FURTHER ZOOLOGICAL RESULTS OF THE SWEDISH ANTARCTIC EXPEDITION

1901—1903

UNDER THE DIRECTION OF DR. OTTO NORDENSKJÖLD

VOL. III

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BY
SIXTEN BOCK

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VOL. III, No. 1.

MARINE ISOPODA

OF THE FAMILIES SEROLIDÆ, IDOTHEIDÆ, PSEUDIDOTHEIDÆ, ARCTURIDÆ, PARASELLIDÆ AND STENETRIIDÆ MAINLY FROM THE SOUTH ATLANTIC

BY

ÅKE NORDENSTAM

WITH 2 PLATES AND 78 TEXT FIGS

STOCKHOLM
P. A. NORSTEDT & SÖNER
May 1933

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CONTENTS.

Preface.

The following work deals with the bulk of the very abundant material of marine Antarctic and subantarctic Isopoda preserved in the Swedish State Museum (Riksmuseum) at Stockholm. It treats of the sub-orders *Asellota* and *Valvifera* and within the sub-order *Flabellifera*, the family *Serolidae*. The other families within the sub-order *Flabellifera* and the entire sub-order *Epicarida* have thus not been included.

By far the larger part of the material investigated is derived from the Swedish Antarctic Expedition (1901—1903) under the direction of Professor O. NORDENSKJÖLD and was collected by K. A. ANDERSSON, Ph.D., Director of the Department of Fisheries at Stockholm. Moreover, I have included the material preserved at the Riksmuseum collected by the following expeditions:

The Swedish »Eugenie» Expedition (1851—1853): material collected by I. G. H. KINBERG Ph.D.

The Swedish Expedition to Tierra del Fuego (1895—1897): material collected by A. OHLIN Ph.D. and Mr. H. ÅKERMAN.

The Swedish Magellanian Expedition (1907—1909) under the direction of Professor C. SKOTTSBERG: material collected by Professor SKOTTSBERG.

In addition, some scanty material has been included which was collected by G. C. WESTERGREN Ph.D. ('Gefle Expedition') 1866, material from South Georgia collected by Mr. E. SÖRLING (1905), as well as material collected by Captain LARSEN (1894), and by Captain E. G. HÖGBERG (1890?)

With a view to securing a more thorough investigation of the distribution of the species examined. I have included some finds made by S. VALLIN Ph.D. in 1923—1924 from the Campbell Islands. This latter material belongs to the Zoological Museum of Lund, and I desire to express my cordial thanks to Mr. VALLIN and the directors of the Museum in question for kindly placing it at my disposal.

For the purpose of comparative study I have procured material of Isopoda, partly consisting of type specimens, from the Museums at Paris, Berlin and Hamburg. I take this opportunity of expressing my gratitude to the directors of these Museums for kindly supplying me with this material. I have also paid a short visit to the British Museum in order to study type specimens.

In addition to a systematic investigation of the material, my treatise also contains a morphological investigation of setae and scale-processes, mainly performed on specimens of the genus *Serolis*.

I desire to express a general debt of gratitude to all those who have facilitated and encouraged this work by the kind assistance they have rendered or the friendly interest which they have displayed.

My special thanks are due to the late Professor A. WIRÉN, who introduced me to the study of Zoology, and to the late Professor A. APPELLÖF, who directed my attention to carcinological research.

I also wish to express my cordial thanks to my esteemed teachers Professor N. v. HOFSTEN and Professor S. EKMAN for their valuable instruction. Professor N. v. HOFSTEN, under whose direction my studies have been pursued, has followed my investigations with unflagging interest, has provided special accommodation for me at the Zoological Institute at Uppsala, and has enabled me to obtain grants in aid of my researches.

Especially it is both a duty and a pleasure to express my extreme gratitude to the superintendent of the Evertebrate Department of the Swedish State Museum (Riksmuseum), Professor S. BOCK. Both in Upsala and at the Riksmuseum in Stockholm I have enjoyed his valuable advice and guidance and benefited by his interest in my researches. In spite of shortage of accommodation, he provided me with comfortable quarters at the Riksmuseum, where this investigation was completed. He has moreover secured me a grant from the Museum funds to defray my expenditure for drawings, at the same time placing at my disposal the services of the Museum draughtsman and the photographer of the Evertebrate Department. I wish to place on record that without his kind efforts on my behalf the appearance of this work would have been considerably delayed.

I am particularly indebted to Mr. NILS ODHNER Ph. D. at the Evertebrate Department of the Swedish State Museum (Riksmuseum) and desire to express my great appreciation to him for a further grant from the Museum funds towards the expenses of my work. He has greatly promoted my work in many ways, especially by allowing me to benefit by his great experience and by putting before me his own interesting points of view.

I am furthermore indebted to the Royal Swedish Academy of Science for a grant from one of their funds.

I desire to acknowledge my indebtedness to Professor W. T. CALMAN, London and Professor M. DOELLO-JURADO, Buenos Aires, as well as to Mr B. BOHLIN, Ph. D., Peking, and Mr. O. NYBELIN, Ph. D., Inspector of Fisheries, Stockholm.

Most of the drawings reproduced in this treatise were first drawn in pencil by myself; for their execution in Indian ink and for some original drawings I am indebted to Mr. S. EKBLOM of the Swedish State Museum and Miss S. OLSSON, Upsala. For the photographs my thanks are due to Mr. S. SVEDÉN of the Swedish State Museum.

Mr. S. ALLWOOD, of the Swedish Board of Education, Mr. G. GROVE, of the British Legation in Stockholm, and Mr. S. J. CHARLESTON, Reader in English at »Stockholms Högskola» have helped me with the English text, and to these gentlemen I wish to express my appreciation of their ever-ready assistance.

SECTION I.

Historical.

The Antarctic and subantarctic Isopod fauna is as yet by no means so well known as the fauna of the corresponding northern latitudes. The Belgian Antarctic Expedition (1897—1899), whose collection of Isopods is the latest that has been elaborated (by MONOD, 1926) increased the known number of Isopods belonging to the families dealt with in this treatise by four, and moreover reported the occurrence of two additional species which, owing to the shortage of material, were inadequately described. »*Ianthopsis nasicornis*», one of the species dealt with in MONOD's work, must be regarded as a new species, for the reasons stated in the sequel. In the present study I have found it necessary to introduce no less than 19 new species, all of them obtained during the Swedish Antarctic Expedition (1901—1903). Most of the new species are of diminutive size. It may therefore be presumed that the Antarctic and subantarctic regions still contain many species which have escaped attention owing to their minuteness.

The first data regarding the Isopod fauna of these regions were given by FABRICIUS, (1775). Since then the most important contributions to our knowledge of the Isopod fauna of these regions have been obtained mainly by the elaboration of material collected by expeditions. The following studies deserve special mention: EIGHTS (1833), AUDOUIN and MILNE EDWARDS (1841), DANA (1852), STUDER (1884), BEDDARD (1884 and 1886), PFEFFER (1887), DOLLFUS (1891), OHLIN (1901), HODGSON (1902 and 1910), STEBBING (1900, 1914, 1919), RICHARDSON (1906, 1908, 1913), VANHÖFFEN (1914), TATTERSALL (1921), MONOD (1926 and 1931).

For the classification of Isopods the works of G. O. SARS[1] have been of fundamental importance. By his thorough researches, especially those reported in »Crustacea of Norway» (1899), SARS laid the foundation of the modern classification of Isopods. His system, in accordance with which the Isopods are divided into six tribes, distinguished mainly by differences in the uropods and pleopods, still holds good in essentials. Each of the tribes into which the Isopods were divided by G. O. SARS comprises a number of families, which he sharply defined.

SARS' classification of Isopods has been supplemented in connection with the extension of our knowledge and the discovery of new and interesting species. Considerable additions have thus subsequently been made to our knowledge of the sub-orders dealt with in this treatise.

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[1] As regards the history of the classification of Isopods prior to SARS, vide GERSTECHER and ORTMANN, 1901: Crustacea, in BRONN: Klassen und Ordnungen des Thierreichs.

The sub-order Asellota, which was divided by SARS into the five families *Asellidae, Ianiridae, Munnidae, Desmosomidae* and *Munnopsidae*, was revised by HANSEN (1905 and 1916). In 1905 HANSEN divides the sub-order into the three families *Asellidae, Stenetriidae* and *Parasellidae*, according to the conformation of the pleopods. The family *Asellidae* is the same as that defined by SARS; the family *Parasellidae* corresponds to the four remaining families into which SARS (1899) divided the sub-order Asellota. HANSEN points out that the families into which SARS divides the Asellota, with the exception of the *Asellidae*, contain transitional forms which render it impossible to retain the latter's classification. In his important later work HANSEN (1916) divides the *Parasellidae* into a large number of groups, basing this classification in the main on a thorough study of the appendages, especially the oral appendages. The Antarctic and subantarctic *Asellota* still contain many species which are by no means so well known as the northern ones dealt with by HANSEN (1916). Hence many southern species cannot as yet be assigned with certainty to HANSEN's groups. In this study I have found it necessary to suggest one new group, and to sub-divide one of the groups previously proposed by HANSEN. By this arrangement a clearer view has been obtained of the relation of the genera to one another.

As regards the sub-order Valvifera, a new family, the *Pseudidotheidae*, was added by OHLIN (1901) to the three families which SARS included in this sub-order.

The fam. *Idotheidae* was divided by MIERS (1881) into two sub-families *Idotheinae* and *Glyptonotinae*. To these RACOVITZA and SEVASTOS (1910) add the sub-family *Mesidoteinae* in connection with their interesting investigations on their new fossil genus *Proidotea*. In proposing their new sub-family they discuss the position of the genus *Macrochiridothea*, which will be dealt with in the sequel.

Historical notes on the families *Arcturidae* of the sub-order Valvifera and *Serolidae* of the sub-order Flabellifera, which have been treated more thoroughly than the others will be given later on in connection with the discussion of their morphology and classification.

As the systematic classification presupposes thorough morphological studies, the investigators are obliged to tackle many a morphological problem. The Isopod studies of RACOVITZA are in this respect significant. In the course of his very conscientious investigations on Isopods (the first published 1907), this author discusses a number of interesting morphological problems, carefully considering their bearings on classification and on the relations between the units of the system. His conclusions are supported by minute descriptions and excellent figures. At quite an early stage of his researches on Isopods, his attention was attracted to the different kinds of setae and other chitinous projections; in this treatise these will be dealt with in a separate section.

RACOVITZA's investigations, especially those on the families *Trichoniscidae* (1907 and 1908), *Sphaeromidae* (1910) and *Cirolanidae* (1912), show that in these families the setae are highly polyform. It should by observed, however, that the morphological nature of the setae and other kinds of chitinous projections can scarcely be satisfactorily elucidated unless comparative researches are concentrated on this special subject. As regards the terrestrial Isopods a comparative study of chitinous processes was made by WAHRBERG (1922).

Wahrberg, partly by dissection and partly by comparative morphological studies, ascertained that the thoracopod setae in terrestrial Isopods are of a composite nature, consisting of an axial setal part, enveloped by a scale, which has coalesced, more or less, with the setal part. Wahrberg did not examine very thoroughly the variations in the form of the freely projecting scales. He holds, however, that the rows of bristle-like »hairs» with which the basipodite of the maxilliped is occasionally beset are not setae proper, being presumably nothing but pectinate scales.

In order to embrace all chitinous processes under a single comprehensive term, Racovitza (1923), coins the word »phanere» which he explains as follows (p. 85, note):

»Ce terme de médecine, antonyme de 'crypte', désigne toutes les productions apparentes (φανεροσ) de la peau. Je le trouve commode pour réunir sous un vocable commun toutes les productions superficielles, si variées, de la carapace des Crustacés: écailles, peignes, poils, soies, tiges, crochets etc. L'étude de ces productions se nommerait Phanérotaxie ou Chaetotaxie terme déjà usuel chez les Entomologistes.»

In sequel to Wahrberg's investigations on thoracopod setae in terrestrial Isopods Racovitza (1923) laid down the rule that »Les phanères des Isopodes sont des modifications de deux organites primitifs, différents par l'origine et la structure: l'écaille et le poil sensitif, ou bien le résultat de la combinaison des deux organites (p. 86)». In this paper Racovitza quite rightly claims that he had shown before Wahrberg that the thoracopod setae in terrestrial Isopods were composed of different parts, and refers to his earlier work of 1907, where he states (p. 183): »Ces productions, à rôle sensitif, sont formées par deux écailles: l'une lancéolée, dans laquelle s'épanouit le nerf, et l'autre en forme de cornet, qui joue probablement un rôle protecteur» etc. This shows, however, that Racovitza has not here properly grasped the distinction between the simple setae and the scale elements, which was brought into clear relief by Wahrberg (1922). »L'écaille lancéolée, dans laquelle s'épanouit le nerf» is a rather rough description of the organ which Racovitza afterwards more correctly termed »poil sensitif».

Racovitza's thorough researches on representatives of the fam. *Cirolanidae* (1912) have shown that in this family the thoracopod setae externally resemble the setae of terrestrial Isopods; like the latter setae they frequently assume a trilobate shape. This resemblance in external form, however, is not in itself sufficient evidence of a composite structure. On the other hand, it has been pointed out by Wahrberg (1922) that even setae which present the appearance of a simple cylindrical structure may be of a composite character. Thus in order to determine the morphological nature of the setae in marine Isopods, it will be necessary to make a careful comparison of the various kinds of setae.

In this treatise the morphological investigation of phaneres has been confined mainly to the family *Serolidae*. The abundant material of *Serolis* preserved at the Swedish State Museum (Riksmuseum) has enabled me to examine the phaneres in 15 species of this genus.

A distinguishing feature of the family is that the species are as a rule provided with two rows (exceptionally one row) of curiously transformed setae on the lower margin of the propodus of the first pereiopod. The characteristic structure of these setae early attracted the attention of investigators. The reports on this subject are, however, inadequate and, in part, contradictory.

The earliest data[1] regarding these setae have been supplied by AUDOUIN and MILNE EDWARDS (1841). They figure setae from the lower margin of the propodus of the first pereiopod as well as from the same place on the second pereiopod, in the full-grown male of the species, *S. gaudichaudi*. The latter setae are described as »tubercules coniques aigus» (p. 24). According to AUDOUIN and MILNE EDWARDS, the setae on the lower margin of the propodus in *Serolis* are (p. 19): »Les unes externes larges et courtes, les autres internes plus grêles et plus longues». In regard to the species *S. gaudichaudi* these authors have observed the marked difference in the shape of the setae in the two rows. But in regard to the corresponding setae in *S. paradoxa* they state (p. 27): »Ces lanières sont également sur deux rangs, mais les supérieures ne diffèrent des secondes que par un peu plus de longueur; elles sont dépourvues de poils et se terminent par un petit article pointu».

GRUBE (1875) made a careful study of the setae on the propodal edge in four species, namely *S. paradoxa, gaudichaudi, schythei* and *tuberculata*. Referring to the genus at large, he states (p. 215): »Die Stachelchen sind von dreierlei Gestalt, in der unteren Reihe etwas lanzettförmig, dicht quergestreift, an den Rändern dicht und fein gewimpert, mit einer zarten, an der Spitze frei hervorragenden, öfters wie mit einem Knöpfchen endenden Mittelrippe, in der dicht darüber befindlichen Reihe mehr drehrund; und länger, je nach den Arten verschieden, glatt oder ebenfalls kurz behaart, einfach griffelförmig oder in eine kurze Gabel auslaufend». As regards the setae on the propodal edge of the first pereiopod in *S. paradoxa* GRUBE states (p. 226): »Die Zähnchen der äusseren Reihe, welche den Innenrand des Handgliedes am 1:ten Fusspaar besetzen, sind nicht stumpfgabelig und glatt wie bei *S. Schythei* sondern einfach und dicht behaart, wie bei *S. Gaudichaudi*, nur nicht so viel länger als die der Innenreihe, letztere sehen schmäler als bei *S. Schythei* aus». GRUBE has here confused the setae of the rostral row (= setae of the upper or inner row) and those of the caudal row (= lower or outer row). In *Serolis* the setae of the rostral row are always the longest (also in *S. gaudichaudi*, see AUDOUIN and MILNE EDWARDS, 1841, Pl. I, Fig. 13 and the explanation of the figure).

In the case of the species *S. schythei*, GRUBE describes and figures the setae on the lower margin of the propodus of the first pereiopod[2] but incorrectly states that the long setae are in the outer row, which is just the reverse of the actual facts. He gives illustrations of setae from the lower margin of the propodus of the second pereiopod in the case of the species *S. schythei, gaudichaudi, tuberculata* and *paradoxa*. His figures show that in *schythei, gaudichaudi* and *tuberculata* the setae were taken from full-grown male specimens, in *paradoxa* from a sub-adult male.

With regard to the setae-armature on the propodus of the second pereiopod in *S. paradoxa*, GRUBE states that it is similar in males and females (p. 226). In reality this is only the case in immature specimens. The very considerable difference in the shape of these setae in the full-grown male of *S. paradoxa* was subsequently demonstrated by BEDDARD (1884).

BEDDARD (1884) supplies us with a great deal of new information on the setae and

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[1] EIGHTS (1833) describes the lower margin of the propodus of the first pereiopod as ciliate, in *S. trilobitoides*.

[2] GRUBE (1875, p. 224; Pl. VI, Fig. 1 b).

scales in the family *Serolidae.* He illustrates the setae on the lower margin of the propodus of the first pereiopod in the species *S. schythei, naera, convexa, minuta* and *pallida.* As regards *S. septemcarinata* BEDDARD gives descriptions, but no figures. With reference to the above-mentioned setae in *S. septemcarinata* he says (p. 48) that »the longer spines terminate in a bifid extremity, of which the anterior bifurcation is the longest; the axis of the spine extends between the two branches, and is rather longer than either». The setae from the lower margin of the propodus of the first pereiopod figured by BEDDARD in the case of *S. convexa* have been taken from an adult male. BEDDARD devotes much attention to secondary sexual differences in *Serolis*, including those which are expressed in the transformed setae-armature of the male. Thus he shows that the full-grown male in *S. paradoxa* is distinguished from the female by bearing two rows of »plumose hairs» on the lower margin of the ischium, merus and carpus of the first pereiopods, and by the modified appearance of the setae on the lower margin of the propodus of the second pereiopod. Setae from this place in the adult male are figured in detail in the case of the species *septemcarinata.* The second pereiopod with its setae is also figured in the male of the following species: *schythei, convexa, antarctica, bromleyana, naera, minuta, paradoxa* and *pallida.* BEDDARD is the only author who has observed the projections which usually occur in *Serolis* on the ventral side of the central joints of the flagellum of the antennae.[1] He describes them with reference to the species *paradoxa, schythei* and *trilobitoides* and figures them in the two last-mentioned species. BEDDARD moreover states that similar formations occur in the species *septemcarinata, bromleyana* and *gracilis.* In *S. paradoxa* they assume the shape of »recurved hooks». According to this author these processes, though similar to those in *S. paradoxa*, are less marked in the species *bromleyana, gracilis, septemcarinata* and *schythei.* In the last-mentioned species there occurs[2] on the lower side of the central flagellum joints in the female, distally, a transverse row of »curved spines», as in *S. paradoxa*, whilst in male specimens there occurs besides »a series of delicate lamellar processes arranged in a single line along the inner side of most of the joints» (BEDDARD, 1884, p. 43). BEDDARD considers it probable that these »lamellar processes» have a sensory function. In *S. trilobitoides* BEDDARD maintains that the antennal processes consist of »short lancet-shaped spines», saying (p. 51) that »these spines which are present upon the antennae of both sexes are like those which are found in *Serolis paradoxa* and which have been described».

PFEFFER (1887) gives a detailed description of *S. septemcarinata*, inclusive of its setae-armature, with figures comprising the setae on the lower margin of the propodus of the first pereiopod. His description and figures of these setae[3] differ considerably from the description of setae on the propodal edge in the same species previously given by BEDDARD (1884). For example, the longer setae in the rostral row are illustrated as, single-pointed and broadly flattened, not trilobate, as described by BEDDARD. PFEFFER gives the first detailed figures, as regards any species of *Serolis* of the two stout setae occurring on the free distal edge of the carpus of the first pereiopod, saying, with reference to *S. septemcarinata* (p. 70): »sie sind solide Zapfen mit einem axialen längsstrei-

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[1] The second pair of cephalic appendages; for the first pair of appendages (= first pair of antennae) I use the term antennulae.

[2] According to BEDDARD, 1884.

[3] PFEFFER, 1887, Taf. III, Figs. 13, 14, 15.

figen Teile und einem darum liegenden Mantel, dessen Streifung in einem Winkel auf die Axe stösst, sodass es scheint, als entspreche diese Streifung einer ursprunglichen Zusammensetzung des Mantels aus Fiedern». Also in regard to S. *septemcarinata* PFEFFER gives the first detailed figures of some of the characteristically shaped setae occurring on the second and third joints of the mandibular palp.

HODGSON (1910) after a thorough examination of *S. trilobitoides*, reports various new observations, especially regarding the setae on the lower margin of the propodus of the first pereiopod. Referring to the setae of the rostral row HODGSON points out that they have »a strongly-marked 'mid-rib' which, however, is not quite straight, and terminates in a delicate elongate sensory structure» (p. 28). He has, however, wrongly drawn the setal canal, which actually terminates in a pore at the end of the axial part of the setae. HODGSON made some interesting observations on the foliate setae in the caudal row, which he calls »leaf-like organs». He says (p. 28) that »the 'leaf-like' organ also has a distinct 'mid-rib', but that the blade is very unequally developed on the two sides, and exhibits a much coarser striation than the tooth. The 'mid-rib' terminates in precisely the same way and in a similar sensory structure». HODGSON thus shows that the structure of these setae is different on their caudal and on their rostral sides, but does not make it clear wherein the difference consists. HODGSON has moreover given a detailed figure of one of the setae of the mandibular palp in *S. trilobitoides*.

COLLINGE (1918) studied *Serolis septemcarinata*. In contradistinction from BEDDARD (1884) and PFEFFER (1887) he found in this species only one row of setae on the lower margin of the propodus of the first pereiopod. COLLINGE figures one of the setae which, he says, is divided into three of four finger-like processes.[1]

On the other hand TATTERSALL (1921) referring to the setae in question in *S. septemcarinata*, states (p. 228): »My own observations agree absolutely with those of PFEFFER, whose account of this species has evidently been overlooked by COLLINGE.»

SECTION II.

Scales and setae in the family Serolidae.

I. The ordinary Structural scales.[2]

The structural scales in the *Serolidae* are of the usual triangular shape, overlapping, and distally, as a rule, rounded. Generally speaking, they are somewhat indistinct, but here and there, as, for example, on the lower surface of the flagellum of the antennae their structure is very distinctive (Fig. 1 g. and h.). It will be seen from a comparison of these two figures that the shape of the structural scales may vary in different species. In *S. paradoxa* (Fig. 1 g.) they are evenly rounded anteriorly, whilst in *S. pagenstecheri* (Fig. 1 h.) they are acutely triangular. I have found a pointed shape in

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[1] See COLLINGE, 1918, Pl. II, Fig. 9.

[2] Structural scales is a translation of the German »Strukturschuppen».

all the structural scales only in the latter species. Structural scales occur also on the tergites, but here they are often ill-defined or sparse. Some well-defined, though sparse,

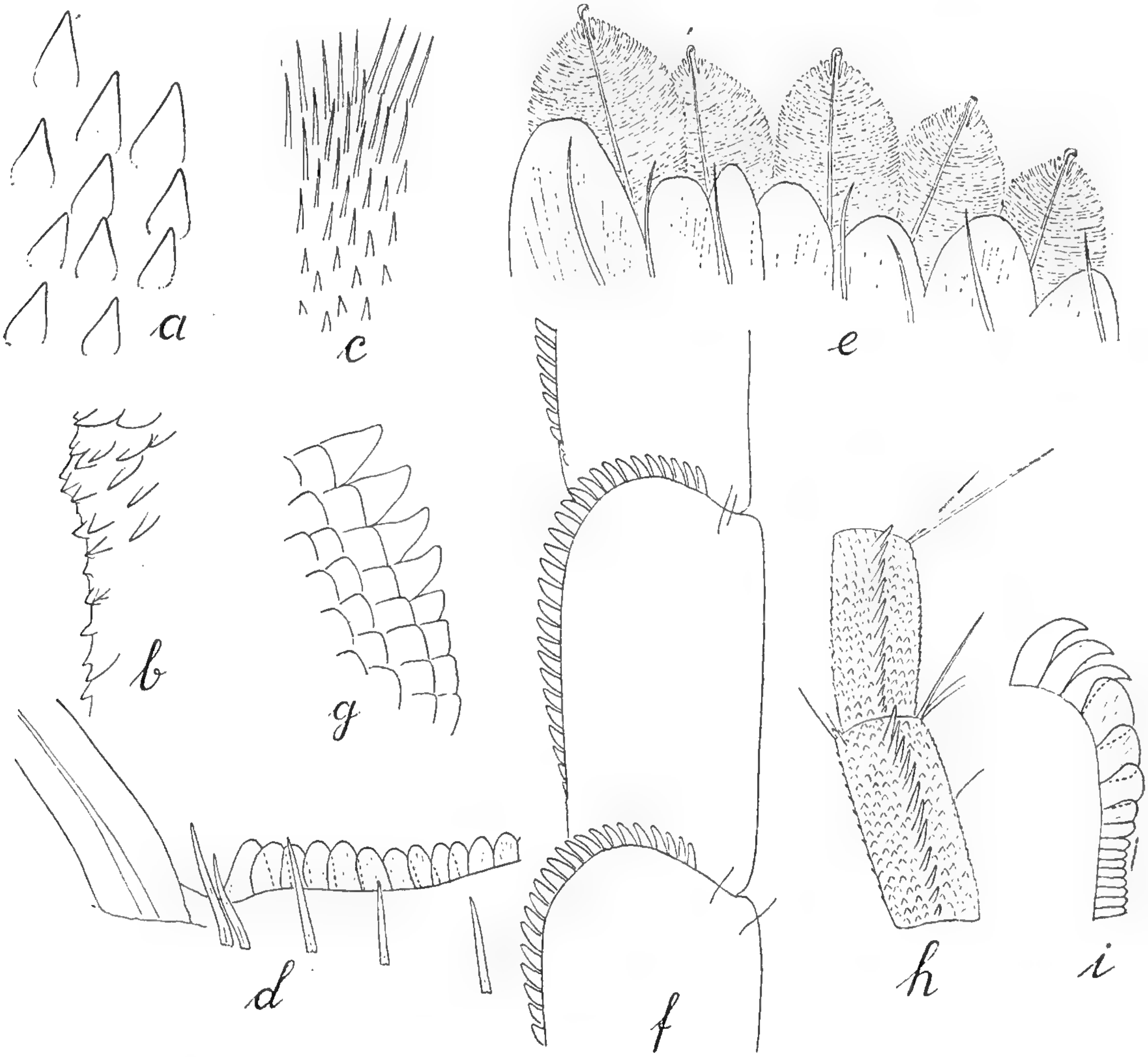

Fig. 1. Scales in *Serolis*. a. Structural scales from the tergum of *S. pagenstecheri*, 435 ×. b. Slightly projecting structural scales close to the lower margin of the propodus of the second pereiopod, adult male of *S. schythei*, 235 ×. c. Spine-like scales from the same spot in an adult male of *S. pagenstecheri*, 240 ×. d. Part of the free distal margin of the carpus of the first pereiopod in *S. septemcarinata*, 240 ×. e. Setae and projecting scales from the lower margin of the propodus of the first pereiopod seen from the caudal side, in *S. polita*, 80 ×. f. Antennal processes on the eighth and part of the seventh and ninth joints of the antennal flagellum, *S. paradoxa*, 80 ×. g. Structural scales and antennal processes from the flagellum of the antenna, *S. paradoxa*, 240 ×. h. Two joints of the antennal flagellum of *S. pagenstecheri*, seen from below, 50 ×. i. Antennal processes from the flagellum of the antenna, female of *S. schythei*, 240 ×.

structural scales from the tergum of *S. pagenstecheri* are shown in Fig. 1 a. Here too we observe the pointed shape of the structural scales, which is characteristic of the species. Generally speaking, however, the structural scales in *Serolis* have a tendency to be effaced and coalesce with one another.

II. Transformed scales.

This general tendency towards the effacement of the distinctive structural scales is not only due to a coalescence of individual scales. In some places they are transformed into chitinous projections of varying shape, which not infrequently assume a spine-like or setiform appearance. This transformation may take place in either of two ways. (1) Each scale increases in size and changes in shape. Or (2) the individual scales split up into several distinct elements.

1. Projections formed by increase in size.

The freely projecting scales of enlarged size occur especially at places where two surfaces meet at an angle. Thus the chitinous processes of varying appearance (hook-like lamellar or fan-shaped), which are situated on the ventral side of the central flagellum joints of the antenna in the angle between the rostral and ventral surfaces,[1] consist of transformed and enlarged structural scales.

An examination of the antennal processes in e. g. *S. paradoxa* shows that the hook-like processes in this species[2] are gradually transformed through transitional forms into the typical scale covering (compare Fig. 1 g. and Fig. 1 f.). A similar transformation is observable in *S. pagenstecheri* (Fig. 1 h.), though only on a few of those joints which are provided with antennal processes, viz. on one or two of those joints, which are situated proximally and one or two of those situated distally. In the species all the spine-like antennal processes attain greater length and assume a more bristle-like appearance as one approaches the centre of the flagellum. The characteristic conformation of the antennal processes in the species *S. schythei* has been illustrated by BEDDARD (1884). I have not been able to detect any such difference in the shape of the processes in male and female specimens as BEDDARD claimed to have observed. The processes which BEDDARD believed to be distinctive of the male are similarly developed also in the female (see Fig. 1 i.). There is therefore no ground for BEDDARD's assumption that certain of the antennal processes — all of which are merely scale formations —, have a sensory function.

Antennal processes occur in most species of *Serolis*. Like BEDDARD (1884)[3] I have found them in the species *paradoxa*, *trilobitoides* and *schythei*. I have also discovered them in *gaudichaudi*, *convexa*, *longicaudata*, *australiensis*, *polita*, *pagenstecheri*, *glacialis* var. *austrogeorgiensis*, and *exigua*.

In the various species these processes differ not only in shape[4] but also in degree of distinctness. I found them quite faintly developed in full-grown specimens (one male and one female) of *S. convexa*, whilst in three immature females of that species they were entirely lacking. In a sub-adult male specimen of *S. bouveri*[5] they were indistinct and scarcely larger than the structural scales. In *S. paradoxa* on the other hand I found antennal processes typical of the species even in young removed from the marsupium, though only in a row along the distal margin; they were entirely absent on the rostral margin of the ventral

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[1] Described and figured by BEDDARD (1884) with reference to certain species of *Serolis* (see p. 13).

[2] Cf. BEDDARD, 1884.

[3] See p. 13.

[4] The reader is referred to the following descriptions of the several species.

[5] The only specimen of this species which I have been able to examine.

surface. In the species *S. latifrons,* — which, together with *S. beddardi,* forms a divergent group within the genus *Serolis* —, antennal processes were entirely wanting, even in full-grown specimens.

Elongated structural scales occur in *Serolis* also in several other places. Occasionally they occur in the full-grown male, on the propodus of the second pereiopod, submarginally, close to the lower margin. This is the case in *S. pagenstecheri* (Fig. 1 c.). The more dorsally situated, pointed structural scales, which are characteristic of the species, increase successively in length towards the lower margin of the propodus, so that near the margin they assume the form of setae. A corresponding part of the propodus of the second pereiopod in *S. schythei* is illustrated in Fig. 1 b. Though the scales in this part have assumed a pointed shape, they scarcely project further than the other structural scales.[1]

We occasionally find a longitudinal row of elongated structural scales on the lower margin of the dactylus of the second pereiopod. In the species *S. schythei* I found them both in males and females. See Fig. 13 d. The scale processes here have a claw-like appearance, and the one most distally situated assumes the form of a distinct claw at the point of the propodus. In different specimens the processes varies in degree of distinctness.

Enlarged and freely projecting scales occur close to the lower margin of the propodus as well as on the distal margin of the carpus of the first pereiopod. In *S. polita* large leaf-like scales are found in a longitudinal row, submarginally, close to the lower margin of the propodus on the caudal side. See Fig. 1 e.[2]

Elongated scales of similar shape are found at the same spot also in *S. minuta, australiensis, longicaudata* and in *S. paradoxa.* In the last-mentioned species they are rather small. In *S. exigua* we find on the lower margin of the propodal joint one longitudinal caudal row of scales and, in contradistinction from other species of *Serolis,* only one longitudinal row of setae (Fig. 4 c.). Similar scale formations from the distal edge of the carpus of the first pereiopod in *S. septemcarinata* are illustrated in Fig. 1 d. In this species they are distinctly developed in a few specimens only.

The masticatory processes on the mandibles, which always are devoid of a setal canal, may be a kind of scale-processes. They differ considerably in shape in the several species, being, as a rule, of a scale-like or spine-like appearance (Figs. 12 c. and d., 13 a. and b., 14 b. and c., 15 c. and d., 19 b. and c., 21 b. and c.); exceptionally they are pectinate at their distal ends (Fig. 17 c. and d.).

2. The pectinate scales[3] and their division into false setae.

We find a variety of the structural scales proper in the pectinate scales. The characteristic feature of these scales is that they are produced distally into a number of slender and acute points. In *Serolis* the size of the part which forms the common basis of these pointed ends, as also the length of the points, varies in individual scales. Indeed in many instances we find no trace of the basal part. In such cases the hair-like points of the scale form regular rows of »hairs». This feature was seized upon by WAHRBERG (1922) as a

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[1] The typical form of structural scale in *S. schythei* is much the same as in *S. paradoxa* (see Fig. 1 g).

[2] This figure also shows the caudal row of short leaf-like setae on the lower margin of the propodus as well as the sub-marginal row of slender setae lying close to the projecting scales. The rostral row of long trilobate setae on the lower margin of the propodus has not been figured.

[3] Kammschuppen in German.

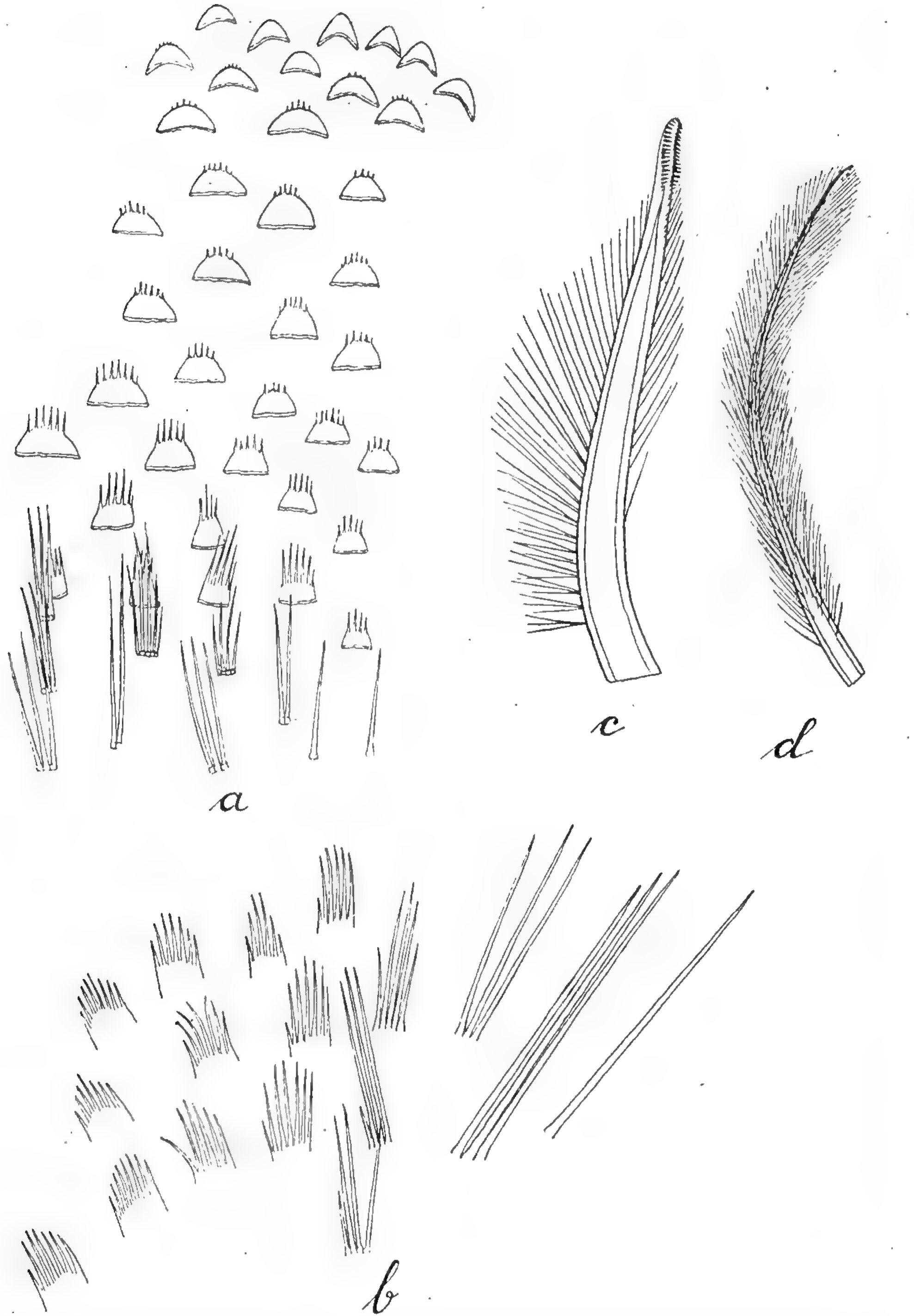

Fig. 2. a. Scales and setae in *Serolis*. Structural scales, pectinate scales and setae-like »hairs». Chitinous tegument from the dorsal surface of the basipodite near its distal margin, maxilliped of *S. paradoxa*, low adjustment of the microscope, 490 ×. b. Pectinate scales and setae-like hairs from the same spot, in *S. paradoxa*, high adjustment of the microscope, 600 ×. c. Seta from the inner proximal angle of the basipodite of the first pleopod, subadult male of *S. polita*, 150 ×. d. Seta from the lower margin of the basipodite of the second pereiopod, adult male of *S. paradoxa*, 115 ×.

plausible explanation of the occurrence of regular rows of hair-like projections without a setal canal on the maxillipeds of terrestrial Isopods (see p. 11). Where a chitinous area is observed proceeding from the basipodite of the maxilliped near its distal margin, we find the features illustrated in Fig. 2 a. Next to the distal edge we see typical structural scales. These are succeeded in a proximal direction by pectinate scales. Those nearest the structural scales are, however, provided with very inconspicuous points. As we advance proximally the hair-like points become longer and longer and their common basal part smaller and smaller, being reduced to nil on the most proximal of the scales figured. In other words we find continuous series of structures forming transitions (1) between the typical structural scales and the pectinate scales and (2) between the pectinate scales and the regular rows of independent setiform projections. It is thus indubitable that each of the structural scales can split up into several separate phaneres.

Further proximally on the basipodite of the maxilliped the surface is covered by a dense nap of long, thin, setae-like »hairs» of considerably greater length than those shown in Fig. 2 a. In this nap the »hairs» are still farther apart. The regular row has in fact been partially dissolved. Here and there one finds solitary hair-like projections at some distance apart from the rest (cf. Figs. 2 a. and b.) Most of these »hairs», however, are grouped together, two and two, in transverse rows; here and there we find groups of three. The distance between the »hairs» in the transverse rows is always greater than in the more distally situated free »hairs» illustrated in Figs. 2 a. and b.[1]

These very slender setae-like »hairs» — which may thus be produced by the separation of the ends of the pectinate scales and which, unlike the setae proper, are devoid of a setal canal —, are widely distributed in marine Isopoda being almost as common as the setae proper. They often form a covering of »hair» on the margins of the pleopods, but also occur abundantly elsewhere, especially on the mouth-parts. Their occurrence is a character which normally applies to all Isopoda.

In the species of *Serolis* examined by me they are very abundant. They occur on the mouth-parts (see for example Fig. 15 f., Fig. 16 and Fig. 17 f.), and on the antennulae (Fig. 21 a.). In all the species of *Serolis* examined by me they are developed on the rostral[2] (medial) margin of the second peduncular joint of the antennae, where they cover a triangular area (see Fig. 12 c. as compared with Fig. 12 a. and b.). They occur also on the pereiopods. In *S. polita*, for example, they form a nap on the upper and lower margin of the sixth pereiopod (Fig. 3 a.). In *S. exigua* they occur on the upper margin of both the basipodite and the ischium of the fifth to seventh pereiopods (Fig. 18 b.), as well as on the upper margin of the basipodite of the second to fourth (Fig. 18 a.). On the pleopods they are very abundant (see Figs. 18 c., d. and e., Fig. 19 d.), as well as on the uropods (Fig. 21 d.).

The antennal processes on the flagellum of the antennae in *Serolis* sometimes likewise assume a pectinate character. I found this to be the case in the species *S. longicaudata* (see p. 92), where the antennal processes are distally produced into points. They deviate, however, from typical pectinate scales in that the central and furthest projecting process is robust and spine-like.

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[1] The double lines shown at the foot of the scales and free »hairs» in Fig. 2 a., in contradistinction from Fig. 2 b., are due to the low adjustment of the microscope in the former picture.

[2] When the antennae are in their natural position this margin is the inner (= median or medial) margin. As regards the orientation of the appendages and the terminology of their margins, I have, in the main followed Racovitza (1923).

Similar features occur also in other Isopods. In *Edotia tuberculata*, we find, distally, on the penial filament of the second pleopod in the male (see Figs. 22 c. and d.) a covering of slender projections, arranged in rows and increasing in length towards the proximal end. Here they assume a setiform appearance, the rows being entirely dissolved.

In *Eurycope* sp. (cf. *frigida* VANHÖFFEN) the last joint of the mandibular palp is ventrally covered by pectinate scales. See Fig. 78 d. In the distal part of the rostral margin of the joint, however, the pectinate scales form free projections of a somewhat setiform appearance, but furnished, like the typical pectinate scales, with a number of forward-facing points.

III. General considerations on the setae in marine Isopoda.

The setae of the Isopods, as has already been pointed out, are very variable in conformation. In terrestrial Isopods, according to WAHRBERG (1922), they consist of two morphologically distinct kinds of setae, viz. simple and composite, the latter comprising a more or less coalesced complex consisting of a setal and a scale portion.

A comparison between the thoracopod setae occurring in the terrestrial Isopods and those obtained from species of the family *Cirolanidae* (see RACOVITZA, 1912) indicates that thoracopod setae similar in conformation to the composite thoracopod setae in terrestrial Isopods occur also in marine Isopods. Such setae are also common in the *Serolidae*. If we compare one of the setae from the rostral row on the lower margin of the propodus of the first pereiopod in *S. trilobitoides* (see Fig. 5 a. and HODGSON, 1910, Pl. IV, Fig. 8) with a thoracopod seta in *Ligia italica* (see WAHRBERG, 1922, Fig. 5, 4), we shall find that the setae in these two widely separated species are actually of the same shape. A characteristic feature of such setae, also in marine Isopoda, is that they consist of an axial, cylindrical median part of more or less prominence, surrounded by an outer mantle, which distally terminates in two free lappets, between which the axial point of the median part stands forth freely.

The above-mentioned type of thoracopod setae, which presents a distinct resemblance to the evidently composite setae in terrestrial Isopods, is commonly found in various sub-orders and families of the marine Isopods and must therefore be regarded as a character common to the Isopods. They occur, for example in various groups of the *Parasellidae* (see Figs. 40 c., 72 h. and k.). Within the sub-order Valvifera I found setae of a similar character in the genus *Macrochiridothea*, where they occur on the lower margin of the robust seroliform propodus of the first pereiopod (Fig. 26).

In marine Isopods stout setae are often found together with very slender ones. In *Cirolana microphtalma* and *Eurydice pulchra* (according to G. O. SARS 1899, Pl. 307), for example, the pereiopods are furnished with numerous slender hair-like setae together with a smaller number of setae of a shorter and stouter type. On the uropods of species of the fam. *Cirolanidae* (RACOVITZA, 1912) these types of setae are found in conjunction with typical plumose setae.

A common feature of the setae in marine Isopods is that they are furnished with two rows of triangular or hair-like sub-branches. Thus in the genus *Antarcturus*, for example, the propodus and dactylus of the first pereiopod are usually beset with long and rather narrow setae, provided with two longitudinal rows of slender triangular sub-branches, the setae ending distally in two fine hair-like points. The setae on the remaining pereiopods in *Antarcturus* are devoid of the two rows of sub-branches and are single-pointed. The external resemblance to the primitive plumose setae — notably the two rows of sub-branches — does not necessarily show that the setae in *Antarcturus* are modified plumose setae.

In the following report on my examination of the setae in *Serolis*, I shall compare the various kinds of setae which occur in the family *Serolidae*. It will be shown that some of the setae are manifestly composite. I have arranged my material accordingly.

When the setal part and the scale part of the composite seta have entirely coalesced they may present the same appearance as simple setae. Hence, as will be shown in the sequel, a mere morphological investigation is not always sufficient to determine the category to which a seta belongs.

IV. Non-composite setae.

Non-composite setae of the plumose type occur in marine Isopoda abundantly on the pleopods but sometimes also on the pereiopods (in e. g. the *Eurycopini*). In *Antarcturus* we find setae of a similar plumose type on the expanded coxopodite of the maxilliped in the ovigerous female (Fig. 33 b.).

From the typical plumose setae with their two rows of sub-branches there is a transition to that type of setae where the sub-branches are irregularly situated. I found setae intermediate between the plumose and the penicillated type on the exopodite of the third pleopod in *Ianthopsis bovallii*, where the proximal ends of the setae may be covered by irregularly situated sub-branches, whilst, distally the sub-branches are inserted into faint incisions arranged in two rows.

The sub-branches of the plumose setae may be wholly or partially reduced. Thus on the pleopods of species belonging to *Antarcturus*, in addition to plumose setae of typical development, we find setae with short and sparse sub-branches as well as those in which the sub-branches have been entirely reduced (see Figs. 33 d. and e.).

In the genus *Serolis* the typical plumose setae occur only on the pleopods. On the first three pairs where they fringe the margins of the exopodite and the endopodite, they attain a considerable length (see Fig. 19 d.). In this figure it is faintly indicated that the sub-branches of the plumose setae are fixed in very marked incisions, except at the proximal third of the setae where incisions are missing. The distal ends of the plumose setae are prolonged into hair-fine points. In conjunction with the plumose setae, we find on the first three pairs of pleopods some very short and slender hair-like setae.

Plumose setae, though reduced in size, occur on the distal and lateral margins of the exopodite of the fourth pleopod (Fig. 18 e.). The plumose setae on the lateral margin become still shorter proximally than towards the distal end, being in *S. paradoxa* and *schythei* provided on the proximal part of the margin merely with sparse sub-branches, and passing further proximally into very slender, hair-like setae without any sub-branches. It is thus seen that the plumose setae of typical development may pass over by transitional forms into the very slender type of hair-like setae.

The fifth pleopod is, as a rule, devoid of setae. *S. exigua* forms an exception in this respect; the exopodite of the fifth pleopod in the latter species being provided with two long setae of the typical plumose type (Fig. 18 f.).

In the inner proximal angle of the basipodite of the first three pairs of pleopods, we find that the plumose setae have been more or less modified (Fig. 19 d. and 2 c.). »Plumose hairs»[1] occur at this spot in most of the species of *Serolis*. Their distal ends are always rounded; the sub-branches are not fixed in incisions, but are arranged more or less regularly in two longitudinal rows. In many species the setae are transformed into a kind of setae which are slightly reminiscent of the coupling-setae of the first pleopods in the *Parasellidae* and *Arcturidae*. See Fig. 2 c. and cf. Fig. 35 d. The sub-branches are very slender except at the distal end of the setae, where they pass over into two adjacent rows of shorter and somewhat broader sub-branches.

On an examination of the pereiopods, we find that the setae also on these appendages often assume a shape similar to that of the setae on the pleopods. On one of the last fifth pairs of pereiopods in a species of *Serolis* we find the following kinds of setae (Fig. 3 a.): —

1. Sensory setae of a plumose type (on the upper margin of the basipodite).
2. Very slender and, as a rule, very short hair-like setae similar to those hair-like setae which sometimes occur on the lateral margin of the exopodite of the fourth pleopod. This type of setae occurs on all the joints.
3. Stout sword-shaped[2] setae, usually provided with two rows of short sub-branches, (occurring on all the joints, except the basipodite and the dactylus). The setae are sometimes devoid of sub-branches. In exceptional cases the sub-branches are moderately long, whence the shape of the setae is similar to that of plumose setae (see Fig. 3 a.).

The ordinary stout sword-shaped setae will be treated in detail on p. 34—36. As regards the hair-like setae, they may exceptionally pass over by a series of transitional forms into those of the stout sword-shaped type. This occurs on the second pereiopod of the sub-adult male in *S. paradoxa* (Fig. 3 b.). It would therefore be tempting to conclude that also the stout sword-shaped pereiopod setae are non-composite. It will, however, be shown in the sequel, by a comparison of the sword-shaped setae with those of the composite kind, that this is not necessarily the case.

The slender setae of a hair-like type occur on all the joints of every pereiopod, though they are often minute and difficult to detect. As a rule, they are easily distinguished from those of the stout type by their extreme slenderness.

Slightly longer setae of the hair-like type are always found in a submarginal row on either side of the lower margin of the propodus of the first pereiopod, as well as on the distal margin of the carpus in the same appendage. See for example Figs 1 d. and 1 e. In *S. exigua* they are sparsely distributed over the whole of the rostral and caudal surfaces of the propodus of the first pereiopod.

In the adult male the setae, as a rule, are more abundant than in the female. As a secondary sexual character of the male sex, the non-composite setae may form a dense nap on the lower surfaces of some of the pereiopods. Such a dense covering of non-composite setae we find, for instance, on the lower surface of the ischium, merus and carpus of the second pereiopod in the adult male of *S. paradoxa*. The setae are here densely provided with slender irregularly situated sub-branches (Fig. 2 d.). Similar penicillated setae are found on the lower margin of the carpus of the first pereiopod in the adult

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[1] According to BEDDARD (1884).
[2] According to BEDDARD (1884).

Fig. 3. Setae-armature in *Serolis*. a. Sixth pereiopod, right, female of *S. polita*, 20 ×. b. Second pereiopod, right, sub-adult male of *S. paradoxa*, 25 ×. c. Row of submarginal pores and setae at the lower margin of dactylus of the first pereiopod, seen from the caudal side; immature specimen taken out of the marsupium, *S. paradoxa*, 665 ×. d. Seta from the same row, seen from the rostral side; adult specimen of *S. paradoxa*, 665 ×. e. Non-composite seta from the carpus of the first pereiopod, adult male of *S. gaudichaudi*, 115 ×. f. Composite seta from the carpus of the first pereiopod in the same specimen, 115 ×. g. Seta from the rostral row on the lower margin of the propodus of the first pereiopod, adult male of *S. gaudichaudi*, 115 ×.

male of *S. gaudichaudi,* (Fig. 3 e.).[1] The same kind of setae likewise forms in the adult male of *S. gaudichaudi* a dense nap on the lower surfaces of the basipodite, ischium, merus and carpus of the seventh pereiopod.[2]

Along the lower margin of the dactylus of the first pereiopod, submarginally on the rostral side, there is a row of short setae which may be referred to the non-composite kind; at any rate there is no indication of a composite character. In some species they are sunk in pores from which only their extreme ends project. GRUBE (1875, p. 224) is the only author who mentions this feature. Referring to the species *S. schythei,* GRUBE states: »an der Basis der Zähne sieht man eine Reihe heller runder Flecke und ähnliche auch am Innenrand der Klaue durchschimmern, deren Aussenrand Stachelchen trägt».

In the species *paradoxa, schythei, polaris* and *convexa* there is a row of pores along the lower margin of dactylus on the rostral side. In *S. convexa* the setae the pointed ends of which project out of the pores are hair-like. In *paradoxa, schythei* and *polaris* they are distally bullet-shaped and swollen, and the setal canal has a rather wide opening at the distal end. Their appearance in *S. paradoxa* is illustrated in Fig. 3 c. and d.

V. The occurrence of composite setae in the Fam. Serolidae.

It has already been mentioned (p. 20) that the characteristically transformed setae in the rostral row on the lower margin of the propodus of the first pereiopod present a striking resemblance to the composite thoracopod setae of the terrestrial Isopods. Their characteristic three-pointed shape in both cases may possibly be due to the same causes, in which case these setae in *Serolis* would likewise be of a composite character. In some species of *Serolis,* at any rate, the composite character of the setae in question is manifest.

In the species *S. exigua,* unlike all other previously described species of *Serolis,* there is only a single row of setae on the lower margin of the propodus of the first pereiopod. This row corresponds probably to the rostral row of other species; instead of the short, flattened and leaf-shaped setae of the caudal row in other species of *Serolis,* we find in *S. exigua* a row of projecting scales (see Fig. 4 c.).

The phaneres of the rostral row consist of setae in which there is an evident combination of setal and scale parts (see Figs. 4 a, b and c). From a common base there issue two branches, one longer, rounded at the distal end, and containing the setal canal, which at its extremity opens out into a pore, the other shorter, pointed at the distal end, and without any setal canal. The longer branch is similar in shape to a typical non-composite seta. The shorter branch is smooth and resembles an elongated structural scale. These parts, which are separated from one another, almost throughout, constitute different morphological elements. This is evident from the fact that a suture-line between them can be distinguished, sometimes very distinctly, in the common base.

In *S. convexa* there is another feature which brings into still clearer relief the composite character of the setae on the lower margin of propodus of the first pereiopod. In the female of this species, in the rostral and caudal rows respectively, the setae normally

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[1] See also AUDOUIN and MILNE EDWARDS, 1841, Pl. I, Fig. 13'.

[2] See AUDOUIN and MILNE EDWARDS, 1841, Pl. I, Fig. 16''.

have the appearance illustrated in Fig. 4 e and d. Near the carpus, however, the setae assume the modified structure illustrated in Fig. 4 f.

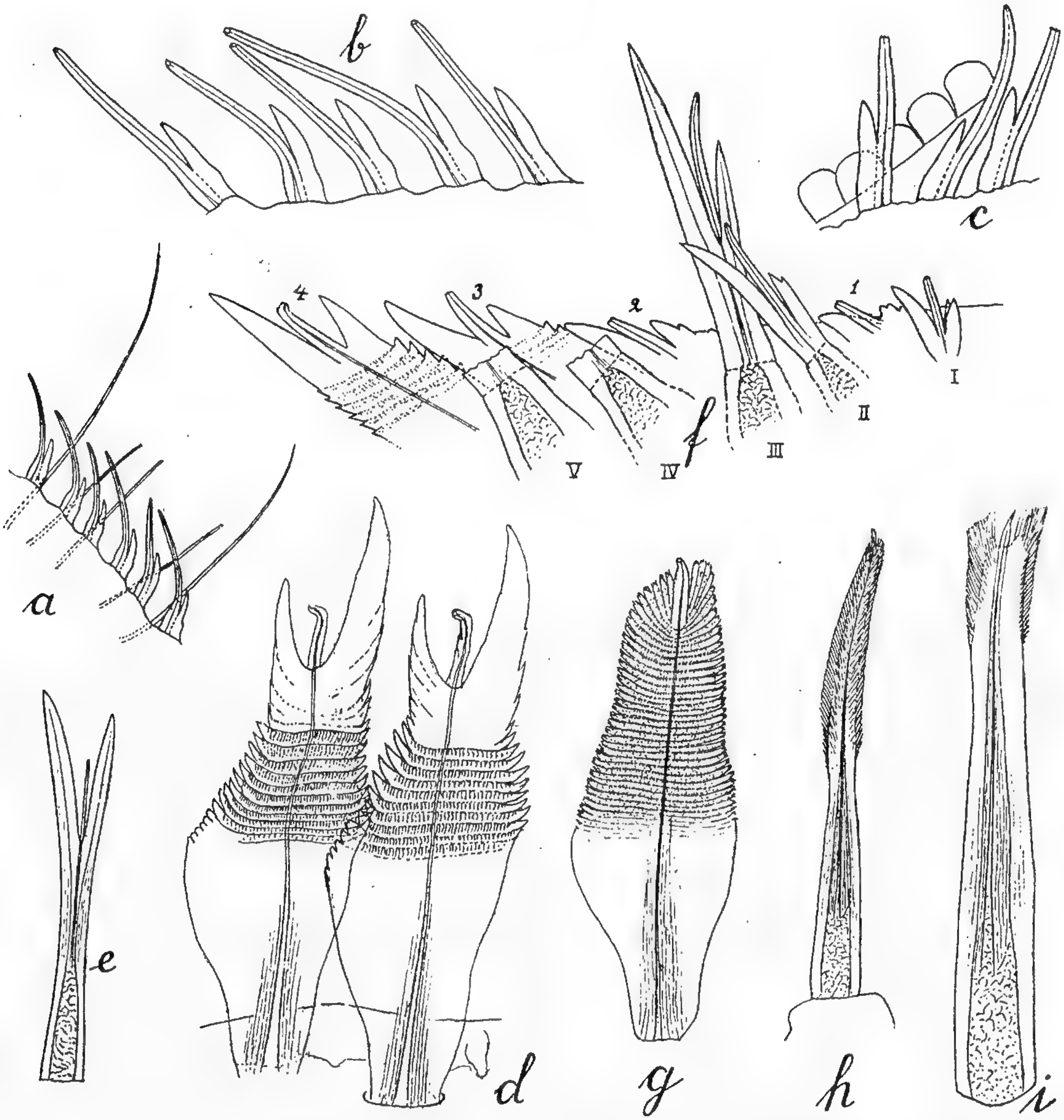

Fig. 4. Setae in *Serolis;* from the lower margin of propodus of the first pereiopod. a. and b. Setae in the female of *S. exigua*, 270 and 600 ×. c. Setae and scales from the lower margin of the propodus, *S. exigua* (female), 490 ×. d. Setae from the caudal row, seen from the caudal side, female of *S. convexa*, 465 ×. e. Seta from the rostral row in the same specimen, 160 ×. f. Proximal part of the lower margin of the propodus in a female of *S. convexa*, 350 ×. g. Seta from the caudal row seen from the caudal side, adult male of *S. convexa* (from a specimen collected by the German »Gazelle» Expedition), 270 ×. h. and i. Setae from the rostral row in the same specimen, 90 and 160 ×.

The setae adjacent to the carpus gradually diminish in size, assuming a stunted appearance close to that joint. Adjoining the carpus in the caudal row there is a non-composite seta (Fig. 4 f, *1*) with a projecting scale on either side of it. The scale furthest from the carpus is subtriangular and pointed, whilst the one nearest the carpus is very small and bifid. If we compare the phaneres in the caudal row with one another (Fig. 4 f, *1*—*4*), we shall find that the non-composite seta adjoining the carpus together with the two surrounding scales corresponds to merely a single phanere elsewhere in the row.

If we pass to the second seta of the caudal row, beginning from the carpus (Fig. 4 f, *2*), we shall see that a median non-composite seta has coalesced at the base with two surrounding scales, forming, together with the latter, a composite seta, the base of which, however, is very small. That margin of the scale part which adjoins the carpus is provided with an incision, whilst that most remote from the carpus is unbroken. The freely projecting terminal lappets of the scale part thus are similar in shape to the previously described freely projecting scales, which appear in the vicinity of the non-composite seta adjoining the carpus.

The following phaneres in the setal row (Fig. 4 f, *3* and *4*) deviate very slightly from the normal appearance. The lateral margins of the scale part are furnished in the fourth seta (Fig. 4 f, *4*) with a row of incisions; the only feature which distinguishes this phanere from the typical one illustrated in fig. 4 d is its relative shortness.

The above description of *S. convexa* indicates that phaneres which, in view of their structure and position in the same setal row, must be considered to be homologous consist of (1) a number of apparently homogeneous setae and (2) one seta with a separate scale on either side of it. We are thus forced to the conclusion that all the setae in the caudal row with the exception of the one nearest the carpus are composed of a setal part and a scale part.

The setae of the rostral row in the female of *S. convexa* likewise belong to the composite category. In this row the phanere nearest to carpus has the appearance illustrated in Fig. 4 f, I. From a short common base there issue three branches, the median one of which is traversed by the setal canal, whilst the lateral branches are subtriangular and pointed. The phanere thus resembles, in its main features, the second phanere of the caudal row, reckoned from the carpus (Fig. 4 f, *2*). Thus in the rostral row, in contradistinction from the caudal, the series of phaneres illustrating the coalescence of a non-composite seta with the surrounding scaly elements is incomplete.

In the female of *S. gaudichaudi*, in which the normally developed setae in both the caudal and rostral rows have the same structure as those of *S. convexa* (cf Figs. 4 d and e), we find, however, that the phanere, nearest to the carpus, in the rostral row, consists of a small non-composite seta with a rounded distal end, situated very close to a small pointed scale. The seta and the scale may possibly have coalesced in a slight degree at their proximal ends, but even there their outlines are quite distinct. The following phaneres of the rostral row form a series of transitional forms leading up to the normally developed composite seta typical of the female in *S. convexa* and *gaudichaudi* (Fig. 4 e).

Thus, in the case of *S. gaudichaudi*, a comparison of the phaneres in the rostral row of female specimens shows that all the setae in this row with the exception of the small one nearest to the carpus are of a composite character. As regards the females of *S. convexa* there is a slight difference from *S. gaudichaudi* in that the setae of the rostral row only form a somewhat incomplete series leading up to the type of seta characteristic of both species (Fig. 4 e). It must be assumed, however, that even in the case of *S. convexa* this type of seta belongs to the composite category.

As regards the setae of the rostral row in the female of S. *convexa*, we find that in the phanere next to the carpus (Fig. 4 f, I) the freely projecting setal part is nearly twice as long as the common base of the setal and scale-parts.

In the immediately succeeding phanere in the setal row (Fig. 4 f, II) the common base is considerably longer, but here too the freely projecting setal part is of great length. In the next phanere the common base is still longer, the freely projecting setal part here being only of about the same length as the base. In the following phaneres the common base increases successively in length, as also the two free branches of the scale part, whilst the freely projecting distal portion of the setal part becomes shorter and shorter, so that the setae finally assume the typical appearance illustrated in Fig. 4 e.

If we compare the setae adjoining the carpus (Fig. 4 f, I—V) with the typical setae situated further distally (Fig. 4 e) in the rostral row, it will be found that they differ from the latter in yet another respect. The first and second setae reckoned from the carpus, (Fig. 4 f, I—II) merge at their proximal ends into a basal part situated below the cuticle.[1] In the third seta the distal end of the basal part protrudes freely beyond the cuticle. In the succeeding setae the entire basal part is situated outside the cuticle.

In the second to eighth setae, reckoned from the carpus, we find on the caudal side (but not on the rostral) a faint suture-line between the base and the remaining part of the seta. These sutures are indicated in Fig. 4 f by dotted lines. In the ninth seta there are vestiges of such a suture-line, whilst in the tenth it has completely vanished.

The above comparison of setae on the lower margin of the propodus of the first pereiopod in the female of S. *convexa* shows that setae in the same row form a continuous series of transitional forms between (1) a non-composite seta plus one or two free scales and (2) large trilobate composite setae. As regards the setae of the rostral row, it has been shown that they form a series of phaneres differing continually in the degree of coalescense between their setal and scale parts, as well as in the development of their basal parts.

It may thus be referred that the above described series of phaneres in the same row, each differing in a slight degree from those immediately adjacent to them, possibly illustrates, in some measure, the normal process of development of the composite setae. The implication is that the phaneres nearest to the carpus have assumed their stunted appearance owing to an arrestment of their growth. In that case the most stunted phanere or group of phaneres, that nearest to the carpus, would correspond to a comparatively early stage of development.

VI. Composite setae on the first pereiopods.

It has been shown above that the setae on the lower margin of the propodus of the first pereiopod in S. *exigua, convexa* and *gaudichaudi* belong to the composite category and that their trilobate shape in the females of the two latter species is due to an incomplete coalescence between their setal and scale parts. In immature male specimens of S. *gaudichaudi* the setae are equal to those of the female, whilst in the adult

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[1] This basal part of the first seta has not been drawn, though it could be brought into view by a low adjustment of the microscope.

males they have, in part, lost their trilobate shape (see p. 30). The composite setae on the propodus of the first pereiopod may thus vary considerably in shape in the same species. On a comparison of the setae on the lower margin of the propodus in the several species of *Serolis* we will find that they all are of exactly the same type as those of *S. convexa* and *gaudichaudi*, agreeing with the setae of the two latter species even in their minute, chitinous structure. As a rule, their shape is characteristic of each species,

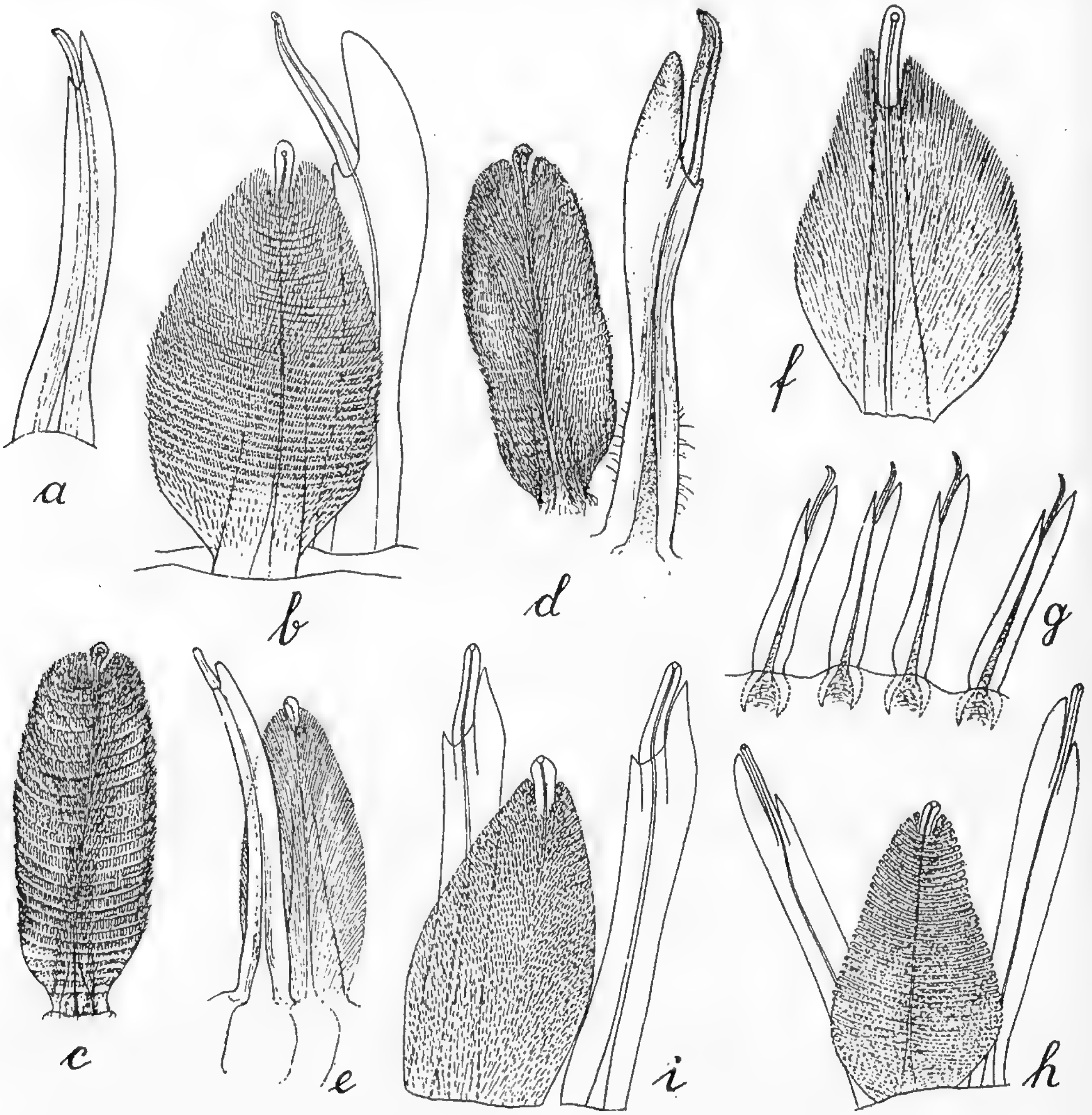

Fig. 5. Setae in *Serolis;* from the lower margin of propodus of the first pereiopod. a. Seta from the rostral row in *S. trilobitoides*, 270 ×. b. Setae from *S. paradoxa*, 265 ×. c. Seta from the caudal row seen from the caudal side, *S. schythei*, 270 ×. d. Setae seen from the rostral side, *S. schythei*, 270 ×. e. Setae, seen from the rostral side. *S. pagenstecheri*, 180 ×. f. Seta from the caudal row, seen from the rostral side, female of *S. polita*, 465 ×. g. Setae from the rostral row, female of *S. polita*, 160 ×. h. Setae from *S. septemcarinata*, seen from the caudal side (high adjustment of the microscope) 270 ×. i. Setae from *S. bouvieri*, seen from the caudal side (high adjustment of the microscope), 270 ×.

but the difference between setae of the different species is not as marked as that between corresponding setae from young and adult males in *S. gaudichaudi*. Setting aside *S. convexa* and *S. gaudichaudi*, the setae adjacent to the carpus differ from the remaining setae in the rows only in their smaller size. Even in young removed from the marsupium, I found the setae on the propodal edge to be of exactly the same shape and structure as in adult specimens (in *S. paradoxa* and *schythei*).

Except in *S. exigua* (see p. 24), two longitudinal rows of setae occur on the lower margin of the propodus. The setae in the two rows always show rather considerable differences in their detailed structure. They are equal in both sexes, except in *S. convexa* and *gaudichaudi*.

In the caudal row they are short, thin, leaf-like phaneres whose setal part is always freely projecting. At a somewhat low adjustment of the microscope, the setal part becomes, as a rule, dimly discernable in its entire length (see Figs. 5 b, e and f). The setae are traversed throughout by a narrow setal canal, opening into a pore at the tip of the setal part; this pore is situated more or less towards the caudal side (see Figs. 5 b, c, f, i, h). The lateral margins of the scale part are often, more or less distinctly split up into pointed triangular lappets.[1]

As was pointed out by HODGSON (1910) with reference to *S. trilobitoides*, the rostral and caudal surfaces of the setae of the caudal row differ in appearance, a difference which I could observe in all the species examined by me. Viewed from the rostral side, the setae have a more or less distinct longitudinal striation (Fig. 5 f and d), whereas from the caudal side, they are seen to have transverse streaks (Fig. 5 c). This is due to the caudal surface of the setae being traversed by fine transverse grooves, running parallel to one another and issuing into the lateral incisions between the triangular marginal lappets. Between the transverse grooves the longitudinal striation[2] of the setae is visible, as minute streaks or dots, also on the caudal side. The striated structure of the setae leads to the formation of minute hair-like points, which occur sparsely at the margins, for example in *S. trilobitoides* (Fig. 5 f) and *S. paradoxa* (Fig. 5 b); in the latter species they occur moreover on the proximal part of the caudal surface. The sculpturing of the caudal surface in setae of *S. bouvieri* deviates from other species in another respect. As will be seen from Fig. 5 i, the leaf-like setae in this species have well-defined grooves only at the distal end, close to the margins.

The typical structure of the setae of the caudal row in several species is illustrated in Fig. 5 with reference to *S. paradoxa* (b), *schythei* (c and d), *pagenstecheri* (e), *polita* (f), *septemcarinata* (h), and *bouvieri* (i). As shown by the figures, setae from different species differ mainly from one another in their shape, as well as in having the lateral margins of the scale part more or less split up into pointed, triangular lappets.

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[1] See, for example *S. schythei* (Fig. 5 c and d) and *S. convexa* (Fig. 4 d and g).

[2] I found a similar chitinous structure at the tip of the dactylus of the first pereiopod in *S. gaudichaudi*. The tip of the dactylus, except its extreme distal end, forms a subtriangular portion which has the appearance of an »impressed» seta of the leaf-like type. The rostral surface of the subtriangular portion is traversed by parallel transverse grooves terminating in faint incisions on the lower margin of the dactylus; its caudal surface is either faintly striated in a longitudinal direction (in the adult male) or, as the rostral surface, traversed by faint parallel transverse grooves (in the female). The subtriangular part is moreover traversed by a narrow longitudinal canal, which, however, does not reach quite up to its distal end. The extreme tip of the »impressed seta» projects freely.

The setae of the rostral row, unlike those of the caudal row, are always long and subcyindrical. The setal part is not discernible within the scale part, but may be indistinctly indicated by a faint longitudinal striation (see Fig. 5 a). As in the setae of the caudal row, the setal part is always freely projecting. As a rule, the scale part is produced at its distal end into two triangular lappets, one on either side of the freely projecting tip of the setal part. The setae are thus trilobate at their distal ends. Only setae from the adult males of *S. convexa* and *gaudichaudi* deviate in this respect (see Fig. 4 h and 3 g). As a rule, the setae of the rostral row in the different species are distinguished by the distal lappets of the scale part being dissimilar in shape and length, and by the varying length of the free terminal portion of the setal part. This feature is illustrated in Fig. 5 with reference to the species *trilobitoides* (a), *paradoxa* (b), *schythei* (d), *pagenstecheri* (e), *polita* (g), *septemcarinata* (h) and *bouvieri* (i). In *S. paradoxa*, for example, the setae of the rostral row have the usual trilobate shape and are not single-pointed, as GRUBE (1875) asserted (see p. 12). As regards the setae in *S. septemcarinata*, which have been variously, described and figured by BEDDARD (1884), PFEFFER (1887) and COLLINGE (1918), my observations agree with those of BEDDARD.

In *S. convexa* and *gaudichaudi* we find a marked difference in structure between setae from female specimens and corresponding setae from adult males.

In *S. convexa* the setae of the caudal row in the female have the structure shown in Fig. 4 d. As in other species they are leaf-like, flattened, and shorter than the setae of the rostral row; but at the distal end the scale part is produced into triangular lappets, one on either side of the free setal part, a feature which is usually peculiar to the setae of the rostral row. Viewed from the rostral side the longitudinal striation is, as usual, visible. The transverse grooves of the caudal surface are well-marked only in the middle part of the setae.

A corresponding seta of the full-grown male is shown in Fig. 4 g.[1] It will be seen that the terminal lappets of the scale part have disappeared, and that the entire distal portion of its caudal surface, from a point situated somewhat proximally from the centre, is traversed by transverse grooves. The setae thus have the general shape and structure which characterizes setae of the caudal row in most species of *Serolis*. A feature peculiar to the setae in the male of *S. convexa* is, however, that each marginal lappet of the scale part terminates in slender hair-like processes.

The setae of the rostral row in the female of *S. convexa* have the usual cylindrical and trilobate shape (Fig. 4 e). The distal end of the setal part projects freely between the two terminal lappets of the scale part, which protrude beyond the free portion of the setal part.

In the corresponding setae of the full-grown male (Fig. 4 h) the free terminal lappets of the scale part are missing, and the setal part projects freely from the tip of the scale-part. The distal portion of the scale-part is obliquely striated, so that it seems to be split up into slender »hairs». This, however, is actually the case only at the proximal end of the obliquely striated portion. Some of the setae of the rostral row in the single male specimen of *S. convexa* which I have been able to examine differs in shape from the rest (see Fig. 4 i). These setae show somewhat less deviation from the corresponding,

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[1] Cf. BEDDARD, 1884, Pl. VI, Fig. 11.

trilobate setae in the female, in that their scale parts are distally produced into two short lappets.

The material at my disposal did not allow of an investigation of the setae in immature male specimens of *S. convexa*. It may, however, be presumed that they are similar in structure to those of the females; this at least is the case in the allied species *S. gaudichaudi*, whose setal armature is very similar to that of *S. convexa*.

In *S. gaudichaudi* the setae of the full-grown female have the same shape and structure as in the female of *S. convexa* (cf. Figs. 4 d and e); in the full-grown male of *S. gaudichaudi* the setae of the caudal row are similar to those of the caudal row of *S. convexa*, whilst in the rostral row the setae have the structure illustrated in Fig. 3 g. As was pointed out by AUDOUIN and MILNE EDWARDS (1841), they are provided with very densely situated hair-like sub-branches. A comparison between a seta in the adult male of *S. gaudichaudi* (Fig. 3 g)[1] and a corresponding seta in the adult male of *S. convexa* (Fig. 4 h) shows, that the obliquely striated part in the latter seta has, in *S. gaudichaudi*, been split up into slender »hairs».

In sub-adult[2] male specimens of *S. gaudichaudi*, the setae in the caudal row have already acquired the same character as in the adult male, whilst in the rostral row they are similar to those of the female. The only way in which these last-mentioned setae differ from those in the rostral row of the female is that the freely projecting terminal part of the setal portion is longer, being of about the same length as the free terminal lappets of the scale part. The setal part has thus almost acquired the length characteristic of the setal part in setae of full-grown males.

In immature males[3] the setae of *S. gaudichaudi* in both rows have the same structure as in female specimens.

As shown above, the setae in the two rows on the lower margin of the propodus usually have a structure peculiar to each species. The setae of the caudal row are thin, leaf-like and flattened, their lateral margins are often provided with more or less distinct incisions, which on the caudal surface are produced into transverse parallel grooves. The setae of the rostral row are longer than those of the caudal row, subcylindrical and — setting aside full-grown male specimens of the species *S. convexa* and *gaudichaudi* —, distally trilobate. The trilobate form is occasionally found even in setae from the caudal row.[4]

The deviations in *S. exigua* have been pointed out above (p. 24).

The type of composite setae found on the lower margin of the propodus recurs also in some of the setae on the carpus. All the species of *Serolis* which I examined are provided, on the lower margin of the carpus or on its free distal edge, with two stout setae, surrounded by a varying number of slender setae. The stout setae on the carpus in the species examined by me are sub-cylindrical in shape and similar in structure to the setae of the rostral row on the propodus; in some cases, however, they may exhibit features which, as shown by the above description, are characteristic of the leaf-shaped setae in the caudal row.

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[1] See also AUDOUIN and MILNE EDWARDS (1841, Pl. I Fig. 13^{II} and 13^{III}).

[2] Male specimens possessing semi-developed penial filaments and a slightly swollen propodus on the second pereiopod.

[3] Male specimens possessing minute penial filaments and with no swelling of the propodus of the second pereiopod.

[4] In female specimens of *S. convexa*, as well as in female and immature specimens of *S. gaudichaudi*.

In the two stout setae which may thus be referred to the composite kind, the setal part, as a rule, has a freely projecting tip which is exactly like the distal end of the surrounding slender non-composite setae. See Fig. 6 f, illustrating a composite seta from the carpus of *S. paradoxa* and Fig. 6 g, which shows one of the surrounding non-composite setae. See also *S. exigua*, Fig. 6 e.

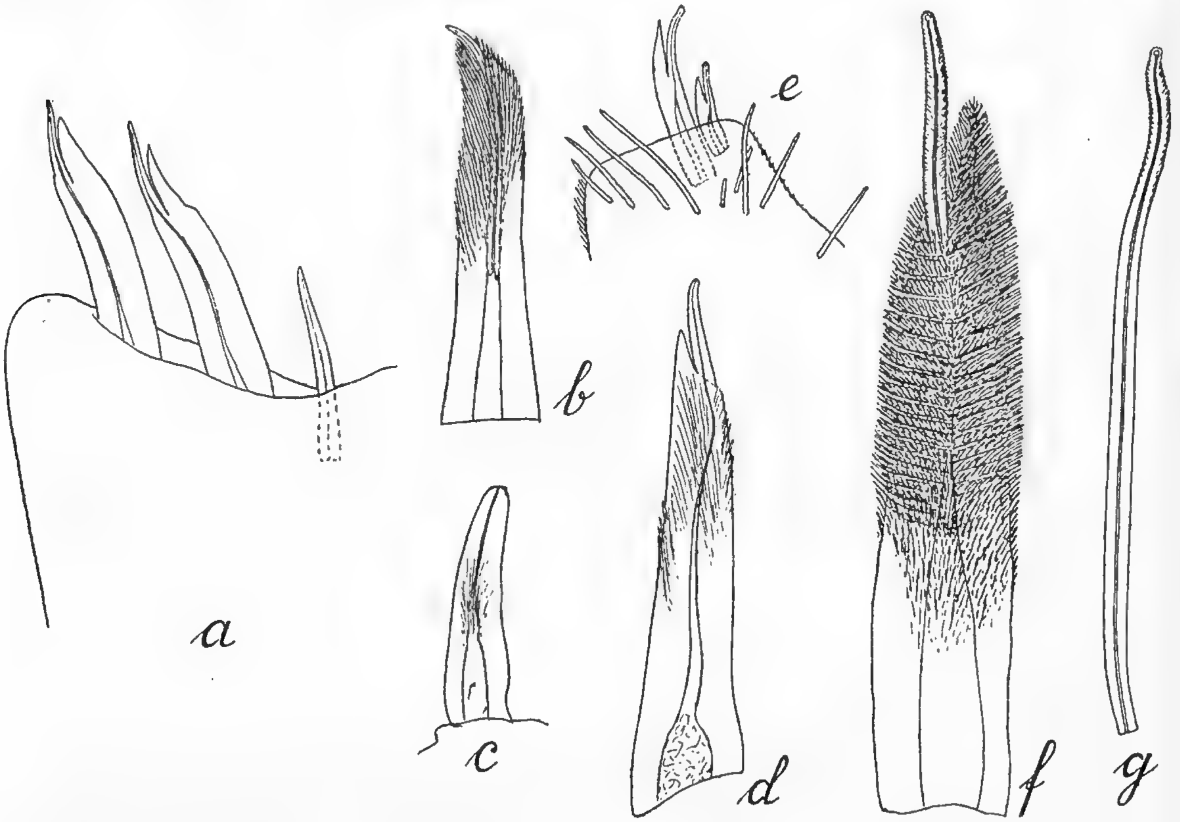

Fig. 6. Setae in *Serolis;* from the carpus of the first pereiopod. a. *S. septemcarinata*, female, 270 ×. b. *S. polita*, female, 270 ×. c. *S. pagenstecheri*, female, 90 ×. d. *S. convexa*, female, 465 ×. e. Distal part of the carpus with setae in a female of *S. exigua*, 160 ×. f. Composite seta in *S. paradoxa*, 270 ×. g. Non-composite seta in *S. paradoxa*, 270 ×.

In *S. exigua* (Fig. 6 e) the composite setae on the carpus are of the same type as the setae on the lower margin of the propodus in this species, where there is only a single row. They differ, however, in the following respects: the base common to the setal and scale part is longer; no line of demarcation between the setal and scale parts is observable within this base; and the freely projecting tip of the setal part is shorter.

In *S. septemcarinata* (Fig. 6 a) the two stout setae on the carpus are similar to the setae in the rostral row on the propodus, but differ in the scale-part having only a single free terminal lappet.

In the female of *S. convexa* (Fig. 6 d) their structure is similar to that in *S. septemcarinata*, except that the distal half of the scale part is distinctly striated. In *S. gaudichaudi* these setae differ slightly in structure in adult males and females. In the adult male (Fig. 3 f) they are provided with hair-like sub-branches at the distal end of the scale part; in female and immature specimens as well as in sub-adult males the scale part is instead obliquely striated.

In *S. polita* (Fig. 6 b) the setal part is dimly discernable within the scale part. The scale part appears to be longitudinally grooved distally but is split into short sub-branches at the margins.

In *S. pagenstecheri* (Fig. 6 c) the setae have a compact structure, being entirely devoid of a freely projecting setal part.

In *S. paradoxa*, the composite setae on the carpus (Fig. 6 f) show resemblance to the setae in the caudal row on the propodus in that the caudal surface of the scale part is traversed by transverse, parallel grooves, but they differ from the latter setae in having a sub-cylindrical shape and in being densely provided with short hair-like sub-branches.

In *S. schythei* the structure of the setae is much the same as in *S. paradoxa.*

VII. Setae of the composite type on the second pair of pereiopods.

The same type of stout setae which occurs on the propodus and carpus of the first pereiopod occurs also on the propodus of the second pereiopod. The setal armature of this pereiopod differs, however, with the sex. In female and immature specimens all the

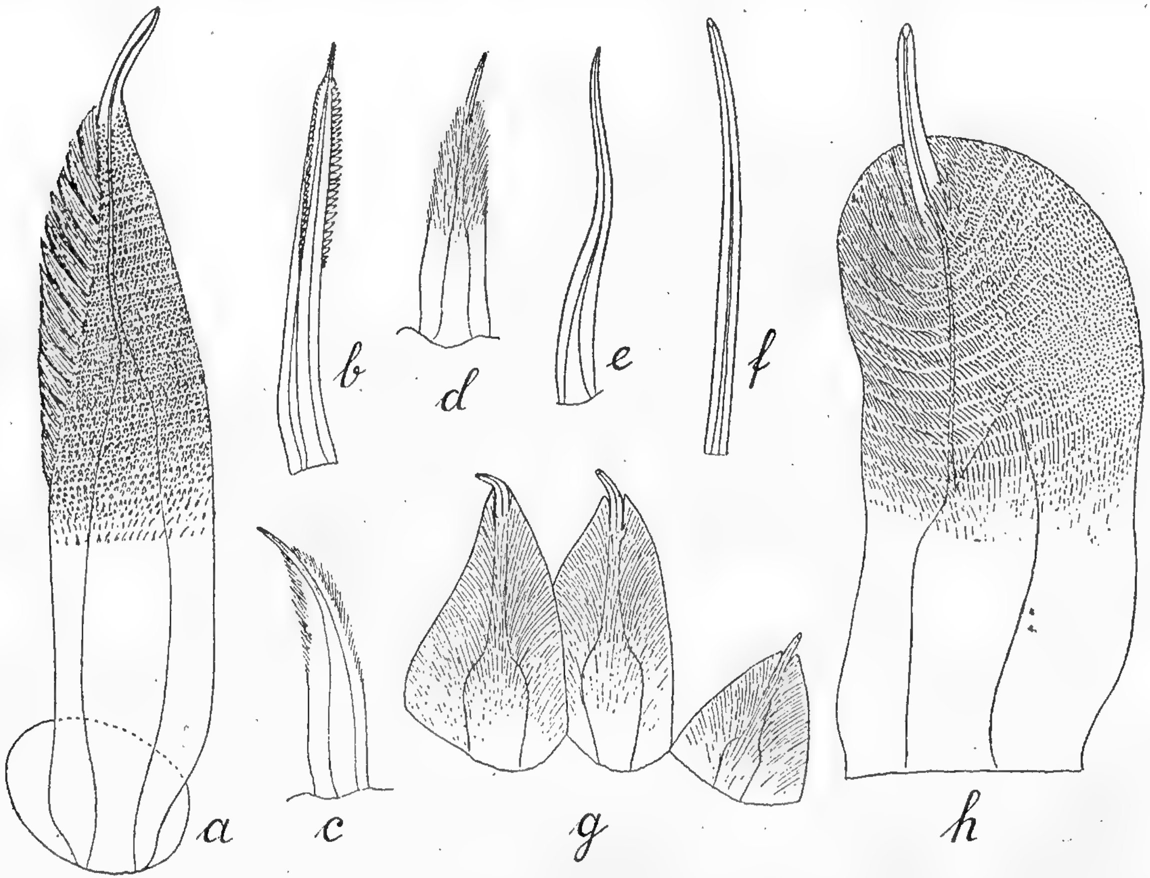

Fig. 7. Setae in *Serolis;* from the propodus of the second pereiopod in the male. a. From the lower margin of the propodus, adult male of *S. paradoxa*, 240 ×. b. From the same spot in a sub-adult male, 140 ×. c. Seta from the proximal part of the lower margin of the propodus, seen from the caudal side, adult male of *S. pagenstecheri*, 80 ×. d. The same seta seen from the rostral side, 80 ×. e. A seta from the distal part of the lower margin of the propodus, adult male of *S. pagenstecheri*, 80 ×. f. One of the submarginal setae near the lower margin of propodus, adult male of *S. pagenstecheri*, 200 ×. g. Seta from the proximal part of the lower margin of the propodus, adult male of *S. septemcarinata*, 240 ×. h. Seta from the lower margin of the propodus, adult male of *S. schythei*, 535 ×.

stout setae on this pereiopod agree with those of the ordinary sword-shaped type which occur on the other pereiopods (see Fig. 3 h). In adult male specimens, we find, however, that the stout setae on the lower margin of the propodus have always been transformed. These setae, in the adult male, agree in their main features with those of the composite kind on the first pereiopod.

The setae are always equal in shape in both the rows. Setae from these rows in adult males of *S. paradoxa* and *schythei* are illustrated in Figs. 7 a and h. Exactly as in composite setae on the first pereiopod the distal end of the setal portion projects freely from the tip of the scale part, and the caudal surface of the scale part is traversed by transverse grooves. The rostral surface, on the other hand, is devoid of transverse grooves in all the setae.

In *S. paradoxa* (Fig. 7 a) the scale part is approximately cylindrical in shape, except at its distal end, where it is markedly three-sided, that side which is directed towards the dactylus being most markedly flattened. The distal half of that portion of the scale part which is directed towards the dactylus differs from the one directed towards the carpus in being obliquely striated, and in having its margin provided with faint incisions. Towards the centre these incisions are produced into oblique grooves. That portion of the scale part which is directed towards the carpus is minutely sculptured, in the manner shown in Fig. 7 a.

In the full-grown male of *S. septemcarinata* the setae on the lower margin of the propodus (Fig. 7 g) are compact and have a conical form and the setal part can be discerned within the scale part.

In the adult male of *S. pagenstecheri* the structure of the setae differs at the proximal and distal ends of the setal rows. The proximal setae have the appearance shown in Figs. 7 c and d. The part directed towards the propodus is somewhat concave. Distally the setae are abundantly provided with hair-like sub-branches; the latter, however, are absent on the caudal surface (Fig. 7 c). The setal part which projects freely at the tip agrees even in minute detail with the distal ends of the slender non-composite setae which occur in a submarginal row on either side of the lower margin of the propodus. (Fig. 7 f). The more distally situated setae on the lower margin of the propodus (Fig. 7 e) are sub-cylindrical, tapering towards the end. They are thus similar to non-composite setae, but are much stouter and thicker.

VIII. The ordinary conspicuous sword-shaped pereiopod setae.

The above described type of stout setae on the lower margin of the propodus of the second pereiopod is found in the adult males only. In sub-adult males the setae on this spot agree with, or are very similar to, the ordinary sword-shaped thoracopod setae.

In sub-adult[1] males of *S. paradoxa* the setae on the lower margin of the slightly swollen propodus (Fig. 3 b) are arranged in two adjoining rows, except in the region near the dactylus, where they converge into a single row. All the setae in the proximal half of the propodus are about twice as long as those more distally situated. Most of the setae have the appearance illustrated in Fig. 7 b. They are distinctly three-sided, except at their

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[1] Male specimens with semi-developed penial filaments and with a slightly swollen propodus on the second pereiopod.

proximal ends. They are furnished with two rows of short sub-triangular sub-branches. The setae agree with the ordinary sword-shaped thoracopod setae, except that they have a freely projecting tip at the distal end. Some of the most distally situated setae, however, preserve the same structure as ordinary thoracopod setae of the sword-shaped type; they thus differ from the seta illustrated in Fig. 7 b by tapering continuously towards the tip. All the setae have their rows of sub-branches directed towards the dactylus. The sub-branches thus correspond to the obliquely striated portion in setae of adult males (cf. Fig. 7 a). Even in the latter setae the triangular sub-branches can be dimly discerned, though they are coalesced with one another and separated only by grooves, except at their extreme ends. The three-sided shape which is characteristic of the distal parts of the setae in adult males is characteristic also of the setae in sub-adult males, though it is here still more marked.

In immature males[1] the setae on the lower margin of the propodus are likewise situated in a longitudinal row, which, in the vicinity of the carpus, divides into two; the setae adjacent to the carpus have shorter and narrower sub-branches than the rest. It is not possible to observe any difference whatsoever between a setal part and a scale part.

The setae on the same spot in the female are arranged in a single longitudinal row; in the vicinity of the carpus this row is sometimes broken up into two adjoining rows. The setae adjoining the carpus are provided with two rows of slender, minute, almost hair-like sub-branches. As we approach nearer the dactylus the sub-branches become more triangular. Between the setae with triangular sub-branches and those with hair-like sub-branches there occur setae which exhibit a continuous series of transitional forms in regard to the structure of the sub-branches.

As mentioned above, the setae on the lower margin of the propodus of the second pereiopod in female and immature specimens correspond to the ordinary stout, sword-shaped setae which occur on all the pereiopods, except the first. On the third to seventh pereiopods the sword-shaped setae occur in groups on all the joints, except the basipodite and the dactylus. In each group the setae may vary in structure and slenderness. In *S. paradoxa* and *schythei* the most conspicuous setae in the groups are distinctly three-sided at their distal ends, the surface facing the joints being the broadest. From each margin of this surface there issue a row of short, flattened subtriangular sub-branches. The more slender setae differ from the stouter, ones in being furnished with hair-like sub-branches; they are likewise three-sided at their distal ends, but the surface which faces the joints is narrower than in the more conspicuous setae. As for the most slender setae, they are sub-cylindrical also at their distal ends and either furnished with minute hair-like sub-branches or devoid of sub-branches. Exceptionally[2] the sub-branches of the ordinary stout pereiopod setae are long and slender (see Fig. 3 a). On examining the second pereiopod in a sub-adult male of *S. paradoxa*, we find (see Fig. 3 b and cf. p. 22) that the stout kind of setae on the ischium gradually diminish in size, so that on the proximal part of this joint they are quite similar to the short and hair-like non-composite setae. Hence it is no longer possible here to distinguish the composite and none-composite type of setae.

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[1] Male specimens with extremely short penial filaments and with no swelling of the propodus of the second pereiopod.

[2] I have only found this type of setae in *S. polita*.

The above study of the setae on the pereiopods has shown the existence of a series of transitional forms between composite setae and the ordinary sword-shaped setae on the pereiopods. It should be noted, however, that there is also a continuous series of transitional forms between the latter setae and those of the hair-like, apparently non-composite type.

IX. The setae on the oral appendages.

Maxillipeds. Most of the setae are slender, sub-cylindrical and devoid of sub-branches. On the distal margin of the basipodite, however, we always find two setae[1] of another type; they are distinguished from the rest by considerably greater thickness as well as by their sculpturing. The latter agrees with that characteristic of the composite type of setae.

In *S. paradoxa* (Fig. 8 a) the ventral surface of the stout setae on the basipodite of the maxilliped is provided with oblique transverse rows of freely projecting »hairs» which proximally assume the form of ridges. The dorsal surface of the seta agrees with the ventral, except that a distinct longitudinal striation is observable at the proximal end and that the projecting »hairs» are shorter and sparser.

In *S. pagenstecheri* (Fig. 8 b) a longitudinal striation of the surface is clearly visible. Freely projecting scale-like processes are found in sparse transverse rows on the ventral surface of the setae; the dorsal surface is smooth.

In *S. polita* (Fig. 8 c) the setae are covered with stout spiny points, which are more scanty on the dorsal surface.

In the species *S. schythei*, *convexa*, *exigua* and *septemcarinata* the corresponding setae are similar to those of *S. paradoxa*.

First and second maxillae. On the distal margins of the lobes of the first and second maxillae we find setae of a sub-cylindrical shape, in many cases provided with two rows of short sub-branches. On the outer lobe of the first maxilla the setae are stout and spine-like, whilst on the inner lobe a single slender seta is seen at the tip.

The second pair of maxillae has the same type of setae as the first pair, though somewhat weaker and longer. Occasionally, however, the setae on the distal margin of the inner lobe vary greatly in length and thickness (see Fig. 15 f).

Mandibles. The somewhat modified setae on the second and third joints of the palp[2] resemble those of the sword-shaped kind on the pereiopods in being provided with two rows of sub-triangular sub-branches, but differ from the latter setae in terminating at the distal end in a distinct knob. In the species *S. paradoxa*, *schythei*, *pagenstecheri*, *polita*, *convexa*, *septemcarinata* and *exigua* the sub-branches of the setae have the same structure as in *S. tribolitoides*.[3] PFEFFER[4] (1887), however, figures the setae of the mandibular palp in *S. septemcarinata* as having slender hair-like sub-branches. The end-knob of the setae varies in shape in different species. In *S. septemcarinata*, as correctly figured by PFEFFER (1887) it is of elongated oval shape; in *S. convexa* it is still more elongated, almost lancet-

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[1] In isolated specimens occasionally three.

[2] Described and figured by PFEFFER (1887) with reference to *S. septemcarinata* and by HODGSON (1910) with reference to *S. trilobitoides*.

[3] See HODGSON, 1910, p. 27, Pl. IV, Fig. 6.

[4] PFEFFER, 1887, Pl. III, Fig. 19.

shaped, and terminally pointed; in *S. exigua* it is oblong-oval; in *S. paradoxa* it is of about the same shape as in *S. trilobitoides*, but tapers less anteriorly.

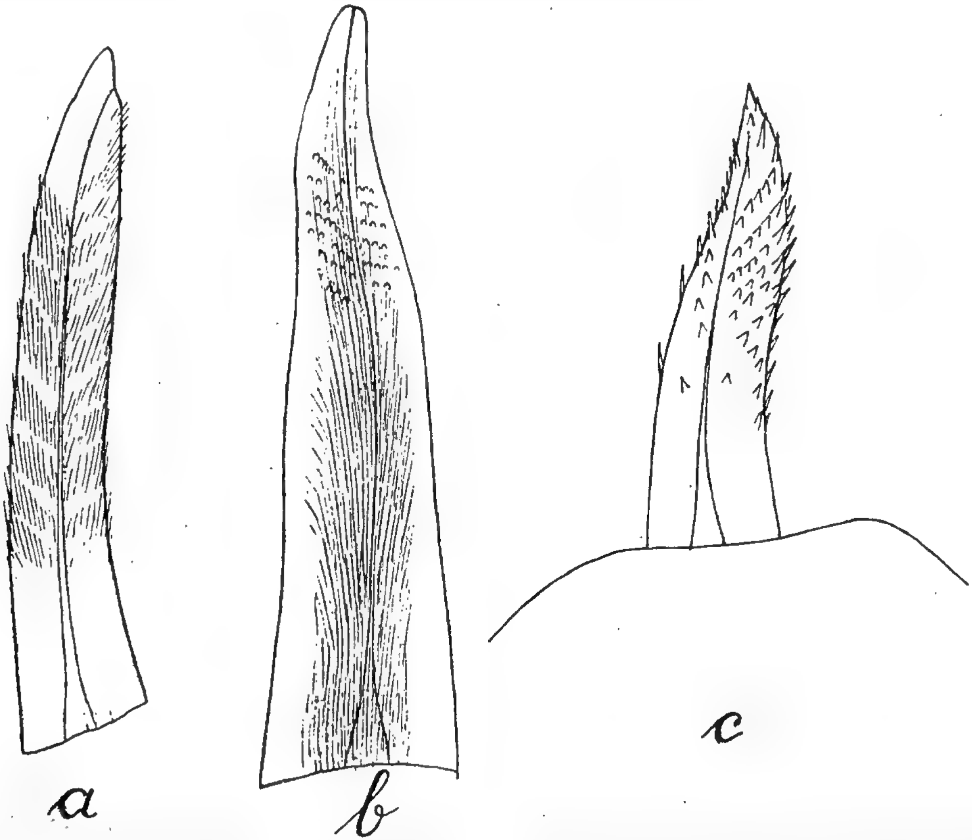

Fig. 8. Setae in *Serolis;* from the distal margin of the basipodite of the maxilliped. a. Seta seen from the ventral side, *S. paradoxa*, 360 ×. b. Seta seen from the ventral side. *S. pagenstecheri*, 360 ×. c. Seta seen from the ventral side, *S. polita*, 470 ×.

X. Summary.

A comparative study of the setae in *Serolis* makes it clear that some of the setae are composite. The composite character is apparent as regards the setae on the lower margin of the propodus of the first periopod. The occurrence of composite seteae is thus not only restricted to terrestrial Isopods. A distinction between the composite and the non-composite category of setae cannot, however, always be made merely by a morphological examination, but requires further investigation of the development of the setae.

Morphological examination makes it clear, however, that the structural scales play an important rôle as phanere-builders, whether independently or by coalescence with non-composite setae.

The part played by scales and setae in phanere-formation may be succinctly described as follows:

1) By the transformation and enlargement of single scales, lamellar, fan-shaped, spiniform, hook-like and even setiform processes may be formed.

2) A nap of delicate chitinous hairs may be formed by a division of the different scales.

3) The plumose seta may be deprived of its sub-branches partially or entirely.

4) The formation of setae is often complicated by the coalescence of the non-composite seta with one or more structural scales.

5) The degree of coalescence between the setal and the scale part of the composite setae shows great variations, ranging between very slight and complete coalescence. In the latter case the composite setae may assume the external appearance of simple setae.

Attention has been drawn to the tendency of the structural scales to be divested of their typical form partly by coalescing with one another, partly by giving rise to heteromorphic and, in many cases setiform processes. In view of this inconstancy of the structural scales it is not surprising that they should lead to the formation of phaneres by coalescence with the primitive non-composite kind of setae. The occurrence of phaneres where the setae and the scales are only slightly coalesced and, broadly speaking are entirely unconnected with one another, seems to indicate that in such cases coalescence has taken place at a relatively late stage of phanere-formation. In the case of setae where this coalescence is complete, it is possible that composite setae may even assume a structure similar to that of the plumose setae. In order to solve this problem it will necessary to study the setal development. The distinction between composite and non-composite setae would be manifested by the number and position of the cells which partake in the phanere-formation.

SECTION III.

Morphology and Classification of the Fam. Serolidae.

I. Morphology.

Suppression of segmentation and reduction of segments.

The family *Serolidae* comprises the single genus *Serolis*. It deviates from the usual type of Isopods in having its first pereion segment (= second thoracic segment) partially fused with the head, and in having dorsally only five complete and distinctly demarcated segments.

GRUBE (1875) and BEDDARD (1884) supposed that the first pereion segment, which is partially fused with the head, had been developed by the coalescense of two segments (viz. that of the maxillipeds and that of the first pereiopods). This view is based on the fact that in certain species the first pereion segment is traversed by two transverse ridges, one on either side of the head. These ridges extend in a transverse direction to a point opposite the centre of the eyes, thus dividing the segment into a small anterior and a large posterior area on either side. GRUBE (1875) and BEDDARD (1884) regarded them as vestigial segment sutures.

In opposition to this view, CALMAN (1920) states: »As a matter of fact, in *Serolis*, as in all other Malacostraca with the exception of *Bathynella*, the first thoracic somite (that of the maxillipeds) is completely incorporated in the head» (p. 301).

The above-mentioned transverse ridges on the epimera of the first pereion segment occur only in certain of the species. In some of the species we find, on either side, yet another ridge situated submarginally behind the anterior margin. The occurrence of both an anterior and a posterior ridge is characteristic of the species *S. trilobitoides, glacialis* and *pagenstecheri*.

In the species *paradoxa, schythei* and *polaris* we find only the posterior ridge, whilst in *septemcarinata, polita* and *australienses* the anterior ridge only is distinctly developed.

The species *exigua, convexa, gaudichaudi, longicaudata, latifrons* and *bouvieri* are devoid of ridges on the epimera of the first segment.

On the epimera of the other pereion segments we frequently find similar ridges, situated submarginally along the anterior margin. They are distinct in *S. paradoxa, septemcarinata, pagenstecheri* and *bouvieri*, indistinct in *polita*, and almost missing in *trilobitoides;* in *latifrons* they are distinct on the fifth an sixth segments, but entirely missing or very indistinct on the second to fourth segment. Submarginal ridges on segments 2—6 are lacking in the species *gaudichaudi, convexa, exigua, minuta, longicaudata,* as also in the species *schythei* and *polaris*. In the latter two species, however, a posterior ridge has been developed on the epimera of the first pereion segment.

S. australienses, which has a submarginal ridge on the epimera of the first segment, is furnished with two transverse rows of tuberculae on the epimera of the other segments.

The last thoracic segment in *Serolis*, as a rule, is not developed on the dorsal side. CALMAN (1920) shows, however, that in two species, *S. beddardi* and *S. latifrons*, the tergum of the last thoracic segment still exists as two minute plates, one on either side laterally from the first abdominal segment.[1] These plates are traversed by a suture, which separates the tergite proper from its coxal plate.

The considerable deviation of the two species *S. latifrons* and *S. beddardi* from other species of *Serolis* is shown in another respect. Their uropods are transformed in a manner reminiscent of the family *Sphaeromidae*. According to the views of STUDER (1879, p. 31) and CALMAN (1920, p. 300) regarding the structure of the uropods, the protopodite is produced into a long point; CALMAN (1920) holds the view that the single branch of the uropod is the exopodite, whilst the endopodite has entirely disappeared.

In her »Analytical key to the families of the *Cymotheidea* or *Flabellifera*», RICHARDSON (1905, p. 55) says that the family *Serolidae*, in contrast to the *Sphaeromidae*, is distinguished by »uropoda with both branches movable». In her diagnosis of the family *Serolidae* RICHARDSON states: »seventh thoracic segment» (actually the eighth thoracic segment) »entirely wanting on dorsal side» and »uropoda lateral, with both branches free and subequal» (p. 320). As these characters do not hold good of *S. latifrons* and *beddari*, RICHARDSON's diagnosis of *Serolis* is not applicable to the genus at large.

Just as the tergum of the seventh pereion segment in *Serolis* shows a tendency to disappear, so does also that of the sixth pereion segment. In some species (*S. tuberculata* and the other Australian species, with the exception of *minuta*[2] the middle part of the tergum of the sixth pereion segment has likewise been reduced, so that the first abdominal segment in the centre comes into direct contact with the posterior margin of the fifth

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[1] They were regarded by BEDDARD (1884) as the epimera of the first abdominal segment.

[2] Including its varieties *bakeri* CHILTON and *eugeniae* n. var.

pereion segment. In *S. minuta* a similar reduction of the dorsal central portion of the sixth pereion segment is merely incipient; the first abdominal segment in the centre of the dorsal side has coalesced with the sixth pereion segment, so that the posterior suture of the latter is interrupted in the middle. In this respect *S. minuta* agrees with the species *S. pagenstecheri* and *bouvieri*.

Another process which is unequally developed in this family is the coalescence of the coxal plates with the segments. The number of segments in which the dorsal sutures of the coxal plates are developed varies in different species.

The process of coalescence (with corresponding suppression of segmentation) between the head and the first pereion segment as well as between the last pereion segments should appear also in the sternal parts of the segments. On this point, however, only incomplete information is available.

SCHIOEDTE (1866), whose studies are not referred to in BEDDARD's monograph on *Serolis* (1884), figures and describes in detail the ventral side of the head and the first pereion segment in *S. paradoxa*[1]. On the ventral surface the suture-line between the head and the first segment is distinct laterally and posteriorly, being interrupted only for a short distance medially from the articular foramina for the first periopods (see Fig. 9). Cf. also SCHIOEDTE (1866)[2]. In the posterior part of the head caudally from the maxillipeds a ridged centre-piece is discernible, and laterally therefrom two small, well-defined oval chitinous plates, situated caudally and laterally from the maxillipeds.

The ventral surface of the first pereion segment is furnished in the middle with a trapezoidal area, which is demarcated by longitudinal limits and anteriorly provided with a longitudinal carina. The ventral side of the first pereion segment shows a rather uniform development in the different species. The above-mentioned carinated central plate (described by SCHIOEDTE (1866) in the case of *S. paradoxa*) is always found[3]. The details of its sculpturing as also the course of its lateral limits vary, however, in the different species. Moreover we always find laterally from the central plate the two small oval chitinous plates mentioned by SCHIOEDTE (1866). In the young of *S. paradoxa* and *schythei* taken from the marsupium the small oval chitinous plates were missing; hence they are not indicative of a primitive organization.

In all the species of *Serolis* examined by me, in addition to the longitudinal sutures which mark off ventrally the central plate of the first pereion segment, we find on either side a distinct laterally situated longitudinal suture passing through the articular socket for the first pereiopod (Fig. 9). This longitudinal suture has not been figured by SCHIOEDTE. One of these sutures has been illustrated by AUDOUIN and MILNE EDWARDS as regards the species *S. gaudichaudi*[4]. These authors, on the other hand, do not figure the longitudinal sutures which mark off the central plate of the first segment.

The ventrally developed sutures passing through the sockets for the first pereiopod mark off externally the epimera of the segment. In view of the course which they run, it may be presumed that these sutures at the same time mark off the coxal plates of the

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[1] SCHIOEDTE (1866, Pl. X, Figs. 2 a and b).
[2] SCHIOEDTE (1866, Pl. X, Fig 2 a).
[3] E. g. in *S. paradoxa* (Fig. 9.).
[4] AUD. and EDW. (1841, Pl. 2, Fig. 1).

first segment. Even in young specimens removed from the marsupium the sutures are quite distinct.

No epimeral sutures are developed on the dorsal side of the first pereion segment. On the remaining segments there are epimeral sutures on the dorsal side only.

Ventral sutures are found also on the last three pereion segments, which are more or less fused with one another. The course of these sutures (shown in Figs. 10 and 11) is fairly uniform in the different species. On the other hand, the coalescence of the sternal parts of the last pereion segments has apparently been carried further in some species than in others. The varying degree of reduction of the last two pereion segments, which is noticeable in their terga (see p. 39 and 40), is set off on the ventral side by a corresponding coalescence of their sternal parts.

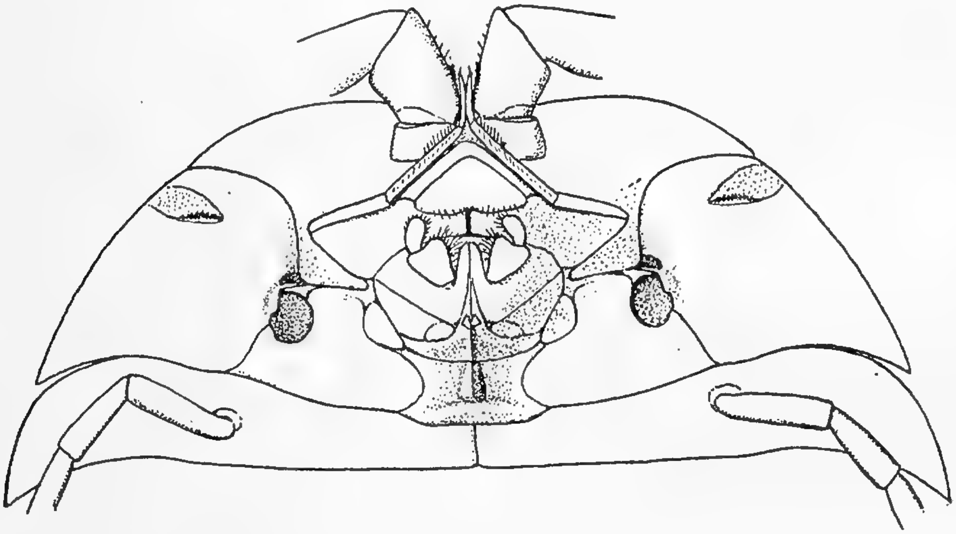

Fig. 9. Ventral surface of the head and first two pereion segments of *S. paradoxa*, sub-adult male, 5 ×.

In *S. latifrons* (Fig. 10 a) which in this respect belongs to the most primitive group of species and in which vestiges of the tergite of the seventh pereion segment are still found, the sternite of this segment is distinctly marked off from the sixth segment.

In *S. paradoxa* (Fig. 10 b) the suture-line between the sixth and seventh segments is clearly defined only laterally, whilst medially it is feebly indicated by a groove on either side of the middle line. The suture-line between the sternites of the fifth and sixth segment is distinct in its entire length in immature specimens, in females and sub-adult males, being, however, interrupted in the middle in adult males (Fig. 10 b). In young removed from the marsupium and thus having the seventh pereiopods not yet developed the suture-line between the sternites of the fifth and sixth segments is very distinct (Fig. 10 c).

I found the suture-line between the sternites of the fifth and sixth segments distinct in its entire length in females of the following species: *paradoxa, schythei, polaris, polita, septemcarinata, glacialis* (var. *austrogeorgiensis*), *gaudichaudi* and *convexa*. As regards *convexa* this feature is illustrated in Fig. 10 d. The suture-line is interrupted in the middle in adult males of *S. paradoxa* (see above) and *schythei*, or indistinct medially: in *S. polaris;* but it is distinct in its entire length in female and immature specimens of these three species also. In *septemcarinata, polita* and *convexa* the suture-line is distinct in its entire length in adult males as well as in female and immature specimens. In *trilobitoides* I found a distinct suture-line in two immature specimens.

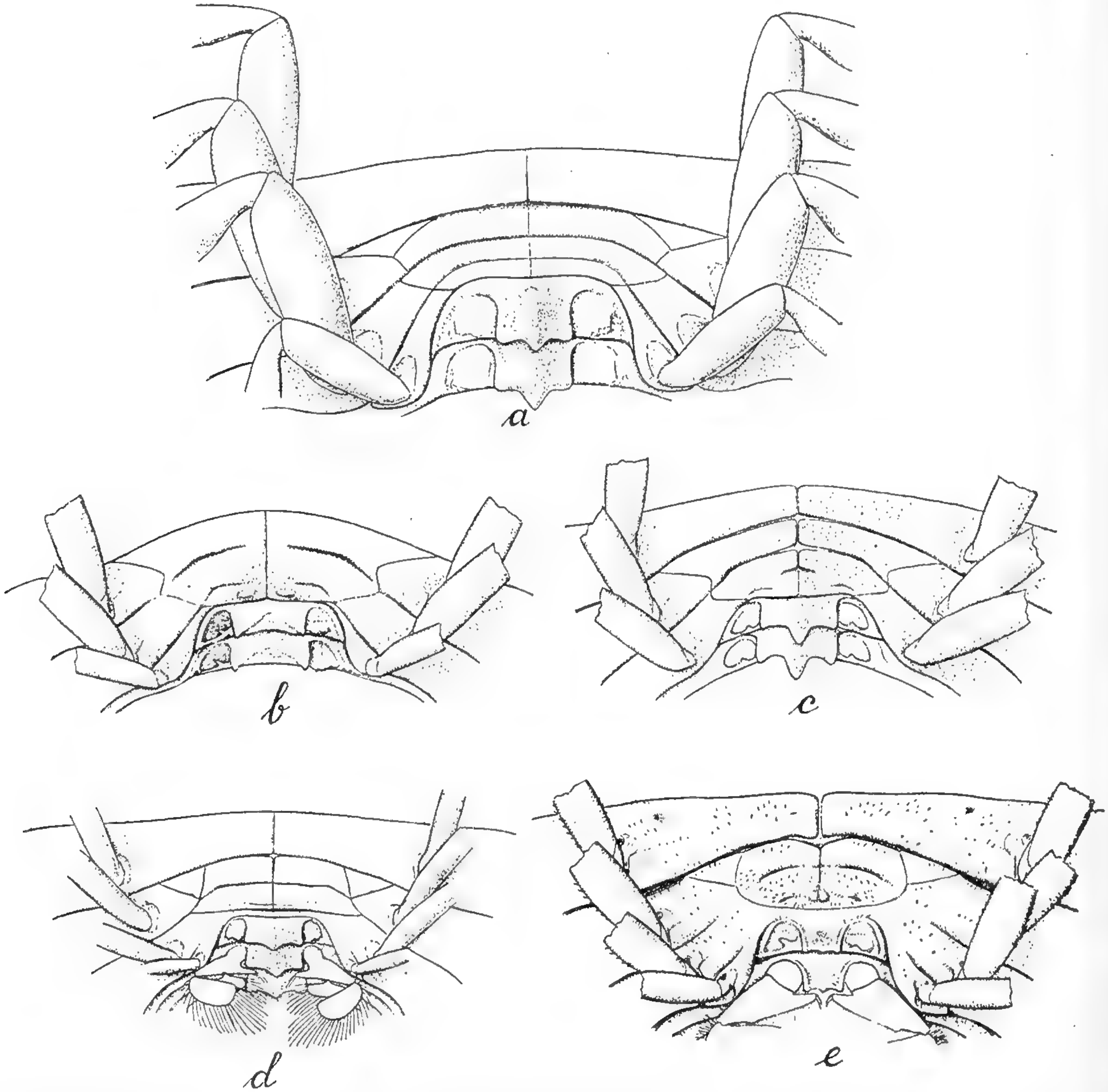

Fig. 10. Ventral surface of the last pereion segments and the first two abdominal segments in *Serolis*. a. *S. latifrons*, immature specimen, 8 ×. b. *S. paradoxa*, adult male, 3.5 ×. c. *S. paradoxa*, immature specimen taken out of the marsupium, 10.5 ×. d. *S. convexa*, female, 5.5 ×. e. *S. pagenstecheri*, adult male, 2.5 ×.

In the species *minuta, pagenstecheri* and *bouvieri*, which agree with each other in having the tergum of the sixth pereion segment fused in the middle with the first abdominal segment (see p. 39 and 40), the sterna of the last two pereion segments are more fused with one another than in the above-mentioned species of *Serolis*.

In *S. pagenstecheri* (Fig. 10 e) a suture-line between the sternites of the seventh and sixth pereion segments is developed laterally, whilst medially it is indicated by two extremely faint grooves one on either side of the middle line. The suture-line between the fifth and sixth pereion segment is also distinct laterally, whilst medially it is indicated merely by two grooves one on either side of the middle line.

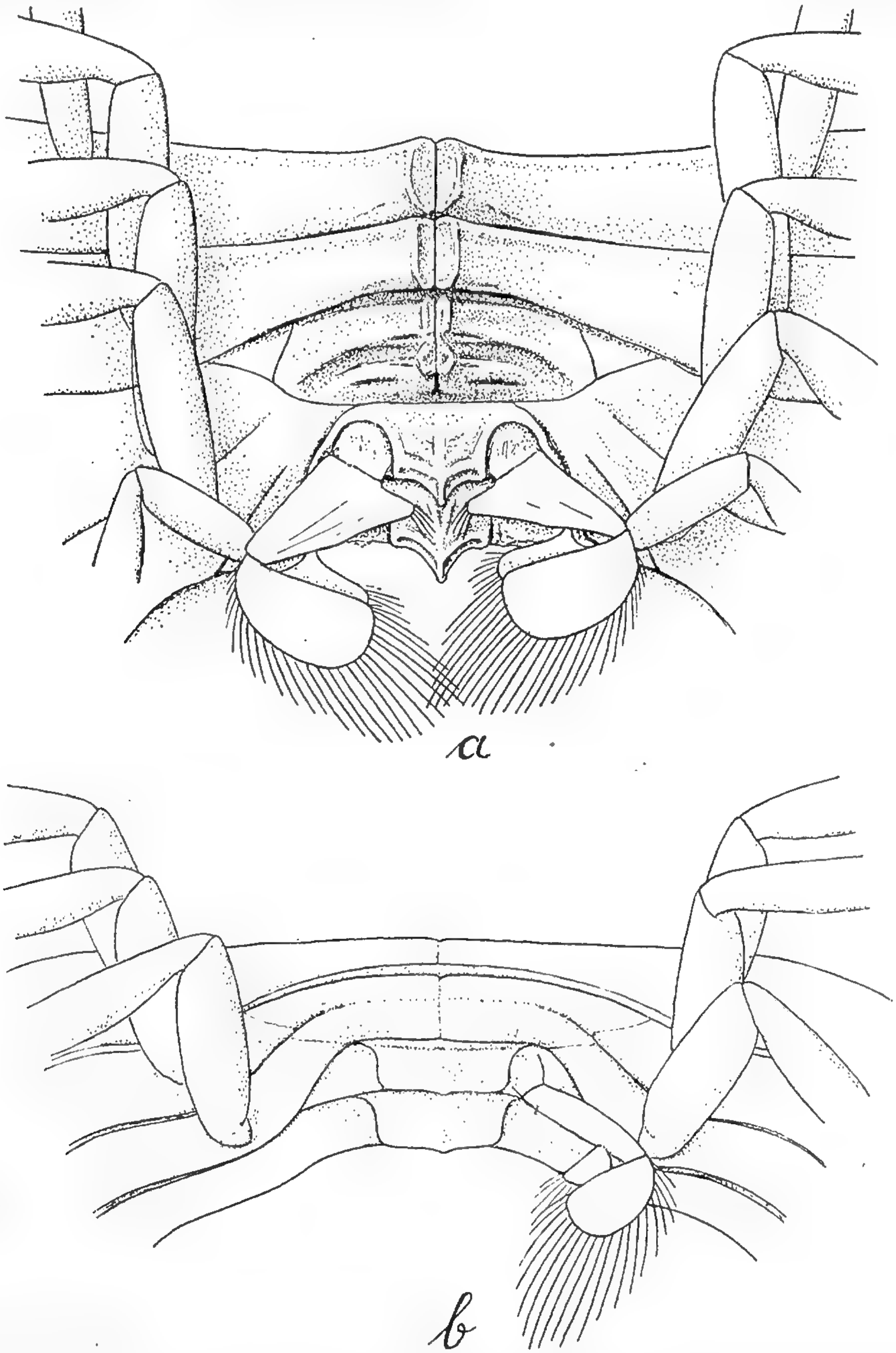

Fig. 11: Ventral surface of the last pereion segments and the first two abdominal segments in *Serolis*. a. *S. bouvieri*, immature male, 7 ×. b. *S. minuta*, var. *eugeniae*, immature specimen taken out of the marsupium, 55 ×.

In *S. bouvieri* (Fig. 11 a.) the sternites of the seventh, sixth and fifth segments are fused with each other similarly as in *S. pagenstecheri*. There are two grooves one on either side of the middle line (somewhat more distinct than in *S. pagenstecheri*), which indicate the suture-lines between the seventh and sixth segments.

As regards *S. minuta*[1], I have been in a position to study in this respect only a single specimen taken out of the marsupium; in the specimen the seventh pereion segment as also its pereiopods were not yet developed. In this young specimen the suture-line between the sixth and fifth segments is distinct laterally, whilst medially the sternites of these segments are fused; we find, however, traces of a suture proper in an extremely faint and narrow groove.

Owing to lack of adequate material, I have not been in a position to examine the ventral side of any species of *Serolis* with the tergum of the sixth pereion segments imperfectly developed.

A morphological feature which is connected with the copulation.

Grube (1875) states that in *S. paradoxa*, close to the upper lateral angle of the epimera of the first pereion segment, there occurs an attenuated chitinous area of oval shape[2], which, according to him, represents an organ of sense. I have found this chitinous area only in the species *S. paradoxa*, *schythei* and *latifrons*, and merely in some of the specimens. In *S. paradoxa* it occurs in females with semi-developed oostegits, in sub-adult males (see Fig. 9) and in young specimens.[3] It is wanting in full-grown males and, as a rule, also in females with a fully developed marsupium.

In one specimen this thin chitinous tegument was broken up into two lateral incisions (in a ♀ with fully developed marsupium), whilst in another it was provided with an aperture (in a ♀ with semi-developed oostegits).

The place occupied by this chitinous area corresponds exactly to the spot gripped by the claw of the second pereiopod of the male in clasping the female during copulation. In the Swedish Antarctic Expedition's collection of *S. pagenstecheri* there is a specimen which clearly illustrates this feature. The specimen, a ♀ with semi-developed oostegits, shows the »chela» of a male still attached to the first pereion segment in such wise that its dactylus grips the ventral side of the epimeron exactly at the spot where the attenuated chitinous area is found in *S. paradoxa*. It is therefore evident that the chitinous areas on the first pereion segments in *S. paradoxa* and *schythei* mark the place where the »chela» of the male is attached during copulation, whence it may be presumed that they facilitate the attachment of the male to the female. In view of the fact that the male »chela» in the above-mentioned specimen of *S. pagenstecheri* was attached to a female with semi-developed oostegits, it may be presumed that copulation takes place in the females at this stage of development. It has been ascertained that all females of *S. paradoxa* with semi-developed oostegits have the attenuated chitinous areas developed. It is significant that they are usually missing in females with a fully developed marsupium,

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[1] The var *eugeniae* of this species.
[2] See Grube, 1875, Taf. VI, Fig. 3 a.
[3] It is absent, however, in young removed from the marsupium.

which seems to indicate that at this stage they no longer have any function to fulfil. It is moreover interesting to note that the attenuated chitinous areas are found also in subadult males and in immature specimens.

The antennae.[1]

The antennal peduncle consists of five complete joints. PFEFFER (1887) has, however, shown that in *S. septemcarinata*, between the first and second joints, there is a vestige of yet another small »joint», developed imperfectly and only laterally.[2] This imperfectly developed »joint» I found in all species of *Serolis* examined, as a rule exactly as described by PFEFFER in regard to *S. septemcarinata*. In the case of *S. paradoxa* it is illustrated in Figs. 12 a and b. Viewed from the ventral side (Fig. 12 a), the »joint» is well defined and of an irregularly triangular shape. The dorsal side of the same »joint» (Fig. 12 b) is imperfectly delimited, its suture-line gradually vanishing towards the inner (rostral) side. *S. exigua* (Fig. 17 b) differs in having a very faint suture-line on the ventral side and none at all on the dorsal side.

The development of »the joint» in young specimens removed from the marsupium agrees (in *S. paradoxa*) exactly with that of adult individuals.

The inner (rostral) surface of the second peduncular joint, (according to PFEFFER 1887, the third) in all species of *Serolis* carries a fine nap of slender »hairs», which occupies an area of triangular shape having its broadest part proximally situated (Fig. 12 c).[3] In all preserved specimens the third joint of the mandibular palps are inserted between these »hairy» areas on the second peduncular joints, so that the nap serves to protect the last joint of the mandibular palp and its marginal setae.

The ventral side of the flagellum of the antenna is provided, as a rule, with antennal processes of varying shape. These are lacking in the species *S. minuta* (var. *eugeniae*) and *S. latifrons*. This is presumably the case also in *S. beddardi*, which is closely allied to *S. latifrons*. On this assumption, the two divergent species *S. latifrons* and *beddardi* differ from the rest in yet another character.

The mandibles.

Of fairly uniform structure in all the species of the genus. The cutting edge is more or less dentated[4]. The mandibles near the cutting edge carry two masticatory processes; the inner and somewhat more anteriorly situated process on the left mandible possibly corresponds to a lacinia and is usually very marked; usually it is attached by a broad base and is completed distally by a long dentated edge. In some species this masticatory process, instead of being expanded, is similar to the lateral somewhat more posteriorly situated process. This applies to the species *S. exigua*, *australiensis* and *longicaudata*. In *S. exigua* (Fig. 17 c and d) the anterior masticatory process is more marked than the

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[1] The second pair of appendages. For the first pair of appendages (= first pair of antennae) I use the term antennulae.

[2] PFEFFER, 1887, Pl. III, Fig. 1.

[3] Cf. Fig. 12 a and b.

[4] According to BEDDARD (1884, p. 10—11) the cutting edge is more sharply dentated in young specimens. I found, however, that in young removed from the marsupium of *S. paradoxa*, the cutting edge was similar to that of adult specimens.

posterior one. In *S. convexa* (Figs. 19 b and c) the anterior masticatory process on both the left and the right mandibles are much expanded.

The first pair of maxillae.

The inner lobe in most species is distally expanded and usually ends in an oval area, which usually is narrowly rounded at the tip or truncate; its shape, however, varies in different species; its distal margin is always furnished with a small seta.

The second pair of maxillae.

