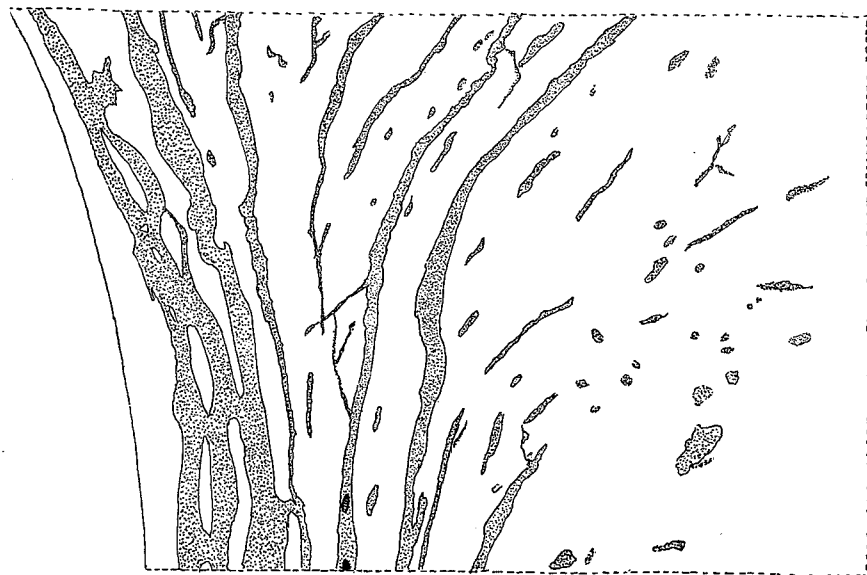


Fig. 58. *Palythoa nelliae* PAX. Canal system in the uppermost part of a macromesentery between the actinopharynx, column and oral disc; to the right column.

19  $\mu$ , very rare; those of the filaments (only a single capsule found) 55 $\times$ 22  $\mu$ ; those of the mesenterial canals 43—60 $\times$ 19—22(24)  $\mu$ ; microbasic mastigophors of the tentacles 17—24 $\times$  about 4  $\mu$ ; those of the actinopharynx 26—36(41) $\times$  about 4  $\mu$ ; those of the filaments 48—55 $\times$  about 4—4.5  $\mu$ . Moreover there were a few cnidae, microbasic mastigophors? of type *a*, in size 22—25 $\times$ 4.5  $\mu$ . In comparison with *nelliae*, the species from Zanzibar is more slender, the siphonoglyph seems to lack a distinct hyposulcus, and the canal-system in the lower part of the mesenteries is somewhat different. Unfortunately the canals in the thin mesenteries were not very well preserved, but the close-set projections from the main canal often seem to make a semicircular curve. In the coelenteric cavities of some specimens of *P. nelliae* I have found a few specimens of the parasitic genus *Baccalaureus*, probably belonging to a new species. Some polyps of the colonies numbered (2) above, had buds springing



from about the middle of the column. Some of these had no mouth, another examined had mouth and tentacles, but did not seem to communicate with the mother-polyp.

***Palythoa durbanensis*, n. sp.**

Pl. I, fig. 9.

Polyps of ordinary height, in the contracted state usually considerably broader in the uppermost part than at the base, united in small colonies, connected by thin coenenchyme, strongly incrustated with grains of sand. Ridges of the scapulus strong, very distinct, 28—37(39). Ectoderm of the column

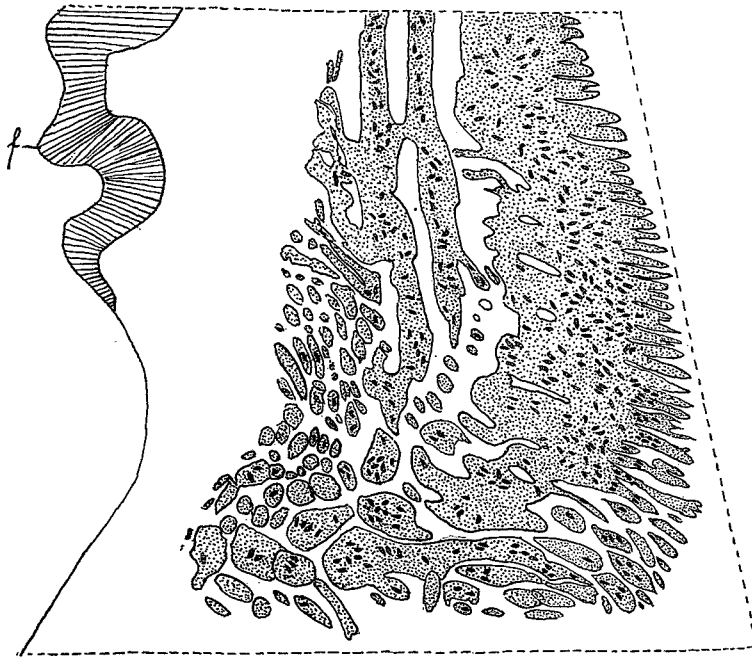


Fig. 59. *Palythoa durbanensis*, n. sp. Canal system in the lowest part of a mesentery.  
f: filament.

rather thin, seemingly discontinuous. Mesogloea of the column with numerous cells and cellgroups, the largest up to about  $84 \times 60 \mu$  in diameter, containing zooxanthellae. Sphincter typically developed, forming in the main a single row of transversely elongated, irregular meshes in its upper part. Ectoderm of the actinopharynx slightly longitudinally folded, the folds not supported by projections of the mesogloea. Siphonoglyph well developed, its mesogloea strongly thickened, hyposulcus well developed. Mesenteries (66)70—78 in larger individuals. Imperfect mesenteries of ordinary development. Ciliated tracts of the filaments long. Canal-system of the mesenteries at the proximal ends of the filaments and below this, forming on the outside a main-canal with commonly numerous projections towards the column; inside this canal one or usually 2 narrower canals and numerous lacunae. Zooxanthellae present in

the endoderm and in the ectoderm of the column and tentacles, but absent in the ectoderm of the actinopharynx. Holotrichs of the column  $43-51 \times 19-22(24) \mu$ ; in the tentacles absent; those of the actinopharynx  $(41)50-53 \times 19-22(24) \mu$ , few; those of the filaments  $43-46 \times 16-17 \mu$  (measured on sections); those of the mesenterial canals  $53-60 \times 20-26 \mu$ ; microbasic mastigophors in the ectoderm of the column  $17-24 \times 3-5 \mu$ , common; in the tentacles  $22-31 \times (2.5)3-4.5 \mu$ ; in the actinopharynx  $31-36 \times (3)3.5-4 \mu$ , common; in the filaments  $48-58(60) \times 4.5-5 \mu$ , numerous; microbasic mastigophors(?) of type *a*, in the filaments,  $23-24 \times 4.5-5 \mu$ , few; spirocysts of the tentacles up to  $26 \times 3.5-4 \mu$ .

*Colour.* Disc darkish green with fine dark brown stripes. Fawn rim (scapulus) and tentacles. Rim serrated and striped with yellowish green near the tentacles (EYRE).

*Size.* Height of the largest polyp, 2 cm., width of its upper end  $1.4 \times 1.2$  cm., in the preserved state.

*Locality.* Durban (Isipingo), June 1935, several small colonies, S. Not very common, occurs in little clumps in pot-holes on the lower platforms, EYRE.

I have counted the ridges of the scapulus in 10 individuals. They were 28, 31, 31, 33, 34, 35, 35, 35, 35, 37. Up to about two thirds of the mesogloea of the column was incrustated. The mesenteries of four individuals were 66, 70 (33+37), 72 and 78 in number. The figures show the aspect of a colony (Pl. I, fig. 9) and the structure of the canal-system of a mesentery in its lower part (fig. 59). 12 mesenteries examined showed the same type of canal-system.

#### *Palythoa natalensis*, n. sp.

Pl. I, fig. 10.

Polyps close-set, projecting little of at all above the surface of the coenenchyme, in the contracted state, mostly of similar size. Colony rather high. Ridges on the scapulus of the polyps almost invisible from the surface of the colony. The greater part of the mesogloea incrustated with grains of sand. Ectoderm of the coenenchyme and scapus rather high, seemingly discontinuous. Mesogloea of coenenchyme and column with numerous cells and cell-islets of various sizes, the largest up to  $180 \times 132 \mu$  in diameter, containing holotrichs and zooxanthellae. Sphincter long, consisting in the main of one row of muscle-meshes. Tentacles and mesenteries 42-48. Siphonoglyph distinct, its mesogloea strongly thickened. Mesenterial canals opposite the lower ends of the filaments and below this, forming a main canal on the inside which sometimes does not reach to the end of the filament; outside the main-canal and below it are numerous more or less transverse canals which show no tendency to grow together and form an outer main-canal. Pigmented cells in the walls of the canals rather common. Zooxanthellae present in the endoderm and in the ectoderm of the coenenchyme, column and tentacles, but not in the ectoderm of the actinopharynx. Holotrichs of the coenenchyme

50—62×24—26  $\mu$ ; those of the mesenterial canals 60—70×24—26  $\mu$ ; microbasic mastigophors of the coenenchyme 32—37×4.5—5  $\mu$ ; those of the tentacles 22—26(29)×2.5—4  $\mu$ ; those of the actinopharynx 34—44×3.5—4.5  $\mu$ , common. Nematocysts of type *a* with strongly armed »hampe» (microbasic mastigophors?) in the ectoderm of the coenenchyme 38—41×5.5—6.5  $\mu$ ; in the filaments 29—35×4.5—5  $\mu$ . Spirocysts of the tentacles up to 26×4  $\mu$ .

*Colour* unknown. In the preserved state the tentacles were greenish, the oral disc sometimes rose-coloured.

*Size.* Height of the colony up to 2 cm., width 7×4 cm.

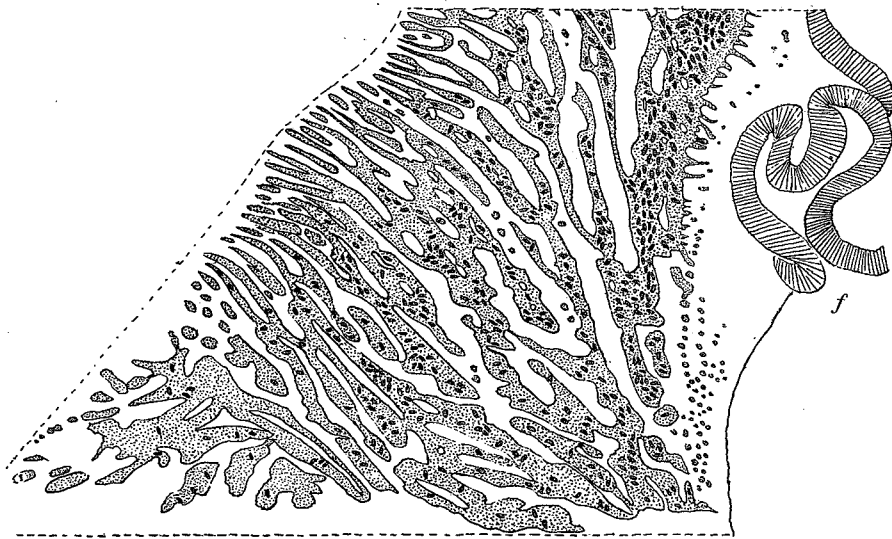


Fig. 60. *Palythoa natalensis* n. sp. Canal system in the lowest part of a mesentery.  
f. filament.

*Locality.* Durban (Isipingo Beach), June 1935, 1 colony, S. Common in pools and pot-holes on the lower platforms, sometimes forming fairly large masses, (EYRE).

The aspect of the colony is shown in Pl. I, fig. 10. I have examined 11 mesenteries from several polyps, as to the mesenterial canals, and in all, the canals were of same type as those I figure here (fig. 60), though of course, there was a little variation in their appearance. The tentacles and therefore the mesenteries were, in 5 polyps, 42, 46, 46, 46 and 48 in number. The species is probably closely related to *P. tropica*, CARLGR., but as I have no type-specimen of the latter at hand, I cannot state whether they are identical.

#### *Palythoa anneae*, n. sp.

Pl. I, fig. 2, 3.

Polyps very long, occurring in small groups held together by a thin coenenchyme, or free; with broad base, rather delicate, incrustated with grains of sand, though not as much as are the polyps of *P. nelliae*. Ridges of the

the endoderm and in the ectoderm of the column and tentacles, but absent in the ectoderm of the actinopharynx. Holotrichs of the column  $43-51 \times 19-22(24) \mu$ ; in the tentacles absent; those of the actinopharynx  $(41)50-53 \times 19-22(24) \mu$ , few; those of the filaments  $43-46 \times 16-17 \mu$  (measured on sections); those of the mesenterial canals  $53-60 \times 20-26 \mu$ ; microbasic mastigophors in the ectoderm of the column  $17-24 \times 3-5 \mu$ , common; in the tentacles  $22-31 \times (2.5)3-4.5 \mu$ ; in the actinopharynx  $31-36 \times (3)3.5-4 \mu$ , common; in the filaments  $48-58(60) \times 4.5-5 \mu$ , numerous; microbasic mastigophors(?) of type *a*, in the filaments,  $23-24 \times 4.5-5 \mu$ , few; spirocysts of the tentacles up to  $26 \times 3.5-4 \mu$ .

*Colour.* Disc darkish green with fine dark brown stripes. Fawn rim (scapulus) and tentacles. Rim serrated and striped with yellowish green near the tentacles (EYRE).

*Size.* Height of the largest polyp, 2 cm., width of its upper end  $1.4 \times 1.2$  cm., in the preserved state.

*Locality.* Durban (Isipingo), June 1935, several small colonies, S. Not very common, occurs in little clumps in pot-holes on the lower platforms, EYRE.

I have counted the ridges of the scapulus in 10 individuals. They were 28, 31, 31, 33, 34, 35, 35, 35, 37. Up to about two thirds of the mesogloea of the column was incrustated. The mesenteries of four individuals were 66, 70 (33+37), 72 and 78 in number. The figures show the aspect of a colony (Pl. I, fig. 9) and the structure of the canal-system of a mesentery in its lower part (fig. 59). 12 mesenteries examined showed the same type of canal-system.

#### ***Palythoa natalensis*, n. sp.**

Pl. I, fig. 10.