The two lappets of the outer lobe have, as a rule, only two or three apical setae. A larger number of setae on the lappets of the outer lobe is found only in the species *S. convexa* and *gaudichaudi* (in the former species 6, in the latter 7 or 8 on each lappet) and in *S. latifrons*, in which the outer lappet of the outer lobe is furnished with two apical setae; the inner lappet of the outer lobe has eight setae on the left maxilla, only four on the right.

In *S. glacialis* var. *austrogeorgiensis* the outer lobe of the left maxilla was uncleft and furnished with five apical setae; the right maxilla had the outer lobe cleft in the usual way into two lappets, each lappet being provided with two apical setae.

The maxillipeds.

Usually divided into four distinct plates, two of which are situated proximally and two larger ones distally, there being in addition a palp, generally three-jointed. Three of these plates consist of the coxopodite, the basipodite and the epipodite; the fourth must have developed from a division of either the coxopodite or the epipodite. PFEFFER (1887) supposes that the epipodite has split up into two plates.[1]

The attachment of the epipodite to the lateral margin of the coxopodite is a feature common to all Isopods.

In *Serolis*, as also in the *Idotheidae* and the *Arcturidae*[1], it may therefore be presumed that the extra chitinous plate at the proximal lateral angle of the maxilliped has developed from a division of the epipodite. Had this chitinous plate been formed by a division of the coxopodite, the distal epipodite plate would have issued from the lateral margin of the extra chitinous plate, which is not the case.

In some species of *Serolis* the distal epipodite is more or less coalesced with the basipodite, so that the suture-line between them has been effaced.

This has occurred in the species *S. paradoxa*, *schythei*, *gracilis* (see BEDDARD, 1884)[2], in *S. carinata*[3] and in the species *S. minuta*, *S. polaris* and *exigua*. In all these species, except *exigua* and probably also *carinata*[3], there is a distal incision between the epipodite and the basipodite.

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[1] In the families *Idotheidae* and *Arcturidae* we likewise find maxillipeds provided with an extra joint, which must have developed from a division of either the epipodite or the coxopodite. HANSEN (1916), after comparing the maxillipeds in *Astacilla granulata* and *Mesitodea sabinei*, shows that in the latter species the epipodite, but not the coxopodite, has been divided into two plates. COLLINGE (1916, 1916 a, 1917), on the other hand, contends that in the genera *Pentias*, *Idothea* and *Mesidotea* the coxopodite has been divided.

[2] BEDDARD (1884, p. 35, 43, 62, Pl. II, Fig. 10; Pl. III, Fig. 10).

[3] See RICHARDSON (1905, Fig. 354 d).

In *S. exigua* (Fig. 17 g) the coalescence is very marked, the distal incision between the distal epipodite and the basipodite having also disappeared.

The palp of the maxilliped usually consists of three joints; occasionally a fourth vestigial joint is found. In the species *S. pagenstecheri* and *bouvieri* this joint, though small, is well demarcated from the third palp joint. The same is the case in *S. gerlachei*[1]. In *S. schythei*[2] there is an indication of a fourth palp joint, which, however, is not clearly demarcated from the third joint; the distinctness of its demarcation varies in different specimens. *S. polita* resembles *S. schythei* in this respect (see Fig. 15 g). In *S. glacialis* var. *austrogeorgiensis* the vestigial joint is not delimited from the third joint. See Fig. 16. The figure shows that the third palp joint in this species carries distally two small projecting lappets, the outer one of which certainly corresponds to a fourth palp joint.

In some species also the third palp joint is reduced in size. This is the case in *S. gaudichaudi*[3] and still more in *S. convexa*[4].

The second palp joint is always large and in most species approximately cordate. In the Australian species of *Serolis* with the exception of *S. minuta* (with its varietys *bakeri* and *eugeniae*) the second palp joint is of a different shape; instead of being cordate it is curved, having the outer margin concave and the inner margin convex[5]. The maxilliped has been figured in the case of *S. australiensis* by BEDDARD (1884)[6], and in the case of *S. tuberculata* by CHILTON (1917)[7]. I may mention that also in *S. longicaudata* the palp of the maxilliped has the same characteristic shape as in the two abovementioned species.

S. minuta, which in other respects also diverges from other Australian species, has the second joint of the palp of the maxilliped irregularly cordate. See Fig. 20.[8]

The pleopods.

The first, second and third pairs of pleopods have a small first peduncular joint, viz. the coxopodite[9]. The inner proximal angle of the basipodite on the first three pleopods is in most species triangularly extended and furnished with three setae on the first pair, and two on the second and third pair. This triangular extension is lacking in the Australian species, even in *S. minuta*,[10] as well as in the species *S. paradoxa, schythei* and *polaris*. The endopodite of the fourth pair is generally triangular; in *S. naera*, according to BEDDARD (1884), it is divided into two lappets by a distal incision. This is the case also in *S. paradoxa, schythei* and *polaris*.

The uropods.

Characteristically transformed in *S. latifrons* and *beddardi*, otherwise fairly uniform; they are reduced in size in *S. bouvieri* (see RICHARDSON 1906).

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[1] MONOD (1926, Fig. 37 F).
[2] Cf. BEDDARD (1884, p. 43, Pl. II, Fig. 10).
[3] AUDOUIN and MILNE EDWARDS (1841, Pl. I, Figs 12 and 12').
[4] BEDDARD (1884, Pl. VI, Fig. 15).
[5] Cf. BEDDARD (1884, p. 67).
[6] BEDDARD (1884, Pl. VI, Fig. 6).
[7] CHILTON (1917, Fig. 7).
[8] The figure illustrates the maxilliped of the var. *eugeniae* of *S. minuta*.
[9] Figured only by PFEFFER (1887, Pl. III Figs. 22, 23, 24) in the case of *S. septemcarinata*.
[10] In *S. minuta* var. *eugeniae*. The main species and the var. *bakeri* have not been examined in this respect.

II. Classification.

Genus **Serolis** (LEACH), 1818.

For diagnosis of the genus see BEDDARD (1884, p. 7) and RICHARDSON (1905, p. 320). RICHARDSON's diagnosis must be slightly modified so as to include also the species *S. latifrons* and *beddardi* (see p. 39); the latter two species are assigned below to the new sub-genus *Spinoserolis.*

Since the great work on *Serolis* by BEDDARD (1884) the following species have been established:

bouvieri, RICHARDSON (1906); *meridionalis,* HODGSON[1] (1908); *polaris,* RICHARDSON (1911); *beddardi,* CALMAN (1920); *glacialis,* TATTERSALL (1921); *gerlachei,* MONOD (1926).

To these species I can add the new species *S. exigua,* described below, whilst I regard »*S. bakeri*», CHILTON (1917), as a variety of *S. minuta.*

Division into sub-genera.

BEDDARD (1884) assigned the six Australian species of *Serolis* to a special group within the family.

A distinguishing feature of all these species, with the exception of *S. minuta,* is that the middle part of the tergum of the sixth pereion segment has disappeared, whilst the second palp joint of the maxilliped is characteristically developed, not being cordate, but of almost uniform breadth. *S. minuta,* in which the tergum of the sixth pereion segment is preserved in its entirety but coalesces in the middle with the first abdominal segment, thus represents a transitional form leading up to *S. paradoxa* and allied species.

BEDDARD neither describes nor figures the maxilliped in *S. minuta,* but points out that, except in the characters of the sixth pereion segment, *S. minuta* more closely resembles *S. paradoxa* and allied species than *S. tuberculata.* He does not follow up his groups by a division into sub-genera.

Nor was the genus divided into subgenera by CALMAN (1920). He showed, however, that the two species *S. beddardi* and *latifrons* deviate considerably from the other species of *Serolis,* firstly in the continued existence of vestiges of the tergum of the last thoracic segment and secondly in the characteristic transformation of their uropods. These characters are regarded by CALMAN (1920) as being of almost generic importance.

CALMAN divides the family into three groups, viz. the *S. latifrons* group, the *S. paradoxa* group and the *S. tuberculata* group. Of these the *S. latifrons* group comprises *S. latifrons* and *S. beddardi,* while the two other groups are the same as those established by BEDDARD. CALMAN includes *S. minuta* in the *S. tuberculata* group, which, according to him, is characterized by having »tergum of penultimate thoracic somite interrupted in the middle so that the first abdominal comes in contact with the antepenultimate thoracic tergum» (CALMAN, 1920, p. 299); *S. minuta,* however, deviates from his group diagnosis.

As has been pointed out above the tergum of the penultimate thoracic segment in *S. minuta* is fused in the middle with the first abdominal segment; this is the case

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[1] Fide VANHÖFFEN (1914).

also in the species, *pagenstecheri* and *bouvieri*[1]. Thus, as regards the fusion and partial reduction of the last thoracic terga, the above-mentioned species occupy an intermediary position between the *S. paradoxa* group and the *S. tuberculata* group. The reduction of the dorsal middle part of the sixth pereion segment has been carried further than in the species of the *S. paradoxa* group, but is not complete as in the *S. tuberculata* group.

If the different degree of coalescence between the tergal parts of the posterior thoracic segments is consistently taken as a systematic character, these species must be assigned to a special group.

That these species constitute a special type within the family, quite as much as the *S. paradoxa* and *S. tuberculata* groups, is clearly shown also by an examination of the sternal parts of the segments. It has been pointed out above that only in the species *S. minuta*, *pagenstecheri* and *bouvieri* is the coalescence between the sternites of the fifth and sixth pereion segments so far advanced that the greater part of the suture-line between them has been effaced.

In contrast to the four above-mentioned species, all the species of the *S. paradoxa* group which I have been in a position to study have the suture-line between the sterna of the fifth and sixth pereion segments developed in its entirety (see p. 41 and 42)[2].

The genus *Serolis* thus exhibits four different constantly recurring types, which differ in regard to the degree of the reduction of, and the coalescence between, the last three pereion segments. Moreover these »types» of the genus sometimes have other characters in common (particularly in the uropods and the maxillipeds). We are, therefore, warranted in dividing the genus into four sub-genera, for which I propose the following terminology:

1. *Spinoserolis* (= *S. latifrons* group, CALMAN);
2. *Serolis* (= *S. paradoxa* group, CALMAN);
3. *Homoserolis* (= *Serolis minuta, pagenstecheri* and *bouvieri*);
4. *Heteroserolis* (= *Serolis tuberculata* group, CALMAN).

Spinoserolis n. subg.

Diagnosis. Uropods spiniform, two-branched, lacking endopodite. Vestiges of the tergum of the seventh pereion segment persist laterally. The sternum of the seventh pereion segment completely demarcated from the sixth pereion segment. Coxal plates marked off by dorsal sutures on second to sixth pereion segments. Second joint of the palp of the maxilliped cordate. Antennal processes on the antennal flagellum missing[3]. Basipodites of the first three pairs of pleopods with their inner proximal angles projecting and furnished with setae.

Serolis n. subg.

Diagnosis. Uropods two-branched (not spiniform). Tergum of seventh pereion segment entirely vanished. Tergum of sixth pereion segment well demarcated from first abdominal segment in its entire length. Suture between the sterna of seventh and sixth pereion segments partially effaced; suture between sixth and fifth segments complete. Coxal

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[1] In *S. bouvieri* the tergum of the sixth pereion segment also coalesces in the middle with that of the fifth.

[2] A short median part of this suture is missing in adult males of *S. paradoxa* and *schythei* (see p. 41 and Fig. 10 b), but the suture-line is distinctly developed in its entirety in female and young male specimens of these species (Fig. 10 c).

[3] Established only in the case of *S. latifrons*.

plates marked off by dorsal sutures on a varying number of segments. Second joint of the palp of maxilliped cordate. Antennal processes developed on the antennal flagellum. Basipodites of first three pairs of pleopods with or without triangular extension at their inner margins.

Homoserolis n. subg.

Diagnosis. Uropods two-branched (not spiniform). Tergum of seventh pereion segment entirely missing; that of sixth pereion segment in the middle short and coalesced with abdomen so that the suture-line between this segment and abdomen has been effaced in the middle. Suture-lines between the sterna of seventh and sixth as also between sixth and fifth pereion segments developed only laterally. Coxal plates marked off by dorsal sutures on second, third and fourth pereion segment. Second palp joint of the maxilliped cordate. Antennal processes developed on the flagellum of the antennae. Basipodite of the first three pairs of pleopods with or without triangular extension at its inner margin.

Heteroserolis n. subg.

Diagnosis. Uropods two-branched (not spiniform). Tergum of seventh pereion segment entirely missing; likewise middle of tergum of sixth pereion segment. Second joint of palp of maxilliped non-cordate, with outer margin concave and inner margin convex. Antennal processes developed on the flagellum of the antennae. Basipodites of first three pairs of pleopods without triangular extension at their inner margins.

Group-division of the sub-genus Serolis.

The subgenus *Serolis* includes the main part of the species. In the subgenus the dorsal sutures of the coxal plates are developed in a varying number of segments. In addition there are differences in the second pair of maxillae and in the shape of the maxillipeds and the pleopods. On the basis of these characters, the subgenus may be divided into the following five groups: —

Group I. Coxal plates marked off from the tergum on second to sixth pereion segments. Third palp joint of maxilliped well-developed. Basipodites of first three pairs of pleopods with their inner proximal angles projecting and furnished with setae.

The group comprises only *S. gracilis* BEDDARD. The second pair of maxillae is not known in the species. As regards the last pleopods BEDDARD (1884, p. 63) states: »The suture which divides the exopodite of the opercula is oblique; the exopodite of the gill appendage is bifurcate».

Group II. Coxal plates marked off from the terga of the second to fifth pereion segments. Outer lappet of outer lobe of second pair of maxillae provided with two or three apical setae, inner lappet of the same lobe with four to seven. Basipodite of first to third pleopods with proximal part of the inner margin slightly convex and lacking setae. Endopodite of the fourth pleopod divided into two lappets by a distal incision.

Comprises the species *paradoxa*, *schythei* and *polaris*.

Group III. Coxal plates marked off from the terga of the second, third and fourth pereion segments. Third palp joint of the maxilliped well developed[1]. Lappets of outer lobe on

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[1] The maxillipeds of *S. meridionalis* have not been described or figured.

second pair of maxillae provided with a small number of setae[1]. Basipodites of the first three pairs of pleopods each provided at their inner proximal angles with a triangular extension which is furnished with setae[2]. The endopodite of third pleopod, as a rule, entire (exceptionally bifid)[3].

Comprises the species *trilobitoides, septemcarinata, antarctica, naera, bromleyana, polita, meridionalis, glacialis, gerlachei* and *exigua.*

Group IV. Coxal plates marked off from the terga on second to fourth pereion segments. Third palp joint of maxilliped minute. Lappets of outer lobe on the second pair of maxillae provided with a large number (6—8) of apical setae. Basipodites of first three pairs of pleopods with inner proximal angles triangularly projecting and furnished with setae. Endopodite of third pleopod entire (not bifid).

Species belonging to this group deviate also in having the setae on the propodal edge of the first pereiopod differently shaped in females and adult males.

The group comprises the species, S. *gaudichaudi, convexa* and *plana.* Our knowledge of S. *plana* is inadequate; it has been examined only with reference to the first character in the group-diagnosis. In its general aspect it is, however, very similar to S. *convexa* and may possibly be identical with that species.

Group V. Dorsal sutures of coxal plates lacking on all pereion segments. Third palp joint of maxilliped well developed.

Comprises only the species S. *carinata* LOCKINGTON, which, as regards most of the characters taken as a basis for the group diagnoses, is inadequately known. The second joint of the palp of the maxilliped in this species is of almost uniform width (cf. RICHARDSON 1905, Fig. 354 d.)

Remarks. Groups II and IV are the most distinctly demarcated groups. Only in Group II, notably in the subgenus *Serolis,* do we find that the coxal plates are dorsally delimited on four of the pereion segments, and that the basipodites of the first three pairs of pleopods have the proximal parts of their inner margins slightly convex.

The species belonging to group IV have, indeed, the same number of demarcated coxal plates as is characteristic of group III, but they are distinguished from all other species of the genus by differences in the second pair of maxillae and in the palp of the maxilliped, as also in the setal armature on the propodus of the first pereiopod.

Subgenus *Serolis*[4], Group II[5].

Serolis (*Serolis*) paradoxa (FABRICIUS, 1775).

Text figs. 1 f and g, 2 a, b and d, 3 b, c and d, 5 b, 6 f and g, 7 a and b, 8 a, 9, 10 b and c, 12 a—f.

Oniscus paradoxus. FABRICIUS, 1775, p. 296.

Serolis Fabricii. LEACH, 1818, p. 339—340; MILNE EDWARDS, 1840, p. 231—232; NICOLET, 1849, p. 821—282; GRUBE, 1875, p. 233.

Serolis Orbignyana. AUDOUIN and MILNE EDWARDS 1840, in MILNE EDWARDS 1840, p. 232; AUDOUIN and MILNE EDWARDS, 1841, p. 25—27, Pl. 2 Figs 8—9; SCHIOEDTE, 1866, p. 181—183, Pl. X, Figs. 2 a—2 g; GRUBE, 1875, p. 225—227, p. 233, Pl. V Figs. 3 and 3 a, Pl. VI Fig. 3 a; SCHMELZ, 1876, p. 161.

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[1] The second pair of maxillae are unknown in S. *antarctica, naera* and *meridionalis.*

[2] The pleopods are unknown in S. *meridionalis.*

[3] In S. *naera.* The shape of the third pair of pleopods is unknown in *antarctica, meridionalis* and *gerlachei.*

[4] For diagnosis see p. 49—50.

[5] For diagnosis see p. 50.

Serolis Orbigniana. CUNNINGHAM, 1870, p. 498.

Serolis paradoxa. AUDOUIN and MILNE EDWARDS, 1841, p. 28—29, Pl. 2 Fig. 10; MIERS, 1875, p. 116—117; 1881, p. 76; BEDDARD, 1884, p. 33—36, Pl. V, Figs 12—14; DOLLFUS, 1891, p. 61—62, Pl. VIII Fig. 4; ORTMANN, 1911, p. 650; NIERSTRASZ, 1917, p. 110.

For synonymy and literature see also MILNE EDWARDS (1840), AUDOUIN and MILNE EDWARDS (1841) and BEDDARD (1884).

Diagnosis. Anterio-lateral angles of the head triangularly prolonged. Coxal plates delimited by dorsal sutures on the second to fifth pereion segments. Posterior epimeral angles on the second to sixth segments of pereion all successively reach further back than the epimeral angles of the preceding segments. Posterio-lateral epimeral angles of the second and third abdominal segments extend to the lateral margins of the pleotelson. Pleotelson with three longitudinal diverging ridges. Inner lobe of first maxilla expanded distally. Outer lappet of outer lobe of second maxillae with two, and inner lappet of the same lobe with five or six, apical setae. Maxilliped without suture between the distal epipodite and the basipodite, the distal epipodite being fused proximally with the basipodite to about half its length; second joint of the palp cordiform. Basipodite of the first three pairs of pleopods with proximal part of the inner margin slightly convex. Fourth pair of pleopods with the endopodite bifid.

Supplementary Description.

Body. Body with lateral margins slightly serrate and furnished with minute setae. Dorsal surface with dark ramose pigment spots.

Colour. Slightly yellowish to brownish.

Head. Anterior margin laterally from the proximal joints of the antennae, slightly bent downwards; there is a submarginal ridge at the base of the downturned part, extending from the second peduncular joint of the antennulae to the anterio-lateral angle of the head.

First pereion segment. Dorsal surface of the epimera with a transverse ridge on each side of the head, extending to a point opposite the centre of the eyes. Close to the anterio-lateral angle of the segment there is a small oval area of very thin chitin (see Fig. 9).

Ventral surface (see Fig. 9) with four longitudinal sutures, the lateral ones passing through the articular sockets for the first pereiopods[1]. Along the middle line there is a broad longitudinal carina, extending from the anterior margin of the segment to about two-thirds of its length and increasing in width backwards. Posteriorly the keel is limited by a transverse furrow from a crescent-shaped elevation along the hinder margin.[1]

The other segments of the pereion. Epimera with faint transverse ridges near their anterior margins. All the segments with a longitudinal furrow ventrally in the middle line. For the ventral surface of the last three segments see Figs. 10 b and c.

Antennulae. Second and third peduncular joint on each of the anterior and posterior sides with a longitudinal row of slender setae. Each joint of the flagellum with one sensory filament and three setae. Last joint of the flagellum with three setae.

Antennae (Fig. 12 a, b and c). First peduncular joint short and visible only from below. Second peduncular joint about twice as long as the first, with an incomplete suture proximally (cf p. 45). Second and third peduncular joints ventrally with groups of

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[1] Cf. SCHIOEDTE, 1866, Pl. X Fig. 2 a.

setae arranged in transverse rows, each group consisting of four to six setae. The rows stretch from about the centre of the joints to the anterior margin, the setae being shorter in the groups situated more anteriorly. Second peduncular joint with three rows of groups of setae, third and fourth joint with five rows.

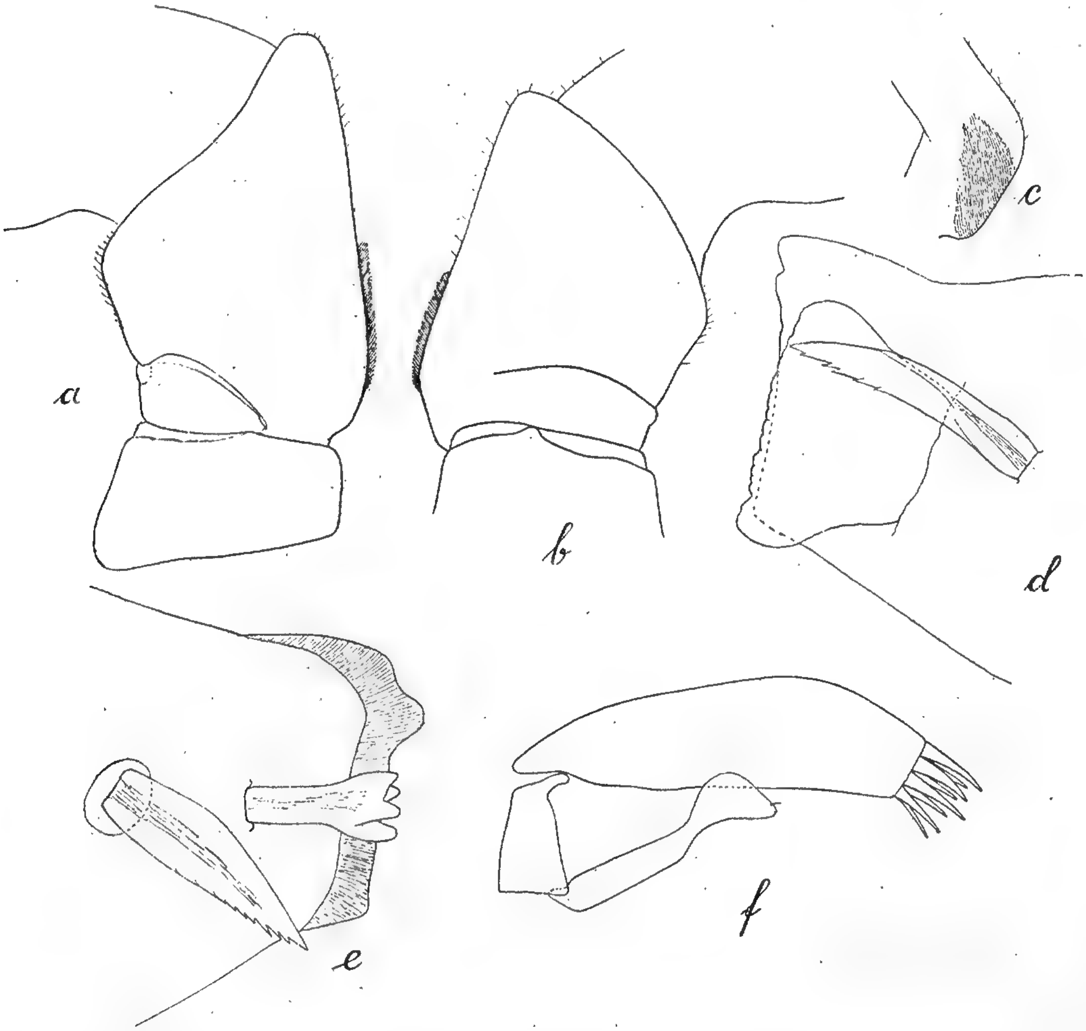

Fig. 12. *Serolis paradoxa* (FABR.). a. Proximal joints of the antenna, seen from below, 13 ×. b. The same, seen from above, 13 ×. c. Part of the peduncular joint of the antenna, seen from the rostral (= medial) side, 10 ×. d. Inner part of the left mandible seen from above, immature specimen taken out of the marsupium, 60 ×. e. Inner part of the right mandible, seen from above, the same specimen, 60 ×. f. First maxilla, male, 20 ×.

Mandibles (Figs. 12 d and e). The inner masticatory process of the right mandible provided at the tip with a number of irregularly placed obtuse teeth, the lateral seta with a row of saw-teeth along its caudal margin.

Setae on the second and third joints of the palp as in *S. trilobitoides*.[1]

First pair of maxillae (Fig. 12 f). Cf. SCHIOEDTE (1866, Pl. X, Fig. 2 b); BEDDARD (1884, Pl. V. Fig. 14).

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[1] Cf. HODGSON, 1910, Pl. IV, Fig. 6.

Second pair of maxillae.[1] Outer lappet of outer lobe with two, and inner lappet of the same lobe with five or six, apical setae.

Maxillipeds.[2] Distal epipodite proximally coalesced with the basipodite to about half its length. Distal margin of the basipodite concave and furnished with two large setae (See Fig. 8 a), one in the middle of the margin and one at the inner distal angle.

First pair of pereiopods. Lower distal angle of the carpus prolonged into a short spine-like projection. Distal margin with two composite sub-cylindrical setae (See Fig. 6 f.) On both the rostral and the caudal side there is a submarginal row of slender setae along the lower part of the distal margin and the distal part of the lower margin.

For the setae on the lower margin of the propodus see Fig. 5 b.

Dactylus with a submarginal row of pores on the rostral side close to lower margin (See Fig. 3 c and d).

Second pair of pereiopods. For the setae on the lower margin of the propodus see Fig. 7 a and b. A dense covering of slender setae[3] on the lower surface of ischum, merus and carpus occurs only in adult males which have penial filaments of full length.

First three pairs of pleopods. Endopodite, decreasing in length but increasing in width, from the first to the third pair. Margins of exo- and endopodite with long plumose setae, mingled with very short »hairs», lacking setal canals.

Fourth pair of pleopods. Exopodite divided by an oblique transverse suture and obtusely pointed distally. Endopodite distally cleft into one narrow digitiform inner lobe and one larger outer lobe. Outer and inner margins of the exopodite provided proximally with branchless slender setae, which gradually become branched distally.

Fifth pair of pleopods. Peduncle short, exopodite and endopodite not divided by transverse limits. BEDDARD (1884, p. 36 and cf. p. 13—14) says that the exopodite of this appendage is bifurcate. This is really only the case with the endopodite of the fourth pleopod.

Uropods. Exopodite almost twice as broad as the endopodite. Outer, inner and distal margins of the branches serrate, each serration provided with one plumose seta; also the outer margin of the basipodite is serrate.

Localities[4] *and material.*

St. 33. South Georgia, Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 22 m. Clay and algae. $^{30}/_{5}$ 1902. 24 specimens, males and females, all sub-adult or immature. Largest specimen, a male with semi-developed penial filaments, length 27.5 mm.

St. 39. Falkland Islands, Port William, lat. 51°40′ S., long. 57° 41′W. 40 m. Sand and small stones with algae. $^{4}/_{7}$ 1902. Ovigerous female. Colour light yellowish to brownish. Length 28 mm.

St. 41. Falkland Islands, Berkeley Sound, Port Louis, lat. 51 ° 33′ S. long. 58° 9′ W. Shallow water. Gravel and sand. $^{23}/_{7}$ 1902. One ovigerous female.

St. 52. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 44′ W. 17 m. Sand. $^{3}/_{9}$ 1902. 33 specimens, males and females. Length of largest specimen, male, about 36 mm.

St. 54. Falkland Islands, Stanley Harbour, lat. 51° 42′ S., long. 57° 50′ W. 10 m. Mud with shells. $^{3}/_{9}$ 1902. 3 specimens of dark colour (one ovigerous female and two immature specimens).

Swedish Magellanian Expedition. Falkland Islands, Port William. Rocks. 20 specimens. Colour, light yellowish. Length of largest specimen 30 mm.

Swedish Expedition to Tierra del Fuego.

Tierra del Fuego, Lennox Island, Lennox Cove. 10—20 fathoms Floride bottom. $^{5}/_{2}$ 1896. 9 immature specimens. Colour, dark in the middle, small dark spots along the posterior margins of the segments and on the head and the pleotelson.

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[1] Cf. BEDDARD, 1884, p. 35.

[2] Cf. SCHIOEDTE, 1866, p. 182, Pl. X, Figs. 2 a and g.

[3] Cf. BEDDARD, 1884, p. 35.

[4] In the list of localities those visited by the Swedish Antarctic Expedition are placed first.

Tierra del Fuego, Paramo. Shore at low tide. Jan. and Febr. 1896. 7 large specimens of very dark colour, males and females. Length of largest specimen, an adult male, 31 mm.

Patagonia, Puerto Gallegos. Common on the shore at low tide. Clay mixed with sand. $^{16}/_{11}$ 1895. 17 specimens (6 adult, 11 immature). Colour of the adult specimens blueish black. Length of the largest specimen, a female with empty marsupium, 34 mm.

Magellanian Region, Gente Grande. $^{25}/_{12}$ 1895. 2—3 fathoms. Rocks and algae. 3 specimens of brownish black colour. Length of the largest specimen, a female, 32 mm.

Magellanian Region, Punta Arenas. Shore at low tide. Sand. $^{25}/_{11}$ 1895. 7 specimens, males, females and immat. Colour, dark brown. Length of the largest specimen (female with young) 38 mm. Length of largest male specimen 36 mm.

The »Gefle» Expedition (G. E. WESTERGREN legit). South Chile, Corral, at Valdivia Bay. 1866. Ovigerous female.

Falkland Islands. Port Stanley. 20 fathoms. 1866. Immature specimen.

Distribution. Coast of Central Chile (NIERSTRASZ 1917), Tierra del Fuego and Patagonia (AUDOUIN and MILNE EDWARDS 1841), Falkland Islands (BEDDARD 1884), South Georgia (Sw. Ant. Exped.)

The species has not previously been recorded from South Georgia. It occurs with certainty as far northwards as the coast of Central Chile. Perhaps it may also be distributed at the coasts of North Chile and Peru. In any case, there are at the Swedish State Museum two specimens, which are labelled: »Vanadis Expedition, Callao» (coast of Peru). This locality I regard, however, as uncertain.

Serolis (*Serolis*) **schythei** LÜTKEN, 1859.

Text fig. 1 b and i, 5 c and d, 7 h, 13 a—e.

Serolis schythei. LÜTKEN, 1859, p. 98—104, Pl. I A Figs. 12 and 13; GRUBE, 1875, p. 220—225; STUDER, 1884, p. 8; DOLLFUS, 1891, Pl. VIII a, Fig. 5; BEDDARD, 1884, p. 40—44, Pl. II Figs. 5—13; PORTER, 1917, p. 99; TATTERSALL, 1921, p. 227; GIAMBIAGI, 1928, p. 11—12; Pl. II, Fig. 3.

Diagnosis. Head of greatest width across the eyes. Coxal plates marked off by dorsal sutures on the second to fifth pereion segments. Epimeral angles of the second to sixth segments of pereion all successively extending beyond the epimeral angles of the preceding segments. Epimera of second abdominal segment extending further back than the posterior angles of the epimera of the fifth pereion segment, but not as far back as those of the sixth pereion segment. Pleotelson with three diverging longitudinal ridges. Posteriolateral angles of pleotelson prolonged into retroverted points. First maxillae with inner lobes expanded distally. Outer lappet of the outer lobe of second maxilla provided with two apical setae, inner lappet of the same lobe with six or seven. Maxilliped without suture between the distal epipodite and the basipodite, the distal epipodite being fused proximally with the basipodite to about half its length. Palp of maxilliped with a vestigial fourth joint. Basipodite of the first three pairs of pleopods with proximal part of the inner margin slightly convex and devoid of setae. Endopodite of fourth pleopod bifid.

Supplementary Description.

Head and pereion. The submarginal ridge on the anterio-lateral parts of the head indistinct. Transverse ridges on the first pereion segment more marked than in *S. paradoxa*. No transverse ridges on the other pereion segments. Ventral surface of pereion as in *S. paradoxa*[1].

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[1] Cf. GRUBE, 1875, Pl. VI, Figs. 1 and 1 c.

Antennae. Antennal processes on the flagellum (Fig. 1 i) exactly alike in males and females.

Mandibles (Figs. 13 a and b). Anterior masticatory process on the right mandible (Fig. 13 c) with a great number of digitiform lobes. Posterior process with a row of teeth.

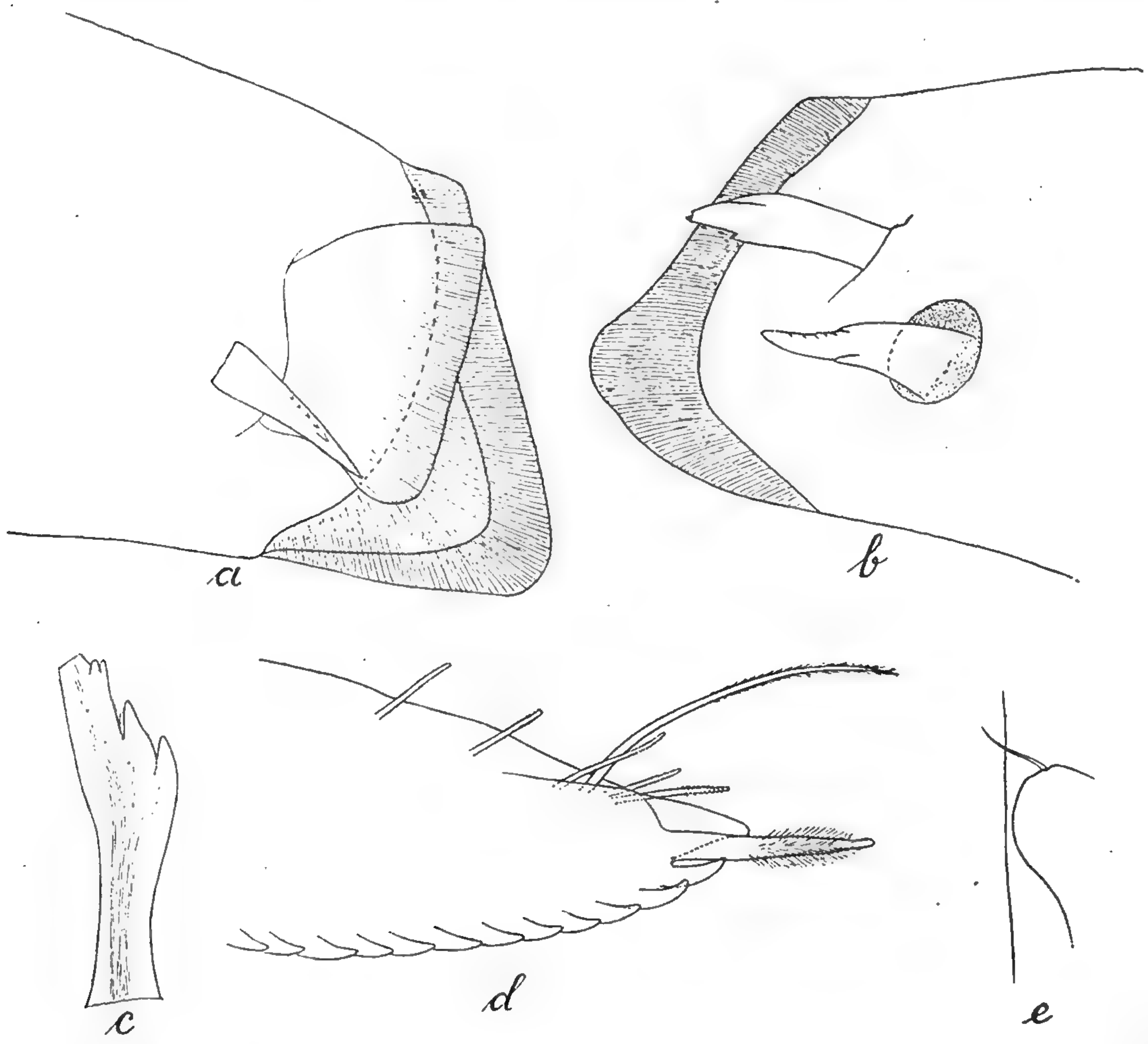

Fig. 13. *Serolis schythei,* LÜTK. a. Inner part of the left mandible, seen from above, 80 ×. b. Inner part of the right mandible, seen from above 80 ×. c. The rostral masticatory seta on the right mandible, 140 ×. d. Tip of the dactylus of the second pereiopod, in a female, 240 ×. e. Tuberculum and seta at the dorsal margin of the ischium of the fourth pereiopod (in an adult male) 115 ×.

First pair of maxillae. Outer lobe with about 12 apical setae, of which that at the posterior-distal angle is provided with two adjacent rows of short and slender sub-branches.

Second pair of maxillae: Outer lappet of outer lobe with two, inner lappet of the same lobe with six or seven, apical setae, most of the setae furnished with two rows of slender sub-branches.

Maxillipeds. Distal epipodite proximally fused with the basipodite to about half its length. Palp with a fourth vestigial joint, distinctly delimited by a suture only in certain specimens[1]. The composite setae on the basipodite as in *S. paradoxa.*

First pair of pereiopods. For the composite setae on the propodus see Figs. 5 a and d. The composite setae on the distal margin of the carpus as in *S. paradoxa.* On the rostral side of the dactylus, close to the lower margin, there is a submarginal row of pores with one seta protruding from each pore.

Second pair of pereiopods.[2] For the setae on the lower margin of the propodus of the adult male see Fig. 7 h. Along the lower margin of the dactylus there is a row of elongated, projecting structural scales (Fig. 13 d), of which the most distal one constitutes the short ventral claw of the joint. Between the two claws is a stout sensory seta. Only sparse setae on the lower margin of the ischium, merus and carpus, in the adult male.

The other pereiopods. In the adult male the seventh pereiopod differs from the same appendage in the female only in having a greater number of setae on the lower margin of the carpus and propodus. BEDDARD (1884, p. 43) states with reference to the third to seventh pereiopods »the second joint (in the males only) has a series of about fifteen tubercles close to the inner margin». Such tuberculae are found on the ischium in the adult male. Each tuberculum is furnished with a simple seta (Fig. 13 e and cf. BEDDARD, 1884, Pl. II, Fig. 9).

Pleopods and uropods. LÜTKEN, (1859, p. 102), GRUBE, (1875, p. 223—224, Pl. V, Figs. 1 c and 1 d.), BEDDARD, (1884, p. 43 and 44).

Localities and Material.

St. 2. Coast of North Argentina, lat. 37° 50′ S., long. 56° 11′ W. 100 m., Gravel mixed with sand. $^{23}/_{12}$ 1901. 9 specimens, males and immature. Length of largest specimen 23 mm. (adult male.)

St. 16. Between Falkland Islands and South Georgia, lat. 51° 40′ S., long. 57° 25′ W. 150 m. Sand. $^{11}/_{4}$ 1902. 8 immature specimens.

St. 33. South Georgia, off Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 22 m. Clay and algae. $^{30}/_{5}$ 1902. 35 specimens, males and females. Length of largest specimen 24 mm. (adult male.)

St. 40. Falkland Islands, Berkeley Sound, lat. 51° 33′ S., long. 58° 0′ W. 16 m. Bottom temp. + 2.75°. Gravel and shells with algae. $^{19}/_{7}$ 1902. 6 adult specimens. Length of the largest specimen 31.5 mm (male).

St. 48. Falkland Islands, Berkeley Sound, lat. 51 °34′ S., long. 57° 55′ W. 25 m. Bottom temp. + 2.75°. Sand and stones. $^{10}/_{8}$ 1902. 10 specimens, males and females. Length of largest specimen 28 mm (female with young).

St. 55. Falkland Islands, Port Albemarle, lat. 52° 11′ S., long. 60° 26′ W. 40 m. Sand bottom with algae. $^{8}/_{9}$ 1902. One sub-adult male (penial filaments about as long as the endopodite of second pleopod). Length 17.8 mm.

St. 57. Falkland Islands, Port Albemarle, lat. 52° 8′ S., long. 60° 33′ W. 18—30 m. Sand. $^{11}/_{9}$ 1902. 15 specimens, males and females. Length of largest specimen, a male, 21.5 mm. One female of a length of only 19.3 mm. was already mature and provided with a marsupium containing young.

St. 58. South of W. Falkland, lat. 52° 29′ S., long. 60° 36′ W. 197 m. Bottom temp. + 4.1°. Sand and gravel. $^{11}/_{9}$ 1902. Female with young. Length 17.3 mm.

Eugenie Expedition. Patagonia. Off Cape Corrientes, lat. 39° 14′ S., long. 57° 0′ W. 52 fms. Black sand. 3 specimens (females and immature specimen). Length of largest specimen, a female with an empty marsupium, 22 mm.

Magellan Straits, off. Cape Virgines, 32 fms. 10 immature specimens of yellowish colour. Length of largest specimen 22 mm, sub-adult male (with penial filaments slightly longer than the endopodite of second pleopod, but with sterna on the first three abdominal segments already transformed).

Swedish Expedition to Tierra del Fuego. Magellanian Region, Punta Arenas. Bottom: sand and algae. 7—8 fathoms. Not rare. $^{4}/_{12}$ 1895. Collected on the shore at low tide. 9 specimens with numerous black spots. Length of largest specimens, adult male and ovigerous female, 27 mm.

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[1] Cf. BEDDARD (1884, p. 43, Pl. II, Fig. 10).

[2] See GRUBE, (1875, Pl. V, Fig. 1 a, p. 224), BEDDARD (1884, Pl. II, Fig. 8).

Material collected by Captain LARSEN 1894. Graham Region, Terror and Erebus Golf. Adult male, yellowish with dark spots, length 23 mm.

Material collected by I. G. HÖGBERG. Argentina, Chubut Territorio. Golfo nuevo, Harbour, Madryn. One specimen, adult female.

Distribution. Coast of Central Chile (PORTER 1917), Argentina (Sw. Ant. Exped.), Patagonia (STUDER 1884, BEDDARD 1884, Tierra del Fuego (GIAMBIAGI 1925), Magellanian Region (LÜTKEN 1859), Falkland Islands (BEDDARD 1884, TATTERSALL 1921), Between Falkland Islands and South Georgia near Falkland Islands (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.), Graham Region (Capt. LARSEN 1894).

The species has previously been found at the Falkland Islands, Magellan Straits, Patagonia and Chile. Here it is for the first time recorded from Argentina, South Georgia and Graham Region; it is thus widely distributed.

Serolis (*Serolis*) **polaris** RICHARDSON, 1911.

Serolis polaris. RICHARDSON 1911, p. 396—398, Fig. 1.

Specific Characters and Remarks.

The species is closely allied to *S. schythei* and tallies with that species in most of the features mentioned above in the diagnosis of *S. schythei*. It differs in that the anteriolateral angles of the head are more pointed and projecting and in that the posterior angles of the pleurae of the second abdominal segment project beyond the posterior angles of the coxae of the sixth pereion segment. There is also a slight, but distinctly marked, difference in the sculpturing of the pleotelson, as well as in some minor features mentioned below. As in *S. schythei* the adult male differs from the female in having the posterior margin of the first three abdominal segments concave.

Supplementary Description.

Colour. Yellowish, often with a brownish spot at the junction of the coxal plates and the thoracic segments.

Antennae. Antennal processes occur on the central joints of the flagellum and consist of 3—5 hook-like projections in a row along the distal margin of the joints.

First and second pairs of maxillae. Inner lobe of first maxilla with the distal end widened; distal margin sub-truncate (very slightly concave). Outer lappet of outer lobe with three apical setae, inner lappet of the same lobe with four or five.

Maxillipeds. As in *S. schythei* but without any trace of a fourth joint of the palp.

First pair of pereiopods. Setae on the lower margin of propodus as in *S. schythei*. Carpal joint (at its lower distal angle) with two composite setae subequal in structure to the corresponding setae in *S. schythei*.

Second pair of pereiopods. Similar to the same appendages in *S. schythei*. The second pereiopod of the adult male differs from *S. schythei* in that the lower margins of the ischium, merus and carpus are furnished with a dense covering of setae, which are abundantly provided with hair-like, sub-branches. The lower margin of the propodus in the adult male is furnished with two rows of setae. In the rostral row there are twelve setae similar in structure to the corresponding setae in *S. schythei* (cf. Fig. 7 h), in the caudal row eight setae, similar to those on the lower margin of ischium, merus and carpus, but with sub-branches on their central parts only.

Pleopods. Basipodites of the first three pairs of pleopods with proximal part of the inner margin slightly convex and devoid of setae. Endopodites of the fourth pair of pleopods bifid, as in *S. schythei* and *paradoxa.*

Localities and Material.

Eugenie Expedition. Argentina, South of La Plata, lat. 36° 50′ S., long. 55° 54′ W. 5 specimens, males and females. Length of largest specimen 21 mm., an adult female with empty marsupium.

Distribution. Argentina (Eug. Exped.), South Sandwich Islands (RICHARDSON 1911).

Thus this species presumably is widely distributed.

Subgenus *Serolis*, Group III.[1]

Serolis (*Serolis*) trilobitoides (EIGHTS, 1833).

Text fig. 5 a.

For synonymy and literature see RICHARDSON, 1913, p. 9. It may be added:
Serolis Brongniartiana. AUDOUIN and MILNE EDWARDS, in MILNE EDWARDS 1840, p. 232—233.
Serolis trilobitoides. MONOD, 1926, p. 38.

Diagnosis. Anterio-lateral angles of the head slightly extended; greatest width of the head in front. Coxal plates marked off by dorsal sutures on second to fourth pereion segments. Posterior angles of the coxal plates of the second to sixth pereion segments all successively projecting beyond those of the preceding segments; the pleurae of the second and third abdominal segments extending with their posterior angles about as far back as two-thirds the length of the pleotelson. Posterior angles of the epimera of the sixth pereion segment reaching further back than those of the second and third abdominal segments, about as far back as the tip of the pleotelson. Pleotelson with three dorsal longitudinal diverging ridges, the one in the middle line being narrow and denticulated. Lateral margins of pleotelson denticulated; pleotelson distally pointed, but without spine-like prolongation at the tip. Inner lobe of first pair of maxillae expanded distally. Lappets of outer lobe on the second maxillae, normally, each provided with two apical setae. Maxilliped with distal epipodite marked off from the basipodite by a distinct suture. Palp of maxilliped consisting of three joints, of which the second is approximately cordiform. Basipodites of first three pairs of pleopods their inner proximal angles projecting and furnished with »plumose setae». Endopodites of fourth pair of pleopods entire (not bifid).

Supplementary Description.

Pereion. Ventral surface of first pereion segment sculptured in the middle in the usual way (see HODGSON, 1910, p. 25) and with four longitudinal sutures, of which the lateral ones pass through the sockets for the first pereiopods. Ventral surfaces of the last three pereion segments have the apperance normally found in the subgenus.

Antennulae. In the flagellum the first joint is about three times as long as the others. In a young male, 24.5 mm. in length the flagellum consists, of 27 joints, in a young specimen of a length of 22.5 mm., of 22 joints.

Antennae. The antennal processes on the central joints of flagellum are spine-like.[2] Joints of the flagellum in a young male 24.5 mm. in length 16, in a young specimen 22.5 mm. in length 14, in number.

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[1] For diagnosis see p. 51.

[2] See BEDDARD, 1884 Pl. I, Fig. 6.

Mandibles. See Beddard (1884, Pl. I, Figs. 7 and 8), Hodgson (1910, p. 26). Normal.

Maxillipeds. See Beddard (1884, Pl. I, Fig. 11), and Hodgson (1910, Pl. IV, Fig. 5). Hodgson (1910) was unable to find any suture between the coxopodite and the proximal epipodite. In my specimens this suture is distinct and has the appearance figured by Beddard (1884).

First pair of pereiopods. For the composite setae on the lower margin of propodus see Fig. 5 a and Hodgson (1910 Pl. IV, Figs. 7 and 8). Distal margin of the carpus close to its inner distal angle with two composite setae of sub-cylindrical shape, the setal part protruding freely at the tip. Around these setae there are slender setae of the non-composite kind. The structural scales around the two composite setae on the distal margin are triangularly prolonged.

First three pairs of pleopods. Peduncle composed of two joints, of which the proximal one is short.

Uropods. Hodgson (1910) states that the exopodite is two-jointed and that »the endopodite is a little longer than the first joint of the exopodite» (Hodgson 1910, p. 30). Beddard (1884, p. 52) observes »the exopodite being almost half again as long as the endopodite».

In the two specimens I have seen that the exopodite was single-jointed and somewhat shorter than the endopodite. Both the rami are distally pointed. The lateral margin of the exopodite in the larger specimen has seven teeth, in the smaller only five. Distal part of the inner margin of the same joint in the larger specimen with four, in the smaller one with two, teeth; the lateral margins of the endopodite in both specimens distally provided with two teeth; distal part of the inner margin of the endopodite has three teeth in both specimens.

The shortness of the exopodite in both the specimens examined is due, presumably, to immaturity, the largest being only of 24.5 mm. in length whereas the largest specimens examined by Beddard and Hodgson were 41 and 48 mm. The species can attain a length of 70 mm. (Eights 1833), Richardson (1913) records a length of 67 mm. in one specimen.

Localities and Material.

St. 8. Graham Region, lat. 64° 3′ S., long. 56° 37′ W. Situation as well as depth of the station uncertain, (360 m?). Soft clay. $^{11}/_{2}$ 1902. One immature male specimen, with a trace of penial filaments but with the propodus of the second pereiopods not at all transformed. Length of the specimen 24.5 mm.

St. 11. Graham Region, lat. 65° 19′ S., long. 56° 48′ W. 400 m. Clay mixed with gravel. $^{18}/_{2}$ 1902. One immature specimen. Length 22.5 mm.

Distribution. Patagonia (Eights[1] 1833), Cape Horn (Eights[1] 1833), Kerguelen (Studer[1] 1879, Beddard 1884), South Shetland Islands (Eights[2] 1833), West of Graham Region (Monod 1926), Graham Region (Sw. Ant. Exped.), Off Victoria Land (Hodgson 1910).

The species has previously been found in the neighbourhood of Graham Region. Its ocurrence at Graham Region (st. 8 and 11) was therefore to be expected.

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[1] Fide Audouin and Milne Edwards (1841).

[2] Fide Beddard (1884).

Serolis (*Serolis*) **septemcarinata** MIERS, 1875.

Text. Fig. 1 d, 5 h, 6 a, 7 g, 14 a—c.

For synonymy and literature see TATTERSALL, 1921, p. 227. Moreover may be added: *Serolis septemcarinata*. RICHARDSON, in MURPHY, 1914, p. 53; MONOD, 1931, p. 26.

Diagnosis. Anterio-lateral angles of the head triangularly prolonged; greatest width of the head at the front margin. Coxal plates delimited by dorsal sutures on the second to fourth pereion segments. The posterio-lateral angles of the epimera of the segments (except those of the first abdominal segment) all projecting beyond those of the preceding segments. Pleotelson with seven longitudinal carinae. First maxilla with the inner lobe expanded distally into an oblong oval area. Outer lappet of outer lobe of second maxilla with two, inner lappet of the same lobe with five, apical setae. Distal epipodite of the maxilliped delimited from the basipodite by a distinct suture. Palp of maxilliped consisting of three joints, of which the second is approximately cordate. Basipodites of first three pairs of pleopods with their inner proximal angles projecting and furnished with setae. Endopodite of fourth pair of pleopods entire, (not bifid).

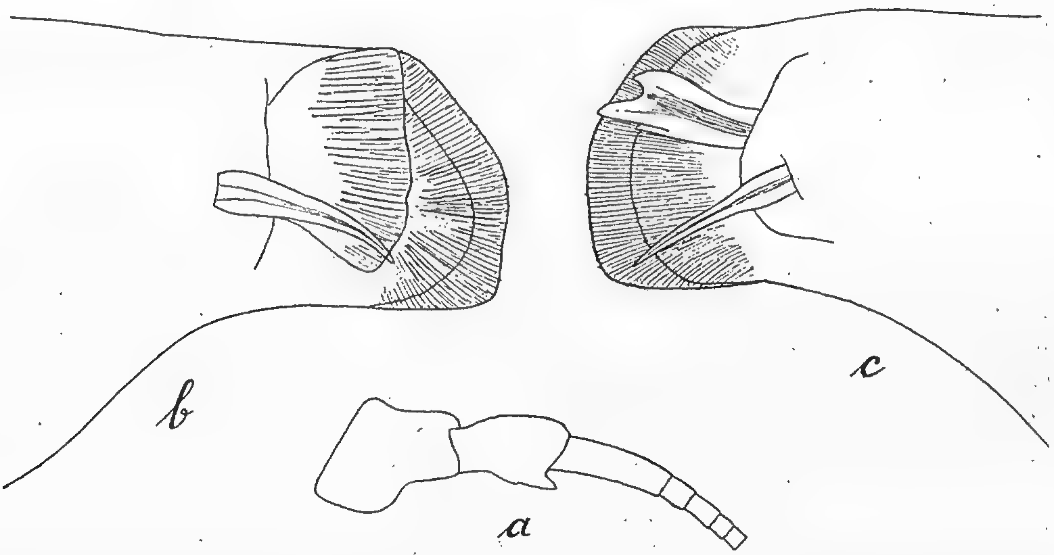

Fig. 14. *Serolis septemcarinata*, MIERS. a. Peduncle and proximal joints of the flagellum of the antennula, male, 17 ×. b. Inner part of the left mandible, seen from above, 80 ×. c. Inner part of the right mandible, seen from above, 80 ×.

Supplementary Desciption.

Head and pereion. Anterio-lateral parts of the head dorsally marked off by a ridge. There is a faint transverse anterior ridge on the first pereion segment. Ventral surface of the first pereion segment divided by longitudinal sutures and sculptured in the middle similarly as in *S. paradoxa*. Ventral surface of the last three thoracic segments have the appearance normally found in the subgenus (cf. PFEFFER, 1887, Pl. II, Fig. 7)[1].

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[1] PFEFFER's explanation of the figures of his Pl. II (PFEFFER, 1887 p. 145) is incorrect as regards figures 1—7).

Antennulae (Fig. 14 a). See BEDDARD (1884, p. 48); PFEFFER (1887, p. 66, Pl. III, Fig. 2). Peduncle consisting of four joints, the first, second and third being of about equal length. The short fourth joint is one-fourth to one-third as long as the third. BEDDARD (1884) states that the second peduncular joint is about twice as long as the first.

Antennae[1]. The central joints of the flagellum, ventrally, with a row of approximately twelve triangular and pointed processes along the anterior margin. In a female specimen with not yet fully developed marsupium and with ten joints in the flagellum, the prolonged scales occur on the second to the seventh joints, no traces of them being observed on the eighth joint. In an adult male with ten joints in the flagellum, they were found even on the first joint already, but were not developed on the seventh.

Mandibles (Fig. 14 b and c)[2]. Third joint of the palp with typical pectinate scales near its lower margin. For the setae on the second and third joint of the palp see p. 36.

Maxillipeds[3]. The composite setae on the distal margin of the basipodite as in *S. paradoxa.*

First pair of pereiopods.[4] For the composite setae on the lower margin of the propodus see Fig. 5 h. Carpal joint distally with two composite and a few simple setae, (see Fig. 6 a), its distal margin (see Fig. 1 d) usually with a row of projecting rounded scales.

Second pair of pereiopods[5]. In the adult male there are two incomplete rows of setae on the lower margin of the propodus, setae being developed only at the proximal and distal parts of the joint. For the setae from the proximal portion of the lower margin see Fig. 7 g. The proximal and distal setae differ slightly in shape, the distal ones being somewhat more slender.

The other periopods.[6] Lower surface of merus, carpus and propodus in the adult male with a dense felt-like nap, extending also somewhat over to the caudal surface. The nap consists of hair-like points, devoid of a setal canal.

First three pairs of pleopods.[7] As observed by PFEFFER (1887), the peduncle consists of two joints, the proximal joint being, however, very short.

Fourth and fifth pairs of pleopods.[8] Expodites with a distinct transverse suture.

Localities and Material.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 125 m. Bottom temp. +1.45°. Gray clay with a few stones. $^5/_6$ 1902. 8 specimens. Length of the largest specimen 11 mm.

St. 34 b. Atlantic Ocean, North of Falkland Islands and East of Patagonia, lat. 44° 49′ S., long. 57° 34′ W. 700—500 m. $^{27}/_{12}$ 1901. 14 specimens, males and females. Length of largest specimen about 15 mm (male). males and females, most of them immature. Length of largest specimen about 12.2 mm (female with marsupium).

South Georgia, Grytviken. From old kelp on the shore. 22 and 23 May 1902. More than 45 specimens,

Material collected by E. SÖRLING, 1905. South Georgia, Grytviken, Cumberland Bay. $^{15}/_1$ 1905. 3 adult specimens, male and 2 females. The largest specimen is the male, which measures 14.5 mm. in length.

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[1] PFEFFER, 1887, Pl. III Fig. 1.

[2] See also PFEFFER, 1887, Pl. III, Figs. 5, 6 and 12.

[3] BEDDARD, 1884, p. 40; PFEFFER, 1887, p. 69—70, Pl. III, Figs. 9, 10 and 11.

[4] PFEFFER, 1887, p. 70—71, Pl. III, Figs. 13—17.

[5] BEDDARD, 1884, p. 49, Pl. VIII, Figs. 3 and 4; PFEFFER 1887, p. 71, Pl. III, Fig. 18; COLLINGE, 1918, Pl. III, Fig. 8.

[6] BEDDARD, 1884, Pl. VIII, Fig. 5, PFEFFER, 1887, p. 71—72, Pl. III, Figs. 19—21.

[7] BEDDARD, 1884 p. 49, PFEFFER 1887, p. 72, Pl. III, Figs. 22—24.

[8] PFEFFER, 1887, p. 72, Pl. III, Figs. 25 and 26.

Distribution. South Atlantic Ocean E. of Patagonia N. of Falkland Islands (Sw. Ant. Exped.). South Georgia (PFEFFER 1887, TATTERSALL 1921), Prince Edward's Island (BEDDARD 1884), Crozet Islands (MIERS 1875), Kerguelen (STUDER 1879, 1884, COLLINGE 1918).

The species has not previously been recorded from a locality situated as far north as st. 34 b (Sw. Ant. Exped.).

Serolis (*Serolis*) **polita** PFEFFER, 1887.

Text Fig. 1 e, 2 c, 3 a, 5 f and g, 6 b, 8 c, 15 a—g.

S. polita. PFEFFER, 1887, p. 81—85, Pl. II, Figs. 4 and 5, Pl. IV, Figs. 4 and 5; RICHARDSON, 1906, p. 7; 1908, p. 5; 1911, p. 396; TATTERSALL, 1921, p. 231—232, Pl. VII, Fig. 6; MONOD, 1931, p. 26—27.

Diagnosis. Anterio-lateral angles of the head prolonged, so that the width of the head is greatest anteriorly. Coxal plates marked off by dorsal sutures on the second to fourth pereion segments. Posterio-lateral angles of the epimera of the pereion segments and those of the second and third abdominal segments all reach further back than those of the preceding segments. Tip of pleotelson sinuate. First pair of maxillae with the inner lobe slightly expanded distally. Second pair of maxillae with the lappets of outer lobe each furnished with two apical setae. Maxilliped with distal epipodite marked off from the basipodite by a distinct suture; palp generally consists of three joints, but sometimes with a vestigial fourth joint; second joint of the palp cordiform. Basipodites of first three pairs of pleopods with their inner proximal angles projecting furnished with setae. Endopodite of fourth pleopod entire (not bifid).

Supplementary Description.

Head, pereion, and abdomen. Anterio-lateral parts of the head demarcated by a ridge. Epimera of first pereion segment with a submarginal ridge at a short distance from their anterior margins. Ventral surface of the first pereion segment on each side with a longitudinal suture passing through the articular sockets for the first pereiopods. Ventral surface of the fifth to seventh pereion segments approximately as in *S. paradoxa.*

The adult male has a sub-circular shape of body, the female has a more oval form. In the adult male the longitudinal ridge in the middle of the sterna of the first to third abdominal segments is missing; the projection in the middle of the posterior margin of the sternum of the first abdominal segment is of smaller size and shorter than the lateral projections.

Antennulae (Fig. 15 a). Peduncle consisting of four joints; the last joint, which is not figured or mentioned by PFEFFER (1887), is one-third the length of the second.

Antennae. The antennal processes on the ventral side of the central joints of the flagellum are somewhat hook-like and resemble those in *S. paradoxa.* They fringe both the distal and rostral margins of the joints. They are longest at the rostro-distal angle.

Mandibles (Figs. 15 b, c and d). Rostral margin of the mandible corpus with a small rounded projection adjacent to the proximal part of the second joint of the palp. (Fig. 15 b). Left mandible (Fig. 15 c) with the posterior masticatory process cleft distally. Right mandible (Fig. 15 d) with the rostral masticatory process expanded. The setae on the second and third joints of the palp have oval and not very prominent end-knobs.

First pair of maxillae (Fig. 15 e). Inner lobe slightly expanded distally. The apical setae on the lobes generally branchless; only one seta, situated at the posterio-distal angle of the outer lobe, is furnished with two rows of short and slender sub-branches.

Second pair of maxillae (Fig. 15 f). Lappets of outer lobe each with two apical setae.

Maxillipeds (Fig. 15 g). Basipodite and distal epipodite marked off from each other by a distinct suture. Palp usually consisting of three joints, but sometimes with an indication of a fourth joint, appearing as a small prolongation, carrying some setae; this prolongation is indistinctly demarcated from the third joint. Composite setae on the basipodite (see Fig. 8 c) usually two; but in one specimen there was also a third seta.

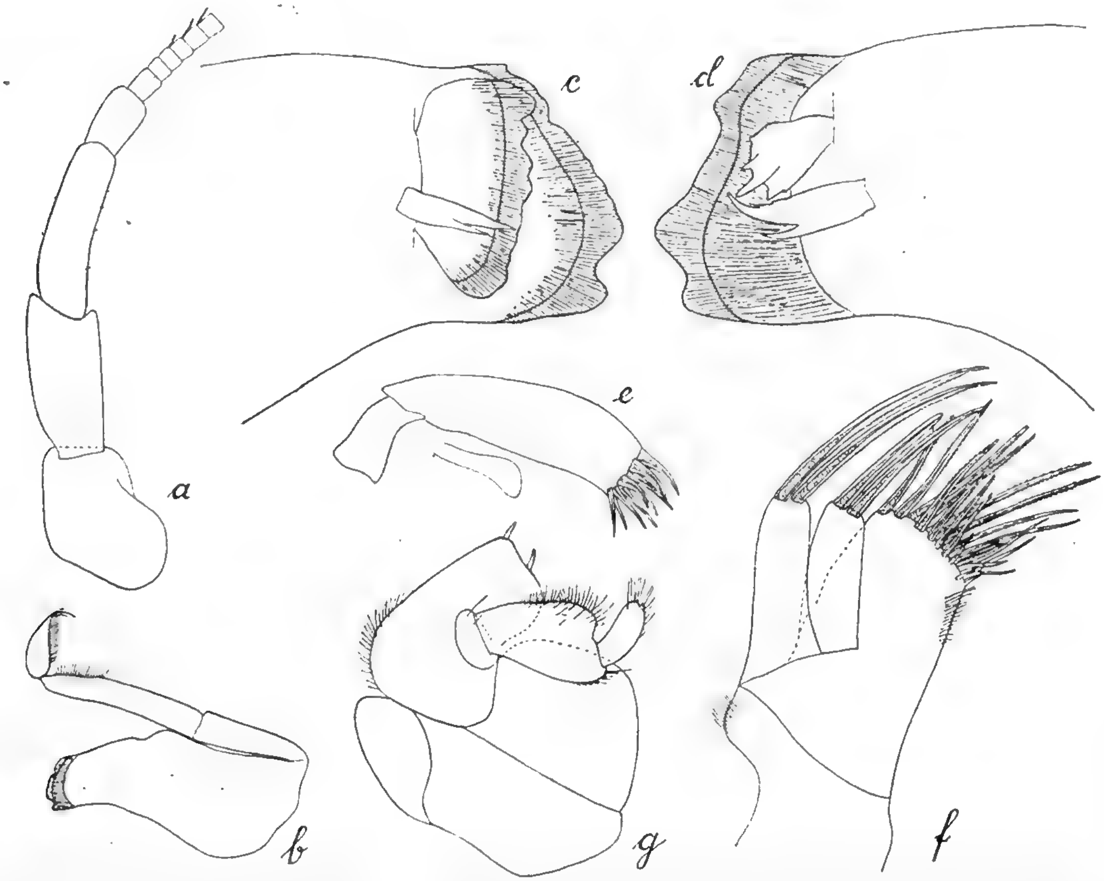

Fig. 15. *Serolis polita* PFEFF. a. Peduncle and proximal part of the flagellum of left antennula, male 13 ×. b. Left mandible, seen from below, 13 ×. c. Inner part of the left mandible, from above, 60 ×. d. Inner part of the right mandible, from above, 60 ×. e. Right first maxilla, female 23 ×. f. Second maxilla, male 60 ×. g. Left maxilliped, 23 ×.

First pair of pereiopods. Distal margin of the carpus with two composite subcylindrical setae (see Fig. 6 b) and about seven simple narrow bristles, provided with two rows of short hair-like sub-branches. For the composite setae on the lower margin of the propodus, see Figs. 5 f and g. On the caudal side of the propodus there is a sub-marginal row of prolonged scales close to the lower margin of the joint (see Fig. 1 e).

On both the rostral and caudal side of the propodus there is also a submarginal row of simple setae (see Fig. 1 e, which shows the caudal row of these setae).

Second pair of pereiopods[1]. In the adult male with two rows of composite setae on the lower margin of propodus, similar to those in *S. schythei*, but without transverse grooves on their caudal surfaces; the submarginal scales close to the lower margin of propodus are somewhat triangularly produced.

Pleopods. Coxopodite of the first three pairs very short and for about half of its length fused with the sternum. On the fourth and fifth pleopods the exopodite has an oblique transverse suture, on the fifth pair the exopodite is divided by a faint suture, which is distinct only near the margins.

Uropods. Inner margin of the protopodite with hair-like setae, its lateral margin with four large plumose setae. Exopodite with distal margin and distal half of the lateral margin obtusely denticulated, distally with plumose setae; inner margin without denticulation, but with hair-like setae. The endopodite has the distal margin and the distal part of the lateral margin serrate and furnished with plumose setae, its inner margin smooth and furnished with hair-like setae.

Localities and Material.

St. 34 b. Lat. 44° 49′ S., long. 57° 34′ W. Atlantic Ocean, North of Falkland Islands and East of Patagonia. 700—500 m. $^{27}/_{12}$ 1901. 8 specimens, males and females. Length of largest specimens 17.5 mm. (ovigerous female), 16 mm. (male).

South Georgia, Grytviken. 15—25 m. $^{14}/_{6}$ 1902. At the rocky islet outside the Bay. Stony bottom with algae. One female specimen with semi-developed marsupial plates, length about 15.5 mm.

Material collected by E. SÖRLING. South Georgia, Grytviken, Cumberland Bay. $^{15}/_{1}$ 1905. 5 specimens (3 adult males and 2 females). Colour brownish with a shade of blue. The largest specimen is a male 16 mm. in length, with the dorsal surface overgrown with algae.

Distribution. South Atlantic Ocean E. of Patagonia N. of Falkland Islands (Sw. Ant. Exped.), South Georgia (PFEFFER 1887, TATTERSALL 1921, MONOD 1931), South Sandwich Islands (RICHARDSON 1911), Graham Region (RICHARDSON 1906 and 1908).

The most northerly locality where the species is known is the st. 34 b, Sw. Ant. Exped.

Serolis (*Serolis*) **glacialis** TATTERSALL var. **austrogeorgiensis** n. var.

Pl. I, Fig. 1; Text fig. 16.

Diagnosis. Anterio-lateral angles of the head only slightly prolonged in lateral direction; the width of the head at the front margin about equal to the width across the middle of the eyes. Coxal plates demarcated by dorsal sutures on the second to fourth pereion segments. Each posterior angle of the coxal plates of the pereion segments extends further back than that of the preceding segment. The posterior angles of the pleural plates of the second and third abdominal segments reach further back than the posterior angles of the coxal plates of the sixth segment of the pereion; pleural plates of the second and third abdominal segments extend about equally far back. First pair of maxillae with the inner lobe narrowly rounded (not expanded) distally. Left second maxilla with the outer lobe uncleft and furnished with five apical setae (one of the setae small); right second maxilla with the two lappets of the outer lobe each provided with two apical setae. Distal

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[1] TATTERSALL 1921, Pl. VII, Fig. 6.

epipodite of the maxilliped marked off from the basipodite by a distinct suture. Palp of maxilliped consists of three joints, of which the second is approximately cordiform. Basipodite of first three pairs of pleopods with a medial extension furnished with setae. Endopodite of the fourth pair of pleopods entire (not bifid).

Description.

Type. Female with marsupial plates semi-developed; length 10.3 mm.

Shape of body. Pear-shape as in *S. glacialis.* There is a longitudinal convex elevation along the middle line, running from the head to the tip of the pleotelson. From this middle keel the segments of the pereion and the free abdominal segments slope in a lateral direction. Lateral margins of the epimera of the pereion segments and the second abdominal segment continuous, so that only the posterior angles of the pleurae of the second and third abdominal segments project freely. Posterior margins of the terga of the pereion segments and the first three abdominal segments without a triangular tip in the middle line.

Colour and sculpturing. The colour is brownish-yellow with scattered dots of dark brown pigment. Almost the whole dorsal surface is covered with a more or less marked network of anastomosing ridges. Anterior part of the pereion epimera slightly semi-translucent.

Head. Anteriorly with an indication of a small triangular rostrum. The front margin of the head between the distal margins of the first joint of the antennulae has a transverse ridge, which, continuing laterally, traverses the anterio-lateral parts of the head. The head is sculptured as in the main species of *S. glacialis.* Behind the rostrum is a subtriangular elevation, the anterior margin of which is convex, and the posterior concave; this elevation forms the anterior tuberculae of the head, which coalesce with each other in front. The posterior part of the head is sculptured exactly as in the main species. Between the eyes are three tuberculae covered with a distinct network of anastomosing ridges, the two lateral tuberculae being almost circular in shape.

Pereion. The second, third, and fourth pereion segments of about equal length in the middle; fifth and sixth segments in the middle together about as long as the fourth. The posterior margin of the tergites without a triangular tip in the mid-line. First pereion segment dorsally with two somewhat curved transverse ridges, the anterior one being a continuation of the transverse ridge on the head. Neither of the transverse ridges extends to the lateral margin of the segment, as they vanish laterally in a network of anastomosing ridges. Between the ridges near the head the surface is smooth; behind the posterior ridge there is a deep cavity, likewise devoid of network. Epimera of second to sixth pereion segments with dorsal submarginal ridges along their anterior margins.

The second, third, and fourth pereion segments have the coxal plates marked off by dorsal sutures; the sutures of the third and fourth coxal plates issue anteriorly somewhat medially of those of the second and third segments respectively.

First, second, third, and fourth segments of the pereion have, as in the main species, a faint rounded elevation on either side medially from the coxal plates; the elevations are covered with anastomosing ridges. They are situated more medially from the coxal plates, as one passes from the first to the fourth segment.

The posterior margins of the first, second and third pereion segments, medially from the coxal plates, are slightly convex. The coxal plates of the second, third and fourth segments are laterally 1.7 times as long as the length of the segments in the middle. Fifth and sixth pereion segment as in the main species.

Ventral surface of the first pereion segment with four longitudinal sutures, the two lateral ones passing through the sockets for the first pereiopods. In the middle it is sculptured in the usual way; posteriorly there is an elevated trapezoidal part with its narrow end pointing to the front; in the middle line anteriorly there is a longitudinal ridge, divided from the trapezoidal part by an incision.

Ventral surface of the second to seventh pereion segments with a longitudinal groove in the middle line. On the second, third, and fourth segment there is a faint longitudinal ventral ridge on each side of the mid-line, from these ridges transverse ridges extend to the coxal plates along the anterior and posterior margins of the segments. On the fifth segment the sternal sculpturing is much the same as on the fourth, but more indistinct. The sixth and seventh segments typical of the subgenus *Serolis.*

Abdomen. The pleurae of the second and third abdominal segments reach further back than the coxal plates of the sixth pereion segments and approximately to the proximal margins of the exopodites of the uropods. The sterna of the free abdominal segments each with a longitudinal carina along the middle line; their posterior margins, in the middle prolonged into large backward-directed points, which increase somewhat in length from the first to the third segment; the posterio-lateral angles of the sternal middle plates are also somewhat pointed and backward-directed.

The pleotelson, dorsally, with five longitudinal carinae, diverging from each other. The keel along the middle line is proximally broad and rounded; it narrows gradually backwards, being sharper from the middle to the distal end; distally it ends in an obtuse point. The middle carina has no trace of any basal point, but is covered with a network of anastomosing ridges. The keels laterally from the middle keel are faint. They are slightly curved, being somewhat concave at the inner side, and they reach proximally only about half the length of the pleotelson. These keels are separated by broad cavities from those most laterally situated. The two most laterally situated keels are moreover somewhat curved, with their inner margins concave. Each of them forms the inner limitation of a triangular elevation, which narrows caudally and is covered with anastomosing ridges. None of the carinae, except the middle one, has any indication of a terminal point.

Antennulae. The peduncle almost reaches the penultimate joint of the antennal peduncle. The flagellum is almost as long as the peduncle and consists of fifteen joints.

Antennae. Peduncle as in the main species; the last two peduncular joints subequal in length. The flagellum, which is about as long as the last peduncular joint, has twelve joints. Rostral margins of the second, third and fourth peduncular joints with groups of setae, one group on the second, and five on each of the third and fourth joints. Antennal processes triangular and pointed, situated along the caudal and distal margins of the central joints of the flagellum.

First pair of maxillae. Inner lobe narrowly rounded (not expanded) distally.

Second pair of maxillae. Outer lobe of left maxilla uncleft and furnished with five apical setae, the one at the posterio-distal angle being small. Outer lobe of right maxilla with two lappets, each furnished with two apical setae.

Mandibles[1]. Normal. Anterior masticatory process on the left mandible broad and strong and furnished with a cutting edge.

Maxillipeds. (Fig. 16.) Distal epipodite marked off from the basipodite by a distinct suture. Palp consists of three joints, second joint approximately cordiform, third joint long with an incision in the distal margin, thus dividing the tip of the joint into two lobes; the lateral lobe corresponds to a minute fourth joint. I was unable to find any suture between the coxopodite and the proximal epipodite.

Fig. 16. *Serolis glacialis* TATT. var. *austrogeorgiensès* n. var. Maxilliped, 63 ×.

First pair of pereiopods. As in the main species.[2] Propodal joint with a characteristic point at its upper distal angle. Rows of composite setae on the lower margin of propodus much as in *S. septemcarinata* (cf. Fig. 5 h). Thus the setae in the rostral row are more slender than figured by TATTERSALL (1921)[3] and approximately as illustrated by MONOD (1926)[4]. The setae in the caudal row have the distal margin of the scale-part rounded, but they are not as broad anteriorly as figured by MONOD[4] (1926).

First three pairs of pleopods[5]. Inner angle of basipodite triangularly prolonged and furnished on the first pleopod with three, on the second and third pleopods with two, setae.

Fourth pair of pleopods. Exopodite with a transverse suture at a distance from the distal end of one-third the length of the exopodite. Endopodite entire (not bifid).

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[1] Cf. MONOD (1926, Figs. 34 A and B).
[2] See TATTERSALL (1921, p. 229, Pl. VII, Fig. 2), MONOD (1926, Fig. 34 C).
[3] TATTERSALL (1921, Pl. VII, Fig. 3).
[4] MONOD (1926, Fig. 34 D).
[5] Cf. MONOD (1926, Fig. 34 F).

Uropods. Shorter than in the main species; the exopodite about half as long as the endopodite. Exopodite and endopodite oval with distal margins broadly rounded.

Remarks. The species *glacialis* has previously been recorded from the Antarctic and is known from an adult male specimen of the length of 17 mm (TATTERSALL, 1921) and a small male specimen 11 mm in length (MONOD, 1926).

The Swedish Antarctic Expedition collected (at South Georgia) only one specimen, a young female with small oostegits, and measuring 10.3 mm in length. It differs from *S. glacialis* as described by TATTERSALL (1921) and MONOD (1926) in the following features: —

1. The lateral margins of the epimera of the pereion segments and the second abdominal segments are continuous with each other, so that the posterior angles of the pereion epimera do not protrude freely[1].

In the main species of *glacialis* the posterior angles of all the pereion epimera protrude freely, except the first. In the figure by TATTERSALL (1921, Pl. VII Fig. 1) the posterior angles of the epimera of the fifth and sixth segments of the pereion appear to protrude freely. The epimera of the sixth pereion segment and those of the second abdominal segment are separated laterally by an interspace, a feature which, in the variety *austrogeorgiensis,* is only slightly indicated on one side.

2. The second, third and fourth segments of the pereion are subequal in length in the middle.

In the main species the second pereion segment is medially twice as long as the third and longer than the second.

3. The distinct proximal spine in the middle line on the pleotelson is missing in *austrogeorgiensis.* The lateral keels are not so marked as in the main species and do not terminate in spines.

4. The uropods are shorter, the exopodite does not reach so far back as in the main species; moreover both rami are broader than in the main species and have their distal margins broadly rounded.

Other differences from the main species are: —

5. That the coxal plates of the second pereion segment are longer as compared with the length of the segment measured along the middle line, the proportion being 1.7: 1 in var. *austrogeorgiensis* and 1: 1 in the main species.

6. That the pleurae of the third abdominal segment reach as far back as those of the second abdominal segment.

7. That the sutures of the coxal plates are not continuous with each other.

8. That the triangular tips in the middle on the posterior margins of the tergites of the segments are minute.

9. That the var. *austrogeorgiensis* is not distinctly semi-translucent.

10. The shape of the setae on the lower margin of propodus of the first pereiopod is more slender than as figured by TATTERSALL (1921, Pl. VII, Fig. 3) and approximately as in *S. septemcarinata* (cf. Fig. 5 h).

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[1] On the right side, however, there is a small interspace between the posterior angle of the sixth pereion epimeron and that of the second abdominal somite.

As the female of *S. glacialis* has not been described, I am unable to determine whether these differences from *S. glacialis*, as described by TATTERSALL (1921) and MONOD (1926), are due merely to difference in sex.

At any rate the specimen from the Swedish Antarctic Expedition approaches very closely to *S. glacialis;* I therefore regard it as a variety of this species.

Localities and Material.

St. 23. South Georgia, off the mouth of Cumberland Bay, lat. 54° 23′ S., long. 36° 26′ W. 64—74 m. Bottom temp. + 1.65°. $^{16}/_{5}$ 1902. Female with semi-developed oostegits. Length 10.3 mm.

Distribution. South Georgia (Sw. Ant. Exped.)

Distribution of the main species: Off Oates Land (TATTERSALL 1921), East Antarctic, lat. 71° S., long. 87° W. (MONOD 1926).

Serolis (*Serolis*) **exigua** n. sp.

Pl. I Fig. 2; Text Figs. 4 a—c, 6 e, 17 a—i, 18 a—h.

Diagnosis. Head with anterio-lateral angles slightly prolonged in a lateral direction; greatest width of the head at the front margin. Coxal plates marked off by dorsal sutures on the second to fourth pereion segments. The posterio-lateral angles of the coxal plates of the pereion segments and pleural plates of the second and third abdominal segments all reaching beyond those of their preceding segments. Anterior masticatory process on the left mandible not expanded and without cutting edge. Inner lobe of first maxilla expanded distally. Outer lappets of outer lobe of the second maxilla each provided with two apical setae. Maxilliped with the distal epipodite fused with the basipodite in its entire length. Palp of maxilliped consisting of three joints, of which the second is approximately cordiform. Basipodites of the first three pairs of pleopods with their inner proximal angles projecting and furnished with setae. Endopodite of fourth pleopod entire (not bifid). Exopodite of the fifth pleopod with the lateral margin furnished with two long plumose setae.

Description.

Type. Female with young, about 7 mm. in length.

Shape of body and sculpturing (Pl. I Fig. 2, Text fig. 17 a). The head, except a submarginal part at its front margin, the tergites of the pereion segments and the free abdominal segments, except the greater part of their pleurae, are elevated as compared with the lateral parts of the body. A dorsal longitudinal carina along the mid-line passes from the centre of the head (= from a spot between the front margins of the eyes) along the body to the distal end of the pleotelson. Posterior margin of the tergites of the pereion segments and the free segments of abdomen all with a small backward-directed triangular tip in the middle line, (very indistinct on the first pereion segment).

Head (Pl. I Fig. 2, Text fig. 17 a). Slightly broader than it is long, posteriorly in the middle continuous with the first pereion segment without trace of any suture. The longitudinal keel in the middle line is faint, yet distinct in the posterior part of the head, as well as on the first pereion segment. The lateral parts of the posterior margin of the head are divided from the first pereion segment only by a slight groove, which develops anteriorly into a distinct suture. Front margin, in the middle, with a very small rostrum; laterally from the rostrum on either side it is somewhat concave;

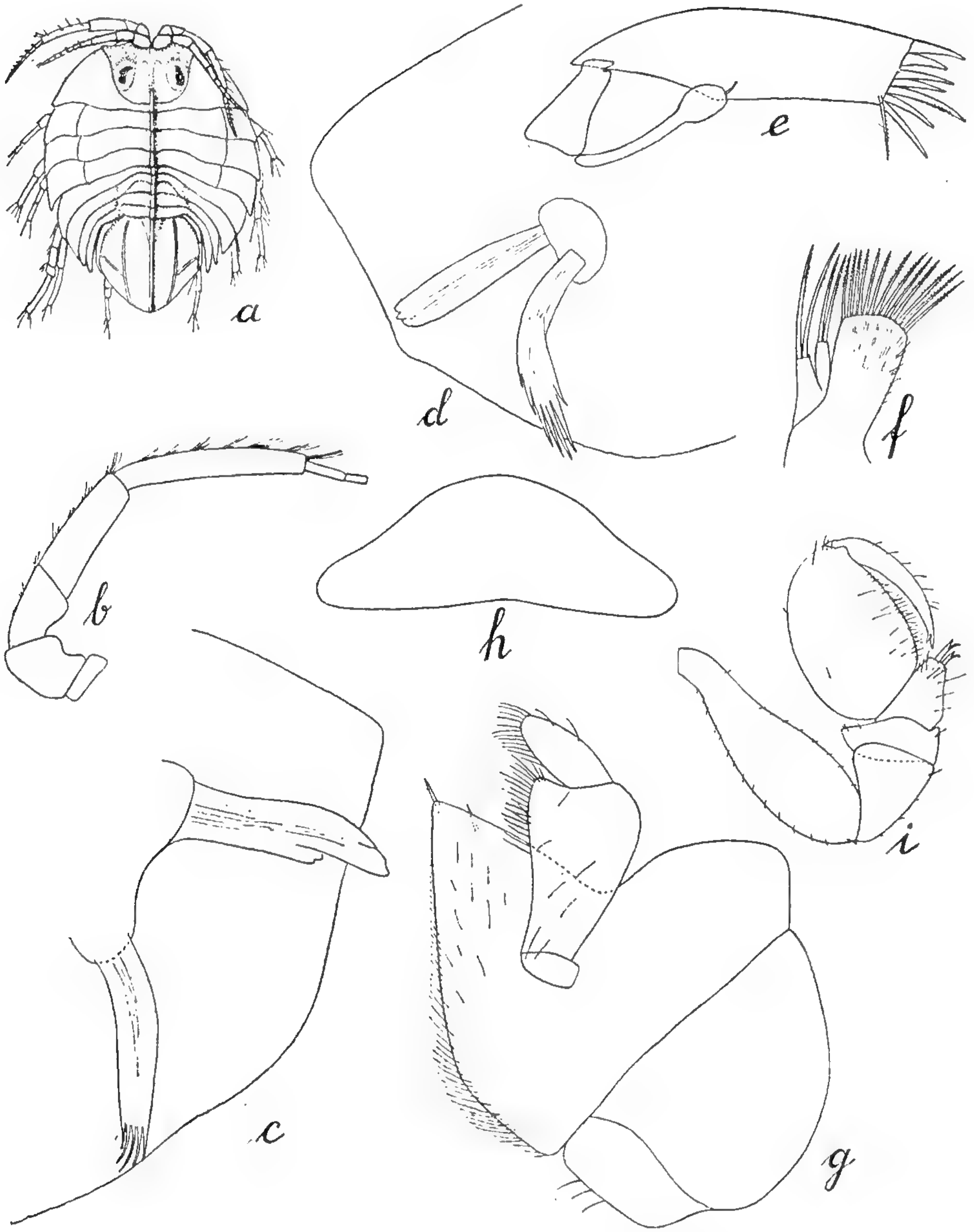

Fig. 17. *Serolis exigua*, n. sp., ♀. a. Female, from above, 5.3 ×. b. Peduncle and two proximal joints of the flagellum of the right antenna, 13 ×. c. Inner part of the left mandible, seen from above, 240 ×. d. Inner part of the right mandible, seen from above, 240 ×. e. Right first maxilla, 80 ×. f. Right second maxilla, 80 ×. g. Left maxilliped, 80 ×. h. Upper lip, 80 ×. i. First periopod, 80 ×.

between the first and second peduncular joints of the antennulae the front margin forms a small triangular point, which extends somewhat further in front than the rostrum. The anterio-lateral angles of the head are triangularly prolonged and slightly bent downwards. The eyes are small, reniform; the distance between the eye and the anterior margin of the head is about the length of one eye. Between the eyes and the longitudinal keel in the middle line there is, on either side, a short indistinct longitudinal ridge.

Pereion (Pl. I Fig. 2, Text fig. 17 a). The first pereion segment, ventrally, with a distinct longitudinal suture passing through the sockets for the first pereiopods. The ventral part of the segment is covered by the marsupium.

Second, third, and fourth segments, in the middle, of about equal length, the fifth and sixth in the middle each about half as long as the fourth. Posterior margin of the tergites of all the segments with a small backward-directed triangular tip in the mid-line (indistinct on the first segment).

Coxal plates demarcated by dorsal sutures on the second to fourth segment; the sutures are curved and not quite in a line with each other; on the second, third, and fourth segments there is a convexity of the posterior margins medially from the coxal plates; a similar convexity is also to be observed on the first segment. Lateral margins of the epimera of the first to fourth segments continuous with each other; only the extreme tips of the coxal plates of the fourth, fifth, and sixth segments protrude freely.

The ventral surface of the pereion segments is almost entirely covered by the marsupium.

Abdomen (Pl. I Fig. 2, Text fig. 17 a). On the first three segments the longitudinal keel along the mid-line is very distinct, whilst the triangular points in the middle of the posterior margins are small and indistinct.

From the median keel the dorsal surface slopes slightly; on the first segment to its lateral margins, on the second and third segments to their pleural plates. The lateral parts of the pleural plates of second and third segments have their posterior margins somewhat elevated compared with their anterior margins. The posterio-lateral angles of the pleural plates of the third abdominal segment extend further back than those of the second abdominal segment, reaching to about two-thirds the length of pleotelson.

The sternites of the first three abdominal segments are posteriorly protracted into one long point in the middle, and two short lateral points, one on each side; the sternites are sculptured, with a longitudinal ridge along the middle line.

Pleotelson, broadly cordiform. The longitudinal carina along the middle line is distinct. Anterior parts of the lateral margins each with a marginal ridge extending somewhat further back than the pleural plates of the second abdominal segment. Between these ridges and the longitudinal carina in the middle there is on either side yet another, longitudinal and somewhat curved, ridge, slightly concave on its inner side. These ridges and the marginal ridges are connected by a short ridge. The part of the pleotelson which is marked off distally by the latter ridge, medially by the ridge situated laterally from and nearest to the middle keel, and laterally and proximally delimited by the marginal ridge, is subtriangular and somewhat elevated.

Antennulae. The peduncle is longer than the flagellum and consists of four joints. Second peduncular joint slightly longer than the first. Third joint narrower and about as long as the second plus half the first. Fourth joint short, about two-fifths as long as the third. The flagellum consists of 16 joints, each joint carrying a sensory filament.

Antennae. (Fig. 17 b). First joint of the peduncle short and visible only from below. Second and third joints of about equal length, forming an angle with each other. Second peduncular joint proximally with a faint incomplete suture on the ventral side, but without suture dorsally. Fourth peduncular joint half again to twice as long as the third; fifth joint slightly longer and narrower than the fourth. Ventral surface of the third, fourth, and fifth joints, near the rostral margin, exhibits groups of setae forming transverse rows. On the distal part of the third joint there are two such rows, each consisting of two groups, on the fourth three rows, each, as a rule, with three groups of setae, on the fifth joint there are five rows.

The flagellum is slightly longer than the last peduncular joint and consists of ten joints. There is a row of prolonged triangular scale-processes along the rostral margin of the ventral surface on the central joints of the flagellum.

Mandibles (Figs. 17 c and d). Left mandible (fig. 17 c) with the rostral masticatory process stronger than the weak, caudal one, which is prolonged distally into bristle-like processes. Right mandible with two weak masticatory »setae».

Setae on the second and third joints of the mandibular palp with oblong-ovate end-knobs.

First pair of maxillae (Fig. 17 e). Distal margin of outer lobe with eleven setae, situated in two rows. Distal end of inner lobe elliptically expanded.

Second pair of maxillae (Fig. 17 f). Inner lobe much broader and longer than both lappets of outer lobe; its distal margin with about fifteen setae, situated in two rows. Lappets of outer lobe each with two apical setae.

Maxillipeds (Fig. 17 g). Distal epipodite fused with the basipodite in its entire length. Composite setae on the distal margin of the basipodite approximately as in *S. paradoxa.*

Upper lip (Fig. 17 h). Normal.

First pair of pereiopods (Fig. 17 i). Basipodite longer than ischium, merus and carpus together. Ischium markedly widening towards its distal end, about as long as the meral and carpal joints together. The merus is short, almost trapezoidal and somewhat broader than the carpus.

For the two composite setae at the upper distal angle of the carpus see Fig. 6 e. Close to the upper distal angle of the carpus there is a group of simple setae on the caudal surface, and on the distal margin there are hair-like points devoid of a setal canal (see Fig. 6 e).

The propodal joint is somewhat shorter than the ischium, merus and carpus together. On the lower margin of propodus there is only one row of composite setae, each seta consisting of a triangular scale which, proximally, is fused with a simple seta (see Figs. 4 a, b, c). The usual caudal row of leaf-like setae is replaced by a row of projecting, anteriorly rounded scales (Fig. 4 c). Close to the lower margin of the propodus on the caudal side there is a submarginal row of simple setae. The caudal and rostral surfaces of the propodus exhibits scattered shorter setae of the same non-composite kind.

The other pereiopods (Figs. 18 a, b). Carpal and propodal joints increasing in length from the second to the seventh pereiopod. Together they are shorter on the third pereiopod than the basipodite, but on the seventh longer than that joint. Upper margin of the

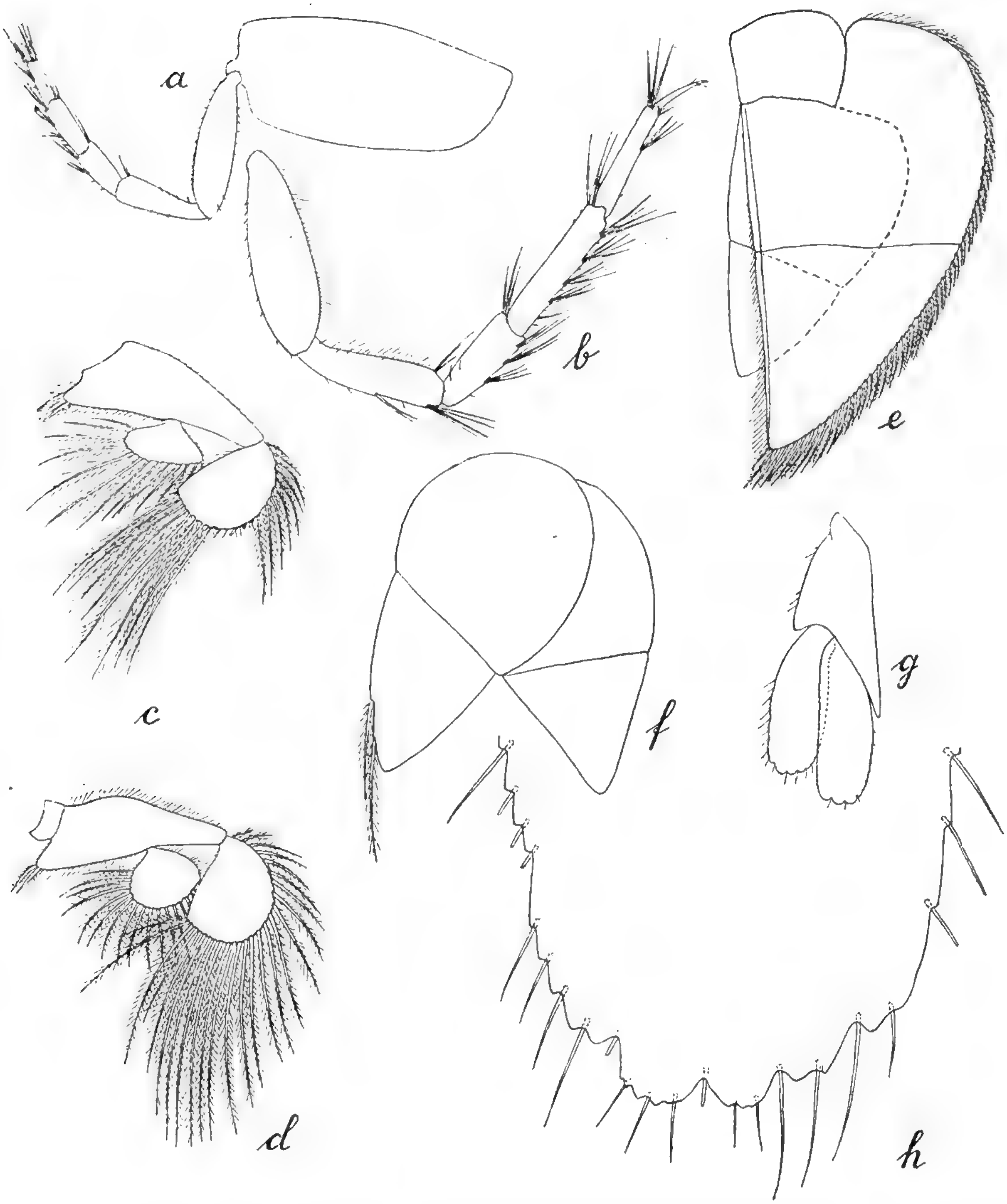

Fig. 18. *Serolis exigua* n. sp. ♀. a. Third pereiopod, 17.5 ×. b. Seventh pereiopod, 30 ×. c. Left first pleopod, 30 ×. d. Left third pleopod, 30 ×. e. Right fourth pleopod, 30 ×. f. Right fifth pleopod, 30 ×. g. Left uropod, 30 ×. h. Tip of the exopodite of the uropod, 240 ×.

basipodite on the second to fourth pereiopods has delicate »hairs» lacking a setal canal; on the fifth to seventh pereiopods such »hairs» occur also on the upper margin of the ischium. The »hairiness» of the limbs increases from the second to seventh, where the hairs cover almost the whole upper margin of the basipodite and the ischium.

First three pairs of pleopods (Figs. 18 c, d). Inner angle of the basipodite of the first pair exhibits three (two in one specimen) setae; on the second and third pairs two setae. Endopodite on the first and second pairs oval in outline, on the third almost circular.

Fourth pair of pleopods (Fig. 18 e). Exopodite and endopodite triangular, the endopodite somewhat smaller than the exopodite; both are divided by an almost transverse suture, somewhat distally from the middle. Lateral margin of the exopodite provided with plumose setae, its proximal margin and distal part of its inner margin furnished with hair-like setae. Margins of endopodite smooth.

Fifth pair of pleopods (Fig. 18 f). Exopodite divided by a transverse suture somewhat distally from the middle; its lateral margin close to the distal end furnished with two long plumose setae. Endopodite likewise divided by a transverse suture; about one-third of the joint is situated posteriorly from the suture.

Uropods (Figs. 18 g and h). Exopodite and endopodite subequal in length, but the exopodite does not extend quite as far back as the endopodite. Both the rami are broadly oval in outline and have their distal margins broadly rounded. Outer and inner margins serrate, distal margins (Fig. 18 h) serrate and in addition provided with some large incisions.

Remarks. In its general shape the new species most resembles *S. glacialis, septemcarinata* and *polita*, but is easily distinguishable, especially by the different sculpturing of the head and the pleotelson.

The single row of composite setae on the lower margin of the propodus of the first pereiopods and the two long plumose setae on the lateral margin of the exopodite of the fifth pleopod are features peculiar to the species, which have not been found in any other member of the genus.

Localities and Material.

St. 39. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 41′ W. 40 m. Sand and small stones with algae. $^{4}/_{7}$ 1902. 2 females possessing marsupia. Length of the specimens 6.8 and 6.5 mm.

St. 49. Falkland Islands, Berkeley Sound, lat. 51° 35′ S., long. 57° 56′ W. 25—30 m. Shells and stones. $^{10}/_{8}$ 1902. Mature female with its marsupium filled with young. Length about 7 mm (type specimen).

Distribution: Falkland Islands (Sw. Ant. Exped.).

Subgenus *Serolis,* Group IV[1].

Serolis (*Serolis*) **gaudichaudi** AUDOUIN et MILNE EDWARDS, 1840.

Text. figs. 3 e—g.

S. gaudichaudii. AUDOUIN and MILNE EDWARDS, in MILNE EDWARDS, 1840, p. 232; AUDOUIN and MILNE EDWARDS, 1841, p. 22—25, Pl. 1 Figs. 1—16, Pl. 2 Figs. 1—7; NICOLET, 1849, p. 282; CUNNINGHAM, 1871, p. 498; GRUBE, 1875, p. 231—232, Pl. V Figs. 4 and 4 a, Pl. VI Figs. 4 and 4 a.

Diagnosis: Anterio-lateral angles of the head prolonged in a lateral direction, so that the head has its greatest width anteriorly. Coxal plates marked off by dorsal sutures on the second to fourth pereion segments. Posterio-lateral angles of the coxal plates of the second to sixth pereion segments each successively reaching further back than those of the preceding segments. Posterio-lateral angles of the pleurae of the second and third abdominal segments extending to the lateral margins of the pleotelson. The pleotelson shows three faint longitudinal diverging ridges, of which the median one is interrupted in the middle; tip of pleotelson truncate. Inner lobe of the first maxillae narrowly rounded (not expanded) distally. Outer lappet of outer lobe of second maxillae with seven, inner lappet of the same lobe with eight apical setae. Distal epipodite of the maxilliped marked off from the basipodite by a suture; the palp consists of three joints, the last one small. Basipodite of the first three pairs of pleopods with its inner proximal angle prolonged and furnished with setae. Endopodite of the fourth pair of pleopods entire (not bifid). Setae on the lower margin of the propodus of the first pereiopod different in females and adult males.

Supplementary Description.

Pereion. The coxal plates are marked off by dorsal sutures on three segments only; on the fifth pereion segment there is no trace of any suture. The figures by AUDOUIN and MILNE EDWARDS (1841)[2] are in this respect inaccurate. Ventral surface of first pereion segment with four longitudinal sutures, exhibiting the arrangement usual, the lateral ones passing through the articular sockets for the first pereiopods; the left lateral suture has been figured by AUDOUIN and MILNE EDWARDS (1841)[3].

Mandibles.[4] Normal. Left mandible with the rostral masticatory process much expanded and provided with a cutting edge, right mandible with two masticatory »setae», of which the rostral one has a narrow base, but is much expanded distally and furnished with digitiform processes.

The modified setae on the second and third joints of the palp have two rows of triangular sub-branches, which proximally are more or less fused with each other. Their endknobs are oblong, lancet-like, distally pointed.

First pair of maxillae[5]. Inner lobe not expanded distally and with a narrowly rounded end.

Second pair of maxillae[6]. Outer lappet of outer lobe with seven apical setae, inner lappet of the same lobe with eight.

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[1] For diagnosis see p. 51.

[2] AUDOUIN and MILNE EDWARDS, 1841 Pl. 1, Figs. 1 and 2.

[3] AUDOUIN and MILNE EDWARDS, 1841, Pl. 2, Fig. 1.

[4] AUDOUIN and MILNE EDWARDS, 1841, Pl. 1, Fig. 7.

[5] AUDOUIN and MILNE EDWARDS, 1841, Pl. 1, Fig. 10.

[6] AUDOUIN and MILNE EDWARDS, 1841, Pl. 1, Fig. 11.

Maxillipeds[1]. Distal epipodite marked off from the basipodite by a suture. Third joint of the palp very small, but longer than in the allied species *S. convexa.*

First pair of pereiopods.[2] The setae on the lower margin of the propodus in the female, as in *S. convexa.* For those on the propodus and the carpus in the adult male see Figs. 3 e, f, and g.

Second pair of pleopods. See Audouin and Milne Edwards (1841, Pl. I, Figs. 14, $14'$, $14''$, $14'''$, $14''''$) and Grube (1875, Taf. V, Figs. 4, 4 a).

Uropods. See Audouin and Milne Edwards, 1841, Pl. 2 fig. 7.

Localities and Material.

Eugenie Expedition. Chile, Valparaiso. 7 fms. and at the surface. Sand. $^{26}/_{5}$ 1852. Males, females and immature. Length of largest specimen 27.5 mm (adult ♂).

Distribution. West Chile (Audouin and Milne Edwards 1841), Chile (Nicolet 1849, Cunningham 1871).

Serolis (*Serolis*) **convexa** CUNNINGHAM, 1871.

Text. figs. 4 d—i, 6 d, 10 d, 19 a—e.

(?) *Serolis plana.* Dana, 1852, p. 794—795, Pl. 53, Figs. 1 a—1 c.
Serolis laevis. Richardson, 1911, p. 399—400, Fig. 2.
Serolis convexa. Cunningham, 1871, p. 498—499, Pl. 59, Fig. 3; Studer, 1884, p. 9—10, Pl. 1, Figs. 1 a—d; Beddard, 1884, p. 37—40, Pl. VI, Figs. 9—15.

Diagnosis. Width of the head at the front margin only slightly greater than across the eyes. Coxal plates marked off by dorsal sutures on the second to fourth pereion segments. Posterior angles of the coxal plates of the third to seventh pereion segments all extending successively further back than those of the preceding segments, the pleurae of second and third abdominal segments extend about as far back as to one-third the length of the pleotelson. Pleotelson, dorsally, with three faint longitudinal ridges, of which the median one is incomplete and interrupted in the middle; the lateral ridges each ending in a terminal point. First pair of maxillae with the inner lobe scarcely expanded distally. Outer lappets of outer lobe of the second maxillae each with six apical setae, inner lobe with nine apical setae. Distal epipodite of the maxilliped marked off from the basipodite by a suture. Palp of maxilliped consists of three joints, of which the last is small and short; second joint of the palp broadest across the middle, its proximal and distal margins subequal in length. Basipodites of the first three pairs of pleopods with their inner proximal angles projecting and furnished with setae. Endopodite of third pleopod entire (not bifid). Setae on the lower margin of the propodus of the first pereiopods different in females and adult males. Endopodites of the uropods, distally, with a small rounded non-setiferous tip.

Supplementary Description.

Head. With a well developed rostrum[3]. There is a very faint ridge along the anterior margin on either side of the rostrum. Anterio-lateral parts of the head triangularly pro-

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[1] Audouin and Milne Edwards, 1841, Pl. 1, Figs. 12, 12'.
[2] Audoin and Milne Edwards, 1841, Pl. 1, Figs. 13, 13,' 13,'' 13'''; Grube, 1875, Pl. VI, Figs. 4, 4 a.
[3] See Richardson, 1911, Fig. 2.

longed and slightly bent downwards, but posteriorly not delimited by a transverse ridge. Eyes reniform, comparatively small, but situated on two marked sub-conical tubercles.

Pereion. First pereion segment without transverse ridges. Second and third pereion segments with the posterior margin dorsally prolonged in the middle into a small triangular tip directed backwards; a slight indication of such a prolongation is also visible on the fourth segment[1]. Lateral margins of the coxal plates of the pereion segments continuous, except those of the fourth and the fifth; the posterior angles of the coxal plates of the fourth segment protrude freely.[2] Measured along the middle line, the second and third pereion segments are of about equal length, the fourth somewhat shorter, the fifth not more than half the length of the fourth, and the sixth segment shorter still. The dorsal sutures of the coxal plates on segments 2, 3 and 4, are not continuous, those of the third segment issuing at the anterior margin of the segment somewhat medially to those of the second, those of the fourth somewhat medially to those of the third, as figured by DANA (1852).[3]

Ventral surface of the first pereion segment divided into five areas by four longitudinal sutures, of which the most lateral ones pass through the articular sockets of the first pereiopods. The caudal part of the middle area has a semi-circular elevation, the anterior margin of the elevated part being convex and extending in the middle at its most anterior point to about one-third the length of the segment. This posterior elevation is separated by a faint furrow from an anterior, wedge-shaped, elevated part, which decreases in width anteriorly and extends in an anterior direction almost to the head.

Ventral surface of the second to fourth pereion segments smooth and without sculpturing. In the middle line they are traversed by a longitudinal groove, which also passes along the middle of the remaining posterior segments of the pereion. Ventral surface of fifth to seventh pereion segments (Fig. 10 d) almost as in *S. paradoxa*, but the suture between the last two segments is more indistinct.

Abdomen. First three abdominal segments about equal in length in the middle, and of the shape figured by RICHARDSON (1911, Fig. 2). Posterior pleural angles of the third abdominal segment extending slightly further back than the pleurae of second abdominal segment. Dorsally, in the middle, the posterior margins of the first three segments have a small triangular tip, directed backwards. The shield-like middle areas of the sterna of the free abdominal segments have their posterior margins in the middle prolonged into a triangular tip directed backwards; their posterio-lateral angles are slightly produced, but rounded.

Shape of pleotelson approximately as figured by RICHARDSON (1911, Fig. 2), but its anterio-lateral angles are somewhat more rounded than shown in the figure and in that respect agree with the figure by STUDER (1884, Pl. I, Fig. 1 a). Its dorsal side is sculptured in three longitudinal ridges, one along the middle line, which is incomplete and interrupted in the middle, and two lateral ridges, the latter each ending in a small and obtuse distal point. The distal end of the pleotelson is thus elevated by a longitudinal ridge running along the middle of the truncate tip. The ventral surface to the tip of the pleotelson is concave.

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[1] See CUNNINGHAM, 1871, Pl. 59, Fig. III; STUDER, 1884, Pl. 1, Fig. 1 a; DANA 1852, Pl. 53, Fig. 1 a; the triangular tip of the fourth segment is not illustrated in RICHARDSON's figure (1911, Fig. 2.)

[2] See RICHARDSON, 1911, Fig. 2.

[3] DANA, 1852, Pl. 53, Fig. 1 a.

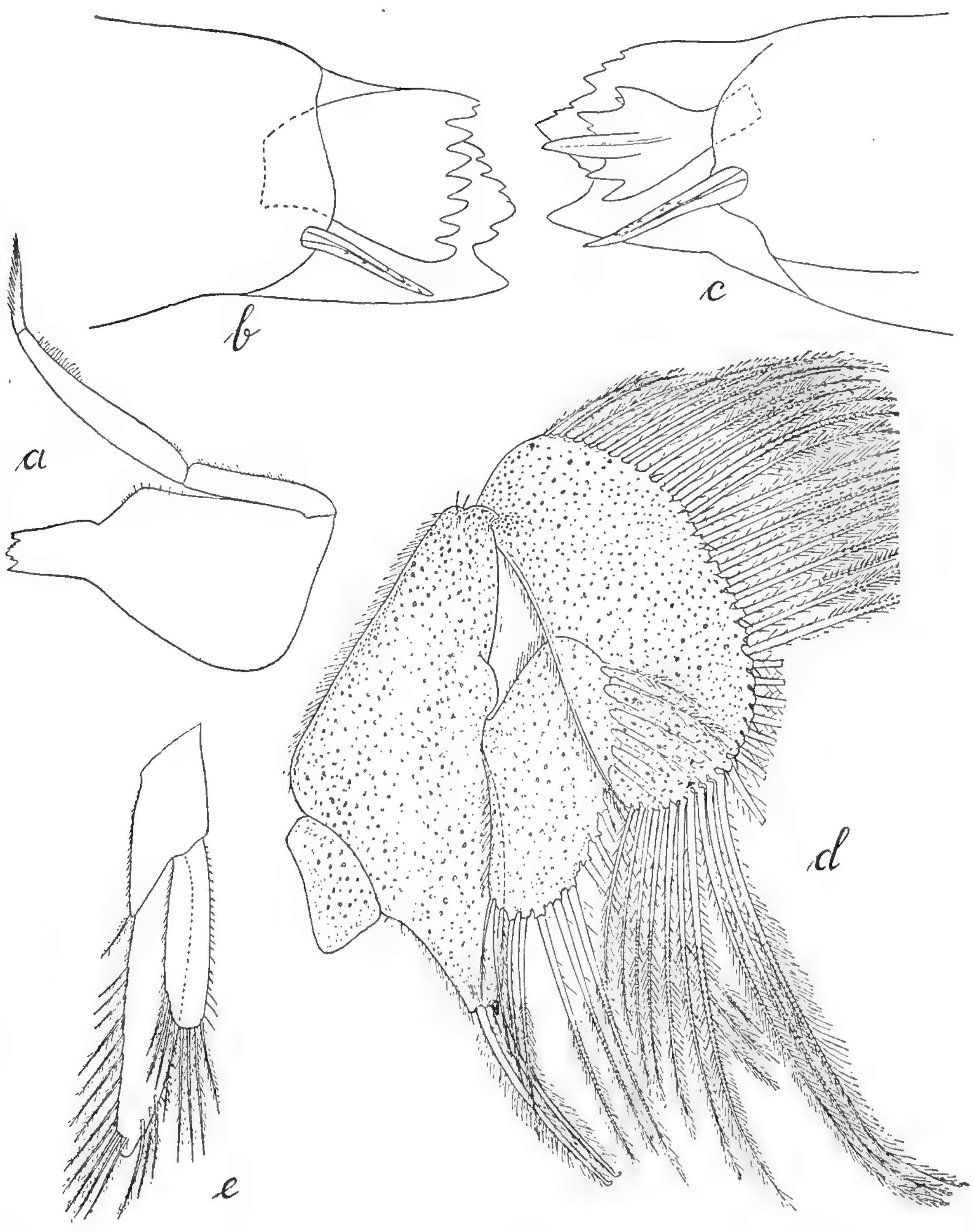

Fig. 19. *Serolis convexa*, CUNN., ♀. a. Left mandible, seen from below, 30 ×. b. Inner part of the left mandible, seen from above, 140 ×. c. Inner part of the right mandible, seen from above, 140 ×. d. Left second pleopod, 90 ×. e. Left uropod, 30 ×.

Antennulae. They extend slightly beyond the last peduncular joint of the antennae. The peduncle consists of four joints and reaches about to the distal margin of the fourth peduncular joint of the antennae. First and second joints of the peduncle subequal in length, third joint slightly longer than the second, fourth joint short, about one-third as long as the second. The flagellum consists of 15—17 joints (in the largest specimen 17 joints). On each joint there is a sensory filament.

Antennae. Extend slightly beyond the anterior margin of the third pereion segment. First peduncular joint very short, second and third joint subequal in length, each being two and a half times as long as the first; the fourth joint is about two and a half times as long as the third, and the fifth about as long as the fourth. Flagellum (in a specimen 17.8 mm. in length) consists of 17 joints. In two comparatively small specimens, 14 and 12.5 mm. in length, there are no projecting antennal scales on the joints of the flagellum, but in adult specimens[1] I could observe them.

Mandibles (Figs. 19 a, b and c). The cutting edge is markedly dentated[2]. Left mandible (Fig. 19 b) with the rostral masticatory process expanded. Right mandible with two masticatory »setae», of which the rostral one is hand-shaped and furnished with a number of finger-like processes. Setae on the second and third joints of the mandibular palp with oblong-oval, pointed end-knobs.

First pair of maxillae. Inner lobe very slightly expanded distally, furnished, with an apical seta.

Second pair of maxillae. Outer lappets of outer lobe each provided with six apical setae, inner lobe with nine apical setae.

Maxillipeds[3]. Distal epipodite marked off from the basipodite by a distinct suture. Palp consisting of three joints, of which the third is very small; second joint is broadest across the middle and has its proximal and distal margins about equal in length. The shape of the maxilliped is almost as in *S. gaudichaudi*, but the last joint of the palp is still shorter than in the latter species. The composite setae on the distal margin of the basipodite are similar to those in *S. paradoxa.*

First pair of pereiopods. The setae on the lower margin of the propodus differ in females and adult males (see Figs. 4 d—i). For the setae on the distal margin of the carpus see Fig. 6 d.

First three pairs of pleopods (Fig. 19 d). Basipodite of the first pleopod at its inner angle with three, of the second and third pleopods with two »plumose setae».

Uropods (Fig. 19 e). Inner margin of the basipodite microscopically serrate (not seen in the figure) and furnished with hair-like setae. Its inner distal angle is pointed; somewhat proximally of the tip there is a plumose seta. Endopodite almost twice as long as the exopodite and somewhat broader, distally and slightly laterally prolonged into a rounded tip; inner margin of the endopodite serrate; in each serration there is a plumose seta; distal margin, except on the tip, as well as the distal part of the outer margin, furnished with plumose setae. The exopodite has the distal margin serrate and furnished with a row of plumose setae, which are continued to the distal part of the in-

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[1] The adult specimens examined were obtained by the German Gazelle Expedition and were determined by STUDER (1884) as *S. convexa.*

[2] This character is perhaps due to the immaturity of the specimen examined (cf. BEDDARD, 1884, p. 10).

[3] BEDDARD, 1884, Pl. VI, Fig. 15.

ner margin; the inner margin is furnished with dense hairs lacking a setal canal. On the dorsal side close to the lateral margin there is a sub-marginal row of hair-like setae.

Remarks. As the name *convexa* indicates, the species, according to CUNNINGHAM (1871), is distinguished by a more convex shape of body than is usually the case in the genus *Serolis*. On examining the type specimens of the species at the British Museum, I found, however, that those specimens, which consist of a female with fully developed marsupium and an immature male specimen, had the dorsal surface only slightly vaulted. The female specimen certainly had the dorsal surface of the body somewhat more vaulted than the male, but this is common also in females of other species possessing a marsupium.

S. laevis RICHARDSON (1911) must be a synonym for *S. convexa*. According to the figure by RICHARDSON (1911), the shape of its body agrees in detail with that which characterizes the type specimens of CUNNINGHAM and all the specimens which I have been able to study, inter alia two specimens from the German Gazelle Expedition determined by STUDER (1884) as *convexa*. As seen in the figure by RICHARDSON (1911, Fig. 2) the epimeral tips of the fourth pereion segment protrude freely. One of the specimens from the Gazelle Expedition formed an exception in this respect. This specimen, a female, probably the one figured by STUDER (1884), differed in having the lateral margins of all the coxal plates continuous.

According to RICHARDSON, »*S. laevis*» differs from *S. convexa* in three respects: —

1) »In the absence of the three well marked ridges» (on the pleotelson) »a median interrupted in the middle and two lateral, each terminating in a sharp point[1]». Elswhere, however, RICHARDSON states that *S. laevis* differs (from *S. gaudichaudi*) »in having the median and lateral ridges of the terminal abdominal segment almost obsolete as well as the lateral tooth on either side».

2) »In the longer lateral angles of the sixth thoracic segment[2].» In CUNNINGHAM's type specimens, however, the epimeral angles of the sixth segment reach further back than figured by CUNNINGHAM (1871), extending backwards quite as far as is shown in the figure by STUDER (1884).

3) »The shape of the last abdominal segment is also different, being less pear-shaped in the specimen from the Sandwich du Sud» (= *S. laevis*) »and truncate at the tip[3].»

This is likewise a fictive difference, since the typical shape of the pleotelson in *S. convexa* is exactly like that figured by RICHARDSON. Neither CUNNINGHAM nor STUDER has figured the pleotelson quite accurately. Its correct shape (RICHARDSON, 1911, Fig. 2) is intermediate between the one figured by CUNNINGHAM and the one shown in the figure by STUDER.

The tip of the pleotelson in *S. convexa* is, moreover, truncate when seen from above, as described by RICHARDSON (1911). The tip was figured by CUNNINGHAM as convex, by STUDER as concave.[4]

It is highly probable that *S. plana* DANA also is identical with *S. convexa*. BEDDARD

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[1] RICHARDSON 1911, p. 399.

[2] RICHARDSON, 1911, p. 399.

[3] RICHARDSON, 1911, p. 400.

[4] This difference must, I think, be due to the fact that the tip of pleotelson is dorsally vaulted and furnished with a faint longitudinal ridge, but has its ventral surface concave. Thus, when seen obliquely from the front, the tip exhibits the appearance shown in the figure by CUNNINGHAM (1871), but seen obliquely from behind it appears to be concave, distally.

(1884) found it almost impossible to distinguish *S. plana* from *S. convexa* with the aid of the description and figures given by DANA (1852). On comparing what is known of *S. plana*, with our knowledge of *S. convexa*, the following differences will be revealed:

1 *S. plana:* eyes subconical; *S. convexa:* eyes reniform, but situated on subconical tubercles.

2. *S. plana:* lateral margins of the coxal plates continuous[1].

3. Behind each of the lateral ridges of pleotelson there is a tooth. In *S. convexa* the teeth are extensions of the ridges.

4. Antennae shorter in *S. plana* than in *S. convexa*, their distal ends, extending beyond the anterior margin of the second segment of the pereion, whilst in *S. convexa* they almost reach the posterior margin of the third segment.

None of the above enumerated distinctions have any great systematic importance. If therefore, on examination of the type specimen of *S. plana*, this vaguely defined species should turn out to be identical with *S. convexa*, the name of the latter species must be altered to *S. plana*.

Localities and Material.

St. 33. South Georgia, Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 22 m. Clay and algae. $^{30}/_{5}$ 1902. 2 immature females, collected together with *S. paradoxa*. Length of largest specimen 14 mm; greatest width 11 mm; length of the pleotelson 4.7 mm. Length of the other specimen 12.5 mm.; width 10.2 mm.; length of the pleotelson 4.3 mm.

Swedish Magellanian Expedition. East Falkland, Sparrow Cove. Shell-gravel 11—13 m. Female with semi-developed oostegits; length 17.8 mm.; greatest width 14.8 mm.; length of the pleotelson 5.8 mm.

Distribution. Northern Tierra del Fuego (CUNNINGHAM 1871), Magellanian Region (STUDER 1884), Falkland Islands (BEDDARD 1884), South Georgia (Sw. Ant. Exped.), South Sandwich Islands (RICHARDSON 1911).

S. convexa is one of those species which are comparatively widely distributed. Having been found previously at the Falkland Islands and the South Sandwich Islands, its occurrence at South Georgia might have been expected.

Subgenus *Homoserolis*.[2]

Serolis (*Homoserolis*) **minuta** BEDDARD var. **eugeniae** n. var.

Pl. I Fig. 3; Text. fig. 11 b and 20.

Diagnosis. Anterio-lateral angles of the head only slightly prolonged in a lateral direction, so that the greatest width of the head is across the middle. Coxal plates marked off by dorsal sutures on the second, third and fourth pereion segments. Posterio-lateral angles of the epimera of the second to sixth pereion segments and of the second and third abdominal segments each reaching successively further back than those of the preceding ones. Pleotelson triangular with a longitudinal carina along the middle line;tip of pleotelson truncate. Inner lobe of first maxillae somewhat expanded distally, its distal margin straight. Outer lappets of outer lobe of second maxillae each with two apical setae. Maxilliped without suture between the distal epipodite, and the basipodite, but with

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[1] Occurs exceptionally in *S. convexa* also (see p. 81).

[2] For diagnosis see p. 50.

a short distal incision between these plates; palp consisting of three joints, the second long and irregularly cordiform. Basipodites of the first three pairs of pleopods narrow proximally, with inner proximal angle not prolonged and without setae. Endopodite of fourth pair of pleopods entire (not bifid).

Description.

Type. Female with young; length 7.2 mm., greatest width 5 mm.

Colour. White-yellowish, semi-translucent.

Head. As in the main species.

Pereion. Third, fourth and fifth segments with a triangular tip in the middle of their posterior margins. Pereion segments with faint triangular elevations medially from the junction of the epimera with the terga.

The ventral surface of the first pereion segment is sculptured in the middle, in the usual manner and is traversed by four longitudinal sutures, the lateral ones passing through the articular sockets for the first pereiopods. The ventral surface of the other segments of the pereion is covered by the marsupium. In young removed from the marsupium, it can be seen that the median parts of the sternites of the fifth and sixth segments have coalesced with one other (Fig. 11 b); the suture between these segments is interrupted in the middle, being replaced by a faint groove. Compare Fig. 10 c (immature specimen taken out of the marsupium of *S. paradoxa*), where this suture is developed in its entire length.

The sterna of the free abdominal segments have their posterior margins produced into a triangular tooth in the middleline.

Antennulae and antennae. The flagellum of both the antennulae and the antennae consists of 10 joints. The usual row of prolonged scale-processes on the central joints of the antennal flagellum is missing.

Mandibles. Left mandible with the anterior masticatory process broad and expanded in the usual manner. Right mandible with weak masticatory processes. The modified setae on the second and third joints of the palp have, distally, two rows of hair-like sub-branches; their end-knobs are indistinct and broadly rounded distally.

First pair of maxillae. Inner lobe increasing in width towards the distal end, its distal margin straight and furnished with a short seta.

Second pair of maxillae. Outer lappets of outer lobe small and short, each with two apical setae.

Maxillipeds (Fig. 20). Distal epipodite coalesced with the basipodite, but there is a short distal·incision between the two plates. The palp consists of three joints, the second joint being very long and widening towards the distal end.

First pair of pereiopods. Distal margin of the carpus with a row of distally rounded and freely projecting scales. Near the lower distal angle, somewhat on the caudal side, the distal margin is furnished with two sub-cylindrical composite setae, having their narrow setal part protruding freely at the distal end. The two large composite setae are surrounded by a group of slender non-composite ones.

Lower margin of the propodus with two rows of setae of the same form as those in the main species[1]. The long setae in the rostral row are characterized by having the two free

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[1] See Beddard (1884, Pl. VII, Fig. 7).

distal lappets of their scale part subequal in length. The free distal end of the setal part is always longer than the lappets of the scale part, and thus much longer than figured by BEDDARD[1]. On the caudal side along the lower margin of the propodus there is a row of distally rounded, freely projecting scales, and also a submarginal row of non-composite setae.

Pleopods. The endopodite of the fourth pleopod is much shorter than the exopodite, which is traversed by a transverse suture.

Fig. 20. *Serolis minuta* BEDD. var *eugeniae* n. var. Right maxilliped, adult female, 140 ×.

Uropods. Endopodite about twice as long as the exopodite and reaching almost to the tip of the pleotelson; its distal margin is narrowly rounded. Exopodite of a uniform width; its distal margin subtruncate and slightly serrate.

Remarks. CHILTON (1917) described as a new species the Australian form »*S. bakeri*», which is very similar to *S. minuta*, and points out that his new species may possibly be only a variety of the latter species. The above described specimen shows close resemblances to both *minuta* and *bakeri* but does not correspond exactly with either of them. I am therefore of the opinion that both *bakeri* CHILTON and the above described new form should for the present be regarded as varieties of *S. minuta*.

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[1] See BEDDARD, 1884, Pl. VII, Fig. 7.

The var. *eugeniae* differs from the var. *bakeri* in the following features: —

1) in its more oblong shape of body,

2) in having a slight tuberculum on each side of the pleotelson laterally from the uropods,

3) in having the epimera of the sixth pereion segment and those of the second and third abdominal segments reaching not quite as far back as in var. *bakeri,*

4) in having faint triangular elevations medially from the junction of the terga with their coxal plates,

5) in having an angular tip dorsally in the middle on the posterior margins of the third, fourth and fifth pereion segments and of the first three abdominal segments,

6) in having the exopodite of the uropods half as long as the endopodite.

From *S. minuta* as described by BEDDARD (1884) the var. *eugeniae* differs: the following respects: —

1) in its more oblong shape of body,

2) in that the free triangular tips of the pereion segments laterally, from their epimera are lacking.

3) in having two lateral tuberculae on the pleotelson,

4) in having the triangular tip in the middle of the posterior margins of the perion segments missing on the first and second segments.

In its uropods it agrees with the main species in having the exopodite half as long as the endopodite, but the distal margin of the exopodite is a little serrate, as is also the case in the var. *bakeri.*

It seems probable that the characters by which the two varieties are distinguished may be subject to variations in the same species.

Localities and Material.

Eugenie Expedition. Port Jackson (off Sydney), the lighthouse. 12 fm. Female with young, length 7.2 mm.

Distribution: Australia (N. S. Wales).

Distribution of the main species: Australia (Port Philip, Jibbon, St Francis Island). See BEDDARD (1884) and WHITELEGGE (1901).

Distribution of the var. *bakeri:* Australia (Encounter Bay). See CHILTON (1917).

Serolis (*Homoserolis*) **pagenstecheri** PFEFFER, 1887.

Text. figs. 1 a, c and h, 5 e, 6 c, 7 c—f, 8 b, 10 e, 21 a—d.

Serolis pagenstecheri. PFEFFER, 1887, p. 73—81, Pl. II, Figs. 2 and 3, Pl. IV, Figs. 1—3; TATTERSALL, 1921, p. 231; MONOD, 1931, p. 26.

Diagnosis. Anterio-lateral angles of the head markedly elongated in a lateral direction; greatest width of the head across the front. Coxal plates marked off by dorsal sutures on the second, third and fourth pereion segments. Posterio-lateral angles of the coxal plates of the second to sixth pereion segments all reaching successively further back than those of the preceding segments. Posterio-lateral angles of the pleurae of the second and third abdominal segments not extending beyond those of the coxal plates of the sixth pereion segment. Pleotelson with five longitudinal dorsal elevations, its distal end sinuate. Inner lobe of first maxilla expanded distally. Outer lappets of outer lobe of the second maxilla each provided with two apical setae. Maxilliped with distal epipodite marked off from the basipodite by a distinct suture; the palp consisting of four joints, the last of which is minute; second joint of the palp slightly cordiform. Inner proximal angles of the basipodite of the first three pairs of pleopods triangularly extended and furnished with setae. Endopodite of fourth pleopod entire (not bifid).

Supplementary Description.

Pereion. Ventral surface of the first pereion segment with four longitudinal sutures, the lateral ones passing through the articular sockets for the first pereiopods. The two other sutures are, as usual, situated one on either side of the middle line, thus marking off a middle plate of the sternite. As the longitudinal sutures are somewhat oblique, the middle plate assumes a trapezoidal shape, having the posterior margin slightly longer than the anterior. The middle plate is furnished with a crescent-shaped elevation at its posterior margin, separated by a broad furrow from an anterior rough tuberculum in the middle line. The ventral surface of the remaining segments[1] shows a furrow along the middle line.

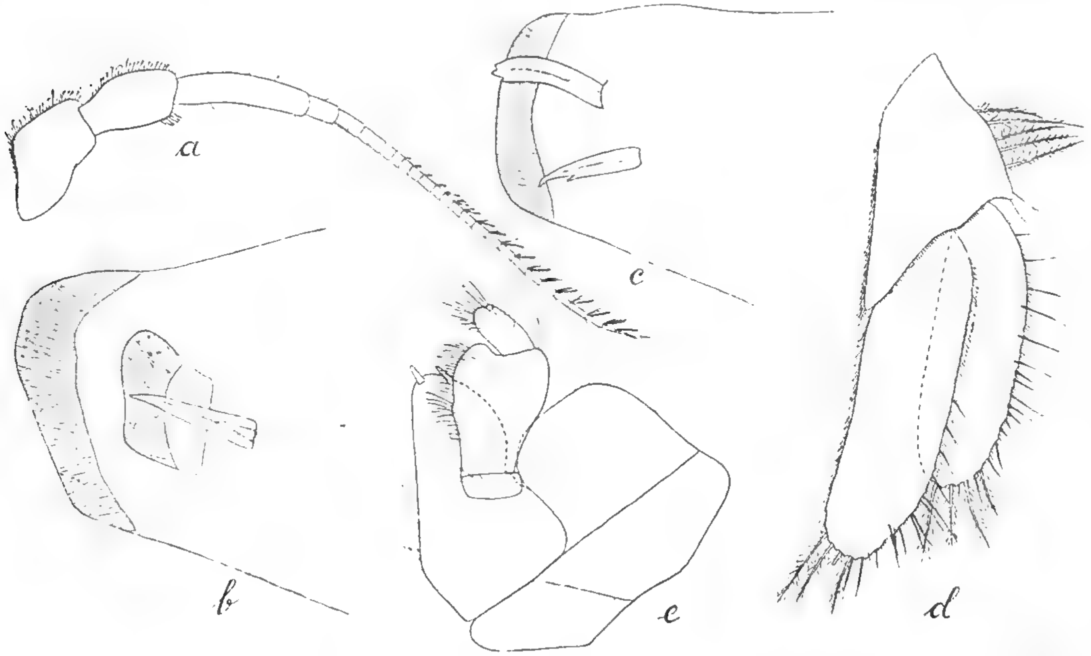

Fig. 21. *Serolis pagenstecheri* PFEFF. a. Left antennula, immature male specimen, 13 ×. b. Inner part of the left mandible, seen from above, 60 ×. c. Inner part of the right mandible, seen from above, 60 ×. d. Right uropod, in a male, 13 ×. e. Left maxilliped, of the var. *albida*, 23 ×.

Last three segments, as is characteristic of the subgenus, greatly coalesced with each other (see Fig. 10 e).

Antennulae (Fig. 21 a). The peduncle consists of four joints, there being a short last peduncular joint, not mentioned or figured by PFEFFER (1887).

The flagellum (in an adult male) consists of 26 joints (the proximal ones not distinctly demarcated from one another).

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[1] PFEFFER, 1887, Pl. II, Fig. 3.

Antennae. Second to fifth peduncular joints provided with transverse rows of groups of setae on the rostral margin and the rostral part of the ventral surface. The distal part of the third joint has two such rows, the fourth and fifth joints six rows each.

Ventral surface of the central joints of the flagellum with a longitudinal row of prolonged spine- to bristle-like scales (see Fig. 1 h).

Mandibles (Figs. 21 b and c). Normal. The setae on the second and third joints of the palp taper towards the end and are furnished with two rows of triangular sub-branches; the setae have oblong, indistinct end-knobs.

Maxillae. Inner lobe of the first pair expanded distally. Outer lappets of outer lobe of second maxillae each provided with two apical setae. Distal margin of the inner lobe furnished with about ten setae.

Maxillipeds. For the composite setae on the distal margin of the basipodite, see Fig. 8 b and p. 36.

The palp has a minute fourth joint.

First pair of pereiopods. For the two composite setae on the distal margin of the carpus, near its lower distal angle see Fig. 6 c and p. 33. Above the lower distal angle, on the caudal surface of the joint, there is a group of slender non-composite setae.

For the composite setae on the lower margin of the propodus, see Fig. 5 e. In the short setae of the caudal row the setal part can be discerned in its entire length. In the setae of the rostral row the longest one of the free branches of the scale part is sometimes two-pointed.

Second pair of pereiopods. The lower margin of the propodus, in the female, is provided with sword-shaped setae lacking sub-branches. In the immature male there is the same kind of setae on the propodus, though smaller and more densely situated. In the adult male the propodus is provided with composite setae, arranged approximately in two longitudinal rows. Those setae which are situated proximally on the joint are of the structure illustrated in Figs. 7 c and d. Towards the distal end of the joint the setae gradually become slightly more slender and assume the structure illustrated in Fig. 7 e. On each of the caudal and rostral side, close to the lower margin of the propodus, there is a submarginal row of slender, non-composite setae (Fig. 7 f). The structural scales close to the lower margin of the propodus are prolonged and bristle-like in the adult male (Fig. 1 c).

Pleopods. Inner proximal angle of the basipodites of the first three pairs triangularly extended and furnished on the first pleopod with three »plumose» setae, on the second and third with two. Exopodite of the fourth pair with a somewhat oblique transverse suture[1]; endopodite sub-triangular, not bifid at the tip. The exopodite of the fifth pleopod is provided with a more oblique transverse suture than the exopodite of the fourth.

Uropods. See Fig. 21 d.

Secondary sexual differences. The adult males differ from the females in the usual way in their second pereiopods, and in the sternites of the first three abdominal segments. Further, the seventh pereiopods in adult males differ slightly from those of the females in having a stronger and more curved dactylus.

The penial filament in the adult male reaches almost to the distal margin of the pleotelson.

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[1] Pfeffer, 1887, Pl. II, Fig. 3.

The sternites of the first three abdominal segments have been described by PFEFFER[1].

In the adult male (Fig. 10 e) the usual longitudinal ridges on the middle area of the sternites are absent. The posterior margin of the middle-area of the sternites is concave on the first segment, on each of the second and third segments it has a short point in the middle, this point being longest on the third segment.

The posterio-lateral angles of the sixth pereion segment reach slightly further back in the adult male than in the adult female. The male is also more circular in outline, while the adult female has a more oval shape. Very small immature specimens are oval in outline; in the sub-adult specimens the shape of body slightly oval, almost circular.

Localities and Material.

St. 20. South Georgia, Antarctic Bay, lat. 54° 12′ S., long. 36° 50′ W. 250 m. Small stones. $^{6}/_{5}$ 1902. 4 specimens. Length of largest specimen 40 mm., female with 12 embryos. One of the specimen is in moulting stage, the moulting having already occurred on the posterior part of the body, but not anteriorly.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. +1.5°. Clay, also some stones. $^{14}/_{5}$ 1902. 5 specimens. Length of largest specimen 25 mm. (sub-adult male). One immature female specimen 12 mm. in length already had minute oostegits developed.

St. 26. South Georgia, off Grytviken, lat. 54° 22′ S., long. 36° 27′ W. 30 m. Stony bottom overgrown with algae, outside the Macrocystis formation. $^{24}/_{5}$ 1902. Immature male specimen with very short penial filaments, and the second pereiopods not transformed. Length about 19.5 mm.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 12—15 m. Sand and algae. $^{24}/_{5}$ 1902. 3 specimens (2 males and 1 female). Length of the largest specimen 43 mm. (adult male). The female specimen has a »chela» of a second pereiopod of an adult male firmly fastened to the lateral margin of the left coxal plate of the first pereion segment. The specimen has semi-developed oostegits and measures 32.5 mm. in length.

St. 30. South Georgia, Morain Bay, lat. 54° 24′ S., long. 36° 26′ W. 125 m. Bottom temp. — 0.25°. Clay with sparse stones. 8 immature specimens. Length of largest specimen 17 mm.

St. 31. South Georgia, South Bay, off the Nordenskjöldglacier, lat. 54° 24′ S., long. 36° 22′ W. 210 m. Bottom temp. + 1.5°. Blue-gray clay with a few small stones. $^{29}/_{5}$ 1902. Adult male specimen, in moulting stage (the abdomen and the posterior part of pereion from the fifth pereion segment covered with fresh chitinous tegument, the old tegument still covering the head and first four segments of pereion). Length 32.5 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 2 immature female specimens with minute oostegits. Colour uncommonly light, yellowish to whitish. Length of the largest specimen about 14.8 mm.

South Georgia, Grytviken, at the rock off the Bay. 15—25 m. Stony bottom with algae. $^{14}/_{6}$ 1902. 4 specimens, males and females. Length of largest specimen, adult male, 46 mm.

Swedish Magellanian Expedition South Georgia, Grytviken. 10 m. Stones. 4 specimens.

Material collected by E. SÖRLING. South Georgia, Cumberland Bay, Grytviken. March 1905. 2 adult males. Length of largest specimen, 44 mm.

Distribution. South Georgia (PFEFFER 1887, TATTERSALL 1921, MONOD 1931).

Serolis (*Homoserolis*) **pagenstecheri** PFEFFER var. **albida** n. var.

Pl. I, Figs. 4 and 5, Text fig. 21 e.

This variety differs from the main species in its smaller size and different colour. The adult specimens are about 23—24 mm. in length, whereas in the main species adult specimens are usually about twice as long. The colour is slightly yellowish, almost whitish. The adult male (Pl. I Fig. 4) has a slightly more oblong shape of body than the main species, in which the body of the adult male is almost circular in outline. The shape of the body in the adult female (Pl. I, Fig. 5) agrees with that of adult female specimens of the main species, thus being more oblong than in the adult male.

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[1] PFEFFER, 1887, p. 80, Pl. II, Fig. 3.

In other features the variety agrees with the main species. For the maxilliped see Fig. 21 e.

Localities and Material.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. 18 specimens, males, females, and immature. Length of the largest specimens, adult male 23 mm., ovigerous female 21.8 mm. (type specimens).

Distribution. Shag Rock Bank (Sw. Ant. Exped.).

The main species has only been found off South Georgia.

Serolis (*Homoserolis*) **bouvieri** RICHARDSON, 1906.

Text. figs. 5 i and 11 a.

Serolis bouvieri. RICHARDSON 1906, p. 7—10, Pl. 1, Fig. 1, Text figs. 12 and 13; 1913, p. 8—9.

Diagnosis. Anterio-lateral angles of the head prolonged in a lateral direction, so that the greatest width of the head occurs anteriorly. Coxal plates marked off by dorsal sutures on the second, third and fourth pereion segments. Posterio-lateral angles of the coxal plates of the second to sixth segments of the pereion all extending further back than those of the preceding ones. Posterio-lateral angles of the pleural plates of the second and third abdominal segments reach not quite as far back as to the posterio-lateral angles of the coxal plates of the sixth pereion segment. Pleotelson with five longitudinal ridges, one long in the middle, the others short; tip of pleotelson sinuate. Inner lobe of first maxilla expanded distally. Outer lappets of outer lobe of second maxilla each with two apical setae. Distal epipodite of the maxilliped marked off from the basipodite by a distinct suture; palp consisting of four joints, the fourth minute, the second approximately cordiform. Inner proximal angle of the basipodite of first to third pleopods triangularly prolonged and furnished with setae. Endopodite of fourth pleopod entire (not bifid). Uropods very small.

Supplementary Description (Immature male specimen).

Head. Front margin of the head, posteriorly from the first peduncular joints of the antennulae, with a transverse ridge behind which there is a groove. The ridge and the groove continue in a lateral direction, thus demarcating the somewhat down-turned anterio-lateral parts of the head.

Pereion. Ventral surface of the first segment with four longitudinal sutures, the lateral ones passing through the articular sockets for the first pereiopods. The two other sutures, which mark off the median part of the sternite are somewhat curved, having their concave sides directed laterally. In the middle of the median part of the sternite there is a broad transverse groove. Anteriorly from this groove the part along the middleline rises into a pronounced oval elevation with ridge-like lateral margins.

Along the middle line of all the other segments of the pereion there is, ventrally, a longitudinal groove.

The ventral surface of the second pereion segment is provided with two sharp longitudinal ridges, one on each side of the middle line. The ridges are curved, with their convex sides directed laterally; the ends of the ridges meet both anteriorly and posteriorly. Each of the rostral ends of the ridges forms a free wing-like projection, which protrudes below the posterior part of the first pereion segment.

On the third and fourth segments, the ventral surface is sculptured in the same way by two curved ridges, between which there is a lower area, which on the third segment is, approximately cordiform and on the fourth approximately elliptical.

Sculpturing comprising two longitudinal ridges occurs also on the following segments, though more indistinctly (see Fig. 11 a). The sternites of last three segments, as is characteristic of the subgenus *Homoserolis*, are strongly coalesced.

Antennulae. These differ somewhat from the description by RICHARDSON (1906), inasmuch as they extend a little further than the peduncles of the antennae; the flagellum consists of 21 joints. In RICHARDSON'S, much larger, specimen the peduncle was a little shorter, but the flagellum also consisted of 21 joints.

Antennae. The flagellum consists of 17 joints. Antennal processes small and indistinct, not much longer than typical structural scales. They are situated in a longitudinal row.

Maxillae. Inner lobe of the first maxilla strongly expanded distally; its distal margin convex. Outer lappets of outer lobe of the second maxillae each provided with two apical setae.

Maxillipeds. Distal epipodite marked off from the basipodite by a distinct suture. The palp has a minute fourth joint. The third joint of the palp is approximately cordiform; the setae on the inner margin of this joint are situated in two groups near each other.

First pair of pereiopods. Distal margin of carpal joint close to the lower distal angle provided with two composite setae and with a group of non-composite setae on the caudal side near the same angle. For the composite setae on the lower margin of propodus see Fig. 5 i.

Fourth pair of pleopods. Exopodite with a transverse suture at a distance from its proximal margin of about one-third the length of the joint.

Uropods. See RICHARDSON (1906, Fig. 13). Exopodite and endopodite minute.

Localities and Material.

St. 6. Graham Region, S. W. of Snow Hill Island, lat. 64 °36′ S., long. 57° 42′ W. 125 m. Stones and gravel. $^{20}/_{1}$ 1902. One immature male specimen, with very short penial filaments and with propodal joint of the second pereiopod not transformed.

Distribution: South Shetland Islands (RICHARDSON 1913), Graham Region (RICHARDSON 1906).

Subgenus *Heteroserolis*[1].

Serolis (*Heteroserolis*) australiensis BEDDARD, 1884.

Serolis australiensis. BEDDARD, 1884, p. 69—71, Pl. VI, Figs. 3—8; WHITELEGGE, 1901, p. 237; CHILTON, 1917, p. 396—397, Fig. 10.

Diagnosis. Anterio-lateral angles of the head only slightly produced in a lateral direction, so that the greatest width of the head is across the middle. Coxal plates marked off by dorsal sutures on the second, third and fourth pereion segment. Posterio-lateral angles of the coxal plates of the second to sixth segments of the pereion each extending successively further back than those of the preceding segment; those of the sixth segment of the pereion

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[1] For diagnosis see p. 50.

reaching further back than the posterio-lateral angles of the second and third abdominal segments. Dorsal surface of the body strongly tuberculated. Inner lobe of first maxilla not expanded distally and with distal margin narrowly rounded. Outer lappets of outer lobe of the second maxilla each with two apical setae. Distal epipodite of the maxilliped marked off from the basipodite by a distinct suture; palp consisting of three joints, its second joint with inner margin convex and outer margin concave (not cordiform). Basipodites of the first three pairs of pleopods narrow proximally, with proximal part of the inner margin slightly convex and without setae. Endopodite of the fourth pair of pleopods entire (not bifid).

Supplementary Description.

Pereion. Coxal plates separated by a suture from the tergites only on the second, third and fourth segments, but not, as was stated by BEDDARD (1884 p. 69) on the fifth and sixth segments.

Antennulae and antennae. The flagella of both pairs are broken off at the tip. The prolonged scales on the central joints of the flagellum of the antennae are spine-like and situated in a longitudinal row on the ventral side of the fourth to tenth joints.[1]

Mandibles. The masticatory edge of the mandible corpus with two strong teeth, posteriorly[2]. Each mandible is furnished with two slender weak masticatory processes.

The setae on the second and third joints of the palp have lancet-like and pointed end-knobs and are furnished with two rows of short sub-branches.

Maxillae. Inner lobe of first maxilla not expanded distally; distal margin narrowly rounded; near the tip there is a short seta.

Outer lappets of the outer lobes of the second maxillae each furnished with two apical setae.

Maxillipeds.[3] The lateral margin of the second joint of the palp is concave, its inner margin is convex and setiferous.

First pair of pereiopods. Distal margin of the carpus devoid of projecting scales; it is provided with two conical composite setae near the lower distal angle, but lacks the non-composite kind. The free distal part of the setal portion is very short in one of the setae and missing in the other.

Lower margin of the propodus with two rows of composite setae of the usual kinds. The leaf-like setae in the caudal row are oblong-oval, narrowing distally. Their distal margin and the distal half of their lateral margins are strongly lobated. The free setal part, which protrudes at the tip of the scale part, is very short, not extending so far distally as the free lobes of the scale part and only differing from these lobes in being traversed by the setal canal which ends in a pore.

The long setae in the rostral row are narrow and, as usual, trilobate distally. The free setal part is somewhat longer and much narrower than the free lappets of the scale part, its distal tip is still narrower, the distal margin narrowly rounded. The free lappets of the scale part are a little flattened and subequal in length. Their lateral margins are slightly convex, their inner margins are straight, their distal ends narrowly rounded.

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[1] BEDDARD (1884), p. 70) observes »the upper surface of the third to tenth joints has a row of short blunt tubercles».

[2] See also BEDDARD, 1884, p. 70.

[3] BEDDARD, 1884, p. 71, Pl. VI, Fig. 6.

On the caudal side there is close to the lower margin a submarginal row of distally rounded, projecting scales.

The other pereiopods. Only very few of the setae are provided with sub-branches.

Uropods. The endopodite extends almost to the tip of pleotelson; its distal end is narrowly rounded. The exopodite is shorter than the endopodite; its distal margin is straight and distinctly crenulate.

Localities and Material.

Eugenie Expedition. Port Jackson (off Sydney), the lighthouse. 12 fathoms. Female with embryos, length 16.5 mm. Colour yellowish.

Distribution. Eastern and Southern Australian coast (BEDDARD 1884, WHITELEGGE 1901, CHILTON 1917).

Serolis (*Heteroserolis*) longicaudata BEDDARD, 1884.

Serolis longicaudata. BEDDARD, 1884, p. 72—74, Pl. VII, Figs. 8—10, Pl. VIII, Figs. 1—2; WHITELEGGE, 1901, p. 238; CHILTON, 1917, p. 397, Fig. 11.

Diagnosis. Anterio-lateral angles of the head only slightly prolonged in a lateral direction so that the greatest width of the head is across the middle. Coxal plates marked off by dorsal sutures on the second, third and fourth pereion segments. Posterio-lateral angles of the epimera very slightly produced backwards. Pleotelson long and narrow. Inner lobe of first maxilla not expanded distally, with its distal end narrowly rounded. Outer lappets of outer lobe of second maxillae each with two apical setae. Distal epipodite of the maxilliped marked off from the basipodite by a distinct suture; palp consisting of three joints of which the second has its inner margin convex and outer margin concave. Basipodites of the first three pairs of pleopods with the proximal part of their inner margin slightly convex. Endopodite of fourth pleopod entire (not bifid).

Supplementary Description.

Antennulae and antennae. The flagellum of the antennula consists of eleven joints.

The flagella of the antennae were both broken off at the tip. Ventral surface of the first to the ninth joints of the antennal flagellum provided with a longitudinal row of projecting non-typical pectinate scales. They differ from typical pectinate scales in having their central and most projecting point larger than the others and of a spine-like appearance. On the first joint there are only two such transformed scales, situated distally, the proximal one being small and indistinct, the distal one provided with only two points, both of which are large and spine-like.

Mandibles. Both mandibles are similar; each mandible being furnished with two weak masticatory processes.

The modified setae on the second and third joints of the palp have no distinct end-knobs, but are broadly rounded distally.

Maxillae. Inner lobe of the first maxilla with narrowly rounded end. Outer lappets of outer lobes of the second maxillae each provided with two apical setae.

Maxillipeds. Distal epipodite marked off from the basipodite by a distinct suture. Palp consisting of three joints, the large second joint being about half as long again as it is wide; the proportion between its length and breadth is 20: 14. It is about equally wide throughout, except for an abrupt constriction at its junction with the first joint. Its lateral margin is concave, inner margin convex and furnished with a row of setae.

First pair of pereiopods. Distal margin of the carpus devoid of projecting scales. The two composite setae near the lower-distal angle are conical with a narrow setal part protruding freely at the distal end of the scale part. Non-composite setae at the lower distal angle of the carpus are missing.

The setae on the lower margin of the propodus are characteristic. They are similar to those in *S. pallida* as figured by Beddard (1884)[1]. The leaf-like setae in the caudal row are broad distally and lobated marginally. Close to the lower margin, on the caudal side, there is a submarginal row of large distally rounded scales and also a row of sparse non-composite setae.

The other pereiopods. According to Beddard (1884), all the setae are branchless. This is, however, not quite correct, as there also occur sparse branched setae of the usual type. The branchless setae are somewhat expanded and blade-like near their pointed distal ends.

Localities and Material.

Eugenie Expedition. Port Jackson (off Sydney), the lighthouse 12 fms. Female with embryos, length 10.8 mm.

Distribution: Eastern and Southern Australian coast. (Beddard 1884, Whitelegge 1901, Chilton 1917).

SECTION IV.

Sub-Order Valvifera.

Barnard (1920), in an analytical table, deduces the principal characters of the four families of this sub-order, viz *Idotheidae, Pseudidotheidae, Amesopodida* and *Arcturidae.* He does not mention the families *Chaetilidae,* proposed by Dana (1852) (embracing the single genus and species *Chaetilia ovata* Dana) or *Holognathidae,* proposed by Thomson (1904) embracing the single genus and species *Holognathia stewarti* (Filhol).

Chaetilia ovata is inadequately known. It closely approaches, however, my new subfamily *Macrochiridotheinae* (see p. 104) within the *Idotheidae.*

The genus *Holognathia* Thomson resembles very close *Cleantis* Dana, agreeing with that genus in all features, except that the mandibles are provided with a distinct, three-jointed palp. In my opinion this characteristic, though very remarkable, is not alone sufficient ground for a separation of *Holognathia* from the *Idotheidae.*

As regards the family *Amesopodidae,* it is still inadequately known and requires further investigation, especially with reference to the penis and first male pleopods. It was proposed by Stebbing (1905) and embraces the single genus and species *Amesopus richardsonae* Stebb. Stebbing (1905) states that the second pereiopod in this species displays only five joints. In his figure of the pereiopod (Stebbing 1905, Pl. XI, gn. 2) a minute

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[1] Beddard 1884, Pl. VIII, Figs. 14 and 15.

sixth terminal joint is, however, discernable; it is, exactly as in the first pereiopod (STEBBING 1905 Pl. XI gn. 1), though still smaller.

The transformed uropods in the Valvifera afford, as a rule, good indications for the characterizing of the families in regard to the presence or absence of a second ramus (see BARNARD, 1920). The *Arcturidae* are characterized by having two rami on the uropods. Within this family I found an exception in this respect in *Microarcturus digitatus* (described on p. 167—171), which agrees with the *Idotheidae* in having uropods provided with a single ramus.

CALMAN (1909) holds that the small upper ramus of the uropods is the exopodite, on the hypothesis that the present position of the uropods is due to a movement of rotation. TAIT (1918), in his detailed report on *Glyptonotus antarticus*, is of the opinion that CALMAN's assumption does not tally with the detailed structure of the articular foramen of the uropods. His interesting investigations, however, bear out the view that the sternal foramen for the uropods has actually undergone a rotation, presumably whilst moving from its more primitive position on the lateral margin to its present ventral position. Nevertheless this does not settle the problem whether the uropods have been folded below the pleotelson. Both TAIT's and CALMAN's theories are possible explanations.

I. Fam. **Idotheideae.**[1]

A. Subfam. **Idotheinae,** DANA 1849, MIERS 1881.

Genus **Idothea** FABRICIUS, 1798.

For diagnosis see G. O. SARS (1899, p. 79), RICHARDSON (1905, p. 356), COLLINGE (1917, p. 736—737).

Idothea metallica BOSC, 1802.

For synonymy and literature see MIERS (1881, p. 35—36), RICHARDSON (1905, p. 362), COLLINGE (1917, p. 746).

Locality and Material.

Eugenie Expedition. Straits of Magellan, York Bay. Surface of water. One small specimen.

Distribution. Almost universal (see RICHARDSON 1905, THIELEMANN 1914, COLLINGE 1917).

Antarctic and sub-antarctic localities: Patagonia (CUNNINGHAM 1871), Magellanian Region (Eug. Exp.), Near Cape Horn (DOLLFUS 1891), Antarctic Seas south of Australia (DANA 1852), (South Africa, TATTERSALL 1913).

Genus **Edotia** GUÉRIN—MÉNÉVILLE, 1829—1844.

Edotia. GUÉRIN-MÉNÉVILLE, 1829—1844; MIERS, 1881; OHLIN, 1901.
Desmarestia. NICOLET, 1849.
Epelys. DANA, 1852; HARGER 1878.
Edotea. RICHARDSON, 1905.

For diagnosis see RICHARDSON (1905, p. 394). RICHARDSON states in her diagnosis »epimera of all the segments of the thorax firmly and perfectly united with the

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[1] COLLINGE (1918 a) divides the Valvitera into the two groups *Idotheinia* and *Astacillinea,* but he does not give any specific characters for his groups.

segments». In some species, however, the pereion is traversed by two lateral and parallel grooves on each side; the most laterally situated of these grooves mark off the epimera. This is the case in *Edotia bilobata* (Pl. I Fig. 6, Text figs. 24 a and b) and *Edotia oculata*[1]. In *E. bilobata* the grooves demarcating the epimera are deepest and narrowest on the last three segments. These grooves are indistinct in *E. tuberculata*[2], and usually they are entirely absent: *E. lilljeborgi*[3], *acuta*[4], *triloba*[5], *montosa*[6], *magellanica*[7], and *doello-juradoi*[8]. Even the more medially situated grooves on the pereion are lacking in *E. lilljeborgi* and *acuta*.

Edotia tuberculata Guérin—Méneville, 1829—1844.

Text. figs. 22 a—d and 23 a.

For synonymy and literature see Ohlin, 1901, p. 292.
It may be added:
Edotia tuberculata. Stebbing, 1914, p. 353; Giambiagi, 1925, p. 12—13, Pl. III Fig. 1.

Diagnosis. Segments of the pereion each with a dorsal tuberculum in the middle line and with two lateral longitudinal grooves on each side, the most lateral grooves often incomplete or indistinct. Abdomen with all segments coalesced with one another, but with two anterior segments indicated, the first by a transverse groove, the second by a short lateral suture or incision. Uropods[9] slightly hollowed distally with lower part of the sympodite and its ramus not bent upwards so as to form a secondary ventral border; ramus triangular, not even half as long again as it is broad.

Supplementary Description.

Oostegits. The number of oostegits in the full-grown female is four pairs. They are all fused with each other by a thin chitinous tegument. The first three pairs are subrectangular, somewhat broader than long; the anterior margin of the small first pair (belonging to the first pereiopods) is not fused anteriorly with the sternum. The second and third pairs are large, the second being subrectangular and broader than it is long, the third subquadrate. The fourth pair is also subrectangular, narrowing backwards, but about twice as long as it is broad; its posterior margin is fastened to the sternum by a thin chitinous tegument.

Antennulae[10]. Anterior margin of the flagellum, in the male, provided with a large number of sensory filaments and with scattered setae; in the female the filaments are fewer in number and only situated distally.

Mandibles[11] (Figs. 22 a and b). Molar tubercle sometimes furnished with spines. Left mandible with a lacinia. Setal row with only one or two setae.

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[1] Ohlin, 1901, Pl. XXIV, Fig. 13.

[2] Ohlin, 1901, Pl. XXIII, Figs 10 and 10 c.

[3] Ohlin, 1901, Pl. XXIV, Fig. 12.

[4] Richardson, 1905, Fig. 439.

[5] Richardson, 1905, Fig. 441.

[6] Richardson, 1905, Fig. 443.

[7] Giambiagi, 1925, Fig. 2.

[8] Giambiagi, 1925, Pl. IV.

[9] As regards the uropods of the Valvifera, I have thought it advisable to describe them in their outbent position. That surface which is directed ventrally when the uropods are bent below the pleotelson is thus denoted as the lateral surface, and so on.

[10] See Ohlin, 1901, p. 293, Pl. XXIII, Fig. 10 a_1.

[11] See Ohlin, 1901, Pl. XXIII, Fig. 10 m.

Second pair of pleopods, male[1]. See Figs 22 c and d.

Uropods[2] (Fig. 23 a). Ramus short, triangular.

Remarks. The species may attain a length of 29—30 mm. (Miers 1881, Ohlin 1901.) The specimens obtained by the Swedish Antarctic Expedition are much smaller, but nevertheless most of them are mature individuals. There are adult specimens of a length of only 9—10 mm. (female with young 9.1 mm. in length, male with fully developed penial filaments 10 mm. in length).

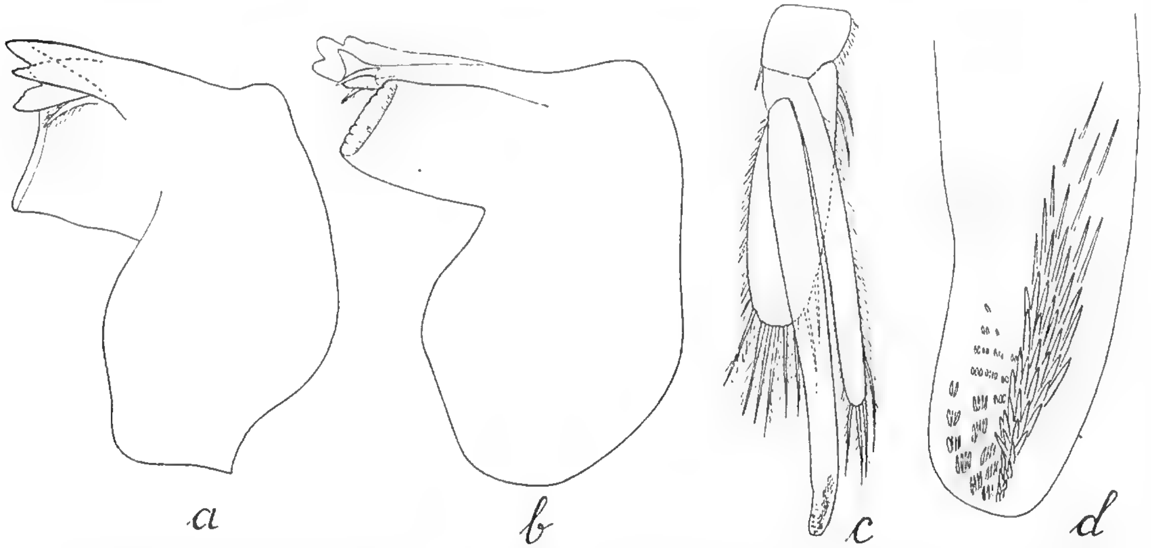

Fig. 22. *Edotia tuberculata*, Guér.-Mén. a. Left mandible, female, 80 ×. b. Right mandible, female, 80 ×. c. Left second pleopod, male 30 ×. d. Distal part of the penial filament of the same pleopod, 235 ×.

Ohlin (1901), who examined a comparatively large amount of material, points out that the individuals vary rather considerably in the configuration of the cephalon and the shape of the abdomen. In the few specimens I have examined I found a less variation in these respects than was indicated by Ohlin. The configuration of the head is illustrated by Ohlin (1901, Pl. XXIII Fig. 10 a). The eyes are placed on large tubercles, the lateral margins of the head are somewhat concave, and the dorsal side of the head has four tubercles, situated approximately in such wise as to form the corners of a square. Usually the front margin of the head is furnished with two small tuberculae. These are not illustrated in Ohlin's figures (1901), but are shown by Dollfus[3] (1891) and Giambiagi[4] (1925).

Localities and Material.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay and also some algae. $^{14}/_{5}$ 1902. 3 specimens, (2 adult females, 1 immature). Length of largest specimen about 9 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 3 specimens. Length of largest specimen 10 mm. (male). An ovigerous female had a length of 7 mm.

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[1] See Ohlin, 1901, Pl. XXIII, Fig. 10 plp$_2$.

[2] See Ohlin, 1901, Pl. XXIII, Fig. 10 u.

[3] Dollfus, 1891, Pl. VIII a, Fig. 12.

[4] Giambiagi, 1925, Pl. III, Fig. 1.

Distribution. Patagonia (OHLIN 1901), Tierra del Fuego (OHLIN 1901, GIAMBIAGI 1925), Magellan Straits (CUNNINGHAM 1871, OHLIN 1901), Southern Fuegian Archipelago (OHLIN 1901), near Cape Horn (DOLLFUS 1891), Falkland Islands (MIERS 1881, STEBBING 1914), South Georgia (Sw. Ant. Exp.)

The species has not previously been recorded from South Georgia.

Edotia magellanica CUNNINGHAM, 1871.

Text. fig. 23 b.

Edotia magellanica. CUNNINGHAM, 1871, p. 499, Pl. 59, Fig 6; MIERS, 1881, p. 74; OHLIN, 1901, p. 295—297, Pl. XXIV, Fig. 11 and Pl. XXIII, Fig. 11 a.

Edotia cf. *magellanica.* GIAMBIAGI, 1925, p. 13—14, Fig. 2.

Diagnosis. Head and pereion devoid of tuberculae. Pereion segments with a faint laterally situated longitudinal groove on each side. Abdomen with two anterior segments indistinctly marked off by grooves, the second on each side ending in a free lateral tip. Uropods markedly hollowed distally, with the lower part of the sympodite and its ramus bent upwards, so as to form a small ventral secondary border; ramus triangular about twice as long as it is broad.

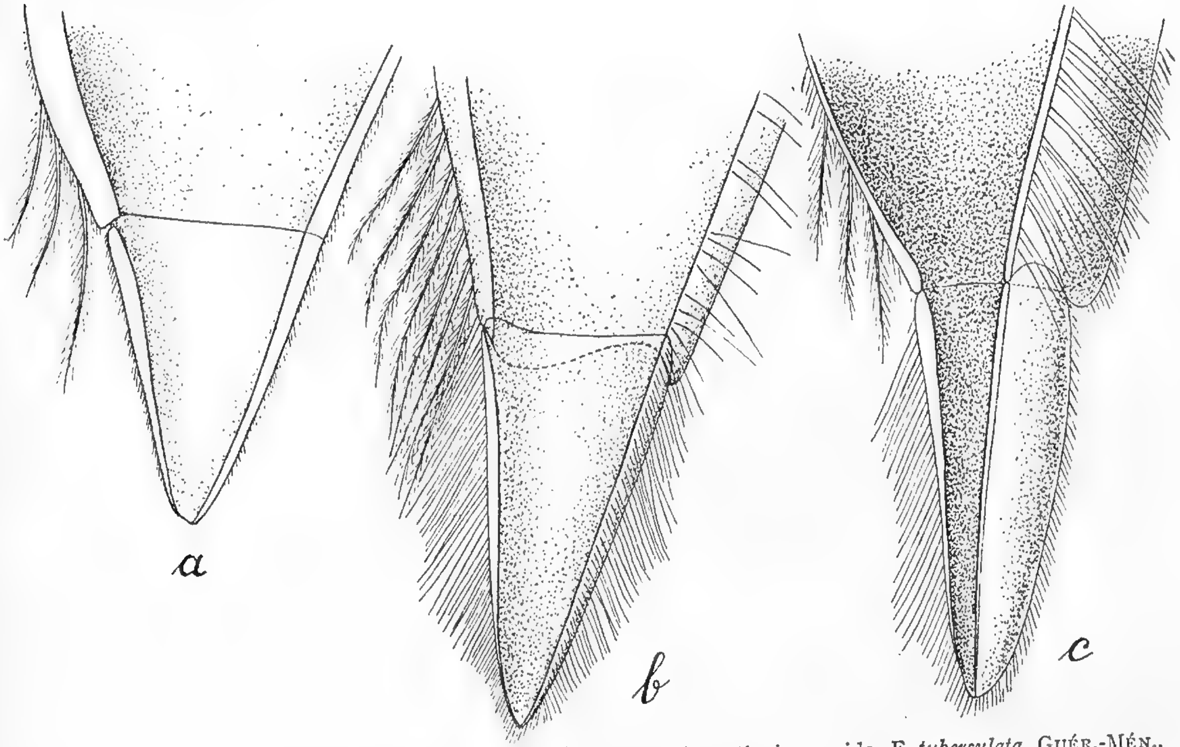

Fig. 23. Uropods in *Edotia.* a. Tip of the left uropod, seen from the inner side, *E. tuberculata,* GUÉR.-MÉN., 80 ×. b. Tip of the left uropod, seen from the inner side, *E. magellanica,* CUNN., 80 ×. c. Tip of the left uropod, seen from the inner side, *E. bilobata* n. sp., 80 ×.

Supplementary Description.

Head. The head is elevated, except at its frontal and lateral margins. The anteriolateral angles are pointed and somewhat triangularly prolonged forwards. The eyes are minute. The elevated part of the head is traversed by two curved grooves with the convexity directed anteriorly.

Pereion. Each segment laterally with a very faint longitudinal groove on each side; these grooves do not demarcate the epimera. Of sutures delimiting the coxal plates there are no vestiges.

Abdomen[1]. Two anterior segments are distinctly marked off by transverse furrows. The lateral tips of the second segment are free and pointed and separated laterally from the posterior part of the abdomen by an incision. Also a third anterior segment is slightly indicated by an incomplete transverse groove, which disappears laterally. The pleotelson is somewhat longer and moreover narrower distally than figured by OHLIN (1901, Fig. 11), its distal end being narrowly rounded. It is almost as in *E. tuberculata;* its highest part is situated anteriorly[2].

Antennae[3]. Of the peduncular joints the first is very small and only visible from below. The other peduncular joints increase in length up to the last, the relation between the length of the joints in the peduncle being 6: 7: 14: 17: 22. The flagellum consists of a long proximal joint and three very small distal ones, decreasing in length to the last, which carries a tuft of long setae.

Uropods (Fig. 23 b). Lower part of the sympodite and its ramus bent upwards, so as to form a small secondary ventral border; ramus about twice as long as it is broad.

Remarks. The description of *E. magellanica* given by MIERS (1881) makes it obvious that the specimen described above is identical with that species. It differs from the description and figures of the species by OHLIN (1901) in having a somewhat divergent shape of the abdomen. It is probable that *E. magellanica* in that respect exhibits variations in a similar way as *E. tuberculata* (see OHLIN 1901).

Localities and Material.

Eugenie Expedition. Magellan Straits, off Cape Virgines. 32 fms. Immature specimen 8.4 mm. in length. Colour yellowish to whitish.

Distribution. Patagonia (OHLIN 1901), Tierra del Fuego (GIAMBIAGI 1925), Magellan Straits (CUNNINGHAM 1871, MIERS 1881).

Edotia bilobata n. sp.

Pl. I, Fig. 6; Text. figs. 23 c, 24 a—c.

Diagnosis. Frontal margin of the head between the antennae furnished with two large rounded lobes. Head and pereion devoid of tuberculae. Segments of the pereion dorsally with distinct lateral grooves, two on either side. Abdomen with only one small anterior segment indistinctly indicated by a furrow. Uropods with distal part markedly hollowed, almost cornet-like and having, the lower part of the sympodite and its ramus bent upwards, so as to form a secondary ventral fold, being about half as wide as the ramus; the ramus is about three times as long as it is wide.

Description.

Type. Immature specimen (female?) of a length of 7.8 mm., whitish to yellowish in colour (Pl. I, Fig. 6).

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[1] MIERS, 1881, p. 74; OHLIN, 1901, Pl. XXIV, Fig. 11, Pl. XXIII, Fig. 11 A, GIAMBIAGI, 1925, Fig. 2.

[2] In the specimen examined by OHLIN (1901) the highest part of the pleotelson was situated posteriorly.

[3] See OHLIN, 1901, p. 297.

Head (Fig. 24 a). Frontal margin between the antennae with two large rounded lobes; between these there lies anteriorly a deep incision. Anterio-lateral parts of the head situated lower than the rest and formed into triangular plates, which are somewhat prolonged in an anterior direction and slightly pointed anteriorly. Eyes small, black, on lateral lobes. The part between the eye-lobes is elevated and traversed by a transverse curved furrow.

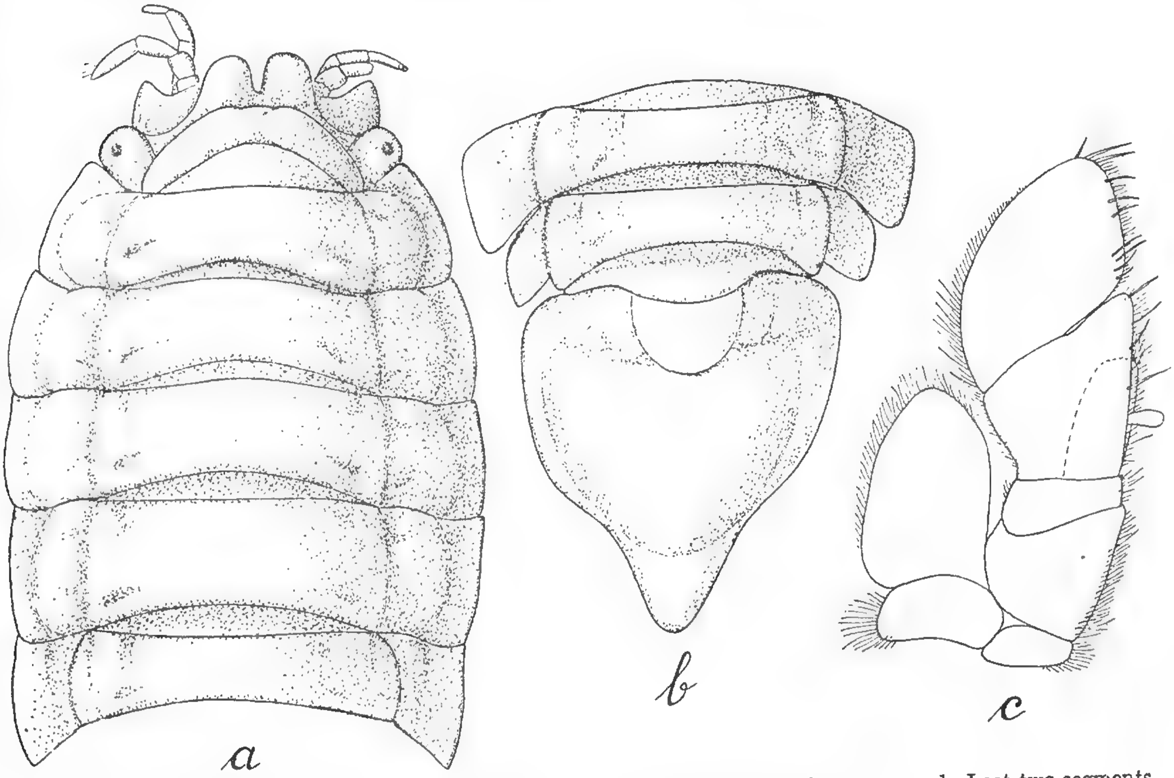

Fig. 24. *Edotia bilobata* n. sp. a. Head and first five segments of the pereion, 17 ×. b. Last two segments of the pereion and the abdomen, 17 ×. c. Right maxilliped, 55 ×.

Pereion (Figs. 24 a and b). The first four segments of the pereion subequal in length, the last three segments decreasing in length from the fifth to the seventh. The pereion traversed by two lateral longitudinal grooves on each side, the more lateral of these demarcating the epimera. The latter grooves are indistinct on the first four segments but distinct and suture-like on the last three segments. The coxal plates of the last three segments are subtriangular and directed somewhat backwards. There is a patch of more glazed pigment on each segment medially from the inner one of the two longitudinal grooves.

Abdomen. About 3 mm. in length and approximately as long as the last four segments of the pereion together. An anterior segment is indicated by a transverse groove. Posteriorly from the first segment there is a distinct semi-circular and superficially rounded elevation in the middle, laterally from which there are two lower, indistinct elevations on each side. Posteriorly from the large elevation in the middle there is a groove, which does not extend to the lateral margins of pleotelson. Remainder part of pleotelson is also elevated, except laterally and at the tip.

Antennulae. Peduncle consisting of three joints slightly increasing in length from the first to the last. The single-jointed flagellum is about as long as the last peduncular joint.

Antennae. Slightly longer than the antennulae and consisting of a five-jointed peduncle and a three-jointed flagellum. The first two joints of the peduncle are very small and subequal in length, the first visible only from below. The third joint is almost as long as the first and second together, the fourth almost as long as the second and the third together, the fifth is a little longer and narrower than the fourth. Flagellum about as long as the last peduncular joint, consisting of one large proximal joint and two very minute distal ones.

First and second pairs of maxillae. Inner lobe of the first maxillae provided with two ciliated setae. Outer lappet of outer lobe of the second maxilla with five, inner lappet of the same lobe with six, apical setae; inner lobe with about seven setae; two of them situated at the inner distal angle are stouter and furnished with long irregularly situated hairlike sub-branches, whilst the other setae are of the usual kind, being furnished with two rows of short sub-branches.

Maxillipeds. See Fig. 24 c.

Uropods (Fig. 23 c). Lower part of the sympodite and its ramus bent upwards, so as to form a secondary ventral fold, which is about half as wide as the ramus. The ramus is about three times as long as it is broad; its distal end is narrowly rounded.

Remarks. Edotia bilobata differs from other species of the genus in having the coxal plates of the last three pereion segments demarcated by very distinct suture-like grooves. These grooves or sutures are not in a line with those grooves which mark off the coxal plates of the anterior segments[1]; they commence at the anterior margin of the fifth segment medially from the lateral furrow on the fourth segment. The development of the coxal plates of the last three segments thus differs from that of the preceding ones. In this feature *E. bilobata* agrees with the genus *Macrochiridothea* (see p. 106—108).

Localities and Material.

St. 3. Falkland Islands New Year Island, lat. 54° 43′ S., long. 64° 8′ W. 36 m. Shingle and gravel. $^6/_1$ 1902. Immature specimen 7.8 mm. in length.

Distribution. Falkland Islands (Swed. Ant. Exped.).

Genus **Cleantis** DANA, 1849.

Cleantis. DANA 1852; OHLIN 1901; TATTERSALL 1921 a, partim.

Diagnosis. Body linear. Coxal plates distinctly marked off on all pereion segments except the first, but only those of the last three segments are large and distinctly visible in a dorsal view. Abdomen composed of more than one segment. The antennal flagellum consists of a large proximal joint, there being sometimes in addition other more or less vestigial distal joints. Mandibles devoid of palp. Palp of maxilliped five-jointed. Fourth pair of pereiopods the smallest; first pair prehensile. Uropods with two branches,

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[1] The grooves which mark off the coxal plates of the last three pereion segments in *Edotia tuberculata* are likewise not in a line with those on the anterior segments; on the fifth and the anterior half of the sixth segment they are actually suture-like, though faint.

the small »secondary» ramus being furnished with dense plumose setae; lateral ramus provided with a long plumose seta at its upper proximal angle.

The above limited definition of the genus *Cleantis*, which is based on examination of the genotype *Cleantis linearis* DANA and of the allied species *Cleantis granulosa* HELLER, permits only these two species to be referred to the genus with certainty. The species previously assigned to *Cleantis*, except *strasseni* THIELEMANN (1910) and *annandalei* TATTERSALL (1921 a), are unknown as regards the structure of the uropods. The two latter species, however, differ from *Cleantis* in being devoid of the »secondary» ramus of the uropods. They should presumably be referred to *Zenobiana* STEBBING (1895), but to decide this requires an examination of the uropods in the genotype of *Zenobiana*.

TATTERSALL (1921 a) points out that the species assigned to *Cleantis* or *Zenobiana* should probably be divided into two genera, in view of the different number of joints in the palp of the maxilliped.

The genus *Holognathus* THOMSON (1904), referred by THOMSON to a separate family of the *Valvifera*, agrees with *Cleantis* as diagnosed above, with the exception that the mandibles are furnished with a three-jointed palp.

Cleantis linearis DANA, 1849.

Cleantis linearis. DANA, 1849, p. 427; 1852, p. 708—709, Pl. 46, Figs. 9 a—9 l; MIERS, 1881, p. 81—82.

Specific Characters. Abdomen with four free segments anteriorly from the pleotelson. Distal margin of the pleotelson truncate. Antella flagellum consisting of two joints; ventral surface of the last peduncular joint as well as that of the first joint of the flagellum covered with a dense nap of fine hairs.

Supplementary Description.

Head. Broader than long. Its anterior margin is slightly sinuate in the middle. Its dorsal surface is traversed by a faint transverse groove anteriorly from the eyes. At the posterior margin of the head there is a small oval area marked off anteriorly by a curved groove with its convexity directed forwards.

Pereion. Segments subequal in width. Second to fourth segments with small coxal plates, not visible from above. Last three segments with large triangular and pointed coxal plates, visible in a dorsal view.

Abdomen. Furnished with fine hairs anteriorly on its lateral sides. Four segments are marked off anteriorly from the pleotelson. Of these the first and the fourth segments are the largest and subequal in length. The first segment is about twice as long in the middle as the second; the second is about twice as long in the middle as the very short third segment. The fourth segment is firmly fused with the pleotelson; the suture between the fourth segment and the pleotelson being indistinctly developed in the middle.

The pleotelson has its distal margin truncate.

Antennulae. The small antennulae extend to the distal margin of the third peduncular joint of the antennae. They consist of a three-jointed peduncle and a single-jointed flagellum, the latter being furnished at the tip with a tuft of sensory filaments.

Antennae. The antennae have a five-jointed peduncle; the small first joint is visible only from below. The last two peduncular joints are together slightly longer than the rest of the peduncle. The flagellum is distinctly two-jointed, but the second joint is minute. The lower margins of the last peduncular joint and the first joint of the flagellum are furnished with a dense nap of fine hairs.

First and second pairs of maxillae. Inner lobe of first maxilla provided with three apical setae. Outer lappet of the outer lobe of the second maxilla with seven, inner lappet of the same lobe with six, apical setae.

Maxilliped. Palp five-jointed, the last joint minute; distal epipodite slightly tapering towards the end, its distal margin rounded.

Pereiopods. The fourth is the smallest, the first is prehensile. Dactyli with two claws, the ventral one minute.

Uropods. Lateral ramus provided with a long plumose seta at its upper proximal angle. »Secondary» ramus oblong-oval, furnished with plumose setae on its dorsal and its distal margin.

Locality and Material.

Eugenie Expedition. Valparaiso. Sandy bottom on roots of seaweed. 4 immature specimens of a brownish colour. Length of the largest specimen 12.5 mm.

Distribution. Coast of Central Chile (Eug. Exp.), Northern Patagonia, (DANA 1852).

Previously not recorded from Chile.

Cleantis granulosa HELLER, 1865.

Cleantis granulosa. HELLER, 1865, p. 132—133, Taf. XII, Fig. 2; MIERS, 1881, p. 82—83; OHLIN, 1901, p. 304—306, Pl. XXV, Figs. 15.

Specific Characters. Abdomen with three complete segments anteriorly from the pleotelson and a fourth indicated by lateral sutures. Pleotelson very faintly granulate; its distal margin very faintly concave in the middle. Antennae with a slingle-jointed, ventrally densely setiferous flagellum; ventral surface of the last peduncular joint of the antenna smooth.

Supplementary Description.

Head. Broader than long. Front margin in the middle slightly sinuate. The head has a transverse groove in front of the eyes and a curved groove at the posterior margin as in *Cleantis linearis*, but these grooves are fainter than in the latter species.

Pereion. Segments subequal in width.

Coxal plates on the second to fourth segments, small, subrectangular; on the last three segments triangular, pointed and visible from above.

Abdomen. Lateral sides, except the caudal third, densely setiferous. The segments are marked off anteriorly from the pleotelson by transverse sutures, but in one of the specimens the suture between the third and fourth segment is indistinct in the middle. A fourth segment is indicated by lateral sutures, which in one of the specimens are continued in the middle by a faint groove, thus, as in *Cl. linearis*, marking off a large segment. The first segment is about as long in the middle as the second and third segments together, the second and third are subequal in length. Pleotelson with distal margin very slightly concave in the middle, its posterior part slightly granulate.

Antennulae. Extending to the distal margin of the third peduncular joint of the antennae.

Antennae. As described by HELLER (1865); the second and third peduncular joints are broader than in *Cleantis linearis.* The ventral surface of the last peduncular joint is smooth. Flagellum consisting of a single joint, which is densely provided with »hairs» ventrally.

First and second pairs of maxillae. Inner lobe of the first maxilla provided with three apical setae. Outer lappet of the outer lobe of the second maxilla with five, inner lappet of the same lobe with seven apical setae.

Maxillipeds. Palp five-jointed, with the last joint minute. Epipodite tapering towards the end; distal margin a little more broadly rounded than in *Cleantis linearis.*

Pereiopods. As in *Cleantis linearis.* The fourth pair is the smallest.

Uropods. Exactly as in *Cleantis linearis.* Lateral ramus provided with a long plumose seta at its upper proximal angle. »Secondary» ramus subrectangular furnished with plumose setae on its dorsal and distal margins.

Locality and Material.

Eugenie expedition. South of La Plata, lat. 36° 50′ S., long. 55° 54′ w. Gravel and stones. $^{13}/_{1}$ 1852. 2 females of about equal length, one of them with embryos, the other with the marsupial plates semi-developed. Colour of the specimens white to yellowish. Length of the largest specimen about 15.2 mm.

Distribution. Argentina (Eug. Exp.), Tierra del Fuego (OHLIN 1901), St. Paul (HELLER 1865).

Not previously recorded from Argentina.

B. Subfamily **Glyptonotinae** MIERS.

Diagnosis[1]. Head posteriorly immersed in the first pereion segment, its lateral margins sinuate or straight. Eyes small, situated dorsally but submarginally at the lateral margins, sometimes with a minute ventral portion. Coxal plates marked off by dorsal sutures on the last three pereion segments. Abdomen anteriorly with three or four free segments. First three pairs of pereiopods prehensile, the others ambulatory.

In proposing the subfamily *Mesidoteinae,* RACOVITZA and SEVASTOS (1910) refer to this subfamily the genera *Proidotea* RAC. et SEV., *Mesidotea* RICH. and *Chiridotea* HARGER, thus leaving only the genus *Glyptonotus* EIGHTS and probably *Symnius* RICH[2]. in the subfamily *Glyptonotinae* of MIERS (1881). In its general shape of body and in its maxillipeds *Glyptonotus* agrees with *Mesidotea;* it differs from the *Mesidoteinae* only in the important characteristic of the number of dorsally delimited coxal plates.

The uropods are in *Glyptonotus* characterized by having branches of about equal length. This, however, is also the case in *Proidotea*[3]; in *Chiroditea,* on the other hand, the »secondary» branch is about half as long as the lateral one, and in *Mesidotea* it is still shorter. In *Symnius* RICHARDSON the uropods appear to be devoid of branches; possibly there is a single branch.

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[1] Cf. MIERS, 1881, p. 9.

[2] *Symnius* RICHARDSON (1904) may probably also be referred to the *Glyptonotinae;* it differs from the *Glyptonotinae* in having only the first pair of pereiopods markedly prehensile; the second pair is faintly prehensile; the third pair remains undescribed.

[3] See RACOVITZA and SEVASTOS, 1910, p. 189, Pl. XVIII.

Glyptonotus Eights, 1833.

Miers 1881 partim, Collinge 1918, nec G. O. Sars 1885.

Diagnosis[1]. Lateral margins of the head sinuate. Abdomen with four free segments anteriorly from the pleotelson. Antennulae small, with a single-jointed flagellum. Antennae with flagellum many-jointed. Palp of maxilliped five-jointed. Uropods with two subequally long branches, each approximately one-fourth the length of the sympodite.

Glyptonotus antarcticus Eights, 1833.

Glyptonotus antarcticus. Eights, 1833, p. 331, 2 Pls.; Collinge, 1918, p. 65—72, Pl. I and II, Figs 1—12; Tattersall, 1921, p. 232—233, Pl. I, Figs 5 and 6; Monod, 1931, p. 27.

For further literature see Collinge 1918, p. 65 and Tattersall 1921, p. 232.

The eyes are small and situated dorsally, but, as has been pointed out by Pfeffer (1887), they have also a ventral portion. In immature specimens taken out of the marsupium this ventral portion of the eye is unpigmented and indistinct.

Localities and Material.

Material collected by E. Sörling. South Georgia, Cumberland Bay. Found dead a long way up the shore. 3 jan. 1905. Female with young, 64.5 mm. in length.

Distribution. South Georgia (Pfeffer 1887, Tattersall 1921, Monod 1931), South Shetland Islands (Eights 1833), Graham Region (Collinge 1918).

Glyptonotus antarcticus Eights var. acutus Richardson, 1906.

Glyptonotus acutus. Richardson, 1906, p. 10—13, Pl. 1, Figs 2—4.

Glyptonotus antarcticus var. *acutus.* Tattersall, 1921, p. 233—235, Pl. IX, Figs. 3—4; Pesta 1928, p. 78 and 81.

For further literature see Tattersall, 1921, p. 233.

The small ventral portion of the eye is very indistinct in some of the specimens.

Localities and Material.

Eastern shore of Seymour Island (off Graham Land). Found alive on the ebb-shore. 10—13 febr. 1903. 18 specimens, males and females. Length of the largest specimen 112.5 mm. — Cape Seymour. 16 jan. 1902. Thrown up on the shore. 2 specimens, male and female. Length of largest specimen 98.5 mm. (male).

St. 4. Graham Region, off Paulet Island, lat. 63° 36′ S., long. 55° 48′ W. 100—150 m. Gravel with small stones. $^{15}/_{1}$ 1902. 2 immature specimens. Length of the largest specimen 35 mm.

Distribution. South Georgia (Pesta 1928), Graham Region (Richardson 1906, 1913), Victoria Land (Hodgson 1910, Tattersall 1921) Gauss Station (Vanhöffen 1914).

Macrochiridotheinae n. subfam.

Diagnosis. Head laterally expanded, its posterior part immersed in the first pereion segment. Body arched with lateral margins bent downwards. Eyes dorsal and small or wanting. Antennulae situated dorsally from the antennae and longer than the antennae; they are furnished with a single-jointed flagellum provided with minute incisions on its

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[1] Cf. Miers 1881, p. 9—10 and Collinge 1918, p. 64.

anterior margin or with a two-jointed flagellum, there being, in addition, a minute distal joint. Coxal plates marked off by dorsal sutures on the last three segments of pereion, those on the second to fourth segments distinctly delimited from the tergites, but not visible from above. Abdomen with three free segments anteriorly from the pleotelson. Maxillipeds with a three-jointed palp. First pair of pereiopods markedly subchelate (seroliform). Second and third pair of pereiopods weaker than the first pair, being either prehensile, with the dactylus more or less reduced, or non-prehensile with the dactylus absent.

The morphology of the coxal plates in the *Macrochiridotheinae* differs considerably from that of the other subfamilies of the *Idotheidae.* That development of the coxal plates which is characteristic of the subfamily is found in the two genera *Macrochiridothea* OHLIN (1901) and *Chiriscus* RICHARDSON (1911); these genera agree also in other respects in the characteristics given in the diagnosis. In *Macrochiridothea* the head is furnished with lateral incisions, which are wanting in *Chiriscus,* whilst the second and third pereiopods are prehensile, though weaker than the first pair. In *Chiriscus* they are not prehensile and lack the dactylus. A peculiar feature of *Macrochiridothea* is that the first pereion segment also has a small laterally and ventrally developed coxal plate, and that the uropods have a sympodite 2—2$^1/_2$ times as long as the lateral ramus, which is about twice as long as the small »secondary» one. RICHARDSON (1911) did not find any coxal plate on the first pereion segment in *Chiriscus;* the uropods in *Chiriscus* have not been described.

Chaetilia ovata, DANA (1852) should presumably be referred to the new subfamily. It was referred by DANA to a separate family, the *Chaetilidae.* The morphology of the coxal plates in *Chaetilia* is, however, imperfectly known. It agrees with the *Macrochiridotheinae* in having the antennulae situated above the antennae. The uropods of *Chaetilia* are subequal with those of *Macrochiridothea,* but they differ in having a sympodite almost three times as long as the lateral ramus; the »secondary» ramus, on the other hand, is slightly longer than in *Macrochiridothea.* According to DANA[1] the first three pairs of pereiopods in *Chaetilia* are prehensile, and also the fourth is slightly prehensile[2]. The head is only very slightly expanded laterally. If the morphology of the coxae in *Chaetilia* agrees with that of *Macrochiridothea* and *Chiriscus,* the name of the subfamily must be altered to *Chaetilidae* DANA.

Genus **Macrochiridothea** OHLIN, 1901

Diagnosis.[3] Head laterally expanded; each lateral margin with a small incision. First pereion segment with distinctly defined, laterally and ventrally developed coxal plates. Abdomen provided with three free segments anteriorly from the pleotelson, whilst a fourth segment is indicated by a groove. Inner lobe of first maxilla with two apical setae. Second and third pairs of pereiopods prehensile, but with a small and faint dactylus. Uropods with sympodite 2—2$^1/_2$ times as long as the lateral ramus, which is about twice as long as the »secondary» ramus.

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[1] DANA, 1852, Pl. 46, Fig. 11 c.
[2] DANA, 1852, Pl. 46, Fig. 11 d.
[3] Cf. OHLIN, 1901, p. 286.

Morphology of the coxae in Macrochiridothea.

RACOVITZA and SEVASTOS (1910) emphasize the importance of the morphology of the coxae in the Idotheidean genera for the systematization, and accordingly base their new subfamily *Mesidoteinae* on characteristics derived from the morphology of the coxal plates. They write (p. 197): »La fusion progressive des épimères avec leur somites respectifs est une transformation orthogénétique qui se manifeste dans tous les groupes d'Isopodes. C'est donc une adaption parallèle dont il faut se méfier. Cependant ce caractère est utilisable pour différencier les *Chiridoteini* à sutures épiméro-tergales visibles sur les péréionites II à VII, des *Glyptonotus* qui n'ont de sutures visibles que sur les péréionites V à VII. Chez *Macrochiridothea* il semble, d'après des mauvaises figures de OHLIN (1907), que chez l'une des espèces les sutures présentent les mêmes caractères que chez *Glyptonotus*, et que chez la seconde espèce elles ont complètement disparu.»

Macrochiridothaea and *Chiriscus* have must been referred to a separate subfamily chiefly because of the peculiar development of their coxae, which agrees neither with that of the *Glyptonotinae* nor with that of the *Mesidoteinae*. I have studied the morphology of the coxae in two species of *Macrochiridothea*, viz. *michaelseni* OHLIN[1] and *stebbingi* OHLIN. In the case of *stebbingi* the new variety *multituberculata* was examined. As regards the morphology of the coxae, both the examined species agree with one another in their main features.

In *Macrochiridothea michaelseni*[2] (Fig. 25 a and b) the coxal plates on the last three segments of the pereion are distinctly delimited dorsally, whilst ventrally, as usual, no suture-lines are visible at all. The coxal plate on the last segment is small, developed only dorsally and rounded posteriorly. It is retroverted and covers the anterior half of the first abdominal segment.

Viewed from above (Fig. 25 a), the coxal plate of the sixth segment is large and subtriangular. Its dorsal suture is curved and has the concave side laterally directed. The posterior angle of the coxal plate is produced into a sharp point, and extends somewhat further back than the posterior angle of the seventh coxal plate. Viewed from the lateral side (Fig. 25 b), it appears that the coxal plate also has a ventrally directed lateral part, forming a right angle with the dorsal surface of the coxal plate. Viewed from above (Fig. 25 a), the lateral margin is very slightly elevated into a ridge; viewed from the lateral side (Fig. 25 b), this ridge forms a very distinct longitudinal carina. The flat ventral side of the coxal plate passes over into the sternite without any suture.

The coxal plate on the fifth segment is developed, as on the sixth, but its posterior angle is more obtuse and its dorsal surface is more vaulted; the ventrally directed lateral side of the coxal plate thus forms a more obtuse angle with the dorsal surface; also the longitudinal carina is consequently weaker.

The pereiopods on the fifth to seventh segments are fixed in sockets on the ventral surface of the coxal plates; the basipodite of the pereiopods has its proximal margin emarginate, and the emargination is provided with a spur originating in the posterior margin of the sockets (see Fig. 25 c).

The coxal plates on the second to fourth segments differ from those on the last three segments. As the lateral parts of the segments are markedly vaulted and the

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[1] The specimens of *M. michaelseni* were kindly sent to me from the Museum at Hamburg.

[2] Cf. OHLIN (1901, Pl XXI, Fig. 8).

lateral margins of the segments are directed ventrally, the coxal plates are not visible in a dorsal view. They are distinctly delimited from the tergites; posteriorly they have a vertically directed projection, and their height decreases continuously from their posterior to their anterior ends. Their ventral surfaces are not delimited from the sternites.

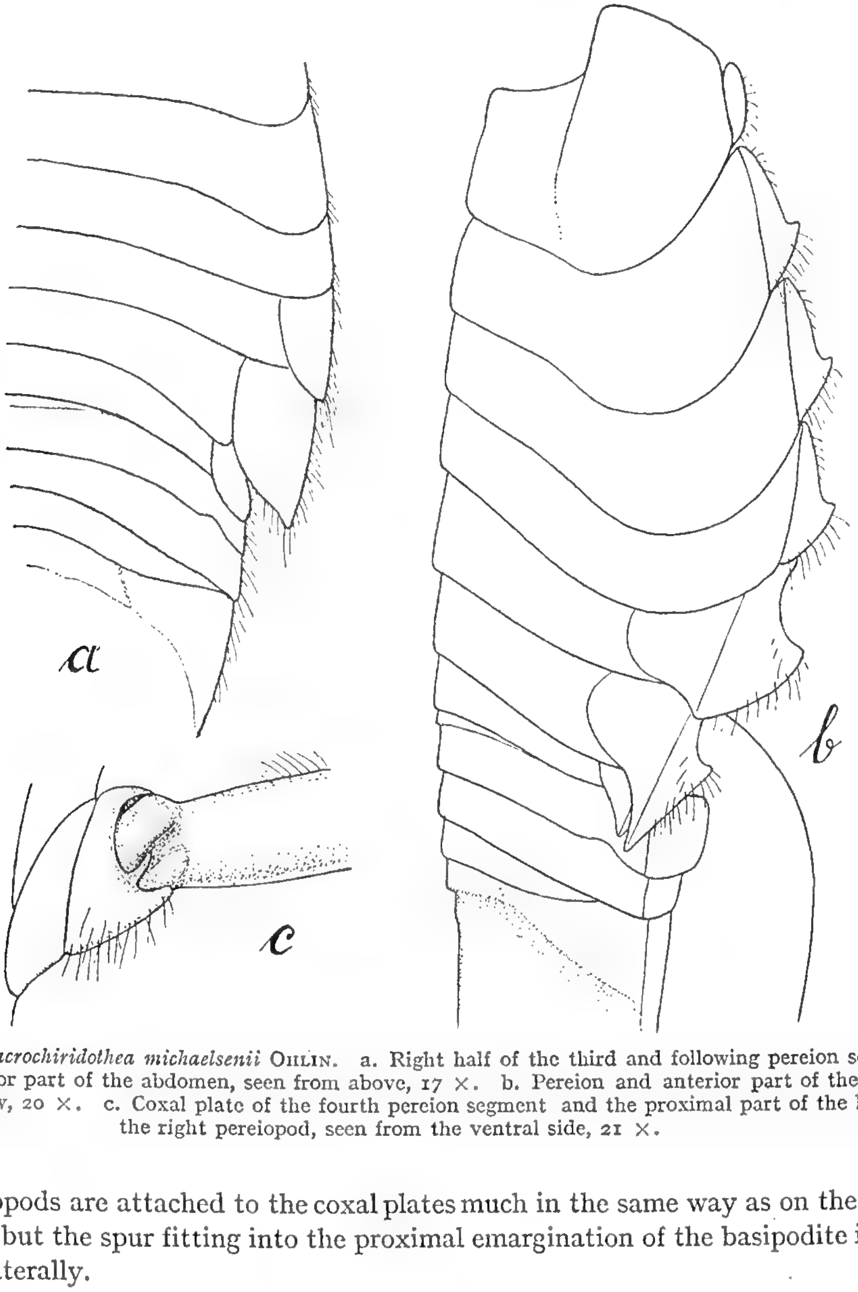

Fig. 25. *Macrochiridothea michaelsenii* OHLIN. a. Right half of the third and following pereion segments and of the anterior part of the abdomen, seen from above, 17 ×. b. Pereion and anterior part of the abdomen in a lateral view, 20 ×. c. Coxal plate of the fourth pereion segment and the proximal part of the basipodite of the right pereiopod, seen from the ventral side, 21 ×.

The pereiopods are attached to the coxal plates much in the same way as on the last three segments, but the spur fitting into the proximal emargination of the basipodite is situated posterio-laterally.

Also on the first segment there is a coxal plate, which is distinctly delimited from the tergite. It is small and sub-rectangular and developed only at the posterior part of the segment. The first pereiopod is attached by the posterior projection of the basipodite to the coxal plate, by its anterior projection to the tergite itself; the small spur fitting into the emargination between the two proximal projections of the basipodite likewise originates from the tergum. Thus the coxal plate on the first segment can be homologous only with the posterior parts of the coxal plates on the other segments, the anterior part of the original coxa having coalesced with the tergum.

It should be noted that the lateral parts of the second and third abdominal segments (not of the third), as also the lateral parts of the pleotelson, are bent downwards in the same way, like the coxal plates of the fifth and sixth pereion segments. Thus, in a lateral view, a sharp ridge is noticeable on the second and third abdominal segments, as well as on the pleotelson.

Macrochiridothea stebbingi var. *multituberculata* has the last three coxal plates distinctly marked off from the tergum by dorsal sutures.[1] They are similar in shape to those in *M. michaelseni*, the lateral and dorsal surfaces of the fifth and sixth pairs thus forming a sharp angle with each other. They differ from the corresponding coxal plates in *M. michaelseni* in having their posterior angles, viewed dorsally, more pointed and posteriorly somewhat upwardly directed, thus presenting the appearance of spiniform projections. The posterior angles of the coxal plates of the sixth segment extend further back than in *M. michaelseni*[2].

The coxal plates on segments 2—4 have the same shape and position as in *M. michaelseni;* this is also the case with the small coxal plate on the first segment. The pereiopods are likewise fastened in the same way as in that species.

In *M. stebbingi*, var. *multituberculata*, the pereion segments 1—4 differ in shape from the corresponding segments of *M. michaelseni;* their posterio-lateral angles are pointed and upwardly directed, so that they present the appearance of spiniform projections. We thus get a lateral row of spiniform projections on the pereion, but, whereas on the first four segments the spines are situated on the actual segments, on the last three segments the spiniform projections emanate from the coxal plates.

The lateral row of spines is continued also on the first and second abdominal segments. The lateral parts of these segments are bent downwards, and the angle between the dorsal surface and the lateral surface is posteriorly elongated into a retroverted spine-like projection. The pleotelson has on either side two longitudinal submarginal ridges.

Affinities of the subfamily Macrochiridotheinae, with special reference to the genus Macrochiridothea.

The characters of the subfamily *Macrochiridotheinae* indicate that it should be assigned a place intermediate between the *Glyptonotinae* and the *Mesidoteinae*. It agrees with the *Glyptonotinae* in having coxal plates marked off dorsally only on the last three segments of the pereion. On the other hand, the subfamily agrees with the *Mesidoteinae* in having coxal plates developed also on the second to fourth segments, though in contradistinction from the *Mesidoteinae,* the coxal plates of these segments are not visible from above. The genus *Macrochiridothea* agrees with the *Mesidoteinae* in having the lateral margins of the head expanded and cleft.

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[1] In the case of *M. stebbingi* these sutures have not been figured by OHLIN (1901). Cf. OHLIN's Pl. XXII, Fig. 9 a.

[2] See OHLIN, 1901, Pl. XXII, Fig. 9.

Features exclusively peculiar to the subfamily are that the coxal plates on segments 2—4 are situated laterally and ventrally; that the sutures which separate them from the tergites are not continuous with those on the last three segments; that the first pereiopods are strongly subchelate and much stronger than the two succeeding, likewise prehensile, pereiopods; and that the dactyli of second and third pereiopods are either more or less vestigial or missing. An important characteristic, which has only been found in *Macrochiridothea,* is that the first pereion segment is provided with a distinct coxal plate, situated laterally and ventrally.

OHLIN (1901) assumed the existence of a close relationship between *Macrochiridothea* and *Chiridotea* in view of the fact that the first three pairs of pereiopods are subchelate and the maxillipeds have a three-jointed palp. RACOVITZA and SEVASTOS (1910), being unable to determine with certainty the morphology of the coxal plates in *Macrochiridothea* from OHLIN's imperfect investigations, contended that *Macrochiridothea* should be assigned to the subfamily *Glyptonotinae.* »*Les Mesidoteini* littoraux septentrionaux sont d'une autre lignée que *Glyptonotus* littoral austral avec lequel ils ont été réunis à tort.»

»C'est également à tort que OHLIN (1907) rapproche son genre subantarctique littoral *Macrochiridothea* de *Chiridotea* littoral subarctique» (RACOVITZA and SEVASTOS, 1910, p. 196).

The morphological type of coxal plates, which is characteristic of the subfamily *Macrochiridotheinae* is not found in the other subfamilies of the *Idotheidae,* but it shows a close affinity to the one characteristic of the family *Arcturidae.* In the Arcturidean genera the coxal plates on segments 2—4 are small and not visible from above; and the sutures which separate them from the tergites are laterally situated, whilst those on the last three segments are large and firmly incorporated with the lateral parts of the tergites. In the spiny species of the genus *Antarcturus,* just as in *Macrochiridothea stebbingi,* the lateral rows of spines on the pereion are situated on the coxal plates of the last three segments, whilst those on the second to fourth segments are mounted on the tergum. In *Antarcturus* the lateral margin of the first pereion segment is always provided with an incision, a feature which may be interpreted as an indication of the coalescence of the coxal plate with the tergite. We thus apparently find a slight trace of at least the posterior part of the coxal plate of the first segment (see Fig. 32 a). In *Antarcturus* the coxal plates on the second to fourth segments are usually provided with an incision, a feature which is common in Isopods and is especially marked in many Parasellids (e. g. *Ianira*).

As pointed out above, the morphology of the coxae in *Macrochiridothea* most closely resembles that which is characteristic of the fam. *Arcturidae.* In both the *Macrochiridotheinae* and the *Arcturidae* the coxae on the second to fourth segments to a great extent form incomplete rings around the proximal ends of the basipodites of the pereiopods. They have thus reached only a comparatively primitive stage of development.[1]

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[1] Another explanation of the ventral position of the coxal plates in *Machrochiridothea* is that the pereion is vaulted; the ventral position may thus result from this shape of the pereion. The laterally and ventrally situated coxal plates in *Macrochiridothea* may then be presumed to have arisen from forms with dorsally situated coxal plates, as in *Mesidotea;* that is to say, the vaulting of the pereion, it may be supposed, has given a ventral position to the coxal plates of the second to fourth segments, whilst only the lateral parts of the last three coxal plates have been directed ventrally.

The vestige of a coxal plate found on the first pereion segment in *Macrochiridothea* must likewise be regarded as a primitive feature.

OHLIN's assumption of a close affinity between *Macrochiridothea* and *Mesidotea* is negatived by the fact that the dorsal sutures of the coxal plates of the last three pereion segments are not in a line with the sutures of the coxal plates of the preceding segments, and that in *Macrochiridothea,* in contradistinction from *Mesidotea,* the posterior part of the coxae remains on the first pereion segment.

The view held by RACOVITZA and SEVASTOS (1910) that *Macrochiridothea* is more closely related to GLYPTONOTUS than to *Mesidotea* is supported by the comparatively primitive development of the coxae on segments 2—4. The coxae on these segments are very small in *Glyptonotus,* though distinctly delimited from the segments. In contradistinction from *Macrochiridothea,* the epimera of segments 2—4 in *Glyptonotus* are mainly formed by the lateral sides of the segments themselves. This feature shows that the transformation of the original coxae of the second to fourth segments in *Macrochiridothea* has preceded along another line of development than in the *Glyptonotinae.* The remnant of a coxal plate on the first segment shows still more clearly that the coxae on this segment have been differently transformed in *Macrochiridothea* and *Glyptonotus.*

Macrochiridothea stebbingi OHLIN var. **multituberculata** n. var.

Pl. I Fig. 7, Text figs. 26 a and b.

Description.

Head. Its general shape agrees with that of the main species, but the head is much shorter, being two and a half to three times as broad as it is long. Posterior part of the head not so deeply immersed intothe first segment of the pereion as is the case in the main species. The dorsal surface of the head is tuberculated, there being about 14 small tuberculae, of which four in the middle are situated in such wise as to form the corners of a square.

Pereion. Lateral margins of the first four segments, as well as those of the coxal plates of the last three segments, provided with short, sparse setae.

The general shape of the pereion agrees with that of the main species. Thus the posterio-lateral angles of the segments are prolonged into hook-like points directed backwards and upwards, which increase in length from the first to the sixth segment; those on the seventh segment being small, with a slightly upward direction and covering the anterior half of the first abdominal segment. The points of the last three segments are situated on the coxal plates. For the coxal plates see p. 108.

The first segment is, measured along the middle line, about as long as the head; it slightly increases in length laterally, so as to be about one-third longer laterally than in the middle. In the main species the segment is about three times longer laterally than in the middle.[1] Second pereion segment about two-thirds as long as the first. The other segments of the pereion are slightly shorter and subequal in length.

The pereion is furnished with a greater number of tuberculae than in the main species, but the larger tuberculae are situated as described by OHLIN in *M. stebbingi.* The first to fourth pereion segments are traversed by nine longitudinal rows of tuberculae, there

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[1] See OHLIN, 1901, Pl. XXII, Fig. 9 a.

being nine tuberculae on each of the second to fourth segments; also the large first segment is furnished posteriorly with a transverse row of nine tuberculae. Each segment is furnished in the middle at the posterior margin with a tuberculum, increasing in size up to the seventh segment, where this tuberculum forms a tip directed backwards. On all the segments except the small seventh we find, on either side of the tuberculum in the middle, one dorso-lateral and one lateral tuberculum; on the seventh segment the lateral ones are developed, but the dorso-lateral are missing. On the first to fourth segments we find between the dorsal tuberculum in the middle and the dorso-lateral tuberculae, as also between the latter tuberculae and the lateral ones, yet another tuberculum, thus increasing the number of tuberculae on the segments to nine. The fifth segment, as mentioned above, is furnished only with seven tuberculae, the seventh only with three. On the first segment anteriorly there are three tuberculae in a transverse row, one in the middle and one on either side of the middle line. The first segment is as mentioned above, provided with nine tuberculae in a transverse row along its posterior margin; anteriorly from the lateral ones of these tuberculae there are three more tuberculae in a longitudinal lateral row. There are also other tuberculae on the first segment, but they are more irregularly situated.

Abdomen. The first two segments are bent downwards laterally in a sharp angle to the dorsal surface. Their posterior angles are pointed and directed backwards. The third segment is enclosed by the second and the pleotelson; laterally it is not bent downwards unlike the other two free segments. In the middle it has a small tuberculum.

The anterior part of the pleotelson is elevated and furnished with a conspicuous tuberculum in the middle and two smaller lateral tuberculae on each side, situated close to one another. The pleotelson is furnished with a longitudinal carina along the middle line. The somewhat flattened tip of pleotelson is triangular and terminates in a narrowly rounded, almost pointed end. The lateral margins of the pleotelson, except at the tip, are bent downwards, so that a submarginal ridge is formed, which is only visible in a lateral view. Medially from this ridge there is yet another submarginal ridge, separated from the other by a groove. This latter ridge can be seen when viewed both laterally and from above.

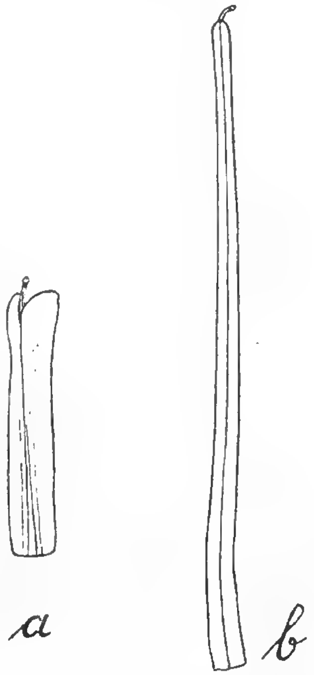

Fig. 26. *Macrochiridothea stebbingi* Ohlin var. *multituberculata* n. var. a. Seta from the lower margin of the propodus of the first pereiopod, 350×. b. Seta from one of the submarginal rows close to the lower margin of the first pereiopod, 350 ×.

Antennulae. Almost exactly as in the main species, differing only in having the second peduncular joint longer. This joint is longer than the last peduncular joint and the flagellum taken together, and almost twice as long as the third joint; the flagellum has a very minute terminal joint.

Antennae. Almost as the in main species, but the third peduncular joint is slightly longer, being almost as long as the second. The flagellum has seven joints in the right antenna, ten in the left.

Maxillipeds. As the in main species.

First pair of pereiopods. Exactly as in the main species. Lower margin of the propodus covered with irregularly[1] situated short setae. The setae (Fig. 26 a) terminate in three points. On both the caudal and rostral side, close to the lower margin, there is a submarginal row of long setae of the shape illustrated in Fig. 26 b.

The other pereiopods. Most of them broken. Second and sixth pereiopods as in the main species. Dactylus of second pereiopod vestigial.

Uropods. As in the main species. Sympodite about twice as long as the lateral ramus.

Remarks. I have examined only a single specimen, a female with fully developed oostegits (13 mm. in length). As the specimen differs in some features from *Macrochiridothea stebbingi* as described by OHLIN, I have thought it advisable to describe it as a new variety of that species. I am not convinced that the species does not exhibit variation in the characteristics by which the new variety is distinguished.

The variety *multituberculata* differs from the main species in the following characteristics:

1. Eyes totally lacking. In the main species they are small and black.
2. Head measured along the middle line about as long as the first segment. First pereion segment only slightly increasing in length laterally. Of *M. stebbingi* OHLIN says that the head is nearly as long as the first three segments of the pereion; the first pereion segment in the main species is three times as long laterally as in the middle.
3. It is more tuberculated than the main species, the pereion being furnished (on the first four segments) with nine rows of tuberculae.
4. The second peduncular joint of the antennula is longer than the third peduncular joint and the flagellum taken together, whilst in the main species it is only about as long as the third peduncular joint plus half the flagellum.

Macrochiridothea kruimeli (NIERSTRASZ, 1918) comes close to *M. stebbingi* OHLIN. It differs in being less tuberculated, in having the second joint of the antennular peduncle more than twice as long as the third peduncular joint plus the flagellum, and in having a very short antennal flagellum, consisting of two about equally long joints. *M. kruimeli* agrees with *M. stebbingi* var. *multituberculata* in its long first pereion segment. Vestigial eyes are found in this species.

Locality and Material.

Swedish Magellanian Expedition. Falkland Islands. Rocks at Port William. 1907. Female with empty marsupium, 13 mm. in length.

Distribution. Falkland Islands (Sw. Mag. Exp.). Distribution of the main species: Tierra del Fuego (OHLIN 1901) and Falkland Islands (STEBBING 1914).

Fam. **Pseudidotheidae,** OHLIN 1901, STEBBING 1905, BARNARD 1920.

For diagnosis see OHLIN (1901, p. 274) and BARNARD (1920 p. 381). It may be added that the penis is in a single piece, which is distally cleft or bilobate.

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[1] Situated approximately in three parallel longitudinal rows.

The family comprises the three genera *Arcturides*[1] STUDER (1884), *Pseudidothea* OHLIN (1901) and *Holidotea* BARNARD (1920). The number of joints in the antennal peduncle is stated by OHLIN (1901), in his diagnosis of the family, to be four. In *Arcturides* there are four joints (STUDER 1884), in *Holidotea*, however, five (BARNARD 1920). In *Pseudidothea* the peduncle also is better described as consisting of five joints, but the short proximal joint is indistinctly marked off on the ventral side from the second (cf. OHLIN, 1901).

The three genera of the family all agree with one another in the structure of the penis, being also in this respect intermediate between the *Idotheidae* and the *Arcturidae*. The penis of *Pseudidothea* is described below. After examining some specimens of *Arcturides cornutus* at the British Museum, I found that the penis is distally cleft also in that genus. In *Holidotea* the penis is distally bilobate.

The uropods of *Arcturides* have not been described. Moreover BARNARD (1920, p. 384) was unable to show whether one or two rami are present in the uropods of *Holidotea*. In *Pseudidothea*[2] the uropods are characteristic; as in the genus *Neastacilla* (cf. p. 118) the »secondary» ramus is provided with one long seta at the tip. The uropods being unknown in the other genera belonging to the family, it is impossible to say whether this characteristic is common to the whole family.

The fam. *Pseudidotheidae* approaches most closely to the fam. *Amesopodidae*[3], a family containing a single species, likewise intermediate between the *Idotheidae* and the *Arcturidae*.

Genus **Pseudidothea** OHLIN, 1901.

Diagnosis. Head fused with the first segment of the percion, being separated from the latter only by a faint groove. Eyes small, situated laterally. Coxae developed as incomplete, not very distinct, rings around the proximal ends of the basipodites of the second to seventh pereiopods. All segments of abdomen fused into one piece. Antennae with a two-jointed flagellum. Maxillipeds with a five-jointed palp. First pair of pereiopods prehensile. Penis cleft distally. Second male pleopod with the exopodite transformed and traversed by a diagonal channel. Uropods with two branches, the »secondary» branch being about three-fourths the length of the lateral one and provided with a single large seta at the tip.

OHLIN (1901) points out that the genus may perhaps be congeneric with *Arcturides* STUDER (1884). *Pseudidothea* is, however, clearly distinguished from *Holidotea* (BARNARD, 1920), by having no lateral notches, indicating two anterior segments, on the abdomen, by having the endopodites of the first pair of pleopods well developed, not as in *Holidotea* reduced in size, and by the characteristic shape of the penis. Another characteristic feature of *Pseudidothea* is that the tip of the »secondary» ramus of the uropods is furnished with a long conspicuous seta. Neither *Pseudidothea* nor *Arcturides* have lateral incisions on the abdomen. Whether *Pseudidothea* and *Arcturides* are congeneric cannot be decided without an examination of the uropods and first pair of pleopods in the latter genus.

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[1] If the name of the family is to be in conformity with that of the oldest genus within the family it should be *Arcturidoidae* (see OHLIN 1901, p. 276).

[2] See OHLIN, 1901, Pl. XXI, Fig. 6 u^x.

[3] See STEBBING 1905, p. 43—44 and BARNARD 1920, p. 381.

Pseudidothea bonnieri OHLIN, 1901.

Text fig. 27.

Pseudidothea bonnieri, OHLIN, 1901, p. 276—281, Pl. XX and XXI, Figs. 6.

Supplementary Description.

Mandibles. Cutting edge with three teeth. Lacinia (on the left mandible) with three teeth. Posteriorly from the cutting edge on each mandible there are three setae.

Fig. 27. *Pseudidothea bonnieri*, OHLIN. Penis, 95 ×.

Penis (Fig. 27). Distally cleft, but the two free distal lobes are situated close together. From each of the lobes there projects from the medial margin a thin flap.

Uropods[1]. »Secondary» ramus provided with a long apical seta.

Remarks. According to OHLIN (1901), possibly identical with *Idothea miersi* STUDER[2] (1884).

Localities and Material.

St. 58. South of West Falkland, lat. 52° 29′ S., long. 60° 36′ W. 197 m. Bottom temp. + 4.1°. Sand and gravel. $^{11}/_{9}$ 1902. 5 specimens (1 male, 4 females). Length of largest specimen 8.2 mm. (female with fully developed marsupium).

Distribution. Patagonia (OHLIN 1901), Falkland Islands (Sw. Ant. Exped.).

Not previously recorded from the Falkland Islands.

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[1] See OHLIN, 1901, Pl. XXI, Figs. 6 u and 6 u^{x}.

[2] See OHLIN, 1901, p. 274.

III. Fam. **Arcturidae.**

Syn. *Astacillidae*, STEBBING, 1905.

For diagnosis see G. O. SARS, 1899, p. 86; RICHARDSON, 1905, p. 323.

This family at present includes the following genera: *Astacilla* CORDINER 1795, *Arcturus* LATREILLE 1829, *Arcturella* G. O. SARS 1899, *Antarcturus* ZUR STRASSEN 1902, *Pleuroprion* ZUR STRASSEN 1903 (= *Antares* ZUR STRASSEN 1902), *Arcturina* KOEHLER 1911, *Arcturopsis* KOEHLER 1911 (= *Arctopsis* BARNARD 1920), *Dolichiscus* RICHARDSON 1913, *Neoarcturus* BARNARD 1914, *Idarcturus* BARNARD 1914, *Neastacilla* TATTERSALL 1921, *Pseudarcturella* TATTERSALL 1921, *Parastacilla*, HALE 1924. To these genera I must add the genus *Microarcturus* (see p. 128).

The genera have been established chiefly on the basis of differences in the following morphological features:

1. Shape of body.

The fourth segment of the pereion in *Astacilla*, *Neastacilla*, *Arcturella*, *Arcturopsis*, *Arcturina* and *Parastacilla* is of a considerably greater length than in the other genera; in *Arcturella*, *Arcturopsis* and *Arcturina* it is, in the female, also much broader than the other segments. As a rule, there is a marked articulation between the fourth and fifth pereion segments; this articulation is lacking in the genera *Pleuroprion*, *Neoarcturus* and *Idarcturus*.

2. The degree of fusion between the head and the first pereion segment.

The first pereion segment has become more or less firmly fused with the head. There is but little information regarding this fusion, and the figures do not always afford reliable guidance in this respect.

As a characteristic feature of the genus *Idarcturus*, BARNARD (1914 a, p. 430) states that the head is fused with the first pereion segment, whilst the sutures are distinct laterally.

In *Pleuroprion* the head and the first pereion segment are separated laterally by a groove, which vanishes on the dorsal side (see ZUR STRASSEN, 1902, p. 687).

In the genus *Arcturus* there is at least usually a distinct suture or furrow between the head and the first pereion segment, as can be seen from figures of the different species. In *A. baffini* (SABINE) I found a very distinct dorsal furrow, passing laterally into a distinct suture; the lateral margin had an incision between the head and the first pereion segment.

In *Antarcturus* there is no suture, but generally a shallow groove. In some species the groove has vanished. This is the case also with *floridanis* RICHARDSON[1], the generic position of which is not settled; according to STEBBING (1908) it probably belongs to *Antarcturus*.

In figures of the species for the genera *Arcturella*, *Arcturopsis*, *Arcturina* and *Neoarcturus* a distinct suture is seen between the head and the first pereion segment (cf. G. O. SARS 1899, KOEHLER 1911, BARNARD 1914). On examining *Arcturella dilatata* G. O. SARS, I found that such a suture exists exactly as figured by SARS (1899).

As regards *Astacilla*, the observations are incomplete. In G. O. SARS' figures (1899) of *A. longicornis*, *arietina*, *affinis* and *pusilla* there is a distinctly marked suture between

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[1] RICHARDSON, 1905, Fig. 366.

the head and the first pereion segment. On examining *A. longicornis,* I found that SARS' figure of this species gives a somewhat misleading impression. In reality the first pereion segment is firmly fused with the head, though the segment is separated from the head by a well-marked furrow, which becomes a real suture only quite close to the lateral margin.

TATTERSALL (1921) points out that in his new genus *Neastacilla* the first segment is firmly fused with the head; but as this is the case also in *Astacilla,* the characteristic cannot be taken as the basis of a generic difference between these two genera.

In *Parastacilla* a faint lateral suture is seen between the head and first pereion segment (HALE, 1924, Figs. 1 and 2).

3. Abdomen (number of distinguishable segments and length).

All segments of the abdomen are fused with one another, but generally three anterior segments are indicated, more or less distinctly, by grooves or lateral incisions. Exceptions are:

Pleuroprion with only one anterior segment, and *Idarcturus* without indication of abdominal segmentation.

A very long abdomen is characteristic of the genus *Dolichiscus,* whilst, on the other hand, *Pleuroprion* is characterized by its very short abdomen.

In *Antarcturus* the three anteriorly discernable segments are, as a rule, separated by transverse grooves, but these are sometimes very faint, the three segments thus being indicated almost solely by their transverse spine-rows. In *A. hodgsoni*[1] the usual groove between the third segment and the pleotelson is entirely absent. In *A. brunneus* var. *spinulosus* (Pl. II, Fig. 11) this groove is very faint, sometimes almost entirely missing.

4. Shape of the lateral parts of the head and first pereion segment.

One of the chief differences between *Arcturus* and *Antarcturus* is that in the former genus the lateral margins of the head and first pereion segment are expanded so as to cover the mouth-organs, when viewed laterally. A lateral anteriorly directed lobe from the first pereion segment is characteristic of typical members of the genera *Astacilla, Arcturella, Arcturopsis* and *Parastacilla.* One important difference between *Neastacilla* and *Astacilla* is that in the former genus the lateral parts of the first pereion segment are not expanded downwards and forwards so as to cover the mouth-organs in a lateral view.

5. Antennulae.

Arcturina, Arcturopsis and *Idarcturus* are characterized by having a flagellum provided with very few sensory filaments, all issuing from the tip of the antennular flagellum. In some Arcturidean genera the males have a greater number of sensory filaments than the females. This sexual difference characterizes *Astacilla* (see G. O. SARS, 1899) and *Neastacilla* (see TATTERSALL, 1921), but occurs also in *Antarcturus* and *Microarcturus,* viz. in *A. franklini* and *M. rugosus.*

6. Antennae.

The flagellum of the antennae exhibits two different types in the family *Arcturidae.* In the one type the flagellum is very short and consists normally of three joints, of which

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[1] RICHARDSON, 1913, Fig. 1.

the terminal one is furnished with a claw. Such a short, as a rule three-jointed, flagellum is characteristic of the genera *Astacilla*, *Neastacilla* and *Arcturella*, and also of *Pleuroprion*, *Arcturopsis*, *Arcturina* and *Neoarcturus*. It also characterizes the genus *Pseudarcturella*, whose flagellum consists of »two joints terminated by a strong spine» (TATTERSALL, 1921) and *Idarcturus*, of which BARNARD says (1914 a, p. 431) »flagellum a little shorter than 5th joint, 4-jointed in ♂».

A long flagellum consisting of a great many joints occurs in the genera *Arcturus*, *Antarcturus* and *Dolichiscus*. Some of the species referred to *Antarcturus* differ, however, in having a short, as a rule three-jointed, flagellum (exceptionally two- or four-jointed). I refer these species — which also have other characteristics in common — to the separate genus *Microarcturus* (see p. 128).

In the genus *Dolichiscus* the flagellum attains an uncommonly great length.

7. Pereiopods.

The difference in length of the dactylus of the first pereiopods is an essential difference between *Arcturus* and *Antarcturus* (see ZUR STRASSEN, 1902). The first pereiopod is always shorter and broader than the three following pairs, except in the genus *Arcturina* (KOEHLER, 1911), where the first three pairs are broad and strong, similar to each other and different from the weak fourth pair.

8. First pair of pleopods in male.

The genera *Antarcturus*, *Dolichiscus* and *Neoarcturus* are characterized by having the posterior surface of the exopodite traversed by a diagonal furrow. In *Pseudarcturella* the exopodite is bifurcate[1].

9. The presence of a characteristic chitinous outgrowth on the ventral surface of the third and fifth pereion segments, in the male.

The presence of such a chitinous outgrowth in the male is the main characteristic of the genus *Arcturopsis*[2] and distinguishes that genus from the allied genus *Arcturella*. BARNARD (1920) points out that a small chitinous process is present on the ventral surface of the third pereion segment in the male in both *Arcturella damnoniensis* and *dilatata* as also in *Astacilla longicornis*. BARNARD therefore cancels the genus *Arcturopsis* and refers its species to *Arcturella*, with one exception: for the single species referred by KOEHLER to *Arcturopsis*, which has the process on the fifth pereion segment instead of the third, he creates a new genus *Arctopsis*. As this species has already been named *Arcturopsis* by KOEHLER there is no need for a new name.

The genus *Arcturopsis* is, however, even with the restricted definition of BARNARD (1920) not satisfactorily etablished as it is founded solely on characters of the male. Not having examined any species of *Arcturopsis* I have retained the genus, but I am of the opinion that it should be identified with *Arcturella*, as I found that the presence of a chitinous process on the fifth segment of the pereion is a common characteristic of *Antarcturus*. In *Antarcturus* this process is spine-like, not bifurcate as in *Arcturopsis*[3]; bifurcate spines, however, occur exceptionally in *Antarcturus* though they are situated only dorsally. In *Antarcturus*, the whole spine-armature (including the spine on the

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[1] TATTERSALL, 1921, Pl. X, Fig. 10.
[2] KOEHLER, 1911, p. 8.
[3] KOEHLER, 1911, Figs 20 and 21.

sternite of the fifth pereion segment) undergoes a considerable individual variation in the same species, sometimes to such an extent that the characteristics of spine-armature are not entirely reliable even as distinguishing features of the species.

10. Number of marsupial plates.

The information supplied by various authors as to the number of marsupial plates in the Arcturidean genera differs greatly[1]. Only few species of different genera have hitherto been sufficiently examined in regard to the number of oostegits. Four pairs appear, however, to be the rule.

This was observed by HANSEN (1916) in regard to *Astacilla* and *Arcturella*, by RICHARDSON (1913) in respeat of *Dolichiscus*, by BARNARD (1920) in regard to *Astacilla* and by TATTERSALL (1921) as regards *Antarcturus*. *Arcturus baffini*, on the other hand, has five pairs of oostegits (HANSEN 1916). HANSEN (1916) states that in *Pleuroprion* the number varies in different species from (usually) five to only four. The number of oostegits therefore presumably cannot be employed as a generic characteristic.

A smaller number than four pairs has not been reliably demonstrated in the case of any Arcturidean species. I found four pairs of oostegits in two species of *Neastacilla*, viz. *falclandica* (OHLIN) and *magellanica* (OHLIN), in six species of *Antarcturus* and three species of *Microarcturus*.

Genus **Neastacilla** TATTERSALL, 1921.

Diagnosis. First pereion segment coalesced with the head, but separated from the head by a mere groove, which is sometimes missing dorsally. Lateral parts of the first segment of the pereion not expanded forwards and downwards. Abdomen with three segments indicated by shallow grooves anteriorly from the pleotelson. Dactylus of first pereiopod not expanded, tapering towards the end; claw missing. »Secondary» ramus of uropod furnished with a very long apical seta.

This genus was diagnosed by TATTERSALL (1921, p. 243) as follows: »The second thoracic somite is fused with the head and its lateral parts are not expanded downwards and forwards to cover partially the mouth-organs. The abdomen is unsegmented, all the segments being fused into one piece.» TATTERSALL refers to the genus only the two species *falclandica* and *magellanica* (OHLIN, 1901).

Astacilla differs from *Neastacilla* in having a short lateral suture between the head and first pereion segment (established in *A. longicornis* (see p. 116); but this is only a minute difference and perhaps varies in different species.

Moreover *Astacilla* differs from *Neastacilla* in having the lateral parts of the first pereion segment expanded. In some species of *Astacilla* these expansions — judging by the literature on the subject — appear to be indistinct or quite absent. Thus *A. mediterranea* KOEHLER[2] has no expansion of the lateral margin of first pereion segment, in e. g. *A. deshaisii* STEPHENSEN[3] this expansion is indistinct.

The degree of fusion of the abdominal segments is little known in *Astacilla*. G. O. SARS (1899) says in his diagnosis of *Astacilla:* »Metasome with only a single segment distinctly separated from the terminal one»; but it can be seen from his figures of *A. lon-*

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[1] See HANSEN (1916, p. 191—192) and BARNARD (1920, p. 384—385).

[2] KOEHLER, 1911, Figs. 26 and 28.

[3] STEPHENSEN, 1915, Fig. 9.

gicornis that three anterior segments are indicated, the line between the first and second being only indicated by a lateral incision. On examining *A. longicornis,* I found that the lines between the second and third segments and between the third segment and the pleotelson figured by SARS are not sutures but mere grooves. Thus in *Astacilla longicornis,* exactly as in *Neastacilla,* all abdominal segments are fused into one piece. Otherwise the abdomen is characteristic in the four species of *Astacilla* figured by SARS (1899), as they all have a lateral incision between the first two segments, and the lateral parts of the third segment project freely. This configuration of the abdomen is also found in *A. kerguelensis* VANHÖFFEN. Of the two species *A. marionensis* BEDD. and *kerguelensis* VANH. TATTERSALL (1921, p. 243) says »that they are closely allied to *Neastacilla falclandica,* OHLIN, but the composition of the pleon will not allow them to be referred to my new genus». As has been pointed out above, the differences in the degree of fusion between the abdominal segments in *Astacilla* and *Neastacilla* is only a minute one; in my opinion it should not, for the present be taken as a generic character.

The first pereiopods are characteristic in both *N. falclandica* and *magellanica;* the dactylus is not expanded and tapers towards the setiferous end; claw is absent. In both the species above mentioned the uropods too are very characteristic, the »secondary» ramus being furnished with one long apical seta. The two characteristics just mentioned I have included in my diagnosis.

The genus as restricted by my diagnosis will include the species *falclandica* (OHLIN), *magellanica* (OHLIN) and probably *amblyura* (STEBBING). In the latter species both the first pereiopods[1] and the uropods[2] agree with *Neastacilla,* and STEBBING (1905) points out that no transverse dorsal divisions could be discerned on the abdomen.

It will perhaps be possible to refer *A. marionensis* and *kerguelensis* to *Neastacilla* when their first pereiopods and uropods have been examined. Most of the species referred to *Astacilla,* however, are imperfectly known as regards characteristics which are distinctive of the genus *Neastacilla.* It may therefore be asked whether there may not be some species intermediate between *Astacilla* and *Neastacilla,* thus perhaps rendering the genus *Neastacilla* superfluous.

Neastacilla falclandica (OHLIN, 1901).

Text. figs. 28 a—c.

Astacilla falclandica. OHLIN, 1901, p. 266—267, Pl. XX, Fig. 1.
Astacilla falclandicus. STEBBING, 1914, p. 353.
Neastacilla falclandica. TATTERSALL, 1921, p. 244, Pl. X, Figs. 1—3.

Supplementary Description.

Head and pereion. The specimens are covered with dark dots of pigment. A very shallow groove indicates the dividing line between the first segment and the head. Eyes large and black, subtriangular.

Second and third pereion segments subequal in length, each being shorter than the first segment. The lateral parts of the second and third pereion segments, as well

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[1] As regards the first pereiopods of *A. amblyura,* STEBBING (1905, p. 47) states »The seventh joint has one conspicuous spine among many that are smaller».

[2] The "secondary" ramus of the uropod appears to have an additional minute seta on its upper margin (STEBBING, 1905, Pl. XI B. urp.).

as the anterio-lateral parts of the fourth pereion segment are traversed by longitudinal grooves, one groove on each side. No dorsal tuberculae on the fourth pereion segment. Seen from above the anterio-lateral angles of the fourth pereion segment are slightly projecting.

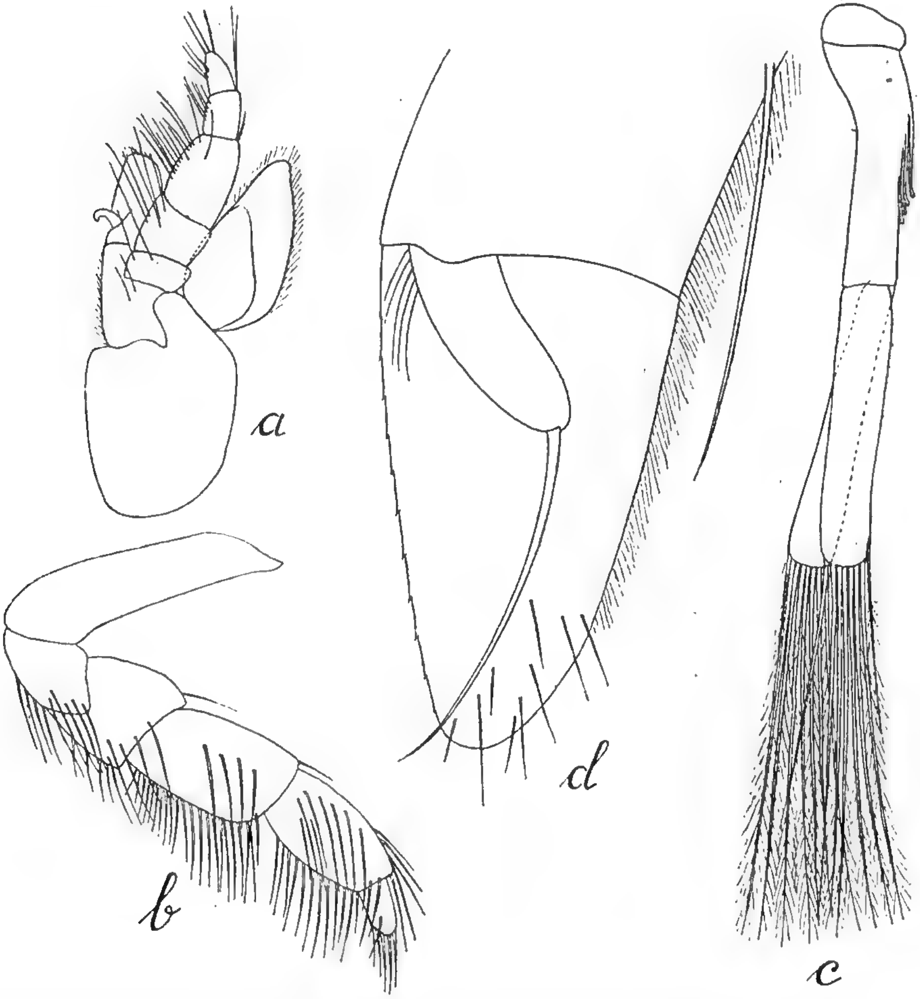

Fig. 28. *Neastacilla falclandica*, (OHLIN). a. Right maxilliped, female with a marsupium, 90 ×. b. Left first pereiopod, female, 90 ×. c. Right first pleopod, female, 90 ×. d. Tip of the right uropod, seen from the inner side, female, 280 ×.

Coxae on the second to fourth pereion segments small and subrectangular, not visible from above; those on the fourth segment almost subquadrate. Coxal plates of last three segments subtriangular.

Antennae. First peduncular joint very short, second about twice as long as the first. Third joint about half as long again as the second, fourth joint twice as long as the third, fifth joint shorter than the fourth and about as long as the second and third joints together. The short flagellum is about two-thirds the length of the last peduncular joint and consists of three joints, which decrease in length. The third and following joints of the peduncle, as well as the flagellum, are furnished with short and sparse setae.

Maxillipeds (Fig. 28 a). Normal. Coxopodite in the mature female expanded into a thin lobe, directed backwards.

First pair of pereiopods (Fig. 28 b). Dactylus characteristic, tapering towards the end and furnished with setae on its distal margin; claw absent.

First pair of pleopods, female (Fig. 28 c). Coxopodite and basipodite together slightly shorter than the exopodite and endopodite, which are subequal in length. Basipodite with five coupling-setae. For further details see the figure.

Uropods (Fig. 28 d). »Secondary» ramus two-fifths as long as the other ramus, its distal margin provided with a single very long seta, which is almost twice as long as the ramus itself.

Remarks. My specimens differ from those described and figured by OHLIN (1901) and TATTERSALL (1921) in the following details:

1. There is a faint groove between the head and the first pereion segment (not figured by OHLIN (1901, Pl. XX, Fig. 1), but observable in the figure given by TATTERSALL (1921, Pl. X, Fig. 1).

2. The first three abdominal segments are faintly indicated by grooves, as figured by TATTERSALL (1921), but not by OHLIN (1901). Just as in *Astacilla longicornis* (cf. p. 116) a furrow between the first and second segments is developed only laterally, and the third segment protrudes when seen from above laterally like a faint tooth.

3. The third peduncular joint of the antennae is somewhat longer than the second peduncular joint. OHLIN (1901, p. 266) says of the antennae: »second and third joints of about the same length»; in the figure by TATTERSALL (1921, Pl. X, Fig. 1) the third joint is somewhat longer than the second.

STEBBING (1914) is of the opinion that *N. falclandica* (OHLIN) is synonymous with *N. magellanica* (OHLIN).

N. falclandica is closely allied to *Astacilla marionensis*[1] BEDDARD, but it differs in 1) having the fourth pereion segment longer (in *marionensis* the length of the fourth segment is only about equal to the length of the head and the first three segments together); 2) in having the third peduncular joint of the antennae shorter (in *marionensis* the third peduncular joint is almost twice as long as the second); 3) and in being devoid of lateral tuberculae on the pleotelson.

Another closely allied species is *Astacilla kerguelensis*[1] VANHÖFFEN, a species which TATTERSALL (1921) assumes to be identical with *Astacilla marionensis*. This is probably not the case, because *Astacilla kerguelensis* differs from the latter species in having the fourth segment of the pereion longer and about as long as in *Neastacilla falclandica*. *Astacilla kerguelensis* differs from *Neastacilla falclandica* in being larger, attaining a size approximately double that of *N. falclandica*, in having a more distinct groove between the head and first pereion segment, in a slightly different configuration of the first three abdominal segments, and in having a lateral tuberculum on each side of the pleotelson.

Localities and Material.

St. 43. Falkland Islands, Port Louis, Greenpatch, near the bridge, lat. 51° 33' S., long., 58° 9' W. A few m. Off the inner border of the *Macrocystis*-zone. Stony bottom with algae. $^{28}/_{7}$ 1902. Female with empty marsupium, length 6 mm.

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[1] This species probably belongs to *Neastacilla*.

St. 46. Falkland Islands, Port Louis, Carenage Creek, lat. 51° 32′ S., long. 58° 7′ W. 1 m. Sand bottom with abundant *Codium*. $^{9}/_{8}$ 1902. Ovigerous female, length 5.5 mm.

Distribution. Falkland Islands (OHLIN 1901, STEBBING 1914) New Zealand (TATTERSALL 1921).

Neastacilla magellanica (OHLIN, 1901).

Astacilla magellanica. OHLIN, 1901, p. 267—268, Pl. XX, Fig. 2.

The two specimens of this species which I have examined agree well with the figure and description by OHLIN (1901). The second and third peduncular joints of the antennae are subequal in length. The first pereiopod agrees with the same appendage in *N. falclandica.* The »secondary» ramus of the uropods, just as in *N. falclandica,* is furnished with a long apical seta.

The colour varies slightly in the species. One of the specimens is of a uniform yellowish colour, just as described by OHLIN, but with sparse brownish dots of pigment. The other specimen has a large brownish spot on the fourth segment and is brownish also on the posterior part of the abdomen, and on the uropods. Moreover the specimen is covered with minute dots of brown pigment.

Localities and Material.

St. 39. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 41′ W. 40 m. Sand and small stones. $^{4}/_{7}$ 1902. Female specimen devoid of marsupial plates, length 5 mm.

St. 53. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 47′ W. 12 m. Sand and gravel. $^{3}/_{9}$ 1902. Female specimen devoid of marsupial plates, length 4.1 mm.

Distribution. Magellan Straits (OHLIN 1901), Falkland Islands (Sw. Ant. Exped.).

Not previously recorded from the Falkland Islands.

The Antarcturus group and a revision of the genus Antarcturus zur Strassen.

Diagnosis of the group. First pereion segment completely fused with the head, separated from the head by a mere groove. All abdominal segments fused into one piece, but three segments anteriorly from the pleotelson are, as a rule, indicated by shallow grooves. Lateral parts of the head and the first pereion segment not expanded downwards and forwards to cover partially the mouth-organs. Dactylus of the first pereiopod long, forming with the propodus a strong »chela». Exopodite of the first male pleopod transformed and traversed by a diagonal furrow, which is often partially closed so as to form a canal.

The group corresponds to the genus *Antarcturus* as defined by ZUR STRASSEN (1902). It comprises the genus *Antarcturus* ZUR STRASSEN, *Dolichiscus* RICHARDSON and the new genus *Microarcturus,* which is defined below. Though they differ in some features these three genera agree with each other in many essential characters, so that they may be treated together as a group within the family.[1]

As mentioned above (p. 115), the members of the genus *Arcturus,* in contradistinction from those of the *Antarcturus* group, have a distinct furrow between the head and the first pereion segment, sometimes developing laterally into a suture.

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[1] In my opinion it is a matter of taste whether they ought to be regarded as subgenera or genera. But as *Dolichiscus* has already been established as a genus, I prefer to give them generic value.

The third abdominal segment in the *Antarcturus* group is, as a rule, not as distinctly marked as the others. Exceptionally it is not demarcated at all (see p. 116). Often it differs in having its median part situated somewhat more anteriorly and marked off by distinct grooves from the lateral parts of the segment.

The genera of the *Antarcturus* group have the first male pleopod characteristically transformed and traversed by a diagonal furrow. The male pleopods in *Arcturus* have not been much studied, but a transformed exopodite of the first pleopod in the male has never been found in the genus. In *Arcturus baffini* (SABINE) I observed that the exopodite of the first pleopod in the adult male was not transformed in the manner which is characteristic of the *Antarcturus* group, and that it was similarly shaped to the corresponding pleopod exopodite of the female.

The *Antarcturus* group comprises a great many species. Most of them have been referred to the genus *Antarcturus*. To *Dolichiscus* belong two species, or according to TATTERSALL (1921) possibly only one.

I shall now make some observation on the general morphology of the species belonging to the *Antarcturus* group and discuss the characters usually taken as a basis for classification.

The segments of the pereion are approximately semi-cylindrical in transverse section, having their dorsal surfaces vaulted, their ventral surfaces flat. The first four segments are furnished with a posterior transverse ridge, which widens out laterally to embrace the whole segment. Thus anteriorly and dorsally a transverse oval area is formed, which is often traversed by a row of spines, or in non-spinous species, by a more or less distinct ridge. The lateral parts of the second, third and fourth segments are somewhat triangularly prolonged, so as to partially project laterally from the pereiopods. These lateral parts are marked off medially by a longitudinal groove. On the first pereion segment the lateral parts are very slightly, or not at all, prolonged outwardly. The first pereion segment differs frequently from the three following in having its anterior dorsal area traversed by two transverse rows of spines or by two transverse ridges.

The coxal plates on the second to fourth segments are not visible in a dorsal view. Seen from the lateral side they are sub-rectangular; seen from the ventral side they form incomplete rings around the proximal ends of the basipodites of the pereiopods; they are fused medially with the sternum. Often they are incompletely divided into two parts by a ventral incision or incomplete suture. The coxal plates of the fourth pereion segments in the ovigerous female have their posterior portions elongated in a median direction into a long prolongation. The points of these, often spine-like, prolongations meet, or almost meet posteriorly from the marsupium. The coxal plates of the second and third segments also are slightly prolonged posteriorly in the ovigerous female (Figs. 36 a, 37 d and 38 d).

On the first pereion segment the coxae are not marked off by sutures from the tergum. As a rule, there is a slight incision in the epimeral margin of the segment (Fig. 32 a) exactly as on the coxal plates of segments 2—4. This incision I deem homologous with the incisions on the coxal plates of the pereion segments 2—4. In that case the tergal border situated posterior to the incision would be homologous with the posterior portion of the second to fourth coxal plates.

The last three pereion segments are traversed by a transverse ridge across the middle. As in the anterior segments, the ridge widens laterally to comprise the whole segment, leaving anteriorly and, in a slight degree posteriorly, a smooth area in the middle.

The coxal plates of the last three segments are large and subtriangular and are marked off by lateral sutures from the tergites.

The development of coxal plates in the *Antarcturus* group is thus rather similar to that in *Macrochiridothea* (see p. 109); it differs in being devoid of delimited coxal plates on the first segment, and in having the coxal plates of the last three segments marked off from the tergum by lateral sutures (not by dorsal).

The above described morphological features of the body are characteristic of the *Antarcturus* group as a whole. In details there are considerable differences in the different species. The most easily discernable of these differences are those of the spine-armature, though as will be shown below, in this respect also the spinous species agree with one another in their main features.

Only seldom are the two terminal spines situated caudally on the pleotelson lacking (e. g. *Microarcturus digitatus*; see p. 167). These, often very large, spines occur also in species where all other real spines are wanting (e. g. *Antarcturus antarcticus*) and where, instead, the body is granulate. Some species are provided with only a few large tuberculae or spines (e. g. *A. americanus*). In most of the species the body, however, is extremely spinous.

Hodgson (1910) distinguishes on the body (in *A. franklini*) three pairs of spines, one pair of dorsal spines, one dorso-lateral and one lateral pair. This spinearrangement occurs in all spinous or tuberculated species, though they may usually in addition be covered with a number of spines or tuberculae, these being, however, usually smaller than the three main pairs of spines. The typical spinearrangement is the following: dorsally on the head there are four spines, situated so as to form the points at the angles of a square. The posterior pair of these spines is often wanting, but in such cases it is, as a rule, indicated by faint tuberculae. Often there is a small spine at the anterio-lateral angle of the head. The posterior ridge of the first four pereion segments is provided on either side of the middle line with one dorsal, one dorso-lateral, and one lateral spine. The lateral spines are situated on the »pleurae».

The same spines occur on the last three pereion segments, one dorsally, one dorsolaterally, and one laterally, situated on either side of the middle, and on the abdomen the larger spines have the same arrangement. But while the lateral spines of the first four segments are situated on the »pleurae», on the last three segments they are situated on the coxal plates. The same arrangement (of tuberculae) was described in *Macrochiridothea stebbingi* (see p. 108). In the spinous species the body is thus traversed by six longitudinal rows of spines. This arrangement is especially prominent in *Microarcturus digitatus*, in which species all the spines on the first five pereion segments are strongly developed, except the dorsal pair on the fifth segment.

In the classification of the species appertaining to the *Antarcturus* group the differences in spine-armature and other differences in the sculpturing of the body have played a leading part. In the few cases where diagnoses of the species have been given (OHLIN 1901, HODGSON 1910) the distinctive characteristics have, almost exclusively (HODGSON 1910), or at any rate to a large extent (OHLIN 1901), been based on the spine-armature or other external sculpturing.

Differences of spine-armature and sculpturing of the body have, however, a very limited value for purposes of classification. As pointed out above, the arrangement of spines is similar in its main features in all the spinous species. In addition, there is considerable individual variation of the spine-armature within the different species. RICHARDSON (1913, p. 11) states that in one specimen of *A. coppingeri* the terminal spines were wanting and of the species *A. furcatus* var. *polaris* the same writer says (p. 10): »Il y a par conséquent, dans cette espèce, une tendance à la variation dans la taille, la position et le nombre des épines.» As regards the additional spines on the body, RICHARDSON (1913) and TATTERSALL (1921) state with reference to *Antarcturus furcatus* var. *polaris* that the small spines increase in number with age.

In all species, in regard to which I have had access to a large number of specimens. I found a considerable variation in the arrangement, number and size of the small spines or tuberculae, even in individuals subequal in size. The occurrence of a small spine at the anterio-lateral angle of the head (a distinction given by HODGSON (1910) as a specific characteristic of *A. franklini*) is liable to individual variation. Thus in *Microarcturus stebbingi* (p. 159) I found a spine in some specimens, whilst in others there was a tuberculum, which in other cases again was entirely missing. In this species the large spines vary even in specimens subequal in size, there being in some specimens only faint tuberculae, in others distinct spines (see p. 159). A similar variation was recorded by BARNARD (1925) in *Microarcturus similis*. This author states (p. 396): »Thus the development of the granules varies, as may also their shape; in some young ♀♀ all the granules are sharply pointed, in other specimens they are all blunt, so that at first sight one would suspect there to be two species[1].»

A still more noticeable variation in the spine-armature has been mentioned as occurring in *Antarcturus franklini*, a species which was described by HODGSON (1902 and 1910) and has since been recorded by RICHARDSON (1913) and TATTERSALL (1921). HODGSON (1910) and TATTERSALL (1921) state, that the females in *Antarcturus franklini* are markedly spinous, whilst in the male sex all spines on the pereion are lacking. After examining material of *A. franklini* at the British Museum, I came, however, to the conclusion that the males previously described as *franklini* must belong to another species, most probably to *A. adaraneus* (HODGSON) (see p. 149).

The differences in spine-armature in different specimens within the same species is only in a very small degree due to sex. Some slight differences in spine-armature between males and females I found, however, to be constant in *Antarcturus franklini*, *Microarcturus stebbingi* and *rugosus*. In these three species the males always differ from the females in having a smaller number of small additional spines on the pereion.

Another character, which varies in individuals of the same species is the length of the fourth segment of pereion (e. g. in *A. furcatus*, p. 130).

Though it slightly varies in length in different individuals, the fourth segment is sometimes consistently longer in the males than in the females. This I found to be the case in *Antarcturus furcatus*, *franklini* and *granulosus* and in *Microarcturus stebbingi*.

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[1] A similar considerable variation in spine-armature was early found in the allied genus *Arcturus*: OHLIN (1895) points out that individuals of *Arcturus baffini* vary as regards their spine armature from being strongly spinous to tuberculated. On the basis of his observations OHLIN merged two previously established species into the single species *Arcturus baffini*.

The antennae differ considerably in different species in the length and number of joints of the flagellum. Either the flagellum is long and consists of a great many joints, or short and consist, as a rule, of only three joints.

The mouth-organs are similar in the different species. The mandibles have not been described or figured in detail. The incisive part of the left mandible (Fig. 32 c) has two teeth, a dorsal and a ventral one, and two other teeth in a row laterally from the dorsal tooth. The lacinia is provided with three brown-coloured proximally fused teeth. Dorsally from the lacinia there is a projecting area of thin membranous skin carrying setae. The molar tubercle is strong and subquadrate in a transverse section and, as a rule, dentated distally. In the right mandible (Fig. 32 d) a lacinia is missing. The projecting area of membranous skin behind the incisive part is large and provided with a number of digitiform processes, of which the first three are the strongest, whilst the others are setiform. Since the ventral part of the chitinous projection with its three non-setiform points is thicker than the dorsal part, this anterior part may perhaps correspond to the lacinia on the left mandible. This view is supported by the fact that the three ventral processes of the right mandible are sometimes brown-coloured, as is occassionally also the ventral margin of the projecting area.

The maxillipeds of the ovigerous female in all the species I examined have the coxopodite posteriorly expanded into a thin lobe directed backwards (see Fig. 32 f). In all specimens examined the marsupial plates were four in number (see p. 118).

As has been pointed out above, differences in spine-armature and sculpturing are of very little value for purposes of classification. On the other hand, distinguishing characteristics other than those based on the spine-armature and sculpturing have seldom been found. This is, however, due to the incompleteness of the descriptions. In *Antarcturus* the pereiopods have been incompletely described; the length of the claws is only rarely to be seen from the figures. The pleopods are still incompletely described, and the uropods have been totally neglected.

An examination of the appendages in *Antarcturus* and *Microarcturus* reveals the existence of more important characteristics, more reliable as bases for classification than the spine-armature and sculpturing. The pereiopods, for example are very dissimilar in different species, there being great differences especially in the length of the dactylus and its claws.

As regards the pleopods, the transformed exopodite of the first male pleopod was for the first time observed by BARNARD[1] (1914) in *A. kladophorus*. TATTERSALL[2] (1921) makes out in detail this transformation in *A. furcatus*. He points out that the exopodite is transformed in a similar way in all species of *Antarcturus*[3] and *Dolichiscus*[4] which he examined. All species of *Antarcturus* and *Microarcturus* examined by me have the exopodites transformed in the adult male. I am therefore of the opinion that the transformation of the first male pleopod in the male sex is a character which probably characterizes both these genera.

In details, however, the exopodite of the first male pleopod is dissimilar in the different species. But also the first pleopods in the female, which agree with those of the

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[1] BARNARD, 1914, Pl. XVIII, B. plp. 1.

[2] TATTERSALL, 1921, Pl. VIII, Figs. 1 and 2, Text fig. 1 A.

[3] *Antarcturus furcatus*, *furcatus* var. *polaris*, (?) *adaraneus* (regarded by TATTERSALL, 1921, as the male of *franklini*), *hiemalis*, *lilliei* and *horridus*.

[4] *Dolichiscus meridionalis*.

male (except that the exopodite has not been transformed), are characters which will be found useful for classification. The basipodite of the first pleopods, for example, differs in regard to the spines on its lateral margin, which differ in size, shape and number in the different species. In the species of *Microarcturus* examined by me, the endopodites of the first pleopods likewise differ, being reduced in size in varying degrees. The first pleopods, especially those of the males, are thus very useful characters for purposes of classification. I observe likewise that the first male pleopod in *Microarcturus stebbingi* was soon typically developed in an immature male, which was lacking in spine-armature and in which the last pereiopod not yet fully out-grown.

The second to fifth pairs of pleopods differ very slightly; as a rule, not at all, in the the different species.

The uropods, on the other hand, serve as a basis for a reliable diagnosis of the species. The size of the exopodite and the number of its apical setae differs in different species. It is a remarkable fact that in one of the species, *Microarcturus digitatus* (p. 171), the "secondary" ramus is absent, a feature which only otherwise occurs in the family *Idotheidae* of the Valvifera.

The penis is, as a rule, similarly shaped in the different species; usually it consists of a chitinous plate which tapers towards the rounded end (Fig. 35 b). In *A. americanus* its shape is divergent (see Fig. 31 e). BARNARD (1925) points out that the penis also in *Microarcturus similis* has a characteristic shape, being distally bilobate (see BARNARD 1925 Fig. 1 pen.).

STEBBING (1908) enumerates the species of *Antarcturus* known up to that date, in a list containing 29 species. To this list he adds with some hesitation the species *floridanus* (RICHARDSON); at the same time he establishes his new species *kladophorus*. Since 1908 the following species have been added: *antarcticus* BOUVIER (1910), *hiemalis* HODGSON (1910), *hodgsoni* RICHARDSON (1913), *gaussianus* and *drygalski* VANHÖFFEN (1914), *lilliei* and *horridus* TATTERSALL (1921), *similis* BARNARD (1925), *belgicae* and *acanthurus* MONOD (1925) and *hirticornis* MONOD (1926).

To the genus *Dolichiscus* only two species have been referred, viz. *pfefferi* RICHARDSON (1913) and *meridionalis* (HODGSON, 1910); TATTERSALL (1921) suspects that these two species are identical.

The genus *Dolichiscus* is characterized by having the antennae provided with a very long flagellum (it being almost twice as long as the last peduncular joint), and by its very long abdomen where the first segment, in particular, is very elongated. In all other characteristics given in the diagnosis of the genus by RICHARDSON (1913) *Dolichiscus* agrees with *Antarcturus*. Thus the characters »Tête unie au premier segment du thorax. Sur la face ventrale du corps se voient de chaque côté un long processus de l'article basal des pattes de la quatrième paire, processus qui se rencontrent presque au centre» (RICHARDSON, 1913, p. 13—14) are likewise characteristic of *Antarcturus* and *Microarcturus*, the last feature being characteristic of the ovigerous female in both genera.