Polyps close-set, projecting little of at all above the surface of the coenenchyme, in the contracted state, mostly of similar size. Colony rather high. Ridges on the scapulus of the polyps almost invisible from the surface of the colony. The greater part of the mesogloea incrustated with grains of sand. Ectoderm of the coenenchyme and scapus rather high, seemingly discontinuous. Mesogloea of coenenchyme and column with numerous cells and cell-islets of various sizes, the largest up to  $180 \times 132 \mu$  in diameter, containing holotrichs and zooxanthellae. Sphincter long, consisting in the main of one row of muscle-meshes. Tentacles and mesenteries 42-48. Siphonoglyph distinct, its mesogloea strongly thickened. Mesenterial canals opposite the lower ends of the filaments and below this, forming a main canal on the inside which sometimes does not reach to the end of the filament; outside the main-canal and below it are numerous more or less transverse canals which show no tendency to grow together and form an outer main-canal. Pigmented cells in the walls of the canals rather common. Zooxanthellae present in the endoderm and in the ectoderm of the coenenchyme, column and tentacles, but not in the ectoderm of the actinopharynx. Holotrichs of the coenenchyme

scapulus not strong, in 3 larger polyps 31, 33 and 34 in number. Ectoderm of the column rather thin, discontinuous. Mesogloea of the column with numerous cells and cell-groups up to  $70 \times 36 \mu$  in diameter. Sphincter of typical structure, forming in the main a single row of muscle-meshes, somewhat broader in its uppermost part. Ectoderm of the actinopharynx slightly longitudinally folded, the folds not supported by projections of the mesogloea, with pigmented cells at the base. Siphonoglyph well developed, its mesogloea strongly thickened, hyposulcus distinct. Mesenteries about 58—80, often irregularly arranged in the dorsal part. Ciliated tracts of the filaments long, middle and cnidoglandular tract pigmented. Canal-system of the mesenteries opposite the lower ends of the filaments and below this, forming a main-canal

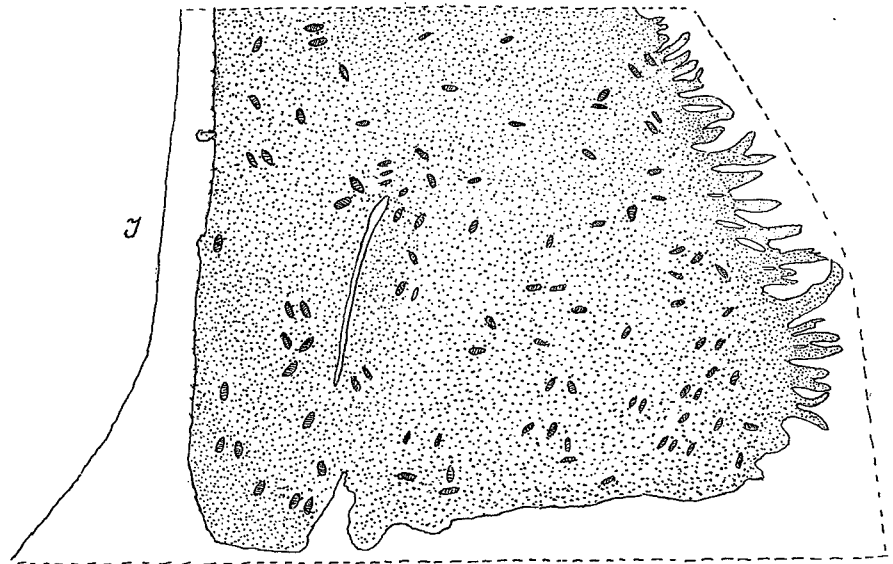


Fig. 61. *Palythoa annea* n. sp. Canal system in the lowest part of a macromesentery. I. inner side of the mesentery.

on the inside; from this canal there run out several projections towards the column, these projections mostly fusing together so that the canal-system presents the appearance of a broad plate filling up almost the whole width of the mesentery. Zooxanthellae present in the endoderm, in the ectoderm of the column, in the cell-groups in the mesogloea and in the tentacles, but absent in the ectoderm of the actinopharynx. Holotrichs in the ectoderm of the column  $41-50 \times 17-21 \mu$ ; in the tentacles absent; in the actinopharynx and filaments about  $41-43 \times 17 \mu$  (measured on sections); in the mesenterial canals  $46-55 \times 17-19 \mu$ ; microbasic mastigophors in the column  $17-26 \times 2.5-4 \mu$ ; in the tentacles  $24-26 \times$  about  $3.5-4 \mu$ ; in the actinopharynx (29)  $31-36 \times$  about  $4(3-4.5) \mu$ , common; in the filaments  $48-60 \times 4-4.5 \mu$ , numerous; microbasic mastigophors(?) of type *a* in the filaments  $26-34 \times 4-4.5 \mu$ , rather common; spirocysts of tentacles up to  $26 \times 3.5 \mu$ .

*Colour.* Disc, tentacles and rim (scapulus) all fawnish brown (EYRE).

*Size.* Largest polyps about 4.2 cm. long; width at the upper end 1 cm., at the base 1.5 cm.

*Locality.* Durban (Isipingo), June 1935, several polyps, not very common, in shallow pools (EYRE).

Four specimens sectioned had 58 (22 + 36), 68 (34 + 34), 70 (34 + 36) and 80 mesenteries respectively. While the mesenteries in the ventral region were typically arranged, there were many irregularities in the dorsal region. In the first individual the mesenteries were grouped after the microtype on the one side, according to the macrotype on the other, which had considerably more mesenteries. The second individual showed the macrotypic arrangement, the third specimen the microtypic. In the fourth specimen there were considerably more mesenteries. In this specimen the mesenteries were so irregularly arranged in the part opposite the siphonoglyph, that it was impossible to elucidate their real distribution. Evidently this is a species in which, as in some *Ceriantharia*, irregularities in the arrangement of the mesenteries are common. I have examined the canal-system of 13 mesenteries. Some of them had a canal-system recalling that in *P. yongei* (CARLGRÉN 1937, fig. 26); in most specimens the canals had fused together and formed a broad plate (fig. 61).

I have named this species after Mrs. ANNE STEPHENSON.

#### *Palythoa capensis*, HADD. and SHACKL.

Pl. I, fig. 11.

*Corticifera* sp.? ERDMANN 1885, p. 46.

*Corticifera tuberculosa*, KLUNZ. R. HERTWIG 1888, p. 45, Pl. 1, fig. 5.

*Palythoa capensis*, nov. nom. HADDON and SHACKLETON, 1896, p. 148.

*Palythoa oorti*, n. sp. PAX 1924, p. 3, fig. 1.

Polyps projecting slightly above the surface of the coenenchyme when contracted, of very dissimilar sizes, irregularly arranged, close-set. Ridges of the scapulus about 18—19 in large polyps, usually not distinct in contracted polyps. Coenenchyme very strongly incrustated with sand and a few spicules, at the surface of the colony; in the interior, between the polyps, not so much incrustated. Ectoderm of the coenenchyme and scapus possibly discontinuous, with numerous holotrichs. Mesogloea of the coenenchyme thick, with numerous cells and large lacunae, the largest found being  $144 \times 120 \mu$  in diameter, containing holotrichs. Sphincter as in other species of *Palythoa*. Tentacles rather short. Actinopharynx longitudinally sulcated, siphonoglyph broad, its mesogloea thickened, hyposulcus present. Mesenteries 34—38 in large polyps, thin in their upper part, thickened in the region of the filaments. Basal part of the glandular tract, and even more the parts outside the filaments, all the way to the mesenterial canal, extraordinarily pigmented, so that the mesenteries in this region seem almost black. Mesenterial canals at the bases of the perfect mesenteries branched, with a stronger canal on the inside and a weaker on the outside of the mesenteries, strongly pigmented. Zooxanthellae present in the endoderm and in the ectoderm of the column, tentacles and oral disc, but

not in that of the actinopharynx. Holotrichs in the ectoderm of coenenchyme and column  $36-50(55) \times (14)17-22 \mu$ ; those of the mesenterial canals  $(53)55-67(70) \times 22-26 \mu$ ; microbasic mastigophors in the coenenchyme  $16-19 \times 2.5 \mu$ ; in the ectoderm of the tentacles  $17-26 \times 3-4.5 \mu$ ; in that of the actinopharynx  $24-34 \times 4-$  almost  $5 \mu$ ; in the filaments  $(36)38-55 \times 5-6 \mu$ ; cnidae, probably also mastigophors and with strongly armed »hampe», in the coenenchyme about  $31 \times 5 \mu$ ; in the filaments  $21-26(29) \times 5-5.5 \mu$ ; spirocysts of the tentacles  $12 \times 2$  to about  $24 \times 4 \mu$ .

*Colour.* Furrows of the scapulus, tentacles, oral disc and actinopharynx red (CARLGRÉN).

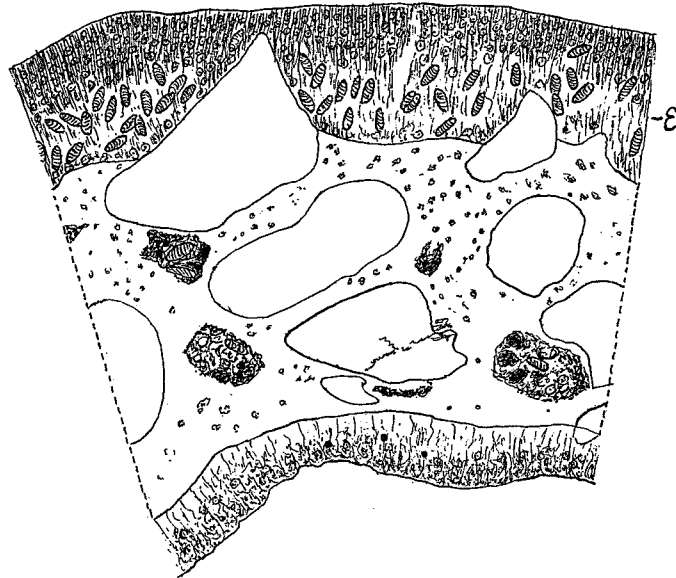


Fig. 62. *Palythoa capensis* HADD. and SHACKL. Transverse section of the scapulus. In the ectoderm (E) numerous symbiotic algae and holotrichs.

*Size* of the colony from East London: length 5 cm., breadth 3.5 cm., height about 1 cm., width of the largest polyps 0.8–0.9 cm., of the smallest 0.2–0.3 cm.

*Localities.* Cape of Good Hope (*Palythoa oorti*); Simons Bay, 10–20 fms., Challenger exped. (*Corticifera tuberculosa*); East London, upper littoral, 1 colony, Dec. 1935, C. I am not sure whether the last colony was taken in the intertidal zone or at a depth of 10–15 fms. off Nanoon river. I had many animals to preserve during the last days of my visit to East London, so that I forgot to label this specimen. Probably the colony is not from the intertidal zone.

I am not sure that the ectoderm of the coenenchyme and scapus is discontinuous. It is possible that the projections are not connected with the cuticle. After the dissolving away of the strong incrustation the ectoderm and the outermost part of the mesogloea were not in good condition. I have figured a section of the scapulus, where the ectoderm with its numerous zooxanthellae and holotrichs was well preserved (fig. 62).

The number of mesenteries in 5 polyps examined was as follows 38 (20 + 18), 38 (20 + 18), 36 (16 + 20), 36 (18 + 18) and 36 (probably 24 + 12); as far as I can see the mesenteries of the one side in the last specimen were strongly retarded

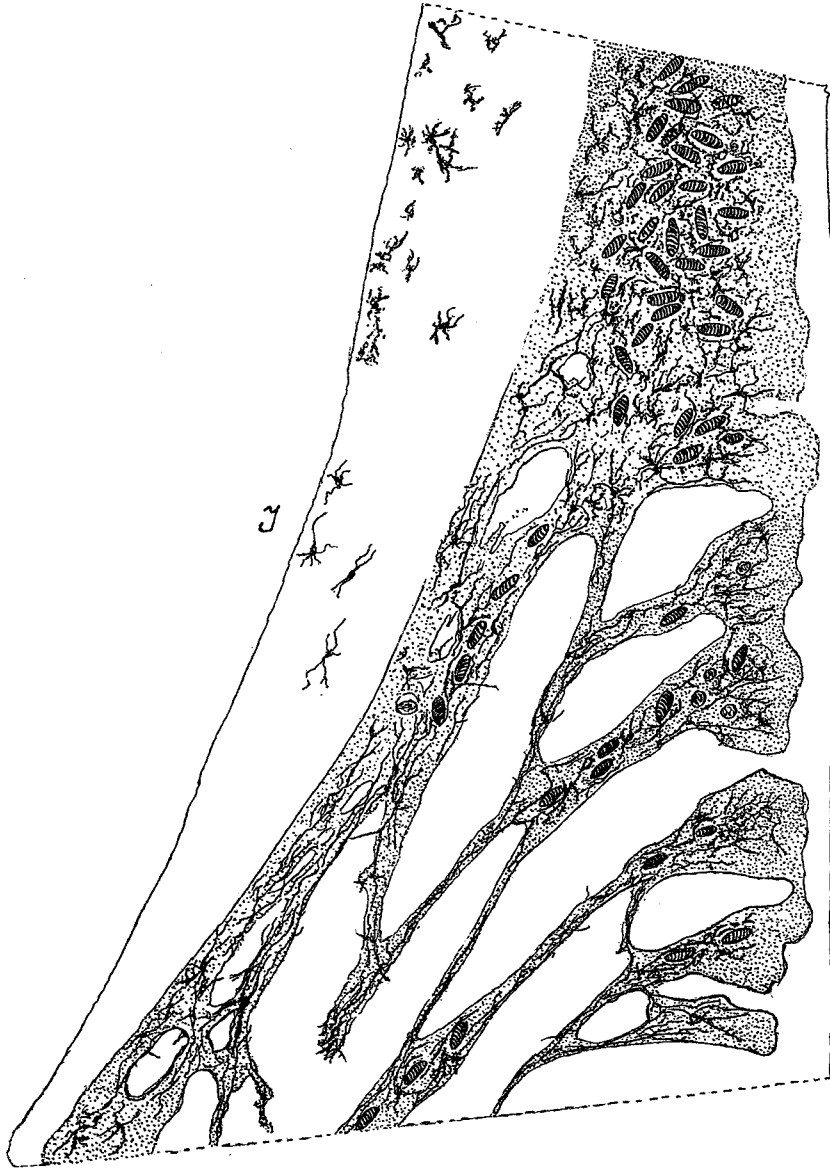


Fig. 63. *Palythoa capensis* HADD. and SHACKL. Canal system in the lowest part of a macro-mesentery with numerous holotrichs and pigmented cells. I. inner side of the mesentery.

in development. ERDMANN (1885) found 34 and 36, PAX (1924) (in *oorti*) only 26. Probably the latter author has examined a smaller polyp or has written 26 instead of 36. The mesenteries were thin in their upper part, but thickened in the region of the filaments at their insertion on the column. The ciliated tracts of the filaments were well developed. It was difficult to get good



preparations of the canal-system in the lower parts of the mesenteries, because the filaments extended almost to the base of the body, and the mesenteries were mostly narrow in this part. I have, however, been able to make two good preparations, in which these parts of the mesenteries were broad and the filaments shorter. The main canal divaricates here, the one canal runs on the inside, the other on the outside of the mesentery; the latter seems to have been formed by the fusion of strong lobes (fig. 63). The canals of the next mesentery had a similar appearance, the outer canal was, however, unbroken. I have examined the nematocysts and spirocysts (1) from the colony from East London, (2) from *tuberculosa* and (3) from *oorti*. The sizes of the cnidae agree rather well as is shown by the following comparison.

	Holotrichs		Microbasic mastigophors			Microbasic mastigophors?
	Coenenchyme, column	Mesenterial canals	Tentacles	Actinopharynx	filaments	filaments
1	36—48× 18—22 μ	55—65× 22—26 μ	22—26× 2.5—4 μ	31—36(42)× 4—5 μ	50—55 μ 5.5—6 μ	22—26(29)× 5—5.5 μ
2	38—50(55)× (14)17—19 μ	58—65× 22—24 μ	17—26 μ	26—34×4 μ	38—49×5 μ	about 22× 4.5—5 μ
3	38—48×(14) 17—20.5 μ	(53)62—67(70) ×22—26 μ	22—24× about 3—4.5 μ	22—24× 3—4.5 μ	(38)41—50× 5—5.5 μ	21—24× about 5 μ

Holotrichs occurred, neither numerous nor rare, in the filaments and in the ectoderm of the actinopharynx. The spirocysts of the tentacles were (1) 14×2 to 24×4 μ. (2) 14×2 to 24×4 μ. (3) 12×2 to 24×4 μ.