Just as *Dolichiscus* deviates from *Antarcturus* in its long abdomen and long antennal flagellum, so do other species, previously referred to *Antarcturus*, deviate in an exactly the reversal way. These divergent species are provided with short antennae and especially with very short antennal flagellum, consisting, as a rule, of only three joints (exceptionally two or four), a characteristic which is a generic distinction of *Pleuroprion* and *Astacilla* and some other allied genera (see p. 117). The abdomen in these species is short, reminiscent of that in *Pleuroprion*, but differs in having three distinguishable, though fused, segments anterior to the pleotelson. All the species are moreover, like *Pleuroprion*, small forms. One of the species, *simplicissimus* (WHITELEGGE) is still more like *Pleuroprion*; of this species WHITELEGGE (1904, p. 406) says that it is, exactly as *Pleuroprion* »apparently without the usual power of flexure between the fourth and fifth segments of the peraeon».

For the species hitherto referred to *Antarcturus*, which, owing to their short abdomen and short three-jointed flagellum of the antennae, show a distinct resemblance to the genus *Pleuroprion*, I propose the new genus:

Microarcturus.

Diagnosis. Antennae shorter than the body, with a short flagellum consisting of three joints (occasionally two or four). Abdomen short, never longer than the last four pereion segments together, (pleotelson posteriorly pointed or cleft). Small forms.

In accordance with the diagnosis of *Microarcturus*, the genus *Antarcturus* may be confined to comprise forms which have the antennae at least equal in length to the body, the flagellum of the antennae in adult specimens, at least consisting of five joints, and the length of the abdomen not exceeding the length of the last five segments of the pereion together. As a rule, the length of the antennae is greater in *Antarcturus* than the length of the body, and the flagellum consists of a greater number of joints than five. In *Microarcturus*, on the other hand, the abdomen is, as a rule, still shorter than described in the diagnosis. The three species of *Microarcturus* which I have examined agree with one another in yet another respect. They all have the endopodite of the first pleopod in both male and female more or less reduced in size; its distal margin is furnished with sparse setae or is even smooth, whilst its outer and inner margins are always devoid of setae.

To the new genus *Microarcturus* the following species should be referred: *stebbingi* BEDDARD (1886), *oculatus* BEDDARD (1886), *patagonicus* OHLIN (1901), *kophameli* OHLIN (1901), *simplicissimus* WHITELEGGE (1904), *nodosus* WHITELEGGE (1904), *serratulus* WHITELEGGE (1904), *similis* BARNARD (1925), *acanthurus* MONOD (1925), *hirticornis* MONOD (1926), and the new species *rugosus* and *digitatus* which are described below. To this list should probably be added the species *dentatus* and *alcicornis* WHITELEGGE (1904), in regard to which the number of joints in the antennal flagellum is unknown.

The following are the remaining species of the genus *Antarcturus*: *coppingeri* (MIERS, 1881) *furcatus* (STUDER, 1882) with its variety *polaris* (HODGSON, 1902), *glacialis* (BEDDARD, 1884), *spinosus* (BEDDARD, 1884), *anna* (BEDDARD, 1884), *cornutus* (BEDDARD, 1884), *spinifrons* (BEDDARD, 1884), *purpureus* (BEDDARD, 1884), *abyssicola* (BEDDARD, 1884), *myops* (BEDDARD, 1884), *studeri* (BEDDARD, 1884), *americanus* (BEDDARD, 1884), *tenuispinis* (BENEDICT, 1898), *multispinis* (BENEDICT, 1898), (?) *floridanus* (RICHARDSON, 1900), *caribbaeus* (RICHARDSON, 1901), *adaraneus* (HODGSON, 1902), *franklini* (HODGSON, 1902), *oryx* ZUR STRASSEN (1902), *kladophorus* STEBBING (1908), *antarcticus* BOUVIER (1910), *hiemalis* HODGSON (1910), *hodgsoni* RICHARDSON (1913), *gaussianus* VANHÖFFEN (1914), *drygalski* VANHÖFFEN (1914), *lilliei* TATTERSALL (1921), *horridus* TATTERSALL (1921), *belgicae* MONOD (1925).

To these 28 species the new species *A. granulosus*, described below (p. 153) should be added.

Genus **Antarctures** ZUR STRASSEN, 1902.

Diagnosis[1]. First pereion segment coalesced with the head, but separated from it by a shallow groove. Lateral margins of the first pereion segment not prolonged downward and forward; the mouth-organs are visible in a lateral view. Abdomen with three segments anterior to the pleotelson, which are indistincly marked off by shallow grooves. Length of abdomen not exceeding the length of the last five pereion segments together. Antennae at least equal in length to the body; its flagellum in adult specimens consisting of at least five joints. First pereiopods prehensile; carpus small, subtriangular; dactylus long and narrow. Exopodite of the first pleopod in the male provided with a diagonal furrow on its posterior surface.

Antarcturus furcatus (STUDER, 1882).

Text. fig. 29.

Arcturus furcatus. STUDER, 1884, p. 12—15, Pl. I, Figs. 3 a, b, c, d; BEDDARD, 1886, p. 85—86, Pl. XXV, Figs. 6, 7.

Antarcturus furcatus. ZUR STRASSEN, 1902, p. 686; VANHÖFFEN, 1914, p. 519; TATTERSALL, 1921, p. 238—240, Pl. VIII, Figs. 1, 2.

Diagnosis. Body densely covered with spines, most of them small. Dorsal surface of the head with a pair of anterio-laterally directed large spines, situated medially from the eyes; posteriorly from these spines there is a transverse row of small spines. First four pereion segments posteriorly with a pair of large spines on the pleurae and with a pair of dorso-lateral spines, which sometimes are almost as long as the pleural spines. Anteriorly the segments are provided with one or more transverse rows of small spines. Fourth pereion segment subequal in length to the third, but varying in length in different specimens. Ventral surface of seventh pereion segment with a spine or tuberculum in the middle line. Pleotelson covered with small spines, of which a pair of terminal spines are always the largest. Tip of pleotelson between the terminal spines slightly rounded, its distal margin provided with spines. Antennae in adult specimens somewhat longer than the body, in young specimens subequal in length to the body. Second to fourth pereiopods always with a spine at the upper distal angle of the basipodite, ischium, merus and carpus and an additional spine on the upper margin of the basipodite; propodus slightly shorter than the carpus; dactylus slightly more than half as long as the carpus; its dorsal claw very short. Last three pereiopods with dactylus a little less than three fourths the length of the propodus, its dorsal claw short. Basipodite of the first pair of pleopods with 7—10 large lateral spines; exopodite in the male subrectangular, of a uniform width, only very slightly curved, with outer margin slightly concave and inner margin slightly convex; diagonal furrow narrowing towards its distal end; latero-distal angle of the exopodite prolonged into a rounded lobe, issuing from the anterior side; distal margin and distal half of the inner margin of the exopodite furnished with long plumose setae; endopodite in both male and female about as large as the exopodite and furnished with long plumose setae. Lateral ramus of the uropods longer than broad, subtriangular and pointed, more than twice as long as the »secondary» ramus, which has its distal margin provided with four setae.

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[1] Cf. ZUR STRASSEN (1902, p. 683—686), STEBBING (1908, p. 52—53).

Supplementary Description.

Body and spine-armature.

Pereion. Ventral surface of the fifth pereion segment in the middle with a spine directed ventrally. Ventral surface of the seventh pereion segment posteriorly in the middle with a spine directed backwards.

Fourth pair of coxal plates in the ovigerous female posteriorly prolonged into medially directed spine-like projections, each furnished with a spine on its ventral margin. In the male the coxal plates of the fourth segment are fused ventrally with the sternum; the ventral surface of the fourth segment is furnished with two spines, probably corresponding to the spines on the spine-like prolongations of the coxal plates in the ovigerous female.

Abdomen. Ventral surface of the first abdominal segment anteriorly with two transverse parallel rows of small spines.

Variation.

The small additional spines on the body vary greatly in number in different specimens, being —, as was pointed out by RICHARDSON (1913) and TATTERSALL (1921) in regard to the var. *polaris* (HODGSON) — less numerous in smaller specimens. The length of the dorso-lateral pairs of spines on the pereion vary, even in specimens subequal in length and from the same locality. Thus in a female with marsupium, 35 mm. in length, they were scarcely longer than the other small spines covering the surface, whilst in another female specimen likewise with marsupium and 25 mm. in length, they were almost as long as the large pleural spines. As a rule, they are a little longer than the small additional spines. The pleotelson has often a pair of dorso-lateral spines longer than the other spines, except the terminal pair; this variation occurs in specimens subequal in size and from the same locality. The length of the terminal pair of spines on the pleotelson likewise varies, being also from $^1/_6$ to $^1/_9$ the length of the specimen.

The length of the fourth segment varies in different specimens. As a general rule, however, in the adult female, it is subequal in length to the third; in the adult male I found it always longer than the third[1]. In the adult female it varied in length, being sometimes longer, sometimes shorter than the third segment. In immature male specimens the third and fourth segments are subequal in length.[2]

Appendages.

Antennulae. Not quite reaching the distal end of the third peduncular joint of the antennae. Second peduncular joint the shortest. Flagellum about $^1/_5$ longer than the second and third peduncular joints together.

Antennae. In adult specimens somewhat longer than the body; in immature specimens subequal in length to the body. Second and third peduncular joints with a row of spines on the caudal (lateral) margin; the spines at the distal angles of the joints being the longest. Flagellum consisting of 9—11 joints (in adult specimens), the first joint long and corresponding to three or four joints.

Maxillipeds. Distal margin of the distal epipodite narrowly rounded. Coxopodite in the ovigerous female in the usual way expanded into a posteriorly directed thin and rounded lobe, which has its inner margin provided with setae.

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[1] Cf. STUDER, 1884, Fig. 3.

[2] Cf. TATTERSALL, 1921, Pl. VIII, Figs. 3 and 4.

First pair of pereiopods. Carpus, propodus and dactylus densely covered with long setae, those on the propodus two-pointed and furnished with two rows of short triangular sub-branches. Dactylus approximately two-thirds as long as the propodus. Length of the dorsal claw not quite one-third the length of the dactylus. Ventral claw less than half as long as the dorsal one. Between the claws there is one seta.

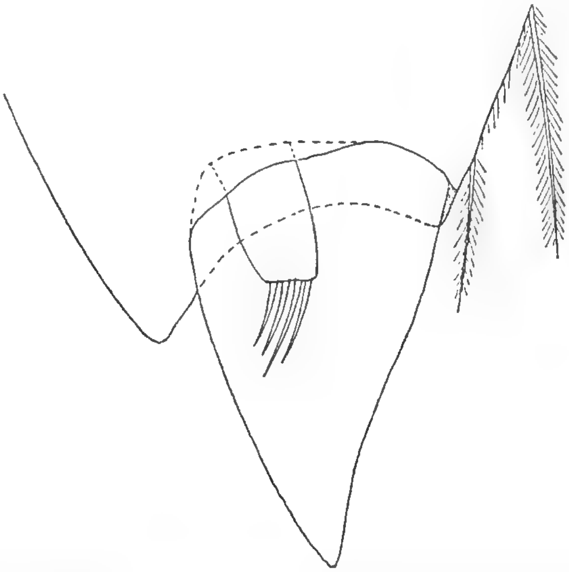

Fig. 29. *Antarcturus furcatus* (STUD.). Tip of the right uropod, seen from the inner side, 95 ×.

Second, third and fourth pairs of pereiopods. Basipodite increasing, but propodus decreasing in length from the second to the fourth pereiopod. Basipodite, ischium, merus and, as a rule, also the propodus, with a spine at its upper distal angle, the basipodite being furnished also with an additional long spine on the upper margin and a few other small spines or tuberculae. Propodus on the second to fourth pereiopods slightly shorter than the carpus, being on the fourth pereiopod about one-third shorter than the carpus. Dactylus slightly more than half the length of the propodus. Length of the dorsal claw (on the second pereiopod) about one-fourth the length of the dactylus; the ventral claw is about one-fourth as long as the dorsal one.

Fifth, sixth and seventh pairs of pereiopods. Basipodite decreasing in length from the fifth to the seventh pereiopod, its upper margin with numerous small spines. Ischium and merus with their upper distal angles prolonged into spines. Dactylus slightly less than three-fourths as long as the propodus. Length of the dorsal claw about one-fifth the length of the dactylus and about five times as long as the minute ventral claw.

First pair of pleopods. Coxopodite about twice as broad as it is long. Basipodite with a lateral row of 5—7 large spines plus 2—5 smaller spines; its inner margin with 11—13 coupling-setae. Exopodite and endopodite in the female large and subequal in length, provided with long plumose setae on the distal, lateral and inner margins.

Exopodite in the adult male subrectangular, of a uniform width, slightly curved, with inner margin slightly convex and outer margin slightly concave, distal margin convex. Inner proximal angle provided with short »hairs». Distal margin and distal part of the inner margin furnished with long plumose setae, lateral margin with long branchless setae. Diagonal furrow narrowing towards its distal end, almost closed at its mouth. At the latero-distal angle of the exopodite anteriorly from the mouth of the diagonal furrow there is a characteristic projecting rounded lobe.[1] Laterally from the proximal end of the furrow there is a shallow cavity on the posterior surface. Endopodite in the male exactly similar to that in the female.

Second pair of pleopods. Coxopodite short; basipodite wider than it is long, its lateral margin lacking spines, but provided with some plumose setae. Exopodite reaching a little further back than the endopodite. Penial filament (in a 32.5 mm. long specimen) reaching the distal margin of the exopodite.

Third pair of pleopods. Exopodite with a small incision in its lateral margin (as in *A. franklini* (HODGSON), cf. Fig. 33 d); the lateral margin is furnished with some short setae (of the plumose type, but only provided with sparse and short sub-branches).

Fourth and fifth pairs of pleopods. Exopodite and endopodite similar to each other, margins with sparse and short setae.

Uropods (Fig. 29). Lateral surface of the sympodite with scattered spines. Lateral ramus longer than it is broad, with a pointed end, and about three times as long as the small, »secondary» ramus, which is furnished with four branchless setae.

Remarks. TATTERSALL (1921, p. 239) states that *A. furcatus* (STUD.) »is very closely related to *A. polaris* (HODGS.), but may be distinguished from that species by the different armature of the body, the longer second antennae and the longer terminal spines on the abdomen». It may be inferred from the descriptions of *A. furcatus* by STUDER (1884) and BEDDARD (1886), compared with the figures of the same species (STUDER 1884), that in *furcatus* the pairs of dorso-lateral spines on the first four pereion segments attain a considerable size, exactly as in *polaris*. I found that this pair of spines on the first four pereion segments was liable to a considerable degree of variation, being in some specimens almost as large as the pleural pair, whilst in other specimens they were scarcely longer than the small surrounding spinules (see p. 130).

Even the lengths of the terminal spines on the pleotelson vary to a degree which makes it impossible to take the length of these spines as basis of distinction between *furcatus* and *polaris*.

As regards the antennae they are always longer than the body in adult specimens of *furcatus*; in young specimens they are, however, subequal in length to the body. TATTERSALL (1921, Pl. VIII, Figs. 3 and 4) figures a young specimen of *polaris* having in one figure the antennae shorter, in the other slightly longer, than the body. Small specimens of *furcatus* of about the same length as the specimen figured by TATTERSALL agree well with one of his figures and differ only from his other figure in having the antennae slightly longer. HODGSON (1902) figures his species *polaris* with the antennae appreciably shorter than the body.

The first pleopods and the uropods are very characteristic in *A. furcatus*. In the structure of these appendages, as well as in the length of the joints of the pereiopods and their claws, both the young and the adult specimens of *furcatus* agree with one another.

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[1] TATTERSALL, 1921, Pl. VIII Fig. 2.

On comparing the pereiopods and the first male pleopods in *furcatus* and in specimens of *polaris* from the British Antarctic Expedition, I could find no differences. The uropods also are very similar in *furcatus* and *polaris*, the only difference being that in *polaris* the »secondary» ramus is slightly longer. In the specimen of *polaris* examined it was about half as long as the lateral ramus. The differences between *furcatus* and *polaris* are thus very small, the latter being characterized only by its slightly shorter antennae and by the slightly greater length of the »secondary» ramus of the uropod. In my opinion, therefore, *polaris* should be regarded as a variety of *furcatus*.

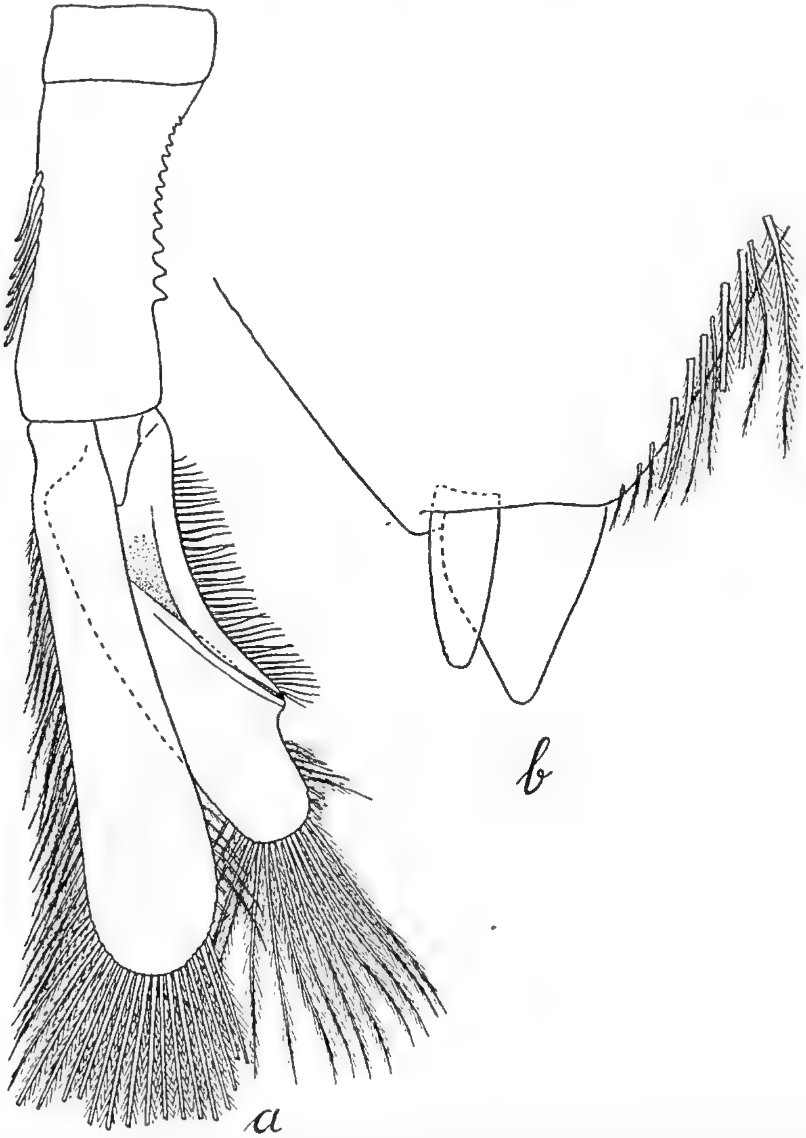

Fig. 30. *Antarcturus spinosus* (BEDD.). a. Right first pleopod of an adult male, from the caudal side (specimen from the »Challenger» Expedition), 15 ×. b. Tip of the right uropod, seen from the inner side (ovigerous female from the »Challenger» Expedition), 35 ×.

I found, on the other hand, that the species *spinosus* (Beddard)[1], which is rather similar in its spine-armature to *furcatus*, is easily recognized by its characteristic uropods and first male pleopods (Fig. 30 a and b).

Localities and Material.

St. 6. Graham Region, S. W. of Snow Hill Island, lat. 64° 36′ S., long. 57° 42′ W. 125 m. Stones and gravel. $^{20}/_{1}$ 1902. 9 specimens, males and females. Fourth pereion segment somewhat longer than the third. Dorso-lateral pair of spines on the first four pereion segments as a rule long, but varying in length, being, in the largest (35 mm. long specimen) not much longer than the surrounding small spines. Terminal pair of spines on the pleotelson short, slightly more than half as long as the pleotelson; in some of the specimens a pair of dorso-laterally situated spines on the pleotelson are longer than other spines on the pleotelson, except the terminal pair. Length of the largest specimen 35 mm (female with a fully developed marsupium).

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. 2 specimens, female with fully developed marsupium and immature specimen. The mature female is 37 mm. in length. Its fourth pereion segment is very slightly longer than the third. Dorso-lateral pair of spines on the first four perion segments not much longer than the small surrounding spines. Terminal pair of spines subequal in length to the pleotelson. A pair of dorso-lateral spines on the pleotelson are longer than the other spines, except the terminal pair. The immature specimen is 11 mm. in length. It agrees with the figure by Tattersall (1921, Pl. VIII, Fig. 4.) Antennae slightly longer than the body, no small spines in a transverse row posteriorly on the head. Dorso-lateral pair of spines on the first four pereion segments almost as long as the pleural pair of spines. Pleotelson with a pair of dorso-lateral spines longer than the others, except the terminal pair.

St. 20. South Georgia, Antarctic Bay, lat. 54° 12′ S., long. 36° 50′ W. 250 m. Small stones. $^{6}/_{5}$ 1902. 2 male specimens. Length of largest specimen 32.8 mm. Fourth pereion segment slightly longer than the third. Dorso-lateral pair of spines on the first four pereion segments not very long, but distinctly longer than the surrounding small spines. Terminal spine-pair on the pleotelson not much shorter than the pleotelson. Pleotelson with a pair of dorso-lateral spines very slightly longer than the other small spines.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay, also some algae. $^{14}/_{5}$ 1902. 2 immature specimens, the longest 11.5 mm in length. Agreeing with the immature specimen of var. *polaris* figured by Tattersall (1921), except that the antennae are distinctly longer than the body, being 14 mm in the specimen of a length of 11 mm. No transverse row of spines posteriorly on the head. Dorso-lateral spines on the first four pereion segments long. A pair of dorso-lateral spines on the pleotelson longer than the other spines, except the terminal pair.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 5 specimens, males, females and immature specimens. Largest specimen, an adult male, 36 mm in length. It has the fourth pereion segment subequal in length to the third; first four pereion segments provided with about two transverse rows of small spines on the posterior transverse elevation. One sub-adult female 28.5 mm in length has long dorso-lateral spines on the first four pereion segments. A young specimen 21.5 mm in length has the fourth segment slightly longer than the third; the dorso-lateral spines on the first four pereion segments are long.

Distribution. Shag Rock Bank (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.), Kerguelen (Studer 1884, Beddard 1886, zur Strassen 1902, Vanhöffen 1914), Heard Island (Beddard 1886), Antarctic Ocean SSE of Kerguelen lat. 65° 42′ S. long. 79° 49′ E. (Beddard 1886), Victoria Land (Tattersall 1921), Graham Region (Sw. Ant. Exped.).

The species is here recorded for the first time from Shag Rock Bank, South Georgia and Graham Region.

Distribution of the var. *polaris:* Victoria Land (Hodgson 1902, Tattersall 1921), Ross Sea (Tattersall 1921), Graham Region (Richardson 1913).

Antarcturus furcatus has been found at varying depths, from 10 m (Vanhöffen 1914) up to 1675 fathoms (by the Challenger Expedition, Beddard 1886).

The var. *polaris* has not been found at a greater depth than about 300 fathoms (Tattersall 1921). Richardson (1913) records it from a depth of 200—460 m.

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[1] Some specimens of *spinosus* were examined by me at the British Museum.

Antarcturus americanus (BEDDARD, 1886).

Text. fig. 31 a—g.

Arcturus americanus. BEDDARD, 1886, p. 104—105, Pl. XXIII, Figs. 5—8; BENEDICT, 1898, p. 48; OHLIN, 1901, p. 269—270, Pl. XX, Fig. 3.

Diagnosis. Body very granular, provided with a pair of small spines on the head and two dorsal spines on each pereion segment. Ventral surface of fifth pereion segment with a spine directed downwards. Ventral surface of seventh pereion segment spineless. Dactylus of the second, third and fourth pereiopods about half as long as the propodus, its dorsal claw only about one-third as long as the dactylus. Seventh pereiopod (especially its last two joints) much stronger in the adult male than in the female. Penis basally broad and sub-rectangular, narrowing abruptly at about two-thirds of its length, where the lateral margins make an incision; distal part of the penis, narrow, tapering towards the rounded end. Lateral margin of the basipodite of the first pleopod in the male with a row of seven spines, in the female with ten spines; exopodite with a very narrow furrow, and with its inner proximal angle smooth and irregularly rounded. Lateral ramus of the uropods distally rounded, slightly more than twice as long as the »secondary» ramus, which is distally truncate and furnished with three ciliated setae.

Supplementary Description.

Coxal plates. Those on the second, third and fourth segments markedly granulate; those on the second and third segments are posteriorly produced into a small triangular elongation directed inwards and downwards. The coxal plates of the fourth pereion segment in the ovigerous female are elongated posteriorly into very long and markedly granulate triangular processes, directed inwards and supporting the marsupium. In the male these processes of the fourth coxal plates are missing and the coxal plates are posteriorly fused with the sternum.

Antennulae. Reaching approximately to the third peduncular joint of the antennae. First joint broad and dorsally granulate, ventrally flat and smooth. Second and third joints smooth and narrower than the first, together about as long as the first joint and subequal in length to the flagellum.

Antennae. First peduncular joint short and not visible from above. Second joint short, broader than the first, markedly granulate, ventrally with one rostral and one caudal triangular distal projection. Third joint about twice as long as the second, dorsally and laterally granulate. Fourth joint about two and a half times as long as the third. Fifth joint very slightly shorter than the fourth. The flagellum is only about one-third the length of the last peduncular joint (in a female having a length of 21.8 mm.).

First pair of pereiopods. Dactylus apart from the claw, not quite two-thirds the length of propodus, and provided with dense and long two-pointed setae, most of the setae furnished with two rows of short triangular sub-branches. Tip of dactylus with one long dorsal and one short ventral claw, the dorsal claw being only about one-fifth longer than the dactylus. Between the claws there are two short setae.

Second pair of pereiopods. Basipodite dorsally and caudally with small spines; ischium, merus and carpus with a dorsal row of small spines.. Carpus and propodus subequal in length. Dactylus about half as long as the propodus. Tip of dactylus with three claws, a long dorsal and two short ventral ones; between the claws there are two setae. The dactylus is about three and a half times as long as the dorsal claw.

Third pair of pereiopods (Fig. 31 a). Dorsal surface of the basipodite, ischium, merus and carpus (usually also of the propodus) provided with small spines, varying, however, greatly in different specimens. Propodal joint slightly shorter than the carpus. Dactylus about half as long as propodus. Tip of dactylus with four claws (Fig. 31 a), one long dorsal, two short ventral ones on the distal margin, and an additional claw on the ventral margin at a short distance from the distal margin. Length of the dorsal claw not quite one-third as long as the dactylus. One seta distally.

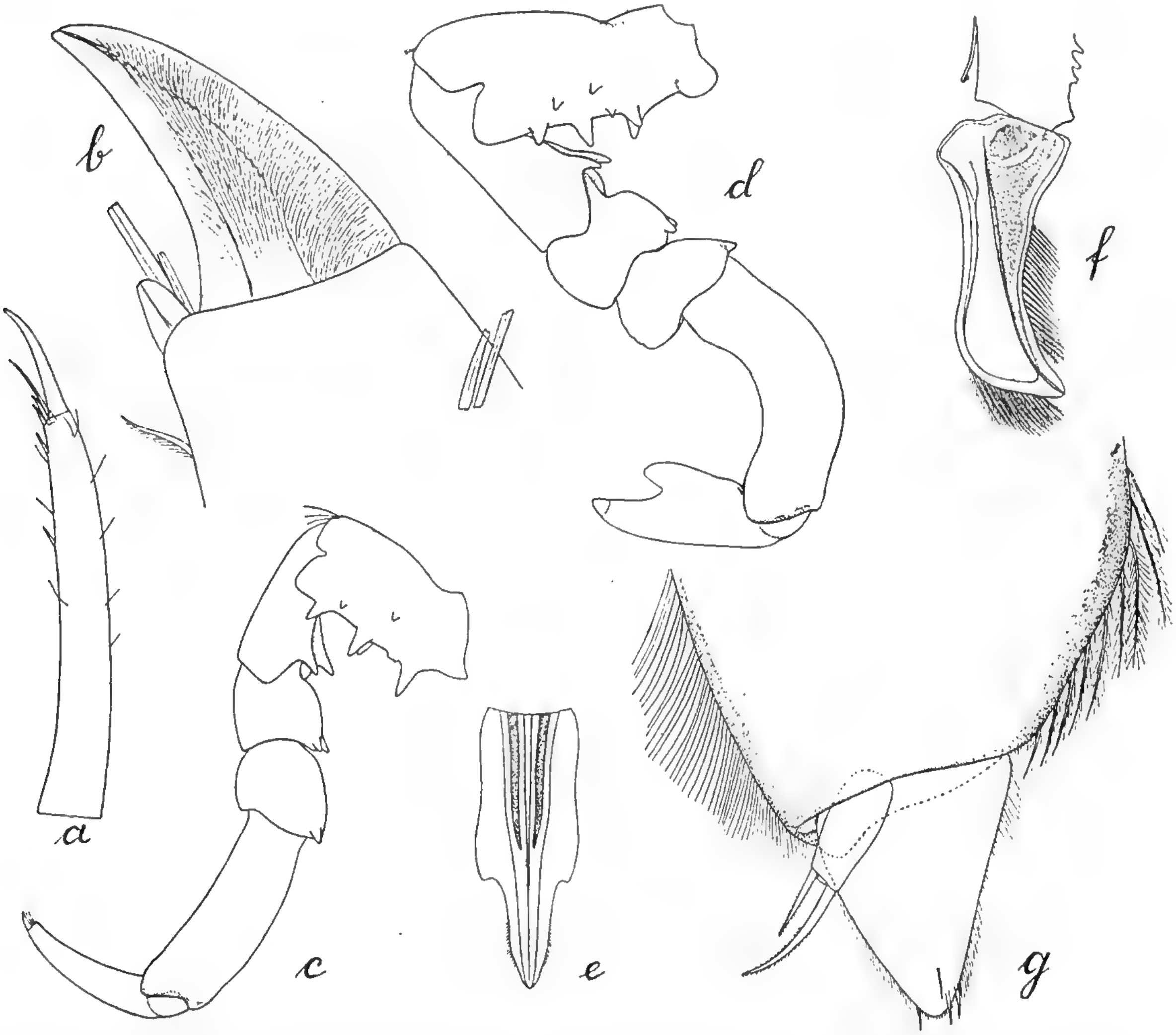

Fig. 31. *Antarcturus americanus* (BEDD.). a. Dactylus of the third periopod, female with a marsupium, 45 ×. b. Tip of the dactylus of the fifth pereiopod, immature female, 240 ×. c. Left seventh pereiopod, seen from the rostral side, in a female (the basipodite figured in a somewhat oblique position), 17 ×. d. Left seventh pereiopod, seen from the rostral side, in an adult male, 17 ×. e. Penis, 17 ×. f. Exopodite and distal part of the basipodite of the first pleopod in an adult male; seen from the caudal side, 17 ×. g. Tip of the right uropod, seen from the inner side (female), 80 ×.

Fourth pair of pereiopods. Basipodite, ischium, merus and carpus with spines dorsally. In the ovigerous female the basipodite is somewhat curved, closely following the marsupium. Propodus somewhat shorter than carpus. Dactylus, apart from the claw, slightly more than half the length of propodus. Distal margin of dactylus provided with one long dorsal claw and three small ventral ones. A row of four small claws, of the same kind as those on the distal margin, extends along the distal part of the ventral margin. Length of the dorsal claw about one-fourth the length of the dactylus.

Fifth and sixth pairs of pereiopods. Basipodite with a large number of small spines. Dactylus slightly shorter than the propodus. Tip of dactylus (Fig. 31 b) provided with two claws, a short and strong dorsal one and a minute ventral claw. Between the claws there are two setae. The dorsal claw is not quite one-third as long as the dactylus.

Seventh pair of pereiopods. (Figs. 31 c and d). In the *female* (Fig. 31 c) the seventh pereiopod is similar to the fifth and sixth.

In the *adult male* (Fig. 31 d) it is stronger than in the female, the merus and carpus being broader, and the propodus curved, having its lower margin concave and upper margin convex. The dactylus is broad and flattened and distally bilobate. It is probable that this transformation of the seventh pair of pereiopods in the adult male is due to their being employed for clasping the female during copulation. The curved propodus, especially, indicates that the seventh male pereiopods are used for this purpose.

Penis (Fig. 31 e). Differs from the usual type in the genus. Proximally it is broad. The distal third of the organ narrows abruptly and tapers towards the narrowly rounded end. The vasa deferentia are broad.

First pair of pleopods (Fig. 31 f). Basipodite in the male with a lateral row of seven spines, in the female ten spines. Coupling setae on the inner margin of the basipodite in the male 13, in the female 11. Exopodite of the male (Fig. 31 f) with lateral margin concave, inner margin proximally concave, and distally convex, inner proximal angle irregularly rounded and lacking »hairs». Distal margin furnished with plumose setae; lateral margin also setiferous, but only a few distally situated setae being plumose. The diagonal furrow on the exopodite is very narrow; its mouth is not surrounded by projecting lappets. The exopodite resembles the one found in *Pseudidothea bonnieri* OHLIN[1], but its outer distal angle is not so elongated and more obtuse.

The endopodite is of the usual shape in the genus; in the male it is somewhat longer than the exopodite.

Uropods (Fig. 31 g). Sympodite laterally granulate; distal part of the upper margin setiferous; distal part of the lower margin provided with plumose setae. Lateral ramus subtriangular, distally rounded; margins provided with fine »hairs» and a few short setae proper distally. »Secondary» ramus subrectangular, half as long as the lateral ramus; its distal margin straight and provided with three ciliated setae.

Remarks. The male of the species was first described by OHLIN (1901), who states that the male is smaller than the female and differs from it in having the dorsal rows of spines on the pereion much longer. The male specimen examined by OHLIN (1901), which was 12.5 mm in length, was probably not adult, since the material from the Swedish Antarctic Expedition contains an adult male specimen 25.5 mm long. This

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[1] OHLIN, 1901, Pl. XXI, Fig. 6 pl 1 and 6 pl. 1².

large male specimen, however, had no longer spines than the adult female and much shorter ones than in the male specimen examined and figured by OHLIN (1901). This shows that in the species there is noticeable variation in the length of the spines.

BEDDARD (1886) points out that the species comes close to *A. coppingeri* (MIERS), from which species it differs in having two rows of dorsal spines on the pereion. These spines are, however, insignificant in *A. americanus*.

Localities and Material.

St. 39. Falkland Islands, Port William, lat. 51°, 40′ S., long. 57° 41′ W. 40 m. Sand and small stones with algae. 4/7 1902. 3 specimens: adult male, length 25.5 mm.; ovigerous female, length 25 mm; sub-adult female length 21.8 mm.

Distribution. S. Patagonia (BENEDICT 1898), Eastern part of Magellan Straits (OHLIN 1901), East of Magellan Straits (BEDDARD 1886), Falkland Islands (Sw. Ant. Exped.).

Not previously recorded from the Falkland Islands. Found at depths from 40 m—100 fathoms and known only from a comparatively restricted area. The supposition of OHLIN (1901), that a restricted distribution is characteristic of all species of *Antarcturus* has, however, not proved to be correct.

Antarcturus brunneus (BEDDARD) var. **spinulosus** n. var.

Pl. II, Fig. 11; Text. figs. 32 a—h.

Diagnosis. Body very spinous. Four spines on the dorsal surface of the head are situated in such wise as to form the points at the angles of a square. First four segments of the pereion posteriorly with a dorsal, a dorso-lateral and a lateral pair of spines and with other additional spines; first, second, and third segments with a single spine in the middle line between the dorsal spine-pair. Fourth segment with two spines between the dorsal spine-pair. Second, third and fourth segments with two spines anteriorly on the dorsal area; in addition a number of other spines laterally on the four anterior segments. Last three segments of the pereion posteriorly with a transverse row of eight spines, the most lateral ones situated on the coxal plates. The anterior three segments of abdomen each with a transverse row of about eight spines, the pleotelson covered with spines rather irregularly situated, but always with two short terminal spurs. Fifth pereion segment ventrally with a tuberculum, seventh pereion segment ventrally with a spine, directed backwards. Dactylus of second and third pereiopods rather more than two-thirds the length of the propodus, the dorsal claw about one-fourth the length of the dactylus. Basipodite of the first pleopod with a lateral row of 7 or 8 rather strong spines, those in the middle of the row being strongest. Exopodite of first pleopod in the male slightly tapering towards the broadly rounded end, its inner margin almost straight, its lateral margin concave; diagonal furrow rather broad; a faint rounded lappet on the margin distally from the mouth of the furrow. Lateral ramus of the uropod subtriangular with distal end rounded; »secondary» ramus of the uropod approximately half as long as the lateral ramus and furnished with five setae.

Description.

Types. ♀ with fully developed marsupium, length 16 mm.,
♂ length 11.5 mm.

Body and spine-armature of the female (Pl. I, Fig. 11).

Head. Fused with the first pereion segment but demarcated by a shallow groove, which almost vanishes dorsally. Anterio-lateral angles rounded, furnished with a small spine. Lateral margins straight. Eyes large, black, subtriangular. Dorsal surface of the head with four large spines situated in such wise as to form the points at the angles of a square.

First pereion segment. The posterior transverse elevation is provided with six spines, a dorsal, a dorso-lateral and a lateral (pleural) spine, one on either side of the middle line. The dorsal spines are the largest, the lateral ones the smallest. There is on either side a small spine between the dorso-lateral and the lateral spine, but situated further back. The anterior area is provided with a dorsal spine in the middle. There is, as a rule, no spine in the middle between the dorsal pair of spines on the posterior elevation, but such a spine does occur in one of the specimens. Pleural parts not much projecting, occupying about two-thirds of the segment laterally and anteriorly. Lateral margin with a small ventral incision (Fig. 32 a).

Second pereion segment. With a dorsal, a dorso-lateral and a lateral pair of spines on the posterior elevation, two large spines, on the anterior dorsal area, one on either side of the middle line, and three small spines around the large lateral spines, situated anteriorly, posteriorly and medially of the latter, (the spine situated medially from the lateral spine is likewise situated between the lateral and dorso-lateral spine, but further back). The dorso-lateral spine-pair is larger than that of the first segment. The dorsal pair of spines on the posterior elevation is situated at a greater distance from each other than on the first segment. A large spine is situated in the middle line between the dorsal pair of spines. The triangular pleurae comprise about three-fourths of the length of the segment anteriorly.

Coxal plates with a ventral incision, smooth or with two small submarginal spines.

Third pereion segment. The longest. Spine-armature much as on the third segment, but the posterior dorsal pair of spines, as well as the two spines on the anterior dorsal area, are situated at a greater distance from each other than on the second segment. Around each of the large lateral (pleural) spines there are four small spines, two anteriorly and two posteriorly. Pleurae triangular, comprising anteriorly about two-thirds of the length of the segment.

Coxal plates smooth, divided into an anterior and a posterior part by an incision, which passes into a distinct suture.

Fourth pereion segment. More spinous than the preceding segments. The two spines on the posterior elevation, which on the preceding segments are situated dorsally, are on the fourth segment situated further apart from one another, thus assuming a dorso-lateral position. Between the two spines are two smaller spines close to each other, one on either side of the middle line, instead of the single spine in the middle on the preceding segment. The pair of spines corresponding to the dorso-lateral pair on the preceding segments is represented by two adjacent spines on either side, situated in a longitudinal row. Lateral (or pleural) pair of spines as on the preceding segments. Posteriorly from the lateral spines there are two smaller spines, one of them situated at the posterio-lateral

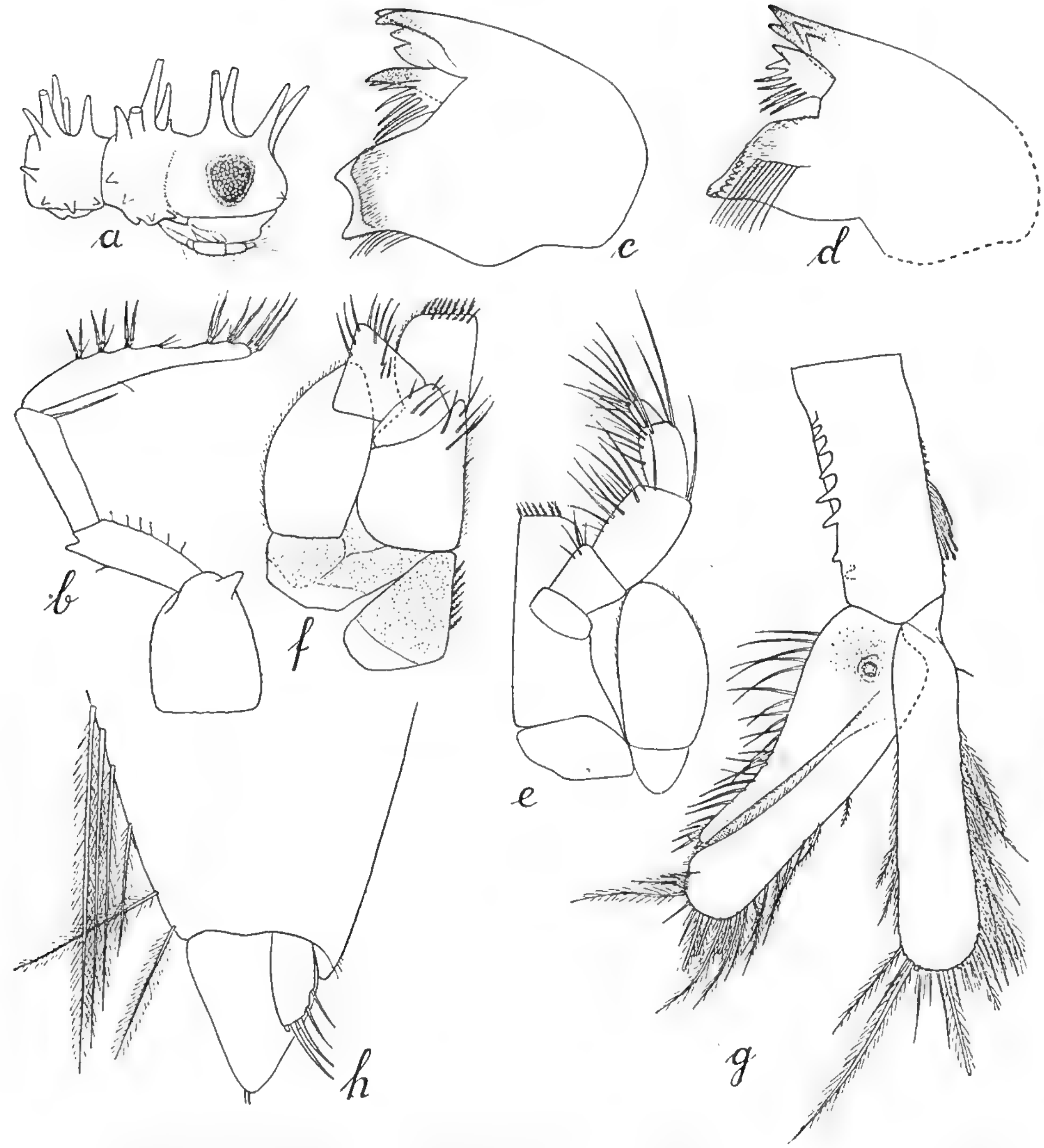

Fig. 32. *Antarcturus brunneus* (Bedd.) var. *spinulosus* n. var. a. Head and first two segments of the pereion, in a lateral view, immature specimen, 8 ×. b. Right antennula, in a female, 30 ×. c. Left mandible, seen from the posterior side, 80 ×. d. Right mandible, seen from the anterior side, 80 ×. e. Left maxilliped, male, 45 ×. f. Right maxilliped (except the last three joints of the palp), female with marsupium, 30 ×. g. First pleopod, (except the coxopodite), in a male; from the caudal side, 35 ×. h. Tip of the left uropod, seen from the inner side, 80 ×.

angle of the segment. The anterior part of the segment is provided with a transverse row of eight spines, of which the two dorsal ones, one on either side of the middle line, are the largest. Two spines of the row on each side are situated anteriorly from the large pleural spines. The pleurae on this segment comprise about half of the lateral sides of the segment.

Coxal plates often spinous, furnished with a small ventral incision. In the female with a marsupium they are prolonged posteriorly into wing-shaped protuberances directed medially. Each projection is provided in the middle of its posterior margin with a small spine directed backwards.

Fifth to seventh pereion segments. Each segment with a transverse row of large spines, consisting of six on the tergum (dorsally, dorso-laterally and laterally situated), and of a large spine on each of the subrectangular coxal plates. Additional small spines occur laterally on the segments and on the coxal plates.

Abdomen. Its length is subequal to that of the four preceding segments together. Three anterior segments are indicated by grooves, these segments taken together being somewhat shorter than the pleotelson. The groove between the third segment and the pleotelson is faint and almost absent dorsally. The three anterior segments are provided each with a transverse row of eight spines, there being in addition some small irregularly situated spines laterally. One lateral spine on each side at the junction of the third segment with the pleotelson is larger than the others.

The pleotelson is covered with spines, somewhat irregularly situated but approximately corresponding to eight longitudinal rows. There are two larger apical spines directed backwards and upwards on each side of the tip. The small tip of the pleotelson is situated somewhat lower than the rest of pleotelson; it is subtriangular, has its distal margin rounded, and is devoid of spines.

Body and spine-armature ot the male.

The males differ from the females in having a smaller number of small spines and in having the fourth pereion segment, as a rule, longer than the third. They also differ in being devoid of the wing-shaped protuberances of the fourth pair of coxal plates, which in the ovigerous female support the marsupium. As a rule, the spinules around the large pleural spines on the second and third pereion segments are absent. The fourth pereion segment has spine-armature similar to that in the female, but some of the small spines found in the female are wanting. Thus anteriorly on the segment there are only four spines, and behind the pleural spines only two, one of them as in the female situated at the posterio-lateral angle.

Variation of the spine-armature.

The small spines laterally on the segments are very variable in number and in situation, but the spines are as a rule, larger and more numerous in large specimens. The four dorsal spines on the head vary in length. In some of the specimens there are, on either side, laterally from the posterior pair of large dorsal spines on the head, two or three additional spines or tuberculae. In one specimen there were two spines, instead of only one between the posterior dorsal spine-pair on the second segment. In another specimen there was a spine in the middle even on the first pereion segment. The spines are sometimes slightly »hairy» distally. The coxal plates are smooth in some specimens, in others provided with small spines.

Apppendages.

Antennulae (Fig. 32 b). Reach approximately two-thirds the length of the third peduncular joint of the antennae. The first three joints are subequal in length. The first peduncular joint is, as usual in the genus, broad and three-sided, having an upper, an inner and outer ventral surface; dorsally near the inner distal angle it is usually provided with a spine. Flagellum (in female) not quite as long as the last two peduncular joints together and furnished with eight groups of sensory filaments and setae.

Antennae. Somewhat longer than the body. First peduncular joint very short and devoid of spines. Second peduncular joint three-sided, having a dorsal and slightly caudal, a caudal-ventral and a rostral-ventral surface; dorsal surface provided with two spines; there is a spine at each of the distal-rostral and the distal-caudal angles. Third peduncular joint caudally (laterally) with a row of about five spines, and ventrally with three or four; distal end of the fourth peduncular joint provided with a spine; fifth peduncular joint devoid of spines. The proportion between the lengths of the peduncular joints was in a female (16.5 mm in length): 0.4: 2.3 : 5 : 6.7 : 5.7. Flagellum about as long as two-thirds of the last peduncular joint, consisting in adult specimens of about 10 joints.

Mandibles (Fig. 32 c and d). Normal.

First pair of maxillae. Normal.

Second pair of maxillae. Normal. The two lappets of the outer lobe are proximally together subequal in width to the inner lobe; each of the lappets is provided with three apical setae. The apical setae on the inner lobe are situated in three rows, one marginal row on the distal margin and one submarginal row on either side. Two setae at the inner distal angle are the largest.

Maxillipeds (Figs. 32 e and f). Normal. In the female with a marsupium (Fig. 32 f) the coxopodite and the proximal epipodite are expanded and the inner margin of the coxopodite is furnished with a row of plumose setae.

First pair of pereiopods. Normal. Propodus and dactylus provided with dense, two-pointed setae, those on the propodus furnished with two rows of short triangular sub-branches. Dactylus with two claws and between the claws a claw-like seta. The dorsal claw is about twice as long as the ventral one and not quite one-third as long as the dactylus.

Second pair of pereiopods. Dorsal side of the basipodite provided with a large proximal spine and two additional spines more distally. Ischium and merus each with a spine distally on the dorsal side. Carpal joint with three spines on the dorsal side at about equal distances from each other; one of the spines is situated at the distal end. Propodus with two spines dorsally. Length of dactylus rather more than two-thirds the length of the propodus. Dactylus provided with two claws and a slender seta between the claws. The length of the dorsal claw is about one-fourth of the length of the dactylus (the proportion being 7.5: 32). The ventral claw is very short being only one-fifth the length of the dorsal one.

Third pair of pereiopods. Basipodite with four dorsal spines, ischium and merus with one, carpus with four, propodus with two, dorsal spines. Length of the dactylus rather more than two-thirds the lenght of the propodus. Dactylus with two claws, the dorsal one being about three times as long as the ventral. Between the claws there are three slender setae.

Fourth pair of pereiopods. Basipodite with two spines on the anterior side and five dorsally. Carpus with three dorsal spines, one of them situated at the distal end. Dactylus subequal in length to the propodus, furnished with two claws and between the claws two slender setae, the dorsal claw being about four times as long as the ventral one.

Fifth to seventh pairs of pereiopods. Basipodite with three or four spines and some tuberculae on the upper margin. Dactylus with two claws, the ventral one very short. Between the claws are two setae.

First pair of pleopods (Fig. 32 g). Coxopodite[1] rectangular, about three times as long as broad. Lateral margin of the basipodite provided with 7 or 8 rather strong spines, those in the middle being the strongest. Inner margin of the basipodite with 6—8 coupling-setae. Exopodite in the male very slightly decreasing in width towards the distal end; inner margin very slightly convex, almost straight; outer margin concave; diagonal furrow rather broad and wide at its mouth. Distally from the furrow there is a faintly marked rounded lobe at the lateral margin. Laterally from the proximal end of the furrow there is a distinct cavity. Distal margin and distal part of the inner margin of the exopodite furnished with plumose setae; lateral margin with branchless setae.

Uropods (Fig. 32 h). Lateral surface of the sympodite provided with small dense spines directed backwards. Lateral ramus subtriangular, distally rounded, not fully twice as long as the »secondary» ramus. »Secondary» ramus distally and somewhat ventrally rounded, but with five distinct incisions; in each incision there is a branchless seta. For further details see the figure.

Remarks. The variety *spinulosus* differs from the main species only in being still more spinous. The third pereion segment is furnished dorsally in the middle with one or two spines and on the fourth pereion segment there are 2 or 4 additional spines in the middle, which are missing in the main species. The dorso-lateral spine-pair on the fourth segment is represented by two spines on either side. The pereiopods are more spinous, the carpus having a large distal spine and 2—3 additional dorsal spines. In BEDDARD's[2] figure of one of the anterior pereiopods in the main species the carpus is provided with a single distal spine. The abundance of small spines in the variety *spinulosus*, compared with the main species, is found in all specimens up to a length of 12 mm., though, as has been shown above, there is a considerable individual variation in their size and number.

In other respects the variety *spinulosus* quite well agrees with BEDDARD's description and figures of *A. brunneus* (1886). It is of the same size as *A. brunneus* and has a slightly brownish colour, from which the name *brunneus* is derived.

A species which stands very near to *Antarcturus brunneus* var. *spinulosus* is *A. hodgsoni* RICHARDSON (1913), which is provided with a still larger number of small spines in addition to the three usual large pair of spines. The difference in spine-armature between *brunneus* var. *spinulosus* and *hodgsoni* is in itself scarcely marked enough to justify a separation of species, but *A. hodgsoni* differs also in having its body covered with long »hairs»[3]. Moreover *A. hodgsoni* is a somewhat larger species, attaining a length of 27 mm.; the greatest length in *brunneus* var. *spinulosus* is 17.5 mm.; in the main species 19 mm. (BEDDARD, 1886).

Localities and Material.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2,05°. Gravel and sand. $^{19}/_{4}$ 1902. 3 specimens (male and 2 females). Length of the two largest specimens 14 mm. (a male, and a female with semi-developed oostegits).

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay and some algae. $^{14}/_{5}$ 1902. 5 specimens, males and females. Length of largest specimen 17.5 mm. (ovigerous female).

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S.,long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 6 specimens, males and females. Length of the largest specimens (types): male 14 mm, female with fully developed marsupium 16 mm.

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[1] Not shown in Fig. 32 g.

[2] BEDDARD, 1886, Pl. XXII, Fig. 3.

[3] In *brunneus* var. *spinulosus* the spines are sometimes short-haired (see p. 141).

Distribution. Shag Rock Bank (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.).

The var. *spinulosus* was obtained at depths of 75—310 m. The main species is known only from a considerably greater depth, having been collected by the Challenger Expedition at a depth of 1,600 fathoms, off Prince Edwards Islands.

Antarcturus franklini (HODGSON, 1902).

Pl. I, Fig. 8; Text. figs. 33 a—e.

Arcturus franklini. HODGSON, 1902, p. 250—251.

Antarcturus franklini. HODGSON, 1910, ♀, nec. ♂, p. 38—40, Pl. V, Fig. 3; RICHARDSON, 1913, p. 10—11; TATTERSALL, 1921 ♀, nec. ♂, p. 240—241.

Diagnosis. Head with a pair of dorsal spines anteriorly and with a small spine at the anterio-lateral angle. First four pereion segments each with six large spines, situated dorsally, dorso-laterally and laterally. Last three pereion segments, as well as abdomen, granulate; pleotelson with a pair of terminal spines. Fifth pereion segment, as a rule, with a spine ventrally (sometimes wanting in the male). Seventh pereion segment, ventrally with a spine directed backwards. Dactylus of the second, third and fourth pairs of pereiopods subequal in length to the propodus (about $^1/_{12}$ shorter); dorsal claw on the same pairs of pereiopods short, being one-fourth to one-fifth times as long as the dactylus. Lateral margin of the basipodite of the first pleopod with a row of nine short spines; exopodite of first pleopod in the male tapering towards the rounded end; its outer margin concave, and inner margin convex; diagonal furrow narrowing towards the end; lateral margin of the male exopodite distally from the mouth of the furrow with a rather indistinct lobe. Lateral ramus of the uropod subtriangular, with distal margin rounded; »secondary» ramus of the uropod more than half as long as the lateral ramus, suboval, slightly tapering towards the end and furnished with six setae on its distal and lateral margins.

Supplementary Description.

Body and spine-armature of the adult female.

Head. Somewhat broader than long. Front margin sinuate. Anterio-lateral angles of the head rounded and furnished with a small spine. Lateral margins straight. Eyes large and protruding, subtriangular with rounded angles. Between the eyes there are two stout spines, directed upwards and slightly outwards and forwards.

Pereion. The segments increase in length and width up to the third, which is the largest, afterwards decreasing to the seventh segment. The first four segments are provided with six large spines, situated dorsally, dorso-laterally and laterally. The segments, with the exception of the first, are laterally protracted into subtriangular »pleurae».

First segment with a small spine anteriorly from the large lateral spine. Lateral margin posteriorly from the pleural spine with a small incision. Anterior dorsal area usually smooth.

Second segment with a small spine anterior to the large pleural spine. Between the dorso-lateral and the lateral spines there is a small spine, but it is situated further back. Anterior dorsal area often provided with a pair of small dorsal tuberculae. Coxal plates with a deep ventral incision. They are furnished with small spines and protracted anteriorly into a spine-like triangular prolongation.

Spine-armature of *the third segment* subequal to that of the second. Anterior dorsal area usually with two, sometimes with four, tuberculae.

On the *fourth segment* the projecting triangular pleurae comprise about four-fifths of the lateral part, anteriorly. Posteriorly from the pleurae the segment is constricted and narrowed. The two large dorsal spines are situated more laterally than on the third segment, and between them there are often two small tuberculae, one on either side of the middle line. One distinct but small spine, in contradistinction from the other segments, is situated at the posterio-lateral angle of the segment. Coxal plates spinous; their anterior parts are spine-like and prolonged. In the ovigerous female the coxal plates are posteriorly elongated into broad processes directed medially, which support the marsupium. Each process carries a small spine directed backwards.

The last three pereion segments have large subtriangular spinous and tuberculated coxal plates with their posterio-lateral ends broadly rounded. All three segments dorsally provided with a transverse row of spines and tuberculae, whilst laterally they are irregularly tuberculated. In many specimens one of the dorsal and dorso-lateral spines on either side are somewhat larger than the others.

Fifth segment ventrally with a tuberculum[1]. Seventh segment ventrally with a tuberculum directed backwards[1].

Abdomen. Three anterior segments are indicated by shallow grooves. The first three segments are anteriorly smooth, posteriorly they are provided with a transverse row of small spines. A dorsal portion anteriorly in the middle of the third segment is separated by longitudinal grooves from the lateral parts. There is a rather large spine laterally on each side of the third segment at its junction with the pleotelson.

The pleotelson is longer than the first three anterior segments together. Its tip between the terminal spurs is situated lower than the rest of the pleotelson. The pleotelson, except for the tip, is covered with small spines directed backwards; as a rule, there is one row of such spines along each of the lateral margins; otherwise they are more irregularly situated. A pair of dorso-lateral spines, at a distance from the distal end of one-third the length of pleotelson, are sometimes much larger than the others.

Body and spine-armature of the male (Pl. I, Fig. 8).

The males are very similar to the females. They differ in having the fourth segment longer than the third; on the fourth segment the pleurae occupy only somewhat more than half of the lateral parts, anteriorly. The spine-armature is similar to that in the female, but there are fewer small spines and tuberculae. Thus the spines between the dorso-lateral and lateral pair and the spines anterior to the lateral spines on segments 2—4 are lacking in the male, as is also the spine at the posterio-lateral angle of the fourth pereion segment. A pair of small tuberculae between the dorsal spine-pair on the fourth segment is often found. The anterior dorsal areas of the second, third and fourth segments, as in the female, are frequently furnished with two more or less distinct tuberculae.

The coxal plates on the second, third and fourth segments have no spines and are not protracted anteriorly into spine-like prolongations.

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[1] Sometimes absent in immature specimens and in the males.

Appendages.

Antennulae (Fig. 33 a). Extend approximately to half the length of the third peduncular joint of the antennae. First peduncular joint, as is usual in the genus, broad, being triangular in a transverse section. In the female, the flagellum is slightly shorter than the second and third peduncular joints together; in the male, it is subequal in length to these joints together. It is provided in the adult female with 10 or 11 groups of pedunculated sensory filaments and ordinary setae, in the male with 17 or 18 groups.

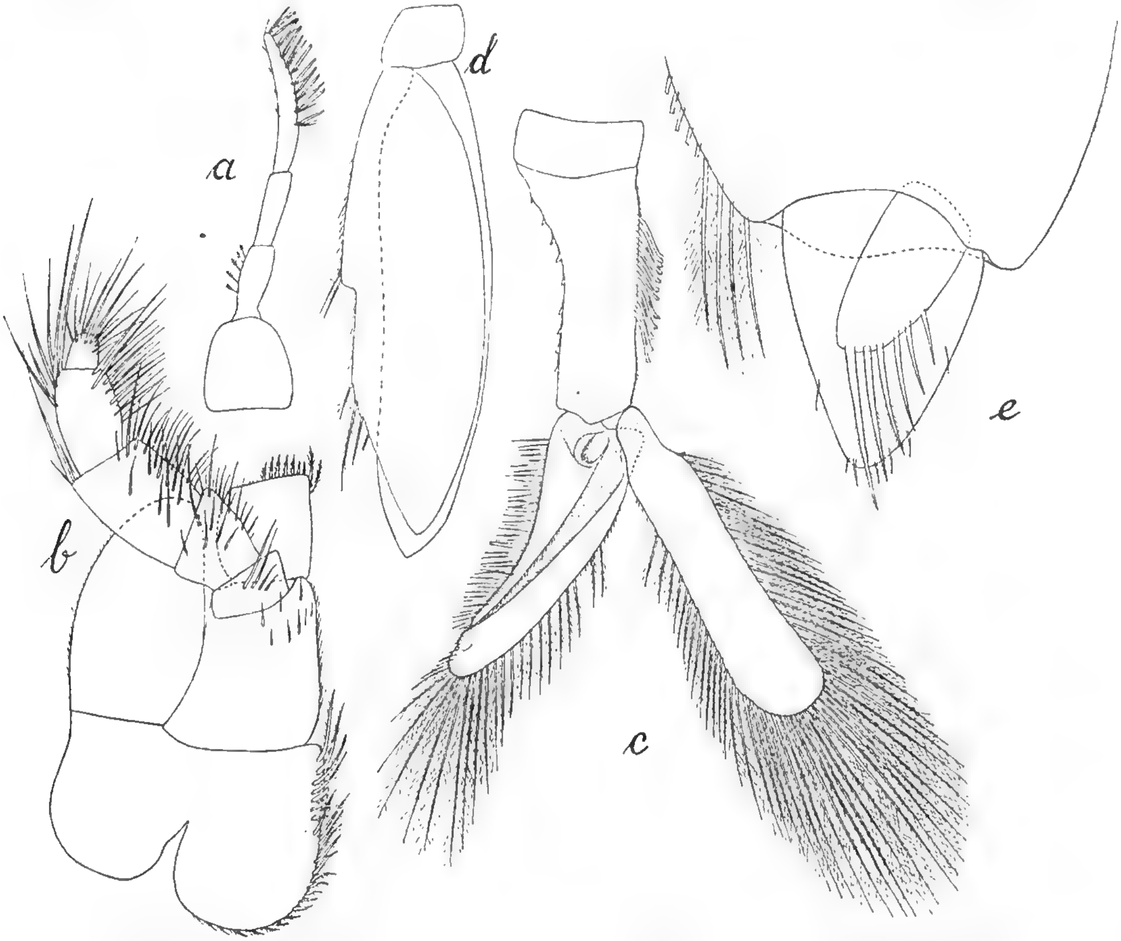

Fig. 33. *Antarcturus franklini* (Hodgs.). a. Left antennula, female, 17 ×. b. Right maxilliped of a female with a marsupium, 25 ×. c. Left first pleopod in an adult male, from the caudal side, 17 ×. d. Right third pleopod, female, 17 ×. e. Tip of the left uropod seen from the inner side (female), 80 ×.

Antennae. Third peduncular joint furnished on its caudal margin with a varying number of small spines and tuberculae. Flagellum slightly shorter than the last peduncular joint, consisting in adult females of about 10 joints, in adult males of about 12 joints, the first joint very long, being equivalent to two or three joints.

Mandibles. Normal.

First pair of maxillae. Outer lobe with about eleven apical »spines», in two rows. Inner lobe with three apical penicillated setae.

Second pair of maxillae. Outer lappet of outer lobe with five or six apical setae, inner lappet of the same lobe with three apical setae. The two lappets of the outer lobe vary greatly in different specimens; sometimes the outer, sometimes the inner lobe is the largest.

Maxillipeds (Fig. 33 b). Distal epipodite reaching to about the middle of the third joint of the palp. Coxopodite as well as proximal epipodite in the ovigerous female expanded, the coxopodite furnished with plumose setae on its inner and distal margins. Endopodite with two plumose setae on the inner margin near the distal margin.

Pereiopods. Dactylus of the first pair provided with a long dorsal and a short ventral claw, and between them a claw-like seta. Propodus and dactylus densely fringed with setae; most of the setae on the propodus, and a few on the carpus, are furnished with two rows of short triangular sub-branches and terminate in two points.

On the second, third and fourth pereiopods the dactylus is subequal in length to the propodus (approximately $^1/_{12}$ shorter), and the dorsal claw is one-fourth to one-fifth as long as the dactylus. Between the claws are one long and one short seta.

On the fifth, sixth and seventh pereiopods the dorsal claw is about one-fifth the length of the dactylus.

First pair of pleopods (Fig. 33 c). Anterior surface of the basipodite vaulted, posterior, surface flattened, its lateral margin with nine small spines, inner margin with about 11 coupling-setae.

Exopodite in the male decreasing in width towards the rounded end; lateral margin concave, inner margin convex; diagonal furrow on the exopodite narrowing towards the end, its distal half provided with dense, short »hairs». Inner proximal angle of the exopodite rounded and furnished with »hairs». Laterally from the proximal end of the furrow there is a distinct cavity. Distally from the mouth of the furrow there is a faint lobe on the lateral margin. Lateral and distal margins of the exopodite with plumose setae, inner margin with branchless setae.

Endopodite in the male slightly longer than the exopodite. In the female both the rami are similar and subequal in length.

Second pair of pleopods. Coxopodite very short, forming a border proximally from the basipodite. Basipodite shorter than in the first pair of pleopods, subquadrate, somewhat broader than it is long; its lateral margin furnished with four plumose setae, inner margin with 6 or 7 coupling-setae. Penial filament in the male extending beyond the distal margin of the exopodite by almost one-third of its length.

Third pair of pleopods (Fig. 33 d). Coxopodite not distinguishable; endopodite oval, somewhat pointed, its margins without setae. Exopodite subequal to the endopodite, its lateral margin provided with a varying number of plumose setae and with an incision near the middle.

Fourth pair of pleopods. Basipodite short. Exopodite and endopodite thin, subequal, the exopodite on the inner margin near the distal end provided with a few setae equipped with sparse sub-branches; the lateral margin with about four short non-typical plumose setae almost lacking sub-branches.

Fifth pair of pleopods. Much as the fourth.

Uropods (Fig. 33 e). Lateral surface of the sympodite with scattered small spines. »Secondary» ramus more than half as long as the lateral branch; the proportion between the lengths of the rami being about 5: 3. Inner ramus suboval, tapering towards the broadly rounded end, distally and laterally with six conspicuous setae, the three more distally situated provided with short sub-branches.

Remarks. The females of this species agree in detail, even as regards the spine-armature, with the figure by HODGSON (1910, Pl. V, Fig. 3). I have also compared the species with a female specimen from the Museum in Paris, determined by RICHARDSON, and sent to me for investigation, but I found only the usual minor differences in the size and number of the small spines. Both HODGSON (1910) and TATTERSALL (1921) state that the males differ considerably from the females in being devoid of spines on the pereion. Finding that the males of *Antarcturus franklini* collected by the Swedish Ant-

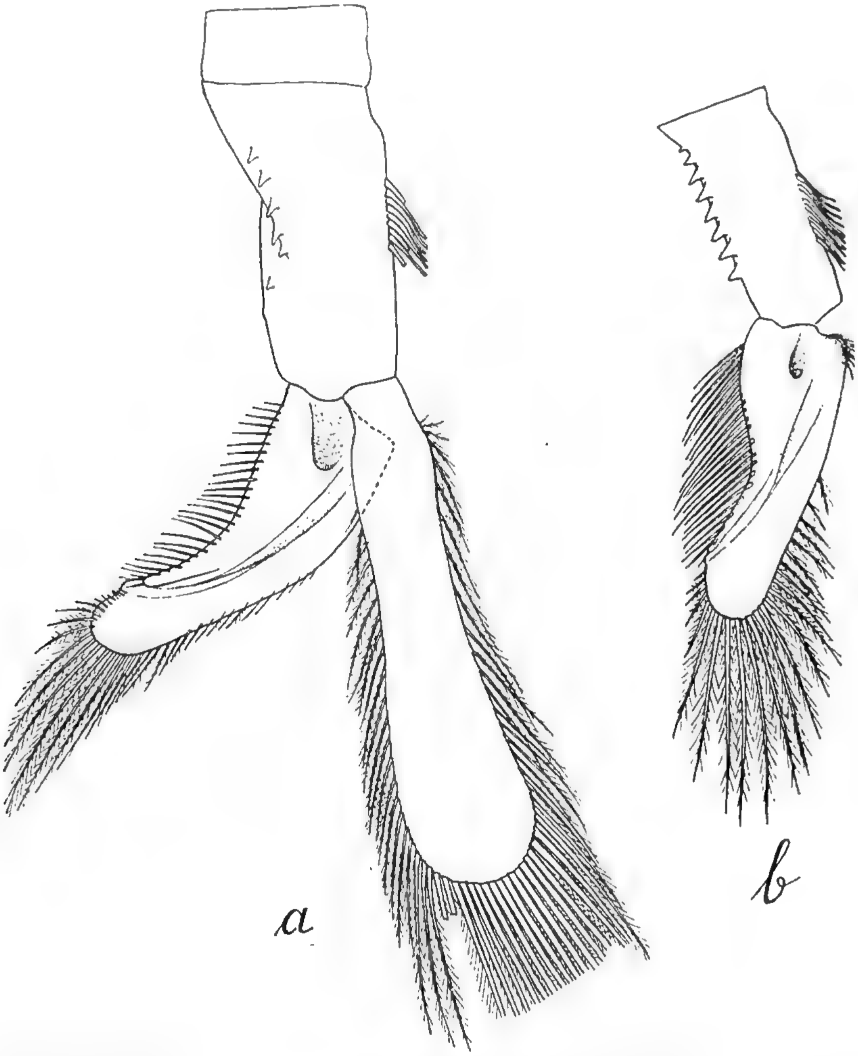

Fig. 34. *Antarcturus adaraneus* (HODGS.) a. Left pleopod of an adult male, from the caudal side, 20 ×. b. First pleopod of an adult male from the caudal side, specimen assigned by HODGSON (1910) to *Antarcturus franklini*, 20 ×.

arctic Expedition had almost exactly the same spine-armature as that of the females, I first surmised that there were two distinct races of the species differing in the spine-armature of the male sex (cf. p. 125). But after examining[1] material collected by the National Antarctic (Discovery) Expedition 1901—1904 and by the British Antarctic (Terra Nova) Expedition 1910, determined as *Antarcturus franklini* by HODGSON (1910) and TATTERSALL (1921), I came to the conclusion that the males previously referred to *A. franklini* are another closely allied species. Though their uropods and pereiopods scarcely differ, the first male pleopods are very dissimilar to those characteristic of *A. franklini.* The first male pleopod in the supposed *A. franklini* (see Fig. 34 b)[2] agrees with that which I found to characterize *A. adaraneus* (HODGSON) (see Fig. 34 a), a species of which I was able to study a few specimens at the British Museum. The males previously referred to *A. franklini* belong therefore in all likelihood to *A. adaraneus.* The spine-armature also bears out the correctness of this supposition (cf. HODGSON 1910, Pl. V, Figs. 1 and 2 and HODGSON 1902, Pl. XXXIII, Fig. 1).

Localities and Material.

St. 16. Between Falkland Islands and South Georgia (near Falkland Islands), lat. 51° 40′ S., long. 57° 25′ W. 150 m. Sand. $^{11}/_{4}$ 1902. Immature specimen, length 12.2 mm.

St. 58. South of West Falkland, lat. 52° 29′ S., long. 60° 36′ W. 197 m. Bottom temp. + 4.1°. Sand and gravel. $^{11}/_{9}$ 1902. 31 specimens, males and females (10 specimens collected on hydroids). Length of the two largest specimens, a male and a female, about 25 mm.

Distribution. Falkland Islands (Sw. Ant. Exped.), Graham Region (RICHARDSON 1913), Victoria Land (HODGSON 1902 and 1910, TATTERSALL 1921).

The species is not previously known from the Falkland Islands or from any other subantarctic locality.

Antarcturus antarcticus BOUVIER, 1910.

Text. figs. 35 a—e.

For synonymy and literature see MONOD, 1931, p. 27.

Diagnosis. Body granulate. Head devoid of spines except, a small one at the anterio-lateral angle. Dorsal area on the first four pereion segments anteriorly elevated and ridge-like, leaving a distinct furrow between the anterior ridge-like part and the posterior ridge. Abdomen with two short terminal spines. Seventh pereion segment with a small spine ventrally. Dactylus of the first pereiopods about two-thirds the length of propodus; dactylus of the second, third and fourth pairs about half as long as propodus. Dorsal claw of the second pereiopod slightly less than one-third as long as the propodus; dorsal claw of the third and fourth pereiopods about one-third as long as that joint. Lateral margin of the basipodite of the first pleopod with four conspicuous spines. Exopodite of first pleopod in the male narrowest in the middle, and thence slightly increasing in width towards the broadly rounded end; inner margin slightly convex, lateral margin slightly concave; diagonal furrow proximally wide, but distally narrowing to a tube; distally from the mouth of the furrow there is a distinct rounded lobe on the lateral margin, marked off by a distinct incision. Lateral ramus of the uropod sub-

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[1] At the British Museum.

[2] The figure illustrates the first male pleopod of a specimen determined by HODGSON (1910) as *Antarcturus franklini.*

triangular with distal end broadly rounded; »secondary» ramus one-fifth longer than half of the lateral ramus; its distal margin obliquely truncate and furnished with six ciliated setae.

Supplementary Description.

Head. Dorsally with a distinct transverse groove and an indistinct longitudinal groove. Eyes large, black, protruding, subtriangular with rounded angles. At the anterio-lateral angles of the head there is a small spine.

Pereion. Segments both anteriorly and posteriorly with a faint ridge-like elevation, dorsally with a distinct groove between the anterior and the posterior ridge. This groove bifurcates laterally, thus demarcating on each side a triangular area. Pleurae subtriangular, faintly marked off medially by longitudinal grooves, which traverse the triangular lateral elevated areas.

The *first segment* differs from the others in having the anterior dorsal ridge divided into two ridges by a transverse groove. Pleurae on the first segment subtriangular, but indistinct; furnished with a small spine. Posteriorly from the pleurae there is a lateral incision.

Pleurae of the *second, third and fourth segments* distinct, with broadly rounded lateral margins. On the first segment they occupy about half the length of the segment, anteriorly; on the second segment the whole lateral side, on the third segment about two-thirds, on the fourth only about half of the lateral sides anteriorly.

Coxal plates on the second and third segment in the ovigerous female posteriorly somewhat produced into short subtriangular prolongations[1], following the outline of the marsupium. Posterior parts of the fourth coxal plates in the ovigerous female prolonged into broad wing-shaped processes, the ends of which almost meet behind the marsupium. In the male these broad processes are missing and the coxal plates are posteriorly coalesced with the sternite, leaving no trace of any suture.

Coxal plates of the *last three segments* large, subrectangular, not visible from above.

Abdomen. The last of the three anteriorly indicated segments is faintly divided by longitudinal grooves into a more anteriorly situated middle area, provided with about four small spines, and two larger lateral areas. The tip of pleotelson between the terminal pair of spines is situated lower than the rest of pleotelson; its distal end is somewhat concave.

Antennulae. Flagellum about as long as the second, third and half of the first peduncular joints together, furnished with 14 or 15 groups of sensory filaments and setae. The proportion between the lengths of the joints is, in both male and female, about 20 : 11 : 13 : 37.

Antennae. First joint very short. The second joint is also short, being about as long as it is broad. The third peduncular joint is about twice as long as the second, having on its caudal margin a varying number of small spine-like tuberculae. Fourth peduncular joint more than twice as long as the third, the fifth subequal in length to the fourth, but narrower.

Flagellum about one-fourth shorter than the last peduncular joint, consisting of 10 or 11 joints, the first being the longest and corresponding to three of the other joints.

Mandibles and maxillae. Normal.

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[1] These small prolongations are missing in the male.

Maxillipeds (Fig. 35 a). Normal. Palp densely setiferous, some of the setae provided with short hair-like sub-branches. Coxopodite in the ovigerous female expanded backwards into a thin, rounded lobe.

First pair of pereiopods. Densely setiferous; many of the setae provided with two rows of short triangular sub-branches. Dactylus about two-thirds as long as the propodus, furnished with two claws; the dorsal claw is about twice as long as the short ventral one, the lower margin of which is dentated. Between the claws there is a claw-like seta. The length of the dorsal claw is about two-fifths the length of the dactylus.

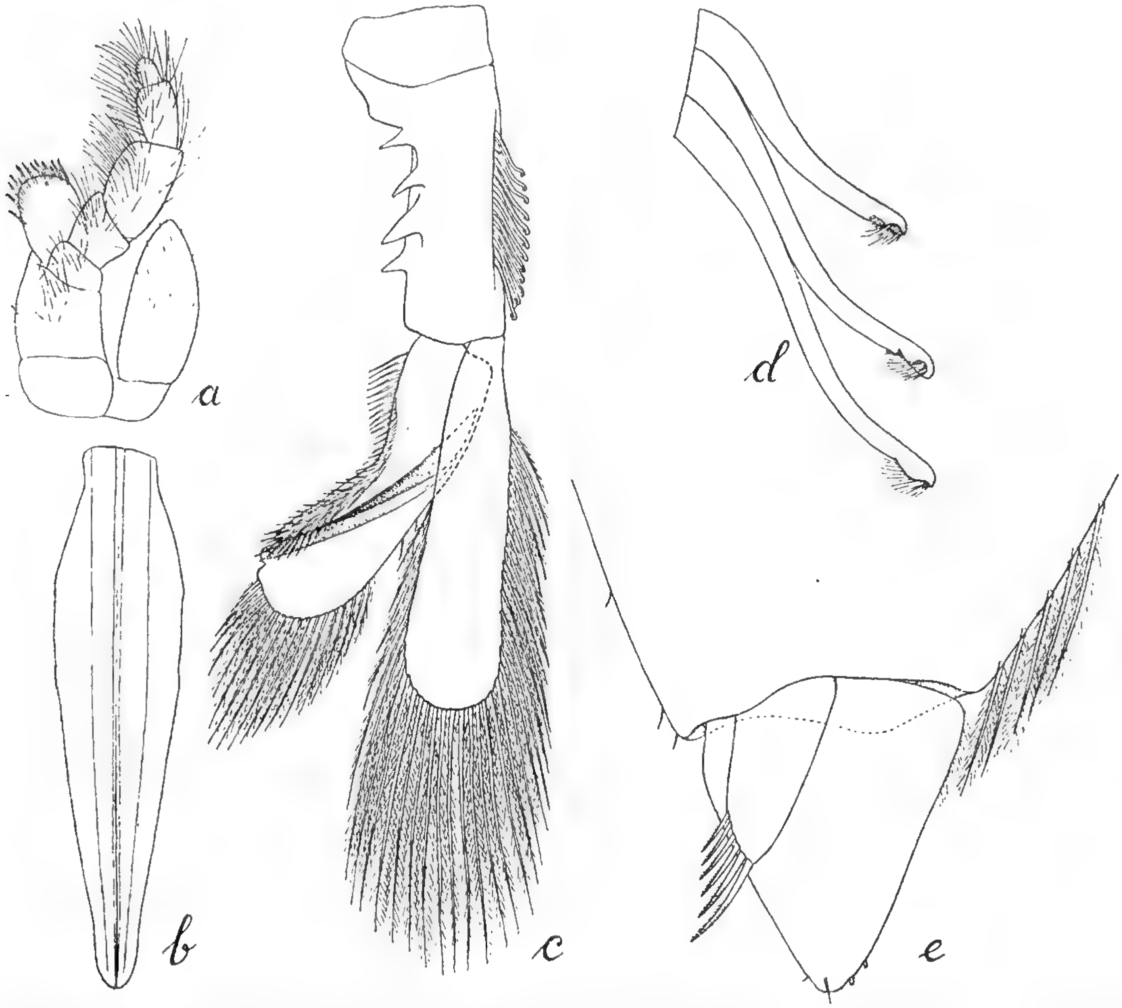

Fig. 35. *Antarcturus antarcticus*, Bouv. a. Left maxilliped in a male, 17 ×. b. Penis, 30 ×. c. Left first pleopod in an adult male, from the caudal side, 17 ×. d. Coupling-setae from the inner margin of the basipodite of the first pleopod, 140 ×. e. Tip of the right uropod, seen from the inner side (female), 80 ×.

Second pair of pereiopods. Dactylus about half as long as the propodus, furnished with two claws and a seta between the claws; the long dorsal claw is not quite one-third as long as the dactylus.

Third and fourth pairs of pereiopods. Similar to the second. Length of the dorsal claw about one-third the length of the dactylus. In one specimen the dactylus of the fourth pereiopod was furnished with four claws, two long dorsal and two short ventral ones, the most dorsally situated one being about one-fifth longer than the other dorsal claw.

Fifth to seventh pairs of pereiopods. On the last three pereiopods the dactylus is about two-thirds the length of the propodus. It is furnished with a long dorsal and a very short ventral claw, the dorsal claw being not quite one-third as long as the propodus and four and a half times as long as the ventral claw.

Penis (Fig. 35 b). Normal.

First pair of pleopods. (Fig. 35 c). Coxopodite subrectangular. Lateral margin of the basipodite provided with four large spines; inner margin with about 13 coupling-setae (cf. Fig. 35 d).

Exopodite in the male narrowest in the middle and thence slightly increasing in width towards the broadly rounded end; inner margin slightly convex; lateral margin markedly concave, and provided with short branchless setae. The same kind of setae also cover the caudal surface, distally, close to the lateral margin. Inner proximal angle of the exopodite provided with short »hairs»; distal margin and distal part of the inner margin furnished with plumose setae; diagonal furrow wide proximally, but narrowing distally to a tube; distally from the mouth of the furrow there is a distinct incision, so that a rounded lobe is formed on the lateral margin; laterally from the proximal end of the furrow the caudal surface of the exopodite is slightly hollowed.

Endopodite of the usual shape.

Second pair of pleopods. Lateral margin of the basipodite provided with plumose setae, inner margin with about six coupling-setae. Endopodite slightly longer than the exopodite. Penial filament in the male somewhat longer than the endopodite; its distal end hook-like.

Uropods (Fig. 35 e). Lateral surface of the sympodite provided with small pointed tuberculae. »Secondary» ramus one-fifth longer than half the length of the lateral ramus, slightly tapering towards the end, distally obliquely truncate and furnished with six ciliated setae.

Remarks. The species somewhat resembles *A. coppingeri* (MIERS, 1881), *adaraneus* (HODGSON, 1910), and *lilliei* TATTERSALL (1921).

The first two species differ from *antarcticus* in their sculpuring on the pereion, the dorsal area of the first four pereion segments not being elevated into a ridge; *adaraneus* is moreover furnished with spines on the head. In the latter species the first male pleopods (Fig. 34 a) have an exopodite which differs from that in *A. antarcticus* in being shorter, more strongly curved and tapering towards the end; *A. adaraneus* differs also in having the dactylus of the second, third and fourth pereiopods subequal in length to the propodus.

A. lilliei TATTERSALL is closely allied to *A. antarcticus*; it is similarly sculptured on the first four pereion segments; the length of the dactylus of the second, third and fourth pereiopods is subequal to that in *A. antarcticus*, but it differs especially in having two cephalic horns anteriorly on the head as well as in its smaller size.

Localities and Material.

St. 5. Graham Region, S. E. of Seymour Island, lat. 64° 20′ S., long. 56° 38′ W. 150 m. Sand and gravel. $^{16}/_{1}$ 1902. 7 specimens, males and females. Length of the largest specimen, about 25.7 mm. (male).

St. 6. Graham Region, Admirality Sound, lat. 64° 36′ S., long. 57° 42′ W. 125 m. Stones and gravel. $^{20}/_{1}$ 1902. 7 specimens, one adult male, females and immature specimens. Length of the largest specimen, 23.1 mm. (female with marsupium).

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. Immature specimen, length about 9 mm.

Distribution. Shag Rock Bank (Sw. Ant. Exped.), South Georgia (MONOD 1931), South Sandwich Islands (BOUVIER 1910, 1911), Graham Region (Sw. Ant. Exped.).

The species has not previously been recorded from Shag Rock Bank or Graham Region.

Antarcturus granulosus n. sp.

Pl. I, Figs. 9, 10; Text. figs. 36 a—c.

Diagnosis. Body granulate; two dorsal spines anteriorly on the head. The first four pereion segments, each with a pair of dorsal and a pair of dorso-lateral small tuberculae. Ventral surface of the pereion, as a rule, smooth. Pleotelson with a pair of short and obtuse terminal spines. Antennae about half as long again as the body, the flagella about two-thirds as long as the last peduncular joint. Length of dactylus of second, third and fourth pereiopod about half the length of the propodus; length of their dorsal claw about two-thirds the length of dactylus. Basipodite of the first pleopod with about six small spines on its lateral margin. Exopodite of the first male pleopod subrectangular, slightly tapering towards the broadly rounded end; both the lateral and inner margins slightly convex; diagonal furrow rather broad, narrowing towards the end; a small but distinct triangular lobe at the lateral margin distally from the mouth of the furrow. Lateral ramus of the uropods subtriangular, with distal margin rounded. »Secondary» ramus of the uropods somewhat more than half as long as the lateral ramus, subrectangular, slightly tapering towards the end and furnished with three apical setae.

Description.

Types. Mature female with young about 11 mm. in length and male about 14.2 mm in length.

Body and sculpturing of the female.

Body (Pl. I Figs. 9, 10), granulate. First three pereion segments in the mature female slightly increasing in length and width, the third being the largest.

Head. Broader than it is long; front margin sinuate; anterio-lateral angles rounded; lateral margins straight. Eyes dark, protruding, almost rounded, about one-third as long as the lateral side of the head. Between the eyes there is a pair of short curved spines with their front margins strongly concave.

Pereion. The perion segments are furnished with a posterior transverse elevation which widens out laterally to comprise the whole of the segments; the pleurae are subtriangular and distinct on the second, third and fourth segments, being distinctly marked off from the medial parts by longitudinal grooves. The anterior dorsal area is elevated in the middle into a low and broad ridge, which on the first segment is indistinctly divided into two parts by a transverse groove. The four anterior segments have their posterior ridge provided with four small tuberculae, two of them dorsally situated and two dorso-laterally. Elsewhere the segments are granulate, especially on the posterior ridge and on the anterior ridge-like elevation, which traverses the anterior dorsal area.

On the *first segment* the four tuberculae on the posterior elevation are very indistinct. The lateral margins are bent down, whence »pleurae» are lacking. Ventral margin of the tergum with a minute spine-like tip, posteriorly from which there is a small incision.

The pleurae of the *second, third and fourth segments* occupy anteriorly about two-thirds of the lengths of their segments; the coxal plates on these segments are provided with a faint ventral incision; they are in the mature female prolonged posteriorly into short triangular lobes, following the outline of the marsupium. On the fourth segment the anterior dorsal area is only very slightly elevated in the middle; its elevated part is often provided with a pair of minute dorsal tuberculae, one on either side of the middle line. The segment is sharply constricted by a lateral incision (behind the pleurae). The coxal plates are provided with a distinct ventral incision; they are posteriorly prolonged into triangular pointed elongations, the points of which meet behind the marsupium.

Last three segments decreasing in length and width from the first to the last. Posterior transverse elevation distinct and granulate. Anterio-lateral angles of fifth segment somewhat projecting triangularly and pointed. Coxal plates subrectangular, broadly rounded posteriorly.

Abdomen. Three anterior segments are distinctly indicated by transverse grooves. The three segments together are shorter than the pleotelson. Laterally they are markedly granulate, dorsally almost smooth. The third segment has its posterio-lateral angles somewhat triangularly prolonged. Its dorsal part in the middle is separated by slight grooves from the more laterally situated parts.

The pleotelson is markedly granulate, and is provided with a pair of short and obtuse terminal spines. The small tip of the pleotelson between the two terminal spines is situated lower than the rest and is almost devoid of granules; its posterior margin is truncate.

Body and sculpturing of the male.

The adult male differs from the female in having the four anterior pereion segments subequal in width, and in having much fainter sculpturing. The posterior and anterior transverse elevations on the first four pereion segments in the male are very faint and the tuberculae on the posterior elevations are almost indistinguishable.

Moreover the male differs from the female in having the fourth segment of the pereion longest, about one-fourth longer than the third[1].

The pleurae of the second, third and fourth segments are smaller than in the female and comprise on the fourth segment only about half the length of the segment, anteriorly. The fourth segment in the male is only indistinctly constricted posteriorly from the pleurae.

On the coxal plates of the second, third and fourth segments the posterior projecting triangular lobes are wanting.

As in the female, the body is covered with granules, most distinctly on the pleotelson.

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[1] The length of the third and fourth segments was in a male specimen 2 mm. and 1.5 mm. respectively.

Appendages.

Antennulae. Reaching the middle of the third joint of the antennae. The first peduncular joint is broader than the others and, seen from above, subrectangular. The flagellum is longer than the last two peduncular joints together and is provided with about ten groups of sensory filaments and setae. The proportion between the lengths of the peduncular joints and the flagellum is (in a female) 10 : 9 : 7.5 : 19.2.

Antennae. About half as long again as the body. First peduncular joint small and not visible from above. Second peduncular joint with a spine at its posterio-distal angle. Third peduncular joint about twice as long as the second and provided with a row of small spines or tuberculae along its caudal margin. Fourth peduncular joint slightly more than twice as long as the third. The fifth is about one-fifth longer than the fourth. The flagellum is about two-thirds the length of the last peduncular joint and consists (in a young specimen about 8.5 mm. in length) of six joints. The long first joint of the flagellum is longer than the two following together, but shorter than the three following joints together. In the adult male the flagellum consists of eight or nine joints.

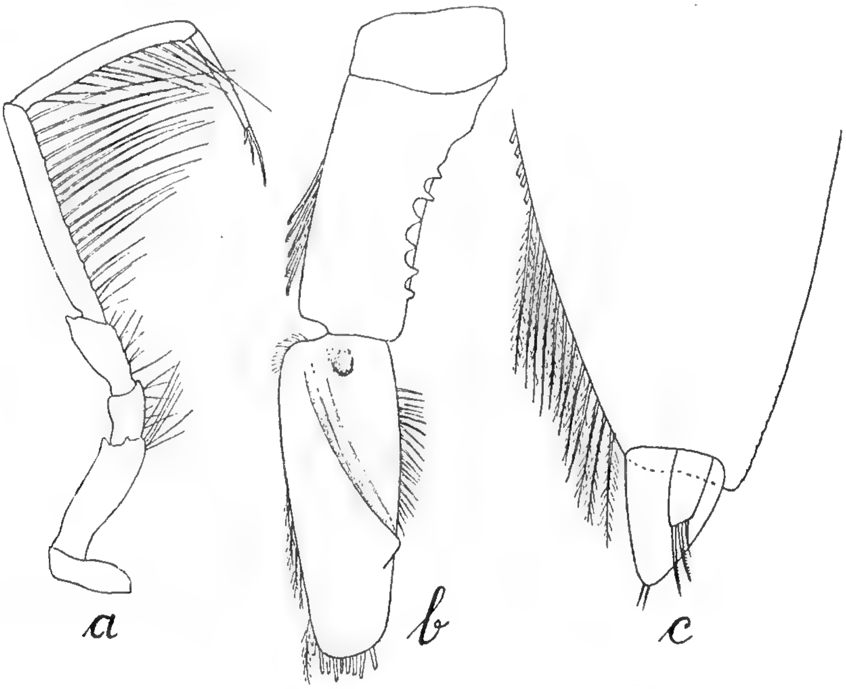

Fig. 36. *Antarcturus granulosus* n. sp. a. Second pereiopod of a female, from the rostral side, 20 ×. b. Right first pleopod (except the endopodite) in the adult male, seen from the caudal side, 35 ×. c. Tip of the left uropod, seen from the inner side, 90 ×.

Mandibles and maxillae. Normal.

Maxillipeds. Distal epipodite with distal margin broadly rounded. Coxopodite in females possessing a marsupium, expanded and prolonged into a thin lobe of the same shape as in *A. brunneus* var. *spinulosus*[1]; inner margin of the coxopodite furnished with ten

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[1] Cf. Fig. 32 f.

plumose setae, distal margin provided with »hairs» devoid of a setal canal, and with short setae.

First pair of pereiopods. As usual in the genus, very setiferous. The setae are long, as a rule two-pointed, and often (especially those on the propodus and carpus) provided with two rows of short triangular sub-branches. The dactylus is about one-third shorter than the propodus (the proportion being 14 : 10), and is provided with two very short claws, the ventral claw being about two-thirds the length of the dorsal one. The length of the dorsal claw is only about one-seventh of the length of the dactylus.

Second pair of pereiopods (Fig. 36 a). Dactylus about half as long as propodus, furnished with two claws and a strong seta between the claws. Length of the dorsal claw approximately five times larger than that of the ventral one and about two-thirds the length of the dactylus. The proportion between the lengths of the joints and the dorsal claw is 20: 9.5: 12: 39: 35: 18.5: 11.

Third and fourth pairs of pereiopods. Similar to the second pair, but the basipodite increases in length, being longest on the fourth pair. On the fourth pair the posterior margin of the basipodite is granulate.

Fifth, sixth and seventh pairs of pereiopods. Upper margin of the basipodite provided with small spines and tuberculae. Propodus almost twice as long as the dactylus, which is provided with two claws, and between the claws two setae. Length of the dorsal claw about one-fourth the length of the dactylus. The ventral claw is minute.

First pair of pleopods (Fig. 36 b). Coxopodite short, subrectangular. Lateral margin of the basipodite with a row of six small spines; inner margin with eight coupling-setae. Exopodite and endopodite subequal in length. Exopodite in the male subrectangular, slightly tapering towards the broadly rounded end; outer and inner margins almost straight; inner proximal angle rounded and furnished with short »hairs»; lateral margin proximally from the mouth of the diagonal furrow with branchless setae; distal margin and distal half of the inner margin with plumose setae; diagonal furrow rather broad proximally, but narrowing towards the end; posterior surface laterally from the proximal end of the furrow slightly hollowed; distally from the mouth of the furrow there is a projecting triangular lobe at the lateral margin of the exopodite.

Penis. Normal.

Uropods (Fig. 36 c). Lateral surface of the sympodite granulate, with a longitudinal row of somewhat larger granules along the middle line. »Secondary» ramus slightly more than half as long as the lateral ramus, slightly tapering towards the end and provided with three apical setae. For other details see the figure.

Remarks. The species is very similar to *Antarcturus spinifrons*[1], (BEDDARD), from which species it differs in having a pair of terminal spines on the pleotelson, one on either side of the tip, instead of only one terminal spine in the middle, as in *A. spinifrons*; in having the pleotelson more markedly granulated; and in having the fourth pereion segment in the male longer than the third. These differences, which mainly relate to the sculpturing are not quite reliable. The uropods and first male pleopods, which are characteristically shaped in *A. granulosus* have, however, not been investigated in *Antarcturus spinifrons*. *A. granulosus* was found at South Georgia, whilst *spinifrons* was obtained from Kandavu

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[1] Cf. BEDDARD, 1886, Pl. XXV, Figs. 9—12.

Islands (off Fidji Islands). It is therefore most probable that a more thorough examination of *spinifrons* will disclose differences in the uropods and the first male pleopods; otherwise *granulosus* in my opinion should be regarded merely as a variety of *spinifrons*.

From *A. lilliei* TATTERSALL (1921) *granulosus* differs expecially in its much longer antennae.

Localities and Material.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. Immature specimen, 6 mm. in length, having the tuberculae on the pereion segments more distinct than in the specimens from st. 34 (South Georgia); in the specimen there is also a pair of minute tuberculae behind the frontal spines on the head.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 6 specimens, males and females. Length of the largest specimen 14.5 mm. (adult male, type); its antennae are about 20 mm. in length. Female with young (type), length about 11 mm.

Distribution. Shag Rock Bank (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.).

Genus **Microarcturus** n. gen.

For diagnosis see p. 128.

Microarcturus stebbingi (BEDDARD, 1886).

Pl. II, Figs. 12, 13; Text. figs. 37 a—g.

Arcturus stebbingi. BEDDARD, 1886, p. 105—106, Pl. XXIV, Figs. 1—4; ZUR STRASSEN, 1902, p. 686.

Diagnosis. Dorsal surface of the head with four tuberculae or spines, situated in such wise as to form the points at the angles of a square. The first four pereion segments posteriorly with six tuberculae or spines, two dorsally, two dorso-laterally and two laterally situated. Fourth segment in the female shorter, in the male longer than the third. Last three pereion segments and abdomen tuberculated. Pleotelson about as long as the three anterior abdominal segments together. Tip of pleotelson triangular and obtusely pointed, with lateral margins straight. Second and third pereiopods with dactylus about half as long as propodus, the dorsal claw one-third as long again as the joint itself; dorsal claw of the fourth pereiopod about half as long as the dactylus. First pair of pleopods much narrower and slightly shorter than the others, lateral margin of the basipodite with 6—9 spines, increasing in size towards the distal end; endopodite in both male and female small, suboval, one-third to two-thirds as long as the exopodite and lacking plumose setae; exopodite in the male, distally from the mouth of the diagonal furrow, tapering towards the rounded end and having its distal margin furnished with a few plumose setae; diagonal furrow proximally broad but distally narrowing almost to a tube, its mouth surrounded by two slightly projecting lobes, the rostral one with convex margin, the caudal one subtriangular and pointed. Lateral ramus of the uropods subtriangular with distal end rounded; »secondary» ramus of the uropods about two-thirds as long as the endopodite, tapering towards the end, distally truncate and provided with three apical setae (exceptionally two).

Supplementary Description.

Body and spine-armature of the female (Pl. II, Fig. 12).

Head. Frontal margin sinuate, anterio-lateral angles rounded and often furnished with a small submarginal tuberculum or spine. Lateral margins straight. Eyes protruding, rounded, of brownish colour, of a length about one-third of that of the lateral side of the head. Dorsal surface with four tuberculae or spines, situated in such wise as to form the points at the angles of a square.

Pereion. In the female the third segment is the longest; in females with marsupium it is also the broadest. The first four segments are sculptured in the usual way by a posterior transverse elevation, which widens out laterally to comprise the whole segment. The pleurae are triangular; on the first segment they are small and indistinct. The posterior transverse elevation on the first four segments is always provided with three pairs of spines or tuberculae, situated dorsally, dorso-laterally and laterally. There are also additional spinules or tuberculae on these segments. The spines or tuberculae are in varying degrees covered with short hairs.

On the *first segment* the dorsal pair of spines or tuberculae on the posterior elevation are the largest. Often there is a tuberculum between the dorso-lateral and the pleural process, but situated further back. The anterior dorsal area is often provided with a pair of dorsal tuberculae. The lateral side of the tergite is provided with a faint ventral incision. Coxal plates not distinguishable.

On the *second segment* the triangular pleurae are distinct and occupy almost the whole lateral side of the segment. The sculpturing of the segment is much the same as that of the first segment, but on either side there is a small spine at the anterior margin of the pleurae. These small spines are directed anteriorly and project beyond the posterior margin of the first segment. Coxal plates with a slight ventral incision. They are elongated posteriorly into small triangular pointed lobes following, in the mature female, the outline of the marsupium.

On *the third segment* the pleurae occupy about three-fourths of the lateral side of the segment. Sculpturing and coxal plates as on the second segment.

On *the fourth segment* the pleurae occupy about two-thirds of the lateral side of the segment. On either side there is a deep and broad furrow posteriorly from the pleurae. The anterior dorsal area is often smooth. The tuberculae between the dorso-lateral and the pleural processes are usually missing. The small spines at the anterior margin of the pleurae are directed anterio-laterally. Otherwise the sculpturing corresponds with that of the second and third segments. The coxal plates are prolonged posteriorly into broad protuberances directed medially, having a rounded distal end and being more or less tuberculated.

The last three segments decrease in length and width from the fifth to the seventh; the posterior elevation is distinctly tuberculated. On the fifth segment there is a pair of small spines, directed laterally, and situated dorso-laterally close to the anterior margin. Dorsal area on the fifth, sixth and seventh segments smooth. Ventral surface of the fifth segment tuberculated, of the sixth and seventh almost smooth.

Abdomen. Short, not longer than the last three segments of the pereion together. Three anterior tuberculated segments are indicated by transverse grooves; the third segment and the pleotelson are broader than the first two segments, and the third segment is also slightly longer than each first or second segment.

Pleotelson subequal in length to the three anterior segments together, dorsally, except on the tip, it is tuberculated. Tip of pleotelson smooth, subtriangular with lateral margins straight and meeting at the apex in a right or obtuse angle. In some specimens a pair of tuberculae anteriorly from the tip are the largest.

Body and spine-armature of the male (Pl. II, Fig. 13).

The body of the male differs from that of the ovigerous female in having the first four pereion segments much narrower (the second and third are subequal in width, the fourth is slightly narrower than the third). It also differs in the fourth pereion segment being distinctly the longest. The pleurae are somewhat smaller and occupy a smaller part of the segments, anteriorly; on the fourth segment they only comprise approximately the anterior half of the lateral side of the segment. The lateral grooves behind the pleurae on this segment are broader and shallower than in the female. The small spines at the anterior margin of the pleurae, which occur in the female on the second, third and fourth segments, are missing in the male.

Variation of the spine-armature.

In their spine-armature the different specimens vary to a large extent. On examining a large amount of material, slightly tuberculated individuals can be found, on the other hand there are individuals which are very spinous. *Microarcturus stebbingi* affords a good example of the great individual variation in spine-armature occurring in the genus, as also in *Antarcturus* and *Arcturus* (see p. 125). As regards these genera an equally great variation in spine-armature has previously been found only in *Microarcturus similis* by BARNARD (1925) and in *Arcturus baffini* by OHLIN (1895).

The four dorsal processes on the head are either spines or mere tuberculae. Sometimes the anterior pair are the largest[1], sometimes the posterior pair, or they are subequal in length. The small process at the anterio-lateral angle of the head occurs as a spine or tuberculum and in some cases is entirely wanting. The processes on the posterior elevation of the first four perion segments are either spines or mere tuberculae. The small processes which are situated between the dorso-lateral and pleural processes, but further back, on these segments are spine-like, tuberculiform or entirely missing. In other specimens, however, these processes are distinct and spine-like.[2]

Though the spine-armature in *Microarcturus stebbingi* varies greatly in both males and females, most male specimens are only tuberculated, whilst spinous specimens are commonly found in the females. Most of the female specimens are at any rate furnished with a pair of dorsal spines on the posterior elevation of the first four pereion segments, often also with a pair of dorso-lateral spines on this elevation, whilst the large pleural processes as well as the other processes on the pereion are generally tuberculiform.

Appendages.

Antennulae (Fig. 37 a). Reaching to the distal margin of the second joint of the antennal peduncle. Third peduncular joint one-half to one-third as long as the second. Flagellum about one-fifth as long again as the second and third peduncular joints together.

Antennae (Figs. 37 b and c). Shorter than the body. First peduncular joint short, only visible from below, second and third increasing in length, the third being about one-third longer than the second. The second joint is triangular in transverse section,

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[1] This is the case in the specimen figured by BEDDARD (1886, Pl. XXIV, Figs. 1 and 2).

[2] These processes occur more often as spines in female specimens. In male specimens I never found a spine-like process between the dorso-lateral and pleural processes on the first four pereion segments, but often there are distinct tuberculae on this spot in the males.

with the posterio-distal, the upper distal and the lower anterior distal angles produced and pointed; distal margin between the points somewhat concave. Third peduncular joint about one third longer than the second, often provided with two tuberculae on its caudal margin (one tuberculum at about the middle of the joint and one near the distal margin). Fourth joint about twice as long as the third and somewhat increasing in width distally. Fifth pecundular joint one-fourth to one-fifth as long again as the fourth.

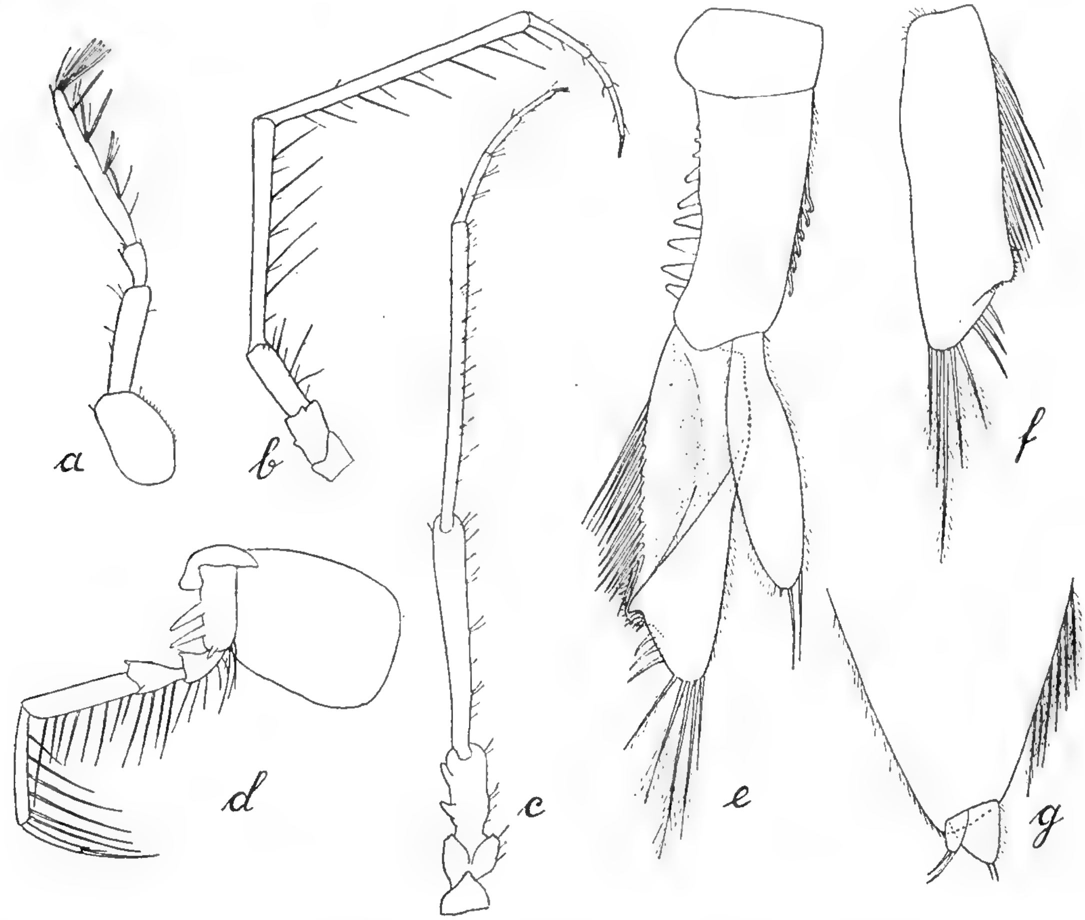

Fig. 37. *Microarcturus stebbingi* (BEDD.). a. Right antennula of a male, 140 ×. b. Right antenna, from above (female), 17 ×. c. Antenna of a male, from below, 17 ×. d. Left second pereiopod of a female with marsupium, 17 ×. e. Left first pleopod of an adult male; from the caudal side, 80 ×. f. Exopodite of the first pleopod in an adult male; from the rostral side, 80 ×. g. Tip of the right uropod, seen from the inner side, (male), 80 ×.

The three-jointed flagellum is slightly more than half as long as the last peduncular joint, its terminal joint is provided with a short »claw», traversed by a setal canal.

Mandibles and maxillae. Normal.

Maxillipeds. Distal epipodite with distal margin broadly rounded in the female, narrowly rounded in the adult male. In the male the epipodite is sometimes undivided. Coxopodite in the female with a marsupium elongated into a thin and rounded lobe directed backwards and having its inner margin furnished with plumose setae.

First pair of pereiopods. Setae on the propodus and dactylus two-pointed and provided with two rows of short triangular sub-branches. Dactylus about two-thirds as long as the propodus, furnished with a long dorsal and a short ventral claw, and between the claws a claw-like seta. Dorsal claw about one-third as long as the dactylus and about twice as long as the ventral claw.

The carpus is about half as long again as it is broad, the proportion being, in an adult male 30: 21, in a female 32: 19; it is thus slightly broader in the adult male than in the female.

Second to fourth pairs of pereiopods. Basipodite, as is usual, increasing in length from the second to the fourth pereiopod, its upper margin on the second pereiopod, as a rule with two, on the third with three, on the fourth with four spines or tuberculae. Upper distal angles of the ischium and the merus often prolonged into short spines. On the second pereiopod (Fig. 37 d) the carpus and propodus are subequal in length, on the third the propodus is slightly shorter, on the fourth about one-third shorter than the carpus (24: 17). The dactylus is about half as long as the propodus and is furnished with a very long dorsal claw and a minute ventral one. On the second and third pereiopods the dorsal claw is about one-third as long again as the dactylus, the proportion being 30: 23; on the fourth it is only about half as long as the dactylus. The minute ventral claw on the second pereiopod is not quite one-tenth as long as the dorsal one.

Fifth to seventh pairs of pereiopods. Basipodite more or less tuberculated. Dactylus about two-thirds as long as the propodus (the proportion being 10: 18), furnished with a dorsal claw about two-fifths the length of the dactylus and a very minute ventral claw; between the claws there are two setae.

First pair of pleopods (Fig. 37 e). Smaller than the other pleopods. Lateral margin of the basipodite provided with 6—9 spines, increasing in length towards the distal end of the basipodite; inner margin with 5—7 coupling setae.

Exopodite, in the female of the usual shape; its distal margin is provided with some short branchless setae. The exopodite in the male (Figs. 37 e and f) is straight and of a uniform width, except that it narrows at the distal end. Its outer and inner margins are almost straight, except distally from the mouth of the diagonal furrow, whence the exopodite tapers towards the broadly rounded end. The lateral margin of the exopodite is furnished with strong branchless setae, three setae of this kind being situated distally from the mouth of the diagonal furrow. The distal margin of the exopodite is furnished with five short-branched setae. The inner proximal angle of the exopodite is rounded and »hairy». The diagonal furrow is very wide proximally but contracts distally almost to a tube. Its mouth is surrounded by two projecting lobes, the posterior lobe (Fig. 37 e) being triangular and pointed, the anterior one (Figs. 37 e and f) rounded. The margins of the anterior lobe, and to a slight extend those of the posterior lobe, are provided with minute spines.

The endopodite is reduced in size, being in the female about half as broad and one-third to two-thirds as long as the exopodite; greatly varying in size in different specimens. Its distal margin is smooth in the female. In the male the endopodite is subequal in shape to that in the female; its length varies from a half to two-thirds the length of the exopodite, its distal margin is provided with a few, as a rule, branchless setae.

Second pair of pleopods. Exopodite and endopodite of ebout equal size, their distal margins provided with long plumose setae, their lateral margins with shorter plumose setae. Penial filament in the adult male somewhat longer than the exopodite.

Third and fourth pairs of pleopods. Basipodite small. The endopodite is somewhat longer than the exopodite. The margins of the branches are devoid of setae, except one short, branchless seta on the lateral margin of the exopodite near the distal margin.

Fifth pair of pleopods. Exopodite and endopodite similar in shape and size, their margins devoid of setae.

Uropods (Fig. 37 g). Lateral surface of the sympodite spinous, tuberculated or almost smooth. "Secondary" ramus from one-half to two-thirds as long as the lateral ramus, tapering towards the end; distal margin with three (exceptionally two) setae.

Remarks. The species has been described by BEDDARD (1886) from a single female specimen[1], (13 mm. in length), obtained off Kerguelen by the Challenger Expedition. It has since been collected likewise off Kerguelen by the German Deep-Sea Expedition 1898—99 (see ZUR STRASSEN, 1902, p. 686). The specimens obtained by the Swedish Antarctic Expedition are from South Georgia and Shag Rock Bank. Though I have examined a large amount of material, I found no specimen of a greater length than 9 mm., whereas BEDDARD (1886) states that the length of his examined specimen was 13 mm. In all other features than this slight difference in length my specimens agree exactly with *stebbingi* as described and figured by BEDDARD (1886). In the figure by BEDDARD (1886, Pl. XXIV, Fig. 1) the antennae of the species have been given a greater length than the body. In his description BEDDARD, however, states that the lengths of the antennae in his 13 mm. long specimen are only 9 mm.

Microarcturus stebbingi approaches most closely to *Microarcturus patagonicus* (OHLIN), *hirticornis* (MONOD) and *rugosus* n. sp. It differs from *patagonicus* in having smaller eyes, in being less spinous on the pereion, and in having the dorsal claw of the first three pereiopods of much greater length. It differs from the two allied species *hirticornis* and *rugosus* in the absence of hair-like small spines on the body and in a different shape of pleotelson. It differs distinctly from *rugosus* in that the first pleopods both in the male and the female have a different shape and have a different length of the dorsal claw of the fourth pereiopods.

Localities and Material.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. 14 specimens, males and females, all specimens spinous. Length of the largest specimen 8 mm. (female with marsupium). The specimens were obtained together with *Microarcturus rugosus*.

St. 21. South Georgia, mouth of Possession Bay, lat. 54° 8′ S., long. 37° 3′ W. 200 m. Bottom temp. + 1.5° Clay. $^{9}/_{5}$ 1902. 6 specimens. Length of the largest specimen about 8 mm.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5° Clay and also some algae. $^{14}/_{5}$ 1902. A large spinous male specimen, length about 9 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{8}$ 1902. About 125 specimens, males and females. Length of largest specimens, males about 9 mm., females 8.5 mm.

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[1] The type specimen of *Microarcturus stebbingi* is preserved at the British Museum. When visiting the British Museum I asked for the specimen, but it could not be found and has perhaps been lost. I have thus been unable to compare the characteristic pleopods and uropods of my specimens with those of the type specimen of *Microarcturus stebbingi*.

Distribution. Shag Rock Bank (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.), Kerguelen (BEDDARD 1886, ZUR STRASSEN 1902).

The species has previously been found only at Kerguelen.

Microarcturus rugosus n. sp.

Pl. II, Fig. 14; Text figs 38 a—e.

Diagnosis. Body densely covered with short-haired spines and »hairs», the largest spines being: four on the dorsal surface of the head, six (a dorsal, a dorso-lateral and a lateral pair) on the posterior transverse elevation of the first four pereion segments and a pair, one on either side of the tip of the pleotelson. Pleotelson with lateral margins slightly convex, converging towards the tip, where they meet in an acute angle. Fourth pereion segment in the male subequal in length to the third. First two peduncular joints of the antennulae, as well as the peduncle of the antennae (except the distal part of the last peduncular joint), dorsally more or less covered with small spines, varying from the usual type down to needle-like points. Length of the dactylus of the second pereiopod two-fifths the length of the propodus, length of the dactylus of the third pereiopod about half that of the propodus; dactylus of fourth pereiopod three-fourths the length of the propodal joint. Dorsal claw of the second and third pereiopods about one-third as long again as the dactylus, of the fourth subequal in length to this joint. Basipodite of first pair of pleopods with a lateral row of 11—16 small and obtuse spines. Exopodite and endopodite in the female linguiform, of uniform width and furnished with one or two long plumose setae on the broadly convex distal margins; the endopodite is slightly shorter than the exopodite, but only about half as broad. Exopodite of the first pleopod in the male sub-rectangular and of a uniform width; distal margin almost straight, provided with a few rather short plumose setae; diagonal furrow proximally broad, but narrowing towards the distal end; mouth of the furrow forming a deep incision in the lateral margin of the exopodite. Lateral ramus of the uropod subtriangular, with a convex distal margin; "secondary" ramus of the uropod about two-thirds as long as the lateral ramus, tapering towards the end and provided with three setae on its distal margin.

Discription.

Types. Male about 7 mm. in length, female with marsupium about 8.5 mm. in length.

Body (Pl. II, Fig. 14). Covered, dorsally and laterally, with spines of varying size and »hairs». The large spines are, as a rule, covered with short »hairs», the small spines are often distally divided into a number of acute points (Fig. 38 b). Ventral surface of the pereion devoid of spines.

Head. Frontal margin concave; anterio-lateral angles rounded; lateral margins straight. Eyes small, dark and rounded, with a length subequal to one-fourth of the length of the lateral side of the head. Dorsal surface of the head with four spines, situated in such wise as to form the points at the angles of a square. The anterior pair of spines are directed slightly forwards and are somewhat longer than the posterior pair. At the anterio-lateral angle of the head there is a long spine. The head is, moreover, covered with small spinules of varying size.

First pereion segment. Fused with the head but separated by a transverse groove. Lateral parts of the segment not projecting, directed ventrally. Lateral margin of the tergite with a small ventral incision. Posterior transverse elevation, as a rule, with a pair of large dorsal and another of large dorso-lateral spines; sometimes also a pair of laterally situated spines are longer than the others. In some of the adult specimens the segment is covered with numerous small spines of uniform length, situated approximately in four transverse rows, two of these rows being on the transverse elevation.

Second, third and fourth pereion segments. In the female the third segment is the longest, in the male the third and fourth segments are subequal in length. Lateral parts of the segments subtriangular and forming horisontally situated »pleurae», those on the fourth segment occupying about the anterior three-fourths of the lateral side of the segment. Posteriorly from the pleurae of the fourth segment as in *Microarcturus stebbingi*, there is, a deep transverse furrow on the lateral side. In small specimens, a dorsal, a dorso-lateral and a pleural pair of spines are always the largest. In some adult females the pleural pair of spines only are longer than the others, the posterior elevation being densely covered with small spines, practically uniform in length, forming, though indistinctly, two dorsal transverse rows and three or four lateral rows; the anterior dorsal area is moreover furnished with a transverse row of spines. In most of the adult specimens, the dorsal, dorso-lateral and pleural pairs of spines on the posterior elevation are larger than the others, and the anterior dorsal area is provided with only one pair of dorsally situated spines. In very small specimens the anterior dorsal area is smooth.

Coxal plates devoid of incisions; those of the second and third segments in the female with marsupium posteriorly prolonged into short triangular projections closely following the outline of the marsupium. Coxal plates of the fourth segment in females with marsupium prolonged into long triangular obtusely pointed processes, directed inwards, the points of which almost meet behind the marsupium. Posterior margins of the processes provided with a small spine.

Fifth, sixth and seventh pereion segments. Decrease in length and width, from the fifth to the seventh. Anterior dorsal area smooth. Posterior elevation covered with spines, dorsally forming two indistinct transverse rows. Coxal plates spinous.

Abdomen. About as long as the last three pereion segments together. Three anterior segments are indicated by very faint transverse grooves; each segment with a transverse row of spines; as a rule, one lateral spine on each side of the third segment is the largest.

Pleotelson about as long as the anterior part of the abdomen covered with spines, of which one pair of terminal spines — one spine on either side anterior to the tip of pleotelson — are always longer than the others. Lateral margins of pleotelson slightly convex meeting at the tip at an acute angle. The part of the pleotelson which is situated posteriorly from the terminal pair of spines is shorter than in *Microarcturus stebbingi*.

Antennulae (Fig. 38 a). Reaching the distal margin of the third peduncular joint of the antennae. First and second peduncular joints with a sparse covering of small spines and setae. Flagellum in the male, as a rule, with six groups of sensory filaments and setae, in the female with only two groups, situated distally.

Antennae (Figs. 38 b and c). Much shorter than the body. Second, third, fourth and, in a minor degree, the proximal part of the fifth joint covered with short and slender spines and »hairs». Third peduncular joint somewhat less than twice as long as the second, as a rule, with one spine larger than the rest at its anterio-distal angle. Fourth peduncular joint about twice as long as the third, increasing in width towards the distal end and provided with a large spine at the anterio-distal angle. Fifth peduncular joint about one-sixth longer and somewhat narrower than the fourth, increasing in width towards the distal end. Flagellum about one-third shorter than the last peduncular joint, consisting, as a rule, of three joints, the last joint being furnished with a terminal claw. Exceptionally there are four joints in the flagellum.

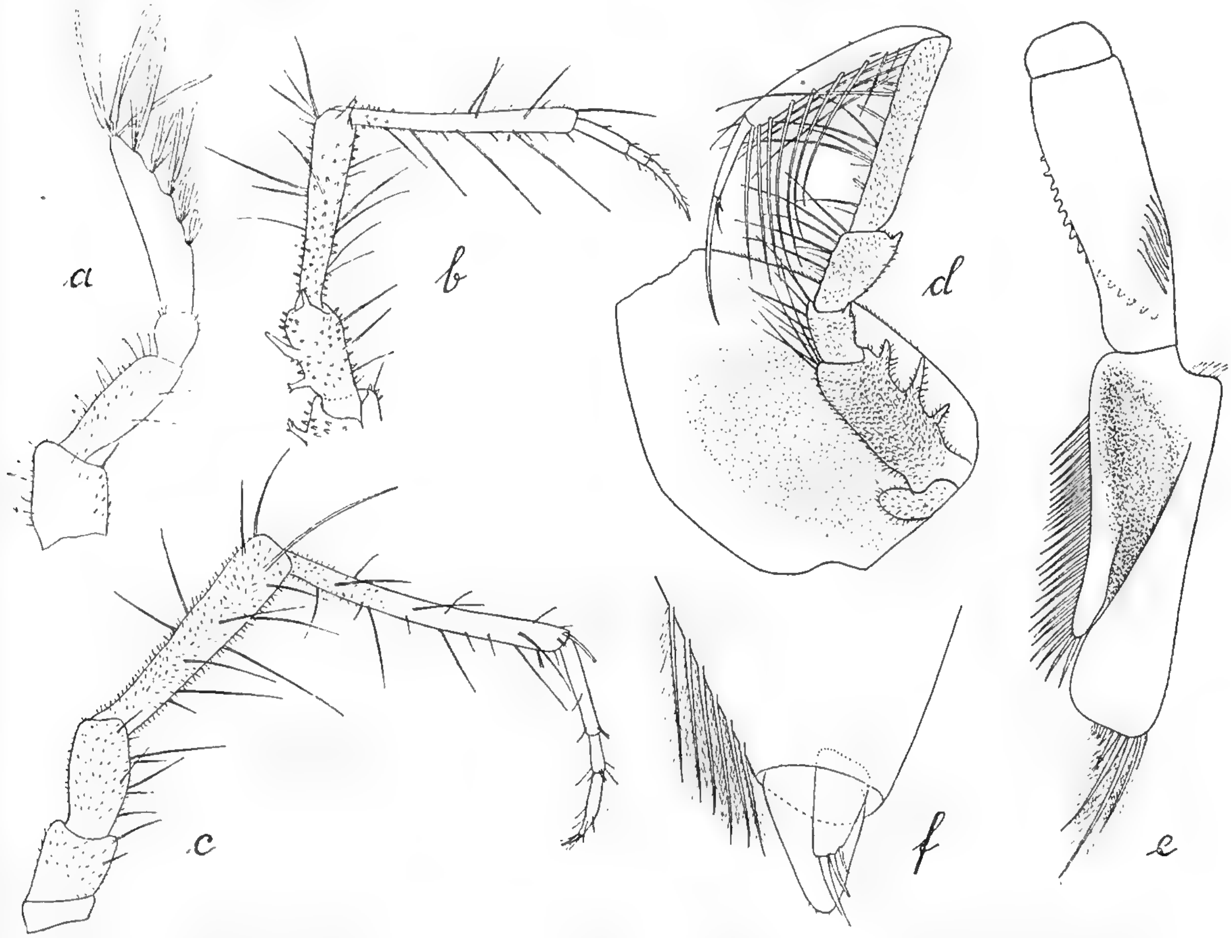

Fig. 38. *Microarcturus rugosus* n. sp. a. Left antennula, in a male, 50 ×. b. Right antenna, from above, 17 ×. c. Left antenna, from below, 30 ×. d. Second pereiopod of a female with marsupium, 25 ×. e. Left first pleopod (except the endopodite) of an adult male; from the caudal side, 80 ×. f. Tip of the right uropod, seen from the inner side, (adult female), 140 ×.

Mouth-organs. Normal. In the maxillipeds the distal margin of the distal epipodite is broadly rounded. The ovigerous female has the coxopodite expanded into a lobe directed backwards; the inner margin of this lobe is furnished with plumose setae.

First pair of pereiopods. Setae on the propodus and dactylus of the usual type, long, two-pointed and furnished with two rows of short triangular sub-branches. Propodal joint about half as long as the dactylus. Dorsal claw about half as long as the dactylus and more than three times as long as the short ventral claw.

Second pair of pereiopods (Fig. 38 d). Upper margin of the basipodite spinous, often with three spines longer than the rest; ischium and merus with a spine at their upper distal angles (frequently larger than in the figured specimen), propodus slightly shorter than the carpus and about two and a half as long as the dactylus; dorsal claw about one-third as long again as the dactylus, ventral claw extremely minute and setiform; between the claws there is a seta.

Third pair of pereiopods. Similar to the second, except that the basipodite is longer and the propodus shorter. Propodus not fully twice as long as the dactylus. Length of the dorsal claw about one-third as long again as the dactylus.

Fourth pair of pereiopods. Basipodite longer than that of the third pereiopod, with upper margin spinous; ischium and merus with a spine at its upper distal angle. Propodus only about half as long as the carpus. Dactylus about one-fourth shorter than the propodus; dorsal claw subequal in length to the dactylus.

Fifth, sixth and seventh pairs of pereiopods. Upper margin of the basipodite more or less spinous. Propodus about two-thirds as long as the dactylus, which is furnished with two claws, and a seta between the claws. Length of the dorsal claw about two-fifths that of the dactylus. Ventral claw minute.

First pair of pleopods, female. Lateral margin of the basipodite with about 10 small obtuse spines. Exopodite and endopodite linguiform, slightly tapering towards the end and furnished with setae only on their distal margins. Distal margin of the exopodite provided with two long plumose[1] setae. Endopodite slightly shorter and only about half as broad as the exopodite; its distal margin provided with one or two plumose[1] setae.

First pair of pleopods, male (Fig. 38 e). Basipodite with a lateral row of 11—16 small obtuse spines; inner margin with 5 coupling-setae. Exopodite broad, not curved, of uniform width; its outer and inner margins almost straight, distal margin almost truncate and provided with about eight short plumose setae, three of them longer than the rest; outer margin with a row of stout branchless setae; inner margin devoid of setae proper but with some short »hairs» at the inner proximal angle; diagonal furrow proximally broad but narrowing considerably towards the end; the mouth of the furrow forms a deep incision in the lateral margin.

Uropods. Lateral surface of the sympodite short-haired. "Secondary" ramus about two-thirds as long as the lateral ramus, tapering towards the end, its distal margin furnished with three branchless setae.

Remarks. It is possible that the species is identical with *Microarcturus hirticornis*[2], a species of which a single, probably non-adult, specimen was obtained by the Belgian Antarctic Expedition (1897—99). The specimen was figured, but not described, and provisionally given the name of *hirticornis* by MONOD (1926). From the figure by MONOD (1926, Fig. 30) it will be seen, however, that *hirticornis* differs in having the distal end of the pleotelson cleft, owing to the pair of terminal spines being situated near each other on the distal margin of the pleotelson; the triangular and pointed tip of the pleotelson between the two terminal spines, which is characteristic of *rugosus*, is thus entirely lacking in *hirticornis*. This difference may perhaps be due to variation within the same species.

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[1] The setae have only sparse sub-branches.

[2] MONOD, 1926, p. 33, Fig. 30.

Localities and Material.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. 32 specimens, males, females, and immature. Length of the largest specimen 9 mm. (female with young); colour whitish. Length of the type specimens, male about 7, female about 8.5 mm.

St. 94. Graham Region, north of Joinville Island, lat. 62° 55′ S., long. 55° 57′ W. 104 m. Gravel mingled with stones. $^{21}/_{12}$ 1902. One male specimen, length about 5.5 mm. (Pl. II, Fig. 14); colour grayish-brown.

Distribution. Shag Rock Bank (Sw. Ant. Exped.), Graham Region (Sw. Ant. Exped.).

Microarcturus digitatus n. sp.