PAX did not find any zooxanthellae in *P. oorti* («Zooxanthellae habe ich nirgends beobachtet»). In fact (I have examined the holotype) there were zooxanthellae in the endoderm as well as in the ectoderm of the scapulus, tentacles and oral disc. There is no doubt that all the three colonies belong to a single species. The polyhedral appearance of the colony taken by the CHALLENGER expedition was certainly caused by a strong contraction of the polyps during preservation. I have not seen the nematocysts in an exploded state but I think that the nematocysts designated *a* (CARLGRÉN 1937, fig. 11) are also microbasic mastigophors, though of different appearance, as I have seen a thin thread in the basal part of the capsule. The above description is in the main based on the specimen from East London, as the other specimens were not well preserved.

#### Genus *Isaurus*, GRAY.

Zoanthidae with a single mesogloal sphincter. Polyps more or less asymmetrical. Column unincrusted. Ectoderm of the scapus discontinuous; ectodermal and endodermal bays present in the mesogloea of the column. No continuous canal-system in the body-wall. Polyps solitary or arranged in small groups. Coenenchyme slightly developed. Monoecious or dioecious.

*Isaurus spongiosus* (ANDRES).

Pl. III, fig. 1.

*Panceria spongiosa*, n. sp. ANDRES 1877, p. 26, Pl. 16, figs. 1—30.*Palythoa (Monothoa) spongiosa*, ANDRES 1883, p. 322.*Isaurus spongiosus* (ANDR.). HADDON and SHACKLETON 1891, p. 630; CARLGRÉN 1900, p. 124, Pl. 5, fig. 6; PAX 1909, p. 408, Pl. 22, fig. 6.

Polyps more or less asymmetrical, with one side a little longer than the other; tuberculated, especially on the longer side; sometimes in younger individuals smooth; usually the body bends over to the shorter side. Area of the scapulus short. Mesogloea of the scapus thick, with numerous cells and more sparse small lacunae. Ectodermal bays sparse, endodermal bays very large and more frequent. Sphincter strong, sometimes with a tendency to transverse stratification, occupying almost the whole thickness of the mesogloea in its uppermost part. Ectoderm of the actinopharynx high, longitudinally folded, the folds corresponding approximately to the perfect mesenteries, and supported by projections of the mesogloea. Siphonoglyph with very strong cilia, distinct, its mesogloea not thickened. Hyposulcus absent. Mesenteries 38—42, muscles of the mesenteries weak, but, at the insertions of the mesenteries, continued in the lower part of the body, where the mesenteries grow together little by little. Canal-system of the mesenteries mainly consisting of several canals running longitudinally. Ciliated tracts of the filaments well developed. Holotrichs of the scapus  $23-32(36) \times 10-12 \mu$ , numerous; those of the filaments?  $31 \times 10 \mu$ ; those of the mesenterial canals  $22-26 \times 8.5 \mu$ , scattered; those of the endoderm of the mesenteries  $10-14 \times 4.5-5 \mu$ ; microbasic mastigophors of the actinopharynx  $22-24 \times 3-4 \mu$ , common; those of the filaments  $22-24 \times 3-4 \mu$ , sparse; cnidae broader at the basal end and with a distinct thick »hampe» (microbasic mastigophors?) in the filaments,  $15.5-19 \times 4-4.5 \mu$ , very numerous. Spirocysts of the tentacles  $14-28 \times 2-4 \mu$ .

*Colour.* Column yellowish brown, paler in its lower part, upper part more red-brown, sometimes shading into green; some specimens yellowish, tentacles and oral disc colourless (CARLGRÉN). Base whitish, column brownish purple, tentacles and scapulus (»Tentakelrand») blue-violet, lips transparent (STUHL-MANN, individuals from Zanzibar). Dark brown, dark greenish brown, or pale brownish yellow (STEPHENSON, individuals from Isipingo).

*Size* up to about 4 cm. long and 0.6 cm. wide in the preserved state.

*Localities.* Durban (Isipingo), on rocks in the intertidal zone, Nov. 1935, C., several specimens. Same locality, 1936, S., several specimen. Port Natal, about 1840, WAHLBERG. Fairly common in pools on lower platforms at Isipingo, S.

*Further distribution.* Zanzibar, Madagascar?

Zooxanthellae were numerous in the endoderm and in the ectoderm of the scapus, absent or, if present, very rare in other parts of the ectoderm. PAX did not find any zooxanthellae in the ectoderm of the column in the individuals from Madagascar, an observation which however requires confirmation. Holotrichs were absent in the ectoderm of the tentacles and actino-

pharynx. The tentacles had only spirocysts. Four individuals sectioned had 38, 38, 38 (18+20) and 40 (18+22) mesenteries respectively. There was no continuous canal-system in the mesogloea of the column, contrary to the state of affairs in *Zoanthus*, and I suggest that it is the same in other species of

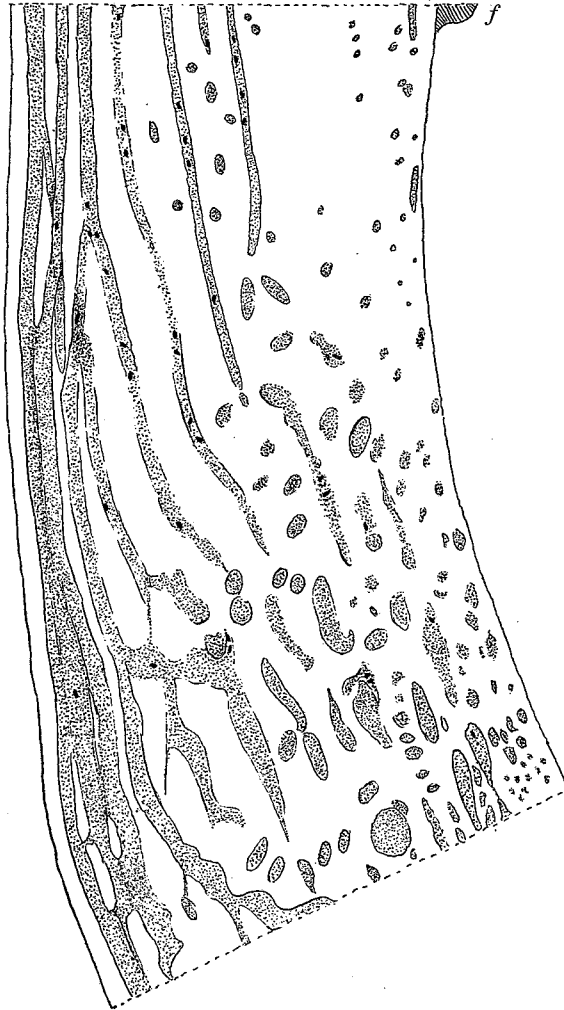


Fig. 64. *Isaurus spongiosus* (ANDR.). Canal system in the lowest part of a mesentery. *f.* filament.

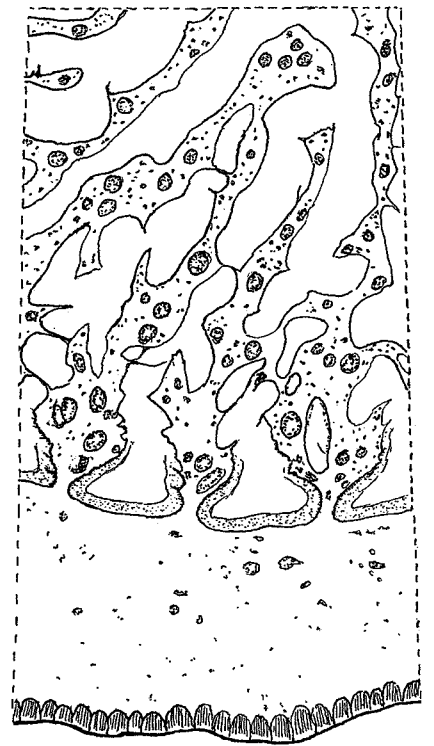


Fig. 65. *Isaurus spongiosus* HADD'S SHACKL. Transverse section of a part of the body where the mesenteries begin to face together.

*Isaurus*. On slides one sometimes receives the impression that the lacunae grow together to form short canals, but in surface-preparations there is nothing of the sort to be seen, though it is possible that sometimes a fusion of lacunae can take place. On the other hand the lacunae are sometimes very irregular in shape. ANDRES (1877) speaks of a system of canals in the mesogloea. The canal-system of the perfect mesenteries is, as previously pointed out by me (1900), divided into several longitudinal canals; and the main canal, running

along the outer border of the mesentery, is more or less subdivided below the filaments. I give here a figure of the canal-system in a perfect mesentery, below the level of the filaments (fig. 64). At the insertion of the mesentery on the column (on the left side of the figure) the somewhat divided main canal is situated, inside this there are several thinner canals, the innermost of which ends almost immediately below the filament; in the inner parts, especially towards the base, there are numerous lacunae, often elongated in a longitudinal direction. The canal-system was of approximately the same type in 9 polyps examined. In the lower parts of the polyps the mesenteries have grown together more or less, as ANDRES (1877) has observed. Sometimes two-fifths of a polyp (in the preserved state) can be transformed in such a way. Usually the fusion takes place simultaneously round the periphery and in the centre. Sometimes traces of the central cavity are still visible. Sometimes the fusion begins in the centre, while the cavities between the mesenteries remain. At the base the fusion is more complete. PAX (1924, p. 115) has described such a fusion in *Isaurus duchassaingi*, var. *microtuberculatus*. In the part where the mesenteries grow together there are cells and numerous longitudinal canals (fig. 65). This species was described by ANDRES (1877) who gave for his time a rather good account of it.

#### Genus *Zoanthus*, LAMARCK.

Zoanthidae forming colonies and provided with a double mesogloal sphincter. Coenenchyme and column unincrusted, though foreign bodies are sometimes attached to the cuticle. Ectoderm of the scapulus discontinuous, more rarely continuous. Mesogloea of the column with a well developed, continuous canal-system, forming net-works. Dioecious or monoecious. Coenenchyme thin to rather thick.

In order to facilitate the examination of the species of *Zoanthus* described below, I give here a guide to their identification. (See also the remarks under the family, p. 103).

#### A. Polyps elongated, broader distally than proximally. Mesenteries 44—54.

##### I. *Pigmented cells in the mesogloea of the column present: parvus, stephensoni, sansibaricus.*

- (a) Very small polyps, often rather short when strongly contracted, close-set on a thin, flat, extended coenenchyme. Tentacles without spirocysts. Canals in the mesogloea of the column fine, not situated in the same plane, the meshes rather fine. Lower sphincter strong, occupying about the whole thickness of the mesogloea, with many large muscle-meshes: *parvus* (p. 136).
- (b) Somewhat larger polyps, always long even in contraction, considerably broader distally than proximally, connected with each other by stolons or by a thin, flat coenenchyme. Tentacles without spirocysts.

Canals in the mesogloea of the column rather broad, not situated in the same plane, the meshes rather fine. Lower sphincter not strong, occupying only half of the thickness of the mesogloea, its muscle-meshes fine: *stephensoni* (p. 135).

- (c) Polyps similar to those of *stephensoni*, connected with each other by stolons or small plates. Pigmented cells very numerous. Tentacles almost without spirocysts. Canals in the mesogloea of the column of ordinary diameter, not wholly situated in the same plane, the meshes rather fine. Lower sphincter rather strong but not long, occupying half of the thickness of the mesogloea or rather more; with numerous large meshes, often transversely elongated: *sansibaricus* (p. 138).

II. *Pigmented cells in the mesogloea of the column absent: racemosus, lawrencei.*

- (a) Polyps similar to those of *stephensoni*, rather delicate, connected with each other by an inconspicuous coenenchyme. Tentacles without spirocysts. Canals in the mesogloea of the column broad, forming wide meshes, in the main situated in the same plane. Lower sphincter long, occupying only half the thickness of the mesogloea, its muscle-meshes fine: *racemosus* (p. 121).

- (b) Polyps more robust than those of *racemosus*, when contracted only a little broader distally than proximally; close-set, rising from a usually thin coenenchyme. Tentacles almost without spirocysts. Canals in the mesogloea rather fine, situated in at least two planes, and forming a close net-work. Sphincter very long, occupying almost the whole thickness of the mesogloea: *lawrencei* (p. 126).

B. **Polyps when contracted rather short, somewhat swollen distally, rather large, not very close-set, rising from a flat, rather thick coenenchyme.**

Tentacles with numerous spirocysts. Pigmented cells in the mesogloea of the column absent. Canals in the mesogloea of the column usually broad, not situated in the same plane, the meshes wide. Lower sphincter long but weak, occupying only half the thickness of the mesogloea, its muscle-meshes very fine. Owing to the weakness of the sphincter the tentacles are often visible even in preserved polyps. Mesenteries in the larger polyps 58—82: *durbanensis* (p. 131).

C. **Polyps short, smaller than those of *durbanensis*. Pigmented cells in the mesogloea absent.**

I. *Tentacles with very few spirocysts: brighti.*

Polyps close-set, rising from a flat, thin coenenchyme. Canal-system recalling that of *lawrencei*, but the canals thinner and communicating with the ectoderm in several places. Lower sphincter long, very strong, occupying about half the thickness of the mesogloea, its muscle-meshes often very large and elongated transversely. Dioecious. Mesenteries 58—72: *brighti* (p. 129).

II. *Tentacles with rather numerous spirocysts: eyrei, natalensis, barnardi, capensis.*

- (a) Polyps rather low, rather close-set, rising from a thin, flat coenenchyme. Canal-system in the mesogloea of the column forming a close net-work of broader and finer canals arranged in more than two nets. Lower sphincter very long, very strong, occupying most of the thickness of the mesogloea, its muscle-meshes not especially large, elongated transversely. Zooxanthellae present in the mesenteries, filaments and actinopharynx, also in their mesogloea. Mesenteries 58—62: *eyrei* (p. 123).
- (b) Polyps close-set, rising from a comparatively thick, flat coenenchyme. Canal-system in the mesogloea of the column forming at most two nets, canals of medium breadth. Lower sphincter rather long, usually situated nearer the ectoderm than the endoderm, occupying about half the thickness of the mesogloea, its muscle-meshes rather large, round. Mesenteries 50—56: *natalensis* (p. 127).
- (c) Polyps close-set, rising from a comparatively thick coenenchyme. Canals in the mesogloea of the column not situated in the same plane, forming rather fine meshes, of ordinary diameter. Lower sphincter of ordinary length, occupying about half the thickness of the mesogloea, its muscle-meshes transversely elongated, some of them rather wide. Mesenteries 50—54. Cuticle of the scapus incrustated with thread algae. Dioecious: *barnardi* (p. 137).
- (d) Polyps close-set, rising from a flat, rather thin coenenchyme. Canals in the mesogloea of the column in the main situated in the same plane, forming a network with broad star-like nodes from which finer and broader canals radiate. Lower sphincter rather short, occupying in its upper part most of the thickness of the mesogloea, its muscle-meshes rather large. Mesenteries in larger polyps 50—58. Cuticle of the scapus incrustated with thread-algae. Monoecious: *capensis* (p. 133).

***Zoanthus racemosus*, n. sp.**

Pl. II, fig. 2.

Polyps elongated, swollen in their upper part, at least in the preserved state; united in clusters and connected with each other by an inconsiderable coenenchyme. Mesogloea of the column with very numerous not pigmented, probably amoeboid cells, and a rather coarse meshed canal-system. Canals broad, in the main situated in the same plane, the meshes usually elongated in the direction of the mesenteries. Lower sphincter very long, of ordinary development, forming rounded, finer or coarser meshes, situated closer to the ectoderm than to the endoderm. Upper sphincter comparatively well developed. Ectoderm of the tentacles without spirocysts, on the aboral side with numerous

holotrichs. Siphonoglyph distinct, its mesogloea not thicker than that of other parts of the actinopharynx. Mesenteries 48—54(62).

Imperfect mesenteries well developed, as also the ciliated tracts of the filaments. Boundary-tract broad, cnidoglandular tract thin. Region of the filaments rather short, the greater part of the mesenteries without filaments. Zooxanthellae absent in the ectoderm, numerous in the endoderm. Holotrichs of the column 13—15×5.5—6  $\mu$ ; those of the tentacles 13—15×5—6  $\mu$ ; those

of the actinopharynx 12—17×6—5.5  $\mu$ ; those of the filaments and boundary tract 13—17×5.5—6  $\mu$ ; microbasic mastigophors absent from the tentacles and probably from the actinopharynx; in the filaments 14×3 to 17×3.5  $\mu$ .

*Colour.* Polyps pink when closed, pinkish gray on top, EYRE.

*Size.* 1.5—2 cm. long, width at the base about 0.2 cm., at the distal end 0.5 cm.

*Locality.* Durban (Isipingo), in pools in low parts of the lower platforms, not common, several polyps, June 1935, EYRE.

Pl. II, fig. 2 shows the external appearance of the polyps; figure 66 a section of the sphincters, and figure 67 a part of the canal-system in the mesogloea of the column. The sphincters of two specimens sectioned agreed very well in their structure. I have examined the canal-system in two individuals; in the one the mesogloea was rather thin (fig. 66), in the other more contracted.

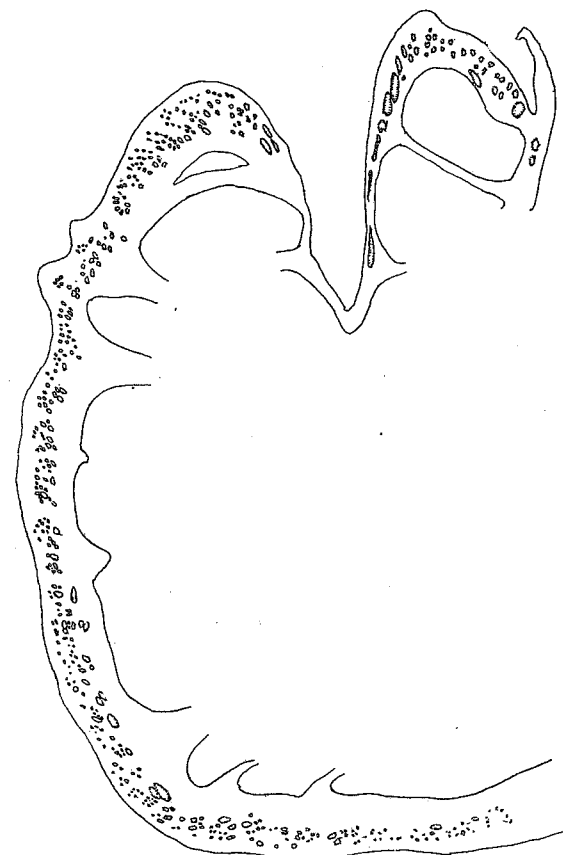



Fig. 66. *Zoanthus racemosus*, n. sp. Upper and lower sphincter. Figs. 66, 68, 70, 71, 73, 76, 77, 79—82 are figured at the same magnification.

The canals in both were broad, the meshes elongated in the same direction and of the same appearance; but in the thicker part of the mesogloea situated closer to each other. The mesogloea of the actinopharynx was thickened. As the ectoderm of the actinopharynx was not folded, and was of the same height as that of the siphonoglyph, the latter was not so marked as in other species described here, but had longer cilia than in the actinopharynx proper. I have examined the mesenteries in four polyps. They were 48 (24+24), 52 (26+26), 54 and 62 in number. The arrangement of the mesenteries in the last individual was irregular in as much as a doubling of imperfect mesen-

teries had taken place on each side of the dorsal micro-directives, so that 5 groups, each consisting of two imperfect mesenteries instead of three, were present on the dorsal side:  (*m*: micro-directives). A similar doubling, recalling that of *Z. racemosus* has been described by ERDMANN (1885) in *Zoanthus* sp?, which R. HERTWIG (1888, p. 37) incorrectly identified with *Z. confertus* VERR. (= *capensis* nov. nom.); but in that case six such groups were

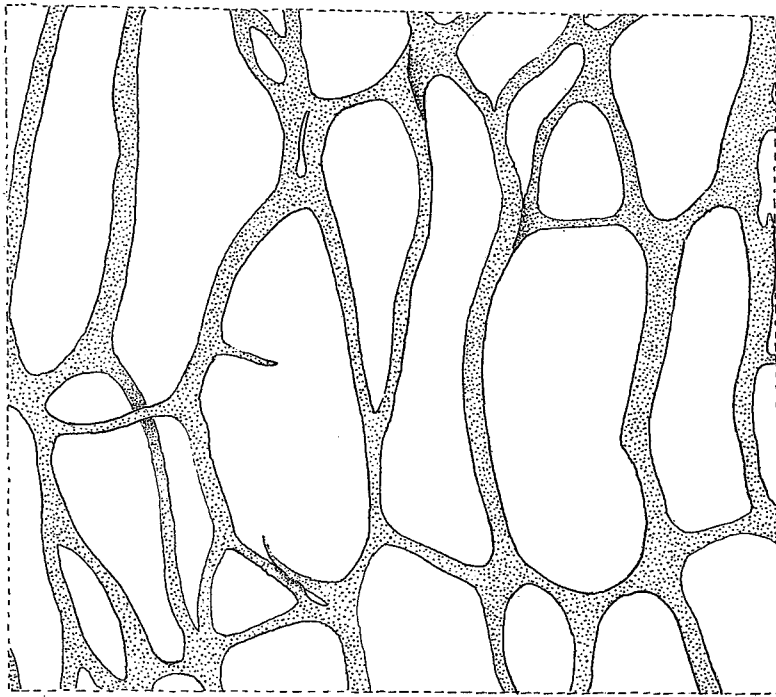


Fig. 67. *Zoanthus racemosus* n. sp. Canal system in the mesogloea of the column at the level of actinopharynx and below it. Textfigures 67, 69, 72, 74, 75, 78 and 83 are figured at the same magnification and are similarly orientated.

developed. The specimens sectioned were sterile. The boundary-tract of the mesenteries was deep greenish black in the preserved state. I have not found any microbasic mastigophors in the ectoderm of the tentacles, in maceration preparations. Owing to the thinness of the short actinopharynx, it was difficult to get any good maceration preparations. On slides I have not observed any mastigophors, but possibly they may be present here.

*Zoanthus eyrei*, n. sp.

Pl. II, fig. 10.

Polyps rather low (at least in the contracted state), almost cylindrical, rather close-set, and connected with each other by a thin, flat coenenchyme. Cuticle of the scapus rather thin, thicker in the lowest parts of the polyps, rarely incrustated with diatoms. Ectoderm of the scapus discontinuous, mesogloea of the column with numerous, not pigmented cells, its canal-system very well



developed, forming a close net-work of broader and finer canals arranged in more than two nets, and communicating with each other. Lower sphincter very long and very strong, occupying the greater part of the breadth of the mesogloea; muscle-meshes not especially large, transversely elongated. Upper sphincter in comparison with the lower one very weak. Distal parts of the tentacles with rather numerous spirocysts. Siphonoglyph distinct, broad, its

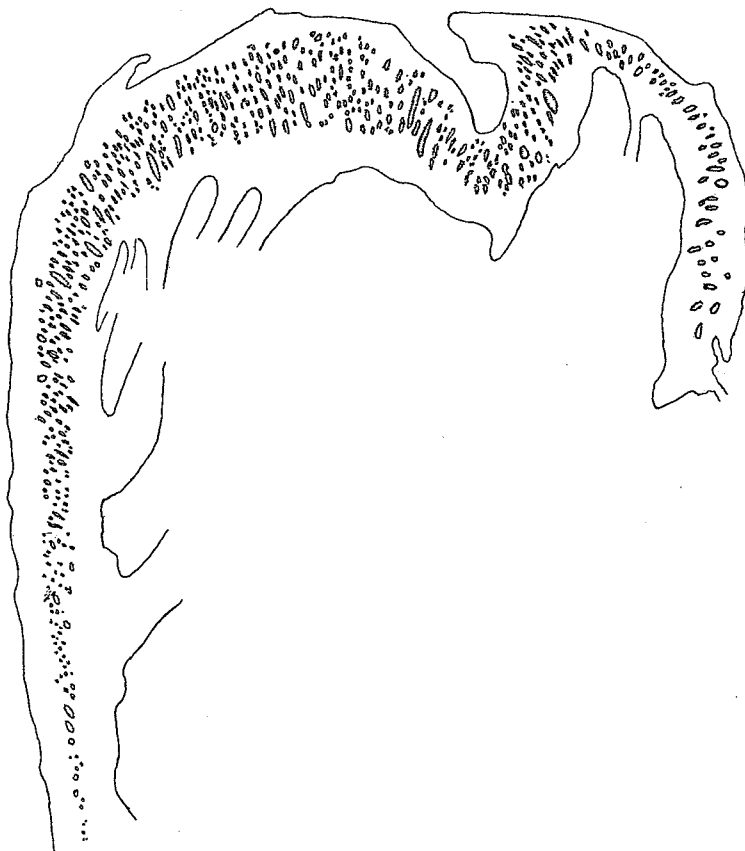


Fig. 68. *Zoanthus eyrei* n. sp. Lower sphincter. Compare fig. 66.

mesogloea not more thickened than that in other parts of the actinopharynx. Mesenteries usually 52—56, sometimes in large polyps up to 62. Imperfect mesenteries well developed. Ciliated tracts of the filaments strong. Region of the filament long, boundary-tract rather broad. Holotrichs of the column 10—12×4 almost 5  $\mu$ ; those of the actinopharynx 11—13×4—4.5  $\mu$ ; microbasic mastigophors in the actinopharynx 14—17× almost 3—3.5  $\mu$ ; those of type *a* in the tentacles 24—25×5  $\mu$ , very sparse; in the filaments 23—26× almost 5  $\mu$ . Spirocysts of tentacles up to about 19×2.5—3  $\mu$ .

*Colour.* Rim (scapulus) and tentacles green, disc salmon-pink, opening of the actinopharynx grey. Pinkish grey when closed (EURE). In the preserved state the boundary-tract of the mesenteries was usually dark greenish.

*Size* in the preserved, contracted state: breadth 0.5—0.6 cm.; height up to 0.6 cm.

*Locality.* Durban (Isipingo), not very common, several colonies, June 1935, EYRE.

I have figured a colony (Pl. II, fig. 10), the lower sphincter (fig. 68), and a surface-preparation of the canal system in the mesogloea of the column (fig. 69 a). The canals were usually fine, forming a fine network, only rarely were there such broad anastomoses as in the upper part of the figure. The ectoderm of the actinopharynx was high, smooth or a little folded, the

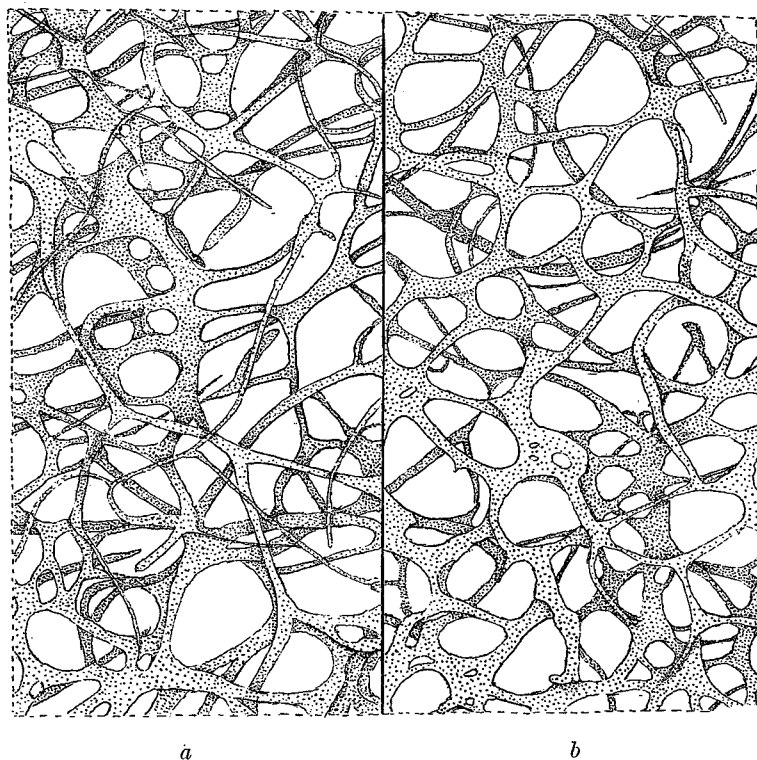


Fig. 69. *a, b.* Canal systems in the mesogloea of the column at the level of actinopharynx and below it.

*a:* from *Zoanthus eyrei* n. sp. *b:* from *Zoanthus lawrencei* n. sp. Compare fig. 67.

mesogloea thickened. I have sectioned 3 specimens in order to examine the number of mesenteries. It was 52 (24 + 28), 54 (26 + 28) and 56. As the insertions of the mesenteries were visible on the rather transparent column, I counted the mesenteries in three other of the largest polyps. They were 56, 60 and 62. The lacunae at the bases of the mesenteries were large. In the boundary-tract of the mesenteries there were irregular groups of cells which I think may be zooxanthellae, both at the base of the endoderm and in the mesogloea; sometimes they form elevations in the endoderm in other parts of the mesenteries. They occur also in the mesogloea of the ciliated tract and

in that of the actinopharynx, whose ectoderm sometimes has similar inclusions. The small holotrichs seem to be fewer than in other species here described. I have associated this species with the name of Miss E. J. EYRE, assistant in the Zoological Laboratory of the University of Cape Town.

*Zoanthus lawrencei*, n. sp.

Pl. II fig. 3.