Pl. II, Figs. 15, 16; Text figs. 39 a—e.

Diagnosis. Head with four large dorsal spines, situated in such wise as to form the points at the angles of a square. First four pereion segments each with a transverse row of six large spines, one dorsal, one dorso-lateral and one lateral on either side of the middle. Last three pereion segments each with a pair of large dorso-lateral and a pair of large lateral spines, the lateral spines being situated on the coxal plates (fifth segment with a pair of dorsal tuberculae). Pleotelson pointed, lacking the usual pair of terminal spines. Second, third and fourth pairs of pereiopods with dactylus slightly longer than the propodus, its dorsal claw on second and third pereiopods being about $^1/_8$, on the fourth $^1/_{12}$—$^1/_{13}$ as long as the dactylus. Last three pairs of pereiopods with dactylus about two-thirds as long as the propodus. Basipodite of the first pair of pleopods with 7—10 small spines on its lateral margin; exopodite and endopodite subequal in length, but the endopodite narrower than the exopodite; endopodite furnished with sparse plumose setae only on its distal margin. Exopodite in the male of a uniform width, slightly curved, with inner margin convex and lateral margin concave; diagonal furrow of the male exopodite contracted into a tube, except at its proximal end. Uropod provided with a subtriangular, distally rounded lateral ramus, but with no trace of a "secondary" ramus.

Description.

Types: Female with marsupium, length 9 mm., length of its antennae 8 mm.; male, length 12.5 mm., length of the antennae 11.5 mm.

Body and spine-armature of the female.

Head. Frontal margin sinuate. Anterio-lateral angles pointed. Lateral margins, when viewed laterally, straight, showing a small point behind the eyes when seen from above. Eyes protruding and circular, about one-third the length of the head. In the middle they are dark-brown in colour but colourless peripherally. Dorsal surface of the head with four large spines, situated in such wise as to form the points at the angles of a square.

Pereion. Segments of the pereion sculptured in the usual way in a posterior transverse elevation, which widens out laterally to comprise the whole segment. The second, third and fourth segments are protracted laterally into subtriangular pleurae, occupying anteriorly on the second and third segments about three-fourths, on the fourth segment about two-thirds of the length of the segment. Pereion traversed by six longitudinal rows of large spines, situated dorsally, dorso-laterally and laterally on the posterior transverse elevation of the segments, and forming on each of the first four segments a dorsal, a dorso-lateral and a lateral pair of spines; the lateral spines on segments 2—4 are formed by the prolonged tips of the pleurae. A similar spine arrangement occurs on the other segments, too, though some of the spines are small or missing. The large lateral spines of the last three segments are formed by the tips of the coxal plates.

The first segment is fused with the head, but separated by a groove. The lateral parts of the segment are not protracted into pleurae, but are furnished with a small but distinct spine, directed laterally and corresponding to the pleurae on the second, third, and fourth segments. Posteriorly from the lateral spine there is a small ventral incision in the lateral margin. Posterior transverse elevation provided with a pair of dorsal and a pair of dorso-lateral spines. The dorso-lateral spines are the largest. Coxal plates absent.

The second segment is longer than the first and is furnished with six large spines, increasing in size from the dorsally situated spines to the pleural ones. There is a small spine on each side between the dorso-lateral and the lateral (pleural) spine, but situated further back, and a small spine anteriorly on the pleurae.

Coxal plates in female with a marsupium posteriorly prolonged into slight triangular projections.

The third segment is subequal in length to the second but broader. It is sculptured in the same way as the second.

Coxal plates as on the second segment.

The fourth segment is narrower than the third and about as broad as the second. It is shorter than both the third and second segments and about as long as the first segment. Its sculpturing is similar to that of the other anterior segments.

Coxal plates in female with a marsupium prolonged into posterior processes directed medially, the points of which almost meet behind the marsupium. The posterior margin of these processes, approximately on the middle, is furnished with a small spine directed downwards and outwards.

The last three segments decrease in length and width from the fifth to the seventh. Each segment is provided with a pair of dorso-lateral and a pair of lateral spines, the latter, situated on the coxal plates (see p. 124), being the longest. Fifth segment furnished with a pair of dorsal tuberculae. It has on each side a small spine, which is situated between the dorso-lateral and the lateral spine but further back, and a small spine anteriorly on each coxal plate; there is also a small spine anterio-laterally on the segment (this spine perhaps corresponding to the large lateral [pleural] spine on the anterior segments). Sixth and seventh segments similar to the fifth, but the small additional processes — except the one anterior on each coxal plate — are mere tuberculae. Ventral surface of seventh segment with a small tuberculum in the middle.

Abdomen. Slightly longer than the last four pereion segments together. First three segments distinctly indicated by transverse grooves. First segment posteriorly with a pair of dorso-lateral and a pair of somewhat larger lateral spines; its ventral surface furnished anteriorly in the middle with a small spine. Second segment with two small dorsal and two larger dorso-lateral spines. Third segment with two small dorsal and two somewhat longer lateral spines.

Pleotelson about one-third longer than the three anterior segments together, with lateral margins slightly convex. Tip of pleotelson ending in an acute point. The pleotelson, with the exception of the tip, is sparsely covered with short tooth-like spines; there are two parallel rows of these spines on either side along the lateral margin, each row consisting of three spines. In the more lateral row the spines are small and tuberculiform.

Body and spine-armature of the male.

The male differs from the mature female in its body being somewhat less broad anteriorly, owing to the absence of marsupium. The lengths of the segments are the same as in the female, the fourth segment in the male being likewise shorter than the third. As in the female, the fourth pair of coxal plates are prolonged into processes, directed inwards, which in the middle are provided with a spine, but these processes are firmly fused with the sternum. The characteristic spine-armature dorsally and laterally on the body is the same in both males and females. In its spine-armature the adult male differs from the female only in having the ventral surface of the fifth pereion segment provided with a spine situated anteriorly in the middle.

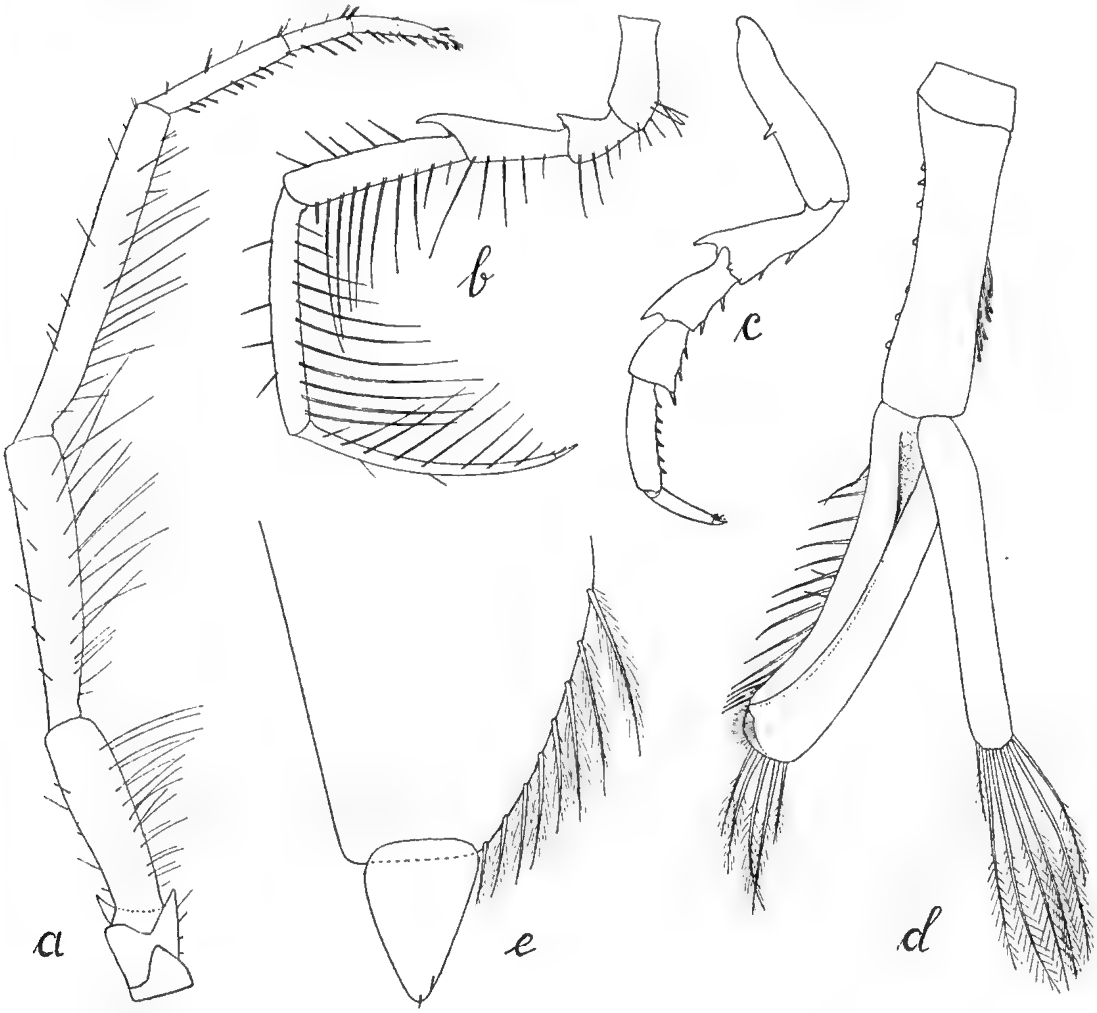

Fig. 39. *Microarcturus digitatus* n. sp. a. Antenna from above, 17 ×. b. Right second pereiopod, 17 ×. c. Right sixth pereiopod, 17 ×. d. Left first pleopod of an adult male; from the caudal side, 45 ×. e. Tip of the right uropod, seen from the inner side, (female), 80 ×.

Appendages.

Antennulae. Reaching approximately the distal margin of the third peduncular joint of the antennae. The proportion between the lengths of the three peduncular joints and the flagellum is 7.9: 5: 3.5: 18 (in a female). The flagellum is thus slightly longer than the peduncle. Its length varies slightly in different specimens.

Antennae (Fig. 39 a). Shorter than the body. Second peduncular joint provided with a spine at its lower-distal and anterio-distal angles. The last peduncular joint is the longest.

The flagellum is about four-fifths as long as the last peduncular joint and consists, as a rule of three joints, the last joint provided with a claw, in which a distinct setal canal can be seen. In one large female with marsupium the flagellum consisted of four joints, the first two joints corresponding to the usual first joint.

Mandibles and maxillae. Normal.

Maxillipeds. Epipodite ovate with distal margin broadly rounded. The suture between the proximal and the distal epipodite is faint in males. In females with a marsupium this suture is distinct, and the coxopodite extends backwards into a thin subrectangular lobe in the usual way, the lobe being furnished on its inner margin with plumose setae.

First pair of pereiopods. Dactylus subequal in length to the propodus, furnished with two very short claws near each other, the claws being almost equal in size. All setae on the pereiopod are single-pointed, without sub-branches.

Second, third and fourth pairs of pereiopods (Fig. 39 b). Basipodite of the second pereiopod, as a rule, with a small spine[1] on its upper margin; on the third pereiopod the upper margin of the basipodite, as a rule, has two, on the fourth pereiopod, three spines. Ischium and merus with their upper distal angles prolonged into spine-like projections. The propodus and dactylus are extremely long, the dactylus being somewhat longer than the propodus. On the second and third pereiopod the dactylus is furnished with a dorsal claw, which is about one eighth as long as the dactylus, and a minute slender ventral claw. Between the claws there is one seta. The dactylus of the fourth pereiopod is provided with two claws, both strong, but the ventral one is about two-thirds the length of the dorsal; between the claws there is one slender seta; the dorsal claw is about $^1/_{12}$—$^1/_{13}$ as long as the dactylus.

Fifth, sixth and seventh pairs of pereiopods (Fig. 39 c). Upper margin of the basipodite provided with a small spine. Upper distal angle of the ischium and merus prolonged into a spine. Lower margin of the ischium, merus, carpus, and propodus, with small spines. Dactylus about two-thirds as long as propodus, furnished with two claws, a small dorsal claw about one-seventh the length of the dactylus, and a minute ventral one, about one-third as long as the dorsal claw.

Penis. Normal.

First pair of pleopods (Fig. 39 d). Basipodite with 7—10 minute tooth-like spines along its lateral margin; inner margin with about seven coupling-setae. Exopodite in the male almost of uniform width, slightly curved; outer margin concave and provided with branchless setae, inner margin slightly convex; distal margin convex and furnished with five plumose setae; inner proximal angle rounded, smooth. The diagonal furrow

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[1] The spine is missing in the specimen figured.

of the male exopodite is broad proximally, but for the greater part of its length it is contracted into a tube; the posterio-distal angle of the mouth of the tube is pointed. For further details see the figure. Endopodite in the male always narrower than the exopodite, its width in some specimens being two-thirds the width of the exopodite; in other specimens it is broader.

The exopodite and endopodite in the female are long and narrow, the endopodite being very slightly shorter and narrower than the exopodite. Both are furnished with plumose setae on their distal margins; the exopodite is provided with four such setae, the endopodite with five. In one female with marsupium the exopodite was transformed in exactly the same manner as in the adult male.

Uropods (Fig. 39 e). Lateral surface of the sympodite with a longitudinal ridge along the middle bearing about six small tooth-like spines. Lateral ramus subtriangular and broadly rounded distally. "Secondary" ramus completely absent in all specimens.

Remarks. Microarcturus digitatus is allied to *M. acanthurus* (MONOD, 1926). The spine-armature of the head and the pereion resembles that of *acanthurus*. The length of the joints of the pereiopods and the antennae is similar in both species, but *digitatus* differs in having the pleotelson pointed, not as in *acanthurus* elongated into a cleft prolongation, as well as in many other details. Whether or not the "secondary" ramus of the uropod is lacking in *acanthurus*, as is the case in *digitatus*, was not indicated by MONOD (1926).

The spine-armature in *Microarcturus digitatus* is very similar to that in *Arcturus parvus* RICHARDSON (1910) from the Phillipine Islands (see RICHARDSON, 1910 a).

Localities and Material.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. Immature specimen, found on a sponge. Flagellum of one of the antennae consisting of only two joints. Seventh pair of pereiopods only semi-developed. Spine-armature in its main features as in adult specimens. Thus there is a transverse row of six spines posteriorly on the first four pereion segments, but the small additional spines are absent or minute. Length of the specimen about 3.2 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 11 specimens, males and females, found on a sponge. Length of largest specimens (types), male 12.5 mm, female possessing a marsupium 9 mm.

Distribution. Shag Rock Bank (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.).

SECTION V.

Sub-Order Asellota.

I. Fam. **Parasellidae.**

A. Group **Ianirini** HANSEN, 1916.

Genus **Ianira** LEACH, 1813.

HANSEN 1916, TATTERSALL 1921.

Subgenus **Iathrippa** BOVALLIUS, 1886.

Syn. *Notasellus.* PFEFFER, 1887.
Jorina. NIERSTRASZ, 1918.

Diagnosis. Eyes protruding, situated laterally. Uropods broad and flattened, the width of the peduncle increasing towards the distal end. First pair of pleopods (in the male) with the latero-distal angles of the sympodite triangular and protruding freely, rami triangular distinctly marked off from the sympodites. Exopodite of third pleopod two-jointed, differently shaped in male and female, being large in the male and widening towards the end, in the female small and narrow and tapering towards the end. Endopodite of third pleopod oblong-ovate furnished with three plumose setae on its distal margin. Otherwise as in *Ianira.*

In 1886, BOVALLIUS referred the species *Ianira longicauda* CHILTON to a new genus *Iathrippa,* characterized by having lamellar uropods. As will be shown below, *Ianira* (*Iathrippa*) *longicauda* CHILTON is identical with *Notasellus trilobatus* RICHARDSON (1910). Consequently, the name *Notasellus* PFEFFER must be abandoned and replaced by the older name *Iathrippa.*

BOTH HODGSON (1902), and TATTERSALL (1921) point out that *Ianira* (*Iathrippa*) *sarsi* (PFEFFER) comes very close to a typical species of *Ianira.* Still more is this the case with the second species *Ianira* (*Iathrippa*) *longicauda.* But as there still remain some features characteristic of both species, as shown in the diagnosis, I prefer to retain *Iathrippa* as a separate subgenus. The value of the subgenerical characters cannot be shown without a revision of *Ianira* and allied genera.

The shape of the first pleopods in the male is characteristic and exactly similar in both the known species. This characteristic thus applies to the subgenus, but it is however, to be remarked that the shape of the first male pleopods within the group *Ianirini* sometimes varies rather considerably in different species of the same genus. (e. g. the closely allied species *Jaera albifrons* LEACH and *Jaera nordmanni* RATHKE).

According to HANSEN (1905, p. 329—330) and STEBBING (1905, p. 49) *Stenetrium inerme* HASWELL (1881) should probably be referred to *Ianira.* In its laterally situated eyes and broad uropods it agrees with the subgenus *Iathrippa* (see HASWELL, 1881, Pl. 19, Figs. 2 and 2 x).

Ianira (*Iathrippa*) longicauda CHILTON, 1884.

Text. figs 40 a—h.

Janira longicauda. CHILTON, 1884, p. 250, Pl. 18, Fig. 2 a; TATTERSALL, 1921, p. 200, Pl. I, Fig. 6.
Iathrippa longicauda. BOVALLIUS 1886, p. 32—33.
Notasellus trilobatus. RICHARDSON, 1910, p. 649—650, Figs. 1 a, b, and c; GIAMBIAGI, 1925, p. 16—17, Pl. V.
Jorina chilensis. NIERSTRASZ, 1918, p. 134—137, Figs. 74—85.
For additional literature see TATTERSALL (1921).

Supplementary Description.

Colour. Whitish to slightly yellow or brownish; some specimens with brownish dots of pigment on the dorsal surface.

Head. Sub-rectangular, anterio-lateral angles rounded. Rostrum extending to about the distal end of the third peduncular joint of the antennae, its dorsal surface concave. Eyes laterally situated, protruding, semi-spherical. Lateral margins with short spinelike setae which, in large specimens, are found, as a rule also on the dorsal surface, mingled with longer ones.

Pereion. In large specimens more or less covered with setae. Coxal plates as described and figured by RICHARDSON (1910).

Abdomen (Fig. 40 a). With one short free segment anteriorly. Pleotelson semi-circular, more or less covered with short and long setae, most thickly on the margins.

Antennulae (Fig. 40 b). Most of the setae on the peduncular joints are two-pointed and of the appearance shown in Fig. 40 c. Flagellum consisting of about 28 joints.

Antennae. Slightly longer than the body. In most of the specimens they are broken between the fourth and fifth peduncular joints. Peduncle furnished with the same kind of setae as the peduncle of the antennulae. First, second and third joints short, subequal in length. Third peduncular joint about twice as long as the first, with well developed and articulated squama, which is furnished with apical setae. The sixth peduncular joint (in a free antenna lacking the first four joints of the peduncle) is longer than the fifth. The long flagellum consists of about 90 (91) joints, the first very long and corresponding to several joints.

Mandibles. Of typical Ianiridian structure, almost as in *Ianira maculosa*[1] LEACH. Incisive part in both mandibles five-pointed. Lacinia (on the left mandible) with five points. Row of setae consisting of 14—16 large setae; they are furnished with a row of spinelike sub-branches, except 1—3 of the posterior setae. Between the large setae occur some hair-like additional ones.

First and second pairs of maxillae, upper and lower lips. Almost as in *Ianira maculosa*[1] LEACH. Each lappet of the outer lobe of the second pair of maxillae is provided with three apical setae.

Maxillipeds (Fig. 40 d). Same in males and females. Third palp joint narrow. Some of the setae on the distal margin of the endite are illustrated in Fig. 40 e.

First pair of pereiopods, female. See Fig. 40 h.

First pair of pereiopods, male[2]. See Figs 40 f and g. Meral joint with six two-pointed distal setae. Carpal joint strong, with lower surface very broad and somewhat hol-

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[1] Cf. G. O. SARS, 1899, Pl. 40.

[2] Cf. RICHARDSON (1910, Fig. 1 b) and GIAMBIAGI (1925, Pl. V, p_1 and p_1x).

lowed. On both the rostral and the caudal margin of the lower surface there is a row of densely situated setae, having between them a longitudinal furrow in the middle. Most of the setae are slender and hair-like, but in the caudal row they are mingled with stout two-pointed ones. The propodus is ventrally hollowed and carries one longitudinal row of hair-like setae on both the rostral and caudal margins of its lower surface.

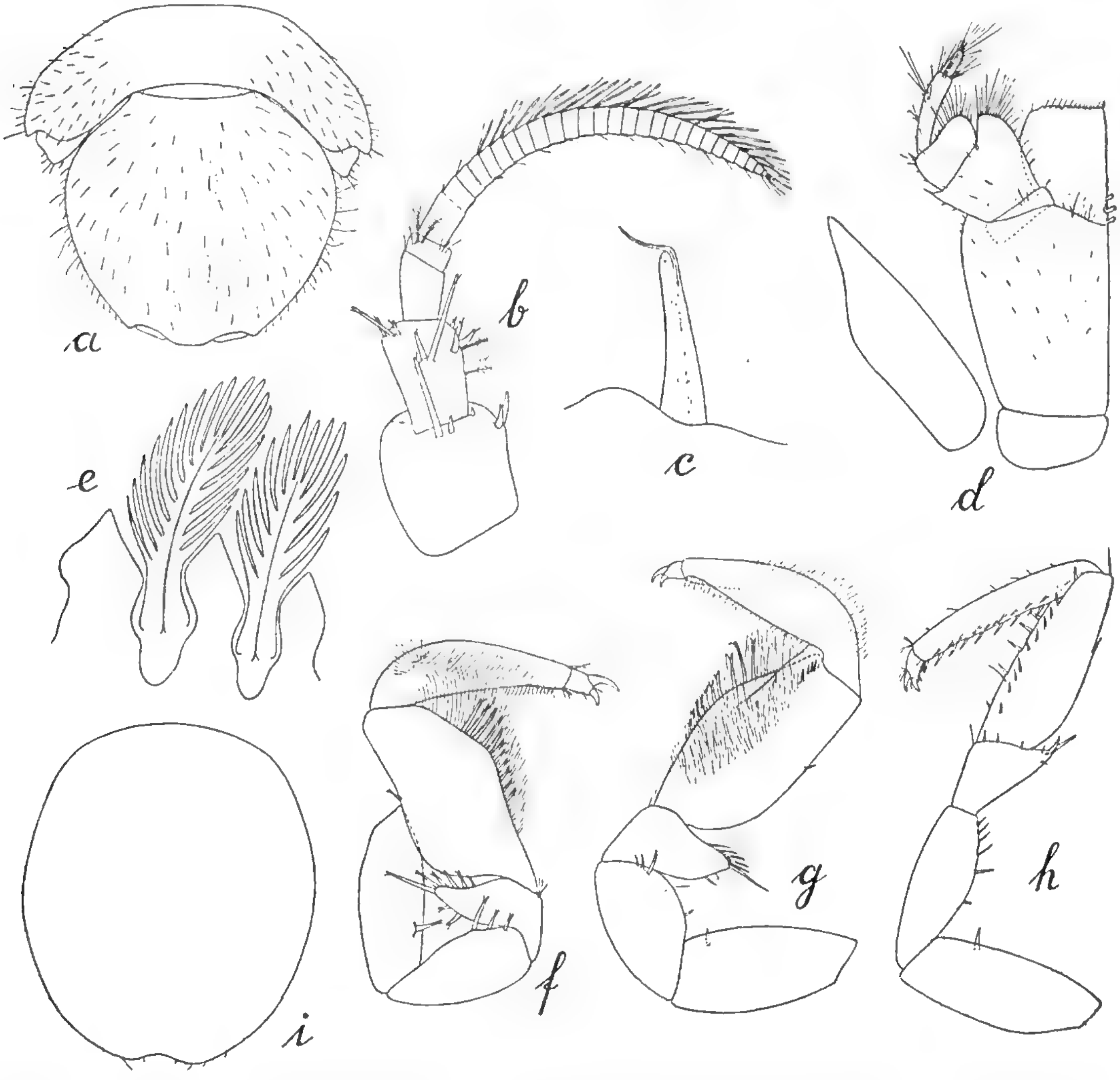

Fig. 40. *Ianira* (*Iathrippa*) *longicauda* CHILT. a. Last pereion segment and abdomen, 13 ×. b. Right antennula, male, 35 ×. c. Seta from the second penduncular joint of the antennula, 240 ×. d. Right maxilliped, (non-ovigerous female), 30 ×. e. Setae from the distal margin of the endite of the maxilliped, 670 ×. f. Right first pereiopod of an adult male; seen from the caudal side, 17 ×. g. Right first pereiopod of an adult male; seen from the rostral side, 20 ×. h. Right first pereiopod, in a female, 25 ×. i. Female operculum, 25 ×.

The figures by GIAMBIAGI (1925, Pl. V, p_1 and p_1^x) illustrate the first pereiopod of an immature male specimen, in which this appendage resembles the first pereiopod of the female.

The other pereiopods. Dactylus provided with three claws.

First pairs of pleopods, male. First pleopods much broader proximally than figured by RICHARDSON[1] (1910) and agreeing with the same appendages in *Ianira* (*Iathrippa*) *sarsi.*

Operculum, female. With distal margin somewhat concave in the middle.

Third pair of pleopods. In the female the exopodite is sligtly longer than the endopodite' narrow, two-jointed, its second joint small; lateral margin of the exopodite exhibiting an incision between its first and second joint. Endopodite oblong-ovate; its distal margin provided with three plumose setae, two of which are situated close to each other near the outer distal angle.

In the male[2] the two-jointed exopodite is much larger and longer than in the female. The endopodite is similar to that in the female.

Uropods, Broad and flattened; exopodite about half as long as the endopodite.

Remarks. With the above described species, previously known only from New Zealand, the Patagonian form *Notasellus trilobatus* described by RICHARDSON (1910) must be identical. I have compared some sub-adult and immature specimens from the Campbell Islands with specimens subequal in size from the Falkland Islands and could find no differences. The rostrum of *Ianira* (*Iathrippa*) *longicauda* is somewhat longer than as figured by TATTERSALL (1921). The anterio-lateral angles of the head are slightly more rounded than shown in the figures by RICHARDSON (1910) and GIAMBIAGI (1925), but not so much rounded as figured by TATTERSALL (1921). The pleotelson (Fig. 40 a) is almost circular in outline (as it is figured by TATTERSALL, 1921), though occasionally it is somewhat trilobate distally, as shown in the figure by GIAMBIAGI (1925), but not so much trilobate as it is figured by RICHARDSON (1910). The lateral margins and the dorsal surface of the body are covered with setae, but sometimes nearly all the setae are missing.

The species described by NIERSTRASZ (1918) under the name of *Jorina chilensis* is certainly identical with *Ianira* (*Iathrippa*) *longicauda* CHILTON. The figures by NIERSTRASZ show that it agrees in detail with the latter species. His description is, however, incomplete in some points which certainly is due to his defective material, consisting of a single female specimen. The characteristic five-pointed incisive part, as well as the lacinia, of the left mandible is illustrated by NIERSTRASZ in his Fig. 77, but it is stated to be that of the right mandible. On all the pereiopods, except the first, I found three claws; NIERSTRASZ (1918) states that the fifth pereiopod is provided with three claws.

Localities and Material.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^5/_6$ 1902. Male specimen of a length of about 9 mm.

St. 40. Falkland Islands, Berkeley Sound, lat. 51° 33′ S., long. 58° 0′ W. 16 m. Bottom temp. + 2.75°. Gravel and shells with algae. $^{19}/_7$ 1902. 2 immature specimens male and female.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^3/_8$ 1902. 6 specimens, males and females; length of the two largest specimens about 9.5 mm. (males).

St. 52. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 44′ W. 17 m. Sand. $^3/_8$ 1902. Female broken into two parts.

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[1] See RICHARDSON, 1910, Fig. 1 b.

[2] See RICHARDSON, 1910 Fig. 1 c.

St. 55. Falkland Islands, Port Albemarle, lat. 52° 11′ S., long. 60° 26′ W. 40 m. Sand with algae. $^{8}/_{9}$ 1902. In a rotten root of kelp. Female with marsupium; the specimen covered with dots of brown pigment dorsally; length about 7 mm.

St. 58. South of West Falkland, lat. 52° 29′ S., long. 60° 36′ W. 197 m. Bottom temp. + 4.1°. Sand and gravel. $^{11}/_{9}$ 1902. 4 specimens (3 males with lengths of about 4.7, 4.7 and 7.9 mm.; ovigerous female, length about 6.5 mm.).

St. 59. South of West Falkland, on the Burdwood Bank, lat. 53° 45′ S., long. 61° 10′ W. 137—150 m. Broken shells with stones. $^{12}/_{9}$ 1902. 2 male specimens; length of the largest specimen about 9.5 mm.

St. 60. Fuegian Archipelago, eastern mouth of the Beagle Channel, lat. 55° 10′ S., long. 66° 15′ W. 100 m. Bottom temp. + 5.0°. Broken shells. $^{15}/_{9}$ 1902. 5 specimens, male and 4 females, one of the females with about 16 eggs in the marsupium. Largest specimen, female with small oostegits, about 8 mm. in length.

Swedish Magellanian Expedition. Tierra del Fuego, Fitzroy Channel, between Otway and Skyring. 13—14 m. Strong current. Gravel. Female with marsupium; dorsal surface with dots of pigment; length about 6.8 mm.

Swedish Expedition to Tierra del Fuego. Magellan Straits, Cape Valentyn. 150 fms. Shells. $^{12}/_{3}$ 1896. Male specimen, with a few scattered dots of pigment dorsally; length about 7.2 mm.

Magellan Straits, Martha Bank, 100 fms. Pebbles and gravel. $^{16}/_{3}$ 1896. Male, damaged; with dots of pigment; length about 6.9 mm.

Distribution. West Chile (NIERSTRASZ 1918), Patagonia (RICHARDSON 1910), Tierra del Fuego (GIAMBIAGI 1925), Magellan Straits (Sw. Mag. Exped., Sw. Exped. to Tierra del Fuego), Fuegian Archipelago (Sw. Ant. Exped.), Burdwood Bank (Sw. Ant. Exped.), Falkland Islands (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.), Campbell Islands (S. WALLIN legit 1924), New Zealand (CHILTON 1884, TATTERSALL 1921).

Not previously recorded from Falkland Islands, Burdwood Bank, South Georgia or Campbell Islands.

Ianira (*Iathrippa*) sarsi (PFEFFER, 1887).

Notasellus Sarsii. PFEFFER, 1887, p. 125—134, Pl. VII, Figs. 5—28; TATTERSALL, 1921, p. 201—202. For further synonymy and literature, see TATTERSALL, 1921, p. 201.

As this species has been described in detail by PFEFFER (1887), I merely add a few supplementary notes. The mandibles are of typical Ianiridian structure and resemble those in *Ianira* (*Iathrippa*) *longicauda*. The maxillipeds have their epipodites somewhat broader than figured by PFEFFER (1887), and their distal margins broadly convex. The third joint of the palp decreases in width distally; interio-distally this joint is somewhat concave, as also figured by PFEFFER. The first pereiopods, as stated by PFEFFER, are alike in males and females. First and second pairs of pleopods in male as in *Ianira* (*Iathrippa*) *longicauda*. The exopodite of the third pleopod in the female is subequal in length to the endopodite and has no lateral incision between its first and second joints; exopodite in the male (PFEFFER, 1887, Taf. VII, Fig. 2) smaller than in *Ianira* (*Iathrippa*) *longicauda*, subequal in width to, and slightly longer than, the endopodite. Endopodite of third pleopod in both male and female as in *Ianira* (*Iathrippa*) *longicauda*.

Localities and Material.

South Georgia, Grytviken. From roots of *Macrocystis* taken on the shore at low tide, 9 specimens; from roots of *Macrocystis* taken at a depth of three to four fathoms by net, 11 specimens. 22, 23 and 24 May 1902. Length of the largest specimen 8.4 mm. (female with young). Colour of the specimens grayish yellowish to brownish.

South Georgia, Cumberland Bay, May Bay. Haul at 1—2 m. among algae on a stony bottom. $^{9}/_{5}$ 1902. 2 females, one of them small of a length of only about 2.6 mm. The anterio-lateral angles of the head in this specimen are somewhat pointed but not projecting as in the adult specimen; rostrum in the young specimen very short.

St. 5. Graham Region, S. E. of Seymour Island, lat. 64° 20′ S., long. 56° 38′ W. 150 m. Sand and gravel. $^{16}/_{1}$ 1902. Fragment of a female specimen.

St. 17. Between Falkland Islands and South Georgia, on the Shag Rock Bank, lat. 53° 34′ S., long. 43° 23′ W. 160 m. Bottom temp. + 2.05°. Gravel and sand. $^{19}/_{4}$ 1902. Female with small oostegits, colour slightly yellowish. Length about 6.4 mm.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay with some algae. $^{14}/_{5}$ 1902. 4 specimens (male and 3 females). Length of the largest specimen, a female, about 8 mm. Colour of specimens slightly yellowish.

St. 32. South Georgia, Sydfjord, off the Nordenskjöldglacier, lat. 54° 24′ S., long. 36° 22′ W. 195 m. Bottom temp. + 1.45°. Clay with stones. $^{29}/_{5}$ 1902. Immature male specimen of a yellowish-brownish colour and of a length of about 3.8 mm.

St. 34 b. Atlantic Ocean, east of Patagonia and north of Falkland Islands, lat. 44° 49′ S., long. 57° 34′ W. 700—500 m. $^{27}/_{12}$ 1901. 2 specimens, male and female, of a grayish-brown colour. Largest specimen, a male, about 6.5 mm. in length.

St. 94. Graham Region, north of Joinville Island, lat. 62° 55′ S., long. 55° 57′ W. 104 m. Gravel and stones mingled with clay. $^{21}/_{12}$ 1902. Male specimen of a slightly yellowish colour. Length, about 6.7 mm.

Distribution. South Atlantic Ocean E. of Patagonia N. of Falkland Islands (Sw. Ant. Exped.), Shag Rock Bank (Sw. Ant. Exped.), South Georgia (PFEFFER 1887, TATTERSALL 1921), Kerguelen (VANHÖFFEN 1914), South Shetland Islands (RICHARDSON 1913), Graham Region (RICHARDSON 1906, 1908, 1913), Victoria Land (HODGSON 1902 and 1910, TATTERSALL 1921).

New localities for the species are Shag Rock Bank and South Atlantic Ocean (St. 34 b, Swedish Antarctic Expedition). In contradistinction from *Ianira* (*Iathrippa*) *longicauda*, it is not only distributed in the subantarctic but also widely in the Antarctic Region. It has been found at different depths, varying from shallow water up to 700—500[1] m.

Genus **Iais** BOVALLIUS, 1886.

STEBBING, 1900.

Diagnosis. Coxae visible from above and marked off by dorsal sutures on the last three pereion segments. Eyes small, situated dorsally. Antennulae short, consisting of one broad peduncular joint and a five-jointed flagellum. Antennae about half as long as the body, with very small but distinct squama and a six-jointed peduncle. Mandibles as in *Ianira*. Maxillipeds with first and second joints of the palp expanded and about as broad as the endite; third joint of the palp about half as broad as the second. Pereiopods all about equal, each with four claws. First pleopods of male with the branches subtriangular; endopodites distally rounded; exopodites[2] somewhat diverging from the endopodites, but with only their distal parts protruding freely. Female operculum broadly rounded with a small apical tip. Third pleopod with exopodite two-jointed, tapering towards the end. Fourth pleopod with exopodite narrow, about half as long as the endopodite and furnished with one conspicuous apical seta. Uropods short, one-third to one-fourth as long as the pleotelson; the endopodite about as long as the peduncle.

The two genera *Ianthopsis* BEDDARD and *Iolella* RICHARDSON were cancelled by HANSEN (1916) and referred to the genus *Ianira* LEACH. In a tabular view however, he divided the genus *Ianira* into three groups according to the development of the epimeral plates. TATTERSALL (1921) is of the opinion that these three groups correspond to *Ianira*, *Ianthopsis* and *Iolella* and that the last two genera should be retained. It should be noted, however, that if *Iolella* RICHARDSON is regarded as a separate genus with the definition given by HANSEN (1916), some of the species referred to *Iolella*

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[1] St. 34 b, Swedish Antarctic Expedition.

[2] See p. 179.

by RICHARDSON (1905) must instead, to judge from the figures, be assigned to *Ianira.* The development of the coxae in *Iais* is exactly as in the group C. of *Ianira* HANSEN (1916), or as in *Iolella* according to TATTERSALL (1921); but, as compared with *Iolella, Iais* is especially characterized by its short uropods, the narrow third joint of the palp of the maxilliped, and the four claws on the pereiopods. The fourth pleopod in *Iais* is very characteristic (see diagnosis). In *Iolella* this appendage has not been described.

Iais pubescens (DANA, 1852).

Text figs. 41 a—c.

Jaera pubescens. DANA. 1852, p. 744, Pl. 49, Fig. 9 a—9 d; BEDDARD, 1886, p. 19—20, Pl. II, Fig. 6—10. *Iais pubescens.* STEBBING, 1900, p. 549—551, Pl. XXXVIII; TATTERSALL, 1913, p. 890; BARNARD, 1914 a, p. 435—436, Pl. XXXVII C; GIAMBIAGI, 1925, p. 17, Pl. III, Fig. 2; MONOD, 1926, p. 13—14; STEPHENSEN, 1927, p. 356; MONOD, 1931, p. 11; 1931 a, p. 1.

This list is by no means complete, but the complete synonymy can be obtained by comparing the synonymous lists of the above-named authors and their discussion of the synonymy.

Supplementary Description.

Coxae. Visible from above and marked off by dorsal sutures on the last three pereion segments.

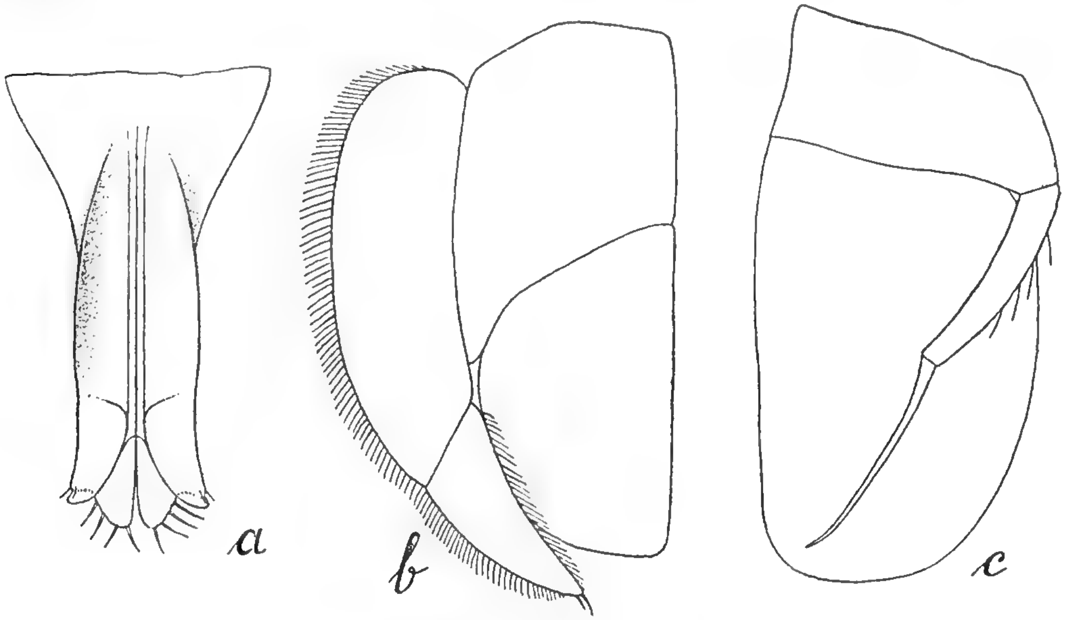

Fig. 41. *Iais pubescens* (DANA). a. First pleopods, male, 225 ×. b. Third pleopod, 225 ×. c. Fourth pleopod, 300 ×.

Mouth-organs. As figured by STEBBING (1900)[1]. The figures of the mandible and maxilliped by BARNARD (1914 a)[2] differ considerably from the corresponding figures by STEBBING. Thus in BARNARD's figure of the mandible the palp is only about half as long as figured by STEBBING (1900). As BARNARD's figures of the first male pleopods and the female operculum tally perfectly with my observations on *Iais pubescens,* it seems probable, that also the specimens examined by him were from the same species.

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[1] STEBBING, 1900, Pl. XXXVIII.

[2] BARNARD, 1914 a, Pl. XXXVII C, mand. and mxp.

First pair of pleopods, male (Fig. 41 a). See also BARNARD[1] (1914 a). The latero-distal parts of the sympodites are marked off by incomplete sutures. It may thus be assumed that these parts correspond to the exopodites, whilst the medially situated rami are the endopodites.

Second pair of pleopods, male. See BARNARD (1914 a).[2] I did not find any setae on the distal margin of the sympodite.

Operculum, female[3]. With a characteristic distal tip.

Third pair of pleopods (Fig. 41 b). Both branches subequal in length. Exopodite tapering towards the end, two-jointed. Endopodite broadly oval, distally non-setiferous.

Fourth pair of pleopods (Fig. 41 c). Exopodite narrow, almost of uniform width, about half as long as the endopodite and provided with one long and stout apical seta, the proximal part of which is almost as broad as the distal part of exopodite. Endopodite broadly oval.

Fifth pair of pleopods. Exopodite missing. Endopodite oblong-ovate, non-setiferous.

Remarks. It is supposed by MONOD (1926) that *Janiropsis californica* RICHARDSON is identical with this species. This supposition seems probable enough, but must be verified by an examination of the Californian specimens, especially of their maxillipeds.

Localities and Material.

Falkland Islands, Hookus Point. Pools, at low water between rocks of quartz. $^{26}/_{2}$ 1902. About 45 specimens, males and females, of whitish colour. Collected together with *Exosphaeroma gigas* (LEACH).

Falkland Islands, on the north beach of Port Louis, in the ebb-region below stones. $^{6}/_{8}$ 1902. 26 specimens, mostly females. Collected together with three specimens of *Exosphaeroma gigas* (LEACH).

Staten Island, (New Year Island). Below stones on the beach at low tide. 9 whitish specimens, collected together with 5 specimens of *Exosphaeroma gigas* (LEACH).

Fuegian Archipelago, Ushuaia. March 1902. In the forest 10 female specimens of a brownish-yellow colour, many of them with embryos. Largest specimen 2.2 mm. in length. A damaged specimen of a terrestrial Isopod was collected at the same time and place.

Swedish Expedition to Tierra del Fuego. Magellan Straits, Punta Arenas. On the shore at low tide. Sand and large stones. $^{25}/_{11}$ and $^{1}/_{12}$ 1895. Plenty of specimens, males and females, of a whitish colour, collected together with *Exosphaeroma gigas* (LEACH).

Fuegian Archipelago, Ushuaia Bay. On the rocky shore at low tide. $^{22}/_{5}$ 1896. 2 specimens, collected together with *Exosphaeroma gigas* (LEACH).

Fuegian Archipelago, Lennox Cove. $^{5}/_{2}$ 1896, 10—20 fms. Red algae. 2 specimens, collected together with *Exosphaeroma gigas* (LEACH).

Eugenie Expedition. Magellan Straits, York Bay, $^{15}/_{2}$ 1852. On the shore at low tide. A great many specimens of a whitish colour. Some few specimens of a dark-brown colour were collected below stones at the surface, in 1852, presumably in Febr. or March. Length of the largest female specimen 2.8 mm.; largest male 1.7 mm. Most of the specimens were collected together with *Exosphaeroma gigas* (LEACH), a few together with *Dynamenella eatoni* (MIERS); some others were collected alone at the surface.

Magellan Straits, St. Nicholas Bay, $^{5}/_{2}$ 1852. Some specimens collected together with *Exosphaeroma gigas* (LEACH).

Distribution. Staten Island (Sw. Ant. Exped.), Fuegian Archipelago (Sw. Ant. Exped., Sw. Exped. to Tierra del Fuego), Tierra del Fuego (DANA 1852), Magellan Straits (BOVALLIUS (1886, GIAMBIAGI 1925), Falkland Islands (STEBBING 1900), Tristan d'Acunha (BARNARD 1914 a), South Africa (BARNARD 1914 a), Kerguelen (SMITH 1876, BEDDARD 1886), Auckland Islands (CHILTON 1909, STEPHENSEN 1927), Campbell Islands (CHILTON 1909, MONOD 1931), New Zealand (CHILTON, fide STEPHENSEN 1927), Chatham Islands (CHILTON 1906), Tasmania (CHILTON, fide STEPHENSEN 1927), Ceylon (STEBBING 1904), Cameroon (MONOD 1931 a), (?) California (MONOD 1926).

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[1] BARNARD, 1914 a, Pl. XXXVII C, plp. 1.

[2] BARNARD, 1914 a, Pl. XXXVII C, plp. 2.

[3] BARNARD, 1914 a, Pl. XXXVII C, operc. ♀.

Genus **Ianthopsis** BEDDARD, 1886.

Ianthe. BOVALLIUS, 1885, part., nec 1881' STUDER, 1884. *Iolanthe.* BEDDARD, 1886; HANSEN, 1895; VANHÖFFEN, 1914.

Diagnosis[1]. Head usually with a long rostrum. Eyes situated dorsally, minute or missing. Antennulae with a flagellum consisting of comparatively few joints. Antennae with a six-jointed peduncle, a distinct squama and a many-jointed flagellum. Mandibles as in *Ianira.* Thoracic segments without coxal plates, with lateral margins often cleft and produced into lappets. Palp of maxilliped with second and third joints about half as broad as the endite. First pereiopods not subchelate, equal in males and females. Dactylus of the pereiopods furnished with two subequal claws. First pleopods in male tapering towards the distal end. Female operculum elongated into a distal tip. Uropods long (usually subequal in length to the pleotelson) and provided with two branches.

The most characteristic feature of the genus *Ianthopsis* is that coxal plates are missing on all thoracic segments[2] (cf. TATTERSALL 1921, p. 199). This feature distinguishes the genus from the allied genera *Ianira* LEACH, *Iolella* RICHARDSON, *Acanthaspidea* STEBBING, and *Iais* BOVALLIUS. HANSEN (1916) considers that *Ianthopsis* BEDDARD and probably also *Iolanthe* BEDDARD should be cancelled as genera and united with *Acanthaspidea* STEBBING. I do not share his opinion, as these genera differ from *Acanthaspidea* in such an essential character as the absence of coxal plates. *Ianthopsis* moreover differs from *Acanthaspidea* in the pereiopods, which are furnished with two subequal claws. The close connection of *Acanthaspidea* with *Ianthopsis* is shown especially by the similarity of the maxillipeds, which, in both genera, have the second joint of the palp narrow and only about half as wide as the endite. The two species previously referred to *Iolanthe* have their maxillipeds exactly shaped as in *Ianthopsis* and *Acanthaspidea.* In the figures of »*Iolanthe acanthonotus*» by BEDDARD[3] (1886) and VANHÖFFEN[4] (1914) no coxal plates are to be seen. HANSEN (1895) states that »*Iolanthe decorata* is devoid of coxal plates. Thus the distinction between *Iolanthe* and *Ianthopsis* is reduced to a slight difference in the shape of the head and the spine-armature of the pereion. These minor dissimilarities cannot be regarded as generic distinctions.

In the two species of *Ianthopsis* examined by me, *I. bovallii* (STUDER) and *nasicornis* VANHÖFFEN, the third pairs of pleopods (Figs. 42 d and 43 j) are similarly shaped, the exopodite being two-jointed, increasing in width distally, its distal margin being furnished with seven to nine penicillated or plumose setae. Having examined only two species of *Ianthopsis* I have not included these characters in the diagnosis, but it seems fairly probable that the peculiar shape of the third pleopod in *Ianthopsis bovalli* and *nasicornis* is characteristic of the whole genus.

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[1] Cf. BEDDARD, 1886, p. 15.

[2] The coxae are developed as basal rings fused with the sternum and surrounding the proximal ends of the basipodites of the pereiopods.

[3] BEDDARD, 1886, Pl. IV, Fig. 9.

[4] VANHÖFFEN, 1914 Fig. 65 a.

Ianthopsis bovallii (STUDER, 1884).

Text. figs. 42 a—d.

Janthe Bovallii. STUDER, 1884, p. 10—12, Pl. I, Figs. 2 a, b, c, d.
Ianthe bovallii. BOVALLIUS, 1886, p. 36.
Ianthopsis Bovallii. BEDDARD, 1886, p. 14—15.
Janthopsis sp. VANHÖFFEN, 1914, p. 544—545, Fig. 70; TATTERSALL 1921, p. 200—201, Pl. I, Figs. 7—10.

Supplementary Description.

Eyes. Colourless, minute, in small specimens difficult to detect.

Pereion. In adult specimens with three longitudinal rows of tuberculae, of which the two lateral rows are faint and indistinct; in young specimens only the row along the middle line is distinct.

Antennulae[1]. The flagellum in an ovigerous female, about 7.3 mm. in length, consists of six joints, the first of which is very long. STUDER (1884) assigns this joint to the peduncle.

Antennae[1]. First four joints of the peduncle short; first and second together about as long as the third, which is furnished with a distinct squama; the fourth joint is about half as long as the third; fifth and sixth joints long, somewhat widening towards their distal ends. The flagellum consists of sixteen joints, the first of which is very long, being almost as long as the remaining joints together. STUDER (1884) does not figure the suture between the first and second peduncular joints or that between the third and fourth joint but assigns the long first joint of the flagellum to the peduncle.

Mandibles[2]. Molar tubercle slightly tapering towards the distal denticulated end. Incisive part with four points. Lacinia (on the left mandible) with three points. Setal row on the left mandible with eleven setae, on the right with twelve.

Second pair of maxillae. Lappets of outer lobe each with four apical setae.

Maxillipeds (Fig. 42 a). Second joint of the palp only about half as broad as the endite.

Pereiopods. All similar and with a row of setae (most of them two-pointed) along the lower margin of the carpus and propodus. The two-pointed setae are of the usual shape; they terminate in one stout and one hair-like point. The dactylus of all pereiopods is furnished with two subequal claws.

First pair of pleopods. See BEDDARD[3] (1886). One female or perhaps hermaphroditic specimen was furnished with a minute first pleopod (Fig. 42 b); in the specimen the fused second pleopods were quite normal and had the usual form of the female operculum. As seen in the figure the first pleopods in this specimen are fused into an operculum which is cleft distally. They differ rather considerably in shape from the first pleopods in the male[3] and all setae are missing.

Operculum female (Fig. 42 c). Distally triangularly elongated.

Third pair of pleopods (Fig. 42 d). Exopodite increasing somewhat in width towards the distal end, two-jointed; its distal margin provided with nine setae, some of them plumose, others penicillated, having irregularly situated sub-branches. Endopodite broadly oval, its distal margin furnished with plumose setae.

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[1] Cf. STUDER, 1884, Pl. I, Fig. 2 b.
[2] STUDER, 1884, Pl. I, Fig. 2 c.
[3] BEDDARD, 1886, Pl. V, Fig. 6.

Fourth pair of pleopods. Exopodite subtriangular, much smaller than endopodite, provided with some short hair-like setae distally. Endopodite broadly oval; its margins devoid of setae.

Fifth pair of pleopods. Exopodite missing. Endopodite oval, without setae.

Uropods[1]. In a small specimen, about two mm. in length, the peduncle was about twice as long as the endopodite, which was about twice as long as the exopodite.

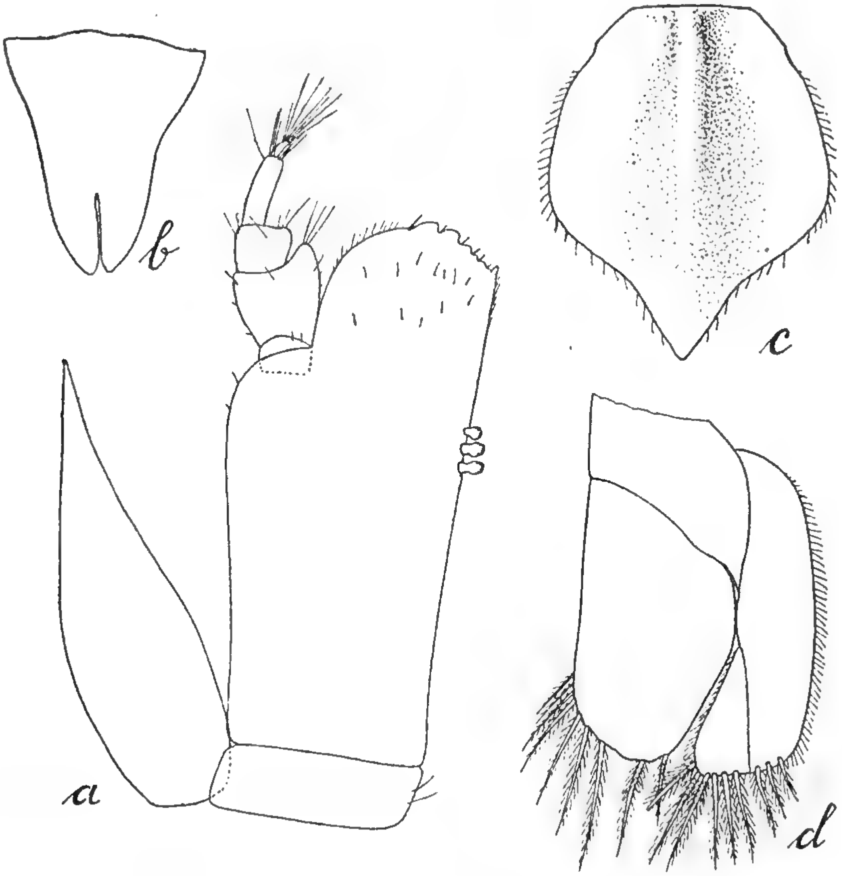

Fig. 42. *Ianthopsis bovalli* (STUD.). a. Right maxilliped, male, 55 ×. b. Vestigial first pleopods from a female specimen, 55 ×. c. Operculum, female, 23 ×. d. Right third pleopod, female, 45 ×.

Remarks. A large specimen, 10 mm. long, of this characteristic species was figured by STUDER (1884). TATTERSALL (1921) figures a small specimen of *Ianthopsis*, of which he says (p. 200) that »it is very closely allied to if not identical with, *I. bovalii*, STUDER». He supposes that his figured specimen belongs to the same species as an unnamed small *Ianthopsis* figured by VANHÖFFEN (1914). The material from the Swedish Antarctic Expedition, which contains an ovigerous female and numbers of young specimens, shows that the latter exactly resemble the unnamed *Ianthopsis* figured by TATTERSALL (1921). Young specimens, about 2.5 mm. in length, differ from adult ones in the following characters: —

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[1] See BEDDARD, 1886, Pl. V, Fig. 8.

1. The projections in front of the eyes on the anterior margin of the head are only slightly indicated, the frontal margin being only slightly convex anteriorly from the eyes.

2. The pleotelson is narrower.

3. The projections on the posterior margin of the pleotelson laterally from its apical tip are short or indistinct.

In the fully grown specimen (about 7.3 mm. in length) the projections of the anterior margin of the head in front of the eyes are somewhat shorter and broader than figured by STUDER (1884), but otherwise it corresponds exactly with his figure.

Localities and Material.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 12—15 m. Sand and algae. $^{21}/_{5}$ 1902. 5 immature specimens; length of the largest specimen about 4.2 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. Female specimen about 5 mm. in length.

St. 58. South of West Falkland, lat. 52° 29′ S., long. 60° 36′ W. 197 m. Bottom temp. + 4.1°. Sand and gravel. $^{11}/_{9}$ 1902. 2 females; length of largest specimen about 7.3 mm. (ovigerous female).

Distribution. Patagonia (BOVALLIUS 1886), Falkland Islands (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.), Kerguelen (STUDER 1884, BEDDARD 1886), Gauss Station (VANHÖFFEN 1914), Victoria Land (TATTERSALL 1921).

The species is here recorded for the first time from South Georgia and Falkland Islands.

Ianthopsis nasicornis VANHÖFFEN, 1914.

Text. figs. 43 a—j.

Ianthopsis nasicornis. VANHÖFFEN, 1914, p. 539—541, Figs. 66 a—g; nec MONOD, 1926.

Supplementary Description:

Head. Lateral margins straight or slightly concave. Eyes vestigial, colourless.

Pereion. First segment with lateral margins straight. Second, third and fourth segments laterally divided into two short lappets of about equal length; the lateral margins of the lappets are almost straight. On the second segment the posterior lappet is slightly larger than the anterior one, on the third the two lappets are subequal, on the fourth the anterior lappet is the largest. Last three segments with lateral margins slightly convex.

Antennulae and antennae (Figs. 43 a and b). Much as in *Ianthopsis bovalli* (STUDER). The antennae are furnished with distinct squamae.

Upper and lower lips (Figs. 43 c and d). Normal.

Mandibles[1]. Left: Molar tubercle sub-cylindrical, of a uniform width; its distal margin approximately straight, but furnished with some teeth. Incisive part and lacinia each provided with four points. Setal row with twelve setae. Second joint of the palp with a row of about seven setae on the distal part of its lower margin. Third joint with setae on the distal part of its lower margin and distally.

Right: Incisive part with five points. Lacinia absent. Setal row with thirteen setae. Otherwise as in the left mandible.

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[1] VANHÖFFEN, 1914, Fig. 66 f.

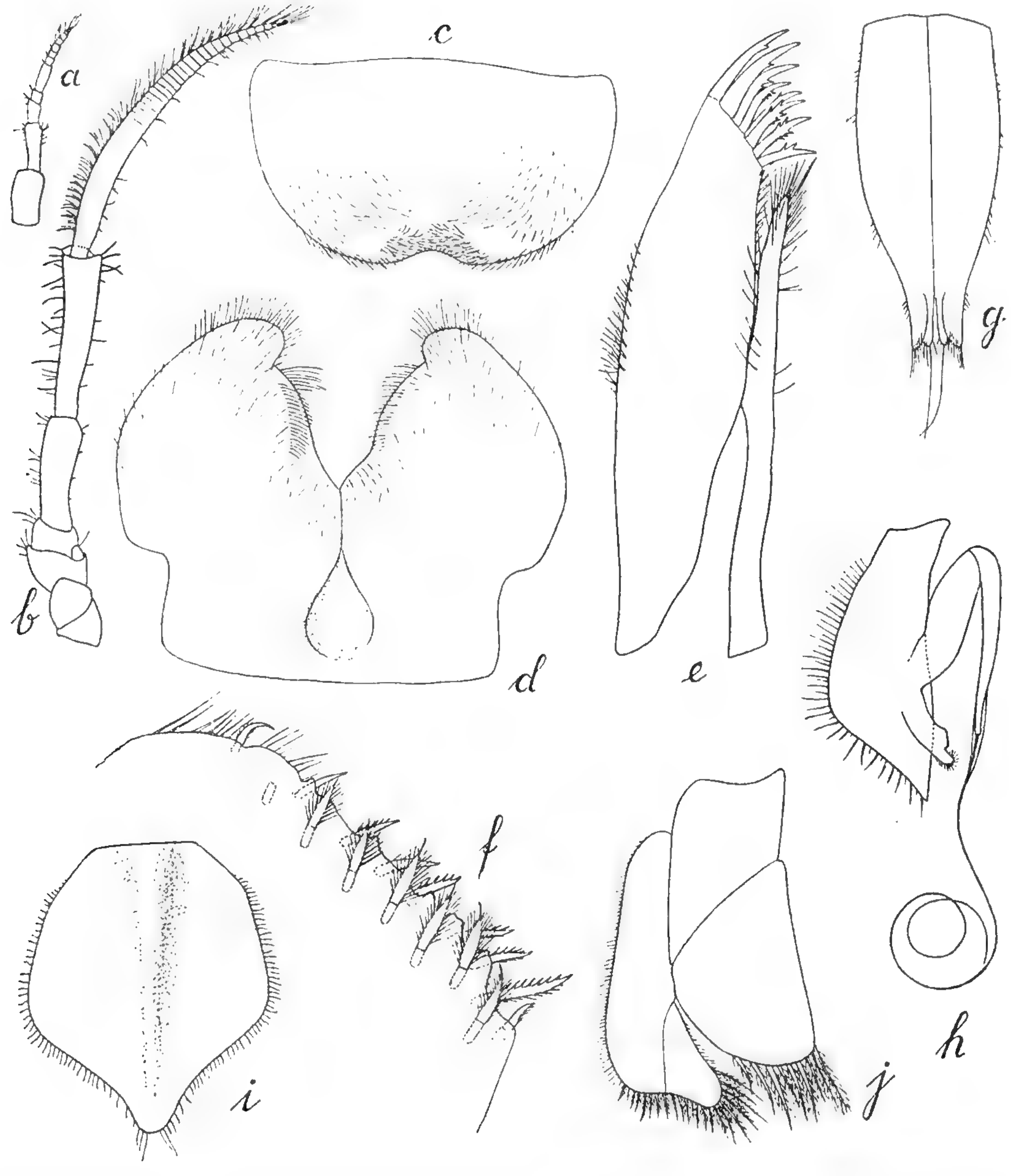

Fig. 43. *Ianthopsis nasicornis* VANHÖFF. a. Antennula, 17 ×. b. Antenna, 17 ×. c. Upper lip, 80 ×. d. Lower lip, 80 ×. e. Right first maxilla, female, 95 ×. f. Distal part of the endite of the maxilliped, seen from below, 240 ×. g. First pleopods, male; seen from the rostral side, 17 ×. h. Left second male pleopod, seen from the caudal side, 17 ×. i. Female operculum, 17 ×. j. Right third pleopod, male, 30 ×.

First and second pairs of maxillae. Inner lobe of the first maxilla (Fig. 43 e) very narrow, somewhat tapering towards the end. Each lappet of the outer lobe of the second maxilla is provided with four apical setae.

Maxillipeds[1]. Endite with five coupling-hooks. The distal part of the endite is illustrated in Fig. 43 f. Close to the distal margin are two rows of submarginal setae, one row on either side; those in the ventral row are somewhat thicker and have more slender sub-branches than the setae in the dorsal row. Dorsally, near the distal margin, there are a large number of fine »hairs[2]», lacking a setal canal.

Pereiopods. All alike and carrying a row of setae along the lower margin of the carpus and propodus, some of them of the usual two-pointed shape (cf. Fig. 40 c). The dactylus has two claws of which the upper is the longest.

First pair of pleopods, male[3] (Fig. 43 g). Exopodite[4] slightly broader than endopodite. Distal margin of endopodite not concave as figured by VANHÖFFEN (1914). The posterior chitinous folds, illustrated in VANHÖFFEN's Fig. 66 d, are not seen in my figure, which shows the pleopods in an anterior view.

Second pair of pleopods, male[5] (Fig. 43 h). Exopodite small, cleft distally. Endopodite distally elongated into a spiral thread.

Operculum, female (Fig. 43 i). As in *Ianthopsis bovalli* with an apical tip but more obtuse than in the latter species.

Third pair of pleopods (Fig. 43 j). Much as in *Ianthopsis bovalli*; the exopodite however, is slightly different in shape.

Fourth pair of pleopods. Exopodite narrowly oval, more than twice as narrow and about three-fourths as long as the endopodite. Endopodite broadly oval. Margins of the branches without setae.

Fifth pair of pleopods. Exopodite absent. Endopodite oval, lacking setae.

Uropods. Narrow. Exopodite about two-thirds the length of the endopodite.

Remarks. A great many specimens of this species were obtained by the Swedish Antarctic Expedition, at South Georgia. They agree well with the figures by VANHÖFFEN (1914, Figs. 66 a—g).

MONOD (1926) figures a species of *Ianthopsis*, which, though it differs in some respects from *I. nasicornis* he refers to this species of VANHÖFFEN, regarding the differences from the figure[6] of *I. nasicornis* by VANHÖFFEN (1914) as due to immaturity of Vanhöffen's specimens. My material shows that differences of this kind between young and adult specimens do not exist in the species. Full-grown specimens, about 10 mm. in length, agree with immature specimens in all characters, except that in very young examples the last segment of the pereion is narrower[6], i. e. the usual difference between young and adult individuals. The species described and figured by MONOD (1926)[7],

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[1] See VANHÖFFEN, 1914 Fig. 66 g.

[2] In Fig. 43 f, which illustrates the distal part of the endite in a ventral view, only a few of these hairs are seen.

[3] VANHÖFFEN, 1914, Fig. 66 d.

[4] I consider that the latero-distal parts of the sympodites correspond to the exopodites, exactly as is the case in *Iais pubescens*. See p. 179.

[5] VANHÖFFEN, 1914, Fig. 66 e.

[6] Cf. VANHÖFFEN, 1914, Fig. 66 a.

[7] MONOD, 1926, p. 14, Figs. 3, 4 and 5.

consequently, is not *Ianthopsis nasicornis* VANHÖFFEN. As will be seen from MONOD's figure of this species (MONOD 1926, Fig. 3), it differs from *Ianthopsis nasicornis* VANH. especially in the following characters: —1. The rostrum and the anterio-lateral projections of the head are longer and more pointed. 2. The first, fifth, sixth and seventh pereion segments are prolonged into lateral spine-like projections. (In *Ianthopsis nasicornis* VANH. the lateral margins of the first segments are straight or almost straight and the lateral margins of the sixth and seventh segments slightly convex). 3. The pleotelson is posteriorly broader than in *Ianthopsis nasicornis* VANH.

For MONOD's species I propose the name of *Ianthopsis Monodi.*

Localities and Material.

St. 22. South Georgia, off May Bay. lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay and some algae. $^{14}/_{5}$ 1902. Male specimen about 7.5 mm. in length.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 9 specimens, males and females. Length of largest specimen about 10 mm. (ovigerous female).

Distribution. South Georgia (Sw. Ant. Exped.), Gauss Station (VANHÖFFEN 1914).

Not previously recorded from South Georgia.

Genus **Ectias** RICHARDSON, 1906.

For diagnosis see RICHARDSON (1906, p. 13—14). To the diagnosis may be added that the coxae are visible from above and are marked off by dorsal sutures on the last three thoracic segments, and that the third pleopod has an oblong-ovate endopodite and a narrow two-jointed exopodite, tapering towards the end and subequal in length to the endopodite.

In the genus the mandibles are of the typical Ianiridean structure. As the coxae are visible from above and are delimited by dorsal sutures on the last three thoracic segments, the genus comes close to *Iolella* RICHARDSON and *Iais* BOVALLIUS. It differs from these genera especially in its very long and narrow body, in its characteristically built first pereiopods in the male (the female is unknown), and in its long and narrow first male pleopods. The last three pleopods are characteristic; the third is similar to that in *Iolella laciniata*[1] (G. O. SARS), except that the exopodite is two-jointed.

Ectias turqueti RICHARDSON, 1906.

Ectias Turqueti. RICHARDSON, 1906, p. 14—15, Pl. 1, Fig. 5, Text figs. 14—19; RICHARDSON, 1913, p. 18; TATTERSALL, 1921, p. 202.

Supplementary Description.

As there is only one specimen in my material, a male of a length of about 3.9 mm., I shall only give a few brief notes.

Coxae. On the last three thoracic segments they are situated at the posterio-lateral angles of the segments. They are small but visible from above and marked off from the segments by dorsal sutures.

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[1] Cf. G. O. SARS, 1899, Pl. 41, plp^2.

Mandible (*right*). Of typical Ianiridian type. Incisive part with five points. Setal row with ten setae. Molar tubercle sub-cylindrical, widening towards the distal end, directed somewhat forwardly. Palp long and slender with the last two joints somewhat expanded.

First pair of maxillae. Normal.

Second pair of maxillae. Lappets of outer lobe narrow, about as long as the inner lobe, each provided with three apical setae.

Maxillipeds. First, second and third joints of the palp broad and expanded, somewhat broader than the endite, second joint broadest. Endite with two coupling-hooks. Epipodite reaching approximately to the middle of second joint of the palp, obtusely pointed distally and with outer margin angular.

Third pair of pleopods. Exopodite about as long as, but narrower than, the endopodite, two-jointed, tapering towards the end. Its inner margin is almost straight, its outer margin convex. The second joint of the exopodite is subtriangular and about half as long as the first; the distal part of its outer margin is provided with plumose setae. Outer margin of first joint, proximal part of outer margin of second joint as well as inner margin of second joint furnished with fine »hairs». Endopodite oval, its distal margin with three plumose setae, of which two are situated near each other at the outer distal and one at the inner distal angle.

Fourth pair of pleopods. Exopodite about half as long as the endopodite, subtriangular, its distal end provided with a seta. Endopodite oval, tapering towards the end, with inner margin almost straight, and outer margin markedly convex.

Fifth pair of peopods. Exopodite missing. Endopodite subtriangular with inner margin straight and outer margin convex.

Locality and Material.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 12—15 m. Sand and algae. $^{24}/_{5}$ 1902. Male about 3.9 mm. in length.

Distribution. South Georgia (Sw. Ant. Exped.), Booth Wandel and Petermann Islands off Graham Land (RICHARDSON 1906, 1913), Victoria Land (TATTERSALL 1921).

Not previously found at South Georgia.

Genus **Neojaera** n. gen.

Diagnosis. Body oblong, at least three and a half times as long as it is broad. Thoracic segments without coxal plates. Eyes small, situated dorsally. Antennulae very short, consisting of one very broad peduncular joint and a five-jointed flagellum. Antennae not quite one-third the length of the body; peduncle six-jointed; squama small but distinct. Maxilliped with second and third joints about as broad as the endite, epipodite very long with lateral margin angular. Pereiopods all similar, generally with two subequal claws. First male pleopods with very broad endopodite and narrow styliform exopodite. Third pair of pleopods with exopodite two-jointed and somewhat tapering towards the end. Uropods very short, fitted in incisions of the pleotelson.

The genus is closely allied to *Jaera* LEACH. As pointed out by BARNARD (1914, a, p. 434), the distinct squama on the antennae, the shape of the maxillipeds and first pleopods of male justify the generic separation of his species *serrata* from *Jaera*. Having found that *N. antarctica* (PFEFFER) likewise differs in all these characters from *Jaera* in the same manner as *N. serrata* (BARNARD), I consider that these two species should be referred to a separate genus.

Neojaera antarctica PFEFFER, 1887.

Text. figs. 44 a and b.

Jaera antarctica. PFEFFER, 1887, p. 134—136, Pl. VII, Figs. 1—3; VANHÖFFEN, 1914, p. 529—530, Fig. 58; NORDENSTAM 1930, p. 550, Fig. 12.

Supplementary Description.

Abdomen. With a short free segment anterior to the pleotelson; pleotelson with a slightly marked longitudinal elevation along the middle line.[1]

Mandibles. Molar tubercle subcylindrical and of uniform width.

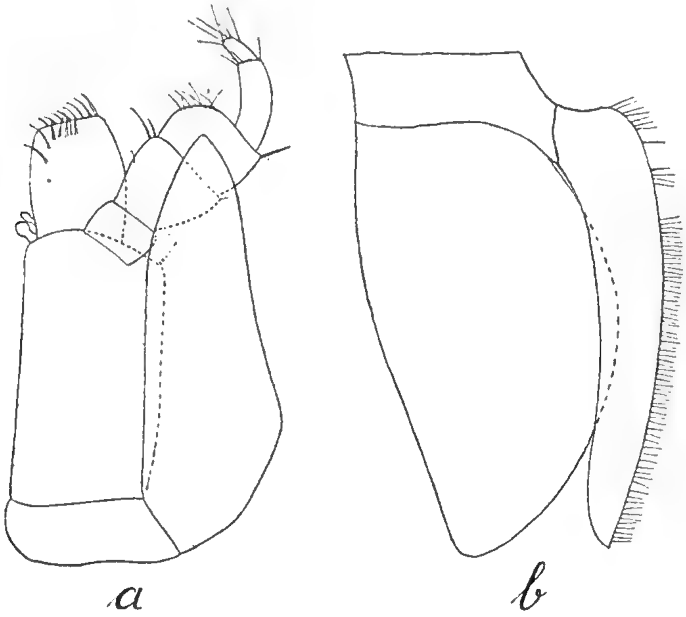

Fig. 44. *Neojaera antarctica* (PFEFF.). a. Right maxilliped, 160 ×. b. Fourth pleopod, 180 ×.

Maxillipeds (Fig. 44 a). Epipodite long, distally pointed, reaching to the middle of the third joint of the palp; lateral margin of the epipodite angular. Endite with two coupling-hooks.

Pereiopods. All similar. Dactylus with two subequal claws. Carpus and propodus with a longitudinal row of setae on the lower margin, most of them two-pointed.

First pair of pleopods, male[2]. Exopodites and endopodites of about equal length. Posterior surface of the endopodites more or less concave.

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[1] Not with a furrow as was stated by PFEFFER (1887).

[2] See NORDENSTAM, 1930, Fig. 12.

Second pair of pleopods, male. Much as in *Neojaera serrata* (BARNARD), see BARNARD (1914 a, Pl. XXXVIII A, plp. 2).

Operculum, female[1]. Almost circular, distal margin provided with setae.

Third pair of pleopods. Much as in *Neojaera serrata* (BARNARD)[2]. Exopodite two-jointed, tapering towards the end, with a lateral incision between the first and the second joint; the second joint is slightly longer, and broader proximally than in *Neojaera serrata*; lateral margin of second joint furnished with hair-like setae. Distal margin of the endopodite provided with three plumose setae, one at the inner distal angle, one at the outer distal angle, and one seta on the distal margin; the latter seta is situated closer to the outer distal angle than to the inner distal angle.

Fourth pair of pleopods (Fig. 44 b). Branches subequal in length. Exopodite single-jointed, tapering towards the end, about one-fourth as broad as the broadly oval endopodite.

Fifth pair of pleopods. Exopodite missing. Endopodite oblong-ovate.

Remarks. *Neojaera antarctica* (PFEFFER) is closely allied to *Neojaera serrata* (BARNARD), from which species it is distinguished by lacking the tip on the distal margin of the pleotelson between the uropods, by having the first male pleopods broader, with shorter exopodites, and by having the exopodites of the fourth pleopods longer (about as long as the endopodites).

Localities and Material.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay with some algae. ${}^{14}/_{5}$ 1902. 2 specimens, female with young, about 3.5 mm. in length, and male about 3.1 mm. in length.

St. 23. South Georgia, off the mouth of Morain Bay, lat. 54° 23′ S., long. 36° 26′ W. 64—74 m. Bottom temp. + 1.65°. Gray clay with gravel and stones. ${}^{16}/_{5}$ 1902. 2 females, washed out from algae. Length of the largest specimen about 2.5 mm.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 12—15 m. Sand and algae. ${}^{24}/_{5}$ 1902. 2 specimens. Length of largest specimen, a male, about 3.5 mm.

St. 34 b. Atlantic Ocean, east of Patagonia and north of Falkland Islands, lat. 44° 49′ S., long. 57° 34′ W. 700—500 m. ${}^{27}/_{12}$ 1901. Female with embryos; length about 3.8 mm.

St. 47. Falkland Islands, Port Louis, mouth of the Carenage Creek, lat. 51° 32′ S., long. 58° 7′ W. 3—4 m. Shells and stones. ${}^{9}/_{8}$ 1902. 2 female specimens. Length of the largest specimen about 3.3 mm.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. ${}^{3}/_{9}$ 1902. 3 specimens, (male and two females); length of the largest specimen about 2.3 mm. (male).

St. 60. Fuegian Archipelago, eastern mouth of the Beagle Channel, lat. 55° 10′ S., long. 66° 15′ W. 100 m. Bottom temp. + 5.0°. Broken shells. ${}^{15}/_{9}$ 1902. 2 males; length of the largest specimen about 2 mm.

Distribution. Juan Fernandez (NORDENSTAM 1930), South Atlantic Ocean E. of Patagonia N. of Falkland Islands (Sw. Ant. Exped.), Fuegian Archipelago (Sw. Ant. Exped.), Falkland Islands (Sw. Ant. Exped.), South Georgia (PFEFFER 1887), Kerguelen (VANHÖFFEN 1914).

In spite of its name *antarctica*, the species has not been found in the Antarctic Region but is widely distributed in subantarctic waters. It was collected by the Swedish Antarctic Expedition at the following new localities: South Atlantic Ocean (st. 34 b), Fuegian Archipelago, and Falkland Islands. The species occurs from shallow water up to a depth of 700—500 m.

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[1] See PFEFFER, 1887, Pl. VII, Fig. 2.

[2] See BARNARD, 1914 a, Pl. XXXVIII A, plp. 3.

B. **Group Jaeropsini**, new group.

Diagnosis. Mandible with the incisive part widening towards the end, divided distally into five points; molar process long and slender, tapering towards the obtuse end, directed somewhat backwards; lacinia missing. Thoracic segments without coxal plates and with their lateral margins not continuous. Antennulae situated above the antennae, very short and consisting of few joints. Antennae with a six-jointed peduncle; squama lacking; first joint of the flagellum longer than the other joints of the flagellum together, which are small and few. First maxillae with the inner lobe short. Second maxillae with the inner lobe much shorter than both lappets of the outer lobe. Maxilliped with the palp at its broadest part about half as wide as the endite; epipodite short, pointed, not reaching the proximal margin of the first joint of the palp. Pereiopods all similar. Uropods inserted in incisions of the distal margin of the pleotelson and provided with two very short branches.

Jaeropsis was referred by HANSEN (1916) to the group *Ianirini*. It differs, however, in some important features from the *Ianirini* as defined by HANSEN, so that I find it necessary to establish a new group for the genus. The most striking character in *Jaeropsis* is the structure of the mandibles, which have a narrow molar process tapering towards the end and directed slightly backwards; thus the mandibles in *Jaeropsis* have almost the type peculiar to the group *Nannoniscini* HANSEN, which, according to HANSEN (1916), comprises creatures »in general aspect somewhat similar to species of *Ianira*, but they differ from all Ianirini in several important features, above all in the mandibles» (HANSEN 1916, p. 84). In the group *Ianirini*, the mandibles are especially characterized by having the »molar process well developed, directed a little forwards, with the end cut off» (HANSEN 1916, p. 12), whilst in the *Nannoniscini* the mandibles have a molar process which »tapers strongly to the narrow, obtuse setiferous end, and is directed somewhat backwards» (HANSEN 1916, p. 83). In *Jaeropsis*, the molar process most resembles the one in the *Nannoniscini*, but it is considerably longer and it is only slightly directed backwards. Another similarity between the *Jaeropsini* and the *Nannoniscini* is seen in the front part of the head, which has the appearance of a small posteriorly delimited lobe, thus forming a »front area», just as in the *Nannoniscini*. Both the groups have small uropods.

In other features, however, *Jaeropsis* differs from the *Nannoniscini*. Thus the antennae have no trace of squama, and the maxillipeds have a narrow palp, with the second joint only about half as broad as the endite. In *Jaeropsis* the eyes are small but distinct; in the *Nannoniscini*, which are related to the *Desmosomatini*, eyes are absent. In view of the above-mentioned differences from the *Nannoniscini*, *Jaeropsis* cannot be referred to that group.

As shown above, the *Jaeropsini* display some important features, which give the group a place between the *Ianirini* and the *Nannoniscini*. This intermediate stage of *Jaeropsis* is noticeable especially in the mandibles, which limbs have been shown by HANSEN (1916) to be of a very essential value for the classification of all Parasellids. The transformation and reduction of the molar process is more advanced in the Nannoniscidean genera than in the *Jaeropsini*.

Genus **Jaeropsis** KOEHLER, 1885.

STEBBING 1905, RICHARDSON 1905, VANHÖFFEN 1914.

For diagnosis see RICHARDSON (1905, p. 476—477). In regard to the antennae RICHARDSON's diagnosis must be amended. They consist of a six-jointed peduncle and a well-developed flagellum with a large proximal joint and a small number of minute additional distal joints. See Fig. 45 c. The proximal joint of the flagellum has previously been referred to the peduncle. This would, however, result in the aberrant number of seven peduncular joints. The arrangement of the setae in groups along the rostral margin on the proximal joint of the flagellum, as well as the fact that the small joints are sometimes marked off by incomplete sutures at the distal end of the large first joint, make it evident that this joint is a part of the flagellum.

Jaeropsis patagoniensis RICHARDSON, 1909.

Text. figs. 45 a—f.

Jaeropsis patagoniensis. RICHARDSON, 1909, p. 421—422, one fig.

Diagnosis. Front area trapezoidal with a small tip in the middle of the distal margin. Lateral margins of the head and the pereion almost smooth. Pleotelson with a small lateral incision on each side anterior to the uropods. Eyes dorsal, at a distance from the lateral margin equal to one eye's width. First joint of antennulae with the inner distal angle projecting, but rounded. Inner distal angle of the second peduncular joint of the antennae prolonged into a forward-directed projection. Endite of the maxilliped with the inner part of the distal margin only slightly concave, the inner distal angle of the second joint of the palp very little produced. Peduncle of uropods almost ovate, longer than broad, inner distal angle with a short hook-like projection. Female operculum obtusely pointed.

Supplementary Description.

Colour. The colour is laterally slightly yellowish; generally there is a broad brownish streak along the middle of the pereion and abdomen. On the dorsal side of the head there is, as a rule, a more or less markedly brown-coloured spot of the same form as in *Jaeropsis brevicornis*[1] KOEHLER and *paulensis*[2] VANHÖFFEN. The colouring is somewhat different in different specimens. One of the examined specimens, a female 2.9 mm. in length, differed in having the short fifth pereion segment uncoloured. Another specimen, a female 4.2 mm. in length, had the pereion and abdomen of a uniformly slight-yellowish colour; the head had a faint brownish spot of the usual form. My largest specimen, a male 6.5 mm. in length, has the same slightly yellowish colour, but the brownish spot on the head in that specimen is more distinct.

Head, pereion, abdomen. As in all other species of *Jaeropsis*, the head, thoracic segments, and abdomen, have their lateral margins not continuous, and there is a broad rounded longitudinal elevation along the middle line. Lateral margins of the head smooth. Lateral margins of the pereion segments smooth and convex. On the first and second and, in a minor degree, also on the third pereion segment, the anterio-lateral angles of the segments are somewhat projecting; the same is the case with the posterio-

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[1] KOEHLER, 1885, Pl. 1, Fig. 1.

[2] VANHÖFFEN, 1914, p. 532.

lateral angles of the fifth, sixth and seventh segments. All the abdominal segments are coalesced, but a rather long anterior segment is faintly marked off by a narrow groove. The lateral margins of the pleotelson are smooth, with the exception of the two marked incisions, one on each lateral margin, which are characteristic of the species.

Antennae. As in *Jaeropsis intermedius* (cf. Fig. 46 c) the anterio-distal (inner distal) angle of third peduncular joint is produced into a long forward-pointing projection reaching to about the distal end of the third joint. The number of joints in the flagellum is seven, including the very large first joint (in a female 2.9 mm. in length). In a male 3.8 mm. in length the number of small joints in the flagellum was 10; the large first joint of the flagellum had three incomplete distal sutures, distinct in the middle of the joint only, but not developed marginally.

Mandibles. Incisive part of the right mandible divided into five points, that of the left mandible likewise with five strong points, but, in addition, with two minute points on the rostral margin. Setal row on the left mandible with eleven, on the right with ten setae.

First pair of maxillae. Typical of the genus. Inner lobe with three stout and a few slender apical setae.

Second pair of maxillae. Typical of the genus. Inner lobe with four apical setae; each lappet of outer lobe with four apical setae.

Maxillipeds (Fig. 45 a). Inner part of the distal margin of the endite only slightly concave, denticulated. The second joint of the palp is the broadest, about half as wide as the endite and having its inner distal angle very little produced. Number of coupling-hooks three or four.

Pereiopods. Dactylus of the first pair provided with two strong claws of about equal size; on the other pereiopods there are three claws of which the intermediate one is smallest. Lower margin of propodus with a row of two-pointed setae of the usual type. On the lower margin of the carpus there is a row of single-pointed setae.

First pair of pleopods, male (Fig. 45 b). Outer distal angles of the sympodites (exopodites) triangular, about as long as the endopodites. Distal margin of the endopodites convex and setiferous.

Second pair of pleopods, male. See Fig. 45 c.

Operculum, female (Fig. 45 e). Distal end obtusely pointed.

Third pair of pleopods (Fig. 45 d). Exopodite two-jointed, longer than the endopodite; second joint tapering towards the obtusely pointed end. Endopodite oval; distal margin provided with three plumose setae, one at the inner distal angle and two near each other close to the outer distal angle.

Uropods (Fig. 45 f). The peduncular joint is approximately semi-cylindrical, tapering towards the end, the dorsal surface being vaulted, the ventral almost flat; the lateral margin is convex, the inner margin almost straight (slightly convex). The inner distal angle is prolonged into a hook-like projection. The branches are minute; the endopodite is a little larger than the exopodite.

Remarks. RICHARDSON (1909) points out that the species has an anteriorly broadly rounded, almost straight, front area (rostrum) with a small apical tip anteriorly in the middle, and that there are two incisions, one on each lateral margin of the pleotelson, anterior to the uropods. In 1912 CHILTON stated that in adult specimens of *Jaeropsis curvicornis* (NICOLET), just as in *Jaeropsis patagoniensis* RICHARDSON, there is only one incision on each lateral margin of the pleotelson, whilst young specimens have the lateral margins of the pleotelson denticulated throughout. Moreover, the front area in *Jaeropsis curvicornis* (NICOLET) has been differently figured by NICOLET (1849) and STEBBING (1905). CHILTON (1912) is therefore of the opinion that *Jaeropsis patagoniensis* RICHARDSON is identical with *Jaeropsis curvicornis* (NICOLET). This, I could state to be incorrect. I found even in immature specimens of *Jaeropsis patagoniensis* RICHARDSON always the two incisions on the pleotelson and the small tip on the front area exactly as figured by RICHARDSON (1909)[1]. Besides, there are other characteristic differences in the uropods, and especially in the maxillipeds, which, in contrast to *Jaeropsis curvicornis* (NICOLET)[2]

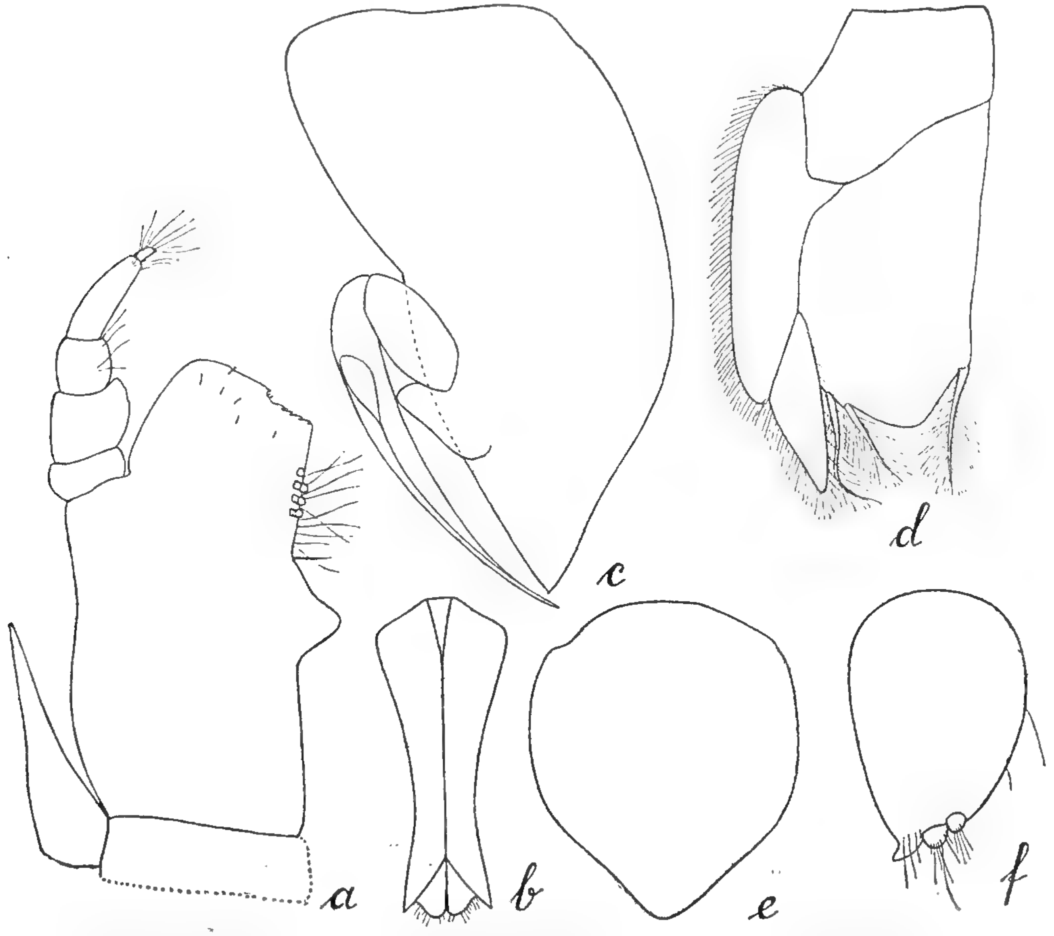

Fig. 45. *Jaeropsis patagoniensis* RICH. a. Right maxilliped, male, 95 ×. b. First pleopods, male, 30 ×. c. Right second male pleopod, seen from the caudal side, 155 ×. d. Right third pleopod, male, 115 ×. e. Female operculum, 45 ×. f. Right uropod, seen from above, (male), 65 ×.

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[1] In a large male, 5.8 mm. in length the small tip on the front area was indistinct.

[2] Cf. STEBBING, 1905, Pl. IX C, mxp.

and *Jaeropsis intermedius* n. sp. (cf. p. 196), have not the inner distal angle of the second joint of the palp elongated into a forward-pointed projection. *Jaeropsis patagoniensis* is a comparatively large species, larger than the two above mentioned species. There are no females with a marsupium in my material, but the largest specimen, a male, attains a length of 6.5 mm. The smallest specimen of this species in the collection has a length of only 2.9 mm., but the characteristic small tip on the front area and the incisions on the lateral margins of the pleotelson can be seen quite clearly.

Jaeropsis patagoniensis Richardson is closely allied to *Jaeropsis paulensis* Vanhöffen, but there are differences in the maxillipeds, the uropods and the shape of the distal part of the pleotelson. The lateral margins of the pleotelson in *Jaeropsis paulensis* Vanhöffen are quite smooth and have no incisions anterior to the uropods. The shape of the front area has not been described in this species.

A revision of the southern species of *Jaeropsis* is very much needed. It cannot for example be considered quite certain that the Chilean species *Jaeropsis curvicornis* (Nicolet) is identical with the species from the Gulf of Manaar described by Stebbing (1905) under the same name. The trapezoidal form and anteriorly almost truncate front area and the brownish colour in *Jaeropsis curvicornis,* as figured by Nicolet (1849), render it possible that the species of Nicolet is the same as *Jaeropsis patagoniensis* Richardson.

Localities and Material.

St. 53. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 47′ W. 12 m. Sand and gravel. $^{3}/_{9}$ 1902. Male about 3.8 mm. in length. Colour, brownish in the middle, slightly yellowish at the margins.

St. 55. Falkland Islands, Port Albemarle, lat. 52° 11′ S., long. 60° 26′ W. 40 m. Sand with algae. $^{8}/_{9}$ 1902. Female without oostegits, length about 2.9 mm. Colour, brownish in the middle, at the margins and on the whole fifth pereion segment; elsewhere slightly yellowish.

St. 59. South of West Falkland, on the Burdwood Bank, lat. 53° 45′ S., long. 61° 10′ W. 137—150 m. Broken shells with stones. $^{12}/_{9}$ 1902. Female without oostegits, of slightly yellowish colour, and lacking brownish spot on the head; length about 4.2 mm.

St. 60. Fuegian Archipelago (off Tierra del Fuego), eastern mouth of the Beagle Channel, lat. 55° 10′ S., long. 66° 15′ W. 100 m. Bottom temp. + 5.0°. Broken shells. $^{15}/_{9}$ 1902. Male specimen of a slightly yellowish colour but with a faint brownish spot on the head; length about 6.5 mm.

Eugenie Expedition. Straits of Magellan, York Bay. 4—6 fathoms; on Echinids. Male specimen; length about 5.8 mm. Colour yellowish. The specimen differs in having the tip of the anterior margin of the front area indistinct.

Distribution. Patagonia (Richardson 1909), Magellan Straits (Eug. Exp.), Fuegian Archipelago (Sw. Ant. Exped.), Burdwood Bank (Sw. Ant. Exped.), Falkland Islands (Sw. Ant. Exped.).

The species has been previously recorded only from Patagonia.

Jaeropsis intermedius n. sp.

Text. figs. 46 a—g.

Diagnosis. Front area pointed. Lateral margins of head and abdomen generally serrate, those of pereion smooth. Eyes dorsal, at a distance from the lateral margin of the head equal to he width of one eye. First joint of antennulae with the inner distal angle somewhat projecting, and pointed. Inner distal angle of the second joint of the antennal peduncle produced into a long forward-pointing projection. Maxilliped with the inner part of the distal margin of the endite deeply concave; second joint of the palp elongated into a projection directed forwards, which reaches to the distal margin of the third joint of the palp. Peduncles of uropods deeply inserted in the distal margin of pleotelson, increasing in width towards the distal end and with its inner distal angle elongated into a hook-like point. Operculum in female apically pointed.

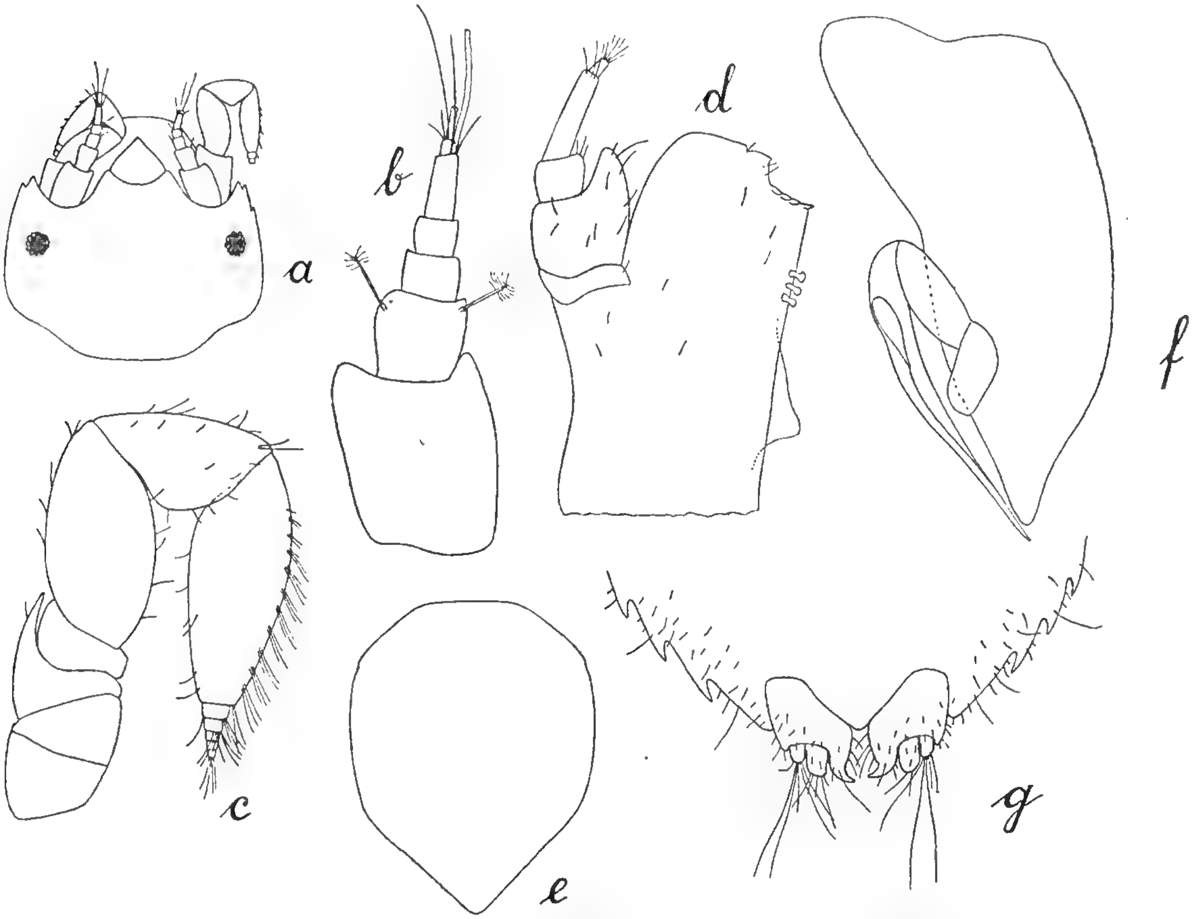

Fig. 46. *Jaeropsis intermedius* n. sp. a. Head, female, 45 ×. b. Left antennula, female, 160 ×. c. Right antenna, female, 115 ×. d. Distal part of the maxilliped, 115 ×. e. Female operculum, 65 ×. f. Right second male pleopod, from the caudal side, 115 ×. g. Tip of pleotelson with the uropods, 115 ×.

Description.

Types. Male, about 2 mm. in length; female, about 3 mm.

Colour. Light yellowish, in some specimens slightly brownish; some of the specimens with indication of a faint brownish-marbled spot on the head.

Head (Fig. 46 a). Front area (rostrum) triangular and pointed, fitting into an emargination of the anterior margin of the head. Lateral margins of the head slightly serrate, anteriorly.

Pereion. Lateral margins of the pereion segments smooth. The fifth pereion segment is the shortest, but only a little shorter than the fourth.

Abdomen. Subtriangular, lateral margins with about eight denticulations and with short setae.

Antennulae (Fig. 46 b). First peduncular joint very large, its inner distal angle is elongated and pointed. Second joint only about half as long and about twice as narrow as the first joint. The third and fourth joints are short, together slightly longer than the second. The flagellum consists of two joints each carrying one sensory filament. The second joint of the flagellum is only about one-third as long as the first.

Antennae (Fig. 46 c). Inner distal angle of the second joint prolonged into a forward-pointing projection reaching to the distal margin of the third joint. Flagellum in specimens with a length of 3 to 3.5 mm. consisting of 5—7 small joints in addition to the very large proximal joint.

Mandibles. Typical of the genus. On the left mandible the incisive part is divided into five teeth, but on the rostral margin there is a row of three additional very small teeth. Setal row on the left mandible with nine setae.

First pair of maxillae. Typical of the genus. Inner lobe with four stout and some slender apical setae.

Second pair of maxillae. Typical of the genus. Outer lappet of outer lobe with three or four apical setae; the inner lappet of the same lobe is furnished with three apical setae, and the inner lobe with four.

Maxillipeds (Fig. 46 d). Inner part of the distal margin of the endite markedly concave and furnished with a row of teeth. Second joint of the palp about half as broad as the endite, its inner distal angle is elongated and reaches to the distal margin of the third joint. The number of coupling hooks is three (in a specimen about 3.5 mm. in length).

Pereiopods. As in *J. patagoniensis.*

First pair of pleopods, male. As in *J. patagoniensis* (cf. Fig. 45 b).

Second pair of pleopods, male (Fig. 46 f). The short branch slightly tapering towards the end.

Operculum, female (Fig. 46 e). More pointed than in *J. patagoniensis.*

Third pair of pleopods. As in *J. patagoniensis* (cf. Fig. 45 d). Exopodite two-jointed.

Fourth and fifth pairs of pleopods. Normal. Fourth pleopod with oblong-ovate endopodite and a small exopodite of about the same shape; fifth pleopod with oblong-ovate endopodite and exopodite missing.

Uropods (Fig. 46 g). Almost as broad as they are long. Peduncles inserted in deep incisions in the margins of pleotelson; only their distal parts project freely. The inner distal angle of the peduncle is prolonged into a hook-like projection, much longer than in *J. patagoniensis.* The free lateral margin of the peduncle is sometimes denticulated. Rami small; exopodite about half as large as the endopodite.

Remarks. Though it is not impossible that this species is identical with one of the previously described species, either *J. marionis* BEDDARD or. *J. curvicornis* (NICOLET), there remain differences, which make it necessary to describe it as a new species. It differs from *J. marionis* BEDDARD in having a more pointed front area, in having broader antennae with another shape of the second and third peduncular joints, in having the lateral margins of the pereion segments smooth and the seventh pereiopods furnished with three claws. It is very similar to *Jaeropsis curvicornis* (NICOLET) as described by STEBBING (1905); especially there is a marked similarity in the maxillipeds; the front area, however, is not rounded anteriorly, but triangular and pointed. *Jaeropsis paulensis* VANHÖFFEN, in which the second joint of the palp of the maxilliped is not produced into a forward-pointing projection, approaches more closely to *Jaeropsis patagoniensis* (cf. p. 194). *Jaeropsis intermedius* is a smaller species than *patagoniensis*. It attains a length of up to 3.5 mm. (see below), but even at the length of 3 mm. we find females with embryos.

Localities and Material.

St. 2. Coast of North Argentina, lat. 37° 50′ S., long. 56° 11′ W. 100 m. Gravel mixed with sand. $^{23}/_{12}$ 1901. 2 specimens, male and female (types), of a slightly yellowish colour; length of the largest specimen about 3 mm. (female), length of the male 2 mm.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^{3}/_{9}$ 1902. Small male specimen, about 1.6 mm. in length and almost colourless.

St. 55. Falkland Islands, Port Albemarle, lat. 52° 11′ S., long. 60° 26′ W. 40 m. Sand with algae. $^{8}/_{9}$ 1902. Female with embryos, colour slightly yellowish, length about 3.5 mm.

St. 59. South of West Falkland, on the Burdwood Bank, lat. 53° 45′ S., long. 61° 10′ W. 137—150 m. Broken shells and stones. $^{12}/_{9}$ 1902. A small male specimen of a slightly yellowish colour, but with a touch of brownish; length about 2.8 mm.

St. 60. Fuegian Archipelago, Eastern mouth of the Beagle Channel, lat. 55° 10′ S., long. 66° 15′ W. 100 m. Bottom temp. + 5.0°. Broken shells. $^{15}/_{9}$ 1902. 6 specimens of a very slightly yellowish colour; length of the largest specimen about 3.2 mm.

Distribution. Argentina (Sw. Ant. Exped.), Fuegian Archipelago (Sw. Ant. Exped.), Burdwood Bank (Sw. Ant. Exped.), Falkland Islands (Sw. Ant. Exped.).

Group **Munnini** HANSEN, 1916.

Fam. *Munnidae* G. O. SARS, 1899.

For diagnosis see HANSEN (1916, p. 33—34). The family *Munnidae* of G. O. SARS was divided by VANHÖFFEN (1914) into three families, *Munnidae*, *Paramunnidae* and *Dendrotionidae*. VANHÖFFEN founded this division on characters based on the shape of the body and the length of the uropods. HANSEN (1916) united the families of VANHÖFFEN into his group *Munnini*, but he points out that »in reality some of the genera, as *Munna* and *Dendrotium*, differ much from each other in a number of features» (p. 33), and expresses the opinion that the group may be divided satisfactorily, when the southern, not very well-known, genera have been more closely investigated. As regards the classification of the family *Parasellidae* it has been shown by HANSEN (1916) that the mandibles are of essential importance. Having been able to examine these appendages in a number of southern genera, such as *Austrosignum* HODGSON, *Antias* RICHARDSON, *Pleurosignum* VANHÖFFEN, *Antennulosignum* n. gen. and *Coulmannia* HODGSON I came to the conclusion that the mandibles are essentially of two different types, the one characterized by its broad, anteriorly cut-off molar tubercle, which widens out towards its distal end, the other by its very narrow molar tubercle distally obliquely truncate or rounded. The generally very marked difference between these two types of mandibles can be seen by comparing the two figures 65 c and 68 b showing the mandible of *Paramunna dentata* n. sp. and *Pleurosignum magnum* VANHÖFFEN. To these two types of mandibles may be added a third, not so well marked as the two others, which is characterized by having a strong molar tubercle tapering towards the end and distally truncate. This type of mandible, which, however, most resembles the one characteristic of *Munna* and *Paramunna*, is found for instance in *Dendrotium*[1] G. O. SARS and *Antias* (Fig. 49 b). Taking into consideration also other marked differences which are found in the antennulae, the antennae, the maxillipeds, and the uropods, the group *Munnini* HANSEN may be divided into four sub-groups. The two genera *Neasellus* BEDDARD, 1885, and *Acanthomunna* BEDDARD, 1886, cannot be arranged under the following division, since their mouth-organs are unknown.

1. *Antiasini*, new sub-group.

(comprises the genus *Antias*.)

Diagnosis. Mandibles with molar tubercle strong and broad, distally truncate but somewhat tapering towards the end. Antennulae consisting of a four-jointed peduncle, of which the first two joints are stout, and a short flagellum composed of one or two joints, only the last joint furnished with sensory filaments. Antennae not provided with squama. Maxilliped with a narrow palp, the palp being $^1/_3$—$^1/_2$ as wide as the endite; epipodite with distal end pointed. Uropods of medium length, being from a-fourth of the length of to subequal in length to the pleotelson.

Antias RICHARDSON, 1906, has previously been referred to the group *Ianirini*. Its shape of body, which is sometimes very similar to that characteristic of the genus *Munna*[2], its broad eye-peduncles and the composition of the antennulae, indicates, that the genus comes close to *Munna* and *Paramunna*.

2. *Munnini*, new sub-group.

(comprises *Munnidae* VANHÖFFEN and *Paramunnidae* VANHÖFFEN p. p.)

Diagnosis. Mandibles with a broad molar tubercle directed somewhat forward, increasing in width towards the distal end and anteriorly abruptly truncated. Antennulae with the peduncle and the flagellum of about equal length; peduncle consisting of four joints, the first two stout, the following two very small; flagellum consisting of few joints (1—4), the last two joints (exceptionally only the last) provided with a long sensory filament. Antennae without squama. Maxillipeds with first three joints of the palp broad, second joint of the palp $^1/_3$—$^1/_4$ narrower than the endite; epipodite with distal margin broadly rounded. Uropods very small, with peduncle minute or missing.

Comprises the genera: *Munna* KROEYER 1839, *Paramunna* G. O. SARS 1866, *Coulmannia* HODGSON 1910, *Notoxenus* HODGSON 1910, *Austrosignum* HODGSON 1910, *Echinomunna* VANHÖFFEN, 1914.

The genus *Astrurus* BEDDARD, 1885, whose shape of body somewhat resembles that of *Coulmannia*, may perhaps be referred to this sub-group. It differs, however, in having a narrow palp of maxilliped. As its mandibles are unknown, its systematical position is doubtful.

3. *Dendrotiini*, new sub-group.

(= Fam. *Dendrotionidae* VANHÖFFEN.)

Diagnosis. Mandibles with molar tubercle broad and strong, similar to the molar in subgroup *Munnini*, but tapering towards the end. Antennulae with flagellum longer than

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[1] See G. O. SARS, 1899, Pl. 49, M. sin.

[2] Cf. *Antias marmoratus*, Pl. II Fig. 17 and VANHÖFFEN (1914, Fig. 61 a).

the peduncle, its last three — as a rule more than three — joints, furnished with short sensory filaments. Antennae with squama missing or small. Palp of maxilliped narrow, with second joint about half as wide as the endite; epipodite pointed. Uropods very long, always longer than the pleotelson; peduncle of uropods long.

Comprises the genera: *Dendrotium* G. O. SARS 1871, *Mormomunna* VANHÖFFEN 1914, and *Pseudomunna* HANSEN 1916.

4. *Pleurogoniini*, new sub-group.

(comprises *Paramunnidae* VANHÖFFEN p. p.)

Diagnosis. Mandibles with a long and narrow molar tubercle, slightly forward-directed, very slightly widening or tapering towards the end, which is obliquely truncated or rounded. Antennulae as in sub-group *Munnini*, except that the penultimate joint of the flagellum is never provided with a sensory filament. Maxillipeds as in sub-group *Munnini*. Uropods very short with peduncle minute or missing.

Comprises the genera: *Pleurogonium* G. O. SARS 1899, *Pleurosignum* VANHÖFFEN 1914, and *Antennulosignum* n. gen.

Synopsis of the genera.

I. Mandibles with a broad subcylindrical molar tubercle widening towards the distal end and distally cut off. (Uropods minute.)

Sub-group *Munnini*.

1. Eye-peduncles broad.
    a. Pleotelson bulbous, coxae visible from above and marked off by dorsal sutures on the second to seventh pereion segments.
        α. Body smooth. *Munna* KROEYER.
        β. Body strongly spinous. *Echinomunna* VANHÖFFEN.
    b. Pleotelson flattened, coxae not visible from above. *Paramunna* G. O. SARS.
2. Eye-peduncles slender.
    a. Pereion flattened, coxae visible from above and marked off by dorsal sutures on the last three pereion segments. *Austrosignum* HODGSON.
    b. Pereion vaulted, coxae not visible from above.
        α. Mandibles with palp. *Notoxenus* HODGSON.
        β. Mandibles without palp. *Coulmannia* HODGSON.

II. Mandibles with molar tubercle stout, but tapering towards the truncate end. (Uropods long to mediumly long).

A. Antennulae with a very short flagellum composed of only a few joints. Uropods of medium length not exceeding that of the pleotelson.

Sub-group *Antiasini*.

Antias RICHARDSON.

B. Antennulae with a very long flagellum consisting of many joints. Uropods very long.

Sub-group *Dendrotiini.*

1. Coxal plates spine-like. *Dendrotium* G. O. SARS.
2. Coxal plates rounded.
   a. Each of the first male pleopods distally cleft. *Pseudomunna* HANSEN.
   b. First male pleopods uncleft, distally rounded. *Mormomunna* VANHÖFFEN.

III. Mandibles with a narrow molar tubercle with obliquely truncate or rounded end.

Sub-group *Pleurogoniini.*

1. Eyes on long eye-peduncles.
   a. Second peduncular joint of the antennula distally prolonged into a spine-like projection longer than the flagellum. *Antennulosignum* n. gen.
   b. Second peduncular joint of the antennula not prolonged distally. *Pleurosignum* VANHÖFFEN.
2. No eyes, no eye-peduncles. *Pleurogonium* G. O. SARS.

Sub-group **Antiasini**, new sub-group.

For diagnosis see p. 198.

Genus **Antias** RICHARDSON, 1906.

RICHARDSON, 1913; VANHÖFFEN, 1914.

Diagnosis.[1] Body short, sometimes with the four first pereion segments sligthly marked off from the last three segments. Eye-peduncles broad furnished with a tooth in front of the eyes. Abdomen narrower than the pereion, with dorsal surface vaulted and sometimes slightly swollen. Antennulae consisting of a four-jointed peduncle having the first two joints stout, the last two small, and an 1—3-jointed flagellum; last joint of flagellum furnished with one or more long sensory filaments. Mandible with a strong subcylindrical molar tubercle with the end cut off and directed forwards. Maxilliped with a narrow palp, the joints not differing much in width; second joint of the palp only one-third to one-half as wide as the endite. Pereiopods with first pair in both sexes slightly subchelate, all with two claws. Uropods never exceeding the length of the abdomen.

This genus was referred by RICHARDSON (1906) and VANHÖFFEN (1914) to the *Ianiridae* G. O. SARS. Its affinity to *Munna* and *Paramunna* is indicated especially by its distinct eyepeduncles, its comparatively narrow, sometimes slightly swollen, abdomen, its antennulae, which consist of very few joints and have the last joint furnished with one or more sensory filaments, its mandibles and its occasionally very short uropods (cf. *Antias marmoratus* VANHÖFFEN). The general shape of body is similar to that of *Paramunna* G. O. SARS. The eye-peduncles resemble those in the genus *Munna*. Owing to its comparatively flattened body and, as a rule, rather long uropods, the genus comes closest to the *Ianirini* of all the genera of the group *Munnini*. In the three species of *Antias* examined by me, the small coxae are visible from above and separated by dorsal sutures from the tergum on the last three pereion segments.

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[1] Cf. RICHARDSSON (1906, p. 16—17).

Antias hispidus VANHÖFFEN, 1914.

Text figs 47 a—g.

Antias hispidus. VANHÖFFEN, 1914, p. 533—534, Fig. 60; STEPHENSEN, 1927, p. 356—357, Fig. 24 (1, 2, 3).

Supplementary Description.

General shape of body. Flattened, oval; body about two and a third times as long as its greatest width.

Head. About as long as the first and second pereion segments together. Rostral part projecting, with rostral margin strongly convex, reaching about to the middle of the penultimate joint of the antennal peduncle. Eyes of a reddish-brown colour and consisting of twenty ocelli. In the anterio-lateral angle of the head, there is a forward-directed tooth-like projection in front of the eyes.

Pereion. Segments approximately equal in length. First four segments approximately equal in width; the fourth segment very slightly broader than the others. Lateral margins of the first four segments almost straight, of the last three convex. Dorsally and laterally the segments are furnished with sparse setae.

Coxae visible from above and marked off from the tergites by faint dorsal sutures on the last three pereion segments.

Abdomen. Narrower than pereion. Anteriorly is one free segment. Pleotelson with lateral margins very slightly convex (almost straight), laterally with two marked incisions for the uropods. Distal margin between the uropods convex.

Antennulae (Fig. 47 a). Short, about two-thirds the length of the head. Peduncle composed of four joints; the first two joints are stout, the second and third joints much smaller. Flagellum single-jointed, about as long as the third and fourth peduncular joints together; it is furnished apically with one long sensory filament and some setae.

Antennae (Fig. 47 b). Short, but about twice as long as the antennulae, lateral margin of the third joint provided with a large seta. The flagellum consists of about eleven joints.

Mandibles. Incisive part with five points. Molar tubercle subcylindrical and forward-directed, very slightly tapering towards the truncate denticulated end. Lacinia (on the left mandible) with three points. Setal row (on the left mandible) with four setae, (on the right) with five.

First pair of maxillae (Fig. 47 c). Outer lobe about twice as broad and one-fourth again as long as the inner lobe; distal margin straight furnished with about ten stout setae; inner margin provided distally with a row of slender setae. Inner lobe distally decreasing in width, with four apical setae.

Second pair of maxillae (Fig. 47 d). Inner lobe provided with setae on the inner margin and at the tip. Lappets of outer lobe with three apical setae each.

Maxillipeds (Fig. 47 e). Palp narrow, its second joint being not fully half as wide as the endite; distal margin of the endite furnished with a row of setae; near the same margin there is also a submarginal row of setae. There are two coupling-hooks. The epipodite is distally pointed, its outer margin is markedly convex, its inner margin almost straight.

First pair of pereiopods (Fig. 47 f). Slightly subchelate and shorter than the other pereiopods. The basipodite is slightly longer than the ischium and merus together. The ischium is slightly longer than the propodus. Merus and carpus are subequal in length. The setal armature is illustrated in the figure. Some of the setae are stout and two-pointed. Dactylus with one long and one short claw.

The other pereiopods. All with one long and one short claw.

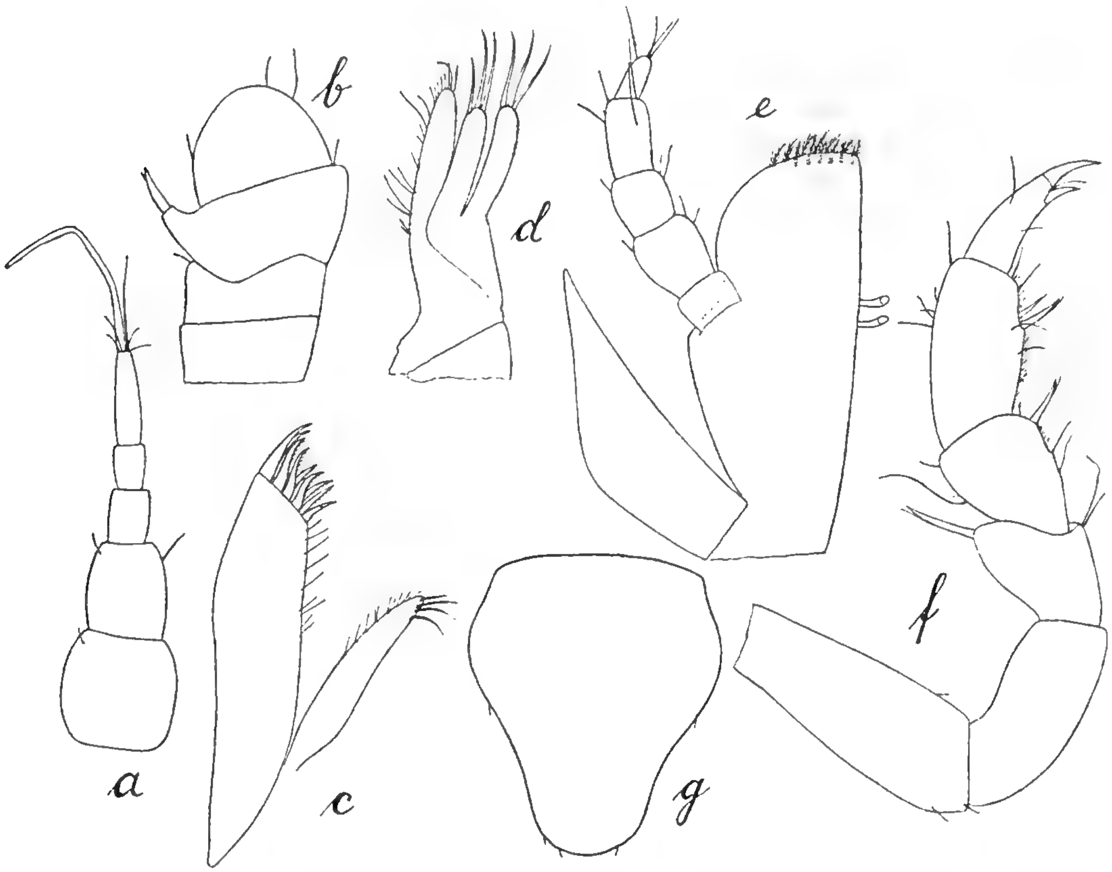

Fig. 47. *Antias hispidus* VANHÖFF. a. Right antennula, female, 235 ×. b. Proximal joints of the right antenna, female, 315 ×. c. Right first maxilla, female, 235 ×. d. Right second maxilla, 235 ×. e. Right maxilliped, female, 235 ×. f. Right first pereiopod, female, 200 ×. g. Female operculum, 200 ×.

Operculum, female (Fig. 47 g). Slightly tapering towards the broadly rounded end, being distally not quite one-third as broad as its greatest width. Lateral margins proximally convex, distally somewhat concave. Distal margin convex.

Uropods. About as long as the pleotelson. Peduncle about half as long as and somewhat broader than the rami. The rami are of about equal length, half as long again to twice as long as the peduncle. Each of the rami with two strong spine-like apical setae, forming an angle of about 60 ° with each other.

Localities and Material.

St. 49. Falkland Islands, Berkeley Sound, lat. 51° 35′ S., long. 57° 56′ W. 25—30 m. Shells and stones. $^{10}/_{8}$ 1902. 2 specimens 1.4 and 1.2 mm. long respectively.

St. 95. Graham Region, North of Astrolabe Island, lat. 63° 9′ S., long. 58° 17′ W. 95 m. Bottom temp. — 1.0°. Sand mixed with clay, algae, and stones. $^{28}/_{12}$ 1902. Female specimen with empty marsupium; length about 1.5 mm.

Distribution. Falkland Islands (Sw. Ant. Exped.), St. Paul (VANHÖFFEN 1914), Auckland Islands (STEPHENSEN 1927), Graham Region (Sw. Ant. Exped.).

The species thus has a wide distribution. It has not previously been found at the Falkland Islands or the Graham Region.

Antias marmoratus VANHÖFFEN, 1914.

Pl. II Fig. 17; Text figs. 48 a—g.

Antias marmoratus. VANHÖFFEN, 1914, p. 534—535, Figs. 61 a—d.

Supplementary Description.

General shape of body. In the fully grown female (Pl. II, Fig. 17) oval, in males and immature females, oblong, narrowing backwards[1]. The greatest width in adult females is across the third pereion segment; in males and young specimens the anterior five pereion segments are subequal in width; the last two pereion segments decrease in width.

Colour. Varying between grayish and brownish. The first four pereion segments are often brownish-marbled, whilst the last three pereion segments and the abdomen have a marbled grayish-brown colour, which is generally of a lighter tinge of gray in the middle of the last three pereion segments. The head is either marbled grayish or brownish. In some specimens the body is marbled brown throughout, except for a lighter tinge in the middle of the last three pereion segments.

Head. Frontal margin straight. Eyes small, often without pigment.

Pereion. First four segments subequal in length, but the third slightly longer than the others Last three segments curved backwards; elevated and of a paler tinge in the middle. Lateral margins of all the pereion segments rounded.

Coxae visible from above and marked off by dorsal sutures on the last three segments.

Abdomen. About as long as the last four pereion segments together, anteriorly with a distinct free segment. The pleotelson is somewhat swollen, having the dorsal surface vaulted; but it is more depressed in a dorso-ventral direction than in the genus *Munna*. The greatest width of the pleotelson is near the anterior margin, whence it tapers towards the distal end. Its lateral margins are convex, its distal margin between the uropods is broadly rounded and often setiferous. The dorsal surface of the pleotelson, in the middle, exhibits a faint longitudinal elevation.

Antennulae (Fig. 48 a). Reaching approximately to the distal margin of the penultimate joint of the peduncle of the antennae. First and second peduncular joints are large and subequal in size. Second and third joints small, approximately equal in length and together about as long as the second joint. Flagellum single-jointed, about as long as the second and third peduncular joints together.

Antennae. From one-half to one-third as long as the body. The first four joints

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[1] See VANHÖFFEN, 1914, Fig. 61 a.

of the peduncle are short, of about equal length and together slightly longer than the fifth joint, which is about as long as the sixth. Squama missing. The flagellum is somewhat shorter than the peduncle and consists (in a female 1.7 mm. long) of eleven joints, of which the first is as long as the two following joints together.

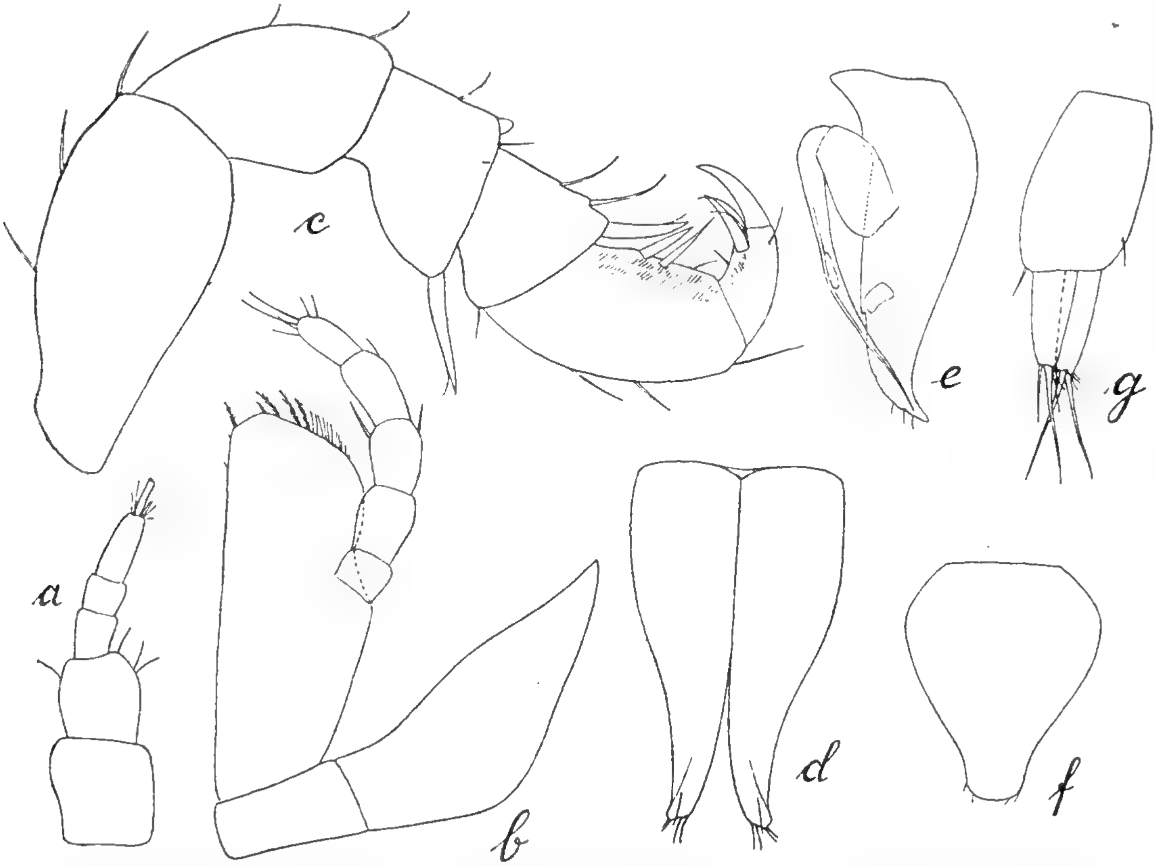

Fig. 48. *Antias marmoratus* VANHÖFF. a. Right antennula, female, 160 ×. b. Left maxilliped, 200 ×. c. Right first pereiopod, male, 200 ×. d. First male pleopods, 160 ×. e. Right second male pleopod, seen from the caudal side, 160 ×. f. Female operculum, 65 ×. g. Right uropod, female, 235 ×.

Mandibles. Incisive part with five points. Lacinia (on the left mandible) with three points. Setal row (on the left mandible) with three or four setae, (on the right) with five setae. Molar tubercle very slightly tapering towards the truncate and denticulated end. Palp short, three-jointed.

First pair of maxillae. Much as in *Antias hispidus.* Inner lobe weak, shorter than the outer lobe and furnished with four setae at the tip (situated somewhat towards the inner margin.

Second pair of maxillae. Lappets of outer lobe about as long as inner lobe, each with four apical setae. Inner lobe not much broader than each of the lappets of outer lobe, provided with setae distally.

Maxillipeds[1] (Fig. 48 b). The epipodite is apically pointed; outer margin strongly

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[1] See also VANHÖFFEN, 1914, Fig. 61 b.

convex, inner margin almost straight. The palp is narrow; its joints are approximately equal in width, the second joint being approximately two-fifths the width of the endite. Each maxilliped is provided with three coupling-hooks.

Pereiopods. Increasing somewhat in length from the first to the seventh. First pereiopod (Fig. 48 c) alike in male and female. Meral joint with a strong seta at its upper distal angle. Carpal joint with three setae on its lower margin, of which the largest is situated at the lower distal angle. Propodal joint with two setae near each other on its lower margin. For other details see the figure.

First and second pleopods in the male. See Figs. 48 d and e and cf. VANHÖFFEN (1914, Figs. 61 c and d).

Operculum, female (Fig. 48 f). Approximately cordate; distally not quite one-third as broad as its greatest width; lateral margins near the distal end somewhat concave; distal margin sub-truncate.

Uropods (Fig. 48 g). Situated in incisions on the margin of the pleotelson. They are only one-third to one-fourth as long as the pleotelson. The short rami are fairly equal in length.

Remarks. My specimens of this species correspond in essentials with the figures and description by VANHÖFFEN (1914). VANHÖFFEN figures, in his Fig. 61 a, a female specimen, apparently an immature female. The ovigerous female (Pl. II, Fig. 17) is more oval in outline. The specimens described above differ slightly in colour from those described by VANHÖFFEN. The colour of the species appears, however, to vary considerably in different specimens.

The general aspect of *Antias marmoratus* VANHÖFFEN is fairly similar to that of a *Munna.*

Localities and Material.