Polyps close-set on a flat rather thin coenenchyme, in the contracted state almost cylindrical, with the distal end only somewhat broader than the base. Cuticle of scapus rather strong, incrustated with diatoms. Ectoderm of the scapus discontinuous. Mesogloea of the column with very numerous, mostly rounded, not pigmented cells. Canal-system very well developed, forming a

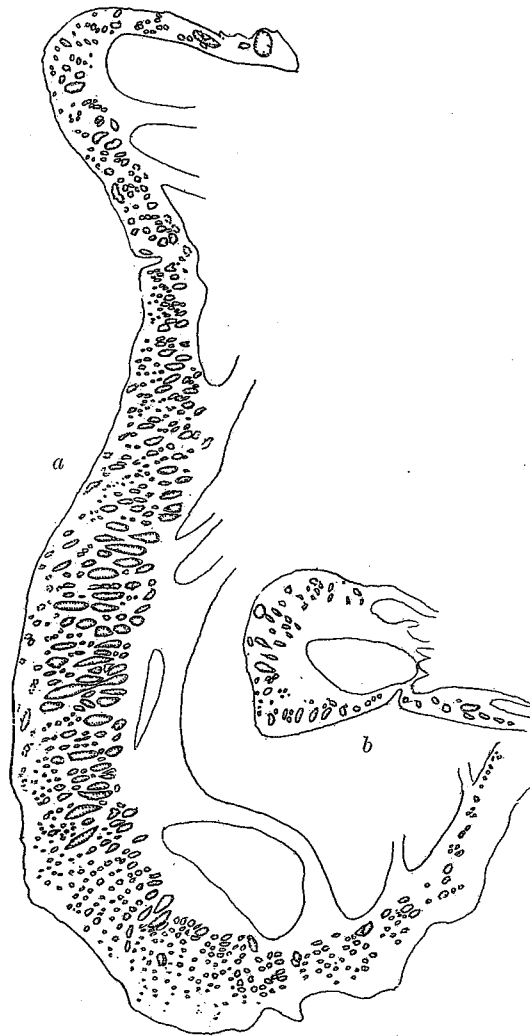


Fig. 70. *Zoanthus lawrencei* n. sp. Lower (a) and upper (b) sphincters. Compare fig. 66.

close net-work, canals mostly fine, forming at least two nets communicating with each other, not drawn out in the direction of the mesenteries. Lower sphincter very strong and very long, occupying almost the whole breadth of the mesogloea, its muscle-meshes often drawn out transversely. Upper sphincter rather well developed, but very weak in comparison with the lower one. Ectoderm of tentacles almost without spirocysts. Siphonoglyph distinct, broad, its mesogloea not more thickened than in the other parts of the actinopharynx. Mesenteries 52—54. Imperfect mesenteries rather weak. Ciliated tract of the filaments well developed, boundary-tract little if at all broader than the broad cnidoglandular tract. Filamentous region of the mesenteries long. Holotrichs short, those of the column 11—13 × about 5 μ; those of the tentacles 11—13 × 4.5—5 μ; those of the actinopharynx 11—13 × about 5 μ; those of the filaments 12—13 × 4.5—5 μ, very few; microbasic mastigophors in the tentacles absent; those of the ectoderm of the actinopharynx 16—20 (22) × 2.5—3.5 μ, common; those of the filaments

22—26 $\times$  about 3.5  $\mu$ , very sparse; those of type *a* in the filaments 26—31 $\times$   $\times$  4.5—5  $\mu$ . Zooxanthellae absent from the ectoderm, present in the endoderm, especially numerous in the tentacles. Dioecious (always?).

*Colour.* Lower part of the column pale, scapulus dark greenish grey, tentacles brown, oral disc brown shading into green, especially visible when the brown colour is scraped off, actinopharynx colourless, CARLGREN.

*Size* of the polyps: length up to 1.5 cm., breadth up to 0.5 cm. in the preserved state. The smallest polyp was 0.8 cm. long and 0.35 cm. wide.

*Locality.* Durban (Isipingo), several colonies, Nov. 1935, C. The colonies formed large expanses on flat rocks.

The figures show the external appearance of part of a large colony (Pl. II, fig. 3), a section of the sphincters (fig. 70), and part of the canal-system in the mesogloea of the column (fig. 69 b). The spirocysts in the ectoderm of the tentacles are very rare and can easily be overlooked. In some tentacles I found none at all, in others a few, both in maceration-preparations and on slides. They are almost absent. The ectoderm of the actinopharynx was folded, and much higher than the ectoderm of the siphonoglyph; its folds supported little if at all by thickenings of the mesogloea, which was rather thin.

Three polyps examined had 52 (26+26), 54 (26+28) and 54 (26+28) mesenteries respectively. The imperfect mesenteries were rather weak in the region of the actinopharynx. All three individuals were fertile and female.

I have named this species after Dr. R. F. LAWRENCE of the Natal Museum, Pietermaritzburg.

#### *Zoanthus natalensis*, n. sp.

Pl. II fig. 1.

Polyps close-set, arising from a comparatively thick, flat coenenchyme, cylindrical, in the contracted state low, their length not greater than the breadth. Cuticle of the scapus rather thick, richly incrustated with diatoms. Ectoderm of the scapus discontinuous. Mesogloea of the column with rather numerous, not pigmented cells. Canal-system of the mesogloea consisting of rather thin meshes, often slightly extended in the direction of the mesenteries and forming at most two nets. Canals of moderate diameter. Lower sphincter rather long, mostly situated nearer the ectoderm than the endoderm, occupying about half the thickness of the mesogloea and of about the same width throughout its course, its muscle-meshes rather large, rounded. Spirocysts in the tentacles rather common. Siphonoglyph distinct, rather broad. Mesenteries 50—56 (64). Imperfect mesenteries well developed. Filamentous region long. Ciliated tract well developed. Boundary-tract not or not much broader than the cnidoglandular tract. Holotrichs of the column 13—14 $\times$  about 5  $\mu$  (12—17 $\times$  5—4.5  $\mu$ ); those of the tentacles 12—13 $\times$  about 5  $\mu$  (13—15 $\times$  5—4.5  $\mu$ ); those of the actinopharynx 12—14 $\times$  about 5  $\mu$  (13—19 commonly 14, by about 5  $\mu$ ) rather common; those of the filaments and boundary tract 12—14 $\times$  about 5  $\mu$  (12—16 $\times$  4.5—5.5  $\mu$ ); microbasic mastigophors of the actinopharynx 24—26 $\times$  about 3.5  $\mu$  (23—24 $\times$  about 3.5  $\mu$ ), very sparse; those of the filaments

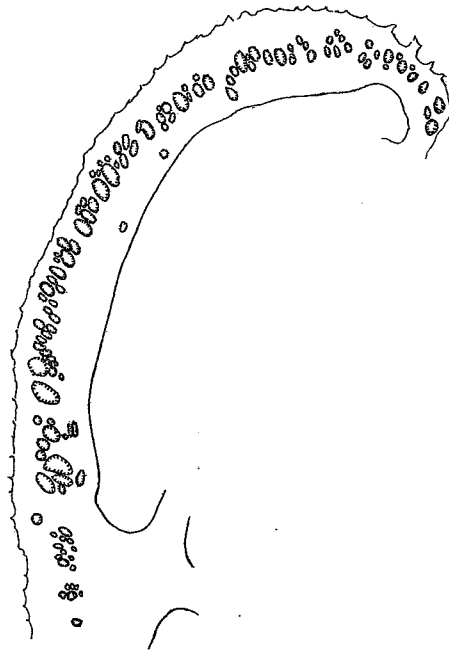


Fig. 71. *Zoanthus natalensis* n. sp. Lower sphincter. Compare fig. 66.

22—26  $\times$  2.5—3  $\mu$  (24—29  $\times$  about 4  $\mu$ ), sparse; those of type *a* in the filaments 19—22  $\times$  3.5  $\mu$  (17—19  $\times$  about 4  $\mu$ ). Spirocysts of tentacles up to about 8  $\times$  3  $\mu$ .

*Colour.* Lower parts of the polyps greyish, upper parts light green, tentacles brown, oral disc brown with a green annulus round the mouth; the oral disc outside the annulus sometimes becomes green or is provided with a second outer annulus, CARLGREEN.

*Size* of the polyps in the contracted preserved state: height 0.2—0.4 cm.; breadth 0.4(0.5) cm.

*Locality.* Durban (Isipingo), several colonies, Nov. 1935, C (holotype); 1 colony, July 1935, S.

The polyps were, in the contracted state, usually very low, the coenenchyme thicker, sometimes up to 0.4—0.5 cm. I have sectioned the sphincters of two polyps. They showed good agreement.

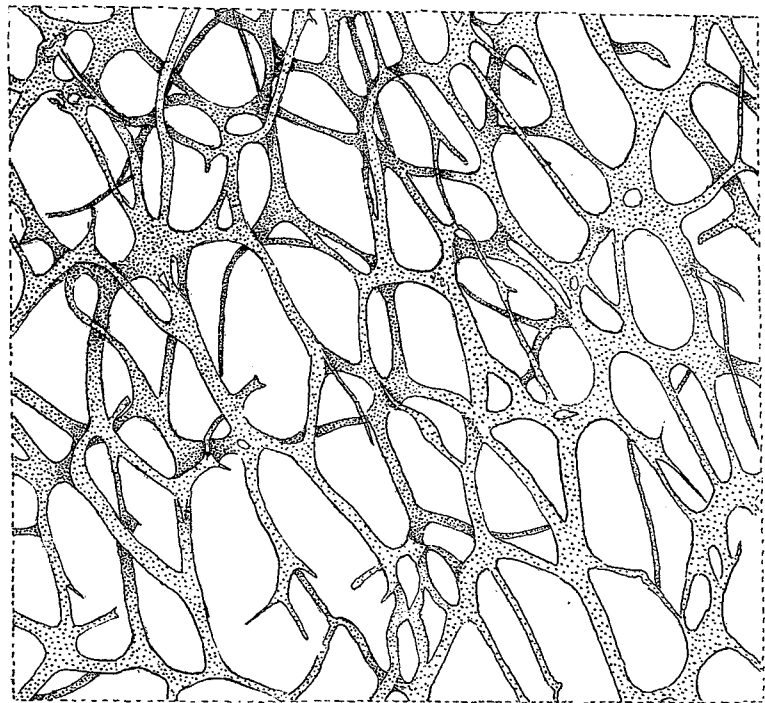


Fig. 72. *Zoanthus natalensis* n. sp. Canal system in the mesogloea of the column at the level of actinopharynx and below it. Compare fig. 67.

The figures represent the facies of a part of a colony (Pl. II, fig. 1), the appearance of the lower sphincter (fig. 71), and a part of the canal-system in the mesogloea of the column (fig. 72). The actinopharynx was longitudinally folded, its ectoderm much higher than that of the broad siphonoglyph; the folds were supported little if at all by thickenings of the mesogloea, which was rather thin.

The mesenteries in 5 polyps examined were as follows: 50 (23 + 27), 50 (24 + 26), 52, 54, 56. The arrangement in the first individual was irregular in that the *imperfect directives were absent*. Some of the polyps examined were fertile, but the ova were sparse. I have identified a colony labelled Dz1a (July 1935) with this species, as the external appearance, the sphincter, the canal-system and the occurrence of spirocysts agree with *natalensis*, but not well with *durbanensis*. The mesenteries, however, were more numerous here, 54—64 in five individuals. The sizes of the nematocysts (given in brackets above) were also a little different.

#### *Zoanthus brighti*, n. sp.

Pl. II fig. 9.

Polyps close-set on a flat thin coenenchyme, in the contracted state cylindrical, low. Cuticle of scapus well developed, little if at all incrustated with detritus. Ectoderm of the scapus discontinuous. Mesogloea of the column with numerous rounded not pigmented cells, its canal-system recalling that of *Z. eyrei* and *Z. lawrencei*, though the canals are thinner, and communicate with the ectoderm in several places; the meshes of the net-work are mostly transversely elongate. Lower sphincter long, very strong, occupying about half the thickness of the mesogloea, its muscle-meshes often very large, and transversely elongated. Spirocysts of tentacles very few (practically absent). Tentacles short. Mesogloea of the distinct siphonoglyph not more thickened than that in other parts of the actinopharynx. Mesenteries 58—72, rather thick, imperfect mesenteries rather short. Ciliated tracts of filaments well developed, as also the cnido-glandular tract; boundary-tract narrow or rather broad, with pigmented gland-cells. Zooxanthellae absent from the ectoderm, numerous in the endoderm, especially in the tentacles. Holotrichs of the column 12—14 × 4.5—5  $\mu$ , sparse; those of the actinopharynx 11—14 × 4.5—5  $\mu$  (possibly belonging to the endoderm); those of the filaments and boundary-tract about 12.5 × 4.5  $\mu$ ; microbasic mastigophors in the ectoderm of tentacles 12—13 (17) × about 3  $\mu$ ; those of the actinopharynx 17—22 × quite 2.5—3.5  $\mu$ ; those of type *a* in the filaments 26—29 × 4.5—5  $\mu$ .

*Colour.* Greenish fawn tentacles, bright green disc with very fine dark brown lines. Grey when closed, EYRE.

*Size.* Length and breadth up to 0.6 cm. in the preserved state.

*Locality.* Durban (Isipingo), several colonies, June 1935, fairly common in pools on lower platform, EYRE.

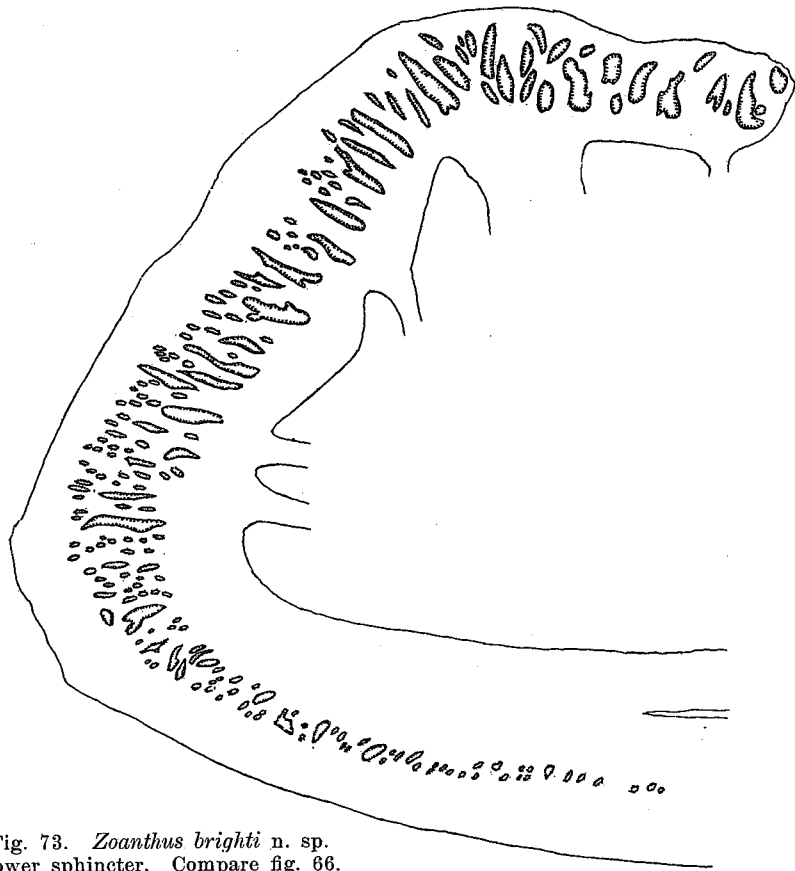


Fig. 73. *Zoanthus brighti* n. sp.  
Lower sphincter. Compare fig. 66.