South Georgia, Cumberland Bay, May Bay. Haul among algae above a stony bottom. 1—2 m. $^{9}/_{5}$ 1902. About 29 specimens, males and females. Length of the largest specimen. 2.2 mm. (female).

South Georgia, Cumberland Bay, May Bay. Haul among algae in and below the low-tide region. 26 specimens, males and females, collected together with *Antias Hofsteni.* $^{5}/_{5}$ 1902. Largest specimen, a female, about 2 mm. in length.

South Georgia, Cumberland Bay, May Bay. $^{8}/_{5}$ 1902. In a rock-hollow in the low-tide region. Washed off from a colony of Bryozoa. One small male specimen.

Distribution. St. Paul, (VANHÖFFEN 1914), South Georgia (Sw. Ant. Exped.), Kerguelen (VANHÖFFEN 1914).

Not previously recorded from South Georgia.

Antias Hofsteni n. sp.

Pl. II, Fig. 18; Text figs. 49 a—i.

Diagnosis. Head with broad eye-peduncles furnished at its anterio-lateral angles with an acute point directed anteriorly. Pleotelson of fairly uniform width, but broadest slightly anterior to the middle; its distal margin with well-marked incisions for the uropods; distal tip between the uropods short and with a convex margin. Antennulae consisting of a four-jointed peduncle and a two-jointed flagellum. First pereiopods very slightly subchelate. Distal half of the fused first male pleopods of a uniform width, subrectangular and not tapering towards the end. Female operculum distally about two-fifths as wide as its width across the middle; distal margin subtruncate.

Description.

Types. Male 1.5 mm. in length and female with an empty marsupium 2 mm. long.

General shape of body. In the male (Pl. II, Fig. 18) the body is oblong, the pereion segments being almost of equal width. In the female with a marsupium it is more oval in outline, being broadest across the third pereion segment. Laterally and dorsally there are short scattered setae.

Colour. Yellowish, slightly marbled with brown, especially on the head and the abdomen.

Head. About three-fourths as long as it is broad, and about as long as the first and second pereion segments together. Front part between the antennulae projecting, divided by two faint parallel and transverse lines into one proximal trapezoidal part and one anterior lobe with distal margin convex. Eyes small without pigment. Anteriolateral angles of the head forward-directed and pointed.

Pereion. The first four segments are subequal in length. The last three segments are short and somewhat curved backwards.

Coxae small, visible from above and marked off by dorsal sutures on the last three pereion segments.

Abdomen. Short, approximately as long as the last three pereion segments together, anteriorly with a free segment. The pleotelson is somewhat swollen, with dorsal surface slightly vaulted; lateral sides slightly convex. The greatest width of the pleotelson is somewhat anteriorly to the middle. The incisions for the uropods are distinct. The posterior part of the pleotelson between the uropods is somewhat triangularly prolonged; its distal margin is convex. The dorsal surface of the pleotelson is furnished with a slight light-coloured longitudinal elevation along the middle line.

Antennulae (Fig. 49 a). The four-jointed peduncle has stout first and second joints; the third and fourth joints are small. The flagellum consists of two joints.

Antennae. Short, about as long as the head and the first pereion segment together. The first four peduncular joints are short and of about equal length; together they are about as long as the fifth joint, which is subequal in length to the sixth. The latter joint differs from the others in being narrow proximally and increasing in width towards the distal end. The flagellum is about as long as the last two joints of the peduncle together and consists of eight joints, which decrease in length and width from the first to the last.

Left mandible (Fig. 49 b). As in *Antias marmoratus.* Incisive part with five teeth. Lacinia with three teeth. Setal row with four setae. Molar tubercle slightly tapering towards the truncate, denticulated end. Palp short, three-jointed.

First pair of maxillae (Fig. 49 c). Of the usual type in the genus. Inner lobe weak, provided with five slender setae at the tip.

Second pair of maxillae (Fig. 49 d). The two lappets of the outer lobe are each provided with four apical setae.

Maxillipeds (Fig. 49 e). Typical of the genus. Second joint of the palp about half as wide as the endite. There are two coupling-hooks.

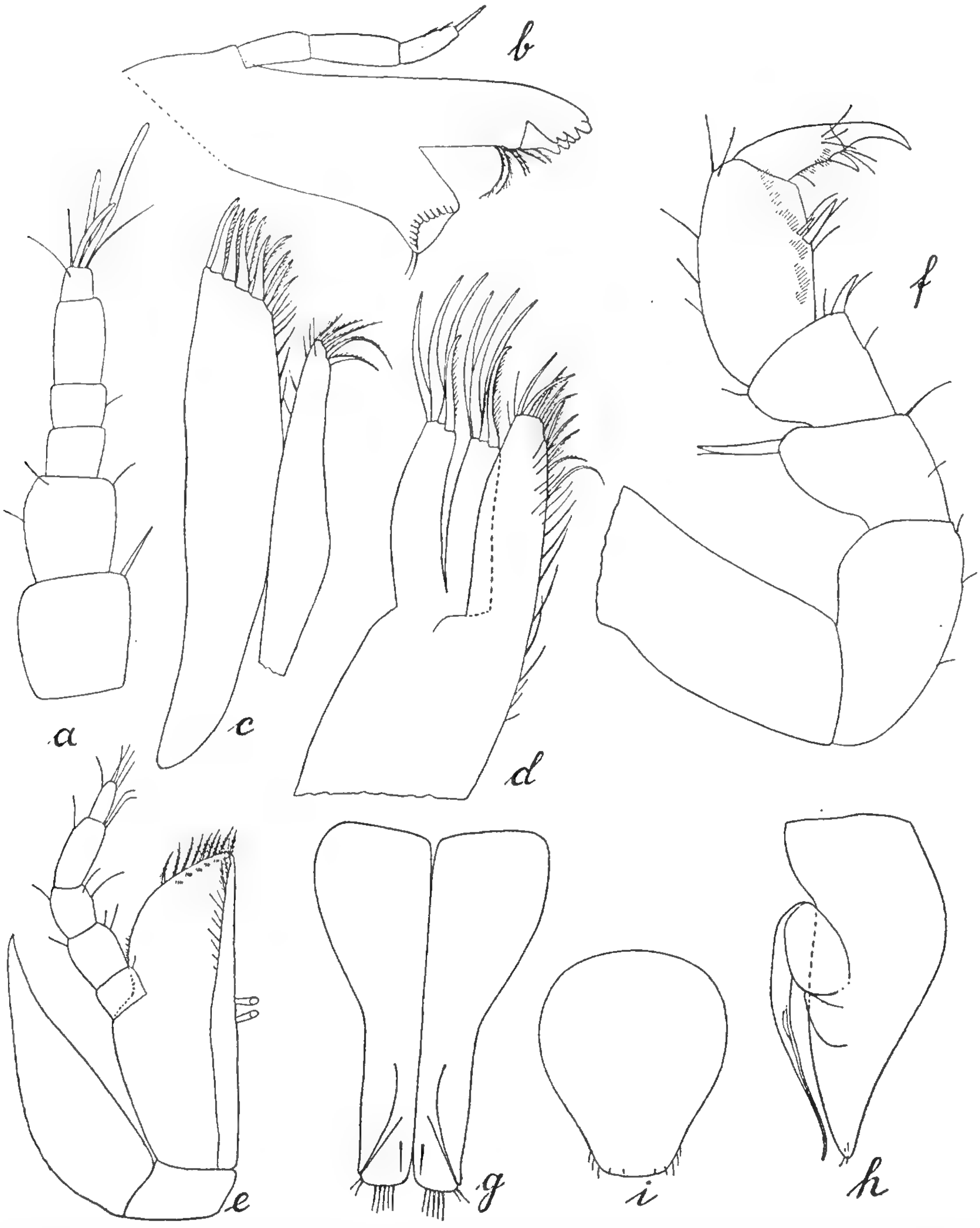

Fig. 49. *Antias Hofsteni* n. sp. a. Right antennula, female, 200 ×. b. Left mandible, female, 200 ×. c. First maxilla, 315 ×. d. Second maxilla, 315 ×. e. Left maxilliped, in a female with embryos, 160 ×. f. Left first pereiopod, female, 235 ×. g. First pleopods, male 160 ×. h. Second male pleopod, seen from the caudal side, 160 ×. i. Female operculum, 95 ×.

First pair of pereiopods (Fig. 49 f). Very similar to those in *Antias marmoratus.*

The other pereiopods. Much as in *Antias marmoratus.*

First and second pleopods male (Fig. 49 g and h). They differ from the same appendages in *Antias marmoratus* in the way shown in the figures. The fused first pleopods are thus much broader distally than in *Antias marmoratus.*

Operculum, female (Fig. 49 i). It is much broader distally than in *Antias marmoratus,* being about two-fifths as wide at the distal margin as across the middle. The distal margin is subtruncate.

Uropods. Broken in all the specimens.

Remarks. In its general aspect the species somewhat resembles *Antias marmoratus,* from which species it is easily distinguished by a different shape of the pleotelson, the female operculum and the first male pleopods.

The species in named after Professor N. v. HOFSTEN of Upsala.

Localities and Material.

South Georgia, Cumberland Bay, May Bay. Haul among algae in and below the low-tide region. $^5/_6$ 1902. 4 specimens (2 males, 2 females), collected together with *Antias marmoratus.* Length of the specimens: Female with empty marsupium (type) 2 mm.; female with embryos, 2 mm.; male (type), 1.5 mm.; male, 1.2 mm.

Distribution. South Georgia (Sw. Ant. Exped.).

Sub-group **Munnini** new sub-group.

For diagnosis see p. 198.

Genus **Munna** KROEYER, 1839.

For diagnosis see G. O. SARS (1899, p. 106—107) and HANSEN (1916, p. 34).

Munna maculata BEDDARD, 1885.

Text fig. 50.

Munna maculata. BEDDARD, 1886, p. 25—26, Pl. XI, Fig. 14; VANHÖFFEN, 1914, p. 563—564, Figs. 92 a and b; MONOD, 1931, p. 18 and 20, Figs. 7 a and b.

The Swedish Antarctic Expedition collected only a single specimen of this species, viz. an ovigerous female about 2.6 mm. long, found off the Falkland Islands. I have compared it with a female specimen from the German Antarctic Expedition, determined by VANHÖFFEN as *Munna maculata* BEDDARD and sent to me for examination from the Berlin Museum. These two specimens are similar in almost every detail, the only difference being in the colour. The Falkland Islands specimen was paler in colour; the pigment spots on the pereion were sparse and entirely absent on the abdomen. The specimen has no setae on the pereion, but the pleotelson is furnished laterally with some small spines. The body is ovoid in shape, and the first pereion segment is the shortest of the anterior four segments.

Coxal plates subrectangular, with lateral margins convex in a dorsal view. Uropods (Fig. 50)with outer margin slightly convex and inner margin almost straight; distal margin provided with three small triangular lobes.

Localities and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^{3}/_{9}$ 1902. Female with an empty marsupium; length about 2.6 mm.; collected together with *Munna pallida* BEDDARD.

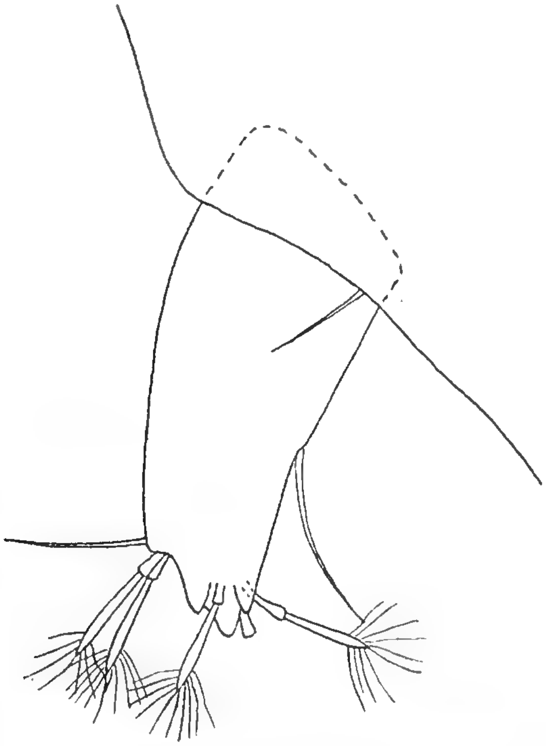

Fig. 50. *Munna maculata* BEDD. Left uropod (of an ovigerous female), 340 ×.

Distribution. Falkland Islands (Sw. Ant. Exped.), Kerguelen (BEDDARD 1886, VANHÖFFEN 1914, MONOD 1931).

The species has not previously been recorded from the Falkland Islands.

Munna pallida BEDDARD, 1886.

Text figs. 51 a—g.

Munna pallida. BEDDARD, 1886, p. 26—27, Pl. XI, Fig. 15; MONOD, 1931, p. 22.

Supplementary Description.

General shape of body (Fig. 51 a). Body very oblong, about three times as long as it is broad.

Colour. Whitish to slightly yellowish.

Head (Fig. 51 a). Almost as long as the first two pereion segments together. Frontal margin straight. Eye-peduncles broad, of uniform width, with a small anteriorly directed tooth in front of the eyes. The eyes are not very large and of a dark colour.

Pereion (Fig. 51 a). Sublinear, with the pereion segments only slightly differing in width. The first four segments are subequal in length and somewhat longer than the last three segments, which are likewise about equal in length. Lateral margins of all the pereion segments rounded.

Coxal plates subrectangular, with their lateral margins rounded.

Abdomen (Fig. 51 a). About as long as the last four pereion segments plus half the fifth segment, anteriorly with a distinct free segment.

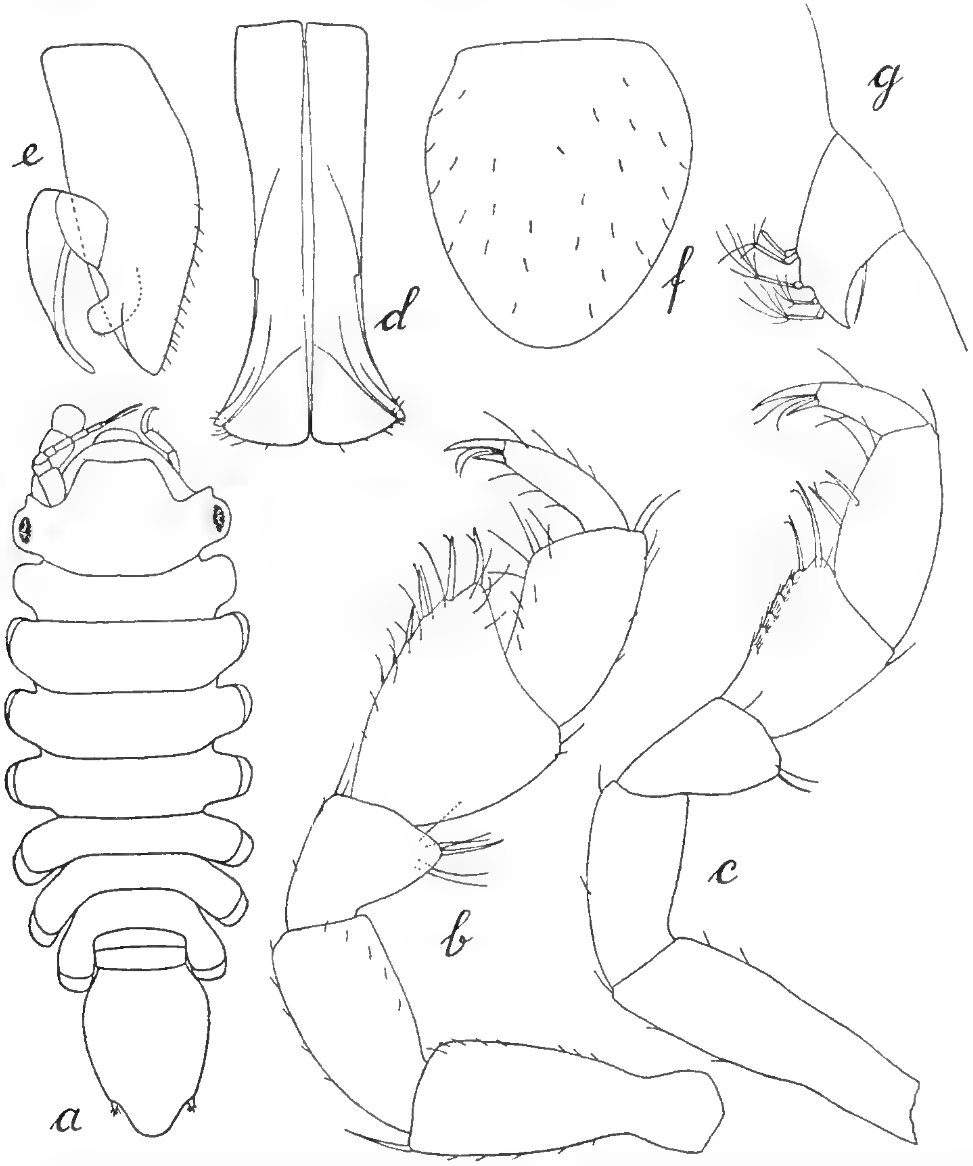

Fig. 51. *Munna pallida* Bedd. a. Male, 27 ×. b. First pereiopod, male, 100 ×. c. First pereiopod, female, 235 ×. d. First male pleopods, seen from the caudal side, 115 ×. e. Right second pleopod, from the caudal side, male, 115 ×. e. Right second pleopod, male, 115 ×. f. Female operculum from the rostral side, 135 ×. g. Left uropod, female, 320 ×.

Pleotelson not very swollen, greatest width near its base. Lateral sides slightly convex. Insertions for the uropods large and distinct. The tip between the uropods with its margin almost semicircularly rounded. Longitudinal elevation along the middle line slightly indicated. Dorsally and laterally the pleotelson has a few minute scattered setae.

Antennulae. Of the usual shape in the genus *Munna*, with third and fourth joints of the peduncle very short. The flagellum consists of four joints, of which the last is small. The last two joints of the flagellum are each provided with a long sensory filament.

Antennae. Broken. The four proximal joints are small.

Maxillipeds. Typical of the genus, having the second and third joints of the palp expanded and broader than the others. Distal margin of the epipodite broadly rounded. Coupling-hooks, three.

First pair of pereiopods, male (Fig. 51 b). Carpal joint broad, subtriangular, widening considerably towards its distal end; lower margin provided with four stout two-pointed setae and a number of more slender bristles. Propodal joint subrectangular, about as long as the carpus, but much narrower. Dactylus narrow, furnished with one long and one short claw.

First pair of pereiopods, female (Fig. 51 c). Much more slender than those of the male (especially the carpus and propodus), but otherwise similar. Carpal joint with only two double-pointed setae on its lower margin. Propodus close to its lower margin with two double-pointed setae. The propodus is somewhat longer than the carpus.

The other pereiopods. In most of the specimens examined not preserved. They are not quite so long as is generally the case in the genus *Munna*. The fifth pereiopod is somewhat shorter than the body.

First pair of pleopods, male (Fig. 51 d). Widening towards their distal ends. Distal margins convex.

Second pair of pleopods, male. See Fig. 51 e.

Operculum, female (Fig. 51 f). Its anterior surface provided with short scattered setae.

Uropods (Fig. 51 g). Somewhat hook-like. For details see the figure. They differ from the description by MONOD (1931) in lacking the »3—4 petites protubérances apicales».

Localities and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^3/_9$ 1902. 7 specimens, of which four are very small. Of the three large specimens one is a male, the two others are indeterminable as to sex, having lost their operculums and first pereiopods; one specimen of slightly more ovoid shape of body than the others is probably a female. Of the four young specimens three are females; one of them has no operculum. Almost colourless. Length of largest specimen, a male, about 3 mm. The specimens were found together with one specimen of *Munna maculata.*

Falkland Islands, Port Louis, Greenpatch. From algae and roots of kelp thrown up on the shore by storm. Male specimen about 2.4 mm. in length. It differs slightly from the above-mentioned specimens in having the pleotelson not quite so tapering towards its distal end and in its slightly brownish colour, the body being faintly marbled with brown pigment.

Distribution. Falkland Islands (Sw. Ant. Exped.), Kerguelen (BEDDARD 1886, MONOD 1931). Previously found only at Kerguelen.

Munna antarctica (PFEFFER, 1887).

Text figs. 52 a, b.

Haliacris antarctica. PFEFFER, 1887, p. 137—143, Pl. VI, Figs. 28—46; HODGSON, 1910, p. 58—61; TATTERSALL, 1921, p. 203—205, Pl. I, Figs. 15, 16, Pl. II, Figs. 1—3.

(?) *Munna antarctica.* VANHÖFFEN, 1914, partim., p. 562—563.

Diagnosis[1]. Anterior margin of the head with a distinct spine-like projection in front of the eyes. First, second and third segments of the pereion laterally pointed, fourth trun-

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[1] Cf. MONOD, 1931, p. 15.

cate, fifth, sixth and seventh with lateral margins convex. Coxal plates (on the second to seventh segments) all pointed. First male pereiopod with ischium longer than merus; in the adult male with the free distal edge of carpus furnished with a tooth, lower distal angle of the propodus tooth-like, projecting, and lower margin of propodus crenulate. Uropods sub-conical, tapering towards the broadly rounded and setiferous end.

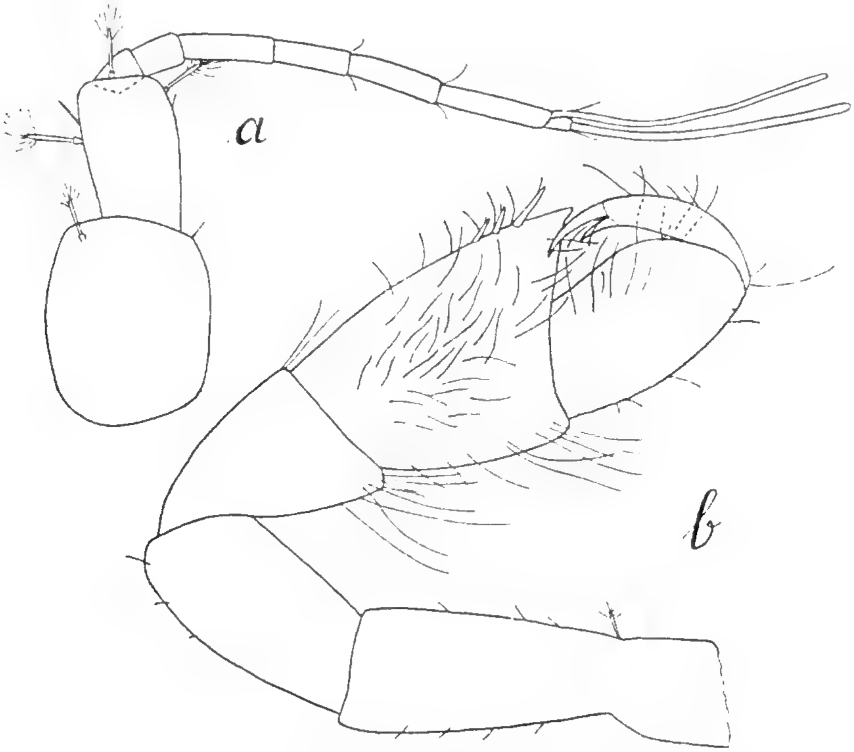

Fig. 52. *Munna antarctica* (PFEFF.). a. Antennula, female, 100 ×. b. Right first pereiopod of a sub-adult male 3.1 mm. in length, 75 ×.

Supplementary Description.

Antennulae (Fig. 52 a). First and second joints of the peduncle very stout, third and fourth very small. The flagellum consists of five joints, of which the last is small; each of the last two joints of the flagellum — as is usual in the genus *Munna* — are furnished with one large sensory filament.

Mandibles. Incisive part with five teeth, of which two are situated on the frontal and three on the inner margin. Lacinia (on the left mandible) with four teeth. Setal row on the left mandible with four setae, on the right with five. Second joint of the palp provided at its distal end with two long setae, each seta furnished with two rows of sub-branches; third joint distally with three setae of the same kind.

First and second pairs of maxillae[1]. Normal. Inner lobe of first maxilla provided distally with four stout and about five slender setae. Lappets of outer lobe of the second maxilla each provided with three long apical setae.

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[1] Cf. HODGSON, 1902, Pl. XXXIV, Figs. 1 a and 1 b.

Maxillipeds[1]. Epipodite with distal margin broadly rounded. Coupling-hooks, about six.

First pair of pereiopods, young male[2] (Fig. 52 b). Ischium, somewhat longer than merus. Carpal joint on the lower margin near its distal end with three setae. The free distal margin of the carpus and the lower margin of the propodus are not denticulated.

First pair of pleopods, male Cf. TATTERSALL (1921)[3]. Distal margin almost straight.

Uropods[4]. Sub-conical. Outer margin slightly convex; inner margin almost straight; distal margin broadly rounded and setiferous, not concave as figured by TATTERSALL[5] (1921).

Remarks. The names *Munna antarctica* (PFEFFER) and *Haliacris antarctica* PFEFFER are often met with in the literature and used by several authors. But, as has been pointed out by TATTERSALL (1921), it is doubtful how far their statements actually refer to the true species. TATTERSALL (1921) examined the first male pereiopod of *Munna antarctica* (PFEFFER) in specimens of different ages from the type locality (South Georgia), and found that this leg in all his specimens examined differed from that figured by RICHARDSON (1906) under the name of *Haliacris australis* HODGSON. He accordingly presumes that *Munna australis* (HODGSON) perhaps is a species distinct from *Munna antarctica* (PFEFFER). He points out, however, that this »matter cannot be cleared up until fully adult males from Antarctic waters are available». According to TATTERSALL (1921), the first male pereiopods in *Munna antarctica* (PFEFFER) are characterized by having the ischium longer than the merus, the lower margin of the propodus smooth and the free distal margin of the carpus furnished with a single tooth, distinct in adult but faint in sub-adult specimens, whereas the figure by RICHARDSON (1906, Fig. 20, illustrating one of the first male pereiopods in »*Haliacris australis*» HODGSON) shows a pereiopod with the meral joint longer than the ischium and with the lower margin of the propodus and the distal edge of the carpus denticulated throughout.

The material of the species from the Swedish Antarctic Expedition was collected at South Georgia and agrees very well with the figures and description of the true *Munna antarctica* given by PFEFFER (1887). It consists only of three specimens, but contains one sub-adult male (length 3.1 mm.) with its first pereiopods preserved. The first pereiopod in that specimen, which is illustrated in Fig. 52 a, agrees almost completely with the same appendage in a young male specimen, 3.5 mm. long, figured by TATTERSALL[6] (1921). The only difference is that the free distal margin of the carpus is quite smooth. This difference is perhaps due to the somewhat smaller size of my specimen. The differences from the first pereiopod of »*Munna australis*» as illustrated by RICHARDSON (1906, Fig. 20) are more marked (see above). This different structure of the first male pereiopods is, however, the single difference of any importance between *Munna australis* (HODGSON) and *Munna antarctica* (PFEFFER). I therefore consider »*Munna australis*» to be merely a variety of *Munna antarctica* (PFEFFER).

In 1910 HODGSON referred his *Haliacris australis*, which in 1902 he regarded as

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[1] Cf. HODGSON, 1902, Pl. XXXIV. Fig. 1 d.
[2] See also TATTERSALL, 1921, Pl. I, Fig. 15.
[3] TATTERSALL, 1921, Pl. II, Fig. 3.
[4] See PFEFFER, 1887, Pl. VI, Fig. 46.
[5] TATTERSALL, 1921, Pl. II, Fig. 2.
[6] TATTERSALL, 1921, Pl. I, Fig. 15.

distinct from *Munna antarctica*, to the synonymous list of *Munna antarctica* (PFEFFER). In describing the first male pereiopod, HODGSON states that the ischium is longer than the merus, which agrees with TATTERSALL's and my own observations on *Munna antarctica*. The statement indicates that his specimens were probably the true *Munna antarctica* (PFEFFER).

The specimens from the German Antarctic Expedition, which have been referred to *Munna antarctica* (PFEFFER) by VANHÖFFEN (1914), are dubious. VANHÖFFEN (1914) says of his *Munna antarctica* that it is »gekennzeichnet durch spitze Epimeren». But in his Fig. 90 the epimera are drawn with rounded lateral margins. I have had the opportunity of re-examining two small specimens from the German Antarctic Expedition, sent to me for investigation from the Zoological Museum in Berlin, and have found that their coxal plates have the lateral margins rounded and are quite different from the pointed coxal plates in *Munna antarctica* (PFEFFER). These two specimens, at any rate, do not belong to *Munna antarctica* (PFEFFER).

STEBBING (1919) describes a *Munna* from the Falkland Islands, which he names *Munna antarcticus*. In his figure of the species the coxal plates are rounded, and there is no trace of the projecting spines in front of the eyes which are characteristic of *Munna antarctica* (PFEFFER). The first male pereiopod, however, is similar to that of *Munna antarctica* (PFEFFER) as figured by TATTERSALL (1921). STEBBING's specimens was referred by MONOD in 1931 to his new species *Munna neglecta*. MONOD presumes that the specimens assigned by TATTERSALL to *Munna antarctica* also was in fact *Munna neglecta*. This, however, is not correct, as my specimens of *Munna antarctica* (PFEFFER) from the type locality agree with *Munna antarctica* as described both by PFEFFER (1887) and TATTERSALL (1921). MONOD's figure of the first male pereiopod in *Munna antarctica* (MONOD 1931, Fig. 11 b) agrees with *Munna antarctica* var. *australis*, as figured by RICHARDSON (1906, Fig. 20). Accordingly his specimens which were found in the Antarctic, have presumably been this variety of *Munna antarctica* (PFEFFER). There are no specimens of *Munna antarctica* var. *australis* in the collections of the Swedish Antarctic Expedition. The synonymy of the variety *australis* should apparently be as follows:

(?)*Haliacris australis* HODGSON, 1902.
Haliacris australis RICHARDSON, 1906, 1908.
Munna antarctica MONOD, 1931.

The rather large species *Munna antarctica* (PFEFFER) is recognizable by its characteristic pointed coxal plates. The figures of the species by PFEFFER, HODGSON and MONOD give a good idea of its general structure. HODGSON (1910, p. 58) points out that the shape of the pleotelson varies with the age in the male sex, being modified in very large male specimens (see also MONOD, 1931, Figs. 6 a and b, Fig. 10 b). In all my specimens the shape of pleotelson is the same, in complete correspondance with PFEFFER's[1] illustration. The pleotelson has a broad, flattened, longitudinal, white-coloured elevation along the middle line. This ribbon-like elevation is often traversed by a transversal white streak, thus forming a distinctly marked white cross on the dorsal surface of the pleotelson[2]. The colour of the head and the pereion is yellowish to brownish. Colour of the eyes brown to black.

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[1] PFEFFER, 1887, Pl. VI Fig. 46.

[2] See MONOD, 1931, Figs. 6 a, 6 b and 10 b.

Localities and Material.

South Georgia, Grytviken. From kelp thrown up on the shore. $^{22}/_{8}$ 1902. 2 specimens, male 3.1 mm. long and female 4.2 mm. in length. Eyes dark. Pleotelson in both specimens typically coloured.

St. 22. South Georgia, off May Bay, lat. 54°, 17′ S., long. 36°, 28′ W. 75 m. Bottom temp. + 1.5°. Clay with some algae. $^{14}/_{5}$ 1902. One damaged specimen about 5 mm. in length, having dark eyes with a touch of brownish; without the whitish colouring on the pleotelson.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54°, 11′ S., long. 36°, 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. One damaged male specimen with the head almost missing. The transverse whitish ribbon-like streak on the pleotelson is absent.

Distribution. South Georgia (PFEFFER 1887, TATTERSALL 1921), Victoria Land (HODGSON 1910, TATTERSALL 1921), (?) Kerguelen (VANHÖFFEN 1914).

According to VANHÖFFEN (1914) it occurs at Kerguelen. The material determined by VANHÖFFEN (1914) as *Munna antarctica* consists, however, at least only partly of the actual *Munna antarctica* (PFEFFER). The species has been found at a depth of 2—5 m.,[1] but occurs also at a depth about of 300 m.[2] Its variety *australis* HODGSON is common in the Antarctic, but has never been recorded from South Georgia.

Munna neglecta MONOD, 1931.

Text figs. 53 a, b.

Munna neglecta. MONOD, 1931, p. 14—15, Fig. 3, 4 a and c, 5 a—b, 10 a and c, 11 a, 12 a—c, 13 a—i, 14 a, 16 a—b

(?) *Haliacris antarctica.* RICHARDSON, 1913, p. 19—20.

Munna antarcticus. STEBBING, 1919, p. 336—337, Pl. V.

For diagnosis see MONOD (1931, p. 15).

Supplementary Description.

(Sub-adult male about 3.2 mm. in length, greatest width about 1.2 mm.).

General shape of body. Oblong, narrow, almost three times as long as it is wide. Segments of the pereion only slightly differing in width; greatest width across the fourth pereion segment. Dorsal surface smooth.

Colour. Grayish-yellowish with scattered dots of brown pigment.

Head. About as long as the first and second pereion segments together. Frontal margin slightly concave, almost straight, with a row of stiff setae. Insertions for the antennulae and the antennae deep. Eye-peduncles narrow, widening towards the end, anteriorly with a short tooth. Eyes distinct, black.

Pereion. First four pereion segments very slightly diminishing in length from the first to the fourth, the first being the longest. Last three segments shorter than the others, subequal in length. Lateral margins of the segments rounded.

Coxal plates distinct on all the segments except the first, seen from above, subrectangular with lateral margins almost straight.

Abdomen. About as long as the last five pereion segments together, anteriorly with one distinct free segment.

Pleotelson oviform; greatest width approximately across the middle; distal margin between the uropods broadly rounded.

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[1] TATTERSALL (1921).

[2] Swedish Antarctic Expedition, st. 34.

Antennulae. First and second joints of the peduncle stout, second and third very small. The flagellum consists of four joints, of which the last is minute.

Antennae. Broken.

Mandibles. See MONOD (1931, Figs 13 a and b).

Maxillipeds. Normal. Epipodite with distal margin broadly rounded. Coupling-hooks, three.

First pair of pereiopods, sub-adult male[1] (Fig. 53 a). In the examined 3.2 mm. long specimen the left periopod is about as long as the body and is of the same shape as in *Munna antarctica*[2] PFEFFER. There is one tooth on the free distal margin of the carpus and one on the lower margin of the propodus. The proportion between the length of the joints in the left pereiopod is 35: 45: 30: 45: 22: 15. The right pereiopod is very much shorter and smaller than the left. Denticulation on the free distal margin of the carpus and the lower margin of the propodus is missing.

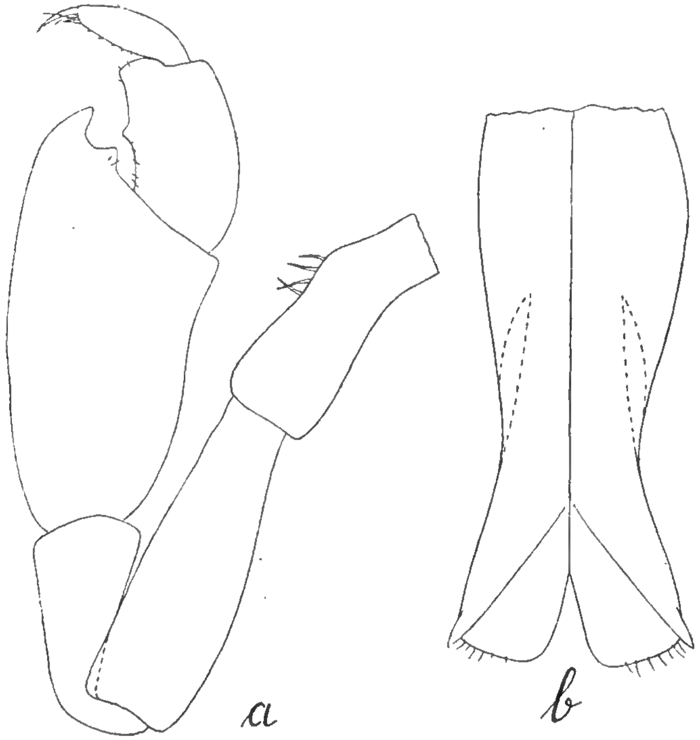

Fig. 53. *Munna neglecta* MONOD. a. Left first pereiopod of a sub-adult male, 50 ×. b. First pleopods, male, 115 ×.

The other pereiopods. Long and moderately »hairly».

First pair of pleopods, male (Fig. 53 b). Distal margins almost straight.

Uropods[3]. Subconical, distally obtusely pointed; outer margin slightly convex, inner margin almost straight.

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[1] Cf. also STEBBING (1919, Pl. I, gn. 1 ♂) and MONOD (1931, Figs. 10 a, 11 a and 12 a).

[2] Cf. TATTERSALL (1921 Pl. I, Fig. 15 and 16; Pl II, Fig. 1).

[3] See MONOD, 1931, Fig. 12 c.

Localities and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. 3/9 1902. Sub-adult male with both the first pereiopods preserved, length about 3.2 mm.

St. 55. Falkland Islands, Port Albemarle, lat. 52° 11′ S., long. 60° 26′ W. 40 m. Sand bottom with algae 8/9 1902. Male, length about 2.6 mm. The specimen is proportionately somewhat shorter than the above-mentioned specimen. The head and the abdomen have the form characteristic of *Munna neglecta* MONOD; the coxal plates have their lateral margins almost straight. The colour is light yellowish, slightly dotted with brown pigment.

Distribution. Falkland Islands (STEBBING 1919), South Orkney Islands (MONOD 1931), Graham Region (MONOD 1931).

Munna affinis n. sp.

Pl. II, Fig. 19; Text figs 54 a—e.

Diagnosis. Anterior margin of the head with short but distinct spine-like projections in front of the eyes. Lateral margins of the pereion segments convex. Last three pereion segments, short medially, increasing in length towards their lateral margins. Coxal plates on the second, third and fourth pereion segments with lateral margins convex, those on the fifth, sixth and seventh segments triangular and pointed. First pereiopods in the male with ischium and merus subequal in length; merus considerably widening towards its distal end, with distal angles somewhat projecting; lower distal angle of the carpus projecting, obtusely pointed; the free distal margin of the carpus and the lower margin of propodus denticulated.

Description.

Types. Male, length about 3.6 mm., with both the first pereiopods preserved; female, length about 3.0 mm.

General shape of body (Pl. II, Fig. 19). Pereion segments only slightly differing in width. Dorsal surface with minute setae.

Colour. Light yellowish.

Head (Pl. II Fig. 19). About as long as the first two pereion segments together. Frontal part between the antennulae about as long as the posterior part of the head, with the front margin very slightly concave and densely fringed with short stiff setae. Insertions for the antennulae and the antennae deep. Eye-peduncles slender, with a short obtuse tooth in front of the eyes. Eyes distinct, black.

Pereion (Pl. II, Fig. 19). First four pereion segments subequal in length. Last three segments very short in the middle, widening towards their lateral sides. Lateral margins of all the segments rounded.

Coxal plates distinct but small on all segments, except the first; on the second, third and fourth segments their lateral margins are convex; on the last three segments they are triangular and obtusely pointed.

Abdomen (Pl. II, Fig. 19). About as long as the pereion, except the first pereion segment. Anterior to the pleotelson there are two short free segments.

Pleotelson bulbous, shortly oval in outline, with its broadest part at a distance from its anterior margin of about one-third of its length. There is a faint broad, slightly light-coloured, elevation along the middle line.

Antennulae (Fig. 54 a)[1]. First and second peduncular joints stout, first joint the longest; third and fourth peduncular joints very small. The flagellum consists of five joints, of which the last is minute. In the male the first joint of the flagellum is somewhat longer than in the female.

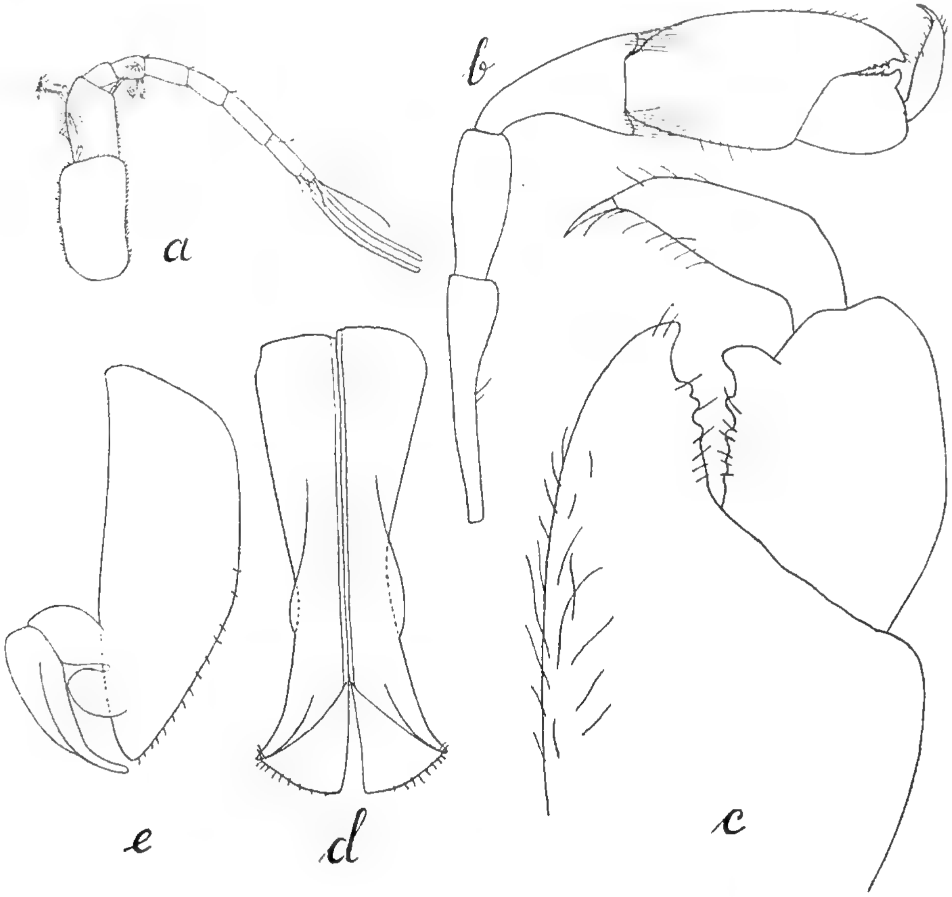

Fig. 54. *Munna affinis* n. sp. a. Right antennula, female, 80 ×. b. First pereiopod, adult male, 28 ×. c. Propodus, dactylus and distal part of the carpus of the same pereiopod, 80 ×. d. First male pleopods, seen from the caudal side, 80 ×. e. Right second male pleopod, seen from the caudal side, 80 ×.

Antennae. Broken.

Left mandible. Normal. Incisive part with five teeth, lacinia with four teeth, molar tubercle denticulated. Second joint of the palp, distally, on the lower margin, with a ciliated seta, third joint with three apical setae of the same kind.

Maxillipeds. Normal. Epipodite with distal margin broadly rounded. Coupling-hooks three.

First pair of pereiopods, male (Figs. 54 b and c). About as long as the body. Basipodite very narrow proximally, but widening towards its distal end. Ischium of approxi-

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[1] Of a female.

mately uniform width, subequal in length to the merus, which increases considerably in width distally; its distal angles are somewhat projecting and have tufts of long setae. Carpal joint large and broad, oval, its lower distal angle obtusely pointed and its free distal margin denticulated. Lower margin of the carpus provided with long setae. Propodus short, with lower distal angle pointed, its lower margin denticulated. Dactylus short and narrow, about equal in length to the propodus. The proportion between the lengths of the joints is 57: 39: 40: 53;[1] 23: 23.

First pair of pereiopods, female. Broken.

The other pereiopods. Long and moderately »hairy». Seventh pereiopod with carpus and propodus (in a male specimen) more densely setiferous than in the other pereiopods. The seventh pair of pereiopods in the female are broken.

First and second pleopods, male. See figs. 54 d and e.

Operculum, female. Broken (in the single female specimen of the species).

Uropods. Slightly tapering towards the end, outer margin slightly convex, inner margin almost straight, distal margin broadly rounded.

Remarks. It is surprising to find that the first male pereiopods in this species are similar to those figured by RICHARDSON (1906, Fig. 20) and MONOD (1931, Fig. 11 b) in *Munna antarctica* var. *australis* (PFEFFER). They differ only in having the ischium and merus subequal in length. But the rounded lateral margins of the pereion segments and the rounded coxal plates on the second, third and fourth segments afford evidence that the specimens do not belong to *Munna antarctica* (PFEFFER). It was thus necessary to establish a new species.

Munna affinis is closely allied to *Munna neglecta* MONOD but differs especially from MONOD's species in having the last three pereion segments increasing in length laterally, in having the lateral margins of the second to fourth pereion segments more convex, in having pointed coxal plates on the last three pereion segments, and in having the ischium and merus of the first male pereiopod subequal in length.

Localities and Material.

South Georgia, Grytviken. From roots of kelp taken at a depth of 3—4 fathoms. $^{24}/_{5}$ 1902 Male about 3.6 mm. in length (type). Colour, faint yellowish.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S, long 36° 28′ W. 12—15 m. Sand and algae $^{24}/_{5}$ 1902. 2 specimens, male and female. Length of the male about 3.5 mm.; colour light yellowish strongly marbled with dark-brown. Length of the female (type) about 3 mm.; colour light yellowish to brownish.

Distribution. South Georgia (Sw. Ant. Exped.).

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[1] The number 53 corresponds to the middle length of the carpus; the length of the lower distal projection of the carpal joint has not been included.

Munna bituberculata n. sp.

Pl. II, Fig. 20; Text figs. 55 a—g.

Diagnosis. Frontal margin of the head with two oblong tuberculae, one on each side of the middle line. Eye-peduncles with a tooth in front of the eyes. Coxal plates on second, third and fourth segments of the pereion subtriangular with lateral margins rounded, those on the last three pereion segments triangular and pointed. First pair of pereiopods in the adult male about twice as long as the body; ischium subequal in length to the merus, merus with a rounded prolongation at its lower distal angle; lower distal angle of carpus projecting and pointed, extending about to the distal margin of propodus; lower distal angle of propodus tooth-like, projecting; the free distal margin of carpus and the lower margin of propodus denticulated, dactylus about as long as the width of propodus.

Description.

Types. Male, length about 5 mm., with both the first pereiopods preserved; and female (Pl. II, Fig. 20), length about 3.5 mm., greatest width 1.5 mm.

General shape of body. The first four segments of the pereion are nearly equal in width. Some scattered, very short, setae on the dorsal surface.

Colour. Light brownish.

Head (Pl. II, Fig. 20). About as long as the first two pereion segments together. At the frontal margin there are two distinct oblong tuberculae, one on either side of the middle line, extending somewhat backwards on the dorsal side. Between the tuberculae there is a longitudinal furrow. Frontal margin between the tuberculae somewhat concave, and laterally from the tuberculae straight. Insertions for the antennulae and antennae deep. Eye-peduncles broad and long, distally sub-globular. Eyes large, slightly brown-coloured. There is a distinct tooth-like projection in front of the eyes.

Pereion (Pl. II, Fig. 20). The first four pereion segments are subequal in length and width. In the male the first and second are a little longer than the others. In the female the second is the longest, the first the shortest Last three segments subequal in length, narrow in the middle but increasing in length towards their lateral margins; together they are about as long as the fourth plus half the third segment. Lateral margins of all the pereion segments rounded.

Coxal plates seen from above, on the second to fourth segments subtriangular with lateral margins rounded, on the last three segments triangular and pointed.

Abdomen (Pl. II, Fig. 20). About as long as the last five thoracic segments together, with a large and distinct first free segment.

Pleotelson suboval in outline, with greatest width approximately across the middle, and distal margin rounded. On the dorsal side there is a distinct white-coloured elevation along the middle line, traversed by an indistinct white-coloured transverse ribbon-like streak.

Antennulae (Fig. 55 a). First and second joints of the peduncle very stout, the first somewhat longer than it is broad, the second about two and a half times as long as it is broad. The following two joints are very small and narrow, each only about one-fourth to one-fifth as long as the second joint. The flagellum, which is in length about equal to the peduncle, consists of five joints in the female and six joints in the male specimen.

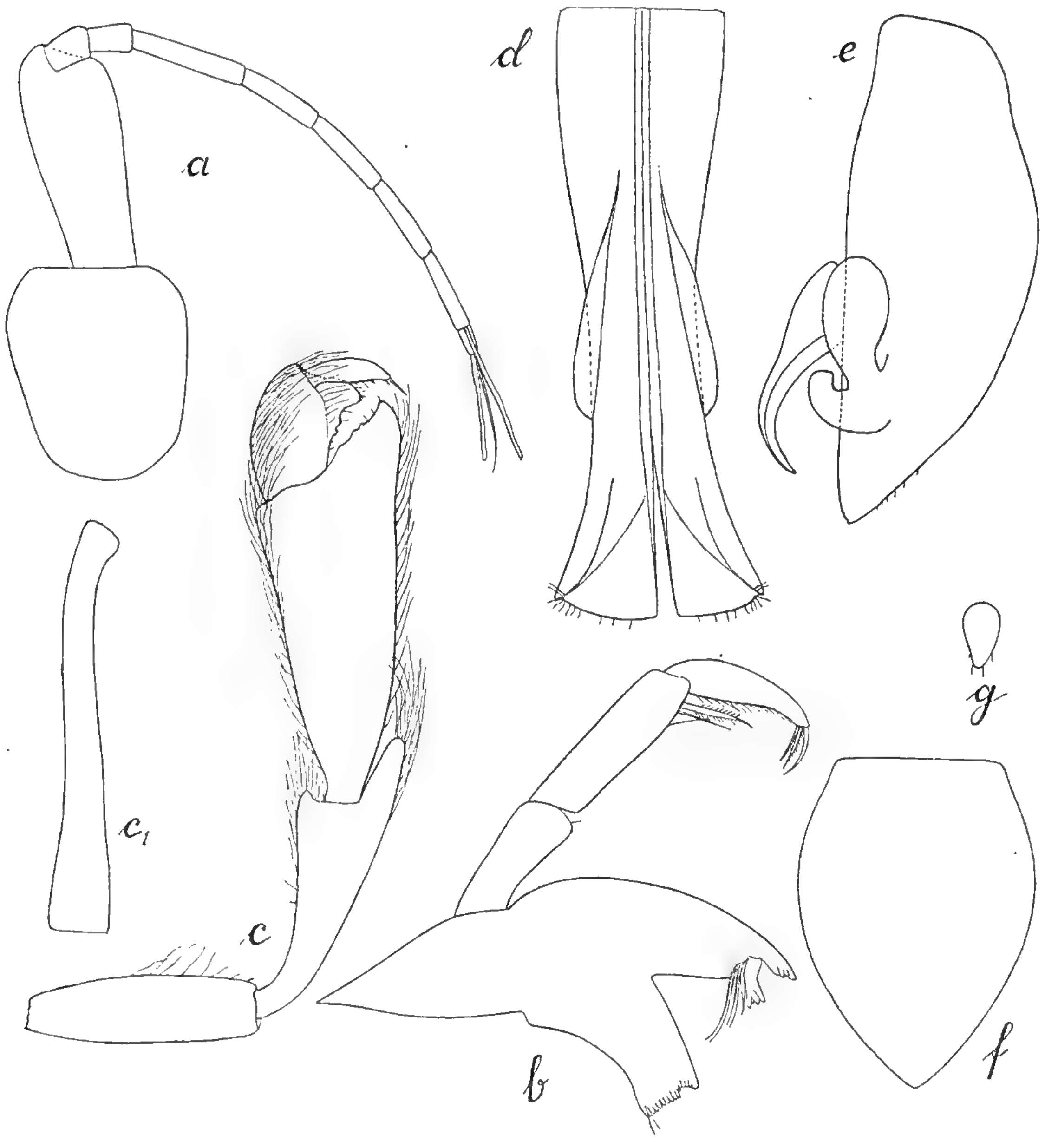

Fig. 55. *Munna bituberculata* n. sp. a. Right antennula, male, 80 ×. b. Left mandible, male, 80 ×. c. Left first pereiopod, (except the basipodite), in an adult male), 26 ×. c$_1$. Basipodite of the same periopod, 26 ×. d. First male pleopods, seen from the caudal side, 80 ×. e. Right second male pleopod from the caudal side, 80 ×. f. Female operculum, 40 ×. g. Right uropod, 80 ×.

Mandibles (*male*) (Fig. 55 b). Of the usual type in the genus. Incisive part with five teeth. Lacinia (on the left mandible) with four teeth. Second joint of the palp on the lower margin distally with one strong ciliated seta and two slender, hair-like setae. Third joint of the palp with three distal setae. For other details see the figure.

First and second pairs of maxillae. Normal. Each lappet of the outer lobe of the second maxillae provided with three distal setae.

Maxillipeds. As in *Munna antarctica* (PFEFFER). Distal margin of the epipodite broadly rounded. Coupling-hooks three.

First pair of pereiopods, in the adult male (Fig. 55 c and c₁). Very strong. In the five mm. long male specimen their length is about 10 mm. The basipodite is very long, almost as long as the pereion, and widens out towards its distal end. Its length is about equal to the length of the ischium plus two-thirds the length of the merus. The ischium is somewhat broader than the basipodite and almost of uniform width. Meral joint about equal in length to the ischium, very narrow proximally, but widening towards its distal end to a width about three times as great as that proximally; on the lower side, distally, the joint is prolonged into a large forward-directed projection with rounded end; upper distal angle slightly produced. The carpal joint is the largest of all the joints widening out distally to about four times the width proximally. Its lower distal angle projects and extends about as far as to the distal margin of the propodus. The distal edge of the carpus is denticulated. The propodus is short and of almost uniform width; its lower margin is slightly denticulated; its lower distal angle forms a broad unguiform projection. Dactylus short and narrow, about as long as the width of the propodus. The lengths of the joints in the 5-mm-long specimen are — 2.8, 1.8, 1.7, 2.4, 0.7 and 0.6 mm. — commencing with the basipodite. The pereiopod is furnished with long and hair-like setae at the lower and upper angles of the ischium, at the lower and upper margins of the carpus and the upper margin of the propodus. Shorter setae appear on the lower margin of the propodus and elsewhere (see figure).

The other pereiopods. All broken.

First pair of pleopods, male. See Fig. 55 d.

Second pair of pleopods, male (Fig. 55 e). Exopodite strongly curved. Endopodite rather short.

Operculum, female (Fig. 55 f). Cordiform, obtusely pointed.

Uropods (Fig. 55 g). Outer margin slightly convex. Inner margin almost straight, distal margin rounded.

Localities and Material.

St. 22. South Georgia, off May Bay, lat. 54° 17′ S, long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay with a few algae. ¹⁴/₅ 1902. 3 specimens (mutilated female specimen about 3.5 mm in length, [type], 2 other damaged specimens, and a first pereiopod of an adult male.)

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S, long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. ¹¹/₅ 1902. Male about 5 mm. in length, having both the first pereiopods preserved (type).

Distribution. South Georgia (Sw. Ant. Exped.).

Occurring at a depth of 75—300 m.

Munna nana n. sp.

Text fig. 56, Text figs. 57 a—j.

Diagnosis. Eye-peduncles broad with front margin straight (the ordinary tooth in front of the eyes missing). Lateral margins of the pereion segments rounded. Coxal plates small, rounded. Antennular flagellum consisting of two joints, the last being furnished with one sensory filament. First pereiopods shorter than the others, but stronger and prehensile. First male pleopods strongly tapering towards the end, being about four times broader proximally than distally. Sympodite of second male pleopod prolonged distally into an acute point. Female operculum approximately cordate, very broad proximally but strongly tapering towards the narrowly rounded end; near the distal margin it is furnished with two slender setae.

Description.

Types. Ovigerous female with twelve eggs (Fig. 56), length about 1.2 mm.; male, about 1 mm. in length.

General shape of body. Body in the female (Fig. 56) broadly oval in outline, with greatest width across the third pereion segment. In the male the first four pereion segments are subequal in width. No setae on the dorsal surface.

Colour. Whithish to yellowish.

Head (Fig. 56). About as long as the first and second pereion segments plus half the third segment. Frontal part broadly trapezoidal with front margin straight. Insertions for the antennulae and the antennae not very deep. Eye-peduncles broad with very small dark eyes. There is no tooth on the anterior margin of the eye-peduncles.

Pereion (Fig. 56). Segments in the ovigerous female increasing in length and width to the third, which is the largest. First segment in the ovigerous female not fully half as long as the second. In the male the first four segments are subequal in length. The lateral margins of the pereion segments are rounded.

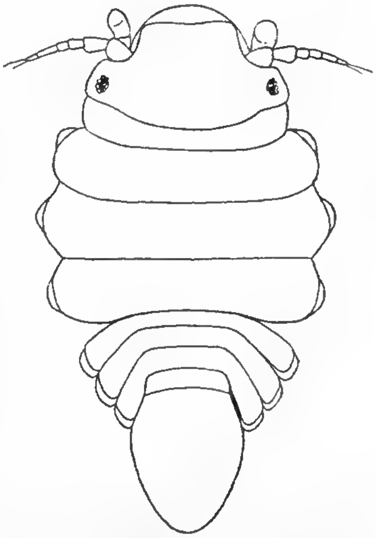

Fig. 56. *Munna nana* n. sp. Ovigerous female, 60 ×.

Coxal plates small; seen from above their lateral margins are rounded.

Abdomen (Fig. 56). About as long as the last five thoracic segments together, anteriorly with one free segment.

Pleotelson oviform, with distal margin rounded. Greatest width of pleotelson in the female somewhat proximally from the middle. In the male the pleotelson is slightly narrower than in the female and has its greatest width about across the middle. There is a faint elevation on the dorsal side along the middle line.

Antennulae (Fig. 57 a). The two proximal joints of the peduncle are stout and the two following joints small. The flagellum consists of two joints only, of which the last is furnished with one sensory filament and some setae. The flagellum thus differs from the ordinary Munna-type characterized by having one sensory filament on the last and penultimate joints.

Antennae. Broken in all specimens, except a small male about 0.9 mm. in length. In this specimen they are about as long as the body. The first three joints of the peduncle are short, the fourth and fifth long, the fifth somewhat longer than the fourth. The flagellum is subequal in length to the peduncle and consists of about ten joints.

Right mandible (Fig. 57 b). Palp with the third joint small.

First and second pairs of maxillae (Figs. 57 c and d). Lappets of outer lobe of the second maxillae each with three apical setae.

Lower lip. See Fig. 57 e.

Maxillipeds. Epipodite ovate with distal margin broadly rounded, reaching to about the second joint of the palp.

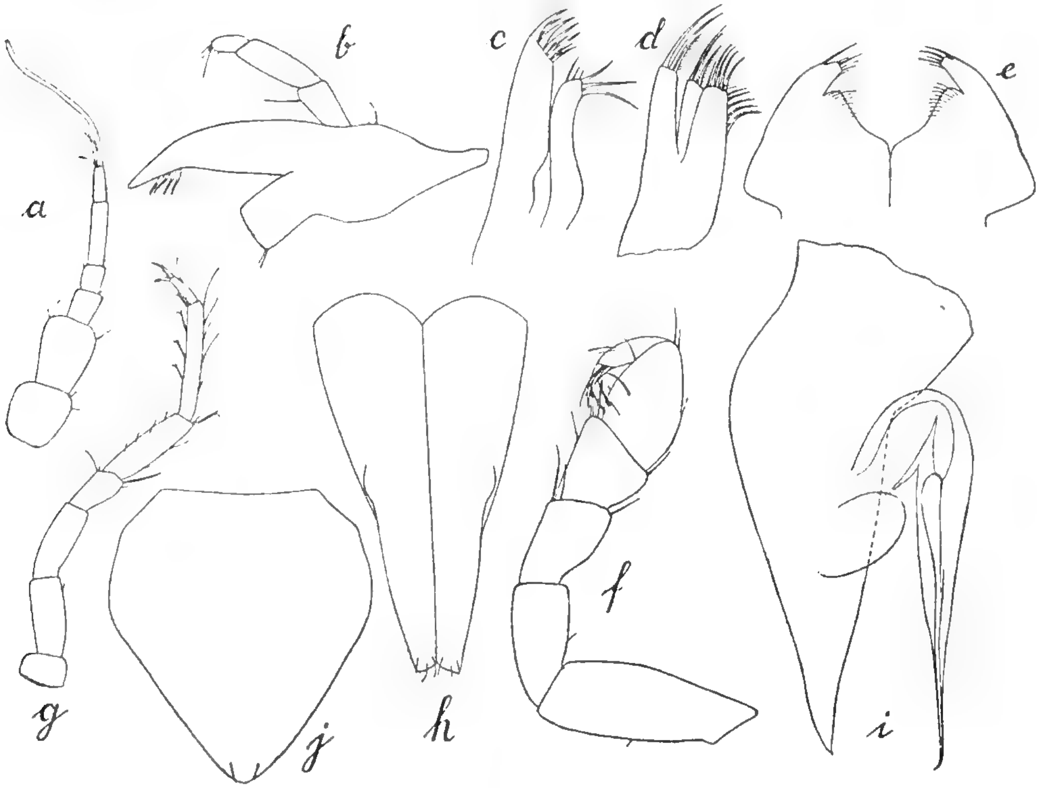

Fig. 57. *Munna nana* n. sp. a. Right antennula, female, 175 ×. b. Right mandible, female, 235 ×. c. First maxilla, 235 ×. d. Second maxilla, 235 ×. e. Lower lip, 235 ×. f. Right first pereiopod of a female, 150 ×. g. Third pereiopod, female, 75 ×. h. First male pleopods, from the caudal side, 240 ×. i. Left second male pleopod, from the caudal side, 325 ×. j. Female operculum, 175 ×.

First pair of pereiopods (Fig. 57 f). Small. Similar in males and females. Carpal joint subtriangular, with one slender seta on the lower margin and two stout setae at the lower distal angle. Propodus ovate, with — as usual in *Munna* — two setae near the lower margin. For other details see the figure.

The other pereiopods (Fig. 57 g). Increase in length from the first to the last, which is about as long as the body. The merus and carpus have each one two-pointed seta at their upper distal angles, and the propodus has a row of setae of the same kind along the lower margin.

First pair of pleopods, male (Fig. 57 h). Elongate, tapering towards the narrow end. They are proximally about four times broader than distally.

Second pair of pereiopods, male (Fig. 57 i). Sympodites ending distally in acute points.

Operculum, female (Fig. 57 j). Approximately cordate. Very broad proximally, triangularly protracted distally. Distal margin narrowly rounded. Near the distal end there are two small setae.

Uropods. Minute, sub-rectangular. Outer and inner margins almost straight; distal margin slightly rounded and provided with a few setae.

Remarks. The species comes very close to *Munna schauinslandi* G. O. SARS. In its general aspect it is very similar to that species, but differs in having the distal margin of the pleotelson slighly more rounded. The first pereiopods are similar to the same limbs in *Munna schauinslandi.*

But it differs distinctly from *M. schauinslandi* in its first and second male pleopods and the female operculum. The first male pleopods taper more strongly towards the end than in *M. schauinslandi*; the sympodites of the second male pleopods are distally more prolonged, each ending in an acute point. The female operculum is proximally much broader than in *M. schauinslandi* and is triangularly protracted distally, having its distal margin narrowly rounded, not concave as in *M. schauinslandi.* The colour, in contradistinction from *M. schauinslandi,* is whitish to yellowish, only in a few specimens there is a slight trace of brownish marbling. The second male pereiopods, which are characteristic in *Munna schauinslandi,* were broken in all the male specimens of *Munna nana.*

Localities and Material.

St. 40. Falkland Islands, Berkeley Sound, lat. 51° 33′ S, long. 58° 0′ W. 16 m. Bottom temp. + 2.75° Gravel and shells with algae. $^{10}/_{7}$ 1902. 7 specimens, all females; length of the largest specimen, an ovigerous female, about 1.2 mm.

St. 46. Falkland Islands, Port Louis, Carenage Creek, lat. 51° 32′ S, long. 58° 7′ W. 1 m. Sand bottom with plenty of *Codium.* $^{9}/_{8}$ 1902. 6 specimens (2 males, 4 females); length of the largest specimen, an ovigerous female (type), 1.2 mm.; largest male (type) length 1 mm.

Distribution. Falkland Islands (Sw. Ant. Exped).

Genus **Coulmannia** HODGSON, 1910.

Diagnosis. Body vaulted, pleotelson bulbous. Eyes small on slender eye-peduncles. No coxal plates, but coxae at the base of the pereiopods. Antennulae short, consisting of a four-jointed peduncle and a single-jointed flagellum, which is about as long as the peduncle; last joint of the flagellum provided with one long sensory filament at the tip. Antennae not much longer than the antennulae, with peduncle six-jointed; squama missing. Mandibles with molar tubercle broad, widening towards its distal end; palp missing. Lower lip with the inner distal prolongations each elongated into four spine-like points. Maxilliped with a broad palp, having its second and third joints almost as wide as the endite; epipodite with distal margin narrowly rounded. First pereiopods equal in males and females, prehensile, but not larger than the others. The first pleopods (in the male) each provided with a lateral triangularly projecting extension. Uropods very small, consisting of two branches.

HODGSON (1910) refers the genus to the fam. *Ianiridae* of G. O. SARS. Its distinct slender eye-peduncles, bulbous pleotelson, its minute uropods, the composition of the antennulae, and its first male pleopods, which are similar to those characteristic of *Paramunna* G. O. SARS, show that it must be assigned to the group *Munnini.*

Coulmannia australis HODGSON, 1910.

Text figs. 58 a—j, text figs. 59 a—h.

Coulmannia australis. HODGSON, 1910, p. 53—54, Pl. IX, Figs. 2, and 2 a.

Supplementary Description.

General shape of body. As illustrated by HODGSON (1910, Pl. IX, Fig. 2). First pereion segment somewhat shorter than the three following segments, which are subequal in length. The first abdominal segment is not so cordiform as figured by HODGSON and much shorter.

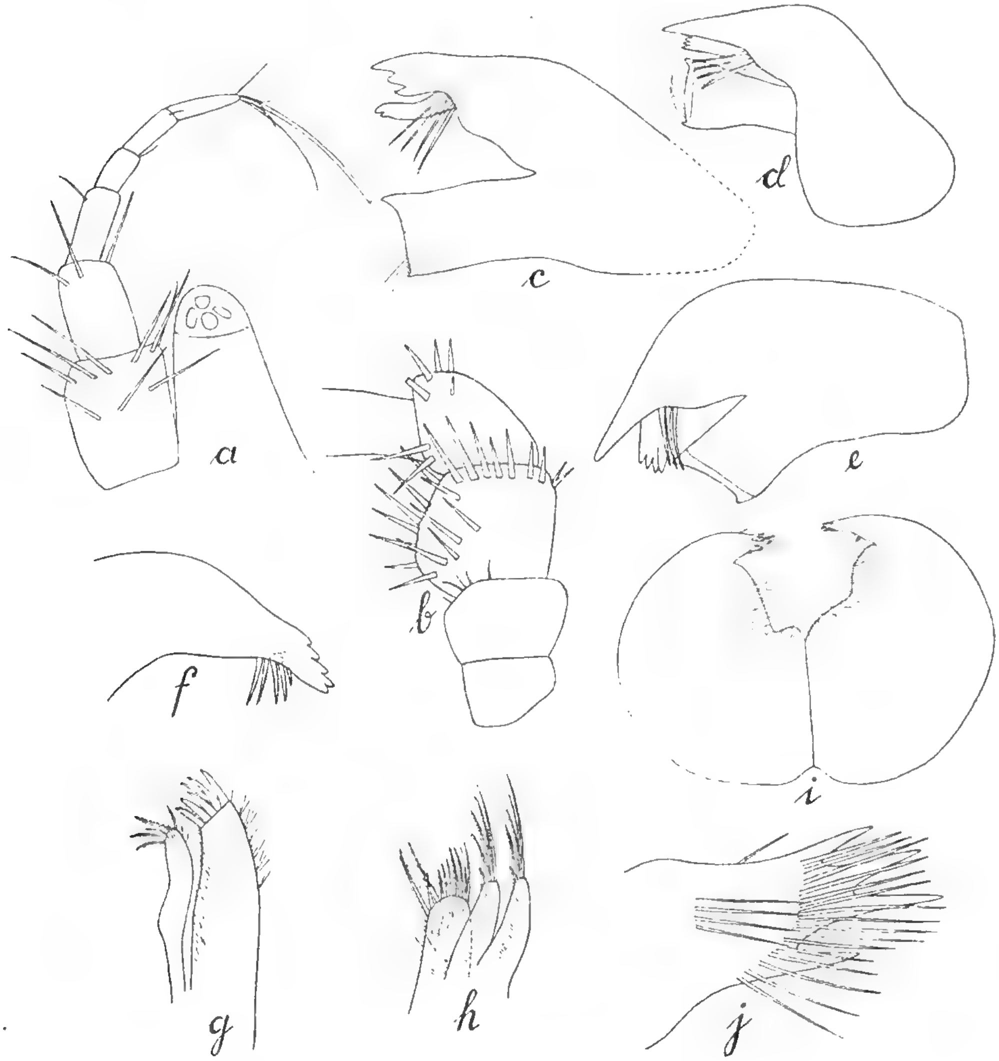

Fig. 58. *Coulmannia australis* HODGS. a. Right antennula and eye, female, 80 ×. b. Proximal peduncular joints of the antenna, 50 ×. c. d. and e. Left mandible, 80, 80 and 90 ×. f. Incisive part of the right mandible 30 ×. g. Left first maxilla, female, 80 ×. h. Second maxilla, female, 80 ×. i. Lower lip, 80 ×. j. One of its inner distal corners, 535 ×.

Antennulae.[1] See Fig. 58 a. The figure illustrates an antennula from a female specimen about 9 mm. in length. The antennulae are always six-jointed. The first two joints are stout, the first being the largest; both the joints are provided with setae, most of the setae situated dorsally. The last four joints are narrow; the terminal joint is furnished with one long sensory filament and some setae. The antennulae are thus similar to those in the genus *Antias* (cf. p. 200). As in that genus, the first four joints may be reckoned to the peduncle.

Antennae[1] (Fig. 58 b). The peduncle consists of six joints, the first four short. The second joint is about twice as long as the first, the third joint about half as long again as the second. The fourth peduncular joint is somewhat shorter than the third; the fifth is about as long as the first, second and third joints together. Sixth joint somewhat longer and narrower than the fifth. Flagellum about as long as the last three peduncular joints together, consisting of thirteen to fifteen joints (fifteen joints in a female specimen about eight mm. long). The first joint of the flagellum is about as long as the two following joints together.

Mandibles (Figs. 58 c, d, e and f). Corpus mandibulae broad and strong. Incisive part with four teeth on the left mandible, five teeth on the right one. Lacinia (left mandible) with four teeth. Setal row on the left mandible with four setae, on the right with five. Molar tubercle strong, subcylindrical, slightly widening towards its distal end, somewhat forwards-directed. Palp missing.

First pair of maxillae (Fig. 58 g). Normal. For details see the figure.

Second pair of maxillae (Fig. 58 h). Lappets of the outer lobe somewhat longer than the inner lobe, each with five apical setae. Distal margin of inner lobe provided with about ten long setae, of which the two largest are situated near the inner distal angle.

Upper lip. With distal margin convex.

Lower lip (Figs. 58 i and j). Distal angles of a tuft-like appearance, each divided into four points and strongly furnished with setae.

Maxillipeds[2]. Distal margin of the endite with two somewhat submarginal rows of setae, one row each on the dorsal and the ventral side. The somewhat ventrally situated submarginal row consists of four stout flattened setae, which are furnished distally and laterally with long and pointed sub-branches; the length of the sub-branches increases towards the distal end of the setae. The other submarginal, but dorsally situated, row consists of five setae, which are longer than in the ventral row and are furnished with slender, hair-like sub-branches. The coupling-hooks are two or three in number. Epipodite triangular, distally pointed, and extending slightly beyond the distal margin of the second palp joint. Second and third joints of the palp broad, being only slightly narrower than the endite. The fourth and fifth joints of the palp are narrow.

First pair of pereiopods (Fig. 59 a). Similar in males and females. Ischial, meral and carpal joints each with one seta at their upper distal angles. Meral and carpal joints broader than long. Lower margin of carpal joint provided with five stout two-pointed setae. Propodus about half as wide as carpus, its lower margin furnished with five setae. For other detail see the figure.

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[1] Cf. Hodgson (1910, p. 53).

[2] See Hodgson (1910, Pl. IX, Fig. 2 a).

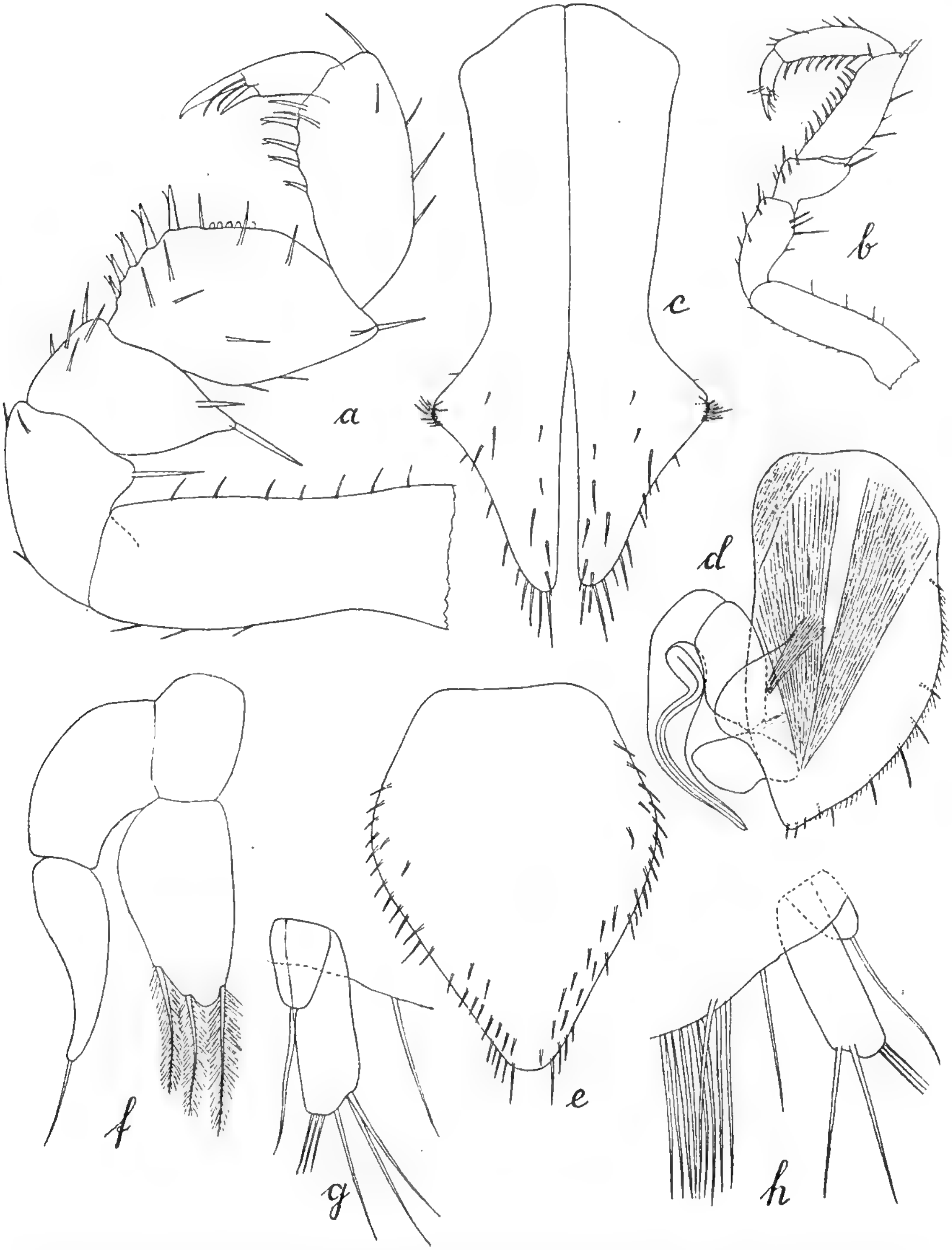

Fig. 59. *Coulmannia australis* Hodgs. a. First pereiopod, female, 80 ×. b. Second pereiopod, 30 ×. c. First male pleopods, seen from the rostral side, 80 ×. d. Right second male pleopod, seen from the caudal side, 80 ×. e. Female operculum, seen from the rostral side, 50 ×. f. Third pleopod, male, 80 ×. g. Uropod, in a dorsal view, 160 ×. h. Uropod, in a ventral view, 150 ×.

The other pereiopods (Fig. 59 b). Meral joint with one seta at its upper distal angle. Lower margin of carpus and propodus provided with a row of single-pointed setae (in the second pereiopod, Fig. 59 b, about 10). Dactylus provided with two claws.

First pair of pleopods, male (Fig. 59 c). The distal parts of the sympodites have not coalesced with one another, but their inner margins are in contact. Anterior surface of the pleopods sparsely setose distally.

Second pair of pleopods, male (Fig. 59 d). Caudal surface of the sympodite with a fold issuing from a place a short distance from the inner margin. Both the rami are attached between this fold and the inner margin of the sympodite. The two-jointed endopodite has the usual shape; its second joint is penetrated by a narrow canal, which terminates in a small proximally situated vesicle with very narrow lumen.

Operculum, female (Fig. 59 e). Laterally and distally with single-pointed setae. Two setae, situated one on either side of the tip, are the longest.

Third pair of pleopods (Fig. 59 f). Similar in males and females. Basipodite about half as long again as broad, almost rectangular. Exopodite two-jointed, with second joint slightly longer than the first. First joint strongly curved, with outer margin convex and inner margin concave. Second joint tapering towards the end, which is furnished with one long apical seta; outer margin proximally slightly convex, distally distincly concave; inner margin convex. The endopodite tapers slightly towards the end; its posterior surface is vaulted, its anterior surface hollowed, its outer margin is convex, inner margin only slightly convex, almost straight; its distal margin is provided with three long plumose setae.

Fourth pair of pleopods. Sympodite subquadrate. Exopodite two-fifths as wide as and slightly shorter than the endopodite, curved and tapering towards the pointed end; outer margin markedly convex, inner margin proximally markedly concave, distally almost straight. Endopodite of an ovate shape, having its caudal surface strongly vaulted and its rostral surface concave with the greatest depth of the cavity nearest to the lateral margin.

Fifth pair of pleopods. Basipodite small. Exopodite wanting. Endopodite oval, with outer margin markedly convex and inner margin slightly concave. Dorsal surface strongly vaulted, ventral surface concave, the deepest part of the cavity being closer to the outer than to the inner margin.

Uropods (Fig. 52 g and h). Small. Exopodite about twice as long as the endopodite, distally with two or three long and three short setae. Endopodite provided with one long distal seta. For further details see the figures.

Localities and Material.

St. 8. Graham Region, lat. 64° 3′ S, long. 56° 37′ W. Position of the station as well as depth uncertain. (360 m?). Soft clay. $^{11}/_{2}$ 1902. Male specimen 7.2 mm. in length.

St. 11. Graham Region, lat. 65° 19′ S., long. 56° 48′ W. 400 m. Clay mingled with gravel. $^{18}/_{2}$ 1902. 2 females; length of the largest specimen about 9 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 85 specimens, males and females. Length of the largest specimen, about 7.6 mm (a male).

Distribution. South Georgia (Sw. Ant. Exped.), Graham Region (Sw. Ant. Exped.), Victoria Land (HODGSON 1910).

One specimen only has previously been found, at the Coulman Island (near Victoria Land).

Genus **Paramunna** G. O. SARS, 1866.

Leptaspidia. BATE and WESTWOOD, 1868.
(?) *Metamunna.* TATTERSALL, 1906.
Austrimunna. RICHARDSON, 1906, 1908, 1913; HODGSON, 1910.
Austronanus. HODGSON, 1910; RICHARDSON, 1913.
Paramunna. STEBBING, 1893, 1910; G. O. SARS, 1899; VANHÖFFEN, 1914; BARNARD, 1920.

For diagnosis see G. O. SARS (1899, p. 111) and cf. STEBBING (1910, p. 435). As pointed out by VANHÖFFEN (1914), *Austrimunna* RICHARDSON is synonymous with *Paramunna.* This is presumably the case also with *Metamunna* TATTERSALL (see BARNARD, 1920, p. 408—409). As I cannot find any difference of importance between *Austronanus* HODGSON and *Paramunna,* I am of the opinion that *Austronanus* is congeneric with *Paramunna.* In the diagnosis of *Austronanus* HODGSON says that the pereiopods are all ambulatory and the uropods consist of a single joint. I do not, however, consider that these differences warrant the retention of the genus *Austronanus.* A comparison of the figures by HODGSON (1910, Pl. VIII, Fig. 3, *Austronanus glacialis*) and RICHARDSON (1908, Fig. 6, *Paramunna serrata*) shows such a marked similarity that it may be possible that these two species are identical.

In the material from the Swedish Antarctic Expedition 1901—1903 there are six species of *Paramunna,* of which two must be described as new, thus increasing the known species of *Paramunna* to seventeen. One of the new species, *Paramunna integra,* bears a strong resemblance to the genotype of the genus, *Paramunna bilobata* G. A. SARS, the head being, anteriorly prolonged into two diverging lobes as in that species.

Paramunna integra n. sp.

Pl. II, Fig. 22; Text figs. 60 a—e.

Diagnosis. Rostral part of the head between the antennae anterio-laterally prolonged into two subtriangular diverging lobes; anterior margin of the head between the lobes slightly concave. Hind part of the head immersed in the first pereion segment, which increases in length laterally to about twice the length in the middle. Segments of the pereion with lateral margins continuous, the first segment longest, the others subequal in length. Pleotelson tapering towards its rounded end, with lateral margins convex and serrate. Carpal joint of the first pereiopod about one-third as broad again as the propodus, its lower margin and its free distal margin each provided with a large two-pointed seta; lower margin of propodus attenuate.

Description.

Type. Male, length 1 mm.

Head (Pl. II, Fig. 22; Text fig. 60 a). Posterior part of the head immersed in the first pereion segment. Frontal part between the antennae prolonged into two subtriangular diverging lobes; rostral margin between the lobes slightly concave. Eye-peduncles broad. Eyes small, distinct and dark-coloured.

Pereion (Pl. II, Fig. 22; Text fig. 60 a). First pereion segment the longest, increasing in length laterally to about twice the length in the middle. Measured along the middle line, it is about one-third as long again as the second pereion segment. The other pereion segments are subequal in length, slightly decreasing in width from the first to the last, and have their lateral margins continuous.

Abdomen (Pl. II, Fig. 22; Text fig. 60 a). Somewhat longer than the last four pereion segments together, with a small free segment anteriorly. Pleotelson subtriangular with greatest width in front, tapering towards the rounded end. Lateral margins slightly convex, finely serrate.

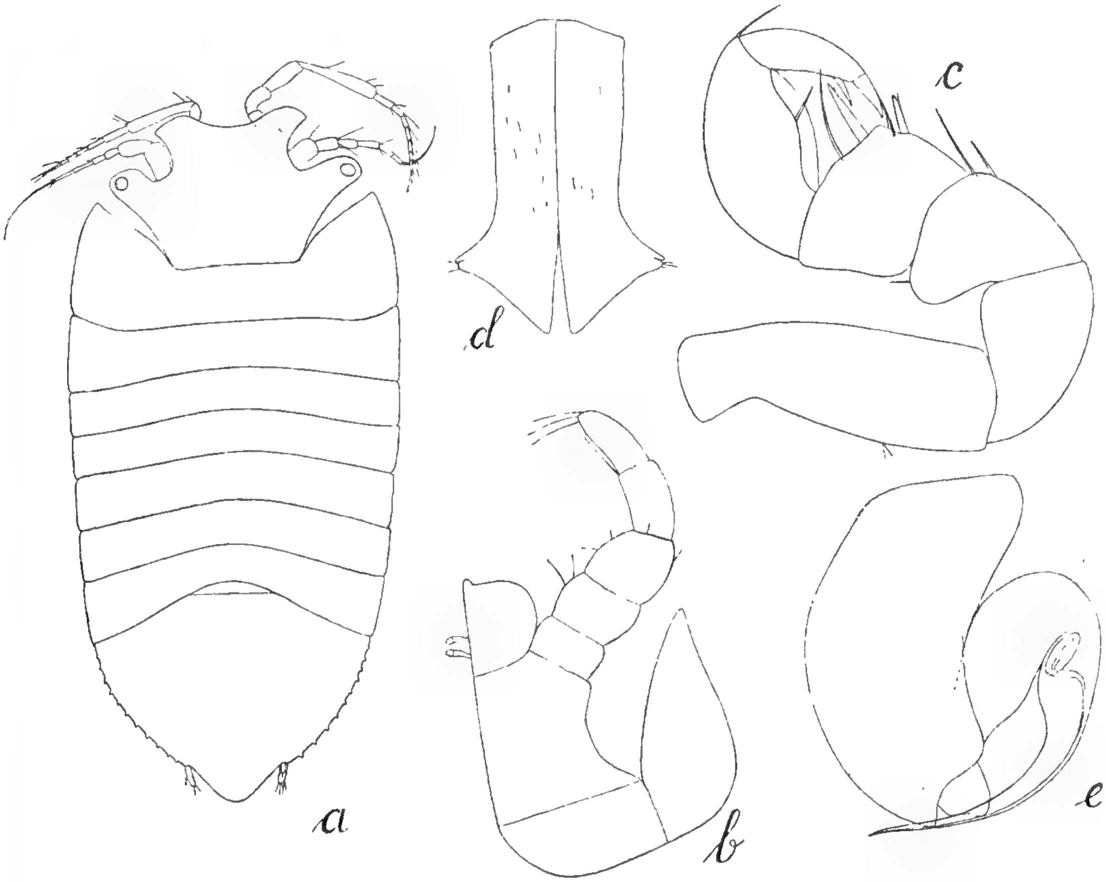

Fig. 60. *Paramunna integra* n. sp. a. A specimen, from above, 80 ×. b. Maxilliped, 315 ×. c. First pereiopod, 240 ×. d. First male pleopods, from the rostral side, 140 ×. e. Second pleopod, male, 240 ×.

Antennulae. About as in *Paramunna bilobata* G. O. SARS, with a four-jointed peduncle and a two-jointed flagellum. SARS refers only the three proximal joints to the peduncle.

Antennae. About as in *Paramunna bilobata* G. O. SARS. Peduncle consisting of six joints, flagellum of seven joints.

Mandibles. Typical of the genus, with molar tubercle strong, widening towards the distal end, somewhat forward-pointing, and with distal margin truncate. Incisive part single-pointed; lacinia (on the left mandible) with three points; setal row of four setae, on the left mandible. Palp very short consisting of three joints.

First and second pairs of maxillae. Normal.

Maxillipeds (Fig. 60 b). Normal.

First pair of pereiopods (Fig. 60 c). Carpus about one-third as broad again as the propodus, its lower margin and its free distal margin each provided with a large two-pointed seta. Propodus with the lower margin attenuate. For other details, see the figure.

The other pereiopods. Normal.

First pair of pleopods, male (Fig. 60 d). Typical of the genus. Anterior surface with short scattered setae.

Second pair of pleopods, male (Fig. 60 e). Exopodite linguiform with distal margin somewhat concave.

Uropods (Fig. 60 a). Very small, two-branched, the endopodite being about half as long as the exopodite.

Remarks. The species is closely allied to *Paramunna bilobata* G. O. SARS, but it differs especially in having the front margin between the frontal lobes of the head less concave, in having the lateral margins of the pereion segments continuous, and in having the pleotelson more tapering towards the end. The first pereiopods are similar to those in *Paramunna bilobata* G. O. SARS. The female is unknown.

Localities and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 122 m. Sand. $^{3}/_{9}$ 1902. Two specimens, males, about 1 mm. in length.

St. 59. South of West Falkland, on the Burdwood Bank, lat. 53° 45′ S., long. 61° 10′ W. 137—150 m. Broken shells with stones. $^{12}/_{9}$ 1902. One specimen (Pl. II Fig. 22).

Distribution. Falkland Islands (Sw. Ant. Exped.), Burdwood Bank (Sw. Ant. Exped.).

Paramunna antarctica (RICHARDSON, 1906).

Text figs. 61 a—b.

Austrimunna antarctica. RICHARDSON, 1906, p. 20—21, Pl. I. Fig. 7, Text figs. 24—26; 1908 p. 5; 1913 p. 20—21.

Supplementary Description.

Antennulae. Consisting of six joints, of which the first two are large and subequal in length, the first being the broadest. The third and fourth joints are, as usual in the genus, short; together they are about as long as the second joint; the fourth joint is shorter than the third. The flagellum consists of two fairly equal long joints, each very slightly longer than the last peduncular joint. The last joint of the flagellum is furnished with one sensory filament and a few setae.

Antennae. Of the usual type in the genus. The flagellum in a full-grown female specimen, 2 mm. long, consists of seven joints.

First pair of pereiopods (Fig. 61 a)[1]. The carpus widens considerably towards its distal end; close to its lower margin it has three stout two-pointed submarginal setae (the right pereiopod of a full-grown specimen from the Swedish Antarctic Expedition was without the proximal seta). The broadly oval propodus is about equal in length

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[1] The fig. shows the left pereiopod of a full-grown female collected by the Expédition Antarctique Française (1903—1905); some material from the French Expedition was kindly sent to me from the Muséum d'Histoire Naturelle in Paris. The first pereiopod from the full-grown female specimen obtained by the Swedish Antarctic Expedition (1901—1903) agrees well with my figure.

to the carpus. Its lower portion is not attenuate; near the lower margin there are a few setae.

Operculum, female (Fig. 61 b). Prolonged into a long subtriangular tip fitting into the distal part of the pleotelson. The distal margin of the tip of the operculum is narrowly rounded.

Uropods. Small, consisting of two joints, of which the endopodite is extremely small and difficult to detect, being only one-fourth to one-fifth as long as the exopodite.

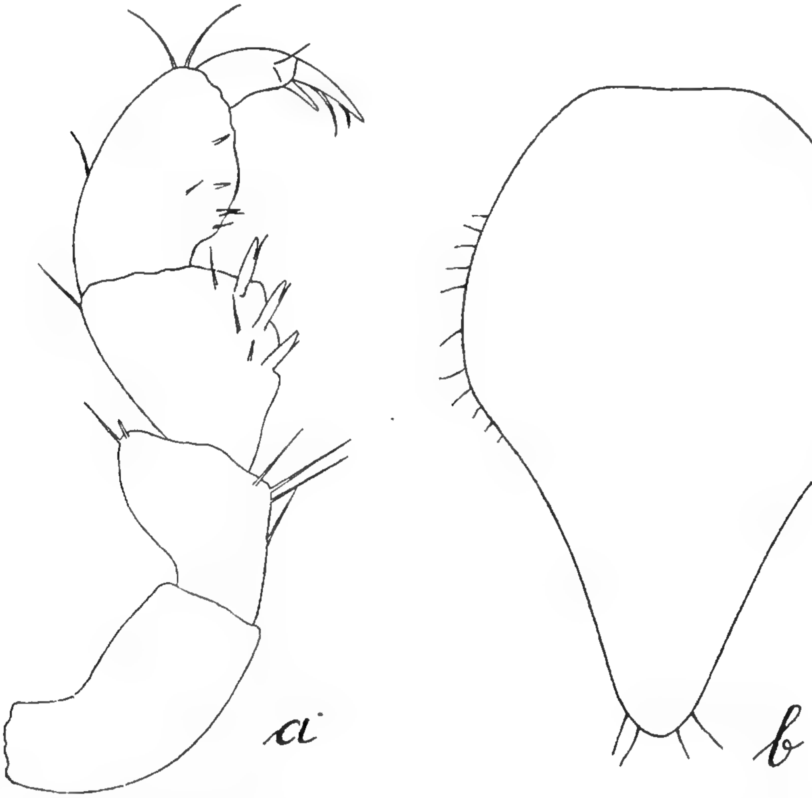

Fig. 61. *Paramunna antarctica* (Rich.). a. Left first pereiopod from the rostral side, (adult female from the Museum of Paris), 215 ×. b. Operculum, female, 180 ×.

Remarks. A full-grown female with empty marsupium was found by the Swedish Antarctic Expedition. It agrees with the description and figures of the species by Richardson (1906), except that the tip of pleotelson is furnished with some setae. A small male specimen, 1 mm. in length, which was collected together with the female specimen, is probably also *Paramunna antarctica.* It differs slightly from the female specimen in having three minute denticulae on each side of the pleotelson in front of the uropods and in having the tip of pleotelson somewhat shorter, the distal margin of pleotelson being almost truncate; the shape of pleotelson almost agrees with Richardson's text figure of *Paramunna antarctica* (Richardson 1906, Fig. 25). In shape as well as in the structure of its antennulae, antennae and first pleopods the specimen agrees with *Paramunna antarctica.* Both its first pereiopods are broken.

Localities and Material.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 12—15 m. Sand and algae. $^{24}/_{5}$ 1902. Female with an empty marsupium, length about 2 mm. Immature male specimen, about 1 mm. in length, probably belonging to *Paramunna antarctica.*

Distribution. South Georgia (Sw. Ant. Exped.), Graham Region (RICHARDSON 1906, 1908, 1913).

Not previously recorded from South Georgia.

Paramunna serrata (RICHARDSON, 1908).

Text fig. 62.

Austrimunna serrata. RICHARDSON, 1908, p. 5—6, Figs. 6—7.
(?) *Austronanus glacialis.* HODGSON, 1910, p. 50—51, Pl. VIII, Fig. 3.
Austronanus serrata. RICHARDSON, 1913, p. 19.

Supplementary Description.

General shape of body. As figured by RICHARDSON (1908, Fig. 6).

Head, pereion, abdomen. Frontal part of the head decreasing in width anteriorly, front margin evenly convex. Eyes small of reddish-brown colour. First four pereion segments subequal in length and width. There is no distinct waist between the first four and the last three pereion segments; the latter are shorter, however, than the anterior segments and curved backwards. Abdomen somewhat broader than it is long, anteriorly with a small free segment.

Antennulae. About three times as long as the eyepeduncles. First joint large, about as long as the narrower second joint; third and fourth joints small, of about equal length. The flagellum is comparatively long, about as long as the second, third and fourth peduncular joints together, and consists of two joints, of which the last is the longest. The proportion between the lengths of joints in the antennula is 10: 9: 3.5: 3.5: 6: 10.

Antennae. Broken (in both specimens).

First pair of pereiopods (Fig. 62). Carpal joint widening towards the distal end, slightly longer than broad, its lower margin provided with two large two-pointed setae. Lower margin of carpus furnished with some small teeth. The propodus is almost as wide as the carpus, but slightly shorter. Its lower margin is thin and is furnished with at least one long slender seta.

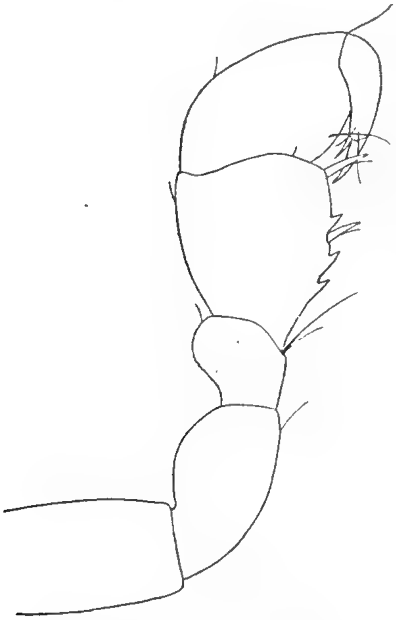

Fig. 62. *Paramunna serrata* (RICH.). Right first pereiopod, female, 270 ×.

First pair of pleopods, male. Extended laterally into long triangular lobes, as shown by RICHARDSON (1908, Fig. 7).

Operculum, female. About as long as it is broad. Lateral margins convex. It is broadest across the middle and thence tapers towards the distal end. Distal margin broadly rounded.

Uropods. Small, two-branched. The minute endopodite is difficult to detect and only about one-third as long as the exopodite.

Remarks. My specimens differ from *Paramunna serrata* as described by RICHARDSON (1908) only in having somewhat longer antennulae. It is possible that *Paramunna glacialis* (HODGSON, 1910) (= *Austronanus glacialis* HODGSON) is identical with *Paramunna serrata* (RICHARDSON). It differs from *Paramunna serrata* in having the head slightly longer, with frontal margin markedly convex, and in having a sligthly longer pleotelson. The antennae, which are characteristic in *Paramunna glacialis* (HODGSON), have not been described in *Paramunna serrata* (RICHARDSON). The species of *Paramunna* described by STEPHENSEN (1927) as *Paramunna* (*serrata* (RICHARDSON)?) differs in having the carpus of the first pereiopod broader than it is long. Possibly it is identical with *Paramunna dentata* n. sp. (see p. 241).

Localities and Material.

St. 46. Falkland Islands, Port Louis, Carenage Creek, lat. 51° 32′ S., long. 58° 7′ W. 1 m. Sandy bottom with plenty of *Codium*. 9/8 1902. Male specimen, about 1 mm. in length.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. 3/9 1902. Female, about 1 mm. in length.

Distribution. Falkland Islands (Sw. Ant. Exped.). Graham Region (RICHARDSON 1908, 1913), (?) Victoria Land (HODGSON 1910).

Not previously recorded from the Falkland Islands.

Paramunna subtriangulata (RICHARDSON, 1908).

Text figs. 63 a—d.

Austrimunna subtriangulata. RICHARDSON, 1908, p. 7, Fig. 8.
Paramunna subtriangulata. MONOD, 1926, p. 16, Figs. 7 A, B, C.

Supplementary Description.

General shape of body[1] (Fig. 63 a). Oblong-ovate, about twice as long as it is broad, broader in the ovigerous female than in the male.

Head. The frontal part is produced into one anterior rounded lobe in the middle and two lateral rounded lobes, neither being very distinct. Posterior part of the head immersed in the first segment of the pereion.

Pereion. Lateral margins of the pereion segments almost continuous. Last three segments short.

In the male the first five segments are subequal in width. The first segment is the longest, being in the adult male about as long as the second and third segments together; in immature males it is shorter, being, in a male specimen 1.3 mm. in length about half as long again as the second segment.

In the ovigerous female (Fig. 63 a) the first segment is the shortest of the anterior four segments, but it widens out laterally to more than twice its length in the middle. The third segment is slightly longer than the second and fourth, which are subequal in length. The greatest width of the body is across the third pereion segment.

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[1] Cf. RICHARDSON (1908, Fig. 8) and MONOD (1926, Fig. 7 A).

Abdomen. About as long as the last four pereion segments together plus half the third segment; anteriorly with a free segment. Pleotelson subtriangular, tapering towards the rounded end.

Antennulae. Short and broad, a little longer than the eye-peduncles. First and second joints large, subequal in length and width and together slightly longer than the remaining part of the antennula. The last four joints, of which the last two belong to the flagellum, decrease slightly in size from the first to the last.

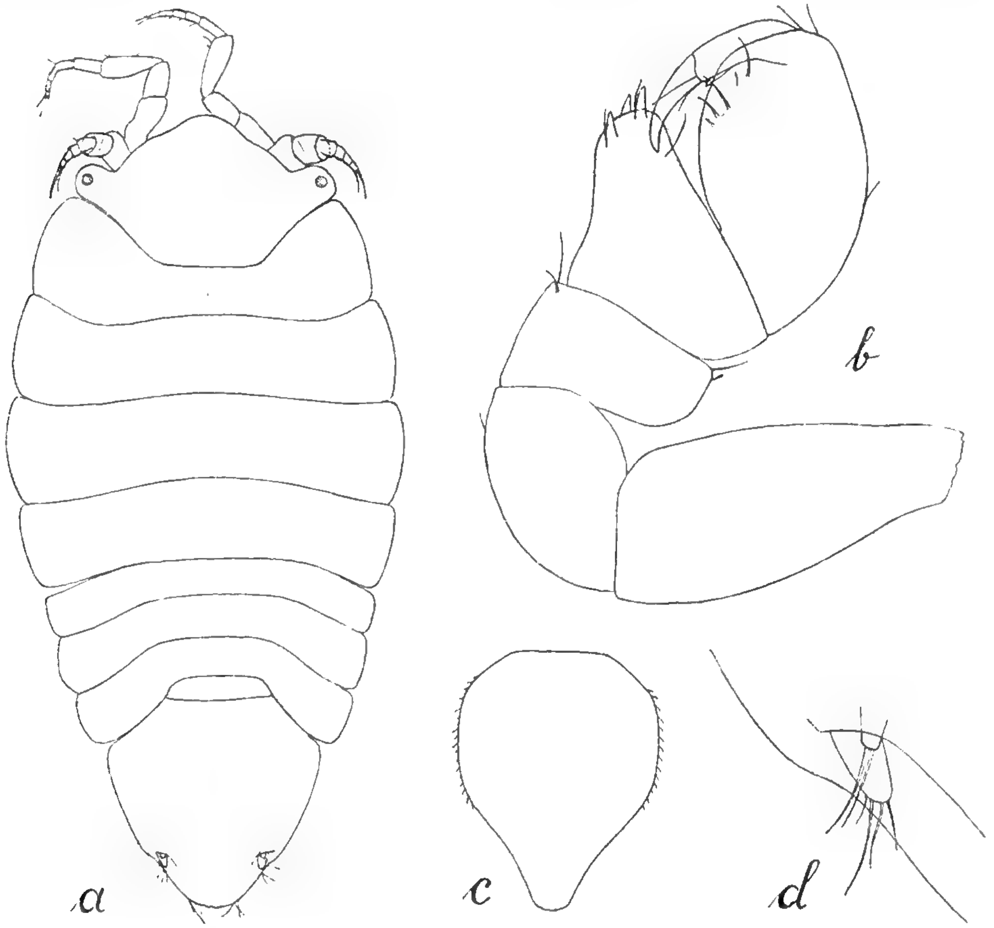

Fig. 63. *Paramunna subtriangulata* (Rich.). a. Female, from above, 65 ×. b. Left first pereiopod, female, 235 ×. c. Female operculum, 65 ×. d. Uropod, 315 ×.

Antennae. Of the usual type in the genus. The flagellum consists usually of five joints in adult specimens.

First pair of pereiopods (Fig. 63 b). Exactly similar in males and females and very characteristic. They are broad and strong. The merus is approximately twice as broad as it is long. The carpus is very broad and increases considerably in width towards its distal end; its lower distal angle is broadly rounded; at the lower margin near the lower distal angle there are generally two, sometimes three submarginal two-pointed setae. The propodus is broadly oval; its lower margin is provided with some slender submarginal setae. Dactylus furnished with one long and one short claw.

First pair of pleopods, male. Typical of the genus.

Operculum, female (Fig. 63 c). About cordate; distal margin broadly rounded.[1]

Uropods (Fig. 63 d)[2]. Very short. Exopodite about twice as large as the endopodite.

Localities and Material.

South Georgia, Cumberland Bay, May Bay. — Haul among algae in and below the tidal zone. ${}^{6}/_{5}$ 1902. 2 females. Length of largest specimen 1.8 mm. — Haul among algae above a stony bottom. 1—2 m. ${}^{9}/_{5}$ 1902. 2 specimens, male and female. Length of largest specimen 1.6 mm. (ovigerous female). — In a rock-hollow within the tidal zone. Shaken out from a colony of Bryozoa. ${}^{8}/_{5}$ 1902. Immature male specimen 1 mm. in length.

Distribution. Magellan Straits (MONOD 1926), South Georgia (Sw. Ant. Exped.), Graham Region (RICHARDSON 1908).

Not previously recorded from South Georgia.

Paramunna rostrata (HODGSON, 1910).

Text figs. 64 a—c.

Austremunna rostrata. HODGSON, 1910, p. 61—63, Pl. X, Fig. 3.
Austrimunna rostrata. RICHARDSON, 1913, p. 21.
Paramunna rostrata. VANHÖFFEN, 1914, p. 572—573, Fig. 102; MONOD, 1926, p. 16—17, Fig. 8.
(?) *Paramunna dilatata.* VANHÖFFEN, 1914, p. 573, Fig. 103.

Supplementary Description.

General shape of body (Fig. 64 a). In the figured specimen, a female 1.4 mm. in length, the pleotelson was slightly longer than broad, agreeing in that respect with *Paramunna dilatata* VANHÖFFEN. In a small 1 mm. long female specimen the pleotelson was broader, being about as wide as it is was long.

Antennulae. About one-third as long again as the eye-peduncles; peduncle consisting of four joints, flagellum of two joints.

Antennae. The third peduncular joint is the broadest. In two specimens 1.4 and 1 mm. in length the flagellum consisted of seven joints.

Right mandible. Molar tubercle considerably widening towards the truncate end. Palp short, three-jointed.

First pair of pereiopods (Fig. 64 b and c). Carpal joint oval, almost twice as long as it is broad, with greatest width across the middle; the lower margin of the joint is provided with two stout two-pointed setae. Propodus about three-fourths as long as the carpus; its lower part is not attenuate; the lower margin is provided with some slender setae. Dactylus furnished with one long and one short claw. For other details see the figures.

Operculum, female. Somewhat longer than broad; distal margin narrowly rounded.

Uropods. Consisting of two small joints. The endopodite is very minute, being about one-fourth as long as the exopodite.

Remarks. The two specimens examined by me differ from *Paramunna rostrata* as described and figured by HODGSON (1910), VANHÖFFEN (1914), and MONOD (1926) in having

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[1] Cf. MONOD, 1926, Fig. 7 B.
[2] Cf. MONOD, 1926, Fig. 7 C.

a slightly longer pleotelson, agreeing in this respect with *Paramunna dilatata* VANHÖFFEN (1914). As mentioned above the pleotelson was slightly longer than broad in a specimen 1.4 mm. in length, whereas in another 1 mm. long specimen it was about as wide as it was long. On comparing the available figures of *P. rostrata* it appears that there exists a considerable variation within this species in the shape of the pleotelson as well as in the shape of the rostrum[1]. In view of the variation in the shape of the pleotelson, it seems very probable that *P. dilatata* is identical with *P. rostrata*. *P. dilatata* was established as a species differing from *P. rostrata* by VANHÖFFEN (1914) on account of the slightly different shape of the pleotelson and the greater width of the last three pereion segments. The unusual shape of the last three pereion segments in the species of VANHÖFFEN may perhaps be explained by his specimens being in a moulting condition, the shedding of the chitin having been accomplished on the posterior part of the body but not yet anteriorly.

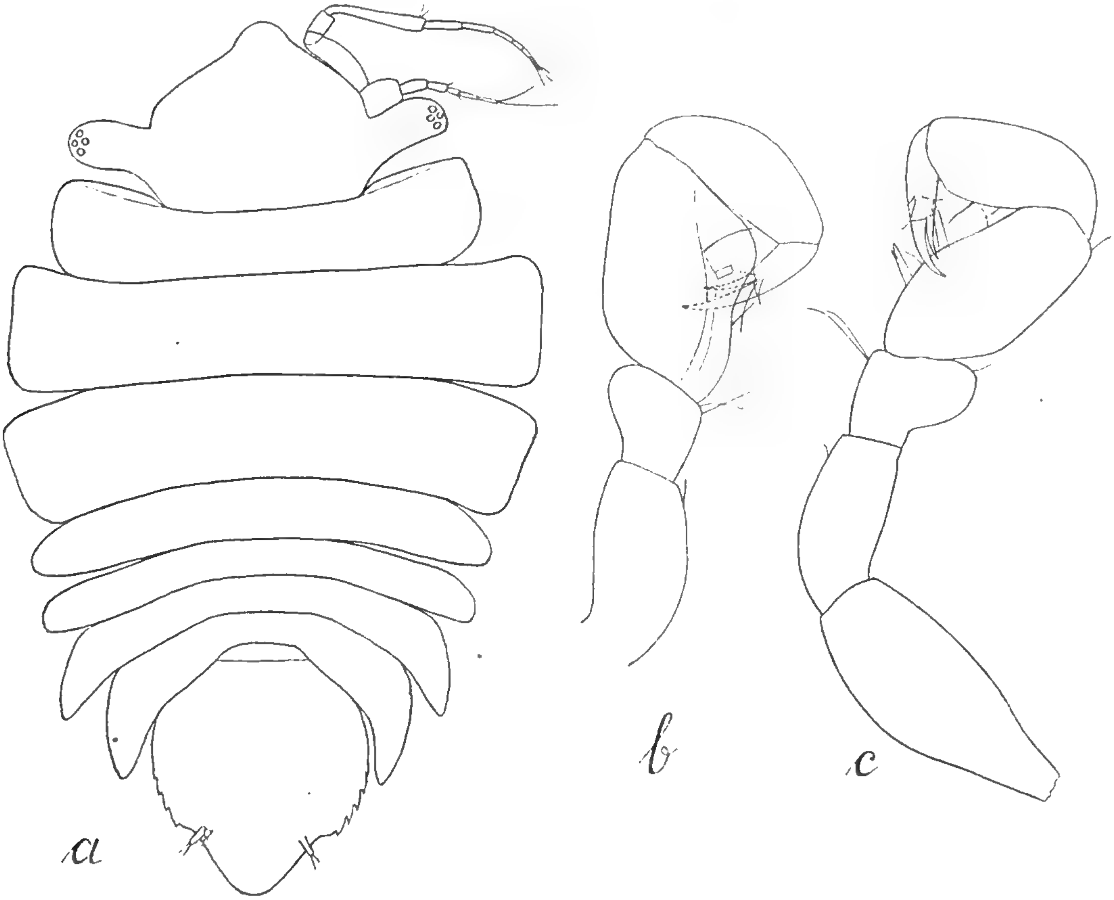

Fig. 64. *Paramunna rostrata* (HODGS.). a. Female from above, 80 ×. b. Right first pereiopod, immature female, 315 ×. c. First pereiopod, adult female, 240 ×.

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[1] The great variation in the shape of the rostrum was pointed out by VANHÖFFEN (1914).

Localities and Material.

St. 23. South Georgia, off the mouth of Morain Bay, lat. 54° 23′ S., long. 36° 26′ W. 64—74 m. Bottom temp. + 1.65°. Gray clay with gravel and stones. $^{16}/_{5}$ 1902. 2 female specimens, one exhibiting an empty marsupium 1.4 mm. in length and one without marsupium 1 mm. in length.

Distribution. South Georgia (Sw. Ant. Exped.), Kerguelen (VANHÖFFEN 1914), Graham Region (RICHARDSON 1913), Antarctic Ocean west of Graham Region (MONOD 1926), Victoria Land (HODGSON 1910).

Not previously recorded from South Georgia.

Paramunna dentata n. sp.

Text figs. 65 a—i.

Diagnosis. Frontal part of the head subtriangular, obtusely pointed anteriorly. Eye-peduncles short, with small eyes of reddish-brown colour. Pleotelson almost semicircular, its lateral margins denticulated, its distal tip between the uropods with broadly rounded margin. Antennulae about twice the length of the eye-peduncles, consisting of a four-jointed peduncle and a single-jointed flagellum. First pereiopod with a very broad carpus, being distally about one-third as broad again as it is long, its lower margin furnished with two conspicuous setae and a few teeth. Female operculum slightly longer than broad, with distal end broadly rounded.

Description.

Types. Male and female, length about 1 mm.

Head. (Fig. 65 a). About as long as the first three pereion segments together. Frontal part subtriangular, obtusely pointed anteriorly. Eye-peduncles short and broad. Eyes small, reddish brown. Posterior part of the head immersed in the first pereion segment.

Pereion (Fig. 65 a). Segments in the female with their lateral margins continuous and the first four segments subequal in length and width. In the male, only the last three segments have their lateral margins continuous and the first segment is the longest. The last three pereion segments are shorter than the others in both sexes and decrease slightly in width from the fifth to the seventh segment.

Abdomen (Fig. 65 a). About as long as the last four pereion segments together, anteriorly with a small free segment. Pleotelson somewhat broader than long, its lateral and posterior margins forming almost a semi-circle, interrupted only by the indentations for the uropods. Lateral margins denticulated with about eight teeth on each side, the number somewhat varying.

Antennulae. About twice as long as the eye-peduncles Consisting of five joints. First joint stout, second joint about as long as the first, but narrower. Third and fourth joints small, about as long as they are broad, subequal in length and together about as long as the second joint. The flagellum consists of one joint, which is about as long as the third and fourth joints together, and is furnished apically with one sensory filament and one seta.

Antennae (Fig. 65 b). Peduncle consisting of six joints, flagellum of seven.

Mandibles (Fig. 65 c). Normal. Incisive part with five points. Setal row with four or five setae. Palp short, consisting of three joints, of which the first two are subequal in length and the third about two-thirds as long as the second.

First pair of maxillae. Inner lobe decreasing in width towards the distal rounded end, which is provided with one conspicuous and three slender, hair-like setae.

Lower lip See Fig. 65 d.

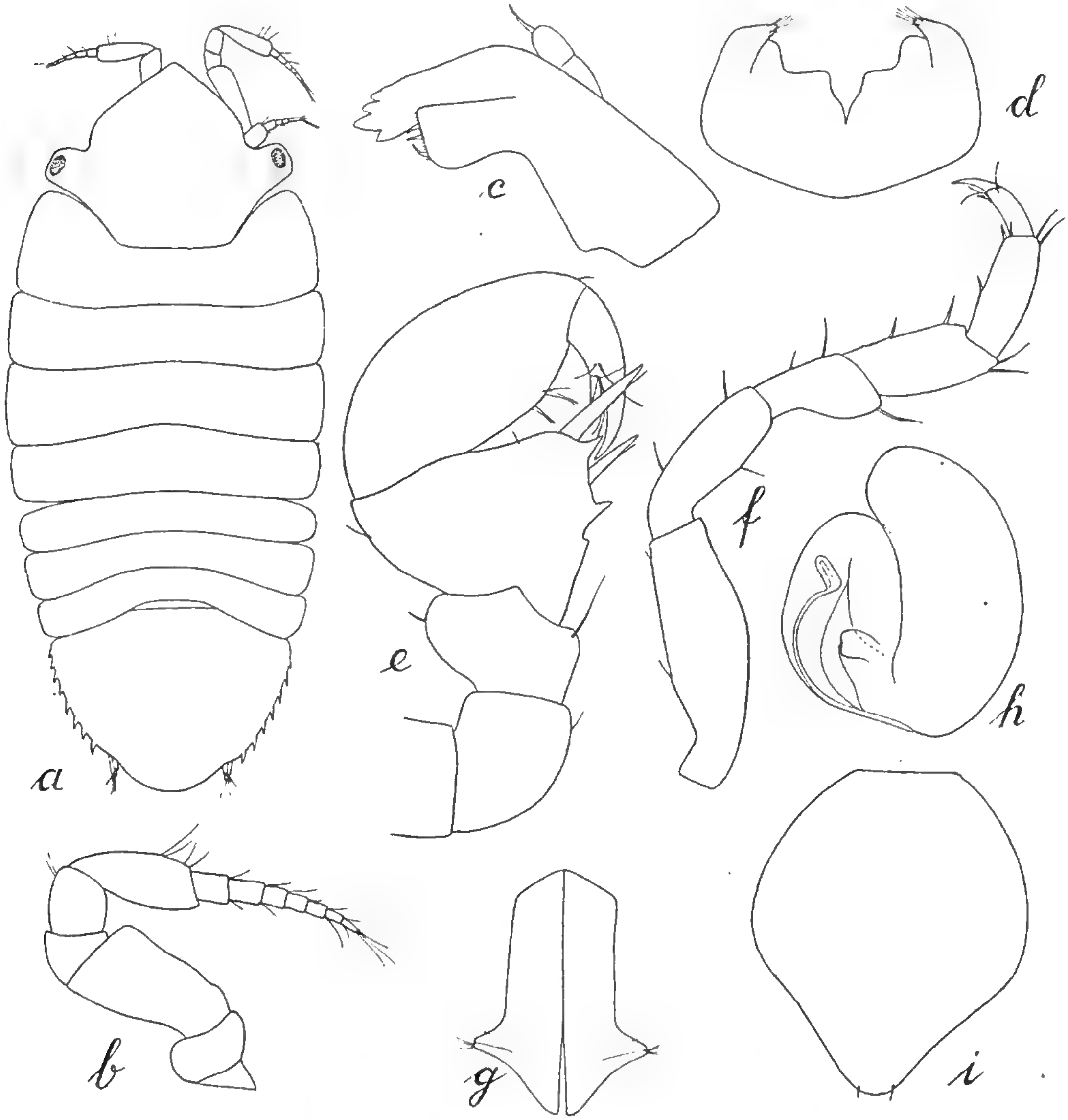

Fig. 65. *Paramunna dentata* n. sp. a. A specimen from above, 80 ×. b. Left antenna, female, 240 ×. c. Mandible, 315 ×. d. Lower lip, 235 ×. e. First pereiopod, (except the larger part of the basipodite), female, 240 ×. f. Second pereiopod, female, 235 ×. g. First pleopods, male, 140 ×. h. Second male pleopod, 240 ×. i. Female operculum, 140 ×.

Maxillipeds. Typical of the genus.

First pair of pereiopods (Fig. 65 e). Characterized by its very broad carpus, which increases in width towards the distal end, where it is about one-third as broad again as it is long. Its lower margin is furnished with two long and stout two-pointed setae and some teeth-like projections; one of the setae is situated at the lower distal angle. The propodus is about as long as the meral and carpal joints together. Its lower margin is furnished with two small two-pointed setae, situated near each other.

The other pereiopods. All similar. The second pereiopod is shown in fig. 65 f. Dactylus provided with one long and one short claw.

First and second pairs of pleopods, male. See Figs. 65 g and h.

Operculum, female (Fig. 65 i). Slightly longer than broad, distal margin rounded.

Uropods. Very short; the exopodite is about twice as long as the endopodite.

Remarks. In its general shape, *Paramunna dentata* shows some resemblance to *Paramunna subtriangulata* (RICHARDSON), but it differs in having the lateral margins of the pleotelson denticulated and in its first pereiopods, which are very characteristic. The first pereiopods agree with those in the species of *Paramunna* from the Auckland Islands named *Paramunna* (*serrata* [RICHARDSON]?) by STEPHENSEN (1928), but *P. dentata* differs from that species in other details, especially in the triangularly prolonged frontal part of the head.

Localities and Material.

St. 51. Falkland Islands. Port William, lat. 51° 40′ S., long. 57 °42′ W. 22 m. Sand. 3/9 1902. 8 specimens, males and females. Length of the largest specimens about 1 mm.

Distribution. Falkland Islands (Sw. Ant. Exped.).

Genus **Austrosignum** HOGDSON, 1910.

Diagnosis. Body oblong with a distinct »waist» between the first four and the last three pereion segments. Eyes small on slender eye-peduncles. Pleotelson slightly bulbous, distally pointed. Coxae visible from above on the last three pereion segments. Antennulae with the first two peduncular joints subequal in length to, or longer than, the remaining part. Mandibles with a strong subcylindrical molar tubercle widening towards the end; mandibular palp short, three-jointed. Maxillipeds with first, second and third joints of the palp wider than the last two joints, being about two-thirds as wide as the endite. First pair of pereiopods prehensile. Uropods minute consisting of two branches.

The genus comes close to *Paramunna* G. O. SARS, but differs in having a distinct »waist» between the fourth and fifth pereion segments, in having the pleotelson pointed and to a slight degree bulbous, and in having the coxae visible from above on the last three pereion segments.

Austrosignum glaciale HOGDSON, 1910.

Text figs. 66 a—c.

Austrosignum glaciale. HODGSON, 1910, p. 68—69 Pl. X, Fig. 2; VANHÖFFEN[1], 1914, p. 578, Figs. 109 a—f; MONOD 1931, p. 12 Figs. 2 a, 2 b, 9 a.

Supplementary Description.

General shape of body. As figured by MONOD (1931, Figs. 2 a and b), the female has a more oval shape of body than the male. The body is in both sexes, however, propor-

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[1] MONOD (1931) doubts whether the specimens referred by VANHÖFFEN (1914) to *Austrosignum glaciale* are correctly determined.

tionately longer and narrower than figured by MONOD (1931). The angles between the anterior margin of the eye-peduncles and the head are not so sharp as figured by HODGSON, in that respect agreeing with the figures by MONOD (1931).

Pereion. The first pereion segment in the male is about as long as the second and half the third segment together; in the female the first four pereion segments are subequal in length in one specimen, in another specimen the second and third are the largest.

Abdomen. The pleotelson in the male is broader than in the female. The indentations for the uropods are more marked in the female than in the male.

Antennulae[1]. First two joints stout and long, together slightly longer than the remaining part of the antennula. The third and fourth peduncular joints are small, but the third is about twice as long as the fourth. The flagellum consists of two slender joints, the last of which is furnished with a long sensory filament and a few setae.

Antennae. Short. Peduncle composed of six joints; first and second joints very short, subequal in length; third joint somewhat longer than first and second together; fourth joint about half as long again as the first; the fifth joint is somewhat longer than the third; and the sixth joint, which is the longest, is about as long as the fourth and fifth together. The flagellum is about as long as the sixth and half the fifth peduncular joints together, and consists in one specimen, 1.1 mm. long, of six joints, of which the first two joints are very long, each twice as long as the third joint and together longer than the four other small joints in the flagellum.

Mandibles (Fig. 66 a). Incisive part with five teeth. Lacinia (on the left mandible) three-dentated, situated very close to the incisive part. Setal row consisting of about four setae. Molar tubercle strong, subcylindrical, widening towards the end and directed somewhat forwards, distally abruptly cut off and provided with a row of marginal teeth. Palp very short, about half as long as the mandible corpus. It consists of three joints the first two of which are subequal in length; the last joint is about half as long as the second.

First and second pairs of maxillae. Of the usual type. Inner lobe of the first pair tapering towards the end and provided with three apical setae.

Maxillipeds. Slightly different from the figure by VANHÖFFEN (1914)[2], inasmuch as the epipodite is broader, being about half as broad again as the third joint of the palp; its lateral margin is strongly convex, its distal end narrowly rounded. The first second and third joints of the palp are subequal in width; the second joint widens out distally, whilst the third decreases slightly in width towards its distal end. The fourth and fifth joints of the palp — as figured by VANHÖFFEN (1914) — are much narrower than the others. Endite with two coupling-hooks.

First pair of pereiopods[3]. Similar in the male and the female. Carpus and propodus subequal in length; carpus with two large two-pointed and a few slender single-pointed setae as well as with some small tooth-like projections on its lower margin; propodus with two double-pointed setae and one slender single-pointed seta on its lower margin. Dactylus provided with one long and one short claw.

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[1] Cf. VANHÖFFEN, 1914, Fig. 109 a.

[2] VANHÖFFEN, 1914, Fig. 109 f.

[3] Cf. VANHÖFFEN (1914, Fig. 109 b) and MONOD (1931 Fig. 9 a).

The other pereiopods (Fig. 66 b). Not prehensile, all with a short dactylus, furnished with one long dorsal claw about as long as the dactylus and one extremely short ventral claw.

First pair of pleopods, male. Shape as illustrated by VANHÖFFEN 1914 in his Fig. 109 c.

Operculum, female (Fig. 66 c). Subtriangularly produced distally and with a narrowly rounded end.

Uropods. Consisting of two small joints. The exopodite is about two and a half times as long as the very small endopodite.

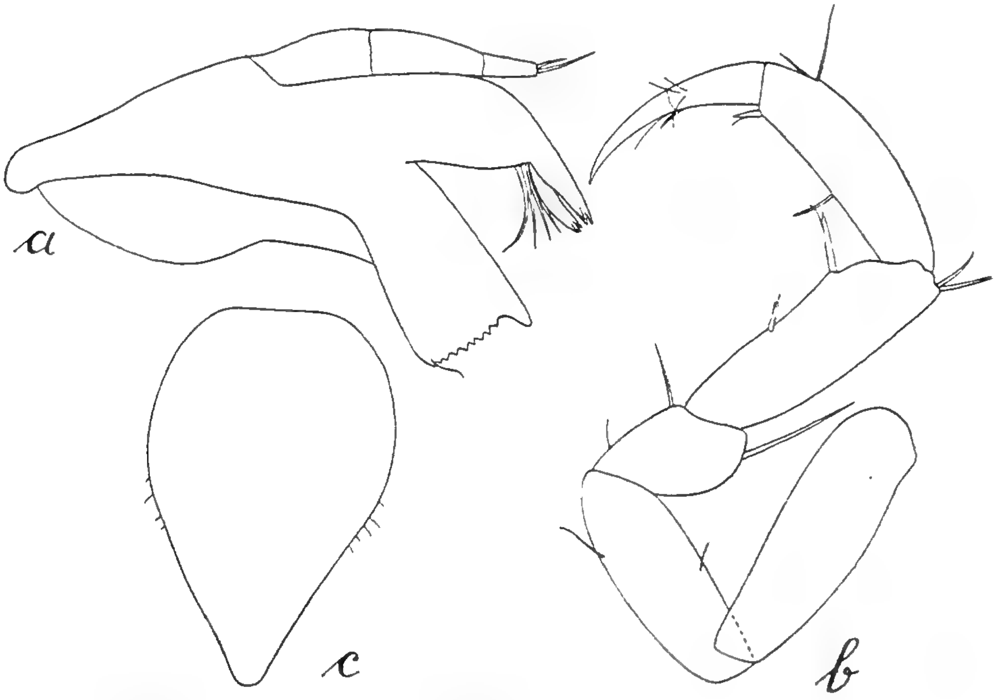

Fig. 66. *Austrosignum glaciale* HODGS. a. Left mandible, male, 350 ×. b. Right second pereiopod, immature female, 225 ×. c. Female operculum 180 ×.

Remarks. The species is very similar to, perhaps identical with *Austrosignum grande* HODGSON, differing from that species only in having the head not so deeply immersed in the first pereion segment and in having the first pereion segment shorter. In the male of *Austrosignum glaciale*, however, this segment attains almost the same length as in *Austrosignum grande.*

Localities and Material.

St. 28. South Georgia, mouth of Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 12—15 m. Sand and algae. 24/5 1902. 3 specimens, one male and two females. Length of the largest specimen, a female, about 1.7 mm.

Distribution. South Georgia (MONOD 1931), Victoria Land (HODGSON 1910), Gauss station (VANHÖFFEN 1914).

Austrosignum falklandikum n. sp.

Text figs. 67 a—d.

Diagnosis. Body about three times as long as broad. Head not immersed in the first pereion segment, of an almost semi-circular shape. Eye-peduncles very short reaching only to about one-third the length of the first peduncular joint of the antennulae. First pereiopod with carpus slightly shorter than propodus and increasing in width in distal direction. All pereiopods with the dorsal claw longer than the dactylus; on the second, sixth and seventh about twice as long as the dectylus.