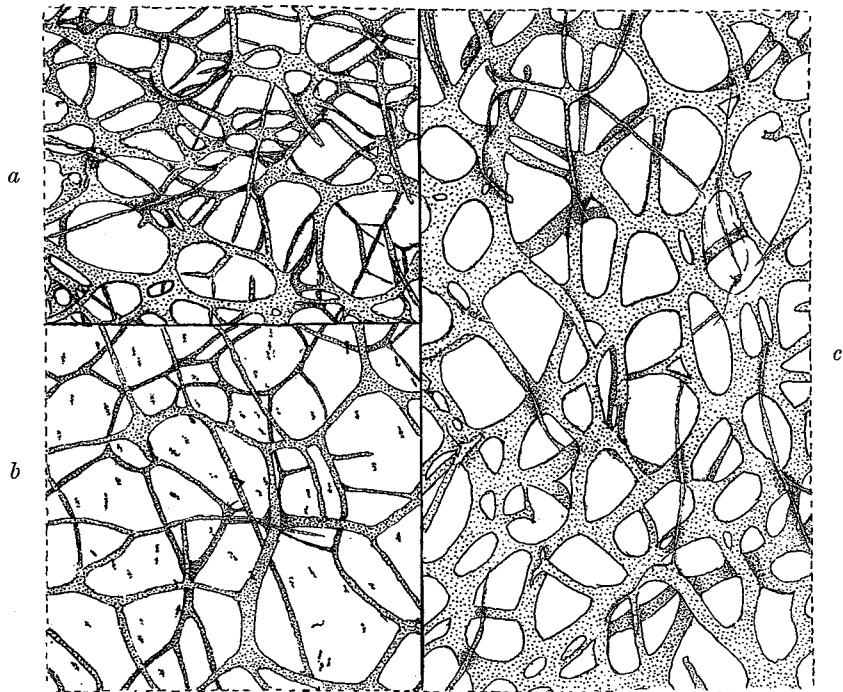


Fig. 74. Canal systems in the mesogloea of the column at the level of actinopharynx and below it *a* from *Zoanthus brighti* n. sp., *b* from *Zoanthus parvus* n. sp., *c* from *Zoanthus barnardi* n. sp.  
Compare fig. 67.

The figures show the appearance of a small part of a colony (Pl. II, fig. 9), the appearance of the lower sphincter (fig. 73), and part of the canal-system in the mesogloea of the column (fig. 74 a). Three specimens sectioned had similar sphincters. The mesenteries in five polyps examined were 58, 62, 64, 66 and 72 in number. The species is named after Miss K. M. F. BRIGHT, formerly assistant at the Zoological Department of the University of Cape Town.

*Zoanthus durbanensis*, n. sp.

Pl. II fig. 13.

Polyps not very closely set, arising from a flat, rather thick coenenchyme. Cuticle of the scapus incrustated with diatoms, rather thick. Ectoderm of the scapus probably discontinuous? Mesogloea of the column with rather numerous, not pigmented cells, its canal-system forming mostly rather wide meshes, often elongated in the direction of the mesenteries, and not situated in the same

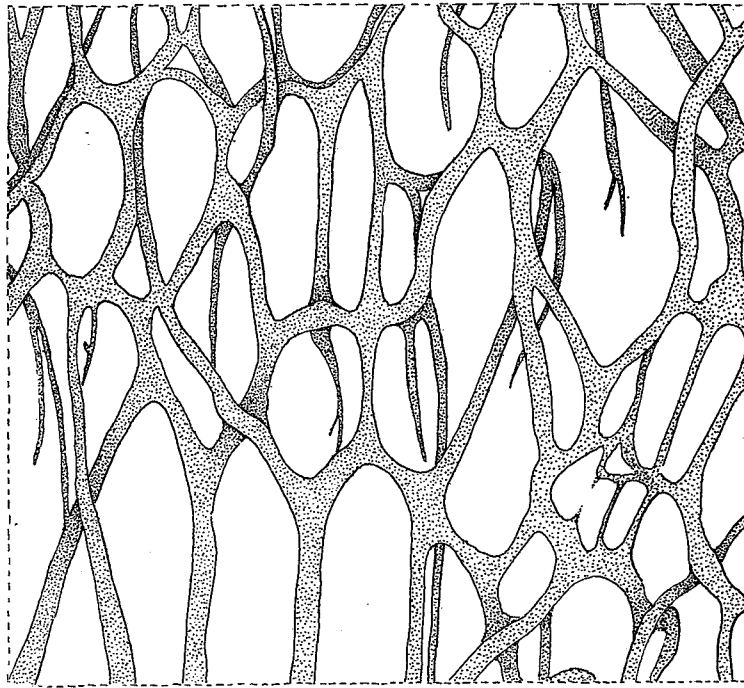


Fig. 75. *Zoanthus durbanensis* n. sp. Canal system in the mesogloea of the column at the level of actinopharynx and below it. Compare fig. 67.

plane; the canals usually rather broad. Lower sphincter long but weak, occupying less than half the thickness of the mesogloea, and consisting of very narrow muscle-meshes. Spirocyts of tentacles common. Actinopharynx longitudinally furrowed, siphonoglyph distinct, broad, its mesogloea not more thickened than that of other parts of the actinopharynx. Mesenteries in large polyps 58—82. Imperfect mesenteries well developed. Boundary-tract of the



mesenteries narrow. Zooxanthellae in the endoderm but not in the ectoderm. Holotrichs of the ectoderm of the column, tentacles and actinopharynx  $14-17 \times 4.5-5 \mu$ ; those of the filaments and boundary-tract  $14-17 \times 4.5-5 \mu$ ; microbasic mastigophors in the actinopharynx about  $22-24 \times 3.5-4 \mu$ , common; those of the filaments  $24-25 \times 4.5 \mu$ , sparse; those of type  $\alpha$   $16-19 \times$  about  $3.5-4 \mu$ . Spirocysts of tentacles up to about  $19 \times 3.5 \mu$ .

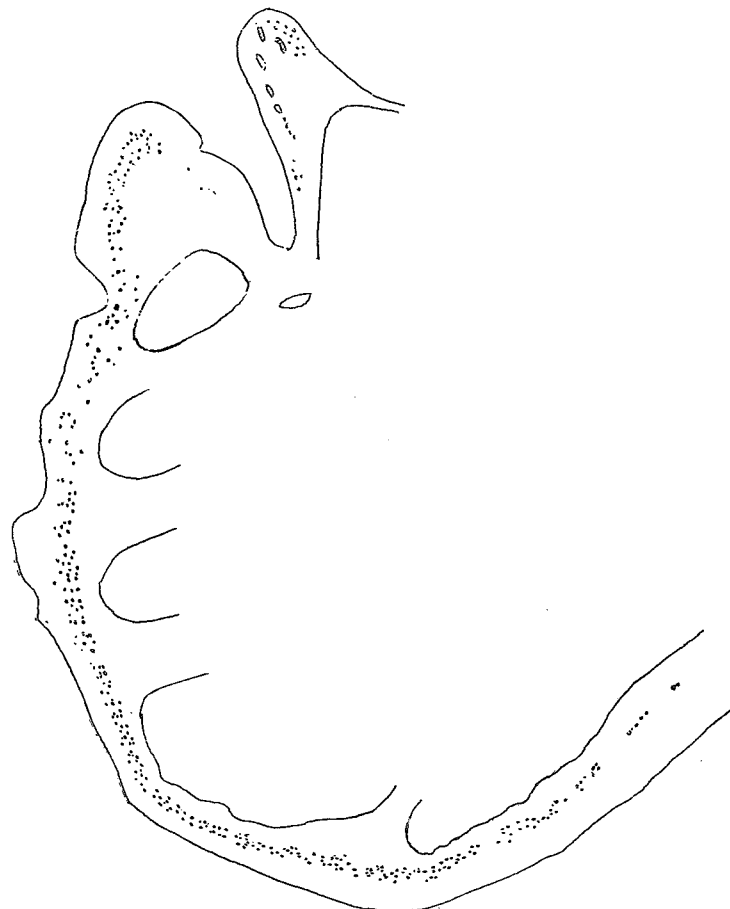


Fig. 76. *Zoanthus durbanensis* n. sp. Lower and upper sphincters. Compare fig. 66.

*Colour.* Bright green disc, rim (scapulus) and tentacles greyish green, which, when the polyps are shut, gives the mass a powdery green greyish appearance, (EYRE). The filaments were greenish in formalin.

*Size.* Breadth up to 0.6(0.7) cm., height up to 0.5 cm. in the preserved state.

*Localities.* Durban (Isipingo), several colonies, also at Reunion rocks, S. »Common in large expanses on the more landward reefs of the seaward belt. At Reunion Rocks it completely covers the landward face of one of the lower platforms.» (EYRE.)

The polyps were of different sizes. In one colony there were three rather small polyps which were connected with each other in almost the whole length of the scapus. One of them was probably in a state of longitudinal fission. There were two crowns of tentacles and two actinopharynges. Although the specimen was not very well preserved, it seems that the incipient division has taken place in the directive plane. In the periphery of the polyp 64 mesenteries were present, 33 on the one side, 31 on the other. Moreover, several mesenteries joined the two parts of the double polyp to one another in the middle. As the ectoderm of the scapus was not well preserved I am not sure that it is discontinuous. Pl. II, fig. 13 shows part of a colony, figure 75 part of the canal-system in the mesogloea of the column, and figure 76 a section of the sphincters. I have examined the sphincters in three polyps, and in all they were of the same structure. Owing to the weakness of the sphincters, the polyps were not very strongly contracted and the tentacles were more or less visible. Four large polyps examined had 58 (28 + 30), 58, 62 (30 + 32) and 82 mesenteries.

*Zoanthus capensis*, nov. nom.

*Zoanthus* sp.? ERDMANN 1885, p. 18.

*Zoanthus confertus* VERR. R. HERTWIG 1888, p. 37, Pl. I, fig. 12.

Polyps rather low, closely set, rising from a flat, rather thin coenenchyme, in the contracted state forming a very low cylinder. Cuticle of the scapus rather strong, somewhat incrustated with thread-algae. Ectoderm of the scapus discontinuous. Mesogloea of the column with numerous, not pigmented cells, its canal-system forming a network, not elongated in the direction of the mesenteries, in the main situated in one plane, and having the appearance of flat, often more or less star-like nodes from which wider and narrower canals run out. Lower sphincter rather short, occupying, in its upper part, the greater part of the thickness of the mesogloea, its muscle meshes rather large. Upper sphincter very weak. Spirocysts of tentacles rather common. Mesogloea of the actinopharynx and siphonoglyph thin. Mesenteries in large polyps about 50—58, imperfect mesenteries rather well developed. Filaments long. Ciliated tract well developed, boundary-tract narrow. Zooxanthellae numerous in the endoderm, especially in the tentacles, absent from the ectoderm. Monoecious, ovaries and testes in one and the same mesentery. Holotrichs of the column  $14-16 \times 5-5.5 \mu$ , numerous at the upper sphincter; those of the tentacles  $13-17 \times 5-5.5 \mu$  (possibly belonging to the endoderm?); those of the actinopharynx  $14-17 \times 5.5-6 \mu$ ; those of the filaments and boundary-tract  $13-17 \times 5-6 \mu$ ; microbasic mastigo-



Fig. 77. *Zoanthus capensis* nov. nom. Lower sphincter. Compare fig. 66.

phors of the actinopharynx  $19-22\times$  about  $3-3.5\ \mu$ ; those of the filaments  $19-24\times$  about  $4\ \mu$ .

*Colour* unknown.

*Size.* Height  $0.6-0.8$  cm., breadth  $0.3-0.4$  cm., in the preserved state.

*Locality.* Simons Bay, 10-20 fms., CHALLENGER exped.

The species has been previously described by ERDMANN, but rather imperfectly. He examined among other structures the gonads and the mesenteries. He speaks of stolons forming a series of narrow bands showing a

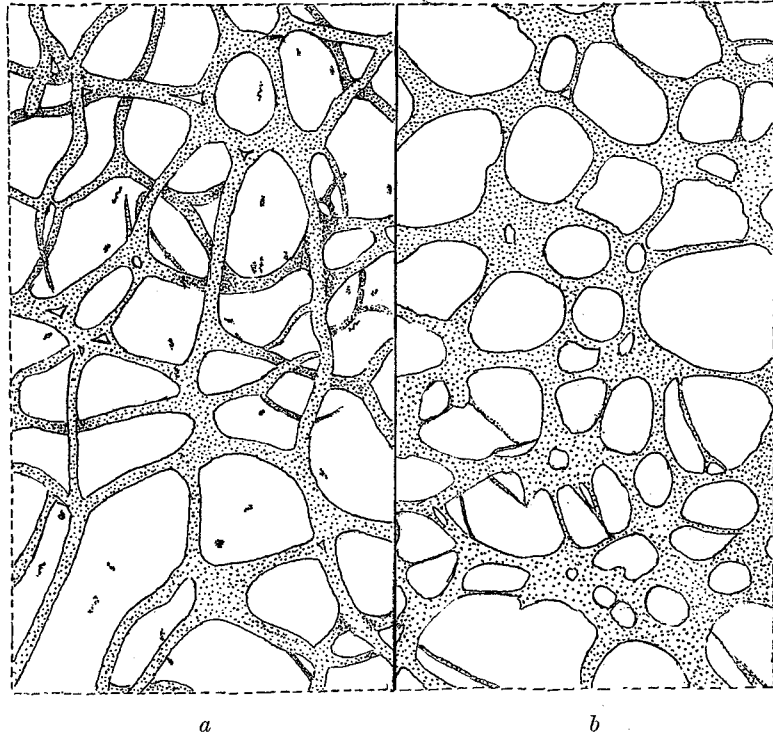


Fig. 78. Canal systems in the mesogloea of the column at the level of actinopharynx and below it *a* from *Zoanthus stephensoni* n. sp. *b* from *Zoanthus capensis* nov. nom. Compare fig. 67

strong tendency to grow together, and thus in several places appearing as a continuous plate. I cannot find any stolons in the coenenchyme of the holotype. ERDMANN examined 11 specimens as to the number of mesenteries. 10 had 36-58 mesenteries, of these 6 were provided with 50-56, the eleventh was irregularly developed (see *Z. racemosus*, p. 121). In three individuals examined by me the mesenteries were 50, 50 and 56. I give here figures of the lower sphincter (fig. 77) and of part of the canal-system of the columnal mesogloea (fig. 78 b).

As HERTWIG certainly incorrectly identified this species with *Z. confertus* VERR., I have given it a new name, *capensis*.

*Zoanthus stephensoni*, n. sp.

Pl. II fig. 11.