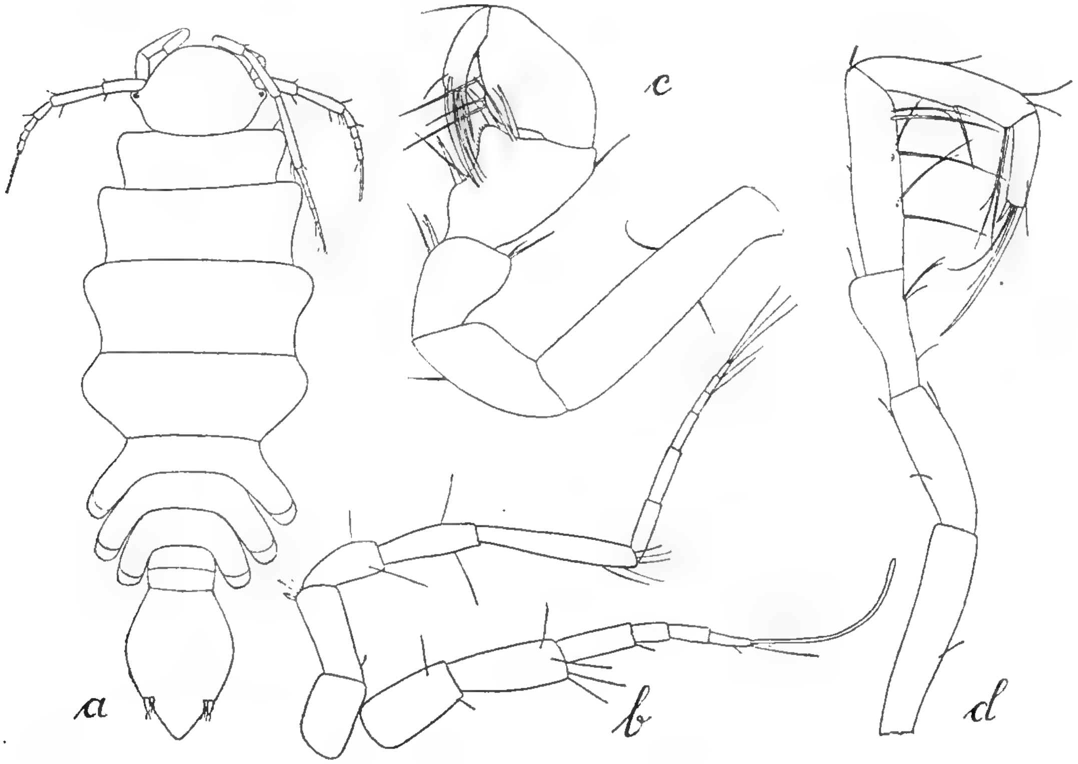

Fig. 67. *Austrosignum falklandicum* n. sp. a. Female, from above, 45 ×. b. Antennula and antenna, 185 ×. c. First pereiopod, female, 185 ×. d. Second pereiopod, female, 160 ×.

Description.

Types. Male about 1.6 mm. in length, and female (Fig. 67 a) about 1.9 mm. in length.

General shape of body (Fig. 67 a). Oblong, about three times as long as it is broad.

Head (Fig. 67 a). Not immersed in the first pereion segment, small, almost circular, with anterior margin convex. The length of the head is subequal to the length of the first plus half the second pereion segment. Eye-peduncles very short, reaching only to about one-third the length of the first peduncular joint of the antennulae. Eyes small of reddish-brown colour.

Pereion (Fig. 67 a). The figure illustrates a female specimen. It will be seen from the figure that the first segment is the shortest and narrowest of the anterior four segments. The second, third and fourth segments are subequal in length and width, the third being slightly longer than the others.

Between the fourth and fifth segments there is a distinct »waist». The last three segments are strongly curved backwards.

The pereion of the male differs from that in the female in having the first segment shorter and wider. In the male this segment is only about half as long as, but subequal in width to, the second segment.

Abdomen. Anteriorly with two free segments. Pleotelson similar in shape to that in *Austrosignum glaciale,* with greatest width across the middle and distally pointed. In the male the pleotelson is very slightly broader than in the female.

Antennulae. See Fig. 67 b. Six-jointed. About one-third shorter than the antennae. First two joints stout and long, the second slightly longer. Together they are slightly longer than the remaining part of the antennula. Second and third joints small, the second about twice as long as the third. Last joint furnished with a long apical sensory filament.

Antennae. See Fig. 67 b. About as in *Austrosignum glaciale.* The flagellum consists of six joints.

Mandibles. Mandibles with molar tubercle widening considerably towards the truncate end. Palp short, three-jointed.

Maxillipeds. As in *Austrosignum glaciale,* but differing in having the distal margin of the epipodite broadly rounded. Endite with a single coupling-hook.

First pair of pereiopods (Fig. 67 c). Carpus and propodus broader than in *Austrosignum glaciale.* Carpus increasing in width towards the distal end. There is one strong two-pointed seta at the lower distal angle of the carpus, one on the lower margin, and one on the distal edge of the carpus. Propodus broad; its lower margin provided with three long single-pointed setae, situated near each other. Dactylus furnished with two claws and with two setae between the claws; the dorsal claw is longer than the joint itself. For details see the figure.

The other pereiopods (Fig. 67 d). The third to fifth pairs are broken. On the second, sixth and seventh pereiopod the lower margins of the carpus and propodus provided with long single-pointed setae, most of them on the carpus. The dorsal claw is very long, about twice as long as the dactylus. For details see the figure.

First pair of male pleopods and female operculum. About as in *Austrosignum glaciale.*

Uropods. Exopodite about three times as long as the endopodite, tapering towards the setiferous end. Endopodite with two apical setae.

Remarks. The new species somewhat resembles *Austrosignum glaciale* HODGSON, but is easily distinguished, especially by its much shorter eye-peduncles, its longer body and the longer dorsal claw on the pereiopods.

Localities and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^{3}/_{9}$ 1902. Female specimen, (type), about 1.9 mm. in length.

St. 59. South of West Falkland, on the Burdwood Bank, lat. 53° 45′ S., long. 61° 10′ W. 137—150 m. Broken shells with stones. $^{12}/_{9}$ 1902. Male specimen, (type), about 1.6 mm. in length.

Distribution. Falkland Islands (Sw. Ant. Exped.), Burdwood Bank (Sw. Ant. Exped.).

Sub-group **Pleurogoniini,** new sub-group.

For diagnosis see p. 199.

Genus **Pleurosignum** VANHÖFFEN, 1914.

Diagnosis[1]. Body flattened. Head posteriorly immersed in the first pereion segment. Eyes small on slender eye-peduncles. Second to seventh pereion segments with long spine-like coxal plates. Pleotelson much narrower than the pereion and having its posterior part subtriangularly produced. Antennulae and antennae short, subequal in length; antennulae few-jointed (composed of five or six joints), the last joint furnished with one long sensory filament. Mandibles with a slender pointed molar tubercle directed somewhat forwards; palp missing. Maxillipeds with the first three joints of the palp about as broad as the endite, the last two joints narrower than the others; epipodite with distal margin rounded. First pereiopods in both sexes prehensile. First male pleopods each with a lateral subtriangular projection. Female operculum with its distal part subtriangularly prolonged. Uropods consisting of two very small branches.

The genus comes close to *Pleurogonium* G. O. SARS, as is shown by the fact that its characteristic mandibles have a narrow molar tubercle, very similar to that in *Pleurogonium*, and that its maxillipeds are shaped exactly as in the latter genus. The genus *Dendrotium* G. O. SARS, whose shape of body still more closely resembles that of *Pleurosignum*, shows in its mandibles and maxillipeds a closer relation to *Paramunna* than to *Pleurosignum*. This is also the case with *Austrosignum* (cf. p. 241).

Both the known species belonging to *Pleurosignum* were obtained by the Swedish Antarctic Expedition, but very few specimens of each (*Pl. magnum* VANH., two specimens, and *Pl. elongatum* VANH., one specimen). VANHÖFFEN (1914) does not figure the anterior four pereion segments in *Pl. magnum*. In his figure of *Pl. elongatum*[2], however, all the pereion segments are provided with spine-like epimeral processes, and this is stated by VANHÖFFEN to be the case also in *Pl. magnum*. But in the specimens of *Pleurosignum* examined by me I found, the spine-like epimera only on the second to seventh pereion segments, whilst on the first segment each lateral margin was provided with a small seta. The epimera on the second to seventh segments are strictly delimited from the segments by dorsal sutures. They are thus to be regarded as coxal plates. These spine-like coxal plates are somewhat obliquely truncate distally and are provided near their distal end with a short hair-like seta. At first sight they thus resemble two-pointed setae of the type regularly found in the Parasellids. In exceptional cases they are provided with two hair-like setae.

Pleurosignum magnum VANHÖFFEN, 1914.

Text figs. 68 a—c.

Pleurosignum magnum. VANHÖFFEN, 1914, p. 577—578, Figs. 108 a—g.

Supplementary Description.

Head. Posteriorly slightly immersed in the first pereion segment.

Pereion. First segment short, measured along the middle line one-third to one-half as long as the second. The second, third and fourth segments are the longest

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[1] Cf. VANHÖFFEN (1914, p. 576).

[2] VANHÖFFEN (1914, Fig. 107 a).

and subequal in length. Each lateral margin of the first segment is furnished with a minute seta.

Pereion. Coxal plates developed on all segments except the first. They are spine-like and marked off from the terga by distinct dorsal sutures. The coxal plates of the second third and fourth segments are almost exactly as figured by VANHÖFFEN[1] (1914) in the case of *Pl. elongatum.* Those on the last three segments are larger, there being a broader proximal part dorsally delimited from the tergum by a slightly convex suture; but laterally the coxal plates gradually narrow and are produced into spine-like projections similarly shaped to those on the second to fourth segments.

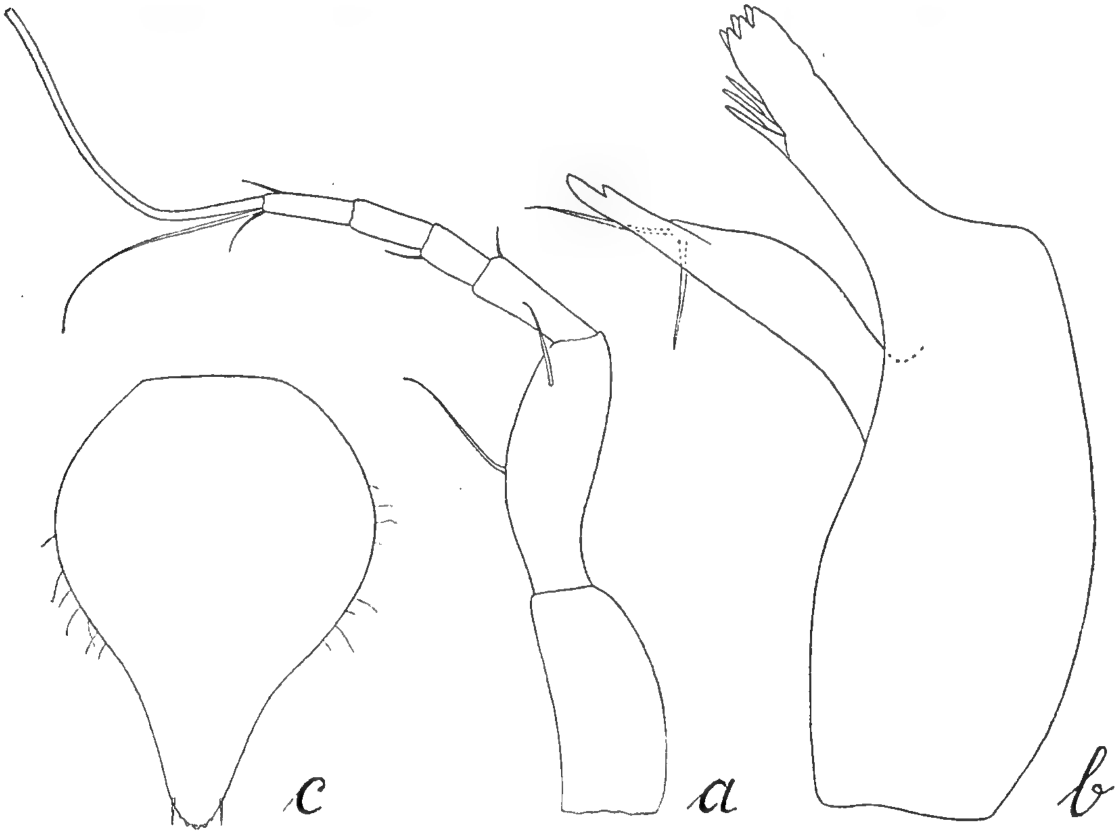

Fig. 68. *Pleurosignum magnum* VANHÖFF. a. Left antennula, 240 ×. b. Left mandible, 650 ×. c. Female operculum, 175 ×.

Abdomen. Anteriorly with one free segment.

Antennulae. See Fig. 68 a and VANHÖFFEN (1914, Fig. 108 c).

Antennae. Broken.

Mandibles (Fig. 68 b). Slender. Incisive part and lacinia, on the left mandible, situated close together, each with many points. Setal row on the left mandible with three setae. Molar tubercle long and slender, directed slightly forwards, distally prolonged into a long pointed projection.

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[1] VANHÖFFEN (1914, Fig. 107 a).

First pair of maxillae. Normal. Inner lobe provided with two apical setae.

Maxillipeds[1]. Epipodite short, reaching about to the distal margin of the first joint of the palp. Its distal margin is broadly rounded.

Operculum, female (Fig. 68 c). Its distal part is subtriangularly prolonged.

Uropods. Consisting of two small joints, of which the endopodite is extremely small.

Remarks. This species is well distinguished from *Pl. elongatum* by its short abdomen and by its characteristic first pereiopods, which have a narrow propodus, furnished with two stout setae on its lower margin and the lower margin of the dactylus dentated.

Localitias and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^{3}/_{9}$ 1902. Female specimen about 1.2 mm. in length.

St. 59. South of West Falkland, on the Burdwood Bank, lat. 53° 45′ S., long. 61° 10′ W. 137—150 m. Broken shells with stones. $^{12}/_{9}$ 1902. Female specimen about 1.5 mm. in length.

Distribution. Falkland Islands and Burdwood Bank (Sw. Ant. Exped.), Gauss Station (VANHÖFFEN 1914).

The species has previously been found only in the East Antarctic (Gauss Station); it is here recorded from the Falkland Islands and Burdwood Bank.

Pleurosignum elongatum VANHÖFFEN, 1914.

Text fig. 69.

Pleurosignum elongatum. VANHÖFFEN, 1914, p. 576—577, Abb. 107 a—f.

Supplementary Description.

Head. Posteriorly immersed in the first pereion segment.

Pereion. First segment short, strongly curved in anterior direction, but of uniform length. Measured along the middle line it is half as to two-fifths as long as the second segment. Each of its lateral margins is provided with a short hair-like seta. The second, third and fourth segments are the longest and subequal in length and width. The last three segments are short and curved backwards.

Coxal plates developed on all segments, except the first. They are spine-like and similar to those in *Pl. magnum.* In the single specimen examined they were somewhat shorter than in *Pl. magnum.*

Abdomen. About as long as the last four pereion segments plus half the third segment. Pleotelson about twice as long as the anterior part of the abdomen. In the anterior part two segments are indicated, one short first segment and one second segment, which is almost fused with the pleotelson, the suture-line between this segment and the pleotelson being very faint.

Antennulae and antennae. As in *Pl. magnum.* The antennal flagellum consists of seven joints.

Maxillipeds. As in *Pl. magnum.*

First pair of pereiopods (Fig. 69)[2]. Propodal joint broad and oval in outline, with its lower part very thin. For details see the figure.

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[1] See VANHÖFFEN (1914, Abb. 108 d).

[2] See also VANHÖFFEN (1914, Figs. 107 b and c).

Operculum, female. Its distal part is prolonged into a subtriangular extension with a rounded distal end.

Uropods. Consisting of two small branches, each furnished with apical setae.

Remarks. Of this species only a single damaged specimen was collected during the Swedish Antarctic Expedition. It is easily recognized as *Pleurosignum elongatum* by its long abdomen and characteristic first pereiopods. It differs from VANHÖFFEN's figures and description of *Pl. elongatum* in being devoid of coxal plates on the first pereion segment, in having the spine-like coxal plates on the other pereion segments slightly shorter and in having the anterior part of the abdomen slightly shorter than figured by VANHÖFFEN (1914).

Localities and Material.

St. 49. Falkland Islands, Berkeley Sound, lat. 51° 35′ S., long. 57° 56′ W. 25—30 m. Shells and stones. $^{10}/_{8}$ 1902. Female specimen, about 1 mm. in length.

Distribution. Falkland Islands (Sw. Ant. Exped.), Gauss Station (VANHÖFFEN 1914).

The species has not previously been recorded from the Falkland Islands.

Fig. 69. *Pleurosignum elongatum* VANHÖFF. Left first pereiopod, 315 ×.

Genus **Antennulosignum** n. gen.

Diagnosis. Body flattened. Head posteriorly immersed in the first pereion segment. Eyes small on long and slender eye-peduncles. Pereion segments, except the first, provided with long spine-like coxal plates. Abdomen narrow. Pleotelson posteriorly subtriangular and prolonged, much narrower than the pereion. Antennulae and antennae short, antennulae with two stout peduncular joints, of which the second is prolonged distally into a spine-like curved projection, which is longer than the flagellum; last joint of flagellum furnished with one long apical sensory filament. Mandibles with a slender molar tubercle and a short three-jointed palp. Maxillipeds with the palp slender. First pereiopods prehensile. The first pleopods in male each with a lateral triangularly projecting extension. Uropods consisting of two very small branches.

Though similar to *Pleurosignum,* this genus differs in the extremely prolonged second peduncular joint of the antennula, which at first sight gives the antennula the appearance of having two flagella, and also in the mandible, which is furnished with a short palp. The genus comprises only one species, which was represented in the material by three male specimens.

Antennulosignum elegans n. sp.

Text. figs. 70 a—e.

Diagnosis. Body about twice as long as it is broad. Pleotelson about one-fourth as long again as its greatest width, tapering towards the end. Antennae with the first four peduncular joints small and subequal in length. First pereiopod prehensile, with carpus trapezoidal and furnished at the tip with three two-pointed setae; propodus broadly oval; dactylus one-half to two-thirds the length of propodus, its dorsal claw about one-third as long as the joint itself.

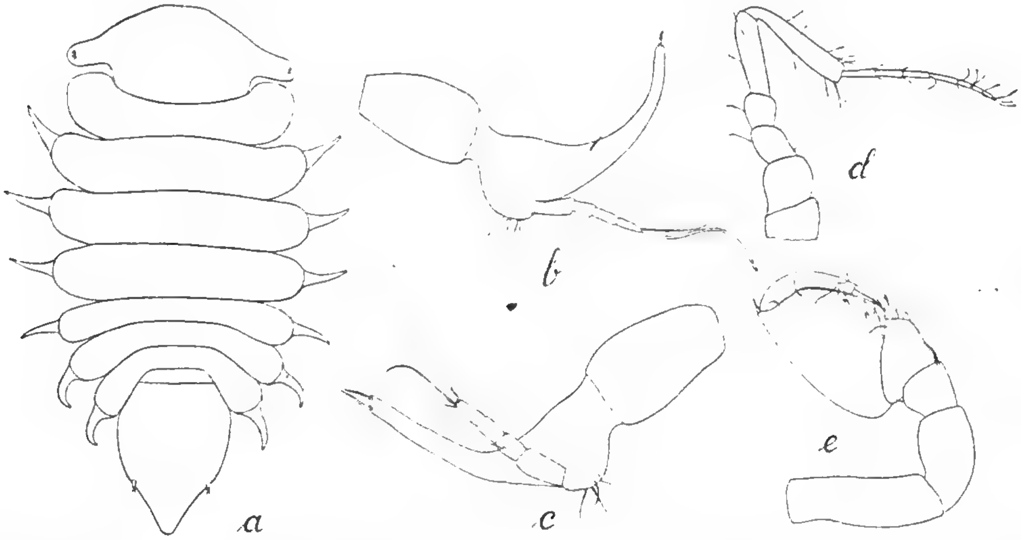

Fig. 70. *Antennulosignum elegans* n. sp. a. Animal, from above, 50 ×. b. Left antennula, male, from below, 100 ×. c. Antennula of another specimen, 120 ×. d. Left antenna, male, 100 ×. e. First pereiopod, 120 ×.

Description.

Type. Male, about 1 mm. in length.

General shape of body (Fig. 70 a). Oblong-ovate; the body is about twice as long as it is broad.

Head. Frontal margin between the eye-peduncules rounded. Eyes distinct, but without pigment, consisting of five ocelli, on slender, laterally directed eye-peduncles, extending about as far as the lateral margins of the first pereion segment. Head posteriorly slightly immersed in the first pereion segment.

Pereion. The first five segments are subequal in width, the sixth and seventh somewhat narrower than the others. First segment curved forwards, narrow in the middle, laterally increasing in width. Second, third and fourth segments long, subequal in length. The last three segments are short, curved backwards, subequal in length, but decreasing in width from the fifth to the seventh; the fifth segment is, in the middle, only about one-third as long as the fourth.

Abdomen. Anteriorly with a short free rectangular segment. Pleotelson about one-fourth as long again as its greatest width, tapering towards the end; its posterior part is produced into an obtusely rounded triangular tip.

Antennulae (Figs. 70 b and c). Peduncle consisting of two very stout joints, of which the second distally produced into a long curved and spine-like prolongation with its concave side directed anteriorly. The flagellum is small and situated posterior to the long prolongation of the second peduncular joint. Its length is only about half the length of this joint including the distal prolongation of the joint.

Antennae (Fig. 70 d). The six-jointed peduncle has four short proximal joints of about equal length. The fifth and sixth peduncular joints are long and increase slightly in width towards their distal ends. Flagellum, seven-jointed.

Mandibles. Molar tubercle slender. Palp short, three-jointed.

Maxillipeds. About as in *Pleurosignum magnum* VANHÖFFEN: The palp is narrow. Endite with two coupling-hooks.

First pair of pereiopods (Fig. 70 e). Basipodite, ischium and merus subequal in width; the basipodite is about as long as the ischium and merus together. The ischium is about twice as long as the merus, which joint somewhat widens distally. The carpus and propodus are broader than the other joints. The carpus is trapezoidal in outline, and provided with three two-pointed setae at the tip. The propodus, which is about twice as broad as the basipodite and about as long as the ischial and meral joints together, is broadly oval and is provided with two submarginal short two-pointed setae close to its lower margin. The dactylus is one-half to two-thirds the length of the carpus; its dorsal claw is about one-third as long as the joint itself.

The other pereiopods. About as in *Pleurosignum.* The dactylus is provided with one long dorsal and one short ventral claw. The dorsal claw is about half as long as the dactylus.

First pair of pleopods, male. As in *Pleurosignum elongatum*[1], except that the distal ends of the fused pleopods is slightly more narrowly rounded.

Uropods. Short, two-branched; the inner branch is minute.

Locality and Material.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand. $^{3}/_{9}$ 1902. 3 small male specimens about 1 mm. in length.

Distribution. Falkland Islands (Sw. Ant. Exped.).

D. Group **Nannoniscini** HANSEN, 1916.

For diagnosis see HANSEN 1916, p. 83. In his diagnosis of this group HANSEN (1916) says as in regard to the mandibles: »The molar process tapers strongly to the narrow, obtuse, setiferous end, and is directed somewhat backwards». In this characteristic the southern genus *Austrofilius* HODGSON forms an exception. In *Austrofilius furcatus* HODGSON I always found the mandible as illustrated in Fig. 71 b, having the molar tubercle truncate. In the second known species of the genus, *Austrofilius serratus* VANHÖFFEN, the molar tubercle is of the same type, except that it tapers more markedly towards the end[2]. HODGSON (1910), however, figures the mandible in *Austrofilius furcatus* as having a molar tubercle with an obtusely rounded end, thus conforming with HANSEN's diagnosis of the group. In his diagnosis of the group HANSEN (1916) moreover

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[1] Cf. VANHÖFFEN (1914, Fig. 107 e).

[2] VANHÖFFEN, 1914, Fig. 83 c.

states that eyes are wanting. This is not the case in *Austrofilius*, in which genus both the known species have eyes, but in a very vestigial stage. HANSEN's definition of the group must, consequently, be revised in the two respects mentioned.

Genus **Austrofilius,** HODGSON, 1910.

HODGSON 1910, VANHÖFFEN 1914.

Diagnosis[1]. Anterio-lateral angles of the head somewhat elongated in anterior direction. Front area with its anterio-lateral angles produced into one forward-directed point on each side. Eyes vestigial. All pereion segments marked off from each other by distinct sutures. Antennulae short consisting of about six joints. Antennae with distinct squama. Palp of maxilliped with first three joints expanded, second joint about half again as broad as the endite, third and fourth joints without lobes. First pairs of pereiopods ambulatory, with two claws.

Austrofilius furcatus HODGSON, 1910.

Text fig. 71 a—c.

Austrofilius furcatus. HODGSON, 1910, p. 51—52, Pl. VIII Figs. 2, 2 a, 2 b, 2 c, 2 d; VANHÖFFEN, 1914, p. 554—555, Figs. 81 a—d.

Supplementary Description.

Eyes. Vestigial, generally consisting of two ocelli; in one specimen the right eye had four ocelli.

Antennulae (Fig. 71 a)[2]. Consisting of six joints.

Antennae. Third joint with a distinct, pointed, distally setiferous squama.

Mandibles (Fig. 71 b)[3]. Incisive part with five points. Lacinia (on the left mandible) with three points. Row of setae consisting of four setae on the left mandible, on the right mandible of seven. Molar tubercle slightly tapering towards the end, directed somewhat backwards, distal margin almost straight.

Second pair of maxillae[4]. Outer lappet of outer lobe with four apical setae and inner lappet of the same lobe with three apical setae.

Maxillipeds. As figured by HODGSON (1910)[5], except that the lateral margin of the exopodite is evenly convex.

Pereiopods. All about equal, furnished with two subequal claws.

First and second pairs of pleopods, male. Exactly as figured by VANHÖFFEN (1914)[6].

Operculum, female (Fig. 71 c). Small, subquadrate Lateral margins somewhat convex; distal margin slightly concave in the middle; the lateral parts of the distal margin are provided with long setae and the concave part of distal margin is furnished with very short setae.

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[1] Cf. HODGSON (1910, p. 51) and VANHÖFFEN (1914, p. 554).

[2] Cf. VANHÖFFEN (1914, Fig. 81 a).

[3] Cf. HODGSON (1910, Pl. VIII, Fig. 2 a).

[4] See HODGSON (1910, Pl. VIII, Fig. 2 c).

[5] HODGSON (1910, Pl. VIII, Fig. 2 d).

[6] VANHÖFFEN (1914, Figs. 81 b and c).

Localities and Material.

St. 6. Graham Region, S. W. of Snow Hill Island, lat. 64° 36′ S., long. 57° 42′ W. 125 m. Stones and gravel. $^{20}/_{1}$ 1902. Male specimen 2.4 mm. in length.

St. 33. South Georgia, Grytviken, lat. 54° 22′ S., long. 36° 28′ W. 22 m. Clay and algae. $^{30}/_{5}$ 1902. Damaged female specimen about 3 mm. long.

St. 51. Falkland Islands, Port William, lat. 51° 40′ S., long. 57° 42′ W. 22 m. Sand $^{3}/_{9}$ 1902. Damaged male specimen (head missing).

St. 64. Fuegian Archipelago, north beach of the Beagle Channel, between Ushuaia and Lapataia. 35 m. Shells and algae. $^{13}/_{10}$ 1902. Female specimen about 2 mm. in length.

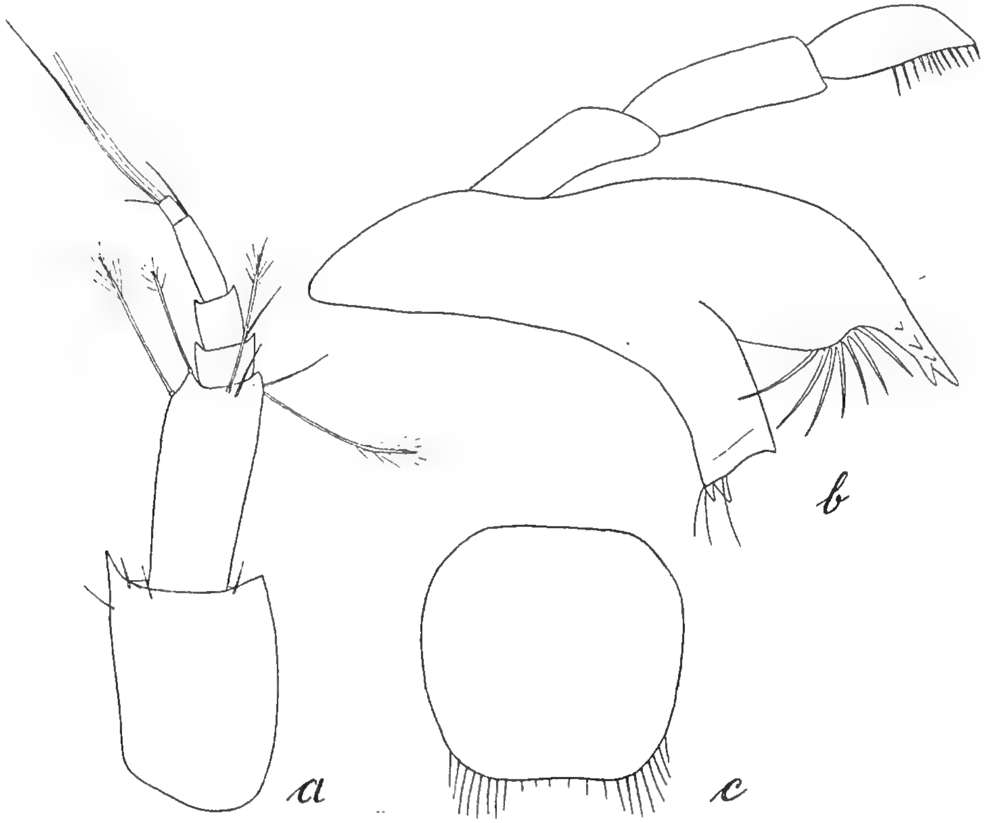

Fig. 71. *Austrofilius furcatus* HODGS. a. Left antennula, 235 ×. b. Right mandible, 240 ×. c. Female operculum, 120 ×.

Distribution. Fuegian Archipelago (Sw. Ant. Exped.), Falkland Islands (Sw. Ant. Exped.), South Georgia (Sw. Ant. Exped.), South Africa (VANHÖFFEN 1914), Kerguelen (VANHÖFFEN 1914), Graham Region (Sw. Ant. Exped.), Victoria Land (HODGSON 1910).

Not previously recorded from the Fuegian Archipelago, the Falkland Islands, South Georgia or the Graham Region.

E. Group **Desmosomatini** Hansen, 1916.

Genus **Desmosoma** G. O. Sars, 1863.

Desmosoma. Meinert 1890, Bonnier 1896, G. O. Sars 1899, Stephensen 1915, Hansen 1916, Monod 1926.
Eugerda. Meinert 1890, Vanhöffen 1914.

For diagnosis see G. O. Sars (1899, p. 124—125) and Hansen (1916, p. 106—107). The majority of the species belonging to this well defined genus have been collected in the northern area; from Antarctic or subantarctic waters only one species has been described, *D. longimanum*, Vanhöffen, 1914. During the Belgian Antarctic Expedition 1897—1899 another species of *Desmosoma* was found, but as it was represented by one damaged specimen only, Monod (1926) did not establish it as a new species. It is quite probable that the genus *Desmosoma* is common also in the southern areas. The Swedish Antarctic Expedition collected not less than four species, three of them from South Georgia and one from the Falkland Islands. Presumably none of these species is identical with Monod's *Desmosoma* sp. Monod gives only one figure, viz. of the uropods of his *Desmosoma* sp.; the lengths of the uropodal joints agree most closely with my species *D. modestum* and *D. brevipes*.

The classification of the genus *Desmosoma* has been dealt with most satisfactorily by Hansen (1916).[1] Very valuable characteristics, according to Hansen are, to be found in the first and second pair of pereiopods. As regards the setal armature, on these pereiopods it should, however, be observed that there is some variation within one and the same species, as will be seen by comparing Figs. 72 c, d, and e, illustrating the first pereiopod of different specimens of *D. australis* n. sp. The setae on the pereiopods are either, single-pointed or double-pointed, a fact to which attention was drawn by Bonnier (1896) when describing his species *D. elongatum*.

Desmosoma australis n. sp.

Text. figs. 72 a—n.

Diagnosis. First pereion segment about as long as the fourth segment and about half as long as the third (the fourth somewhat longer in the female). Second and third pereion segments subequal in length in the female, the second being somewhat longer than the third in the male. Fifth pereion segment in adult specimens increasing in width forwards. Sixth and seventh pereion segments of uniform width, and with their lateral margins straight. Abdomen with its greatest width proximally, decreasing in width towards the distal end. Last joint of the antennula longer than the penultimate joint. First pereiopods narrow; carpal joint provided on its lower margin with three or four slender setae, of which two or three are situated at the lower distal angle; all the setae are shorter than half the length of the propodus. Second pereiopod very strong; carpal joint increasing in width towards the distal end, approximately, twice as long as its greatest width; the lower row of setae on the carpus consists of eleven to thirteen setae, of which the two distal ones extend to about two-thirds the length of the propodus; upper row of setae on the carpus with twelve to seventeen setae. First pleopods in the male with distal margins of the rami convex. Female operculum broader than it is long, with distal margin concave and furnished with

Fig. 72. *Desmosoma australis* n. sp. a. Male, from above, 20 ×. b. Antennula, and proximal joints of the antenna, female, 60 ×. c. Right first pereiopod, female, 60 ×. d. Right first pereiopod, female, 40 ×. e. First pereiopod, male, 60 ×. f. Right second pereiopod, female, 60 ×. g. Dactylus of the same pereiopod, 400 ×. h. Seta from the carpus of the second pereiopod, 180 ×. i. Left seventh pereiopod, female, 40 ×. j. Seventh pereiopod, adult female, 20 ×. k. Distal part of a seta from the carpus of the seventh pereiopod, 400 ×. l. Left second male pleopod, from the caudal side, 50 ×. m. Female operculum, 35 ×. n. Left uropod, 60 ×.

four setae at about equal distances from each other. Uropod about half as long as the abdomen, single-branched, its second joint about one-third as long again as the first.

Description.

Types. Male, length about 4.1 mm.; and female with young, length about 5.1 mm.

Head. Of the usual shape, posteriorly with a faint sculpturing (see Fig. 72 a).

Pereion. In the male (Fig. 72 a) the first and fourth segments are subequal in length. The second segment, which is the longest of the first four segments, is more than twice as long as the first and somewhat longer than the third. The fifth segment is the largest of all the segments; in adult specimens it increases in width towards the anterior margin, where it is not fully half as broad again as it is long; its anterio-lateral angles are narrowly rounded.

In the female the first segment is about half as long as the second; the second and third are subequal in length; the fourth segment is almost half as long again as the first.

The proportion between the lengths of the first four pereion segments is: in the adult male 5: 12: 10: 6, in the adult female[1] 9: 18: 19: 13.

Coxal plates of medium size, anteriorly pointed and of about the same shape in males and females.

Abdomen. In the female with a small free segment anteriorly from the pleotelson. This segment is missing or at least very indistinct in the male. Pleotelson with its greatest width anteriorly.

Antennulae (Fig. 72 b). Consist of five joints. The first joint is the broadest[2], being about twice as broad as the second. It increases in width towards the distal end. The second joint is about twice as long as the third. The fifth joint is longer than the fourth.

The proportion between the lengths of the joints is, in a female 9: 14.5: 7.5: 3.5: 5.5.

Antennae. Broken. For the first four joints see Fig. 72 b.

Mandibles. Incisive part of the left mandible with two, that of the right with three points. Lacinia (left mandible) with two points. Setal row on the left mandible with ten, on the right mandible with twelve setae of the usual kind; between the setae in the row there are sparse, very slender »hairs». Palp three-jointed.

First and second pairs of maxillae and maxillipeds. Normal.

First pair of pereiopods (Figs. 72 c, d, e). Slender, not expanded. The carpus is about three and a half times as long as it is broad. Its lower distal angle is usually furnished with one long and one short seta. The long seta does not extend to half the length of the propodus. Sometimes there are three setae at the lower distal angle. Also the setae on the other joints show some variation, see the figures. The propodus is somewhat longer than the carpus and is provided with a few short setae.

Second pair of pereiopods (Fig. 72 f). Broad and strong, the strongest of the four anterior pairs of pereiopods. The carpus increases somewhat in width towards its distal end and is furnished with two longitudinal rows of stout setae, the lower row consisting of 11—13, the upper of 12—17 setae. The three distal setae in the lower row are the

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[1] Female specimen about 5.1 mm. in length.

[2] Thus in this species the »peduncle» generally speaking is single-jointed. HANSEN (1916) reckous three joints to the peduncle in the genus *Desmosoma*. I have found it more natural to include into the peduncle of the Parasellids the more differentiated proximal joints (normally four in number) which lack sensory filaments of the simple non-ciliated type.

longest. Their length is about two-thirds the length of the propodus. There are two kinds of setae, single-pointed and two-pointed. The first kind have their slender distal parts equipped with delicate »hairs». One seta of the latter kind is shown in Fig. 72 h[1]. In the lower row of setae the six proximal ones are of the single-pointed type, the seventh is two-pointed, but the eighth is again single-pointed. The other distal setae in this row are two-pointed. In the upper row the setae consist only of the single-pointed kind. The propodus also carries two longitudinal rows of setae; in the lower row there are six, in the upper about eight setae, all single-pointed. For the dactylus see Fig. 72 g.

Third pair of pereiopods. About the same as the second, but not quite so strong.

Seventh pair of pereiopods (Figs. 72 i and j). The proportion between the lengths of the joints is 56: 25.5 :7: 27: 19: 13. The setae on the lower margin of the carpus and the propodus are two-pointed. Fig. 72 k shows the distal part of such a two-pointed seta.

First pair of pleopods, male. The distal margins of the rami are convex and setiferous.

Second pair of pleopods, male. See fig. 72 l.

Operculum, female (Fig. 72 m). Distal margin somewhat concave and furnished with four setae at about equal distances from each other.

Third, fourth and fifth pairs of pereiopods. Normal, and of the same shape in males and females.

Uropods (Fig. 72 n). A little less than half as long as the abdomen. Second joint about one-third as long again as the first, distally furnished with three setae and two sensory filaments. The proportion between the lengths of the joints in the female type specimen is about 12: 15, in another specimen (see Fig. 72 n) 13: 18.

Remarks. D. australis is similar to the northern species *D. lineare* G. O. SARS, which it resembles in its first and second pereiopods, the first being slender and furnished with only a few setae on the carpus, in having single-branched uropods, and in the absence of projections on the pleotelson anteriorly to the uropods. It differs from the species mentioned especially in the different length of the first four pereion segments, in the setal armature on the first pereiopod, in the shape of the female operculum and the first pleopods of the male, and in having longer proximal joints of the uropods.

Localities and Material.

St. 22. South Georgia, off May Bay, lat. 54° 22′ S., long. 36° 28′ W. 75 m. Bottom temp. + 1.5°. Clay with some algae. $^{14}/_{5}$ 1902. Fragments of specimens.

St. 23. South Georgia, off the mouth of Morain Bay, lat. 54° 23′ S., long. 36° 26′ W. 64—74 m. Bottom temp. + 1.65°. Gray clay with gravel and stones. $^{16}/_{5}$ 1902. Fragments of specimens.

St. 30. South Georgia, Morain Bay, lat. 54° 24′ S., long. 36° 26′ W. 125 m. Bottom temp. — 0.25°. Clay with sparse stones. $^{28}/_{5}$ 1902. 2 specimens, female with young (type) about 5.1 mm. in length, and male about 4.1 mm. in length.

South Georgia, Morain Bay. 148 m. Bottom temp. — 0.35°. $^{15}/_{5}$ 1902. Male (type), 4.1 mm. in length.

Distribution. South Georgia (Sw. Ant. Exped).

Desmosoma brevipes n. sp.

Pl. II Fig. 21; Text. figs. 73 a—i.

Diagnosis. First pereion segment about half as long as the fourth and about one-third as long as the third. Second pereion segment the longest of the first four pereion seg-

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[1] Cf. also BONNIER, 1896, Pl. 34, Fig. 3 m.

ments and one-third to one-fourth as long again as the third. The fifth segment of the pereion is widest posteriorly and slightly decreases in width towards the anterior margin. Abdomen with greatest width near the anterior margin. Last joint of the antennula shorter than the penultimate joint. First pair of pereiopods slender, with a few setae on the lower margin of the carpus, the seta at the lower distal angle being the longest but not extending to half the length of the lower margin of the propodus. Second pair of pereiopods broad and strong; the carpus with its greatest width near the distal margin; not fully twice as long as its greatest width and furnished with two longitudinal rows of setae with eight or nine setae in each row, the two distal setae in the lower row extend to about half the length of the dactylus. First pleopods of the male with distal margins of the rami evenly convex. Female operculum with the distal margin slightly concave and furnished with four setae. Uropods single-branched, with second joint about twice as long as the first.

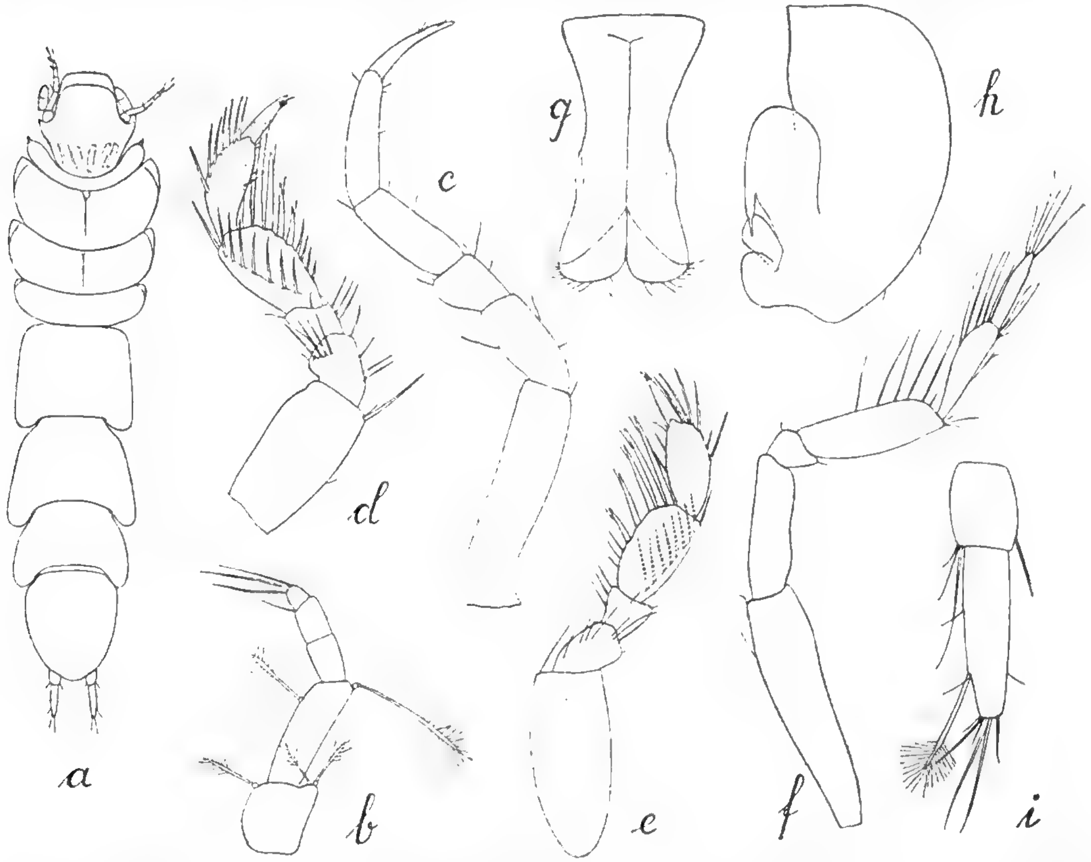

Fig. 73. *Desmosoma brevipes* n. sp. a. Female from, above, 35 ×. b. Left antennula, 160 ×. c. Right first pereiopod, adult male, 115 ×. d. Right second pereiopod, seen from the caudal side, female, 80 ×. e. Right second pereiopod, seen from the rostral side, female, 80 ×. f. Seventh pereiopod, 95 ×. g. First male pleopods, 160 ×. h. Right second male pleopod, from the caudal side, 240 ×. i. Left uropod, female, 235 ×.

Description.

Types. Adult male, and female with an empty marsupium, both about 2 mm. in length.

Head (Fig. 73 a). Of the usual shape in the genus; posteriorly with six faint oblong elevations.

Pereion (Fig. 73 a). First segment short, about half as long as the fourth. The second segment is the longest of the first four pereion segments and about twice as long as the fourth. The third segment is about three-fourths as long as the second. The fifth pereion segment decreases slightly in width in anterior direction.

The coxal plates on the first four segments are small and triangular and have the same shape in males and females.

Abdomen (Fig. 73 a). Anteriorly with a faintly indicated short free segment. The shape of the pleotelson is slightly different in males and females. In the first sex its posterior part between the uropods is slightly more projecting.

Antennulae (Fig. 73 b). Normal and consisting of five joints. The first joint is the broadest; it increases slightly in width towards the distal end. The second joint is more than half as long again as the first and about as long as the last three joints together. Of these the third and fourth are subequal in length and about twice as long as the fifth. The proportion between the lengths of the joints is 15: 25: 10: 9: 5.

Antennae. Normal. The peduncle consists of six joints, of which the first four are short and of about equal length; together they are subequal in length to the fourth joint or somewhat shorter. The fifth joint is slightly longer than the fourth. The flagellum consists of nine joints (in a female about 2.1 mm. in length and a male about 2 mm. in length). In the male it is, as usual in *Desmosoma*, stronger and broader than in the female.

First pair of pereiopods (Fig. 73 c). Very similar to those in *D. australis* but comparatively shorter and broader. The carpus is about two and a half times as long as it is broad; its lower distal angle is usually furnished with one long and one short seta (on the figured specimen only one seta). The propodal joint is slightly longer than the carpus. The proportion between the lengths of the joints is 17: 7: 5: 7.5: 9.5: 6.5.

Second pair of pereiopods (Figs. 73 d and e). They are the broadest of all the pereiopods. The carpus increases on width towards the distal end and carries two longitudinal rows of setae with eight setae in the lower and eight or nine setae in the upper row. In the lower row the three or four proximal setae are single-pointed, the others two-pointed. The two most distally situated setae extend to half the length of the dactylus. In the upper row there are only single-pointed setae. The propodal joint has an upper longitudinal row of seven setae; on the lower margin there are four setae, of which two at the lower distal angle.

Third pair of pereiopods. Much as the second pair, but somewhat more slender.

Seventh pair of pereiopods (Fig. 73 f). The proportion between the lengths of the joints is 23: 11: 3: 11.5: 9: 7.

First pair of pleopods, male (Fig. 73 g). Distal margin of the rami convex and furnished with setae.

Second pair of pleopods, male. See Fig. 73 h.

Operculum, female. Of the same shape as in *D. australis;* distal margin slightly concave and furnished with four setae; lateral margins smooth.

Uropods (Fig. 73 i). Single-branched, as in *D. australis*, but the second joint is longer, being twice as long as the first.

Remarks. D. brevipes comes very close to *D. australis*, but is a smaller species. It differs from *D. australis* especially in its smaller size, in having another shape of the fifth pereion segment, which decreases in width in anterior direction, in having a relatively greater width of the carpus of the first and second pereiopods, in having the second joint of the uropods longer, and the terminal joint of the antennulae shorter.

Localites and Material.

St. 23. South Georgia, off the mouth of Morain Bay, lat. 54° 23′ S., long. 36° 26′ W. 64—74 m. Bottom temp. + 1.65°. Gray clay with gravel and stones. $^{18}/_{5}$ 1902. Female with empty marsupium (type), 2 m. in length.

St. 24. South Georgia, off the mouth of Grytviken, lat. 54° 22′ S., long. 36° 27′ W. 95 m. Clay. $^{20}/_{5}$ 1902. Female with young; length about 2.2 mm.

St. 30. South Georgia, Morain Bay, lat. 54° 24′ S., long. 36° 26′ W. 125 m. Bottom temp. — 0.25°. Clay with sparse stones. $^{26}/_{5}$ 1902. 9 specimens. Length of largest specimen about 2.1 mm.; a male (type) and a female with embryos had the length of 2 mm.

South Georgia, Morain Bay. 148 m. Bottom temp. — 0.35°. $^{15}/_{5}$ 1902. 7 female specimens. Length of largest specimen 2.4 mm. (ovigerous female).

Distribution. South Georgia (Sw. Ant. Exped.).

Desmosoma modestum n. sp.

Text. figs. 74 a—h.

Diagnosis. First pereion segment about half as long as the fourth, which is slightly shorter than the third. Second pereion segment slightly longer than the third. Fifth pereion segment with its broadest part near the anterior margin and thence decreasing somewhat in width posteriorly. Last three joints of the antennula subequal in length. First pair of pereiopods about as strong as the second; lower margin of carpal joint with four long setae at about equal distances from each other; the lower distal angle of the propodus with two short setae. Second pair of pereiopods with carpus and propodus about equal in width and with carpal joint 2—2$^{1}/_{2}$ times as long as it is broad; its two rows of setae consist of nine setae in the lower row, eleven in the upper, of which the two distal ones in the lower row are the longest. Female operculum broader than it is long, distal margin slightly concave in the middle and furnished with about five setae. Uropods about as long as one-third the length of the abdomen, single-branched, with second joint about twice as long as the first.

Description.

Type. Female with an empty marsupium, 2.2 mm. in length.

Head. Of the usual shape, with faint sculpturing on its hinder part.

Pereion. Decreasing in width in females without a marsupium continuously backwards. In females with a marsupium (Fig. 74 a) the second, third and fourth segments are slightly broader than the first. The first segment is the shortest, being about as long as the fourth segment. The third segment is somewhat longer than the fourth. The second segment is the longest of the first four segments, but is only slightly longer than the third. The long fifth segment has its broadest part very near the anterior margin and decreases from there in width slightly in a posterior direction. Sixth and seventh segments of the usual shape; lateral margins slightly convex.

The coxal plates on the first four segments are triangular, pointed on the first two segments, and are slightly more rounded anteriorly on the following two segments.

Abdomen. Comparatively narrower than in *D. australis* and *brevipes*, being one-half to one-third as long again as the sixth pereion segment. The proportion between the length and the breadth of the abdomen is about as 11: 8. Anteriorly it has an indication of a faint first segment.

The pleotelson is broadest anteriorly, its lateral margins are slightly convex; distal margin between the uropods evenly convex.

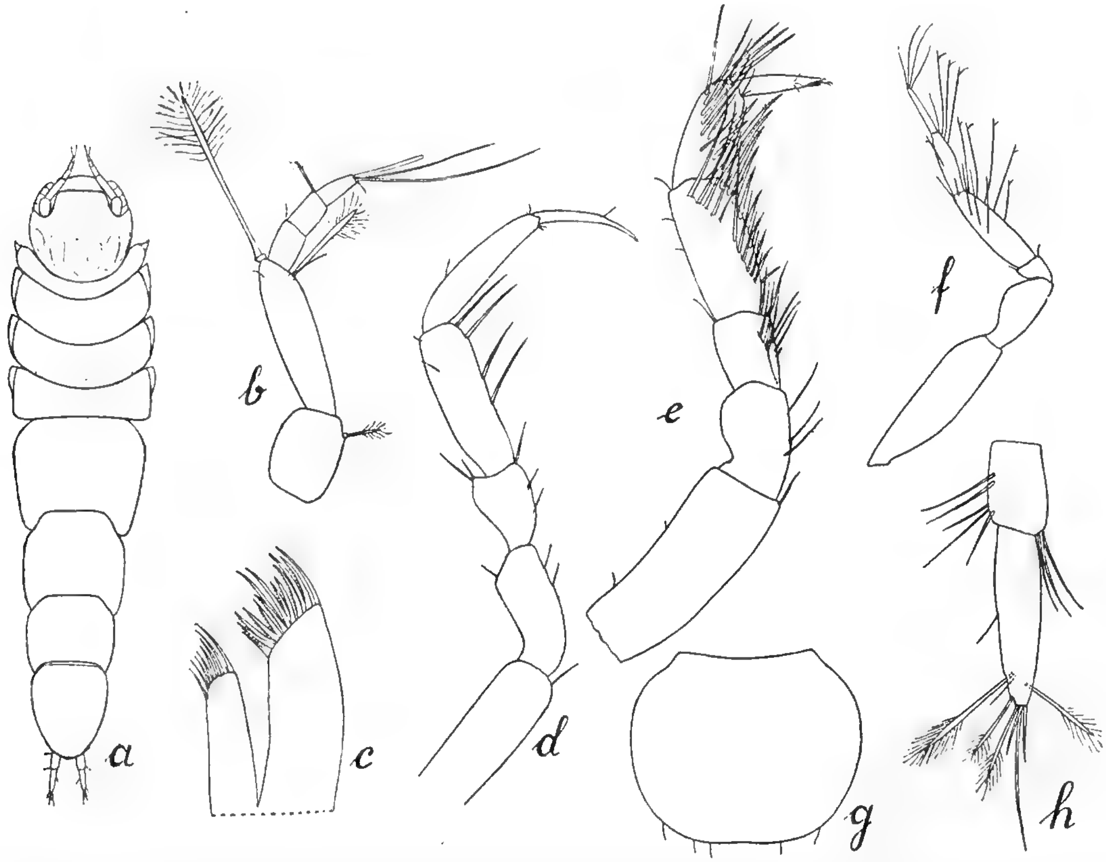

Fig. 74. *Desmosoma modestum* n. sp. a. Female with a marsupium, 27 ×. b. Antennula, female, 230 ×. c. First maxilla (except its proximal part), female, 230 ×. d. Right first pereiopod (except the proximal end of the basipodite), female, 140 ×. e. Right second pereiopod, female, 95 ×. f. Seventh pereiopod, female, 95 ×. g. Female operculum, 117 ×. h. Right uropod, from below, female, 230 ×.

Antennulae (Fig. 74 b). The proportion between the lengths of the joints is 12: 20: 5: 5: 5. The second joint is thus almost twice as long as the first, and the last three joints are subequal in length.

Antennae. Normal. First four joints short. The sixth joints is one-third as long again as the fifth but more slender. The flagellum is about one-third as long again as the last peduncular joint and, in a specimen measuring 1.6 mm. in length, consists of eight joints; but the suture between the first two joints is extremely faint.

First pair of maxillae. See Fig. 74 c.

First pair of pereiopods (Fig. 74 d). Almost as strong as the second pair. The carpus is about three times as long as it is broad and slightly longer than the propodus.

A very characteristic feature of the species is that the carpus is furnished on its lower margin with four long setae. These setae are single-pointed and equipped with very fine »hairs»[1], the length of the setae exceeds half the length of the propodus. The propodus is provided with a few setae; two short ones are situated at the lower distal angle. For details see figure.

Second pair of pereiopods (Fig. 74 e). Carpal joint of uniform width, 2—2 $^1/_2$ times as long as it is broad. In the lower row there are nine setae, the length of the most distal one exceeding that of the propodus. In the upper row there are eleven setae. Propodus with a lower row of about five setae (of which one seta is situated at the lower distal angle) and with an upper row of eight setae.

Third pair of pereiopods. About as the second.

Seventh pair of pereiopods. See Fig. 74 f.

Operculum, female (Fig. 74 g). Distal margin slightly concave in the middle, and furnished with about five setae.

Uropods (Fig. 74 h). Single-branched; second joint about twice as long as the first.

Remarks. The most characteristic feature of *D. modestum* is the structure of the first pair of pereiopods, which are almost as strong as the second pair and have the lower margin of the carpus furnished with four long setae. In these feature *D. modestum* differs very sharply from *D. australis* and *brevipes*, which two species it otherwise somewhat resembles. The proportion of the thoracic segments, the shape of abdomen etc., are also characteristic. The male of the species is unknown.

Localities and Material.

St. 18. South Georgia, mouth of Westfjord, Cumberland Bay, lat. 54° 15′ S., long. 36° 25′ W. 250 m. Bottom temp. + 1.2°. Soft clay. $^{22}/_4$ 1902. 4 female specimens, one of them broken. Length of largest specimen 2 mm.

St. 30. South Georgia, Morain Bay, lat. 54° 24′ S., long. 36° 26′ W. 125 m. Bottom temp. — 0.25°. Clay with sparse stones. $^{26}/_5$ 1902. 9 females, partly broken. Length of largest specimen 2.2 mm (type specimen).

Distribution. South Georgia (Sw. Ant. Exped.).

Desmosoma falklandicum n. sp.

Text. figs. 75 a—f.

Diagnosis. First three pereion segments subequal in length, the fourth shorter and narrower than the third. Fifth pereion segment sub-rectangular with lateral margins concave. Abdomen oblong, being broadest about across the middle and with sparse short setae on the lateral sides. Last antennular joint about one-third as long as the penultimate joint. First pair of pereiopods much stronger than second pair; carpal joint very much expanded, only about one-third as long again as it is broad, its lower margin with eight strong setae; the propodus is shorter than the carpus and only somewhat more than half as broad as this joint. Second pair of pereiopods with carpus about three times as long as it is broad and provided with a lower setal row consisting of ten setae and an upper row with sparse (two) setae. Female operculum sub-circular in outline, its lateral and distal margins furnished with sparse setae.

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[1] Only visible on high magnification.

Description.

Type. Female with semi-developed oostegits (Fig. 75 a), length 2.5 mm.

Head (Fig. 75 a). Of the shape usual in the genus, about as long as the first plus two-thirds the length of the second pereion segment.

Pereion (Fig. 75 a). Greatest width across the first segment; second segment almost as broad as the first, the third somewhat narrower than the second; fourth segment considerably narrower than the third. The first three segments are subequal in length. The fourth segment is the shortest of all the pereion segments. The fifth segment is subrectangular and has a slightly convex anterior margin; its posterior margin is slightly concave; its lateral margins are concave; its anterio-lateral and posterio-lateral angles are rounded. The sixth and seventh pereion segments are of the shape usual in the genus.

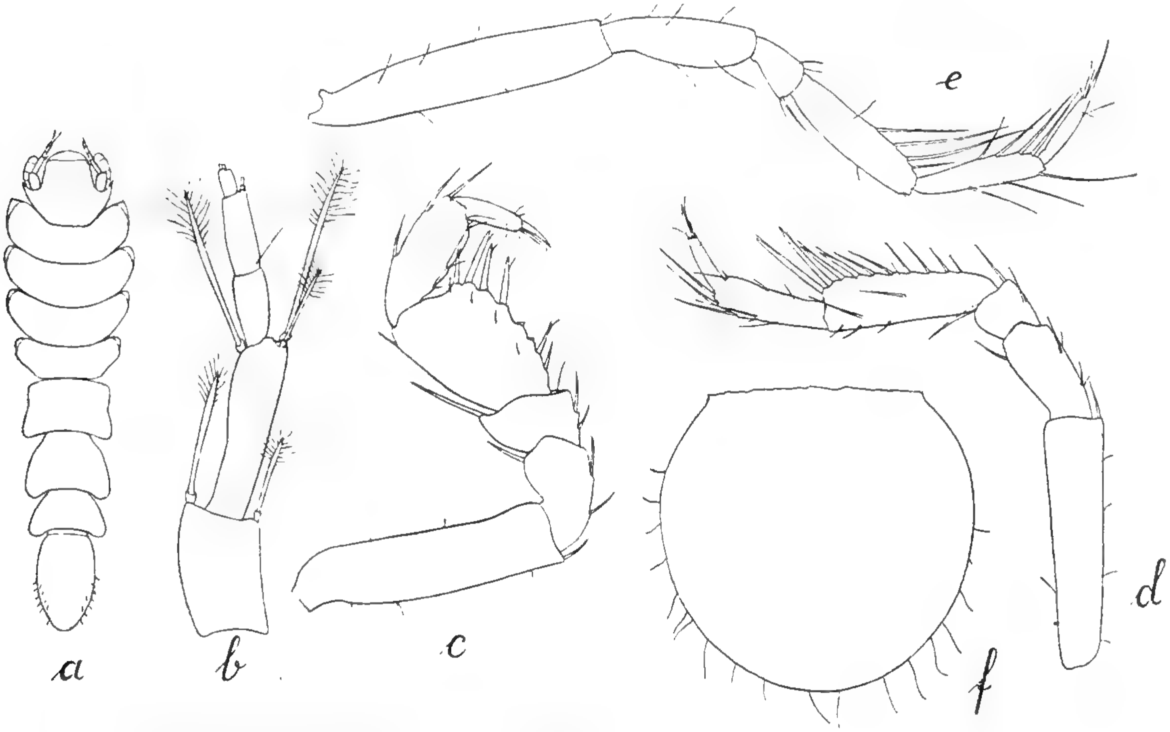

Fig. 75. *Desmosoma falklandicum* n. sp. a. Female, from above, 24 ×. b. Right antennula, female, 230 ×. c. Right first pereiopod, female, 95 ×. d. Right second pereiopod, female, 95 ×. e. Right seventh pereiopod, female, 95 ×. f. Female operculum, 125 ×.

Coxal plates small, on the first segment pointed, on the second to third segments rounded anteriorly.

Abdomen (Fig. 75 a). About as long as the seventh and sixth pereion segments together. Anteriorly there is a distinct free segment. Pleotelson oblong, being broadest about across the middle, somewhat more than half as long again as it is broad; its lateral sides provided with a few short setae.

Antennulae (Fig. 75 b). The proportion between the lengths of the joints is 17: 24: 10: 11: 4.

Antennae. Broken; only the first four short joints remain.

First pair of pereiopods (Fig. 75 c). They are the strongest of all the pereiopods and very characteristic. The carpus is very broad and expanded, sub-oval, about one-fifth as long again as the propodus. It increases somewhat in width towards its distal end. The proportion between its length and its greatest width is 12: 9 and, consequently its greatest width is three-fourths of its length. The distal margin in its lower part is free to about half its length, the proximal margin of the propodus being in contact only with the upper half of the distal margin of the carpus. The lower margin of the carpus is furnished with a longitudinal row of eight stout setae, most of them two-pointed. Submarginally at the lower margin there are four short, hair-like setae. The propodus is only slightly more than half as wide the carpus, the proportion between the width of the propodus and that of the carpus being 9: 16. Its upper margin is provided with three long single-pointed setae, one of them situated at the upper distal angle. The marginal part of the lower side of the propodus is very thin; it is furnished with four setae. Dactylus provided at the tip with a distinct claw and two setae.

Second pair of pereiopods (Fig. 75 d). More slender than the first pair. The basipodite and the carpus increase slightly in width towards their distal ends. The carpus is about three times as long as it is broad and approximately one-third as long again as the propodus, the proportion between its length and its width being 28: 9; the proportion between the lengths of the carpus and the propodus is 28: 20. The lower margin of the carpus is provided with 10 stout setae; upper setal row with sparse setae (two). The propodus is provided with four setae on its lower margin; two of which are situated at its lower distal angle. The upper row of setae consists of five long and some short setae. For other details see the figure.

Third pair of pereiopods. About as the second. Carpus with a lower row of 9 setae and an upper row of 4 setae.

Seventh pair of pereiopods. See fig. 75 e.

Operculum, female (Fig. 75 f). Almost circular; distal and lateral margins sparsely furnished with setae.

Uropods. Broken.

Remarks. *Desmosoma falklandicum* is especially characterized by its strong first pereiopods, which have the carpal joint expanded and furnished with stout setae. In contradistinction from the three above described species of *Desmosoma,* it thus belongs to Section II in HANSEN's analytical table of the genus[1]. *Desmosoma falklandikum* is easily recognized by its characteristic first pereiopods and the shape of its pereion, the first three segments of which are long, the third shorter and narrower, whilst the lateral margins of the fifth segment are concave. The shape of the abdomen is also characteristic.

Only a single specimen of this characteristic species was obtained by the Swedish Antarctic Expedition.

Locality and Material.

St. 40. Falkland Islands, Berkeley Sound, lat. 51° 33′ S., long. 58° 0′ W. 16 m. Bottom temp. + 2.75°. Gravel and shells with algae. $^{19}/_{7}$ 1902. One female specimen, about 2.5 mm. in length (type).

Distribution. Falkland Islands (Sw. Ant. Exped.).

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[1] HANSEN (1916, p. 107).

F. Group **Ilyarachnini** HANSEN, 1916.

For diagnosis see HANSEN (1916, p. 120—121).

Genus **Ilyarachna** G. O. SARS, 1863.

G. O. SARS, 1899, HANSEN 1916, BARNARD 1920.

For diagnosis see G. O. SARS (1899, p. 134—135) and HANSEN (1916, p. 121—122).

Ilyarachna antarctica VANHÖFFEN, 1914.

Text. figs. 76 a—d.

Ilyarachna antarctica. VANHÖFFEN, 1914 p. 591—592, Figs. 124 a and b.

Supplementary Description.

Antennulae (Fig. 76 a). First joint broad, its outer distal part triangularly produced and furnished with a ciliated seta at the tip; its lateral margin furnished with a row of two-pointed setae of the usual type; inner margin devoid of setae, except one short seta at the inner distal angle. Second joint much smaller than the first The third joint is very long and narrow, whilst the fourth is minute. The remaining part of the antennula is composed of eight narrow joints in the female, nine or ten in the male.

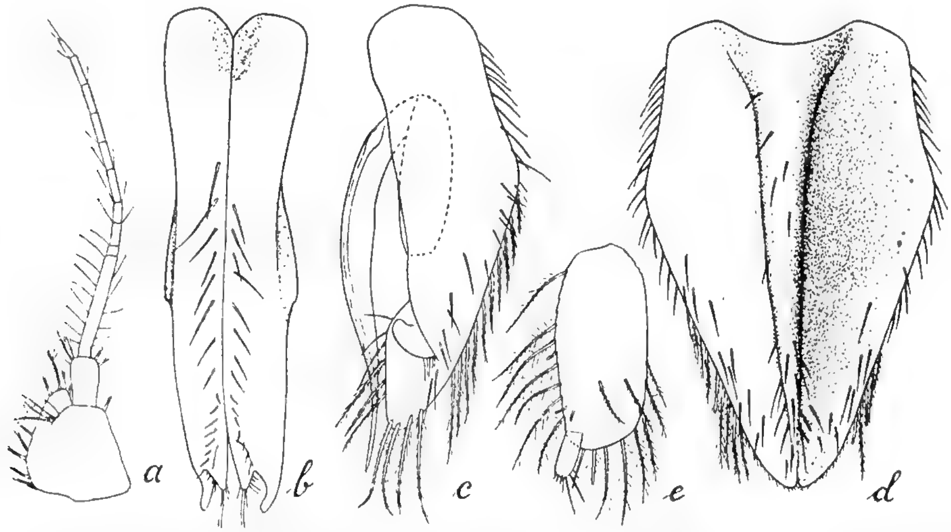

Fig. 76. *Ilyarachna antarctica* VANHÖFF. a. Left antennula, ovigerous female, 25 ×. b. First male pleopods 70 ×. c. Left second male pleopod, from the rostral side, 70 ×. d. Female operculum, 50 ×. e. Uropod, 70 ×.

Antennae. Broken in most of the specimens, so that only the first four short joints remain. In one ovigerous female, however, almost the whole of one antenna remains, the flagellum having been broken off only at the tip. In this specimen, in spite of the broken tip, the antenna attains a length of about three times the body length. The squama on the third joint is distinct but small. The fifth peduncular joint is provided with sparse setae; the sixth joint is almost smooth.

Mandibles. Of the usual type in the genus. Mandible corpus provided on its anterior side with a broad somewhat bright-golden carina. The lacinia is distinctly developed on the left mandible. The setal row consists of seven setae, on the left mandible. Molar tubercle tapering conically towards the end, which is furnished with three setae. Palp long and narrow, consisting of three joints, of which the second is the longest; the last joint is provided with two apical setae.

Maxillipeds. Of the usual type in the genus, having the second and third joints of the palp very broad. The epipodite is obtusely pointed distally. Coupling-hooks, five on the right, six on the left maxilliped.

First pair of pleopods, male (Fig. 76 b). Almost of uniform width. The anterior surface of the fused sympodites is provided with two longitudinal rows of setae, one on either side of the middle line. Both the digitiform exopodites and the subtriangular endopodites have coalesced with the sympodites, so that the sutures have been effaced.

Second pair of pleopods, male. See Fig. 76 c.

Operculum, female (Fig. 76 d). Provided with a sharp longitudinal carina along the middle line.

Uropods (Fig. 76 e). Exopodite completely wanting.

Locality and Material.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 5 specimens (2 small male specimens and 3 adult females, two of them with eggs). Length of largest specimen 5.3 mm. (female).

Distribution. South Georgia (Sw. Ant. Exped.), Gauss Station (VANHÖFFEN 1914). The species has not previously been recorded from South Georgia.

Genus **Echinozone** G. O. SARS, 1899.

For diagnosis see G. O. SARS (1899, p. 139).

Of this genus, which is closely allied to *Ilyarachna* G. O. SARS, only five species have been described; two of them, *E. coronata* G. O. SARS and *E. arctica* HANSEN, are from the northern area, whilst three species *E. quadrispinosa* (BEDDARD), *spinosa* HODGSON and *magnifica* VANHÖFFEN are Antarctic or subantarctic. *E. spinosa* HODGSON will be shown below to be synonymous with *E. quadrispinosa* (BEDDARD). The known southern forms of *Echinozone* are thus reduced to only two species.

Echinozone quadrispinosa BEDDARD, 1886.

Text figs. 77 a—l.

Ilyarachna quadrispinosa. BEDDARD, 1886, p. 76—78, Pl. XII, Figs. 2—6.

Echinozone spinosa. HODGSON, 1902, p. 255—256, Pl. XXXVIII and XXXIX, Figs. 1—10; MONOD, 1926, p. 23—25, Figs. 16, 17 a—f, 18.

Supplementary Description.

Antennulae. Extending to about half the length of the fourth peduncular joint of the antennae. First joint larger and broader than the others; its outer distal angle is triangularly produced and provided with a plumose seta at the tip. Second joint only about one-third as broad as the first, inserted at the inner part of the distal margin of the first joint. The remaining part of the antennula consists of about 24 joints, the first of which is very long, being about one-fourth the length of the others taken together.

Antennae (Figs. 77 a and b). First four peduncular joints very short, first and second laterally (posteriorly) produced and obtusely pointed, the third with a distinct, distally setiferous squama. Ventrally the distal margins of the second and third joints are each furnished with a row of two-pointed setae.

Mandibles (Fig. 77 c)[1]. Mandible corpus with a broad slightly bright-golden carina on its anterior side (not to be seen in the figure, which shows the posterior surface of the mandible). None of the mandibles have any lacinia (as is the case also in *Echinozone arctica* HANSEN)[2], but the ventral seta in the setal row is stronger in the left than in the right mandible and is probably homologous with the lacinia[3].

Maxillipeds. Endite with five coupling-hooks, distally with two submarginal rows of setae. The dorsal row consists of five broad setae, each with two rows of sub-branches[4]. The ventral row consists of a large number of slender setae.

Pereiopods. First pereiopod see Fig. 77 d. On the fifth and sixth pereiopods the basipodite is furnished with single-pointed setae without sub-branches, while the ischium is provided on its upper margin with a row of plumose setae, on its lower margin with branchless setae. The carpus and the propodus are furnished both on the upper and lower margins with plumose setae. I did not find a spine on the dorsal margin of the ischial joint, a feature which BEDDARD (1886) states to be characteristic of the species[5]; the spine is not figured by HODGSON (1902). On the seventh pereiopod the setal armature is similar to that of the fifth and sixth, except that the setae fringing the margins of the joints are more sparse. The small ischial joint of the last three pairs of pereiopods is furnished only with branchless setae.

First pair of pleopods, male (Figs. 77 e and f). They are inserted in the first abdominal segment. The fused sympodites are provided with a sharp longitudinal carina along the median line on the rostral side, gradually vanishing somewhat distally from the middle. The carina is furnished with one row of long setae, situated almost alternating with each other on either side of the middle line. This row has presumably been formed by the coalescence of two rows, as on the distal half of the sympodites it gradually divides into two distinct rows, where the setae gradually diminish in size. The exopodites and endopodites are fused with the sympodites. The exopodites are distally hook-shaped.

Second pair of pleopods, male (Fig. 77 g). Inserted in the pleotelson. The sympodite has the distal half of its lateral margin furnished with a row of plumose setae, which continues on the distal tip, where the setae are situated submarginally on the anterior side. The distal half of the anterior surface of the sympodite is moreover provided with long scattered branchless setae. The distal margin itself is covered with fine »hairs» lacking a setal canal. The rami (see the figure) are both short.

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[1] Cf. also HODGSON (1902, Pl. XXXIX, Fig. 8) and MONOD (1926, Fig. 18).

[2] See HANSEN, 1916, p. 129.

[3] Cf. MONOD, 1926, Fig. 18.

[4] The setae have the same construction as those from the same place in *Ianira* (*Iathrippa*) *longicauda* (CHILTON). See Fig. 40 e.

[5] See BEDDARD, 1886, Pl. XII Fig. 6.

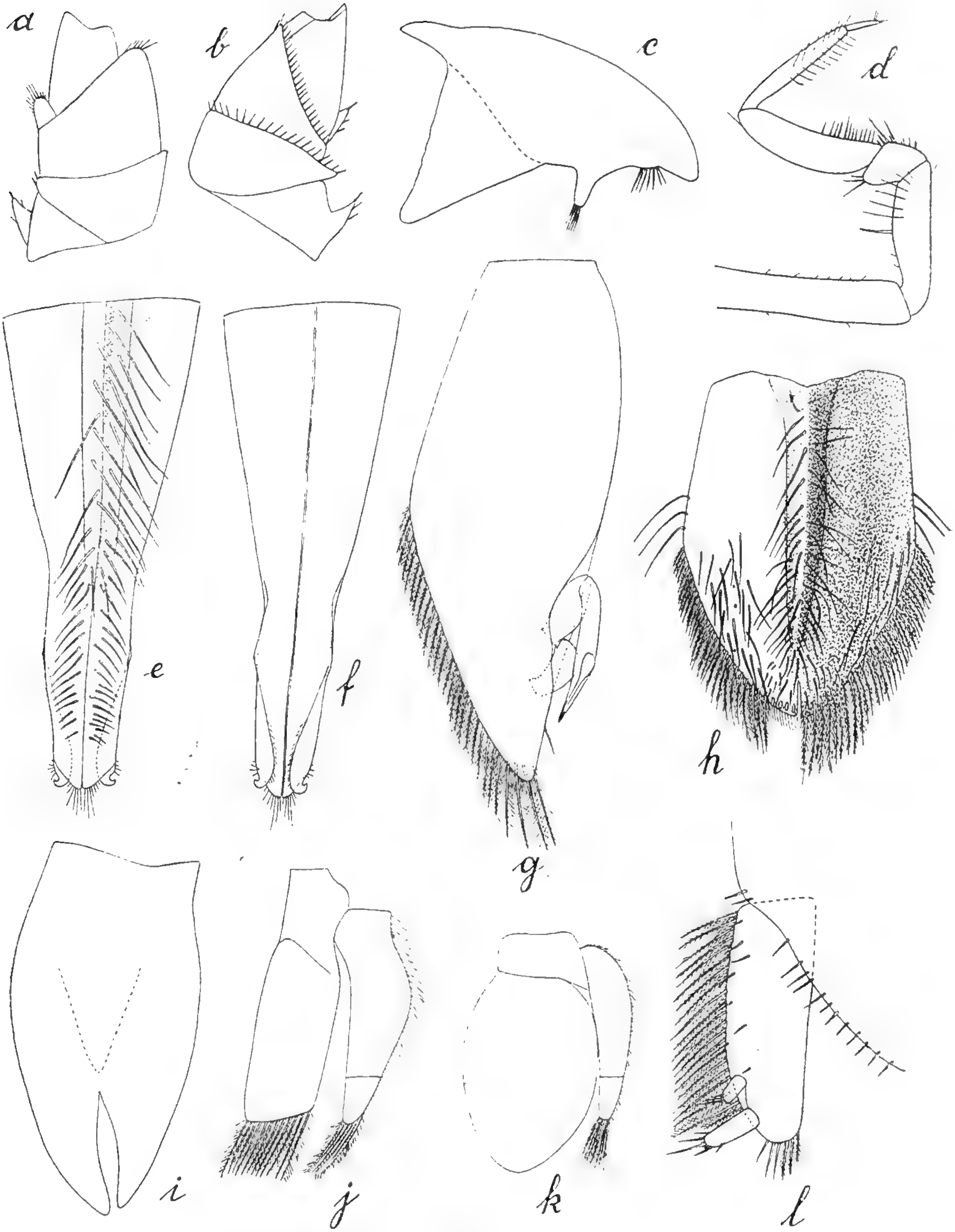

Fig. 77. *Echinozone quadrispinosa* (BEDD.). a. Proximal joints of the left antenna, from above, 18 ×. b. The same from below, 18 ×. c. Right mandible, from the posterios side, male, 50 ×. d. First pereiopod, adult female, 18 ×. e. First male pleopods, seen from the rostral side, 80 ×. f. First male pleopods, seen from the caudal side, 80 ×. g. Left second male pleopod, from the caudal side, 80 ×. h. Female operculum, 25 ×. i. Female operculum from immature specimen taken out of the marsupium, 240 ×. j. Third pleopod, 30 ×. k. Fourth pleopod, 30 ×. l. Left uropod, seen from the ventral side, female, 80 ×.

Operculum, female (Fig. 77 h). Inserted in the pleotelson. It is strongly vaulted. Lateral margin in its proximal half straight, in its distal half convex. Distal margin at the tip with a short but distinct incision. The operculum is provided along the median line of its anterior surface with a sharp longitudinal carina furnished with long setae, which proximally are situated approximately alternating with each other on the right and left side of the middle line, but distally are arranged in two distinct longitudinal rows. The longitudinal carina narrows towards its distal end and is marked off by grooves; also its distal end is abruptly delimited from the rest of the operculum. The distal halves of the lateral margins are furnished with rows of plumose setae, increasing in length towards the distal end and continuing on the distal tips (exactly as in the second male pleopods) with some submarginal setae on the anterior side; the distal margin itself is furnished with fine »hairs».

In young individuals taken out of the marsupium (Fig. 77 i) the longitudinal carina of the operculum is only slightly indicated, and the incision in the distal margin is longer and much more marked than in adult individuals, thus indicating that the operculum was originally formed by the coalescence of two distinct plates.

Third pair of pleopods (Fig. 77 j). Similar in both sexes. Basipodite longer than broad; proximal and inner margins straight; outer margin irregularly curved; distal margin straight, oblique. The exopodite has its outer margin convex and inner margin slightly concave. It is two-jointed, being divided by a suture into two plates, one large proximal and one small distal one. The second joint of the exopodite is furnished with about six plumose setae at the tip. The whole lateral margin of the exopodite is provided with »fine hairs». The endopodite is almost rectangular; its distal margin is furnished with about twelve plumose setae.

Fourth pair of pleopods (Fig. 77 k). Basipodite broader than long. Exopodite indistinctly two-jointed; its lateral margin provided with short, fine »hairs»; distal tip of the exopodite with about six plumose setae. Endopodite broad, ovate.

Fifth pair of pleopods. Basipodite small, vestigial, about rectangular. Exopodite wanting. Endopodite oval.

Uropods (Fig. 77 l)[1]. Inserted in small incisions on the lateral margin of the pleotelson and usually folded in below the pleotelson.

Variation. Of this species BEDDARD (1886) says that it is of small size. The largest specimen, an ovigerous female, seen by BEDDARD was only 6 mm. in length. HODGSON (1902) describes a species of *Echinozone* (*E. spinosa*), closely allied to *E. quadrispinosa*, but differing from the latter species in having a pair of spines on the dorsal side of the last two pereion segments. Regarding the size and sex of his specimens HODGSON gives no particulars.

As the difference indicated by HODGSON (1902) between his species *E. spinosa* and *E. quadrispinosa* is minute, VANHÖFFEN (1914, in describing *E. magnifica*) very properly makes the suggestion that the species of HODGSON is possibly identical with *E. quadrispinosa.*

MONOD (1926) examined three female specimens from the Antarctic, the largest 11 mm. in length, yet with only rudiments of oostegits. All his three specimens had

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[1] See also MONOD, 1926, Fig. 17 E.

a considerably greater length than that previously stated by BEDDARD (1886) to be characteristic of *E. quadrispinosa.* As in their spine-armature they essentially agreed with the figure and description by HODGSON (1902, *E. spinosa*), he refers them[1] to the species of HODGSON.

They also differ from HODGSON's specimens (1902) in another respect; they all have the last peduncular joint of the antennae about as long as the body, whereas in the figure by HODGSON (1902) it is only about equal in length to the head and the first five pereion segments together. MONOD therefore presumes that the length of the last peduncular joint of the antennae varies in specimens of different size.

The Swedish Antarctic Expedition collected a large amount of material of *Echinozone quadrispinosa,* so that I have been in a position to study the variation within the species. As regards spine-armature, the variation is considerable. This will be illustrated by the tabular view below, which comprises 35 specimens (14 males, 21 females), all from South Georgia.

Spine-armature on the fifth to seventh pereion segments of Echinozone quadrispinosa (BEDDARD).

	Number of specimens.	
	Males	Females
1. Fifth, sixth and seventh pereion segments smooth or almost smooth (quadrispinosa-specimens, typical)	0	9
2. Fifth pereion segment spinous, sixth and seventh smooth (quadrispinosa-specimens, non-typical)	1	7
3. Fifth and sixth pereion segments spinous, seventh smooth (spinosa-specimens, non-typical)	9	1[2]
4. Fifth, sixth and seventh pereion segments spinous (spinosa-specimens, typical)	4	4[3]

As shown by the tabular view the examined material contains both specimens which agree with *quadrispinosa* (BEDDARD) and with *spinosa* (HODGSON), as well as all manner of transitional forms between the two supposed species. I therefore regard *spinosa* HODGSON as synonymous with *quadrispinosa* BEDDARD. It will also be seen that the males are generally more spinous than the females. All the males examined, but only 12 of the females, had spines or distinct tuberculae on the fifth pereion segment, nine females having no spines or tuberculae on that segment. Whether abundant and distinct spine-armature of the male sex always occurs in this species is a question which cannot be settled on the basis of the table. After comparing the spine-armature of specimens with their size, I came to the conclusion that larger specimens are generally more spinous than smaller ones. But from this rule there were many exceptions. Thus one female, only 3 mm. in

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[1] Their spine-armature is, however, very similar to that characteristic of *E. quadrispinosa* according to BEDDARD (1886), as »les tubercules spiniformes dorseaux de la division postérieure du péréion sont ici à peine perceptible et moins développés que sur la figure de HODGSON» (MONOD, 1926, p. 24).

[2] Distinct spines on the fifth, tuberculae on the sixth segment.

[3] Distinct spines on the sixth, tuberculae on the seventh segment.

length, had spines on the fifth pereion segment, whilst in one adult female, 5 mm. in length, spines were wanting on that as well as on the following segments.

As mentioned above, MONOD (1926) observed a considerably greater length of the last peduncular joint of the antennae in his examined specimens than was stated by HODGSON in 1902; he presumes that the length of the last peduncular joint varies with the size of the specimens. I investigated this matter by comparing the length of the last peduncular antennal joint with the lengths of the specimens examined. In my material only eleven specimens (two males, nine females) had one or both of the antennae still adhering to the head. The lengths of their last peduncular joints, as well as their size, are given in the table below.

Length of the last peduncular joint of the antennae and the size of the specimens in Echinozone quadrispinosa (BEDDARD).

Length of the specimens in mm.	*Length of the last peduncular joint of the antennae in mm.*	*Loc.*
Females.		
3.5 (without oosteg.)	Extending to the anterior margin of the seventh pereion segment.	St. 34
3.5 » »	Extending to the anterior margin of the abdomen	St. 34
4.4 » »	Extending to the middle of the seventh pereion segment	St. 34
4.4 » »	Extending to the anterior margin of the abdomen	St. 34
6.0 (oostegits semi-developed)	» » » » » » » »	St. 22
6.3 »	» » » » » » » »	St. 22
6.4 »	» » » » » » » »	St. 34
6.8 »	» » » » » » » »	St. 34
7.2 (rudiments of oostegits)	» » » » » » » »	St. 34
Males.		
(3.9[1]	Extending to the end of abdomen	St. 24)
4.0	Extending to half the length of the abdomen	St. 34
6.0	Extending behind the body (the joint was one-fourth longer than the specimen)	St. 34

From this table it will be seen that most of the female specimens have the last peduncular joint of the antennae about as long as the head plus the pereion. This was observed in female specimens of a length ranging from 3.5 to 7.2 mm., which gives support to the view that the length of the last peduncular antennal joint, does not increase in length with age. It must be brought in view, however, that I have not examined specimens of such great length as those investigated by MONOD (1926). That a considerable variation in the length of the last peduncular joint of the antennae is found in the species, even in specimens of the same size, is shown by the table; in the two smallest specimens, both 3.5 mm. in length, the joint in one case extended to the anterior margin of the seventh

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[1] The antenna was not found adhering to the head, but it probably belongs to that specimen.

pereion segment, and in the other to the anterior margin of the abdomen. In no specimen, however, was the joint so short as in the specimen figured by HODGSON (1902), where the last peduncular joint of the antenna only reached the anterior margin of the sixth pereion segment. The males (only three specimens) show a considerable difference from the females. The length of the last antennal peduncular joint, in all specimens, is much greater than in the females, amounting in the small specimen (4 mm.) to half the length of the abdomen; in the largest specimen (6 mm.) the joint is of a remarkable length, being about one-fourth longer than the body. The measurements show that in the males the last antennal peduncular joint is longer than in the females, and that its length in the specimens examined increases with size. But, as only three male specimens were examined it cannot be decided whether the difference in length of the last peduncular antennal joint is not due to a considerable individual variation.

A characteristic feature of those specimens of *Echinozone quadrispinosa* which have been collected in the Antarctic, is their larger size compared with specimens found in subantarctic waters (see MONOD, 1926). The largest specimen from the Expédition Antarctique Belge 1897—99 was a female 11 mm. in length and was not yet mature, being furnished only with rudiments of oostegits, whilst BEDDARD (1886) gives the length of his largest specimen (ovigerous female) collected off the Kerguelen as only 6 mm.

As the material from the Swedish Antarctic Expedition contains only one specimen collected in the Antarctic (Graham Region), I cannot say anything about the variation of Antarctic specimens of *Echinozone quadrispinosa.* The specimen from Graham Region, is, however, the largest of all the specimens collected during the Expedition and the largest of all specimens of *Echinozone* hitherto caught. It is a female about 17 mm. long and yet having only semi-developed oostegits. The largest specimen from South Georgia obtained by the Expedition is a female with semi-developed oostegits 9.7 mm. in length. Some of the specimens collected at the same time and locality are only about 5 mm. in length, but have, however, a fully developed marsupium. This considerable variation of size in adult specimens from the same material gives support to the supposition that the females may survive the laying of offspring and may mature several times; thus, increasing in size after every moult, they may attain, comparatively speaking, gigantic proportions.

Remarks. The female and the male operculum show a remarkable resemblance to each other. Though the male operculum is formed by three plates (the fused first pair of pleopods and the second pleopods), these three plates lie so very close together that without separating the plates it is difficult on a superficial view to determine the sex by observing the pleopods.

The shape of the female and male operculum is quite the same, and in both sexes there is a distinct longitudinal carina on the anterior side. The setal armature is similar in almost every detail (cf. Figs. 77 e, g and h). Thus the longitudinal carina is furnished with long setae, which distally are arranged in two distinct longitudinal rows. The lateral margins in both the male and female operculum are likewise furnished each with a row of plumose setae, distally continuing in a submarginal row on the anterior side, whilst the distal margins themselves are equipped with fine »hairs». This similarity between the male and the female operculum is partly due to the fact that the first pleopods in the male have assumed a carinated shape, almost the same as the carina in the female operculum. That the parts of the female operculum other than the carina, on the other hand, show a detailed resemblance to the second pleopods of the male, is presumably due to the homology between the sympodites of the second male pleopods with the female operculum.

Echinozone quadrispinosa very closely resembles *Echinozone magnifica* VANHÖFFEN (1914), which differs merely in having a larger number of spines in the transverse spine-rows on the first four pereion segments, but this only in specimens about 5 mm. in length, whilst the spine-armature of small specimens up to 2 mm. is just as in *Echinozone quadrispinosa.* Another difference which VANHÖFFEN mentions, viz. that the lateral margins of the pleotelson in *Echinozone magnifica* are furnished with incisions, does not hold good; also in *Echinozone quadrispinosa* there occur the same incisions for the insertions of the uropods.

Localities and Material.

St. 8. Graham Region. Situation of the station as well as depth uncertain, lat. 64°, 3′ S., long. 56°, 37′ W (360 m?). Soft clay. $^{11}/_{2}$ 1902. Large female specimen possessing semi-developed marsupial plates; length about 17 mm.

St. 18. South Georgia, mouth of Westfjord, Cumberland Bay, lat. 54°, 15′ S., long. 36°, 25′ W. 250 m. Bottom temp. + 1.2°, Soft clay. $^{22}/_{4}$ 1902. A large, damaged female specimen with head and first pereion segment missing.

St. 24. South Georgia, off Grytviken, lat. 54°, 22′ S., long. 36°, 27′ W. 95 m. Clay. $^{20}/_{5}$ 1902. 3 specimens; length of the largest specimen, 8.3 mm., (female with semi-developed oostegits).

St. 33. South Georgia, Grytviken, lat. 54°, 22′ S., long. 36° 28′ W. 22 m. Clay and algae. $^{30}/_{5}$ 1902. Female possessing semi-developed oostegits; length about 4.7 mm.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54°, 11′ S., long. 36°, 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. About 72 specimens. Length of the largest specimen, a female with the oostegits semi-developed, 9.7 mm.

Distribution. South Georgia (Sw. Ant. Exped.), Kerguelen (BEDDARD 1886), West of Graham Region (MONOD 1926), Graham Region (Sw. Ant. Exped.), Victoria Land (HODGSON 1902).

The species has not previously been recorded from South Georgia; nor has it been taken at Graham Region, though the Belgian Antarctic Expedition 1897—99 collected material at stations situated slightly west of Graham Region.

G. Group **Eurycopini**, HANSEN, 1916.

For diagnosis see HANSEN (1916, p. 129—130).

Genus **Eurycope** G. O. SARS, 1863.

G. O. SARS, 1899; VANHÖFFEN, 1914.

For diagnosis see G. O. SARS (1899, p. 144).

Eurycope sp. (cf. **frigida**, VANHÖFFEN, 1914).

Text figs. 78 a—h.

Description.

General shape of body (Fig. 78 a). As in *Eurycope frigida* VANHÖFFEN.

Head. With a trapezoidal »front area». See Fig. 78 a, which illustrates a female specimen with semi-developed oostegits, about four mm. in length. The shape of the »front

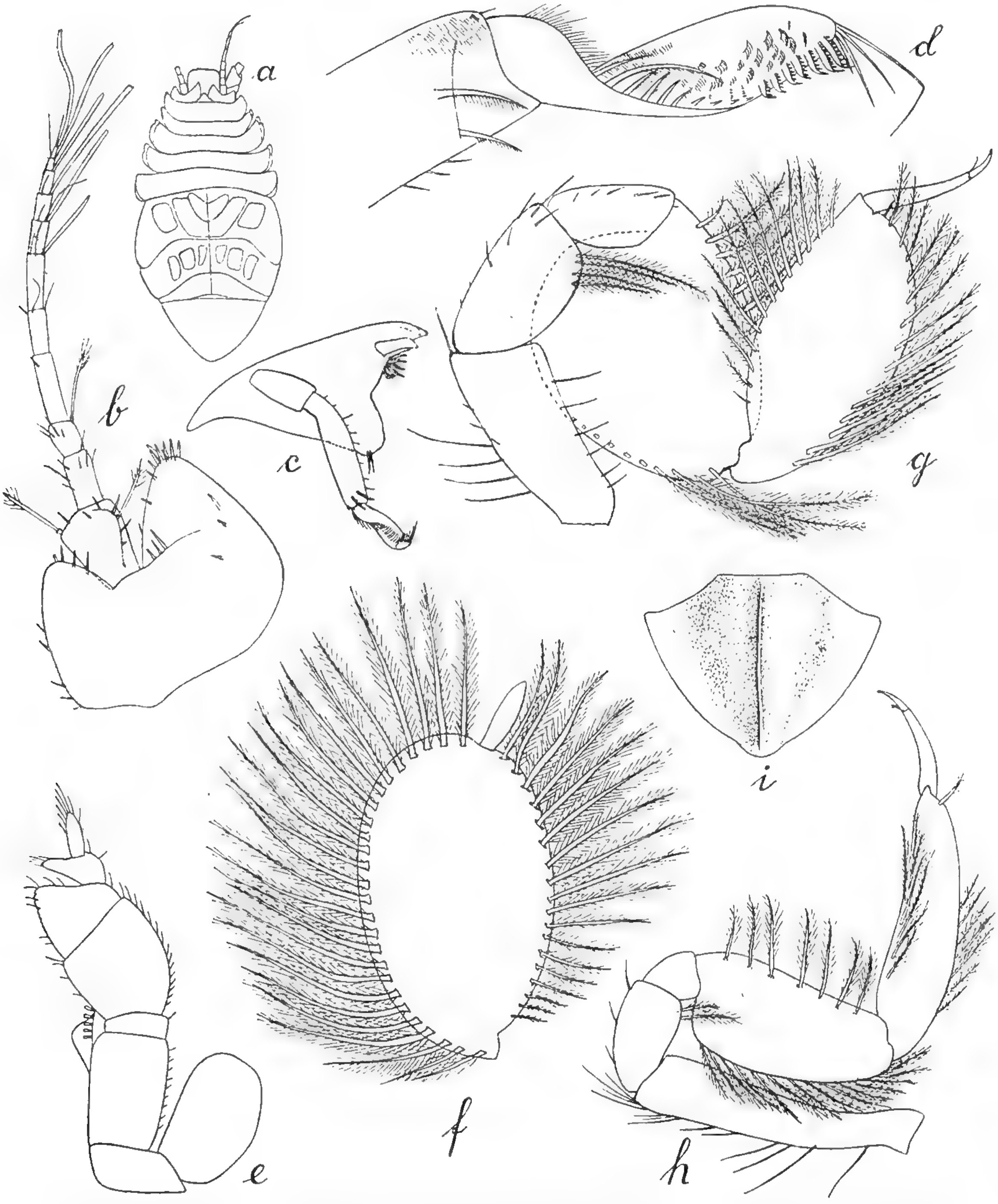

Fig. 78. *Eurycope* sp. (cf. *frigida* VANHÖFF.). a. Female, from above, 10 ×. b. Antennula, female, 80 ×. c. Left mandible, female, 50 ×. d. Third joint and distal part of the second joint of the mandibular palp, 240 ×. e. Maxilliped, female, 45 ×. f. Propodus and dactylus of the fifth pereiopod, female, 80 ×. g. Sixth pereiopod female, 80 ×. h. Left seventh pereiopod, female, 80 ×. i. Female operculum, 30 ×.

area» is the same as that in *Eurycope frigida* (see VANHÖFFEN, 1914, Figs. 122 a and b). But in his description of *Eurycope frigida* VANHÖFFEN (1914, p. 590) says of the head »vorn etwas wellig abgeschnitten».

Pereion. See Fig. 78 a. Similar in shape to that in *Eurycope frigida* VANHÖFF. The last three segments decrease in length from the fifth to the seventh; the seventh is slightly longer than figured by VANHÖFFEN; they are immovably attached to one another but distinctly delimited; along their middle line there is a faint longitudinal groove. The fifth and sixth segments are faintly sculptured in the way shown in Fig. 78 a.

Coxal plates distinct on the first four pereion segments. On the first three segments they are in contact with the whole lateral margin, whilst on the fourth they are smaller, being in contact with the posterior part of the lateral margin of the segment and leaving the anterior part of the margin free. The coxal plates on the second and third pereion segments have a distinct lateral incision.

Antennulae (Fig. 78 b). First peduncular joint very broad, broader than long; outer distal and inner distal parts triangularly produced, the inner distal projection being the largest. The comparatively small second peduncular joint is longer than it is broad and increases slightly in width towards the distal end. The two following joints are narrow but more setose than the joints of the flagellum. Third peduncular joint only about half as broad as the second joint and half as long again as the fourth. The flagellum consists of eight joints, of which the first is the longest.

Antennae. Only the first four short peduncular joints remain. Squama with distal margin evenly rounded, furnished with six setae.

Mandibles (Figs. 78 c and d). Incisive part with two large points and two smaller points[1]. Lacinia (on the left mandible) with two points. Row of setae on the left mandible with six to eight setae. Molar tubercle strong, subconical, proximally very broad, distally truncate, and provided with five or six small teeth[1]. There are two small setae at the tip of the molar tubercle. Palp consisting of three joints, of which the second is the longest, being about twice as long as the first; it is furnished with two distal plumose setae. The third joint, which is slightly longer than the first, forms a thin plate (Fig. 76 d) of peculiar shape. Its upper side is vaulted, the lower side hollowed. Proximal part of the rostral margin with fine »hairs»; middle part of the rostral margin with stout setae decreasing in length distally. Distal part of the rostral margin furnished with seven projecting pectinate scales increasing in size towards the distal end. The lower surface is covered with pectinate scales of typical form. The distal end of the joint is provided with three long setae.

First pair of maxillae. Typical of the genus. Inner lobe distally provided with a large number of slender setae.

Second pair of maxillae. Typical of the genus. Lappets of outer lobe together about as broad as the inner lobe, each with three long apical setae. Inner lobe with a large number of apical setae, situated in two rows.

Maxillipeds (Fig. 78 e). Typical of the genus. Epipodite oval, with distal margin broadly rounded. Endite with five coupling-hooks. In *Eurycope frigida* VANHÖFFEN

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[1] Not to be seen in the figure.

the epipodite is pointed[1]. In one of Vanhöffen's specimens[2] of *Eurycope frigida*, re-examined by me, I found that the epipodite was still more pointed than figured by Vanhöffen, extending to the end of the second joint of the palp.

Upper lip. About semi-circular, with front margin evenly convex.

Pereiopods. The first four pereiopods were all broken. The fifth pereiopod (Fig. 78 f) with the first three joints decreasing in length. Carpal joint expanded, slightly longer than broad. Propodus expanded, about half as long again as broad. Dactylus very short, vestigial, about one-fourth as long as the propodus. Sixth pereiopod (Fig. 78 g) like the fifth, but the propodal joint is a little narrower and about twice as long as it is broad; dactylus well developed, furnished with a distinct claw. The seventh pereiopod (Fig. 78 h) has its carpal and propodal joints slightly expanded and provided with sparse plumose setae on its upper and lower margins.

Operculum, female (Fig. 78 i). Sub-pentagonal. Proximal margin divided into a median and two lateral parts forming obtuse angles with each other. Lateral margins convex, except distally, where they are slightly concave. Distal tip obtusely rounded. A sharp carina stretches along the middle line on the anterior side; the carina is sharpest in the middle and widens out somewhat distally.

Uropods. Broken.

Remarks. The species is closely allied to *Eurycope frigida* Vanhöffen. I have compared my specimens with the type specimen of *Eurycope frigida* Vanhöffen, from the Museum in Berlin. The described species agrees with *Eurycope frigida* Vanhöffen in the shape of the head and the pereion; also the same sculpturing of the fourth and fifth pereion segments was found in the type specimen. It differs, however, from *Eurycope frigida* Vanhöffen in its maxillipeds, which have their epipodites broadly rounded distally.

Locality and Material.

St. 34. South Georgia, off the mouth of Cumberland Bay, lat. 54° 11′ S., long. 36° 18′ W. 252—310 m. Bottom temp. + 1.45°. Gray clay with a few stones. $^{5}/_{6}$ 1902. 2 small damaged female specimens.

Distribution. South Georgia (Sw. Ant. Exped.).

The closely allied species *Eurycope frigida* Vanhöffen has been found in the East Antarctic (Gauss Station).

II. Fam. **Stenetriidae.**

Genus **Stenetrium,** Haswell, 1881.

Stenetrium acutum Vanhöffen, 1914.

Stenetrium acutum. Vanhöffen, 1914, p. 546—548, Figs. 72, 73 a—h.

Locality and Material.

St. 5. Graham Region. S. E. of Seymour Island, lat. 64°, 20′ S., long. 56°, 38′ W. 150 m. Sand and gravel. $^{16}/_{1}$ 1902. Male specimen; 8.6 mm. in length, large specimen with the abdomen missing, head and pereion together about 8.9 mm. in length.

Distribution. Gauss Station (Vanhöffen 1914), Graham Region (Sw. Ant. Exped.).

The species has not previously been recorded from the West Antarctic.

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[1] See Vanhöffen, 1914, Fig. 122 b.

[2] Some specimens of *Eurycope frigida* Vanhöffen were kindly sent to me for investigation from the Museum in Berlin.

SECTION VI.

Table of Distribution.

	Coast of Central Chile	Argentina	Patagonia	Tierra del Fuego and Mag. Straits	Burdwood Bank	Falkland Islands	Shag Rock Bank	South Georgia	West Antarctic	East Antarctic	Other localities
Serolis paradoxa	+		+	+		+		+			
Serolis schythei	+	+	+	+		+		+	+		
Serolis polaris		+									South Sandwich Islands.
Serolis trilobitoides			+	+					+	+	Kerguelen.
Serolis septemcarinta								+			South Atlantic E of Patag. N. of Falkl. Isl., Prince Edw. Isl., Crozet Isl., Kerguelen.
Serolis polita								+	+		S. Atlantic. N. of Falkl. Isl. E. of Patagonia, S. Sandw. Isl.
Serolis glacialis var. austrogeorgiensis								+			
Serolis exigua						+					
Serolis gaudichaudii	+										
Serolis convexa				+		+		+			S. Sandw. Isl.
Serolis minuta var. eugeniae											Australia.
Serolis pagenstecheri								+			
Serolis pagenstecheri var. albida							+				
Serolis bouvieri									+		
Serolis australiensis											Australia.
Serolis longicaudata											Australia.
Idothea metallica			+	+						+	Almost universal.
Edotia tuberculata			+	+		+		+			
Edotia magellanica			+	+							
Edotia bilobata						+					
Cleantis linearis	+		+								
Cleantis granulosa		+		+							St. Paul.
Glyptonotus antarcticus								+	+		
Glyptonotus antarcticus var. acutus								+	+	+	
Macrochiridothea stebbingi var. multituberculata						+					
Pseudidothea bonnieri			+			+					
Neastacilla falclandica						+					N. Zealand.
Neastacilla magellanica				+		+					
Antarcturus furcatus							+	+	+	+	Kerguelen, Heard Island.
Antarcturus americanus			+	+		+					
Antarcturus brunneus var. spinulosus							+	+			
Antarcturus franklini						+			+	+	
Antarcturus antarcticus							+	+	+		S. Sandw. Islands.
Antarcturus granulosus							+	+			
Microarcturus stebbingi							+	+			Kerguelen.
Microarcturus rugosus							+		+		
Microarcturus digitatus							+	+			
Ianira (Iathrippa) longicauda	+		+	+	+	+		+			Campbell Isl., N. Zealand.

	Coast of Central Chile	Argentina	Patagonia	Tierra del Fuego and Mag. Region	Burdwood Bank	Falkland Islands	Shag Rock Bank	South Georgia	West Antarctic	East Antarctic	Other localities
Iantra (Iathrippa) sarsi							+	+	+	+	S. Atlantic. E. of Patagonia. N. of Falkl. Isl., Kerguelen.
Iais pubescens				+		+					Widely distributed up to Cameroon and Ceylon.
Ianthopsis bovalli			+			+		+		+	Kerguelen.
Ianthopsis nasicornis								+		+	
Ectias turqueti								+	+	+	
Neojaera antarctica				+		+		+			Juan Fernandez, S. Atl. E. of Pat. N. of Falkl. Isl., Kerguelen.
Jaeropsis patagoniensis			+	+	+	+					
Jaeropsis intermedius		+		+	+	+					
Antias hispidus						+			+		St. Paul, Auckl. Isl.
Antias marmoratus								+			St. Paul, Kerguelen.
Antias Hofsteni								+			
Munna maculata						+					Kerguelen.
Munna pallida						+					Kerguelen.
Munna antarctica								+		+	
Munna neglecta						+			+		S. Orkney Isl.
Munna affinis								+			
Munna bituberculata								+			
Munna nana						+					
Coulmannia australis								+	+	+	
Paramunna integra					+	+					
Paramunna antarctica								+	+		
Paramunna serrata						+			+		
Paramunna subtriangulata				+				+	+		
Paramunna rostrata								+	+	+	Kerguelen.
Paramunna dentata						+					
Austrosignum glaciale								+		+	
Austrosignum falklandicum					+	+					
Pleurosignum magnum					+	+				+	
Pleurosignum elongatum						+				+	
Antennulosignum elegans						+					
Austrofilius furcatus				+		+		+	+	+	S. Africa, Kerguelen.
Desmosoma australis								+			
Desmosoma brevipes								+			
Desmosoma modestum								+			
Desmosoma falklandicum						+					
Ilyarachna antarctica								+		+	
Echinozone quadrispinosa								+	+	+	Kerguelen.
Eurycope sp. cf. frigida								+			
Stenetrium acutum									+	+	

SECTION VII.

Bibliography.

Audouin and Milne Edwards. 1841. Description des Crustacés nouveaux ou peu connus. Arch. du Mus. d'Hist. Nat. T. 2. Paris 1841.

Barnard, K. H. 1914. Contributions to the Crustacean Fauna of South Africa, 1. Additions to the Marine Isopoda. Ann. S. Afric. Mus. Vol. 10. London 1914.

— 1914 a. Contributions to the Crustacean Fauna of South Africa, 3. Additions to the Marine Isopoda with Notes on some previously incompletely known species. Ann. S. Afric. Mus. Vol. 10. London 1914.

— 1920. Contributions to the Crustacean Fauna of South Africa, 6. Further Additions to the List of Marine Isopoda. Ann. S. Afric. Mus. Vol. 17. London 1920.

— 1925. Contributions to the Crustacean Fauna of South Africa, 9. Further Additions to the List of Isopoda. Ann. S. Afric. Mus. Vol. 20. 1925.

— 1927. A study of the freshwater Isopodan and Amphipodan Crustacea of South Africa. Trans. Royal Soc. S. Afric. Vol. XIV. Part 2. 1927.

Beddard, F. E. 1884. Report on the Isopoda collected by H. M. S. Challenger during the years 1873—76. Part I. The genus Serolis. »Challenger» Reports. Zoology. Vol. XI. London 1884.

— 1886. Report on the Isopoda collected by H. M. S. Challenger during the years 1873—76. Part II. »Challenger» Reports. Zoology. Vol. XVII. London 1886.

Benedict, J. E. 1898. The Arcturidae in the U. S. National Museum. Proc. Biol. Soc. Washington. Vol. XII. 1898.

Bonnier, J. 1896. Édriopthalmes, in, Koehler, R.: Résultats scientifiques de la campagne du »Caudan». Paris 1896.

Bouvier, M. E. L., 1911; in, Chevreux, M. E., Algunos animales marinos de las Islas Sandwich. Anal. Mus. Nac. Buenos Aires. Ser. III. T. XIV. 1911.

Bovallius, C. 1881. *Ianthe*, a new genus of Isopoda. Bihang till K. Svenska Vet. Akad. Handl. Band 6, nr. 4. Stockholm 1881.

— 1886. Notes on the family Asellidae. Bihang till K. Svenska Vet. Akad. Handl. Bd. 11, nr. 15. Stockholm 1886.

Calman, W. T. 1909. Crustacea; in, A treatise on Zoology edited by Sir Ray Lankester. Part. 7. Fascicle III. London 1909.

— 1920. A new species of the Isopod Genus *Serolis*. Ann. Mag. Nat. Hist. Ser. 9. Vol. 6. London 1920.

Chilton, Ch. 1883. On two new Isopods. Trans. New Zeal. Inst. Vol. 15, 1882, Wellington 1883.

— 1884. Additions to the sessile-eyed Crustacea of New Zealand. Trans. New Zeal. Inst., Vol. 16, 1883. Wellington 1884.

— 1892. Notes on some New Zealand Amphipoda and Isopoda. Trans. New Zeal. Inst. Vol. 24, 1891. Wellington 1892.

— 1906. List of Crustacea from the Chatham Islands. Trans. New. Zeal. Inst. Vol. 38, 1905. Wellington 1906.

— 1909. The Crustacea of the Subantarctic Islands of New Zealand. »The Subantarctic Islands of New Zealand». Vol. II. Wellington 1909.

CHILTON, CH. 1912. Miscellaneous Notes on some New Zealand Crustacea. Trans. New Zeal. Inst. Vol. 44, 1911. Wellington 1912.

— 1917. Notes on Australian Isopoda. Trans. Royal Soc. S. Austral. Vol. 41. Adelaide 1917.

COLLINGE, W. E. 1916. Description of a new species of Marine Isopoda of the genus *Pentias*, RICHARDSON. Journ. Zool. Research. Vol. 1, nr. 1. London 1916.

— 1916 a. On the marine Isopod *Idotea ochotensis* BRANDT. Journ. Zool. Research. Vol. 1, nr. 2. London 1916.

— 1916 b. On the structure of the marine Isopod *Mesidotea sibirica* (BIRULA) with some Remarks upon allied genera. Journ. Zool. Research. Vol. 1, nr. 2. London 1916.

— 1916 c. Some Remarks upon the Structure and generic position of *Idotea lacustris*, THOMSON. Journ. Zool. Research. Vol. 1, nr. 4. London 1916.

— 1917. A Revision of the British Idoteidae, a Family of Marine Isopoda. Trans. Royal. Soc. Edinburgh. Vol. 51. Part 3. Edinburgh 1917.

— 1918. Some Observations upon two Rare Marine Isopods. Journ. Zool. Research. Vol. III. London 1918.

— 1918 a. On the Oral Appendages of certain Species of Marine Isopoda. Journ. Linn. Soc. London. Zoology. Vol. 34. London 1918.

CUNNINGHAM, R. O. 1871. Notes on the Reptiles, Amphibia, Fishes, Mollusca and Crustacea obtained during the voyage of H. M. S. »Nassau». Trans. Linn. Soc. London. Vol. 27. 1871.

DANA, J. D. 1849. Conspectus Crustaceorum. Amer. Journ. Sci. and Arts. Ser. 2. Vol. 8. New Haven 1849.

— 1852. »Crustacea», in, »United States Exploring Expedition». Vol. 13. Philadelphia 1852.

DOLLFUS, A. 1891. Crustacés Isopodes. »Mission Scientifique du Cap Horn 1882—1883.» Zoologie. Tome VI. P. 2. Paris 1891.

EIGHTS, J. 1833. Description of a new Crustaceous Animal, found on the Shores of South Shetland Islands, with Remarks on their Natural History. Trans. Albany Inst. Vol. II. Albany 1833.

— 1856. Description of an Isopod Crustacean from the Antarctic Seas, with Observations on the New South Shetlands. Americ Journ. Sci. and Arts Ser. 2. Vol. 22. New Haven 1856.

FABRICIUS, J. C. 1775. Systema entomologiae. Flensburg et Leipzig 1775.

GERSTECHER, A. and ORTMANN, A. E. 1901. Malacostraca. Ordnung Isopoda; in, Bronn: Die Klassen und Ordnungen des Thierreichs. Band V, Abt. II. Leipzig 1901.

GIAMBIAGI, D. 1925. Crustáceos Isópodos. Resultados de la Primera Expedición a Tierra del Fuego (1921). Buenos Aires 1925.

GIESBRECHT, W. 1913. Crustacea; in, Lang A.: Handbuch der Morphologie der wirbellosen Tiere. Erste und zweite Lieferung. Jena 1913.

GRUBE, E. 1875. Beitrag zur Kenntnis der Gattung *Serolis* und einer neuen Art derselben. Arch. f. Naturgesch. Jahrg. 41. Bd. 1. 1875.

HALE, H. 1924. Notes on Australian Crustacea, Nr. III. Trans. Royal. Soc. S. Austral. Vol. 48. Adelaide 1924.

— 1925. Notes on Australian Crustacea, Nr IV. Rec. S. Austral. Mus. Vol. III, Nr. 1. Adelaide 1925.

HANSEN, H. J. 1887. Oversigt over paa Dijmphna Togtet indsamlede Krebsdyr. Dijmphna Togtets Zoologisk Udbytte. Kjöbenhavn 1887.

— 1895. Isopoden, Cumaceen und Stomatopoden der Plankton-Expedition. Ergebnisse der Plankton-Expedition. Bd. II. Kiel und Leipzig 1895.

— 1905. On the Morphology and Classification of the *Asellota*-Group of Crustaceans, with Descriptions of the Genus *Stenetrium* Hasw. and its Species. Proc. Zool. Soc. London. Ser. 4. Vol. 8. 1904.

— 1916. Crustacea Malacostraca III, The Ordo Isopoda. »The Danish Ingolf-Expedition.» Vol. III, 5. Copenhagen 1916.

HASWELL, W. A. 1881. On some new Australian Marine Isopoda. Part I. Proc. Linn. Soc. N. S. Wales. Vol. 5. Sydney 1881.

— 1882. Catalogue of the Australian Stalk- and Sessile-eyed Crustacea. The Australian Museum, Sydney. Sydney 1882.

HELLER, C. 1865. Crustaceen. »Reise der Österreichischen Fregatte Novara um die Erde.» Zoologischer Theil. Band II, Abt. 3. Wien 1865.

HODGSON, T. V. 1902. Crustacea, in, »'Southern Cross' Collections». London 1902.

— 1910. Crustacea, IX. Isopoda; in, »National Antarctic Expedition 1901—1904». Vol. 4. Nr. 3. Zoology and Botany. London 1910.

ISSEL, R. 1913. Nota sulla *Zenobiana prismatica* RISSO (*Idotea chelipes* COSTA) e sulla identità del gen. *Zenobiana* RISSO col. gen. *Cleantis* Dana. Annuario del Museo Zoologico della R. Università di Napoli (Nuova Serie). Napoli 1913.

KOEHLER, R. 1885. Description d'un Isopode nouveau le *Jaeropsis brevicornis*. Ann. sciences naturelles, Ser. 6, Tome XIX. Paris 1885.

— 1911. Arcturidés nouveaux provenant des campagnes de la »Princesse-Alice» ou appartenant au Musée Océanographique de Monaco. Bull. l'Inst. Océanogr. Nr. 214. Monaco 1911.

LÜTKEN, CHR. 1859. Beskrivelse av en ny *Serolis*-Art, *Serolis Schythei* LTK. Vidensk. Meddel. fra naturhist foren. Kjöbenhavn 1858. Kjöbenhavn 1859.

MIERS, J. E. 1875. Descriptions of three additional species of Crustacea from Kerguelen's land and Crozet Islands, with Remarks upon the genus *Paramoera*. Ann. Mag. Nat. Hist. Ser. 4. Vol. 16. London 1875.

— 1881. Revision of the Idotheidae. Journ. Linn. Soc. London. Zoology. Vol. XVI. London 1881.

— 1881 a. Account of the Crustacea collected during the Survey of H. M. S. »Alert» in the Straits of Magellan and on the Coast of Patagonia. Proc. Zool. Soc. London, Ser. 3. Vol. 21. London 1881.

MILNE-EDWARDS, M. 1840. Histoire naturelle des Crustacés. Paris 1840.

MONOD, TH. M. 1925. Isopodes et Amphipodes de l'Expédition antarctique Belge (S. Y. Belgica); 2:e note préliminaire. Bull. Mus. Paris. Nr. 4. Paris 1925.

— 1926. Tanaïdacés, Isopodes et Amphipodes. Résultats du voyage de la Belgica, Rapports Scientifiques. Zoologie. Anvers 1926.

— 1931. Tanaidacés et Isopodes sub-antarctiques de la collection Kohl-Larsen du Senckenberg Museum. »Senckenbergiana». Band 13, Nr. 1.

— 1931 a. Sur quelques Crustacés aquatiques d'Afrique (Cameroun et Congo). Revue de Zoologie et de Botanique Africaines publiée sous la direction du Dr. H. Schouteden (Tervueren). Vol. XXI, fasc. 1. 1931.

NICOLET, H. 1849. Crustaceos; in, GAY CL. Historia fisica y politica de Chile. Paris 1849.

NIERSTRASZ, H. F. 1917. Die Isopoden-Sammlung im Naturhistorischen Reichsmuseum zu Leiden, II, Cymothoidae, Sphaeromidae, Serolidae, Idotheidae, Asellidae, Janiridae, Munnopsidae. Zoologische Mededeelingen. Deel 3. Aflev. 2—3. Leiden 1917.

— 1918. Alte und neue Isopoden. Zoologische Mededeelingen. Deel IV. Aflev. 2. Leiden 1918.

NORDENSTAM, Å. 1930. Tanaidacea and Marine Isopoda from Juan Fernandez. »The Natural History of Juan Fernandez and Easter Island edited by Dr. CARL SKOTTSBERG». Vol. III. Upsala 1930.

NORMAN, A. M. 1899. *Jaeropsis Dollfusi*, a new Mediterranean Isopod. Ann. Mag. Nat. Hist. Ser. 7. Vol. 4. London 1899.

OHLIN, A. 1895. Bidrag till kännedomen om Malakostrakfaunan i Baffin Bay och Smith Sound. Akademisk avhandling. Lund 1895.

— 1901. Isopoda from Tierra del Fuego and Patagonia. Wissenschaftliche Ergebnisse der schwedischen Expedition nach den Magellansländern 1895—1897. Band II. Stockholm 1907.

ORTMANN, A. E. 1911. Crustacea of Southern Patagonia. Rep. Princeton Univ. Exped. Patagonia, 1896—1899. Vol. III, 2. Zool.

Pesta, O. 1928. Eine Crustaceenausbeute aus Süd-Georgien. Annal. Naturhist. Mus. Wien. Band 42. 1928.

Pfeffer, G. 1887. Die Krebse von Süd-Georgien. 1. Teil. Jahrb. der Hamb. Wiss. Anst. Jahrg. 4. Hamburg 1887.

Porter, C. E. 1917. Los Crustacéos de la expedicion a Tartao. Bol. del Museo Nac. de Chile, Tom. 10. Santiago de Chile 1917.

Racovitza, E-G. 1907. Isopodes terrestres (Première Série). Arch. de Zool. Sér. IV. Tome VII. Paris 1907.

— 1908. Isopodes terrestres (Seconde Série). Arch. de Zool. Sér. IV. Tome IX. Paris 1908.

— 1910. Sphéromiens (Première Série) et Revision des Monolistrini. Arch. de Zool. Sér. 5. Tome IV. Paris 1910.

— 1912. Cirolanides (Première Série). Arch. de Zool. Sér. 5. Tome X. Paris 1912.

— 1919. Notes sur les Isopodes, 1, 2. Arch. de Zool. Tome 58. Paris 1919.

— 1919 a. Notes sur les Isopodes, 3, 4, 5. Arch. de Zool. Tome 58. Paris 1919.

— 1919 b. Notes sur les Isopodes, 6, 7. Arch. de Zool. Tome 58. Paris 1919.

— 1920. Notes sur les Isopodes, 8, 9. Arch. de Zool. Tome 59. Paris 1920.

— 1920 a. Montage, conservation et classement des préparations microscopiques. Arch. de Zool. Tome 59. Paris 1920.

— 1923. Notes sur les Isopodes, 10, 11. Arch. de Zool. Tome 61. Paris 1922—1923.

— 1924. Notes sur les Isopodes, 12. Arch. de Zool. Tome 62, 1923—1924. Paris 1924.

— 1925. Notes sur les Isopodes, 13. Arch. de Zool. Tome 63, 1924—1925. Paris 1925.

— and Sevastos, R. 1910. *Proidotea Haugi* n. g. n. sp. Isopode oligocène de Roumanie et les Mesidoteini nouvelle sous-famille des Idotheidae. Arch. de Zool. Sér. 5. Tome VI. Paris 1910.

Richardson, Harriet. 1904. Contributions to the Natural History of the Isopoda. Proc. U. S. Nat. Mus. Vol. 27. Washington 1904.

— 1905. A Monograph on the Isopods of North America. Bull. U. S. Nat. Mus. Nr. 54. Washington 1905.

— 1906. Crustacés Isopodes (Première mémoire). »Expédition Antarctique Française (1903—1905).» Paris 1906.

— 1908. Crustacés Isopodes (Seconde mémoire). Expédition Antarctique Française (1903—1905). Paris 1908.

— 1908 a. Some new Isopoda of the Superfamily Asellodea from the Atlantic coast of North America. Proc. U. S. Nat. Mus. Vol. 35. Washington 1909.

— 1909. Description of a New Isopod of the Genus *Jaeropsis* from Patagonia. Proc. U. S. Nat. Mus. Vol. 36. Washington 1909.

— 1909 a. Isopods collected in the Northwest Pacific by the U. S. Bureau of Fisheries steamer »Albatross» in 1906. Proc. U. S. Nat. Mus. Vol. 37. Washington 1910.

— 1910. Description of a new Isopod of the genus *Notasellus* from the East Coast of Patagonia. Proc. U. S. Nat. Mus. Vol. 37. Washington 1910.

— 1910 a. Marine Isopods collected in the Philippines, by the U. S. Fisheries Steamer »Albatross» in 1907—8. Washington Department of Commerce and Labor, Bureau of Fisheries Document, 736. Washington 1910.

— 1911. Isopodes du Sandwich de Sud. Anal. Mus. Nac. Buenos Aires. Ser. 3. Tomo 14. Buenos Aires 1911.

— 1911 a. Descriptions of a new genus and species of Isopod Crustacean of the Family Idotheidae from the mouth of Rio de la Plata, Argentina, South America. Proc. U. S. Nat. Mus. Vol. 40. Washington 1911.

— 1911 b. Descriptions of a new genus and species of Janiridae from the Northwest Pacific. Proc. U. S. Nat. Mus. Vol. 40. Washington 1911.

— 1912. Descriptions of a new species of Isopod of the genus *Cleantis* from Japan. Proc. U. S. Nat. Mus. Vol. 42. Washington 1912.

Richardson, Harriet. 1913. Crustacés Isopodes. »Deuxième Expédition Française (1908—1910).» Paris 1913.

— 1914. Crustacea; in, Murphy, R. C.: A Report on the South Georgia Expedition. Mus. Brooklyn Inst., Science Bull. Vol. 2, nr. 4, 1914.

Sars, G. O. 1885. Crustacea. »Den norske nordhavsexpedition 1876—1878.» Bind. 6. Christiania 1885.

— 1899. An Account of the Crustacea of Norway Vol. II. Isopoda. Bergen 1899.

— 1905. Pacifische Plankton-Crustaceen II, Brackwasser-Crustaceen von den Chatham-Inseln. Zool. Jahrb. Abt. Systematik. Bd. 21. Jena 1905.

— 1909. Crustacea. »Report on the Second Norwegian Arctic Expedition in the 'Fram' 1898—1902.» Kristiania 1909.

Schioedte, J. C. 1866. Krebsdyrenes sugemund. Naturhist. tidskr., Raekke 3, Bind 4. Kjöbenhavn 1866.

Smith, S. I. 1876. Crustaceans. Contributions to the Natural History of Kerguelen Island. Bull. U. S. Nat. Mus. Washington 1876.

Stebbing, Th. R. 1895. Notes on Crustacea. Ann. Mag. Nat. Hist. Ser. 6. Vol. 15. London 1895.

— 1900. Crustacea from the Falkland Islands collected by Mr. Rupert Vallentin, Part I. Proc. Zool. Soc. London 1900.

— 1904. Gregarious Crustacea from Ceylon. Spolia Zeylanica. Vol. II. Part V. Colombo 1904.

— 1905. Report on the Isopoda collected by Professor Herdman at Ceylon in 1902. Ceylon Pearl Oyster Fisheries, Suppl. Rep. XXIII. London 1905.

— 1908. South African Crustacea. Ann. S. Afric. Mus. Vol. VI. 1908.

— 1910. General Catalogue of South African Crustacea. Ann. S. Afric. Mus. Vol. VI. Part IV. London 1910.

— 1914. Crustacea from the Falkland Islands collected by Mr. Rupert Vallentin, Part II. Proc. Zool. Soc. London 1914.

— 1919. Crustacea from the Falkland Islands collected by Mr. Rupert Vallentin, Part III. Proc. Zool. Soc. London 1919.

Stephensen, K. 1915. Isopoda, Tanaidacea, Cumacea, Amphipoda (excl. Hyperiidea). »Report on the Danish Oceanographical Expeditions 1908—1910 to the Mediterranean and adjacent Seas.» Vol. II, Biology. Copenhagen 1915.

— 1927. Crustacea from the Auckland and Campbell Islands. Papers from Dr. Th. Mortensen's Pacific Expedition 1914—1916, XL. Vidensk. Medd. fra Dansk Naturh. Foren. Bd. 83. Odense 1927.

Strassen, zur O. 1902. Über die Gattung *Arcturus* und die Arcturiden der deutschen Tiefsee-Expedition. Zool. Anz. Band 25. Leipzig 1902.

— 1903. Zusatz zu meinem Artikel über die Arcturiden. Zool. Anz. Band 26. Leipzig 1903.

Studer, Th. 1879. Beiträge zur Kenntniss niederer Thiere von Kerguelensland. Troschel: Arch. f. Naturgesch. Jahrg. 45, Heft. 3. Berlin 1879.

— 1884. Isopoden, gesammelt während der Reise S. M. S. Gazelle um die Erde 1874—1876. Abhandl. Königl. Akad. der Wissenschaften 1883. Berlin 1884.

Tait, J. 1917. Experiments and Observations on Crustacea, Part IV. Some structural Features Pertaining to Glyptonotus. Proc. Royal Soc. Edinburgh, Vol. XXXVII, 1916—1917. Edinburgh 1918.

Tattersall, W. M. 1906. The Marine Fauna of the coast of Ireland. Report on the Sea and Inland Fisheries of Ireland for 1904, Part II — Scient. Invest. Dublin 1906.

— 1913. The Schizopoda, Stomatopoda, and non-Antarctic Isopoda of the Scottish National Antarctic Expedition. Trans. Royal. Soc. Edinburgh. Vol. 49. 1914.

— 1921. Tanaidacea and Isopoda. »British Antarctic ('Terra Nova') Expedition 1910», Natural History Report. Zool. Vol. III, nr. 8. Crustacea Part VI. London 1921.

— 1921 a. Mysidacea, Tanaidacea, and Isopoda. Zoological Results of a Tour in the Far East. Memoirs of the Asiatic Society of Bengal Vol. 6. Part. 7. Calcutta 1921.

THIELEMANN, M. 1911. Beiträge zur Kenntnis der Isopodenfauna Ostasiens. Beiträge zur Naturgeschichte Ostasiens, herausgegeben von T. Doflein. Abhandl. der math.-physikal. Klasse der Königl. Baierschen Akademie der Wissenschaften. Suppl. Bd. 2. München 1909—1914.

THOMSON, G. M. 1884. Descriptions of new Crustaceans. Trans. New Zeal. Inst. Vol. 16. 1883. Wellington 1884.

— 1889. Notes on and recent Additions to the New Zealand Crustacean Fauna. Trans. New Zeal. Inst. Vol. 21, 1888. Wellington 1889.

— 1904. A new family of Crustacea Isopoda. Ann. Mag. Nat. Hist. Ser. 7. Vol. 14. London 1904.

VANHÖFFEN, E. 1914. Die Isopoden der deutschen Südpolar-Expedition 1901—1903. »Deutsche Südpolar-Expedition 1901—1903.» Zoologie. Band XV, Heft. IV. Berlin 1914.

WAHRBERG, R. 1922. Terrestre Isopoden aus Australien. Arkiv för Zool. Band. 15, nr. 1. Stockholm 1922.

WHITELEGGE, TH. 1901. Isopoda I, Crustacea Part II. Scientific Results of the trawling Expedition of H. M. C. S. »Thetis» off the coast of New South Wales. Memoirs Austral. Mus. IV, Part 3. Sydney 1901.