Polyps elongated, broader distally than at the base, rather close-set on a very thin coenenchyme which forms stolons or narrow plates. Cuticle of scapus incrustated with diatoms; a distinct, strong sub-cuticle. Ectoderm of scapus discontinuous. Irregular, scattered, often pigmented cells in the mesogloea of the column; its canal-system netlike, with the meshes sometimes not situated in the same plane, and rarely elongated in the direction of the mesenteries. Canals moderately wide. Lower sphincter rather strong and somewhat long, occupying about half of the thickness of the mesogloea, its muscle-meshes rather narrow, rounded. Upper sphincter weak. Tentacles without any trace of spirocysts. Ectoderm of the narrow actinopharynx smooth or sometimes folded, but in the latter case not supported by elevations of the thick mesogloea. Siphonoglyph distinct, its mesogloea not thicker than in other parts of the actinopharynx. Mesenteries 48—50. Imperfect mesenteries well developed. Filaments short, ciliated tracts well developed, boundary-tract broad. Zooxanthellae numerous in the endoderm of tentacles and mesenteries, absent from the ectoderm. Holotrichs of the column  $12-14 \times 5-6 \mu$ ; those of the tentacles  $13-14 \times 5-5.5 \mu$ , common on their aboral sides; those of the actinopharynx  $13-4.5 \mu$ ; those of the filaments and boundary-tract  $12-17 \times 5-6 \mu$ ; microbasic mastigophors of the actinopharynx  $13-19 \times 2.5$ —almost  $3.5 \mu$ ; those of the filaments  $24 \times 2.5 \mu$ , very rare; those of type *a*  $19-20 \times 4.5-5 \mu$ .

*Colour.* Bright green disc, dark brown rim (scapulus) and tentacles; pink when closed; (EYRÆ).

*Size* in the preserved state: length of the polyps 1.3—1.5 cm., breadth in the uppermost part 0.3—0.35 cm., at the base 0.15—0.2 cm.

*Locality.* Durban (Isipingo), several colonies, June 1935, common in pools in the seaward part of the lower platforms, EYRÆ; Durban (The Bluff), 1 colony, Aug. 1929, M.

Three sterile polyps which were sectioned had 48, 50 and 50 (26+24) mesenteries respectively. I have made several maceration-preparation of the tentacles and also examined the oral disc and tentacles on slides, but have never found any spirocysts in these organs. I have figured the external appearance of a colony (Pl. II, fig. 11), a section of the sphincter (fig. 79), and a part of the canal-system of the mesogloea of the column (fig. 78 a). Owing



Fig. 79. *Zoanthus stephensoni* n. sp.  
Lower sphincter. Compare fig. 66.

to the narrowness of the actinopharynx it was very difficult to make maceration-preparations of it, whence I am not sure that the holotrichs belong to the ectoderm.

*Zoanthus parvus*, n. sp.

Pl. II fig. 4.

Very minute polyps, elongated but in the contracted state often low; close-set and connected with each other by a rather thin, flat coenenchyme. Ectoderm of the scapus probably discontinuous, and provided with a rather well developed cuticle incrustated with diatoms. Mesogloea of the column in

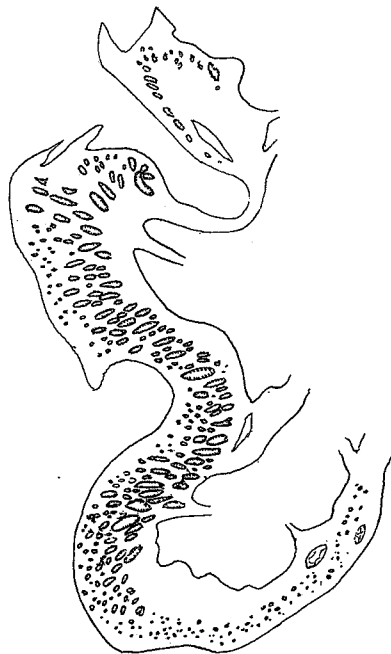


Fig. 80. *Zoanthus parvus* n. sp. Lower and upper sphincter. Compare fig. 66.

its outer half with scattered, elongated pigmented cells, its canals usually fine, not situated in the same plane, the meshes not elongated in the direction of the mesenteries. Lower sphincter strong, with many large transverse muscle-meshes. Ectoderm of tentacles without any trace of spirocysts. Mesogloea of the actinopharynx thick, siphonoglyph distinct, its mesogloea not thicker than that of the other parts of the actinopharynx. Mesenteries 44—52, rather thick, the microcnemes rather well developed. Boundary-tract of the macrocnemes broad, cnidoglandular tract thin. Zooxanthellae present in the endoderm, especially numerous in the tentacles, absent from the ectoderm. Holotrichs in the ectoderm of the column  $14-15.5 \times$  about  $5 \mu$ ; in that of the tentacles  $13-17 \times 5.5-4.5 \mu$ , numerous and in the main situated on the aboral side; in that of the actinopharynx  $14-16 \times 6-5 \mu$ ; in the filaments and boundary tract  $14-16 \times 5.5-4.5 \mu$ ; microbasic mastigophors absent from the tentacles, present in the ectoderm of the actinopharynx and in the filaments, in the former numerous  $14-17 \times 3-4 \mu$ ; in the latter  $17.5-20 \times$  almost  $4 \mu$ .

*Colour.* I have not seen the polyps in the expanded state, but noted that they were not greenish. The cuticle, especially in the lower part of the polyps, was yellowish brown.

*Size* in the preserved state, with the tentacles drawn in: breadth of the polyps 0.2—0.35 cm., length up to 0.9 cm., usually considerably shorter.

*Locality.* Durban (Reunion rocks), Nov. 1935, several colonies, C.

I have sectioned four polyps, which show good agreement in their structure. The numbers of mesenteries were 44, 46, 46 (24+22) and 52. Two polyps had small ovaries. I have examined many tentacles in maceration-preparations and on slides, but never observed any spirocysts; they may be completely

absent here. Pl. II, fig. 4 shows the appearance of the colony, figure 80 a section of the sphincters, and figure 74 b part of the canal-system and the pigmented cells in the mesogloea of the column.

*Zoanthus barnardi*, n. sp.

Pl. II fig. 7.

Polyps short, close-set, rising from a comparatively thick, flat coenenchyme. Upper ends of the polyps in the strongly contracted state, somewhat truncate. Ectoderm of the scapus discontinuous, its cuticle rather strongly incrustated with thread-algae and a few diatoms; sub-cuticle distinct. Mesogloea of the column with numerous, mostly rounded, not pigmented cells and cell islets. Canal-system in the mesogloea well developed, the canals of ordinary width, not situated in the same plane, the meshes rather fine, not elongated in the direction of the mesenteries. Sphincter of ordinary length, occupying about half the thickness of the mesogloea, the muscle-meshes transversely elongate, some of them rather wide. Spirocysts of the tentacles rather common. Actinopharynx wide, longitudinally folded, the folds supported by more or less strong elevations of the mesogloea. Siphonoglyph broad, very distinct, its mesogloea not more thickened than that of other parts of the actinopharynx. Mesenteries 50—54. Imperfect mesenteries rather well developed. Region of the filaments long. Boundary-tract of the mesenteries narrow. Dioecious. Holotrichs of the column  $14-17(18) \times 5-5.5 \mu$ ; those of the tentacles  $14-17 \times 5-6 \mu$ ; those of the actinopharynx  $14-18 \times 5-6 \mu$ , common; those of the filaments  $14-17 \times 5-6 \mu$ ; microbasic mastigophors of the tentacles probably absent; those of the actinopharynx  $24-31 \times 3.5-4 \mu$ , not numerous; those of the filaments  $(22)24-31 \times (2.5)3-4 \mu$ .

*Colour* when closed, light green (CARLGRÉN).

*Size.* Breadth and length of polyps, in preserved state, at most 0.5 cm., most individuals smaller.

*Locality.* Durban (Reunion rocks), 1 colony, Nov. 1935, C.

I have sectioned four specimens in order to ascertain the structure of the lower sphincter. It was not well preserved, but had in all polyps about the appearance shown in figure 81. Part of the canal-system is shown in figure 74 c. Two individuals had 54 (28 + 26) and 50 (26 + 24) mesenteries. In one polyp I found a few ova.

I associate this species with the name of Dr. K. H. BARNARD of the South African Museum, Cape Town.

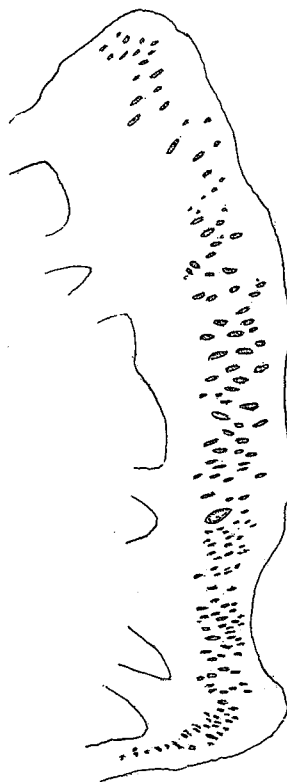


Fig. 81. *Zoanthus barnardi* n. sp. Lower sphincter. Compare fig. 66.

*Zoanthus sansibaricus*, CARLGR.

Pl. II fig. 8.

*Zoanthus sansibaricus*, n. sp. CARLGRÉN 1900, p. 101, Pl. 3, fig. 4, pl. 5, fig. 7, pl. 7, figs. 1, 3.

» » CARLGR. PAX 1909, p. 407, pl. 23, fig. 1.

Polyps elongated, broad distally, diminishing towards the base, connected with each other by stolons or small plates. Ectoderm of the scapus discontinuous, with a well developed yellowish brown cuticle, incrustated with numerous

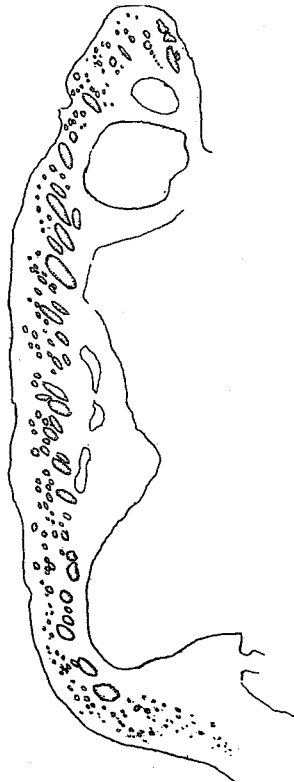


Fig. 82. *Zoanthus sansibaricus*. Lower sphincter. Compare fig. 66.

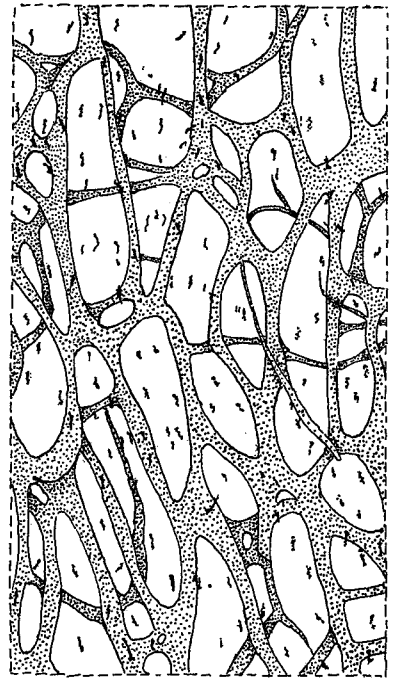


Fig. 83. *Zoanthus sansibaricus*. Canal system in the mesogloea of the column at the level of actinopharynx and below it. Compare fig. 67.

diatoms; sub-cuticle distinct. Mesogloea of the column with very numerous pigmented cells towards the ectoderm, its canals of ordinary diameter, not situated in the same plane, the meshes usually rather fine, sometimes elongated in the direction of the mesenteries. Lower sphincter rather strong but not very long, occupying half or more of the thickness of the mesogloea, with numerous large meshes often transversely elongated. Spirocysts in the tentacles very few. Ectoderm of the actinopharynx not folded, its mesogloea thick, siphonoglyph rather distinct, its mesogloea not thickened. Mesenteries 44—55 (55). Imperfect mesenteries well developed. Region of the filaments long, boundary-tract broad, cnidoglandular tract narrow. Zooxanthellae numerous

in the endoderm, absent from the ectoderm. Holotrichs in the ectoderm of column and tentacles  $14-17 \times 5-5.5 \mu$ ; in the actinopharynx  $14-16 \times 5.5-6 \mu$ ; in the filaments and boundary-tract  $14-16 \times 5.5-6 \mu$ ; microbasic mastigophors in the actinopharynx  $17-20 \times$  about  $3 \mu$ .

*Colour.* Polyps pinkish grey distally (colonies from Isipingo), EYRE; greenish grey distally (colony from Reunion Beach). According to STUHLMANN (CARLGRÉN 1900) the column was slate-grey, whitish above, the tentacles smoke-brown with orange-red spots on their inner sides, the oral disc red-brown with greenish radial stripes.

*Size.* Length 0.8—1.5 cm., breadth distally 0.35—0.4 cm., at the base 0.2—0.3 cm., in the preserved state.

*Localities.* Durban (Isipingo), several colonies, June 1935, S.; (Reunion Beach), 1 colony, July 1932, S.

The polyps from Isipingo were more closely examined. The figures show a section of the lower sphincter (fig. 82) and part of the canal-system (fig. 83). The mesenteries in four polyps were 44, 44 (22+22), 46 and 50 in number. The polyps from Reunion Beach show rather good agreement in all characters with those from Isipingo. The mesenteries in two polyps were, however, slightly more numerous, 52 and 55 (24+31).

I have with some hesitation identified the colonies from Durban with *sansibaricus*. At least they are very closely related to this east-African form.

#### The distribution of the species. Some zoogeographical results.

As has been seen above, the Actinarian and Zoantharian fauna is very rich in species in South African waters; and probably there are more species new to science in these waters than the ones described here. This richness is connected with the fact that a warm current, running southward from the Mosambique Channel, and known as the Agulhas current, sweeps past a considerable part of the South African Coast. Another factor contributing to this richness is, I think, that warm and cold currents meet off part of the coast, and where such a meeting is to be found a rich benthal fauna commonly appears.

The species described here have very different individual distributions along the coast of South Africa. A few species occur along the whole coast and also in South-West Africa; others seem to exist only in the Atlantic waters, others only on the coast of Natal. The majority of the species seem to be endemic, though belonging to genera previously known. Five new genera (*Halcampaster*, *Anthostella*, *Isanthus*, *Litophellia* and *Acontiophorum*) are proposed in this paper, and these genera, together with *Palaeozanthus*, seem to be characteristic of South Africa. To these must be added *Anthothoë*, which also occurs on the South-West-African coast. About half of the species described inhabit the intertidal (littoral) zone. Some of them also extend deeper down (in the table given below these are marked with an asterisk).



Examining first the intertidal forms, we find from the comparative table given below that of the 34 intertidal species, 13 occur on the Atlantic coast, all the others in the Indian Ocean (the boundary between them being set at Cape Agulhas). Four species, *Pseudactinia flagellifera*, *Bunodactis reynaudi*, *Anthopleura michaelsoni* and *Anthothoe stimpsoni*, occur the whole way from Lüderitz Bay in South-West Africa, to Durban; 5 species have been found solely in the Atlantic, 22 solely in the Indian Ocean. One species is recorded also from St. Helena, 3 from Zanzibar, 2 from the Red Sea, one from the Auckland Islands, and one from European and West African waters. Several opinions have been expressed concerning the boundary between the tropical and the temperate fauna, on the South African coast. ORTMANN (1896) placed it at Durban, other authors in Algoa Bay or more westwards. It may well be that there is a considerable difference between the planktonic and the benthonic forms in this respect. Tropical fishes and plankton are transported by the warm Agulhas current, at least when it is strongest, as far as Algoa Bay or even further westwards. Free-swimming larvae of tropical bottom-animals may also under favourable circumstances adhere, grow and reach sexual maturity in a temperate region, and perhaps live on for some time. Probably the discovery of *Zoanthus capensis* and *Palythoa capensis*, the former once and the latter twice, in False Bay, may be explained by such a settlement; but these species have not been taken in the intertidal zone in False Bay, but only in the sublittoral<sup>1</sup>. On the whole I think that at least as far as the Actinaria and Zoantharia are concerned we must set the boundary between the tropical and temperate region at Durban. I will, however, make the reservation that it is possible that the tropical forms extend somewhat further westwards. The fauna on the long stretch of coast between East London and Durban has never been closely examined. At Durban we meet such exclusively tropical forms as *Isaurus* and *Rhodactis*; other forms (*Calliactis polypus* and *Actinioides sultana*) which also occur, the former in the Red Sea and at Zanzibar, the latter at Zanzibar; and an exceptionally rich fauna of several species of *Zoanthus* and *Palythoa*. All these forms are missing at East London, except a single species of *Palythoa*, which was probably taken in the sublittoral zone. For the corals also we may set the boundary for the tropical fauna at Durban. Here reef-corals are to be found, though sparingly, in the intertidal zone; at East London there are none. Probably the same supposition holds good also for other marine invertebrates.

A further comment on certain of the species is required. As I have already pointed out (p. 30), I have not been able to find any distinct difference between the European *Actinia equina* and the specimens of *Actinia* which occur round the whole South African coast. This seems rather curious, but

<sup>1</sup> A similar occurrence, certainly accidental, is to be noted from the Scandinavian coast. Several specimens of *Anemonia sulcata* [which according to STEPHENSON (1935) is not recorded for certain on the East coast of England and Scotland, but extends in the Channel from the Scillies at least as far East as Portsmouth] were found in 1936 in the intertidal zone at Espeland, not far from Bergen.

if we recall that this European species has been found on the West African coast as far south as St. Thomé in Guinea Bay, the distribution appears less peculiar. It is true that there is a gap in the distribution, between St. Thomé and Port Nolloth, as far as we at present know, but I think that the species possibly occurs also on the coast of South-West Africa, the fauna of which has been very imperfectly examined. If the species should really prove to be absent there, the absence may be connected with the fact that this area is characterised by its cold surface-water; on the other hand the species inhabits fairly cold water in Northern Europe.

As to the 5 species so far taken only on the Atlantic coast of South Africa, there are two which are certainly of subantarctic origin. These are *Phellia aucklandica*, found also in the Auckland Islands, and *Halianthella annularis*, which is closely related to *Halianthella kerguelensis* from Kerguelen and Marquarie Islands. If the forms of Actiniaria which especially characterise the Atlantic waters of South Africa are few, it is quite otherwise in the waters of Natal. In these warm waters there occur many forms not found in other parts of the South African coast. Especially strongly represented in this region are the Zoantharia, which include several species of *Palythoa*, numerous species of *Zoanthus*, and one representative of the genus *Isaurus*.

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Table I.

*The distribution of the Intertidal species at the various localities.*

	Atlantic Ocean										Indian Ocean			Localities outside S. Africa				
	S.W. Africa, Lüderitz Bay	Port Nolloth	Saldanha Bay	Houtjies Bay	Melk bosch (Table Bay)	Cape Town	Oude kral	Kommetje	St James and east side of C. Peninsula	Still Bay	Port Elizabeth	East London	Durban	St. Helena	North Atlantic	Zanzibar	Red Sea	Auckland Islands
* <i>Anthopleura michaelsoni</i> . . . . .	+	+	+		+	+	+	+	+	+	+	+						
* <i>Anthothoe stimpsoni</i> . . . . .	+	+	+	+	+	+	+			+	+	+	+					
<i>Bunodactis reynaudi</i> . . . . .	+	+	+			+			+	+	+	+	+					
* <i>Pseudactinia flagellifera</i> . . . . .	+	+	+	+	+		+	+	+	+	+	+	+					
" <i>varia</i> . . . . .								+	+	+	+	+	+	+				
<i>Actinia equina</i> . . . . .		+					+	+	+	+	+	+	+		+			
* <i>Bunodosoma capensis</i> . . . . .				+		+	+	+	+	+	+	+	+					
<i>Isozoanthus capensis</i> . . . . .							+	+	+	+	+	+	+					
* <i>Corynactis annulata</i> . . . . .		+	+			+	+	+	+	+	+	+	+					
<i>Anthostella stephensoni</i> . . . . .					+		+	+	+									
<i>Halianthella annularis</i> . . . . .							+	+										
<i>Phellia aucklandica</i> . . . . .							+	+										+
<i>Isanthus capensis</i> . . . . .					+		+	+										
<i>Aiptasia parva</i> . . . . .												+						
<i>Halcampaster teres</i> . . . . .												+						
<i>Rhodactis rhodostoma</i> . . . . .													+				+	
<i>Actiniooides sultana</i> . . . . .													+		+			
<i>Anemonia natalensis</i> . . . . .													+					
<i>Litophellia octoradiata</i> . . . . .													+					
<i>Telmatactis natalensis</i> . . . . .													+					
( <i>Condylactis natalensis</i> ) <sup>1</sup> . . . . .													+					
( <i>Calliactis polyopus</i> ) <sup>1</sup> . . . . .													+		+			
<i>Palythoa nelliae</i> . . . . .													+					
" <i>natalensis</i> . . . . .													+					
" <i>anneae</i> . . . . .													+					
" <i>durbanensis</i> . . . . .													+					
<i>Zoanthus racemosus</i> . . . . .													+					
" <i>eyrei</i> . . . . .													+					
" <i>lawrencei</i> . . . . .													+					
" <i>natalensis</i> . . . . .													+					
" <i>brighti</i> . . . . .													+					
" <i>durbanensis</i> . . . . .													+					
" <i>stephensoni</i> . . . . .													+					
" <i>parvus</i> . . . . .													+					
" <i>barnardi</i> . . . . .													+					
" <i>sangibaricus</i> . . . . .													+					

<sup>1</sup> The two species put in parenthesis were possibly not taken in the intertidal zone. No depth was given on the labels.

Table II.

*Species not belonging to the intertidal fauna, or when intertidal occurring also deeper down, in the sublittoral zone (the species marked with an asterisk live also in the intertidal zone).*

## A. Species taken in the Atlantic as well as in the Indian Ocean.

	In the Atlantic	In the Indian Ocean
<i>Halcurias capensis</i> . . . . .	287 m.	100—155 m.
<i>Bolocera capensis</i> . . . . .	90—178 m.	73—77 m.
* <i>Bunodosoma capensis</i> . . . . .	27 m.	100? m.
* <i>Pseudactinia flagellifera</i> . . . . .	8—46 m.	100? m.
" <i>varia</i> . . . . .	27 m.	73—102 m.
<i>Paractinostola capensis</i> . . . . .	168—178 m.	500 m.
* <i>Anthothoë stimpsoni</i> . . . . .	7—37 m.	20—77 m.
<i>Actinauge granulata</i> . . . . .	326 m.	64—500 m.
<i>Parazoanthus capensis</i> . . . . .	62 m.	64 m.
<i>Palythoa capensis</i> . . . . .	18—37 m.	18—27 m.?

## B. Species taken only in the Atlantic Ocean.

* <i>Corynactis annulata</i> . . . . .	18—73 m.
<i>Edwardsia capensis</i> . . . . .	91 m.
<i>Haloclava capensis</i> . . . . .	22 m.
<i>Halocampa capensis</i> . . . . .	91 m.
* <i>Anthopleura michaelsoni</i> . . . . .	27—46 m.
<i>Urticinopsis crassa</i> . . . . .	567—1014 m.
<i>Anthosactis capensis</i> . . . . .	287 m.
<i>Phelliactis capensis</i> . . . . .	567—1014 m.
<i>Isozoanthus gilchristi</i> . . . . .	347 m.
<i>Epizoanthus studeri</i> . . . . .	106—178 m.
" <i>similis</i> . . . . .	49—90 m.
<i>Zoanthus capensis</i> . . . . .	18—37 m.

## C. Species taken only in the Indian Ocean.

<i>Condylanthus magellanicus</i> . . . . .	73—500 m.
<i>Liponema brevicirrata</i> . . . . .	500 m.
<i>Acontiphorum mortenseni</i> . . . . .	73—77 m.
<i>Calliactis algoaënsis</i> . . . . .	90 m.
<i>Isophellia algoaënsis</i> . . . . .	?
<i>Amphianthus laevis</i> . . . . .	?
" <i>natalensis</i> . . . . .	805 m.
" <i>capensis</i> . . . . .	155 m.
<i>Phelliactis algoaënsis</i> . . . . .	?
<i>Isozoanthus giganteus</i> . . . . .	86—100 m.
<i>Epizoanthus tubae</i> . . . . .	64—124 m.
" <i>carcinophilus</i> . . . . .	155—500 m.
<i>Palaeozoanthus reticulatus</i> . . . . .	155 m.

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## Explanation of Plates.

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| Fig. 4. <i>Parazoanthus capensis</i> DUERD.  | » 10.       " <i>natalensis</i> n. sp.      |
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| » 3.   " <i>lawrencei</i> n. sp.            | » 10.  " <i>eyrei</i> n. sp.             |
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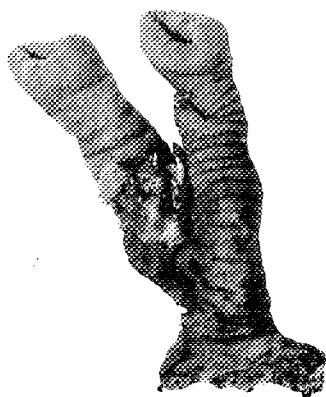
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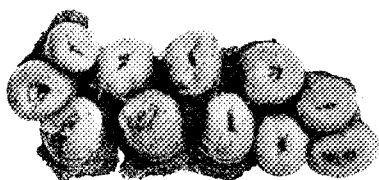
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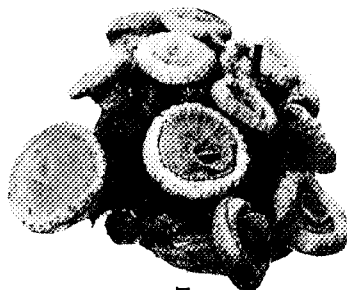
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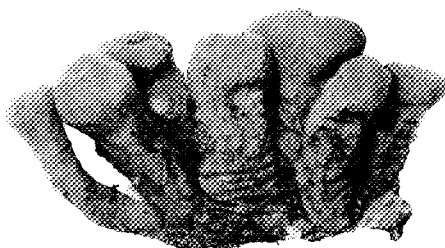
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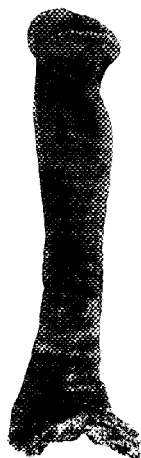
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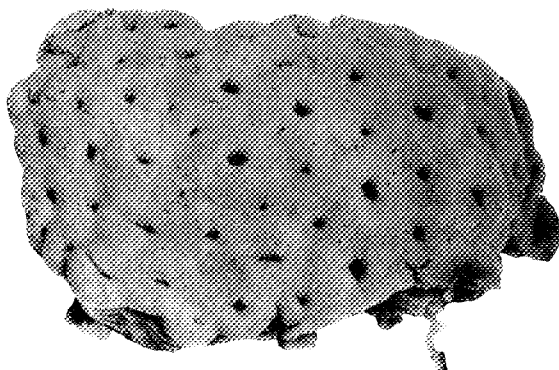
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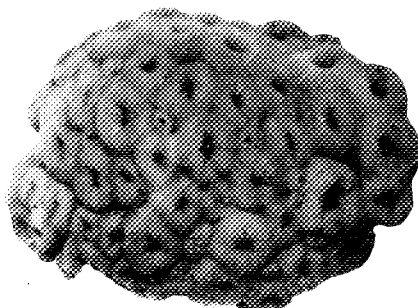
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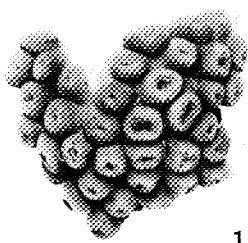
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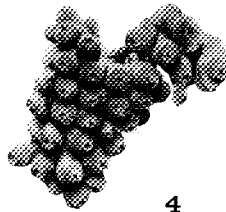
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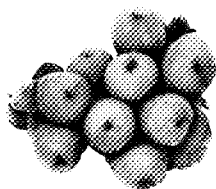
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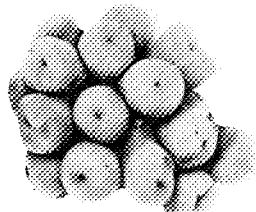
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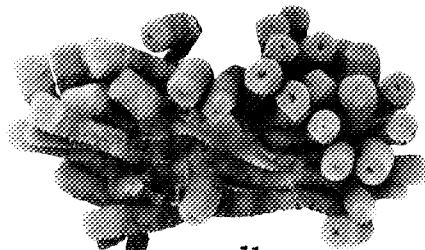
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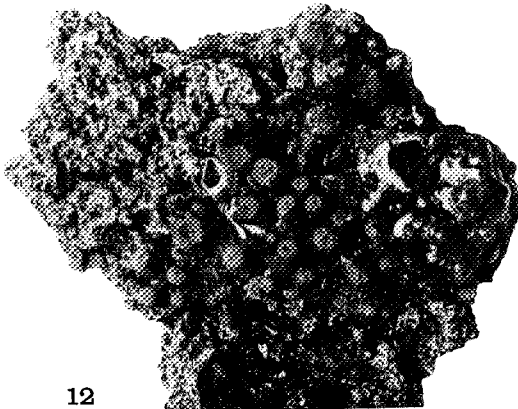
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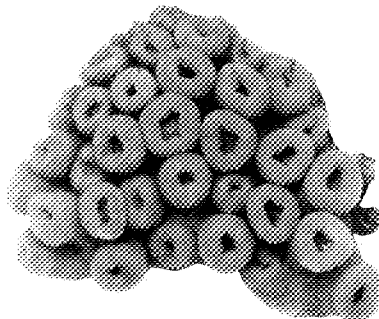
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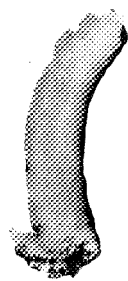
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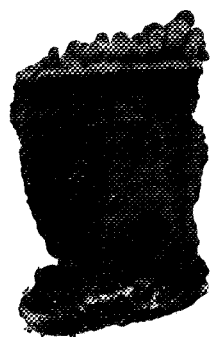
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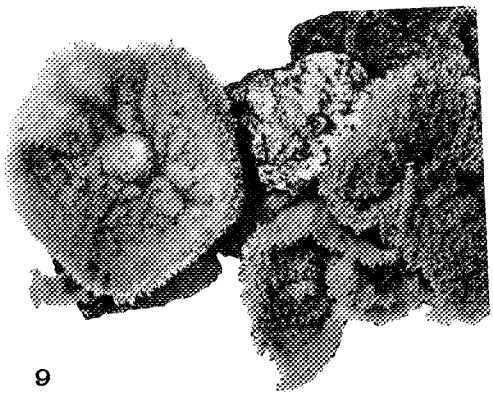
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