— 1904. Isopoda III. Crustacea Part IV. Scientific Results of the trawling Expedition of H. M. C. S. »Thetis» off the coast of New South Wales. Memoirs Austral. Mus. IV, Part 7. Sydney 1904.

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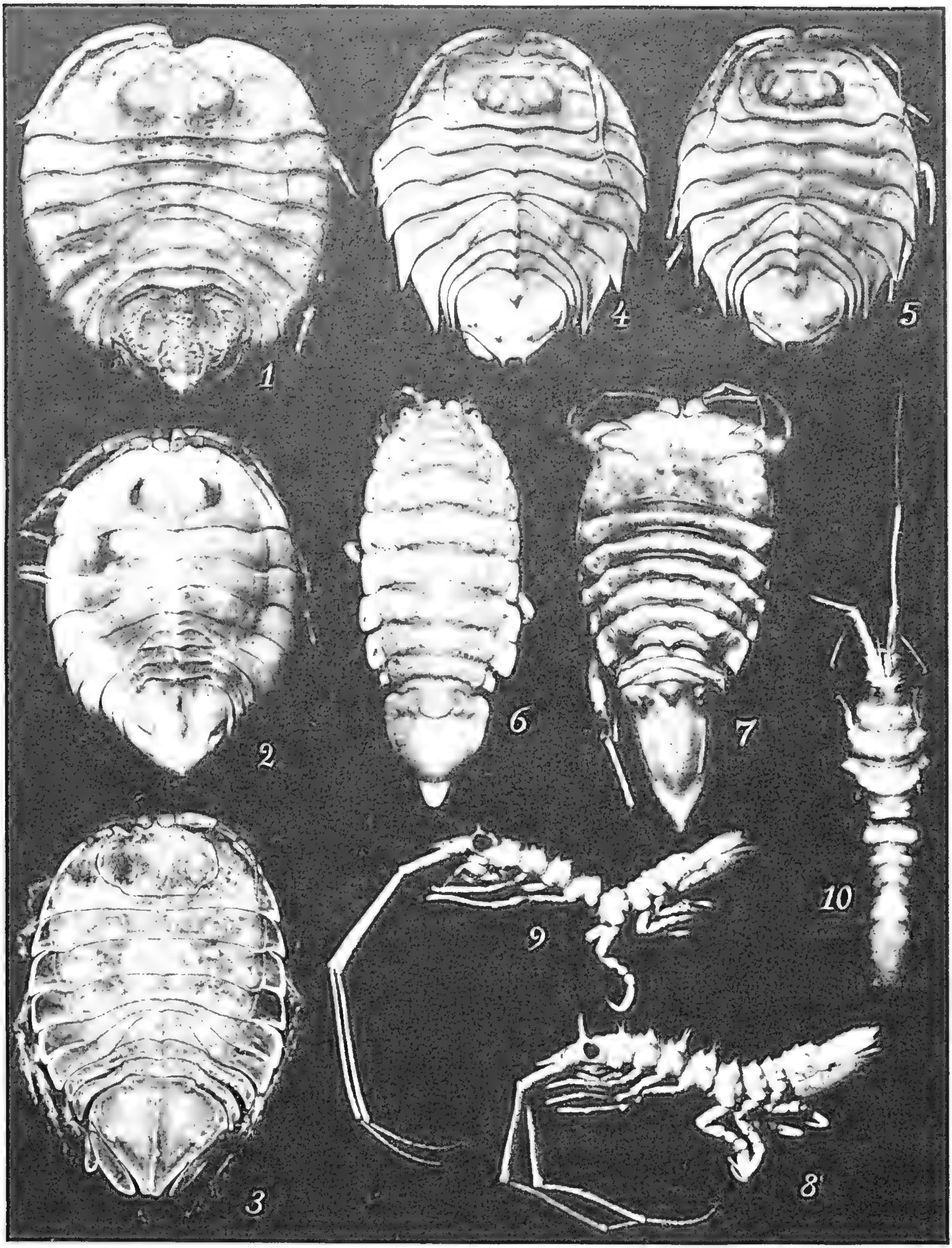
PLATES

EXPLANATION OF PLATE I.

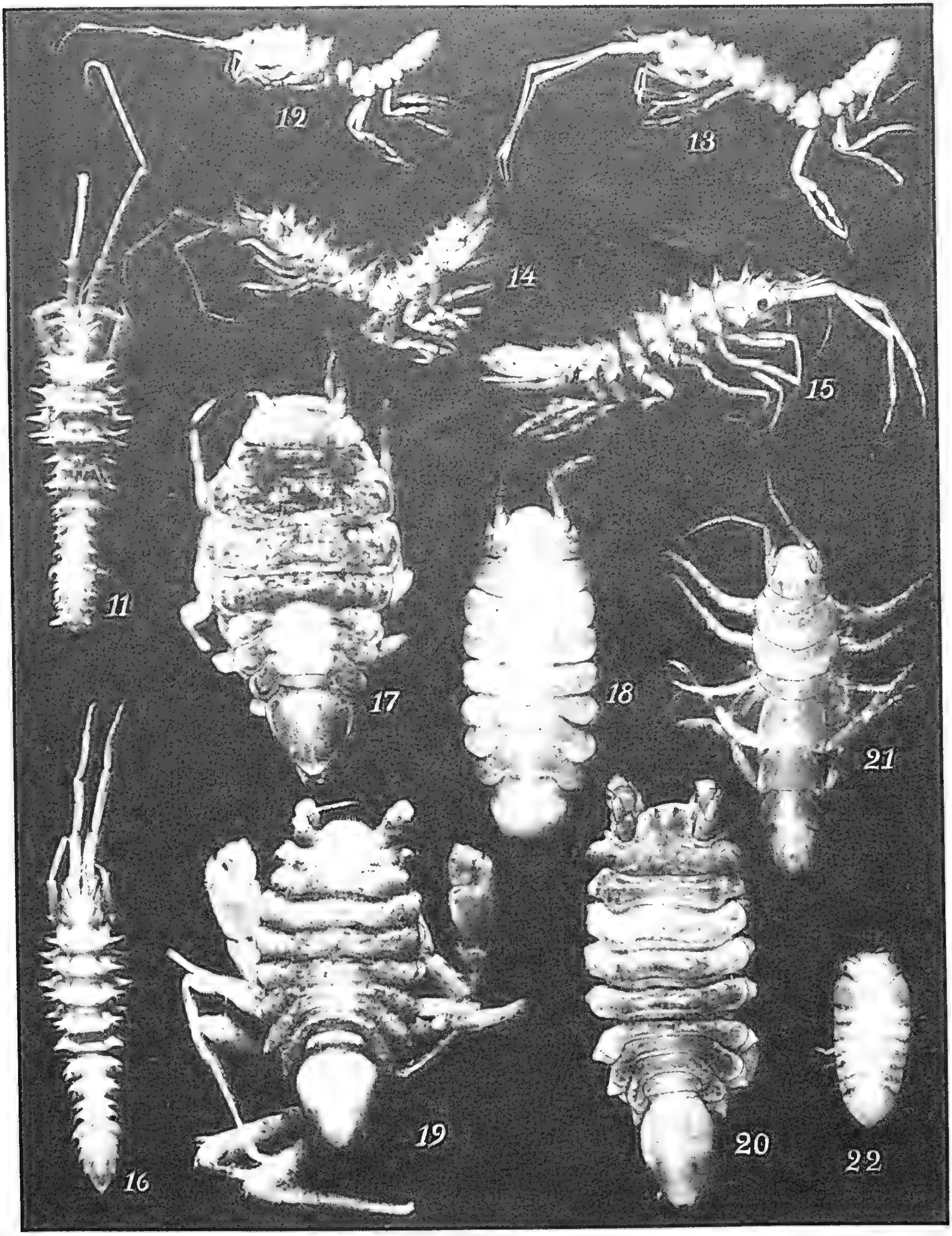
Fig. 1. Serolis glacialis Tattersall var. austrogeorgiensis n. var., ♀ with marsupial plates semi-developed. $5^{1}/_{2}$ ×.
Fig. 2. Serolis exigua n. sp. ♀ with young. 8 ×.
Fig. 3. Serolis minuta Beddard var. eugeniae n. var., ♀ with young. $7^{1}/_{2}$ ×.
Fig. 4. Serolis pagenstecheri Pfeffer var. albida n. var., adult ♂. 2 ×.
Fig. 5. Serolis pagenstecheri Pfeffer var. albida n. var., ♀ with a marsupium. 2×.
Fig. 6. Edotia bilobata n. sp. $7^{1}/_{2}$ ×.
Fig. 7. Macrochiridothea stebbingi Ohlin var. multituberculata n. var., ♀ with an empty marsupium. 5.7 ×.
Fig. 8. Antarcturus franklini (Hodgson), ♂. 3 ×.
Fig. 9. Antarcturus granulosus n. sp., immature ♀. $5^{1}/_{2}$ ×.
Fig. 10. Antarcturus granulosus n. sp., ♀ with young. $4^{1}/_{2}$ ×.

EXPLANATION OF PLATE II.

Fig. 11. Antarcturus brunneus (Beddard) var. spinulosus n. var., ♀ with semi-developed oostegits. $4^{1}/_{2}$ ×.
Fig. 12. Microarcturus stebbingi (Beddard), ♀ with a marsupium. 7.6 ×.
Fig. 13. Microarcturus stebbingi (Beddard), adult ♂. 7.6 ×.
Fig. 14. Microarcturus rugosus n. sp., ♂. 8 ×.
Fig. 15. Microarcturus digitatus n. sp., immature ♂ in a lateral view. 5 ×.
Fig. 16. Microarcturus digitatus n. sp., the same specimen seen from above. 5 ×.
Fig. 17. Antias marmoratus Vanhöffen, ♀ with a marsupium. 40 ×.
Fig. 18. Antias Hofsteni n. sp., ♂. 35 ×.
Fig. 19. Munna affinis n. sp., sub-adult ♂. 18 ×.
Fig. 20. Munna bituberculata n. sp., ♀. 18 ×.
Fig. 21. Desmosoma brevipes n. sp., ♀ with an empty marsupium. 28 ×.
Fig. 22. Paramunna integra n. sp. 30 ×.



E. Swedén phot
A. B. [illegible] TRYCKERI A. B. STHLM



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A BORTZELLS TRYCKERI A B STHM

ERRATA.

Page 58 Line 6. In place of *Magellanian Region* read *Magellan Straits.*
» 82 » 24. In place of *Magellanian Region* read *Magellan Straits.*

FURTHER ZOOLOGICAL RESULTS
OF THE SWEDISH ANTARCTIC EXPEDITION
1901—1903

UNDER THE DIRECTION OF DR. OTTO NORDENSKJÖLD

EDITED BY SIXTEN BOCK

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SPONGES

BY

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DEPARTMENT OF ZOOLOGY, BRITISH MUSEUM
(NATURAL HISTORY)

WITH 8 PLATES AND 16 TEXT-FIGURES

STOCKHOLM
P. A. NORSTEDT & SÖNER
Febr. 1934

FURTHER ZOOLOGICAL RESULTS
OF THE SWEDISH ANTARCTIC EXPEDITION
1901—1903
UNDER THE DIRECTION OF DR. OTTO NORDENSKJÖLD

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SPONGES

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I. INTRODUCTION.

The two hundred or more sponges collected by the Swedish Antarctic Expedition are, for the most part, in an excellent state of preservation. In addition to furnishing valuable information in regard to taxonomy and distribution, they have made possible interesting observations on development, on the processes of death and regeneration and on the internal anatomy, and separate sections are devoted to these.

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III. SYSTEMATIC NOTES AND DESCRIPTION OF SPECIES.

Phylum **Nuda.**

Order **Hexactinellida.**

Bidder's (1929) recent proposal to re-establish the Sub-Kingdom *Parazoa* is commendable on the grounds that it emphasizes the sharp distinction which exists between the sponges and the rest of the *Metazoa.* The manifold attempts on the part of earlier writers to find some common ground between the *Porifera* and the *Coelenterata* served only to emphasize how little these two groups have in common. Similarly, Bidder's demonstration of the gulf between the *Hexactinellida,* on the one hand, and the rest of the *Porifera* should show the need for a more marked differentiation than has hitherto obtained.

Family **Rossellidae.**

Genus **Rossella Carter.**

Rossella nuda Topsent.

(For synonymy and discussion see Burton 1929, p. 409 and 1932, p. 255.)

Occurrence. 928a:[1] stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. The present specimen is a handsome sponge 32 cms high and 20 cms across which agrees in the characters of its spicules with many specimens already described. Its shape and the distribution of its pleuralia show it to be a further intermediate in the series of forms figured by me (1929, fig. 2).

Distribution. Falkland Islands; Graham Land; Victoria Land; Wilhelm Land.

Rossella racovitzae Topsent.

(For discussion and synonymy see Burton 1929, p. 407 and 1932, p. 256.)

Occurrence. 915: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S by 36° 18′ W), 252—310 m.

Remarks. The single specimen is subspherical, 1.5 cms high by 1 cm across, and ends below in a short bifurcating rooting process. It resembles closely the specimen figured

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[1] Stockholm Riksmuseum Number.

by SCHULZE and KIRKPATRICK (1910, pl. iii, fig. 4) and, like it, has pentactin dermalia of two kinds, the regularly cruciform and those in which the tangential rays of the pentactins are confined to an angle of 180°. The rooting tuft is supported mainly by diactins with an occasional pentactin, and its presence in this specimen suggests that the species, possibly only in the young stages, may be temporarily attached directly to the substratum.

Distribution. Falkland Islands; South Orkneys; South Georgia; Graham Land; Victoria land; Wilhelm Land.

Genus **Anoxycalyx** KIRKPATRICK.

Anoxycalyx ijimai KIRKPATRICK.

(For synonymy and discussion see BURTON 1929, p. 413.)

Occurrence. 879: stn. 5, January 16 1902, off Seymour Island (64° 20′ S, 56° 38′ W), 150 m.

Remarks. The several specimens agree in all respects with those previously recorded.

Distribution. Graham Land; Victoria Land; Wilhelm Land.

Aggregations of Hexactinellid spicules.

Aggregations of spicules from Hexactinellid sponges, to form compact masses, such as were recorded by me (1932, p. 379) from a former Antarctic collection were found in the present collection from stns. 18, 31 and 32.

Phylum **Gelatinosa.**

Order **Calcarea.**

Family **Homocoelidae.**

Genus **Leucosolenia** BOWERBANK.

Leucosolenia falklandica BREITFUSS.

L. falklandica BREITFUSS 1898, p. 458, pl. xxvii, figs. 3—4.

Occurrence. 873, 874: South Georgia, Cumberland Bay, on algae between tide-marks, May 5—9 1902.

Remarks. In external form there is a close resemblance between these two specimens and the holotype, but in each case the various kinds of rhabds are quite scarce.

Distribution. Falkland Is.; South Georgia.

Family **Sycettidae.**

Genus **Sycon** RISSO.

Sycon incrustans BREITFUSS.

S. incrustans BREITFUSS 1898, p. 461, pl. xxvii, figs. 5—7.

Occurrence. 1048: St. 50, August 12 1902, Falkland Is., Port Louis (51° 33′ S by 58° 9′ W), 7 m. Bottom, mud.

Remarks. The single specimen agrees closely with the type but shows a stronger tendency to the formation of erect tubes. In the skeleton, otherwise typical, the rhabds are comparatively rare and the rays of the gastral radiates more conical.

Distribution. Tumbes, Chile; Falkland Is.

Family **Grantiidae.**

Genus **Grantia** FLEMING.

Grantia hirsuta (TOPSENT).

(For synonymy see BURTON 1929, p. 402.)

Occurrence. 1055: stn. 17, April 19 1902, Shag Rock Island, between Falkland Islands and South Georgia, 160 m.

Remarks. A small specimen 4 mm. high growing on a pair of detached Polychaete setae.

Distribution. Antarctic (Kerguelen, Graham Land, Victoria Land).

Order **Tetraxonida.**

Sub-order Sigmatosclerophora.

Family **Haplosceridae.**

Genus **Haliclona** GRANT.

Haliclona variabilis (THIELE).

(Pl. 1, figs. 4, 5.)

Reniera fortior Ridley (nec SCHMIDT) 1881, p. 126. pl. xi, fig. 3; *Acervochalina variabilis* THIELE 1905, p. 477, figs. 17, 33, 96; *A. variabilis* subsp. *elongata* Id. l. c., p. 479; *Haliclona variabilis* BURTON 1932, p. 265, pl. li, figs. 1—2.

Occurrence. 933, 936, 937, 941, 1039. ii, iii: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m.; 1015, 1019, 1024: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.; 1026: stn. 60, September 15 1902, Beagle Canal, Tierra del Fuego (55° 10′ S, 66° 15′ W), 100 m.

Remarks. Most of the specimens show a close resemblance to the digitate specimen figured by THIELE (l. c., pl. xxviii, fig. 17) and here chosen as the lectotype. The largest of them is palmo-digitate, 10 cms. high, with dichotomous branches, the whole showing some degree of flattening in one plane. A second, fragmentary specimen shows a similar branching. A third is digitiform and the rest differ only in minor details of shape. Two of the specimens exhibit a tendency to develop spinous outgrowths, very much in the manner of a *Spinosella.*

The skeleton in the forms described above is typical and there is only one point to which reference may be made here. Of the several specimens of this species now known to us, one has the skeleton of a *"Ceraochalina"* (cf Thiele l. c., p. 479), with horny fibres containing vestigial spicules only; several have the skeleton of a *"Pachychalina"*, with many rows of spicules enclosed in stout horny fibres; and the rest have the skeleton of a typical *"Chalina"*. *Reniera fortior* Ridley (nec Schmidt) belongs to the latter category. The spicules in the majority of the individuals examined measure 14 mm. long, but in one (1019) they measure 0.175 mm.

Through the courtesy of Dr. W. Arndt, of the Berlin Museum, I have been able to compare the present specimens with the types and have no doubt as to the accuracy of the identifications. This is the more satisfactory in that it is thus possible to demonstrate in yet another species the variation from a chalinoid through a pachychalinoid to a ceraochalinoid skeleton, and to demonstrate thereby, with even greater certainty, the futility of attempting to maintain the genera *Chalina, Pachychalina* and *Ceraochalina* as usually accepted.

Reniera fortior Ridley (nec Schmidt) is almost identical with the rounded form described by Thiele, but has the same skeleton as his subsp. *elongata.* I have thought it unnecessary therefore to continue to recognize the subspecies.

Distribution. Straits of Magellan; Punta Arenas; Juan Fernandez; Falkland Islands.

Haliclona algicola (Thiele).

Reniera algicola Thiele 1905, p. 466, fig. 83; *Chalina algicola* Burton 1930, p. 332.

Occurrence. 1212: stn. 16, April 11 1902, between Falkland Islands and South Georgia (51° 40′ S, 57° 25′ W), 150 m.; 1006: stn. 58, September 11 1902, southwest of Falkland Islands (52° 29′ S, 60° 36′ W), 197 m.

Distribution. Talcahuano, Chile; Campbell Island.

Haliclona[1] **ignobilis** (Thiele).

Reniera ignobilis Thiele 1905, p. 470, figs. 8, 34, 88.

Occurrence. 872: Port Louis, shore, July 25 1902; 959: stn. 46, August 9 1902 Falkland Islands, Port Louis, Carenage Creek (51° 32′ S, 58° 7′ W), 1 m, sand with masses of *Codium.*

Distribution. Punta Arenas.

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[1] There are 8 specimens of *Haliclona,* fragmentary or of small size, the identification of which is doubtful. In five cases I have suggested an identification (with *H. ignobilis, H. algicola, H. chilensis* and *H. sordida*) but this must be treated with reserve. In the remaining cases it was quite impossible to attach a name to the specimens.

Haliclona sordida (THIELE).

Reniera sordida THIELE 1905, p. 468, fig. 85.

Occurrence. 878. ii: stn 2, December 12 1901, North Coast of Argentina (37° 15′ S, 56° 8′ W), 100 m.

Distribution. Calbuco, Chile.

Haliclona chilensis (THIELE).

Reniera chilensis THIELE 1905, p. 467, figs. 5, 84; *Haliclona chilensis* BURTON 1932, p. 265.

Occurrence. 995: stn. 56, September 8 1902, Port Albemarle, Falkland Islands (52° 9′ S, 60° 33′ W), 15 m.

Distribution. Calbuco, Chile; Falkland Islands.

Genus **Microxina** TOPSENT.

Microxina benedeni (TOPSENT).

(For synonymy see BURTON 1932, p. 271.)

Occurrence. 891: stn. 6, Jan. 20 1902 S.W. of Snow Hill Island (64° 36′ S, 57° 42′ W), 125 m.

Remarks. The single specimen bears a close resemblance to that figured by TOPSENT (1917, pl. i, fig. 3), but is larger and more profusely branched. In the structure of the skeleton it agrees also, but instead of containing oxea, 0.6 by 0.03 mm., and microxea, 0.1 mm. long, it has oxea, 0.56 by 0.032 mm., and microxea, 0.08 mm. long, and, in addition, sigmata measuring up to 0.16 mm. chord. There can be little question of the identity of this specimen with the holotype of *M. charcoti* TOPSENT and the presence of sigmata in it, in addition to the microxea, supports my suggestion (1932, p. 271) that that species is identical with *Gellius benedeni* TOPSENT.

Distribution. Falkland Islands; South Georgia: Graham Land; Victoria Land; Wilhelm Land.

Microxina simplex (TOPSENT).

(Pl. 1, figs. 1, 2.)

Thrinacophora simplex TOPSENT 1916, p. 166; 1917, p. 39, pl. iv, fig. 12, pl. vi, fig. 1.

Occurrence. 890: stn. 5, January 16 1902, S.E. of Seymour Island, Graham Land (64° 20′ S, 56° 38′ W), 150 m.

Remarks. The single specimen is an elongated lobe, 3.5 cms. high, 2 cms. broad by 1 cm. thick. The spicules are oxea 0.8 by 0.03 mm. and trichodragmata 0.7 by 0.016 mm. In external form it resembles the holotype and the dimensions of its spicules approximate to those given by TOPSENT (1917), and the strong resemblance between it and some of the varieties of *Microxina benedeni* (TOPSENT) leave little doubt that the two are, at least, congeneric.

Distribution. Graham Land.

Genus **Hoplochalina** LENDENFELD.

Hoplochalina glacialis sp. n.

(Pl. 2, fig. 1.)

Holotype. 965.

Occurrence. 963, 965: stn. 50, August 12 1902, Port Louis, Falkland Islands (51° 33′ S, 58° 9′ W), 7 m; 980: stn. 51, Port William, Falkland Islands (51° 40′ S, 57° 42′ W), 22 m.

Diagnosis. Sponge erect, composed of a varying number of digitate branches; surface uneven, rendered hirsute by projecting fibres of skeleton; oscules small, inconspicuous, scattered over surface; texture soft, compressible; colour, in spirit, white or greyish white; skeleton composed of a central system of branching and anastomosing fibres running longitudinally through branches and giving off numerous lateral fibres; lateral fibres pass obliquely to surface to project beyond and are connected to each other at intervals throughout their length by short transverse fibres; fibres of skeleton formed by loose bundles of oxea surrounded by an inconspicuous sheath of spongin; transverse fibres slightly less well-developed than oblique fibres; no special dermal skeleton and no microscleres; oxea straight or only slightly curved, tornota-like in form, sometimes assymetrically-ended, 0.175 by 0.007 mm.

Remarks. The holotype (pl. 2, fig. 1) consists of two cylindrical branches broken off below and joined at about the middle of their length. The co-type is a single incomplete branch. Both in external appearance and in the composition of the skeleton they bear a strong resemblance to the holotype of *H. dendrilla* LENDENFELD.

Genus **Adocia** GRAY.

Adocia glacialis (RIDLEY and DENDY).

(For synonymy see BURTON 1932, p. 274.)

Occurrence. 900, 1041: stn. 17, April 19 1902, Shag Rock Island (53° 34′ S, 43° 23′ W), 160 m; 1008, 1021, 1023, 1050, 1051: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 49′ W), 137—150 m.

Remarks. Specimen 1008 is subspherical, 9 cms in diameter, and very like *Gellius laevis* RIDLEY and DENDY in texture and the structure of the skeleton. The spicules are, however, oxea instead of substrongyla and measure 0.4 by 0.014 mm. The sigmata vary from 0.03 to 0.1 mm chord. Specimens 1023 and 1021 differ in no essential respect from the several specimens of the species, *Adocia glacialis* (RIDLEY and DENDY), hitherto described. The larger of them is some 6 times greater than the holotype amd the spicules differ slightly in size, the oxea measuring 0.4 by 0.014 mm and the sigmata from 0.03 to 0.14 mm chord. Specimens 1050 and 1051 resemble the foregoing in so far as the skeleton is concerned but being fragmentary specimens only it is not possible to say more regarding the external features.

In all the specimens discussed above, the dermal skeleton consists of a unispicular network of triangular mesh. In the next specimen, 900, this is replaced by a similar triangular network in which the sides of the meshes are multispicular. Occasionally the dermal skeleton is unispicular or nearly so but this is exceptional. The nature of the dermal skeleton in this case is very like that which characterizes the genus *Dasychalina.* It may be difficult later on to draw a distinction between *Adocia* and *Dasychalina,* but at the moment there is not sufficient data on which to form an opinion. The spicules in 900 are larger than those of the specimens from station 59, the oxea measuring 0.63 by 0.035 mm and the sigmata, from 0.035 to 0.24 mm chord.

If we compare the measurements of the spicules of the present specimens with those given by KIRKPATRICK (1908, p. 49), it becomes clear that a distinction between *A. glacialis* and its variety *nivea* cannot be maintained, especially as there is no essential difference between them in external form. RIDLEY and DENDY (1887, p. 42) do not record a dermal skeleton in the var. *nivea,* but this structure is actually present.

In view of the variations now known to occur in *Adocia glacialis* it is merely a matter of opinion as to how far we are justified in recognizing the validity of *A.* (*Gellius*) *laevis* (RIDLEY and DENDY) and *A.* (*Gellius*) *carduus* (RIDLEY and DENDY). That all three are extremely closely related there can be no doubt and it seems that it is only a matter of time before they are regarded as identical. This is the more probable when we remember their geographical relation to each other.

Distribution. Agulhas Bank, South Africa; Prince Edward Isle; Falkland Islands South Georgia; Victoria Land.

Adocia conica (THIELE).

Pellinella conica THIELE, 1905, p. 471, figs. 90, 103.

Occurrence. 982: stn. 52, September 3 1902, Fort William, Falkland Islands (51° 40′ S, 57° 44′ W), 17 m.

Remarks. The single incomplete specimen is massive, about 3 cms long by 3 cms broad by 1.5 cms thick and is a greyish cream in colour. The surface has been badly damaged and in a few places only is the dermis intact, but where undamaged the dermal skeleton is a regular unispicular reticulation of triangular mesh. The size of the spicules and the structure of the main skeleton are also typical.

Distribution. Admiralty Sound, South America.

Adocia tenella (TOPSENT).

(Pl. 3, fig. 1.)

Gellius tenellus TOPSENT 1916, p. 171; Id. 1917, p. 80, pl. vi, fig. 23; *Adocia tenellus* BURTON 1932, p. 276.

Occurrence. 880, 886, 889: stn. 5, January 16 1902, S. E. of Seymour Island, Graham Land (64° 20′ S, 56° 38′ W), 150 m.

Remarks. In dealing with the sponges of the 'Terra Nova', I (1929, p. 422) misinterpreted TOPSENT's description of the surface characters of this species. Having now a specimen before me, it is clear that the species is distinct from *Gellius rudis* TOPSENT.

The present specimens are large, irregularly-massive sponges with conspicuous oscules and a minutely reticulate surface. This surface reticulation is not due, as in *G. rudis,* to a system of spicules set at right angles to the surface, but is provided by a tangential, mainly unispicular reticulation.

The megascleres in the present examples measure 0.36 by 0.012 mm and have the characteristic form. The sigmata measure, for the most part, 0.035 mm but a few are found measuring up to 0.06 mm. They are barely 0.002 mm thick and the larger are somewhat rectilinear in the median portion (cf TOPSENT l. c. p. 80). The extreme tenuity of the sigmata and the angulated appearance of the larger sigmata are the two most characteristic features of the species.

The specimen figured on plate 5 fig. 1 gave rise to a good deal of speculation and even now its identity cannot be fixed for certain. The irregular body possesses a skeleton of oxea, 0.45 by 0.012 mm., for the most part unispicular but terminating at the surface in a tangential layer which resembles very much the dermal skeleton in a *Halichondria.* In addition, sigmata are present having the same shape and dimensions as those found in the typical specimens of *Adocia tenella* of this collection. The stalks on the other hand, are supported by a skeleton of styli, of about the same dimensions as the oxea of the body, and do not contain sigmata. The most feasible explanation seems to be therefore that we have here specimens of *A. tenella* which have grown on the macerated stems of some examples of *Homaxinella balfourensis* (RIDLEY and DENDY).

Distribution. Petermann Is., Graham Land.

Genus **Calyx** VOSMAER.

The genus *Calyx* is characterized by a main skeleton of stout, bast-like fibres cored by spicules and a tangential dermal skeleton in the form of a unispicular reticulation of triangular mesh. The spicules are oxea and, in the type, there are no microscleres. Two species have been recognised hitherto, *C. nicaeensis* (RISSO), the genotype, and *C. stipitatus* TOPSENT. The first of these is from the Mediterranean and has a beaker-like form; the second, from the Antarctic, is flabellate. There is, however, a third species, *Gelliodes kerguelensis* HENTSCHEL, which must be included. This has the same bast-like main skeleton, a unispicular dermal skeleton corresponding exactly to that found in the genotype, but there are, in addition, microscleres in the form of sigmata. In view of the observations recorded on p. 54, there need, however, be no hesitation in including this third species in the genus. At all events, *Gelliodes kerguelensis* has nothing in common with *G. fibulatus* RIDLEY, the genotype of *Gelliodes*, except the possession of oxea and sigmata.

Calyx arcuarius (TOPSENT).

(For synonymy see BURTON 1932, p. 277.)

Occurrence. 909: stn. 17, April 19 1902, Shag Rock between Falkland Islands and South Georgia (53° 34′ S, 43° 23′ W), 160 m.

Remarks. The single specimen is quite the largest recorded. Unfortunately, it has been much damaged, but before injury was probably 50 cms high by 50 cms broad. The thickness rarely exceeds 6 mm. It is flabellate and has much the same shape as that described by me (l. c.). Oscules are plentifully scattered over each face of the sponge but, on each side they are restricted to broadly defined areas and in no case does the oscular area of one side lie opposite to that of the other side. They are considerably more numerous than in the Terra Nova specimen, and smaller, but are not so small, relatively numerous or closely set to each other as in the holotype.

Distribution. Shag Rock; South Georgia; South Orkneys; South Shetlands; Graham Land; Victoria Land.

Calyx kerguelensis (HENTSCHEL).

(Pl. 2, fig. 2.)

Gelliodes kerguelensis HENTSCHEL 1914, p. 127, pl. viii, fig. 11; *Calyx kerguelensis* BURTON 1932, p. 278.

Occurrence. 927: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. The specimen is represented by three fragments, of which the largest is 30 cms long and 9 cms in diameter. Each is approximately cylindrical and the oscules are conspicuous, few in number and 8 mm in diameter. It is clear that the fragments belong to the same sponge but do not represent the whole of it, so that the complete specimen must have been fully a metre in length.

Distribution: Kerguelen; Falkland Islands; South Georgia.

Genus **Dasychalina** RIDLEY and DENDY.

Dasychalina validissima (THIELE).

Petrosia similis var. *massa* RIDLEY and DENDY 1887, p. 11, pl. ii, fig. 11, pl. iii, fig. 6; *Pachychalina validissima* THIELE 1905, p. 473, figs. 16, 91; *Halichondria magellanica* DENDY 1924, p. 325; *Dasychalina validissima* BURTON 1932, p. 278, pl. 1, figs. 3—7, text-fig. 12.

Occurrence. 877. ii: stn. 2, December 23 1901, coast of North Argentina (37° 15′ S, 56° 8′ W), 100 m; 946, 1039. i: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m; 991: stn. 56, September 8 1902, Port Albemarle, Falkland Islands (52° 9′ S, 60° 33′ W), 15 m.

Remarks. The various specimens in the present collection, and the types of *Petrosia similis* var. *massa* RIDLEY and DENDY and *Halichondria magellanica* DENDY, resemble each other strongly in general features and differ only in small details.

The main skeleton in this species is composed of a coarse network of broad fibres, each of which is composed in turn of an anastomosis of more slender fibres. The meshes of this larger network may be filled with isolated spicules scattered without order, or may be further subdivided by a more feeble, usually unispicular, network. The dermal skeleton consists also of a coarse network of fibres, each fibre being formed of bundles of spicules, and the meshes thereof are either filled with scattered spicules or subdivided by a unispicular network. The spicules in each specimen have the same shape and size.

The main differences between these various specimens assigned to *D. validissima* (THIELE) concern certain details of external form, and these have a particular interest to the systematist. *Petrosia similis* var. *massa* and *Halichondria magellanica* both have smooth and even surfaces, but in one of the specimens of the present collection there are a number of patches of low conuli scattered here and there over the surface. In another specimen the surface is entirely conulose but the conuli are not strongly pronounced.

In the holotype of *Pachychalina validissima*, on the other hand, the surface is strongly conulose throughout.

Distribution. Magellan Straits; Falkland Islands; Calbuco, Chile; South Georgia.

Genus **Callyspongia** DUCHASSAING and MICHELOTTI.

Callyspongia fortis (RIDLEY).

(Text-fig. 1.)

Siphonochalina fortis RIDLEY,1881, p. 111, pl. x, fig. 3; *Callyspongia fortis* BURTON 1932, p. 279, figs. 13—14.

Occurrence. 930: stn. 39, July 4 1902, Port William, Falkland Islands (51° 40′ S, 57° 41′ W), 40 m, sand and small stones; 975. ii, 971, 977: stn. 51, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 42′ W), 22 m, sand; 983: stn 52, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 44′ W), 17 m, sand; 990: stn. 55, September 8 1902, Port Albemarle, Falkland Islands (52° 11′ S, 60° 26′ W), 40 m, sand with algae.

Remarks. The holotype of this species is a dried fragment of a sponge, in a much worn condition, about 3 cms long and slightly more than 1 cm in diameter. It has the form of a hollow tube, and it was for this reason, undoubtedly, that RIDLEY placed the species in the genus *Siphonochalina*. Other specimens suggest, however, that the species should be placed in *Callyspongia*, since they show that the form may vary from irregularly massive or, more frequently, branching, to erect and tubular. The branching forms possess a single large exhalant canal running the length of the branches at the centre, so that the difference between them and the tubular forms is but slight. Similarly with the other forms, whether they be flabellate or massive, the oscules always lead into deep cloacae. The variations in form shown by the different individuals of this species demonstrate quite clearly the impossibility of maintaining the genus *Siphonochalina* exclusively for tubular Chalininae.

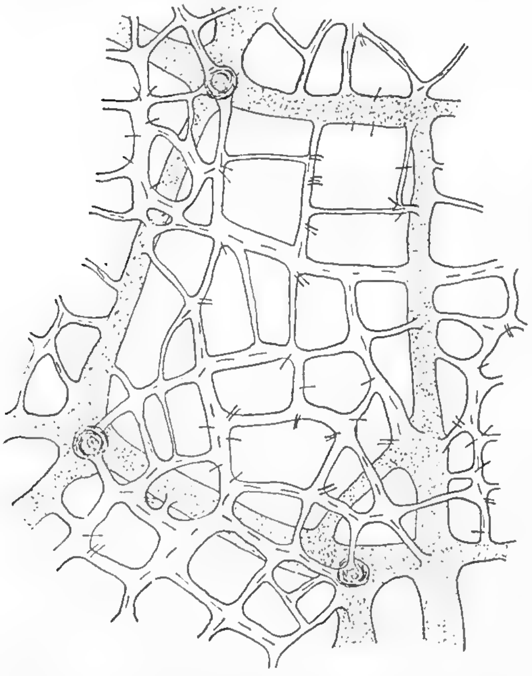


Fig. 1. *Callyspongia fortis* (RIDLEY), specimen 975. ii; dermal skeleton showing the manner in which the fibres are sometimes connected which those of the main skeleton. Fibres of main skeleton are shaded. × 70.

The present specimens range from flabellate, 10 cms by 8 cms by 1 cm, with a series of oscules, 5 mm in diameter arranged along the upper margin, to tubular with several long erect tubes springing from a common base, 14 cms high and 1.5 to 2.5 cms in diameter. In all cases the oscules are the patent openings of deep cloacae.

The oxea vary from 0.06 to 0.12 by 0.003 to 0.008 mm and are usually abruptly but sharply pointed.

The dermal skeleton of the holotype is almost wholly lost, except for a small patch, about 1 mm square, but as the characters of this small patch agree with those of the dermal skeleton found in the specimens under examination there can be no question of the identity of all with a single species.

The conspicuous features of the species are: i. the main skeleton is an irregular reticulation, sometimes becoming almost regularly isodictyal, of ceraochalinoid fibre in which primary and secondary fibres are barely differentiated except in so far as their relative positions are concerned. The primary fibres, those running more or less vertically to the surface, are usually cored by tracts of plumosely-arranged spicules. The secondary fibres may be aspiculous or contain, at most, a single linear series of spicules. ii. The dermal skeleton is an irregular reticulation of ceraochalinoid fibres, showing an incipient differentiation into primary and secondary mesh. The fibres enclose a single linear series of spicules, but are echinated by other, similar, spicules at various points, chiefly at the nodes of the network.

An unusual feature of the dermal skeleton is that the fibres of the tangential mesh sometimes pass over the outermost fibres of the main skeleton and at other times are joined to them (fig. 1). Usually it is the case, in Chalininae with a special dermal skeleton, that the dermal mesh is independent of the underlying fibres of the main skeleton except at the nodes of the network where the primary fibres of the main skeleton pass upwards and join them.

Distribution. Madre de Dios Archipelago, Chile; Falkland Islands.

Callyspongia ramosa (Gray).

(Pl. 2, fig. 3.)

Spongia ramosa Gray 1843, p. 295; *Chalina oculata* var. *novae-zealandiae* Dendy 1924, p. 326; *Cladochalina dendyi* Burton 1929, p. 421.

Occurrence. 948, 954: Stn. 40, July 10 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m.

Remarks. The species is represented by two handsome bush-like growths. The external form is strikingly like that of *Haliclona oculata* (Pallas), except that the branches are stouter, and show a greater tendency to anastomose, and the texture and general appearance are coarser. Further, the distinction between dermal and choanosomal skeletons is evident at any point of breakage in the branches and the presence of a tough dermal skeleton is obvious to the naked eye. The total height of the larger of the two specimens exceeds 20 cms.

In the holotype, the main skeleton is a coarse and irregular network of fibres, of large mesh, in which the spicules are arranged multiserially and in a plumose manner in the main fibres, and uniserially and in a linear series in the secondary fibres. In both the present specimens, the main skeleton is composed of smaller meshes and both primary and secondary fibres are multispicular.

The dermal skeleton of the holotype consists of an irregular network of fibres, usually subdivided in a quite irregular manner into secondary meshes, which are mainly unispicular. The whole is echinated at the nodes of the network by sparse bunches of spicules set at right angles to the surface. The corresponding skeleton of 948 is composed of a similar network but because the thickness of the fibres is much the same in every part, the distinction between primary and secondary meshes is not marked. Added to this, all fibres are multispicular and there are no echinating tufts of spicules.

At first sight, the dermal skeletons of the holotype and 948 appear to be very different but it is clear that if that of the former were deprived of its echinating spicules and fibres rendered multispicular, the apparent difference would to a large expent disappear. The dermal skeleton of the second specimen, 954, is intermediate between that of the holotype and that of specimen 948. It has the same type of mesh as the latter, the fibres are mainly multispicular but less markedly so than in specimen 948, and occasional echinating tufts are present at the nodes of the network.

The oxea measure 0.11 by 0.011 mm in the holotype, 0.12 by 0.006 mm in specimen 948, and 0.12 by 0.01 mm in specimen 954.

Distribution: New Zealand; Victoria Land. (I have stated in a previous publication (1929) that this species is also found in the Indian Ocean and in Australian waters. This will no doubt prove to be the case eventually, but without a complete revision of the species of Chalininae it is not possible to be emphatic on this point. I have, therefore, ignored the possibility of an extra-Antarctic distribution for the time being, but the species will be more fully discussed in my report on the sponges of the Great Barrier Reef.)

Genus **Pachypellina** gen. n.

Genotype. Petrosia fistulata KIRKPATRICK.

Diagnosis. Haploscleridae with main skeleton an isodictyal network of oxea, with a dense dermal (or subdermal?) layer of closely packed oxea inter-crossing without order and arranged mainly tangentially to surface.

Remarks. I had originally (1929, p. 420) regarded *Petrosia fistulata* KIRKPATRICK as a synonym of *Haliclona* (*Chalina*) *dancoi* (TOPSENT) but re-examination of the original material leads me to believe the two to be generically distinct.

Pachypellina fistulata (KIRKPATRICK).

(Text-fig. 2.)

Petrosia fistulata KIRKPATRICK 1907, p. 290; Id. 1908, p. 51, pl. xviii, fig. 4, pl. xxiv, fig. 7.

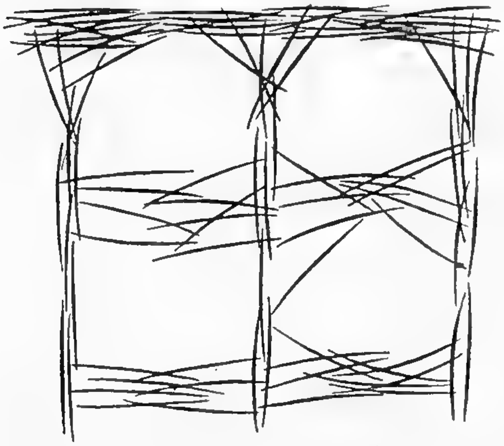


Fig. 2. *Pachypellina* gen. n. *fistulata* (KIRKPATRICK). Skeleton at right angles to surface; diagrammatic.

Occurrence. 889 C: stn. 5, January 16 1902, S. E. of Seymour Island, Graham Land (64° 20′ S, 56° 38′ W), 150 m.

Remarks. The single specimen consists of a pair of erect tubes fused for the greater part of their length. Each tube is 6 cms high and 1.5 cms in diameter. The texture is hard and incompressible, but very friable. The skeleton is a rather loose isodictyal network of oxea, 0.36 by 0.02 mm and at the surface is a dense aggregation of oxea lying tangentially to the surface. This surface layer, which may perhaps be regarded as a special dermal skeleton, although it does not function as such in the strict sense of the term, is the most characteristic feature of the species and is in fact the only thing which distinguishes it from the various tubular 'Renieras' from the Antarctic. This structure I consider of sufficient importance to serve as a basis for generic distinction.

Distribution. Victoria Land.

Family **Desmacidonidae.**

Section Isodictyeae.

Genus **Isodictya** BOWERBANK.

Isodictya setifer (TOPSENT).

(For synonymy see BURTON 1932, p. 284.)

Occurrence. 879, 885: stn. 5, January 16 1902, off Seymour Island, Graham Land (64° 20′ S, 56° 38′ W), 150 m; 1003: stn. 58, September 11 1902, S.W. of Falkland Islands (52° 29′ S, 60° 36′ W), 197 m; 1011, 1018: stn. 59, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. The largest specimen is somewhat macerated and the dermis much damaged, but in this condition it resembles almost exactly the holotype of the species. The second specimen consists of what must have been a large regularly massive, perhaps subspherical, sponge, probably about 6 or 7 cms in diameter. In this the dermis is uninjured and the surface appears minutely and evenly conulose, the conules being about 1 mm high and 2 to 4 mm apart. Several oscules are scattered over the surface. These are basin-shaped pits, with margins level with the surface, each receiving the openings of some 6 or 8 exhalant canals. The third specimen is immature, a small pyriform sponge 2 cms high and 1.5 cms at the greatest diameter. The surface of this shows the same structure and the oscules have the same appearance as in the preceding specimen; but the height of the conules, and the distances between them, are considerably smaller, and the size of the oscules much less. These things, small in themselves, combine to give the specimen a different appearance to that of the second specimen described above. Indeed, at first sight they appear to belong to different species.

There is little difference between the three specimens in the arrangement of the skeleton except that in the smaller immature individual the meshes of the reticulation are smaller. The megascleres in the two larger specimens measure, on an average, 0.45 mm long, and the chelae vary from 0.018 to 0.032 mm. The third, the immature specimen, has oxea measuring on an average 0.5 mm while the chelae are absent. Thus in the matter of the skeleton also, the third specimen differs from the other two, which supplies an additional incentive for regarding it as a separate species, but to place all three side by side is to have no doubt of their identity with a single species.

Distribution. Falkland Islands; Burdwood Bank; Shag Rocks; South Georgia; Graham Land; Victoria Land.

Isodictya cactoides (KIRKPATRICK).

(Pl. 3, fig. 1.)

Desmacidon kerguelensis var. *cactoides* KIRKPATRICK 1908, p. 38, pl. xix, fig. 2, pl. xxiii, fig. 2; *Isodictya cactoides* BURTON 1929, p. 424; 1932, p. 286.

Occurrence. 925: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. The single specimen is subspherical, 8 cms in greatest diameter, and composed of a mass of anastomosing trabeculae. The trabeculae are flattened or cylindrical in form and 2 to 4 mm in diameter. The skeleton consists of large oxea, 0.7 mm long, and there is no trace of any microscleres. By comparison with the specimens of this species recorded by me (l. c.), the present specimen appears, in spite of the absence of microscleres, to be quite definitely a member of *I. cactoides*, the external form being the same in each case and the size of the megascleres also. It is true that the megascleres are oxea only, but this would appear to be a negligible point since those of the holotype are oxeote or strongylote.

Distribution. South Georgia; Graham Land; Victoria Land.

Isodictya erinacea (TOPSENT).

(For synonymy see BURTON 1932, p. 286.)

Occurrence. 892: stn. 6, S.W. of Snow Hill Island (64° 36′ S, 57° 42′ W), 125 m; 1018: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. The specimen is 15 cms high and differs in slight details of the skeleton from the holotype. The oxea are 1 mm long and the chelae 0.06 mm. Rhapides do not appear to be present but the chelae are very abundant and present in dense masses.

Distribution. Graham Land; Victoria land.

Isodictya delicata (THIELE) var. **megachela** var. n.

Holotype. 887 A.

Occurrence. 887 A, 889 A, 889 B: stn. 5, January 16 1902, off Seymour Island, Graham land (64° 20′ S, 56° 38′ W), 150 m.

Remarks. The new variety differs from the typical form of the species in the external apperance and the larger size of the chelae only. The type is regularly flabellate and stipitate, with even but coarsely hispid surface, and oscules arranged in linear series along the margin of the sponge. The oxea are 0.52 mm long and the chelae measure up to 0.07 mm.

The second specimen is practically identical in form with Stephen's specimen of *I. compressa* (ESPER) from South Africa, but has the same skeleton as the first specimen, the oxea measuring 0.4 mm long and the chelae 0.07 mm.

The differences between *I. delicata* var. *megachela* and *Desmacidon delicata* THIELE (1905) are slight and it may well be doubted whether there is any justification for the formation of the variety. The difference in the sizes of their respective chelae is, however, great and this is the chief reason for making the distinction. Possibly it may be necessary eventually to unite THIELE's species, the new variety and *Isodictya compressa* (ESPER) under one specific name.

Genus **Guitarra** CARTER.

Guitarra fimbriata CARTER.

(For synonymy and discussion see BURTON 1929, p. 426 and 1932, p. 287.)

Occurrence. 922: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. A typical specimen 10 cms high by 12 cms across and 6 cms thick.

Distribution. North Atlantic; Indian Ocean; New Zealand; Antarctic (Falkland Islands; South Georgia; Wilhelm Land; Graham Land; Victoria Land).

Genus **Cercidochela** KIRKPATRICK.

Cercidochela lankesteri KIRKPATRICK.

C. lankesteri KIRKPATRICK 1907, p. 284; Id. 1908, p. 42, pl. xix, fig. 5, pl. xxiii, fig. 5; HENTSCHEL 1914, p. 74; BURTON 1929, p. 426.

Occurrence. 902: stn. 17, April 19 1902, Shag Rock Island, between Falkland Islands and South Georgia, (53° 34′ S, 43° 23′ W), 160 m.

Remarks. A flabellate specimen, incomplete below, measuring 14 cms high and 13 cms across. One side of the sponge bears oscula only, the openings being 1 mm or less in diameter and plentifully and evenly scattered over the whole surface. The opposite face of the sponge bears pores only. There is no trace of pseudoscula such as were described by me in the Terra Nova specimens.

Distribution. Graham land; Victoria land; Wilhelm Land.

Section Mycaleae.

Genus **Mycale** GRAY.

Mycale magellanica (RIDLEY).

(Pl. 7, figs. 1, 2.)

(For synonymy see BURTON 1932, p. 288.)

Occurrence. 908: stn. 17, April 19 1902, Shag Rocks, between Falkland Islands and South Georgia (53° 34′ S, 43° 23′ W), 160 m; 957: stn. 41, July 23 1902, Falkland Islands (51° 33′ S, 58° 9′ W), 2—4 m; 958: stn. 40, July 19 1902, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m; 966—970: stn. 50, August 12 1902, Port Louis, Falkland Islands (51° 33′ S, 58° 9′ W), 7 m; 989: stn. 54, September 3 1902, Stanley Harbour, Falkland Islands (51° 42′ S, 57° 50′ W), 10 m; 994: stn. 56, September 8 1902, Port Albemarle, Falkland Islands (52° 9′ S, 60° 33′ W), 15 m; 998, 1001, 1004, 1049: stn. 58, September 11 1902, S.W. of Falkland Islands (52° 29′ S, 60° 36′ W), 197 m; 1017: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m; 1027: stn. 60, September 15 1902, eastern mouth of Beagle Canal, Tierra del Fuego (55° 10′ S, 66° 15′ W), 100 m; 1030: stn. 62, September 16 1902, Beagle Canal (54° 53′ S, 67° 56′ W), 140 m.

Remarks. A large number of specimens of *Mycale magellanica* has been recorded from the Antarctic and Sub-Antarctic, and a good number is present in this collection, and the observations of the various authors show that the spiculation, especially as regards

Table showing dimensions of spicules and the external form of those specimens here regarded as belonging to *Mycale magellanica*, (Ridley).

Specimen	External form	Styli	Anisochelae			Sigmata	Rhaphides
Esperia magellanica Ridley Alert Coll.	massive, sub-cylindrical.	0.461–0.544 × × 0.013	not seen	0.036 rare	0.024 rare	not seen	0.044—0.063 very rare
Esperia cunninghami Carter Holotype	massive, lobate.	0.36 × 0.009	0.06 very rare	0.033 very rare	not seen	not seen	0.04 very rare
Esperella magellanica Challenger Coll.		0.36 × 0.006	not seen	0.033	0.024	not seen	0.036 abundant
Mycale magellanica Thiele 1905	irregularly massive	0.45 × 0.01	not seen	0.035	0.018	not seen	rare (no measurements given)
Mycale sp. Thiele 1905	encrusting	0.37—0.4 × 0.013	not seen	0.035	0.02—0.022	0.015	not seen
Mycale sp. Kirkpatrik 1908	fragmentary	0.562 × 0.017	0.09	0.045 common	0.03	0.224 × 0.006 common	not seen
Mycale magellanica Topsent 1913	massive with central cloaca	0.32—0.57 × × 0.012–0.016	not seen	0.04—0.045	0.027—0.032	0.035—0.05	0.02—0.05 abundant
Mycale pellita Topsent 1913	fragmentary	0.45—0.5 × × 0.012–0.014	0.07	0.04	not seen	0.038–0.052, 0.15—0.16	not seen
Mycale antarctica Hentschel 1914	fragmentary	0.472—0.6 × × 0.01—0.013	0.06—0.065	?	0.023—0.036	0.066—0.077	not seen
Mycale rossi Hentschel 1914	encrusting(?)	0.512–0.616 × × 0.008—0.01	0.06—0.068	?	0.025—0.046	not seen	0.062—0.105
Mycale magellanica Dendy 1924	massive	0.56 × 0.014	0.076	0.037	0.026	not seen	0.07
Mycale lillei Dendy 1924 (Holotype)	lobate	0.5 × 0.014	0.065	0.04	0.024	0.048, 0.16 abundant	0.04
Mycale lillei:							
R. N. XX	—	0.45 × 0.009	0.06 abundant	0.03 abundant	0.024 abundant	0.036—0.12 abundant	not seen
R. N. XX. i.	—	0.46 × 0.012	0.063 abundant	0.036 abundant	0.024 abundant	not seen	0.045
R. N. XX. ii.	—	0.54 × 0.009	0.063 abundant	0.033 abundant	0.024 abundant	0.03—0.12 infrequent	0.052 common
R. N. XX. iv.	—	0.44 × 0.012	0.075 abundant	0.036 abundant	0.02 abundant	not seen	0.05 abundant
R. N. XX. v.	—	0.45 × 0.012	0.057 abundant	0.036 rare	0.022 abundant	0.028—0.12 infrequent	0.045 very rare
R. N. XX. vi.	—	0.51 × 0.011	0.06 common	0.039 common	0.024 rare	0.03—0.135 rare	0.06 common
R. N. XX. vii.	—	0.48 × 0.012	0.057 abundant	0.031 common	0.021 common	0.018—0.12 rare	0.045 abundant
R. N. XX. viii.	—	0.58 × 0.009	0.057 abundant	0.033 common	0.024 common	0.01—0.03 very rare	0.041 abundant

the microscleres, is quite variable. In addition to this species, four others have been described from the same areas and comparison of the written descriptions of these with those of *M. magellanica* shows a remarkable similarity between them all. In fact it is difficult to see any difference between them except in the details of the smaller spicules, and experience shows that these are extremely sporadic and variable in their occurrence in the known specimens of *M. magellanica.* These four species, which I propose here to regard as synonyms of *M. magellanica* are: *M. pellita* TOPSENT, *M. antarctica* HENTSCHEL, *M. rossi* HENTSCHEL, and *M. lillei* DENDY. When specimens of these five so-called species are compared side-by-side, their identity with each other and with a single species is readily apparent. This is, moreover, strikingly shown when the dimensions of the spicules are compared, and the table on p. 22 brings out this point very decisively.

The twenty specimens in the present collection, all obviously conspecific, show the same variations of external form as those detailed in the above list and the same variations in the dimensions of the spicules. The manner in which the various categories of microscleres may be present or absent and their relative proportions, when present, are also of a similar character.

Distribution. Patagonia; Falkland Islands; Punta Arenas; Cape Horn; Burdwood Bank; Victoria Land; Wilhelm Land.

Mycale acerata KIRKPATRICK.

(Pl. 8, figs. 1—4.)

M. acerata KIRKPATRICK 1907, p. 280; Id. 1908, p. 36, pl. xx, fig. 1, pl. xxiv, fig. 10; *M. acerata* var. *minor* HENTSCHEL 1914, p. 63; *M. acerata* TOPSENT 1917, p. 63; BURTON 1929, p. 430; 1932, p. 289.

Occurrence. 903: stn. 17, April 19 1902, Shag Rock Island, between Falkland Islands and South Georgia, (53° 34′ S, 43° 23′ W), 160 m; 919, 920, 923: stn. 34, June 5 1902, Cumberland Bay, South Georgia, 252—310 m; 1002: stn. 58, September 11 1902, S.W. of Falkland Islands (52° 29′ S, 60° 36′ W), 197 m.

Remarks. Specimen 919 is typical in all respects except that the microscleres are all extremely rare. In specimen 903, also typical in other respects, the trichodragmata are abundant but the rest of the microscleres very rare. So sparse are the microscleres in both these specimens that the megascleres form the most reliable guide to the indentification of the species.

Distribution. South Georgia; South Orkneys; South Shetlands; Graham Land; Victoria Land; Wilhelm Land.

Mycale tridens HENTSCHEL.

M. tridens HENTSCHEL 1914, p. 56, pl. v, fig. 6; TOPSENT 1917, p. 63; BURTON 1929, p. 430; 1932, p. 289.

Occurrence. 921: stn. 34, June 5 1902, Cumberland Bay, South Georgia, 252—310 m.

Remarks. A large fragmentary specimen conforming with the holotype in the details of its skeleton.

Distribution. South Georgia; Graham Land; Wilhelm Land; Victoria Land.

Genus **Amphilectus** VOSMAER.

Amphilectus fucorum (ESPER).

(For synonymy and discussion see BURTON 1932, p. 289.)

Occurrence. 875. ii, iv, 876. ii, 877. i: stn. 2, December 23 1901, North Coast of Argentina (37° 15′ S, 56° 8′ W), 100 m; 904. i: stn. 17, April 19 1902, Shag Rock Island (53° 34′ S, 43° 23′ W), 160 m; 961. i: stn. 47, August 9 1902, Falkland Islands (51° 32′ S, 58° 7′ W), 3—4 m; 1045: stn. 35, June 12 1901, South Georgia, 2—8 m.

Remarks. Amphilectus fucorum has been, for some reason unknown, usually ascribed to JOHNSON but that ESPER was the author of the species described by JOHNSON as *Halichondria fucorum* is certain. The sponges belonging to this species are typically irregularly-shaped cushions with crateriform or slightly papillate oscules, but the external form is sufficiently variable to have caused BOWERBANK to describe it under a number of different names. STEPHENS and BRØNDSTED, too, have created new names, obviously with reluctance, for individuals from South Africa and New Zealand respectively which certainly belong to *A. fucorum.* The surface, for example, is typically even but minutely hispid and porose, but it may be minutely mamillated or ridged. Further, it may be obviously hispid to the naked eye or may bear so few spicules projecting through the dermis that they can be barely detected with a strong hand-lens. The porose appearance of the surface is due to the underlying subdermal cavities which fail to reflect the light from above and produce a mottled appearance, and this may be conspicuous to the naked eye or may be entirely lacking. That these variations, though marked, are insignificant is shown by the fact that all may occur in a single specimen. These remarks, it is true, are based on the examination of preserved material and it is possible that specimens examined in the live state would exhibit a more uniform appearance. At the same time there is reason to believe that some of the variations may be due to age or to changes in the environment. New growths, for example, generally have a smoother, more even and less porose surface.

There is yet another variation in growth common to the species which deserves attention here if only because it has been responsible for the creation of new specific names. It sometimes happens that a typically massive specimen will bear a few blunt processes, conulose to digitate. In other cases such processes have grown out into long slender branches. When, as sometimes happen, these processes are broken off in the dredge the impression is given of an erect branching sponge. The holotype of *Isodictya gracilis* BOWERBANK consists of a bunch of branches of this nature.

The sponge which I recently described as *Axinosia incrustans* is actually only a specimen of *Amphilectus fucorum* with chelae so rare that they were overlooked entirely in the original examination. As regards the external form and appearance, however, both this and other specimens from the South America-Antarctic region, including those of the present collection, are indistinguishable from those found on the coasts of the British Isles.

Distribution. Arctic; Atlantic coasts of Europe; South Africa (Cape of Good Hope); Kerguelen; Tristan da Cunha; New Zealand; Aukland and Campbell Islands; Falkland Islands; Shag Rocks; South Georgia; Chile (Tumbes).

Genus **Asbestopluma** NORMAN.

Asbestopluma calyx HENTSCHEL.

A. calyx HENTSCHEL 1914, p. 66, pl. iv, fig. 4, pl. v. fig. 11.

Occurrence. 914: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. The several specimens closely resemble those described by HENTSCHEL in all respects.

Distribution. South Georgia; Wilhelm Land.

Section Iophoneae.

Genus **Iophon.**

Iophon radiatus Topsent.

(For synonymy and notes see Burton 1929, p. 442; 1931, p. 512—518; 1932, p. 296.)

Occurrence. 883: stn. 5, January 16 1902, S.E. of Seymour Island, Graham Land (64° 20′ S, 56° 38′ W), 150 m; 972: stn. 51, September 3 1902, Port William, Falkland Island (51° 40′ S, 57° 42′ W), 22 m.

Remarks. Specimen 972 is sub-pyramidal and measures 6 cms by 4 cms by 3 cms. The surface is wrinkled in the manner peculiar to many individuals of this species and is hirsute. The colour, in spirit, is brown. The skeleton is the same as in the specimen described by Kirkpatrick (1908, p. 30) as *Iophon flabello-digitatus* except that no microscleres can be found. The dermal skeleton is irregular but not tangential.

Distribution. Falkland Islands; South Georgia; South Shetlands; Graham Land; Victoria Land; Wilhelm Land.

"**Iophon aceratus** Hentschel".

(Pl. 4, fig. 4.)

Occurrence. 1053: mouth of the Morain Fjord, May 15 1902, 5 m; 911: stn. 22, May 14 1902, South Georgia (54° 17′ S, 36° 28′ W), 75 m.

Remarks. In a previous work (1931, pp. 512—518), I have suggested the indentity of *I. aceratus* Hentschel with *I. radiatus* (Topsent) but, although I still believe this to be the case, there is a specimen in the present collection which, while agreeing with *I. aceratus* in spiculation, does not agree with the typical external form of *I. radiatus.*

Iophon proximum (Ridley).

(For synonymy and illustration see Burton 1932, p. 296.)

Occurrence. 875. ii, 876. i, 878. iii: stn. 2, December 23 1901, North coast of Argentina (37° 15′ S, 56° 8′ W), 100 m; 898: stn. 16, April 11 1902, between Falkland Islands and South Georgia (51° 40′ S, 57° 25′ W), 150 m; 932: stn. 39, July 4 1902, Port William, Falkland Islands (51° 40′ S, 57° 41′ W), 40 m; 1003. i: stn. 58, September 11, 1902, south of Falkland Islands (52° 29′ S, 60° 36′ W), 197 m; 1010: stn 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m; 1029: stn. 61, September 16 1902, Beagle Canal, Tierra del Fuego (54° 54′ S, 67° 52′ W), 125 m; 1032: stn. 62, September 16 1902, Beagle Canal, Tierra del Fuego (54° 53′ S, 67° 56′ W), 140 m.

Remarks. The various specimens are irregularly massive, the largest being 6 cms by 4 cms in extent, and have the form and general apperance of *Iophon pattersoni* (Bowerbank). 878. iii differs slightly from the rest in that it consists of a cylindrical branch. The spiculation in all cases approximates very nearly to that of the holotype and such differences as were noted are set forth in the table given below. A much more important point concerns the discovery of the presence of echinating acanthostyli. These were not recorded in the holotype by Ridley but re-examination has shown them to be present. That these spicules are of variable distribution is, however, certain. In 1032, for example, whole tracts of the sponge tissues may be without echinating acanthostyli but in other places these spicules will be abundant, with one to each node of the main skeleton.

When Dendy (1924) established the genus *Iophonosis*, he proposed to distinguish between the genus *Iophon* and a group of species which differed from *Iophon* by the presence of echinating acanthostyli only. It is of interest to note that the unidentified fragment which he referred to at that time as *Iophonopsis* sp. actually does possess echinating spicules, and is therefore a typical *Iophon*. This fragment belongs in fact to *I. proximum* (see table below) and the fact that the echinating spicules are smaller and thinner than usual may account for Dendy's having overlooked them.

Comparison of spicules in the various specimens here recorded.

(Measurements in μ).

Specimen	Acanthostyli (Main)	Acanthostyli (Echinating)	Tornota	Anisochelae	Bipocilla
Iophonopsis sp. Dendy 1924	200 × 16	160 × 8	220 × 4	16 extremely rare	8 extremely rare
1032	180 × 12	140 × 8	220 × 8	9—35 rare	9
1010	220 × 16	100 × 6 rare	220 × 8	12—36 rare	10 very rare
876. i.	220 × 7	120 × 4 extremely rare	240 × 5	12—28 rare	10 rare
1003	280 × 16	140 × 8	280 × 6	12—40 very abundant	8 extremely rare
932	200 × 12	absent	200 × 6	12—16 extremely rare	absent
878. iii.	180 × 7	100 × 7	240 × 5	12—24 rare	9 extremely rare
1029	240 × 16	120 × 8	260 × 6	12—36 rare	10 common
875. ii.	160 × 10	100 × 6	200 × 8	12 extremely rare	absent

Distribution. Kerguelen; Cape of Good Hope; Tristan da Cunha; Gough Island; Falkland Islands; Patagonia; Chile; Galapagos Islands; California (*fide* de Laubenfels 1932); Canada (Pacific and (?) Atlantic coasts); South Georgia; New Zealand.

Section Tedanieae.

Genus **Tedania** Gray.

Tedania massa Ridley and Dendy.

(For synonymy and discussion see Burton 1932, p. 303.)

Occurrence. 1041: stn. 17, April 19 1902, Shag Rock Island (53° 34′ S, 43° 23′ W), 160 m.

Distribution. South America; Falkland Islands; Shag Rock; South Georgia; Graham Land and Antarctic generally.

Tedania spinata (RIDLEY.)

(For synonymy and discussion see BURTON 1932, p. 306.)

Occurrence. 875. iii, 878. i: stn. 2, December 23 1901, North coast of Argentina (37° 15′ S, 56° 8′ W), 100 m.

Distribution. Chile; Falkland Islands.

Tedania charcoti TOPSENT.

T. charcoti TOPSENT 1907, p. 69; 1908, p. 30, pl. i, fig. 3, pl. iii, fig. 3, pl. v, fig. 6; 1913, p. 630, pl. v, fig. 3, 7. (nec. *T. charcoti* TOPSENT 1917; cf BURTON 1929, p. 441.)

Occurrence. 916: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m; 999: stn. 58, September 11 1902, off the Falkland Islands (52° 29′ S, 60° 36′ W), 197 m; 1007: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. The first specimen (1007) is a large fragment measuring 13 by 10 by 5 cms agreeing in all respects with that described and figured by TOPSENT (1908). The second is even more fragmentary and differs from the typical form in the size of the styli only, these measuring 0.55 mm long.

Distribution. Graham Land; Burdwood Bank; Victoria Land (This record is obtained from a specimen collected by the Shackleton-Rowett Expedition).

Tedania murdochi TOPSENT.

T. murdochi TOPSENT 1913, p. 629, pl. v, fig. 5.

Occurrence. 973: stn. 51, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 42′ W), 22 m; 992: stn. 56, September 8 1902, Port Albermarle, Falkland Islands (52° 9′ S, 60° 33′ W), 15 m.

Remarks. The specimen is fragmentary, the largest piece being 16 cms high and 11 cms across by 1.5 cms thick. When complete the sponge was probably flabello-digitate, very like *T. tenuicapitata* RIDLEY and DENDY in general appearance but with the spiculation of *T. murdochi.* This suggests a closer relation between the two species than has been suspected hitherto.

Distribution. Falkland Islands.

Tedania mucosa THIELE.

T. mucosa THIELE 1905, p. 430, fig. 50.

Occurrence. 875, i and v: stn. 2, December 12 1901, North coast of Argentina (37° 15′ S, 56° 8′ W), 100 m.

Distribution. Chile.

Section Myxilleae.

Genus **Myxilla** Schmidt.

Myxilla mollis Ridley and Dendy.

(For synonymy see Burton 1932, p. 309.)

Occurrency. 893, 895: stn. 6, January 20 1902, S.W. of Snow Hill Island, Graham Land (64° 36′ S, 57° 42′ W), 125 m; 918: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m; 901, 904. ii: stn. 17, April 19 1902, Shag Rock Island (53° 34′ S, 43° 23′ W), 160 m.

Remarks. The two specimens from stn. 17 resemble the type closely in all but minor details. The first is subspherical and 11 cms in diameter and has chelae ranging from 0.016 to 0.06 mm chord and sigmata from 0.02 to 0.64 mm chord. In the type the chelae measure up to 0.04 mm. The second specimen, a much smaller one, differs from the first only in the size of the sigmata, which measure 0.35 to 0.06 mm chord.

A third specimen (918) is massive in form and measures 8 cms by 6 cms by 5 cms high. It is brown in colour and the surface is covered with spinose outgrowths measuring 2 to 3 mm high. The skeleton is the same as in the holotype of *Myxilla magna* Topsent except that the smaller chelae and sigmata are entirely absent and the larger sigmata are rare. It is therefore atypical in form only.

A fourth specimen (893) is typical except that the styli reach a length of 0.7 mm.

Finally, there is a damaged specimen so mixed up with *Polyzoa* and worm tubes that the shape is entirely lost. The spiculation is, however, typical, except that the styli measure on an average 0.72 by 0.05 mm as against 0.57 by 0.029 mm in the holotype.

Distribution. E. coast of South America up to the mouth of Rio de la Plata; Falkland Islands; South Georgia; Graham Land; Victoria Land; Wilhelm Land.

Myxilla chilensis Thiele.

M. chilensis Thiele 1905, p. 443, figs. 22, 62; *Ectyomyxilla kerguelensis* Hentschel 1914, p. 103, pl. iv, fig. 10, pl. vii, fig. 10; *Crellomyxilla intermedia* Dendy 1924, p. 364, pl. xv, figs. 16—21; *Myxilla tornotata* Brøndsted 1923, p. 142, fig. 21; *Ectyomyxilla kerguelensis* Burton 1929, p. 437; *Myxilla chilensis* Burton 1930, p. 333; 1932, p. 311, pl. liv, fig. 10.

Occurrence. 974, 975. i, 979: stn. 51, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 42′ W), 22 m.

Remarks. Re-examination of the original material at my disposal and of the original descriptions of the species concerned shows that *Myxilla chilensis* Thiele and *Ectyomyxilla kerguelensis* Hentschel (sensu Burton 1929) are conspecific. The species is not an *Ectyomyxilla*, as I had previously believed, the smaller acanthostyli not being echinating as a rule, but a *Myxilla* in which the characteristic features are a main skeleton of acanthostyli arranged in an isodictyal network and a dermal tangential layer of small acanthostyli with tornota set at right angles thereto.

The present specimens are massive and quite typical except that the tornota are microspined at the ends. This feature would, under the circumstances, make it appear that the present specimens are specifically distinct from *M. chilensis* Thiele, but they are so obviously identical with it in all other respects that it would not be logical to accept the presence of spines on the tornota as evidence of the existence of a second species. The real significance of this feature seems to be, rather, that whereas the shape of the tornota is constant for most individuals, it will occasionally depart from the normal without any correlated alteration in the other characters of the individual concerned.

Distribution. Chile; Falkland Islands; Kerguelen; New Zealand; Campbell Islands; Victoria Land; South Georgia.

Genus **Ectyodoryx** LUNDBECK.

Ectyodoryx paupertas subsp. **nobile** (RIDLEY and DENDY).

(For synonymy see BURTON 1932, p. 313.)

Occurrence. 1013: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. The two specimens are approximately equal in size and have an irregularly flabellate form. Their height is 8 cms, their breadth 7 cms, and they are 1.5 cms thick. Both are incipiently stipitate and the lateral faces of one of them bear several irregular secondary lobes. The dermis is extremely delicate and is, for the most part, lost. In places it persists, however, and from the examination of such patches it would appear that the pores are segregated into well-defined pore-areas, each surrounded by a palisade of tornota set at right angles to the surface. Oscules cannot be found. The subdermal tissues exposed by the loss of the dermal membrane are thrown into meandering ridges, which in places form a honeycombed structure, and it may be presumed that in life the grooves between these were roofed over by a thin pore-bearing dermis.

The main skeleton consists of an irregular reticulation of plumose bundles of large styli echinated by acanthostyli, but in places this plumose effect is replaced by a triangular reticulation of bundles of styli echinated at the nodes by acanthostyli. The skeleton is therefore for the most part that of a typical *Stylostichon* but in places this is replaced by the structure characteristic of *Ectyodoryx*. This only serves to emphasize the close relationship between these two genera and shows that the present species is in the nature of a connecting link between them.

The spicules resemble those of the type and their dimensions are: 1. basally-spined styli, 0.32 by 0.012 mm; 2. acanthostyli, 0.19 by 0.009 mm; 3. tornota, with strongylote or slightly tylote heads, 0.2 by 0.004 mm; 4. chelae arcuatae, 0.024 to 0.035 mm chord.

Distribution. Off the mouth of the Rio de la Plata; Patagonia; Falkland Islands; Burdwood Bank; South Georgia; Crozet Islands.

Ectyodoryx ramilobosa (TOPSENT).

(Pl. 3, fig. 3.)

Dendoryx ramilobosa TOPSENT 1916, p. 167; Id. 1917, p. 47, pl. iii, fig. 3, pl. vi, fig. 6; *Ectyodoryx ramilobosa* BURTON 1929, p. 399; 1932, p. 314.

Occurrence. 887, 889 A: stn. 5, January 16 1902, S.E. of Seymour Island, Graham Land (64° 20° S, 56° 38′ W), 150 m.

Remarks. The specimens are typical in regard to their spiculation, the characters of the surface and the texture, but are irregularly flabellate in form.

Distribution. South Georgia; Graham Land; Victoria Land.

Genus **Anchinoë** GRAY.

Anchinoë latrunculioides (RIDLEY and DENDY).

(For synonymy see BURTON 1929, p. 439 and 1932, p. 315.)

Occurrence. 1012: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. In dealing with this species in my 'Terra Nova' Report, I referred to it as "a typical *Anchinoë*" reduced "by the loss of one or more categories of spicules". This statement is, however, open to criticism, that in a typical *Anchinoë* there is no special dermal layer of tangentially-placed megascleres and the dermis contains microscleres only, except around the pore-areas where the tornota are arranged in a palisade at right angles to the surface. Thus, the typical *Anchinoë* has the same dermal structure as that shown by SHAW (1927, p. 432, fig. 4) for *Hamigera dendyi.* In *Anchinoë latrunculioides*, on the other hand, the dermis is filled with a dense layer of tangentially-arranged megascleres in addition to the palisades around the pore-areas. It is conceivable therefore that this species should be regarded as generically distinct from the other species of *Anchinoë.* In such a case it would be necessary to revive the use of the genus *Pyloderma.* At the moment, however, this would be inadvisable as *Hymedesmia leptochela* HENTSCHEL, which there is reason to believe is an *Anchinoë*, has a dermal skeleton intermidiate between that of a typical species of that genus and *A. latrunculioides.* In some places its skeleton is that of a typical *Anchinoë* but in certain patches the dermis contains a tangential layer of megascleres as in *A. latrunculioides.*

Distribution. South America; Falkland Islands; South Africa; Shag Rocks; South Georgia; New Zealand; Graham Land; Victoria Land; Wilhelm Land.

Anchinoë areolata (THIELE).

(For synonymy see BURTON 1932 p. 315).

Occurrence. 898 B: stn. 16, April 11 1902, between Falkland Islands and South Georgia (51° 40′ S, 57° 25′ W), 150 m.

Distribution. Chile; Shag Rocks; South Georgia; Victoria Land.

Genus **Kirkpatrickia** TOPSENT.

Kirkpatrickia coulmani (KIRKPATRICK).

(Pl. 3, fig. 4.)

Tedania coulmani KIRKPATRICK 1907, p. 280; Id. 1908, p. 33, pl. xxi, fig. 2, pl. xxv, fig. 2; *Kirkpatrickia coulmani* TOPSENT 1912, p. 3; BURTON 1929, p. 399; 1932, p. 317, pl. lv, fig. 5.

Occurrence. 926: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. A single specimen flabello-digitate in form and measuring 40 cms high by 20 cms across and varying in thickness, the average being about 1 cm. The surface is uneven and covered with irregular conuli, giving the whole a ragged appearance. In general freatures, this handsome specimen resembles the type but as the latter was a somewhat fragmentary specimen, it has been thought worth while to include a photograph.

The skeleton is a dense and irregular reticulation of smooth styli, 0.39 by 0.02 mm, with tornota, measuring 0.26 by 0.006 mm, set in an irregular manner at the surface.

Distribution. South Georgia; Victoria Land.

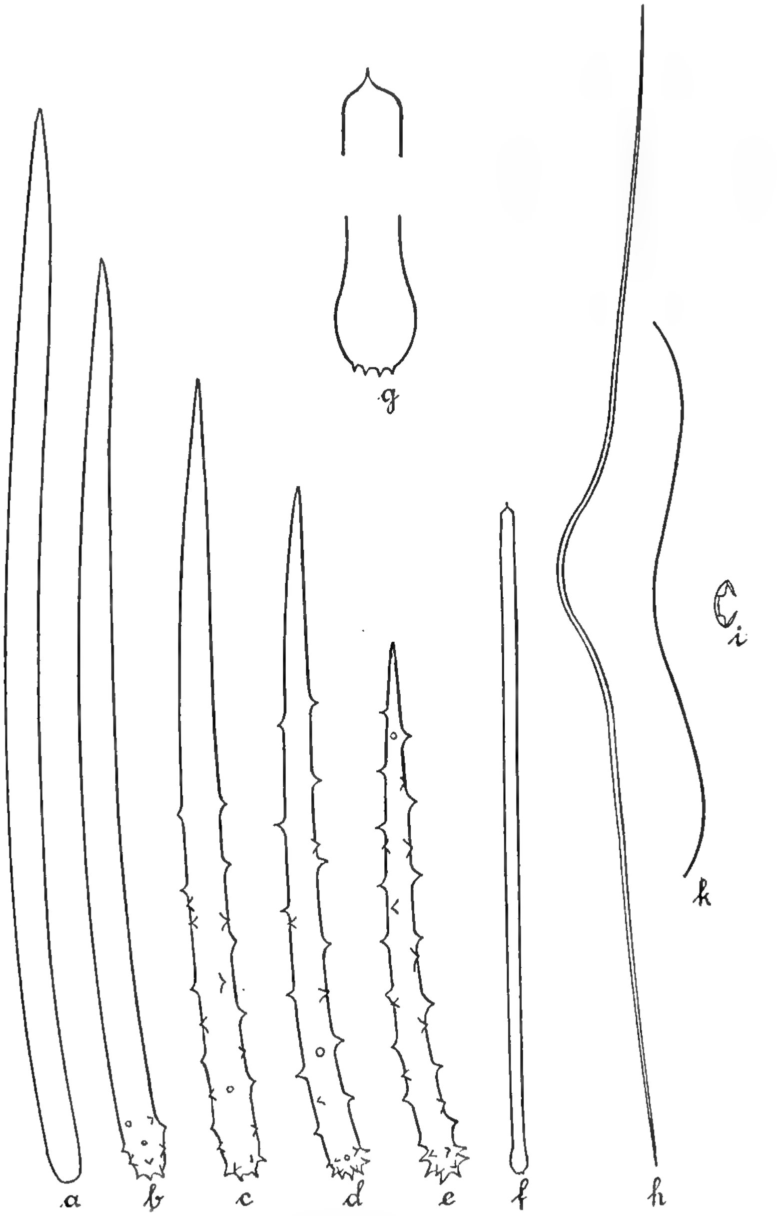


Fig. 3. *Clathria toxipraedita* TOPSENT, specimen 406. a—e. Series showing transition from styli of main skeleton to echinating acanthostyli; f. dermal spicule, h—h'. toxa; i. chela; × 250. g. ends of dermal spicule, × 1,400.

Genus **Inflatella** SCHMIDT.

Inflatella belli (KIRKPATRICK).

Joyeuxia belli KIRKPATRICK 1907, p. 283; Id. 1908, p. 41, pl. xvi, figs. 1—5.
(For further synonymy see BURTON 1929, p. 439 and 1932, p. 318.)

Occurrence. 1014: stn. 59, September 12 1902, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Distribution. Falkland Islands; Victoria Land; Wilhelm Land; New Zealand.

Section *Clathrieae.*

Genus **Clathria** SCHMIDT.

Clathria toxipraedita TOPSENT.

(Pl. 4, figs. 2, 3; text-fig. 3.)

C. toxipraedita TOPSENT 1913, p. 620, pl. v, fig. 4, pl. vi, fig. 12; BURTON 1932, p. 319.

Occurrence. 904, 906: stn. 17, April 19 1902, Shag Rock Island (53° 34′ S, 43° 23′ W), 160 m.

Distribution. Burdwood Bank; South Georgia; Palmer Archipelago.

Clathria lipochela BURTON.

C. lipochela BURTON 1932 p. 319, pl. lv, figs. 6—7, text-fig. 29.

Occurrence. 978: stn. 51, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 42′ W), 22 m.

Remarks. The sponge is small and so macerated that only the fibres of the skeleton are left. In life it was, probably massively and irregularly flabellate, with broad upper margins, possibly bearing several rows of small oscules.

The fibres of the skeleton run more or less vertically to the surface, branching and anastomosing as they go. They are cored by styli and echinated by acanthostyli. In many of the fibres two sizes of styli are present, the one measuring 0.22 by 0.006 mm and the other measuring 0.22 by 0.012 mm. In other fibres only the larger of these two is present. We may therefore assume that the thinner styli represent nothing more than development stages of the larger, and are not auxiliary spicules. In one or two places, a few slender subtylostyli, measuring 0.26 by 0.004 mm, are present and these probably represent the remains of the auxiliary spicules. The acanthostyli are typical. No microscleres were seen.

Genus **Rhaphidophlus** EHLERS.

Rhaphidophlus lissocladus sp. n.

(Pl. 4 fig. 1; text-figs. 4, 5.)

Holotype. 952.

Occurrence. 951, 952, 955: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m.

Diagnosis. Sponge erect, flabello-digitate; surface smooth, very minutely hispid; texture firm, compressible; lipostomous; colour, in spirit, ash-white; skeleton composed of spongin fibres running longitudinally through branches and giving off lateral branches to pass vertically to surface; fibres cored by styli and echinated by acanthostyli; dermal subtylostyli arranged in loose tufts at outer ends of fibres; auxiliary subtylostyli scattered between fibres; styli smooth, straight or slightly curved, 0.24 by 0.012 mm; auxiliary subtylostyli, 0.24 by 0.004 mm; dermal subtylostyli, 0.18 by 0.003 mm; acanthostyli, with sparse spines tending to arrangement in pairs, 0.04 to 0.12 by 0.007 mm thickness exclusive of spines; chelae palmatae, 0.012 mm chord.

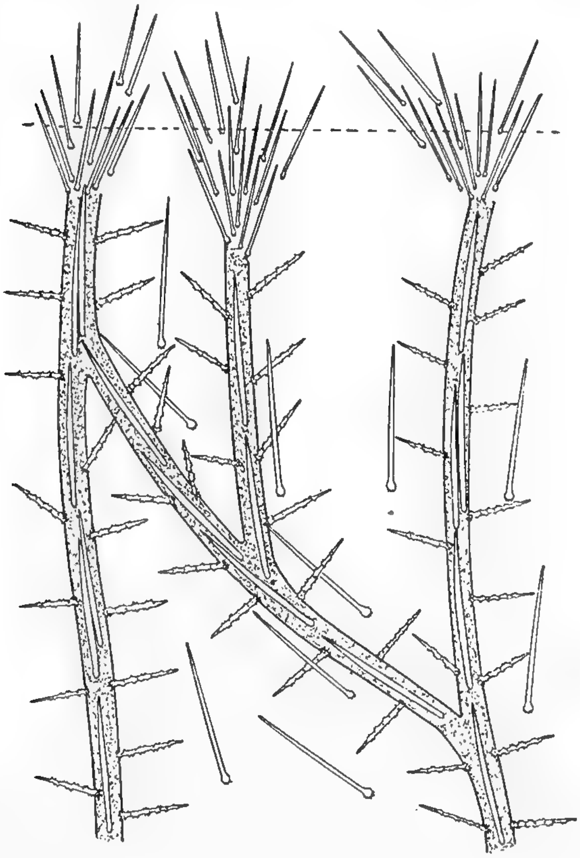


Fig. 4. *Rhaphidophlus lissocladus* sp. n. Skeleton at right angles to surface (diagrammatic).

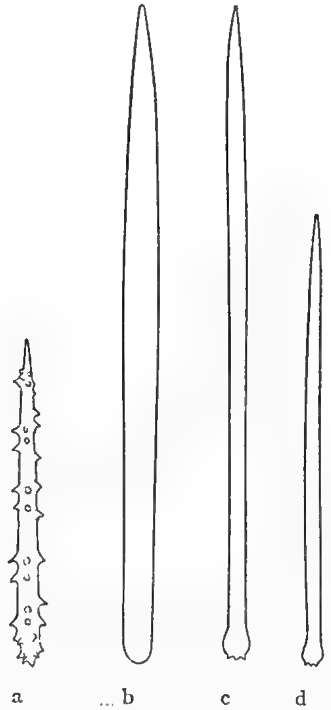


Fig. 5. *Rhaphidophlus lissocladus* sp. n. a acanthostyle, b) style of main skeleton, c) auxiliary subtylostyle of choanosome, d) dermal substylostyle, all × 500.

Remarks. The holotype is 17 cms high by 8 cms across and consists of a flabellate lower portion from which arise a number of digitate branches, roughly cylindrical and varying from 7 to 20 mm in diameter. The surface is even and smooth, but very faintly harsh to the touch. Oscules are not to be seen and the numerous rounded openings scattered over the surface lead into rounded chambers containing commensal Copepods.

The skeleton is that of a typical *Rhaphidophlus* and calls for little comment, and the characteristic feature of the species is the external form.

Genus **Ophlitaspongia** Bowerbank.

Ophlitaspongia membranacea Thiele.

Ophlitaspongia membranacea Thiele 1905, p. 450, figs. 67, 105; Burton 1932, p. 321.

Occurrence. 981: stn. 51, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 42′ W), 22 m.

Remarks. A macerated skeleton, containing a system of fibres enclosing smooth styli, may possibly represent this species. No other spicules are present.

Distribution. Juan Fernandez; South Georgia.

Genus **Artemisina** Vosmaer.

Artemisina plumosa Hentschel.

(For synonymy see Burton 1932, p. 323.)

Occurrence. 894: stn. 6, January 20 1902, S.W. of Snow Hill Island, Graham Land (64° 36′ S, 57° 42′ W), 125 m.

Remarks. The single specimen consists of a stout compressed branch bearing several lateral branches, the whole having a markedly shaggy surface. The skeleton agrees with that of the type in construction but the dimensions of the spicules show certain conspicuous differences. The large styli measure 0.75 to 2 mm long and the auxiliary styli are only 0.5 mm long. The toxa are very well developed and often measure as much as 0.8 mm long, chelae are absent in the adult, which corresponds therefore to the type of the var. *lipochela.*

In the choanosome are a number of spherical embryos measuring 0.3 mm in diameter, the more developed of which contain styli and chelae.

Distribution. Falkland Islands; Wilhelm Land.

Genus **Axociella** Hallmann.

Axociella flabellata (Topsent).

Ophlitaspongia flabellata Topsent 1916, p. 167; 1917, p. 41, pl. i, fig. 4, pl. vi, fig. 2; *Axociella flabellata* Burton 1929, p. 433; 1932, p. 325.

Occurrence. 910: stn. 22, May 14 1902, South Georgia, (54° 17′ S, 36° 28′ W), 75 m.

Remarks. Two specimens slightly larger than the holotype but typical in most respects. The chief point in which they differ from those specimens hitherto described lies in the comparative rarity of the toxa.

Distribution. South Georgia; Graham Land; Victoria Land.

Genus **Eurypon** Gray.

Eurypon miniaceum Thiele.

E. miniaceum Thiele 1905, p. 446, fig. 64; *Raspailia irregularis* Hentschel 1914, p. 121, pl. viii, fig. 6; *Eurypon miniaceum* Burton 1932, p. 325.

Occurrence. 904, v: stn. 17, April 19 1902, Shag Rock Island (53° 34′ S, 43° 23′ W), 160 m.

Remarks. A small irregularly massive specimen, with somewhat lobulate surface, agreeing closely with the holotype in spiculation. The "eigentümliche Acanthostyle" are, however, entirely smooth and take the form of anisostrongyla. The colour of the sponge, in spirit, is a pale flesh-colour.

Distribution. Calbuco, Chile; South Africa; South Georgia; Graham Land; Wilhelm Land.

Genus **Stylostichon** TOPSENT.

Stylostichon tuberculata sp. n.

(Pl. 3, fig. 2; text-figs. 6—9.)

Holotype. 950.

Occurrence. 931: stn. 39, July 4 1902, Port William, Falkland Islands (51° 40′ S, 57° 41′ W), 40 m; 945, 950: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m.

Diagnosis. Sponge erect, irregularly flabellate with incipient digitate processes; surface smooth, thrown into tubercles and ridges; texture firm but compressible; oscules and pores not seen; colour, in spirit, yellowish grey; skeleton, composed of smooth styli,

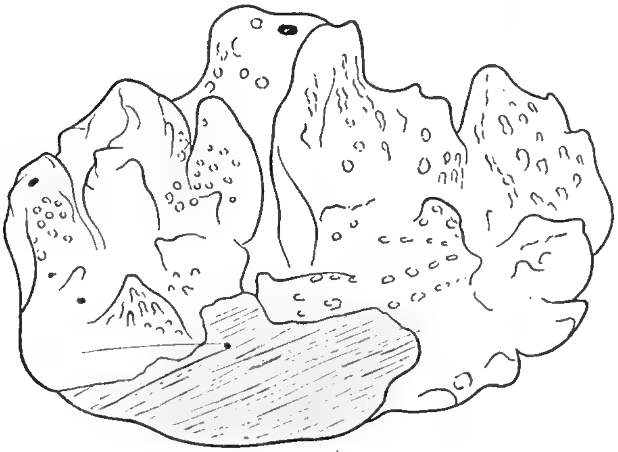


Fig. 6. *Stylostichon tuberculata* sp. n. Specimen no. 950. $\times \frac{2}{3}$.

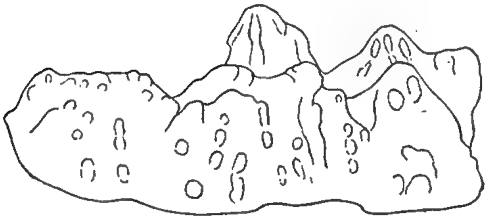


Fig. 8. *Stylostichon tuberculata* sp. n. Specimen no. 931. $\times \frac{2}{3}$.

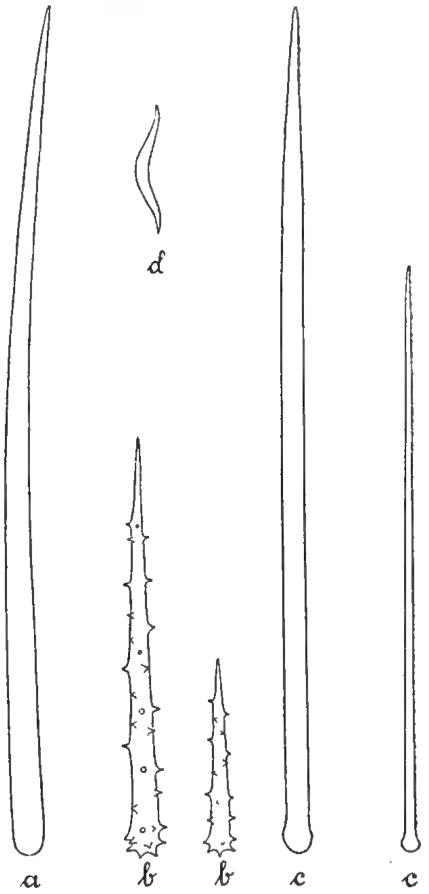


Fig. 7. *Stylostichon tuberculata* sp. n. Specimen no. 930. a) Style of main skeleton; b) acanthostyli; c) dermal subtylostyli; d) toxon, × 300.

of three distinct sizes, and acanthostyli, divisible into main and dermal portions; main skeleton composed of plumose columns formed mainly of large subtylostyli and acanthostyli; dermal skeleton a dense palisade of small subtylostyli set at right angles to surface and projecting slightly beyond it; medium sized subtylostyli found both in dermal skeleton and associated with fibres of main skeleton; three sizes of subtylostyli measure 0.41 by 0.012 mm, 0.36 by 0.008 mm and 0.27 by 0.008 mm respectively; acanthostyli, 0.09 to 0.18 mm long; microscleres toxa 0.035 mm.

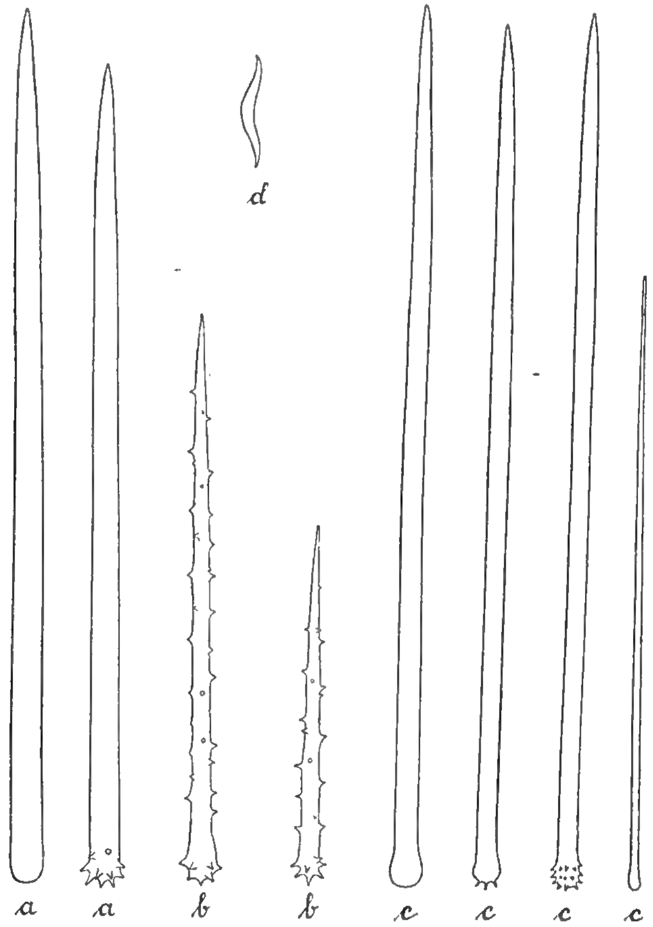


Fig. 9. *Stylostichon tuberculata* sp. n. a) Style and occasional basally-spined style from main skeleton; b) acanthostyli; c) dermal spicules; d) toxon × 300.

Remarks. The main skeleton in this species is formed of such a dense aggregation of spicules that it is not easy to understand its construction. The main fibres are usually plumose, but occasional fibres may be seen in which the axis is formed of non-plumose bundles of large subtylostyli echinated by acanthostyli. The intermediate or medium-sized subtylostyli are found in both main and dermal skeletons and it is not improbable that there is no real separation of the subtylostyli into three distinct categories, but that all are connected by intermediates. On the other hand, even though this may be so, the intermediates appear to be extremely rare so that for practical purposes there is in fact a sharp differentiation into three categories. Many of the smallest of the subtylostyli bear a few small spines at the base and occasional instances are seen of a large subtylostyle with sparsely-scattered spines on the lower two-thirds of the spicules.

Genus **Microciona** BOWERBANK.

(Text-fig. 10.)

Genotype. M. atrasanguinea BOWERBANK.

Diagnosis. Clathrieae, usually encrusting, with skeleton composed of plumose columns of styli, subtylostyli or tylostyli, smooth for the greater part of their length but covered at base with spines or tubercles, echinated by entirely spined acanthostyli; dermal spicules subtylostyli, or some modification thereof, entirely smooth or bearing a crown of a few spines at base; with small palmate isochelae and toxa for microscleres.

Remarks. The above diagnosis is based on the characters of the genotype but is so designed to include other species obviously congeneric with it. From this diagnosis it seems that *Clathria toxipraedita* TOPSENT, and allied species, must be included in the genus *Microciona* despite the fact that it is not encrusting. This species, a reference to which is given on p. 32, varies from encrusting to massive and erect and branching, but no matter what the external form the skeleton is always of the same type, consisting of plumose columns of basally-spined styli and acanthostyli. There is, however, a certain amount of variation in the manner in which the two types of spicules may be arranged: they may be mixed indiscriminately with their bases implanted in stout, vertically ascending spongin fibres and their apices directed outwards at varying angles; or the styli may form the ascending fibres, the acanthostyli echinating these in the usual manner; or, more rarely, both types of spicules may be so distributed that they form a somewhat irregular reticulation in which the plumose columns can only vaguely be seen. No one of these three types of skeleton arrangement appears to be correlated with a particular external form.

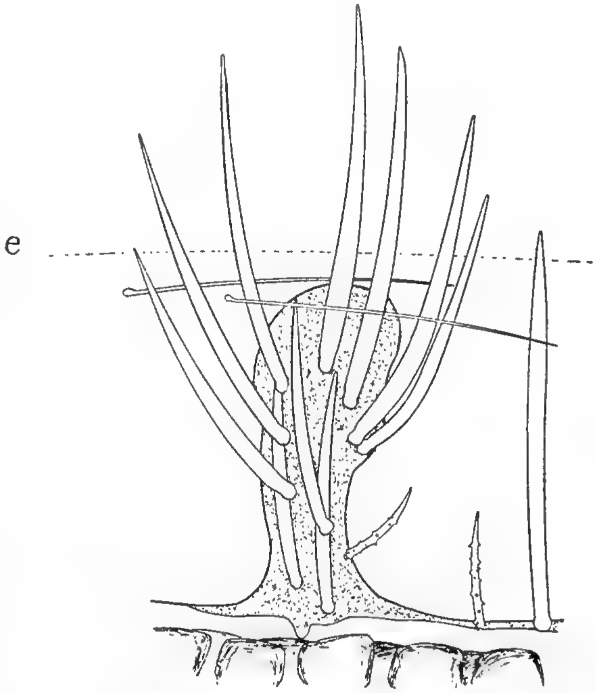


Fig. 10. *Microciona atrasanguinea* BOWERBANK, showing arrangement of skeleton in holotype; e = ectosome.

The genus *Dictyociona* TOPSENT is extremely closely related to *Microciona*, and it is possible that future research may render it necessary to regard the two as synonymous.

Microciona basispinosa sp. n.

(Pl. 5, fig. 2; text-figs. 11—12.)

Occurrence. 997. ii: stn. 57, September 11 1902, Port Albemarle, Falkland Islands, 18—30 m.

Diagnosis. Sponge encrusting; surface smooth; oscules at summits of delicate papillae(?); colour, in spirit, brown; skeleton composed of a basal layer of acanthostyli echinating substratum, with occasional long styli, smooth or basally-spined, rising vertically towards surface; auxiliary subtylostyli forming plumose bundles around long styli, as well as dermal brushes and a tangential layer at some distance below surface; long styli smooth or basally-spined, straight or slightly curved, 0.35 to 0.7 by 0.012 mm; acanthostyli, 0.1

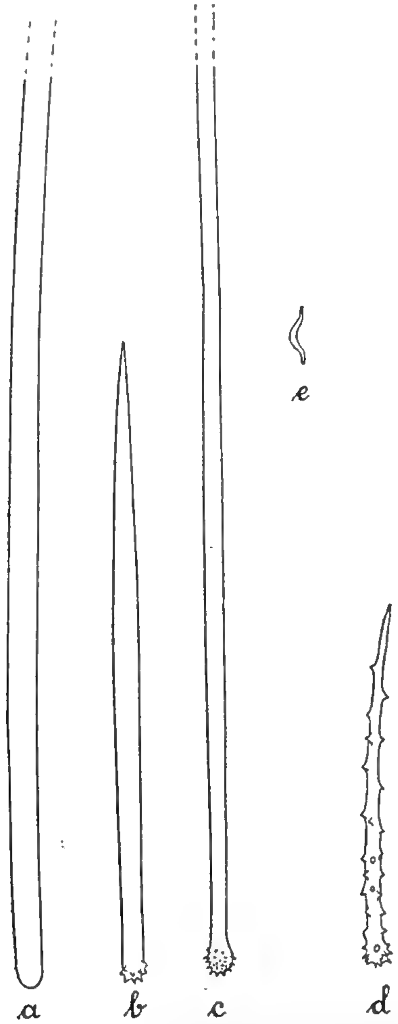


Fig. 11. *Microciona basispinosa* sp. n. a) main style, b) occasional basally-spined style, c) auxiliary basally-spined subtylostyle, d) acanthostyle, e) toxon, all × 300.

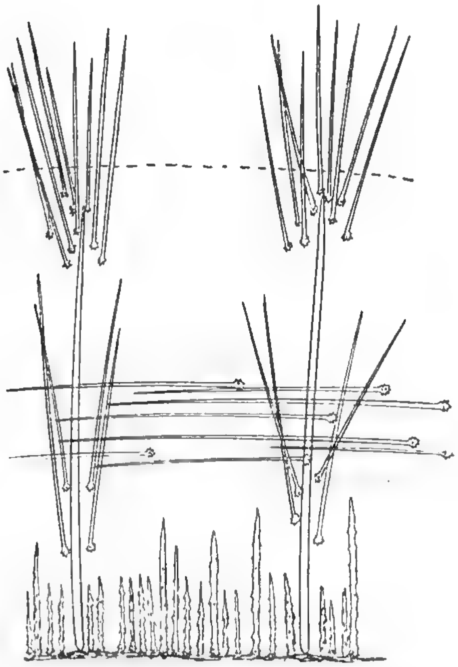


Fig. 12. *Microciona basispinosa* sp. n. Arrangement of skeleton (semi-diagrammatic).

to 0.28 by 0.005 to 0.01 mm; subtylostyli, entirely smooth or basally spined, 0.24 to 0.6 by 0.004 to 0.01 mm; microscleres toxa, 0.028 mm.

Remarks. The holotype forms a thin crust, 1 mm thick, and several square centimeters in extent, on a valve of *Mytilus magellanicus* CHEMNITZ. The tissues are so crowded with spicules, and the spicules of such varying size and unusual arrangement, that it is not easy to decide precisely how the skeleton is constructed. The subtylostyli are particularly variable in size, the largest being disposed in a tangential layer well beneath the surface (fig. 12) and the smallest forming the greater part of the dermal brushes. The smaller are usually without the basal spines.

The affinities of the species are obscure and it is not improbable that the holotype represents the postlarval stage of an Ectyonine sponge as yet undescribed.

Genus **Pseudanchinoë** BURTON.

Pseudanchinoë toxifera (TOPSENT).

(Pl. 5, fig. 3; text-fig. 13.)

(For synonymy see BURTON 1932, p. 325.)

Occurrence. 1000: stn. 58, September 11 1902, S.W. of Falkland Islands (52° 29′ S, 60° 36′ W), 197 m.

Distribution. Falkland Islands; Shag Rocks; Gough Island; Graham; Victoria Land.

Family **Axinellidae.**

Genus **Hymeniacidon** BOWERBANK.

Hymeniacidon BOWERBANK 1864, p. 191; *Styloiella* LENDENFELD 1888, p. 185; *Amorphilla* THIELE 1898, p. 44.

Genotype. Hymeniacidon caruncula BOWERBANK (= *H. sanguinea* (GRANT) Auctt.).

Diagnosis. Axinellidae with styli only for spicules, sometimes becoming subtylostylote (or even tylote?), often differentiated into two categories of different sizes; main skeleton a confused reticulation of spicules or forming ascending bundles of spicules with single spicules scattered between; dermal skeleton of radial brushes or of a single tangential layer of spicules crossing each other without order, composed mainly of small styli, where these are present.

Fig. 13. Spicules of *Pseudanchinoë toxifera* (Topsent), × 400.

Remarks. BOWERBANK's (1864, p. 191) original diagnosis of the genus *Hymeniacidon* was as follows: "Skeleton without fibre, spicula without order, imbedded in irregularly disposed membranous structure". This unsatisfactory definition was altered by RIDLEY and DENDY (1887, p. 166) to: "Form massive. Skeleton reticulate, composed of ill-defined spiculofibre, not plumose. Megasclera all monactinal, styli or subtylostyli. No microsclera." The emendation was, however, very little better than the original diagnosis. Several years ago, on re-examining a few of BOWERBANK's specimens of *Hymeniacidon sanguinea* (GRANT), I found that the main skeleton consisted of a halichondroid reticulation of styli, and that there was, in addition, a tangential dermal skeleton of similar styli. My definition was framed accordingly, but further experience with specimens of the species from various points on the British coasts showed clearly that even this was insufficient.

Accordingly, I have made a closer study of the characters of the species with the view to framing an adequate diagnosis of the genus. In this I have been greatly helped with gifts of specimens from Professor L. P. RENOUF, of University College, Cork, Mr H. B. MOORE, of Port Erin, and Dr. MARIE V. LEBOUR, to whom I wish to express my gratitude.

Hymeniacidon sanguinea (GRANT) may be found as thin crusts or cushion-shaped or irregular masses. Occasionally sub-spherical specimens may be found which are unattached. The largest specimen examined was 15 cms by 10 cms by 5 cms. The colour varies from yellow to orange or blood-red, but is usually deep orange or blood-red. The surface may be smooth, minutely tuberculate, thrown into small irregular folds (i. e. corrugated: BOWERBANK 1866, p. 168) or covered with numerous irregularly-digitate processes varying from 1 mm to 1.5 cms in height. In spite of the considerable variations in form and colour, the characteristic appearance together with the structure of the skeleton put the identification beyond doubt.

The skeleton consists of simple styli, usually slightly curved, varying according to the individual from about 0.24 by 0.007 mm to 0.4 by 0.008 mm, and the first point of importance to be noted is that in many individuals the spicules are differentiated into two sizes, the smaller being a little more than half as long or as thick as the larger. In this, however, individuals show a great difference: in one, for example, the spicules may be all of the large size; in another, on the other hand, the smaller spicules may constitute from 25 to 30 percent of the total number of spicules present. The styli of the main skeleton may be arranged in an halichondroid manner, scattered loosely and without order, or, more often, may form loose bundles running towards the surface, occasionally branching, with single spicules scattered between. The dermal skeleton may be composed of brushes of spicules set at right angles to the surface or of a tangential layer of single spicules forming a loose reticulation. In those individuals in which the smaller styli are abundant the dermal skeleton will be composed exclusively of them; where they are common but not abundant both large and small styli will be found in the dermal skeleton. In this way an unusual diversity of appearance in sections taken at right angles to the surface will be seen when a large number of individuals is examined, depending on whether the skeleton is halichondroid or composed of ascending columns of spicules, whether the styli are all one size or differentiated into categories, and whether the dermal skeleton is tangential to the surface or composed of brushes set at right angles to it.

A somewhat similar condition is found in *Pseudosuberites sulcatus* THIELE (see BURTON 1929, p. 334), and although the spicules in this species are tylostyli instead of styli or subtylostyli as in *Hymeniacidon sanguinea*, the embryos (gemmules?) in each are of the same type, suggesting at least a family and possibly a generic relation.

Hymeniacidon sanguinea (GRANT), with its synonym *H. caruncula* BOWERBANK, has been found hitherto throughout the Arctic, around the coasts of Europe (including the Mediterranean) and down the West Coast of Africa to Saldanha Bay. There is also a specimen from New Zealand in the British Museum which may be identified with this species. Moreover, the genotype of *Stylotella, S. digitata* (= *Hymeniacidon agminata* RIDLEY), from Australia and New Zealand, is undoubtedly identical with it also. In this the main skeleton, though variable, consists either of ascending bundles of spicules and single spicules scattered between, a dermal skeleton of horizontally disposed spicules or of radial brushes and styli, the maximum size of which is 0.286 to 0.305 mm, but having also shorter spicules "of between one-half and two-thirds the length of the longest" (*fide* HALLMAN 1914, pp. 351—353). The only difference between the typical European *H. sanguinea* and its Australasian form (i. e. *H. agminata*) is that the surface processes are usually longer in the latter.

The species is met with again around Japan since THIELE's 6 species of *Amorphilla*, *A. halichondroides, renieriformis, papillosa, compressa, penicillata* and *adhaerens*, are all identical with *Hymeniacidon sanguinea*. THIELE (1898, p. 44) distinguished between *Amorphilla* and *Hymeniacidon* by the presence of a dermal skeleton in the former and its absence in the latter (he having been misled by the definition given by RIDLEY and DENDY). His drawings illustrate the divison of the styli into two categories, however, and agree in this respect with those given originally by BOWERBANK for *H. caruncula* and *H. sanguinea* (*vide* BOWERBANK 1874, pl. xxxii, figs. 1—8). Examination of the types of THIELE's species, which I owe to the courtesy of Dr. ARNDT of the Berlin Museum, leaves no doubt as to their identity with *H. sanguinea*.

Hymeniacidon fernandezi THIELE.

H. fernandezi THIELE 1905, p. 422; TOPSENT 1913, p. 615, pl. iii, fig. 6.

Occurrence. 877 iii: stn. 2, December 12 1901, North Argentine coast (37° 15′ S, 56° 8′ W), 100 m.; 997 iii: stn. 57, September 11 1902, Port Albemarle, Falkland Islands, 18—30 m.

Remarks. The species is represented by a small subspherical sponge, about 2 cms in longest diameter. The surface is thrown into gentle maeandriform ridges, with the subdermal canals showing through the dermis in the grooves between the ridges. The skeleton is the same as that in the holotype, with which I have been able to compare it.

H. fernandezi THIELE, though very like *H. sanguinea* (GRANT) in so far as its skeleton is concerned, is quite distinct in external form and appears to constitute a good species. Its distinguishing features are that the surface is not wrinkled, the dermis is more readily separable, the subdermal canals more clearly defined, papillae are absent, and the sponge itself is usually of an encrusting habit.

In addition to the specimens already recorded, there is a further specimen in the British Museum collection from Port Chalmers, New Zealand, collected by Dr. R. VON LENDENFELD, which agrees closely with the holotype.

Distribution. Juan Fernandez; Falkland Islands; Shag Rock; South Georgia.

Genus **Homaxinella** TOPSENT.

Genotype. Axinella supratumescens TOPSENT.

Diagnosis. Axinellidae with skeleton composed of styli, often modified to subtylostyli, of variable size, which may be completely divided into two categories; main skeleton varying from a loose reticulation of large styli (in massive forms) to an axial concentration with extra-axial, more or less radial, bundles of styli (in branching forms); dermal skeleton of smaller styli arranged in definite brushes set at right angles to surface or loosely scattered in dermis; smaller styli also found associated with main skeleton; microscleres absent.

Remarks. The genus *Homaxinella* appears to be a well-defined one, and will doubtless be found to include, on further investigation, many species hitherto assigned to other genera of Axinellidae. In some respects it occupies a position intermediate between the Axinellidae and the Clavulidae.

Homaxinella balfourensis (RIDLEY and DENDY).

Axinella balfourensis RIDLEY and DENDY 1886, p. 480; Id. 1887, p. 179, pl. xxxiii, fig. 1; *Axinella supratumescens* TOPSENT 1908, p. 32, pl. ii, fig. 4, pl. iii, fig. 6, pl. v, fig. 6; KIRKPATRICK 1908, p. 23, pl. xxii, fig. 8. pl. xxvi, fig. 6; HENTSCHEL 1914, p. 122; *Homaxinella supratumescens* TOPSENT 1917, p. 38; BURTON 1929, p. 443.

Occurrence. 882—4, 888, 1040: stn. 5, January 16 1902, off Seymour Island (64° 20′ S, 56° 38′ W), 150 m; 1044: stn. 34, June 5 1902, Cumberland Bay, South Georgia (54° 11′ S, 36° 18′ W), 252—310 m.

Remarks. The figure given by RIDLEY and DENDY of the holotype of *Axinella balfourensis* does not show some of the more important aspects of the specimen. For this reason, doubtless, the identity of this species with *A. supratumescens* TOPSENT has remained unsuspected. On comparing it with the specimens identified by KIRKPATRICK and myself from the Antarctic, there remained no possible doubt as to the identity of the holotype of *A. balfourensis* RIDLEY and DENDY and the numerous specimens of *A. supratumescens* TOPSENT recorded from many points in the Antarctic and Subantarctic by various authors.

Raspailia flagelliformis RIDLEY and DENDY belongs also to *Homaxinella*, and may be no more than a variety of *H. balfourensis* (RIDLEY and DENDY). Similarly, *Raspailia australiensis* RIDLEY and *R. clathrata* RIDLEY also belong to TOPSENT's genus.

There are several specimens of *Homaxinella balfourensis* in the present collection agreeing closely, both among themselves and with the holotype, in structure, texture and appearance but differing slightly in form. Three of them have the typical form and consist of a rigid stalk bearing a number of cylindrical branches of characteristic fragility. There are in addition a number of small specimens which differ from the typical sponge in a number of ways and since they probably represent immature individuals of the species the description of their salient characters has un unusual interest.

The first of these supposedly immature forms is subspherical, unfortunately incomplete, and bears at one end a short digitate process which may represent the stalk of the larger forms. The whole sponge is only 1 cm in length. The interest of this specimen is that whereas from all other points-of-view the skeleton is typical, the characteristic axial condensation of styli is absent. The second specimen agrees closely with the first but is smaller and even less complete. A third consists of a small plexus of branches, the whole being only 1.5 cms long and the diameter of the cylindrical branches only 1.5 mm. In this individual, too, the only atypical features are the shape and the absence of an axial concentration of spicules.

From the immature forms considered above, it seems clear that *H. balfourensis*, though usually erect, stipitate and branched, may be repent and ramose, or possibly massive and only slightly stipitate; and that correlated with the difference in external form is a difference in the structure of the skeleton, the axial concentration of spicules being found only in the erect and branching forms. Perhaps it may be that the axial skeleton, in this and in other sponges, is in response to the need for greater rigidity resulting from increase in size in a vertical plane and that in the immature, and consequently low-growing, individuals it is not developed.

Distribution. Graham Land; Victoria Land; Wilhelm Land.

Genus **Rhizaxinella** KELLER.

Rhizaxinella australiensis HENTSCHEL.

R. australiensis HENTSCHEL 1909, p. 397, pl. xxii, figs. 4—5, text-figs. 27—28; BURTON 1929, p. 443.

Occurrence. 1031: stn. 62, September 16 1902, Beagle Canal, Tierra del Fuego (54° 53′ S, 67° 56′ W), 140 m.

Remarks. The single specimen is stipitate and digitate, and consists of a stalk, 2 cm long by 0.5 cm in diameter, bearing 7 irregularly-disposed cylindrical branches of which the largest is 7 cms long and 0.6 cm in diameter. The spiculation is the same as in the holotype, so that this specimen is more nearly in agreement with the holotype than the Antarctic specimens recorded by me (l. c.).

Distribution. S. W. Australia; Victoria Land; South Africa.

Genus **Halichondria** FLEMING.

Halichondria panicea (PALLAS).

Spongia panicea PALLAS 1766, p. 388; *Halichondria prostata* THIELE 1905, p. 458, figs. 3, 73; *H.* spec. 2 HENTSCHEL 1914, p. 136, pl. iv, fig. 16, pl. viii, fig. 16.

Occurrence. 876. iii: stn. 2, December 23 1901, North Argentine Coast (37° 15′ S, 56° 8′ W), 100 m; 960: stn. 40, July 19 1902, Falkland Islands, Berkeley Sound (51° 33′ S, 58° 0′ W), 16 m.

Remarks. The specimen from stn. 46 is certainly conspecific with *Halichondria prostrata*, and both appear to be synonymous with *H. panicea*. The present specimen, for example is practically identical in appearance with that figured by BOWERBANK (1874, pl. xxxix, fig. 5) while the holotype of THIELE's species is almost indistinguishable from the specimen figured by BOWERBANK (l. c., pl. xl, fig. 4). HENTSCHEL's *Halichondria* sp. 2 appears to be a synonym of *H. panicea* also. The first specimen, from stn. 2, consists of a single papilla and belongs without doubt to PALLAS' species also.

I have refrained from giving a complete synonymy of this species because to do so would entail an amount of labour out of all proportion to the result desired at the moment.

Distribution. Probably cosmopolitan, but it is impossible to define accurately the distribution without undertaking a long and tedious research which would be impracticable at the moment.

Genus **Eumastia** SCHMIDT.

Eumastia attenuata TOPSENT.

(Pl. 4, fig. 5.)

E. attenuata TOPSENT 1913, p. 35, figs. 1, 2.

Occurrence. 939: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m; 961: stn. 47, August 9 1902, Port Louis, Falkland Islands (51° 32′ S, 58° 7′ W), 3—4 m.

Remarks. The first specimen differs from the type in that the spicules measure up to 0.64 mm long and that the digitiform processes of the surface are fewer in number and more robust. The second specimen, which measures 8 cms by 6 cms by 3 cms is quite typical.

There is in the British Museum Collection a specimen collected by Mr. P. STAMMWITZ from South Georgia.

Distribution. Falkland Islands; South Georgia.

Family **Clavulidae.**

Genus **Suberites** NARDO.

Suberites carnosus (JOHNSTON).

Halichondria carnosa JOHNSTON 1842, p. 146, pl. xiii, figs. 7—8; *Suberites carnosus* TOPSENT 1900, p. 233, pl. vii, figs. 1—5; ROW 1911, p. 304; STEPHENS 1912, p. 21; FERRER 1914, p. 17; DENDY 1916, p. 134; FERRER 1922, p. 248; *S. carnosus* var. *novae-zealandiae* DENDY 1924, p. 380; *S. carnosus* BURTON 1926, p. 81; SHAW 1927, p. 435.

(For further synonymy see TOPSENT l. c.)

Occurrence. 985, 987: stn. 53, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 47′ W), 12 m.

Remarks. The ten specimens collected from these two stations are all massive or irregularly subspherical and are quite typical in all other respects.

Comparing the type of *S. carnosus* var. *novae-zealandiae* with typical examples from the British coasts it is impossible to detect any difference between them.

Distribution. Coasts of Europe; Red Sea; Indian Ocean; Tasmania; New Zealand.

Genus **Pseudosuberites** TOPSENT.

Pseudosuberites sulcatus THIELE.

(Pl. 5, fig. 2, pl. 6, figs. 1—6.)

(For synonymy see BURTON 1930, p. 334.)

Occurrence. 929: stn. 39, July 4 1902, Port William, Falkland Islands (51° 40′ S, 57° 41′ W), 40 m; 947, 953, 955, 956: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m; 962: stn. 48, August 10 1902, Berkeley Sound, Falkland Islands (51° 34′ S, 57° 55′ W), 25 m; 993: stn. 56, September 8 1902, Port Albemarle, Falkland Islands (52° 9′ S, 60° 33′ W), 15 m.; 997. i: stn. 57, September 11 1902, Port Albermarle, Falkland Islands, 18—30 m; 1020: stn. 59, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. The specimens hitherto obtained have been mostly of small size but the present collection contains a dozen which are mainly of large size. With two exceptions they are erect and flabello-digitate, the largest being 16 cms high by 12 cms across. 929 consists of a number of vertical lamellae joining each other at various angles and 947 consists of 3 vertical columns bearing a number of digitate processes. In addition 2 small specimens similar to those figured by THIELE (1905, figs. 27, 29) are present.

I have already pointed out (l. c.) that the dermal skeleton may be tangential in this species, or it may form a palisade of spicules set at right angles to the surface. Examination of the present specimens shows that there is nothing constant in this particular feature. A large specimen may have a tangential skeleton throughout the whole extent of its surface and a small specimen may have a dermal palisade, and vice versa. On the other hand, there are also specimens in which the dermis is for the most part supported by a tangential skeleton, but in which over large areas this may be replaced by a palisade. The presence of the palisade type of skeleton is usually accompanied by a roughening of the surface at that point and the suggestion may be made that this points to the change in the structure of the skeleton being due to the extrusion of spicules. Where the dermal skeleton is a palisade, it may be that the spicules at this point are in the process of being directed outwards prior to extrusion.

Distribution. Admiralty Sound; Tierra del Fuego; Gough Island; South Georgia; Campbell Islands.

Order **Keratosa.**

Genus **Halisarca** DUJARDIN.

Halisarca dujardini JOHNSTON var. **magellanica** TOPSENT.

H. dujardini var. *magellanica* TOPSENT, 1901, p. 44, pl. i, fig. 2, pl. vii, figs. 11—14; BURTON 1929, p. 414; Id. 1932, p. 340.

Occurrence. 934, 938, 940, 942, 944: stn. 40, July 19 1902, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m; 964: stn. 50, August 12 1902, Port Louis, Falkland Islands (51° 33′ S, 58° 9′ W), 7 m; 986: stn. 53, September 3 1902, Port William, Falkland Islands (51° 40′ S, 57° 47′ W), 12 m; 996: stn. 57, September 11 1902, Port Albemarle, Falkland Islands, 18—30 m; 1025: stn. 59, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Remarks. Judging by the results of this and other collections, the species appears to be extremely common. The present specimens vary in size from small incrustations to large cushion-shaped masses, the largest measuring 7 cms long by 3 cms broad by 3 cms high, but all agree closely with the holotype in external form and anatomical characters.

In all specimens hitherto recorded oscules have not been observed and in many of those in the present collection they are not to be seen, but in some they are very abundant and appear as small circular or oval openings, less than 1 mm. in diameter, scattered generally over the surface. In the largest specimen, they are few in number but measure several millimetres in diameter.

Distribution. Victoria Land; Londonderry Islands; Cape Horn.

Genus **Dendrilla** LENDENFELD.

Dendrilla membranosa (PALLAS).

(For synonymy see BURTON 1929, p. 448.)

Occurrence. 881: stn. 5, January 16 1902, off Seymour Island (64° 20′ S, 56° 38′ W), 150 m; 896: stn. 6, January 20 1902, S.W. of Snow Hill Island, Graham Land (64° 36′ S, 57° 42′ W), 125 m; 935, 943: stn. 40, Berkeley Sound, Falkland Islands (51° 33′ S, 58° 0′ W), 16 m; 984: stn. 53, September 3 1902, Port William, Falkland Islands (51° 40′ S, 54° 47′ W), 12 m; 1005: stn. 56, September 8 1902, Port Albemarle, Falkland Islands (52° 9′ S, 60° 33′ W), 15 m; 1009: stn. 59, Burdwood Bank (53° 41′ S, 61° 9′ W), 137—150 m.

Distribution. Red Sea; Indian Ocean; Malay; Australia; Antarctic; South America.

Genus **Spongia** LINNAEUS.

Spongia magellanica THIELE.

S. magellanica THIELE 1905, p. 483, figs. 18, 106.

Occurrence. 976: stn. 51, September 3 1902, Port William, Falkland Island (51° 40′ S, 57° 42′ W), 22 m; 1033: stn. 64, October 13 1902, Tierra del Fuego (54° 52′ S, 68° 25′ W), 35 m.

Distribution. Punta Arenas and Calbuco, Chile.

IV. EMBRYOLOGICAL NOTES.

Embryos were found in several specimens and the following notes were made, mainly from unstained preparations.

Pachypellina fistulata sp. n. The embryos (Text-fig. 14) are large, nearly spherical and measure 0.32 mm diameter. They consist of a mass of granular cells, varying little in size, each 0.011 mm in diameter, and contain slender oxea, 0.12 by 0.003 mm which are arranged tangentially to and just beneath the surface. Collected on January 16.

Mycale magellanica (RIDLEY). A specimen collected on September 11 contained a few large embryos, spherical and aspiculous, measuring 0.5 mm diameter.

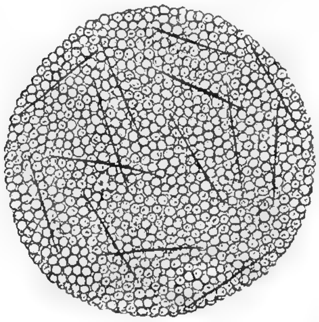


Fig. 14. *Pachypellina* gen. n. *fistulata* (KIRKPATRICK); embryo, × 120.

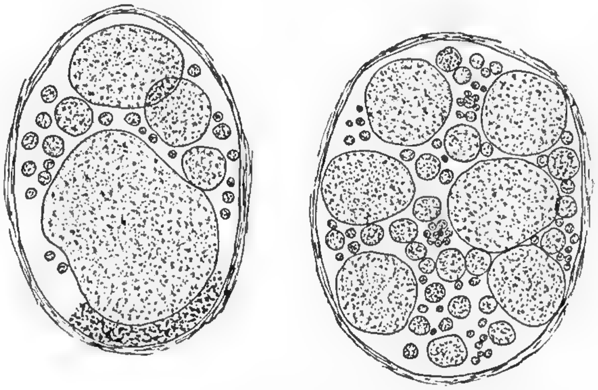


Fig. 15. *Iophon proximum* (RIDLEY). Embryos showing unusually irregular segmentation, × 150.

Iophon proximum (RIDLEY). Specimens 875. ii and 876. i contain spherical, aspiculous embryos, 0.28 mm diameter, in an early stage of segmentation. Typical examples are shown in text-fig. 15, which illustrates the unusually irregular method of segmentation. A few embryos are at a stage resembling that illustrated by me (1932, fig. 48 b) for *Tedania tenuicapitata* RIDLEY, with the outer layer of cells just beginning to appear, but even at this stage no spicules can be seen. Both specimens were collected on December 23, but similar embryos were found in a specimen of this species collected by the 'Discovery' Expedition on March 25.

Tedania spinata (RIDLEY). Embryos similar to those described by me (1932) for this species were found in a specimen collected on December 12.

Tedania mucosa THIELE. Aspiculous embryos resembling those of *T. tenuicapitata* (BURTON 1932, fig. 48 a) but measuring 0.21 mm diameter were found in a specimen collected on December 12. The earlier stages in the development of this species appear to be closely similar to corresponding stages in both *T. charcoti* and *T. tenuicapitata.*

Stylostichon tuberculata sp. n. Aspiculous, subspherical embryos, measuring 0.32 by 0.28 mm, were found and from these it appears that the development in this species follows much the same lines as that of *Tedania spinata* (cf. BURTON 1932, fig. 49 a—b).

Artemisina plumosa HENTSCHEL. Embryos found in a specimen collected on January 20 show that the early stages of development are similar to those in *Tedania spinata* (cf. BURTON 1932, fig. 49 a—b). The later stages contain styli, 0.105 by 0.004 mm with an almost imperceptible basal inflation, and abundant isochelae, 0.011 mm chord. The fully developed embryo measures 0.25 mm in diameter.

It is a matter of some interest to find, in a lipochelous individual, embryos plentifully supplied with chelae and the matter has been more fully discussed on page 54.

Pseudosuberites sulcatus THIELE. In specimens collected on July 4 are found peculiar groups of granular cells closely resembling the embryos of *Pachypellina fistulata* but having no spicules of any sort. They are situated just beneath the surface and are probably reproductive in function, but as so little is known of the development in the family to which the species belongs it is not possible to say more about them here. At all events, it is of interest to note that they correspond closely to certain bodies, presumably reproductive, occasionally found in specimens of *Stelletta.*

V. LIPOSTOMOUS SPONGES AND THE ABSENCE OF FLAGELLATED CHAMBERS.

On examining stained sections of one of the specimens of *Rhaphidophlus lissocladus* sp. n., in order to study its embryology, it was at once apparent that the choanosomal tissues differed markedly from the normal. Instead of the compact ground work of tissues intersected by canals, the choanosome consisted of a very loose network of stellate cells, often enclosing large lacunae. But the most striking feature was the complete absence of flagellated chambers. It was naturally assumed, at first, that this might be due to imperfect preservation but as the histology of the other cells could be readily made out, the nuclear structure of the larger amoebocytes being particularly well shown, it was obvious that the absence of collared cells could not be due to post-mortem effects. Sections were therefore cut from each of the other specimens of this species, in every case with the same result. It had already been noted that these particular sponges were lipostomous and, following on the observations regarding the collared cells, fresh examination was made for oscules and also for pores, with the result that none of these structures could be found.

Lipostomous sponges have been often recorded and always it has been tacitly assumed either that the oscules have contracted under the influence of the preservative or that there was no marked difference in size between pores and oscules. In other words that the lipostomy was apparent rather than real. The complete absence of oscules and pores being such an unexpected phenomenon a most exhaustive search was made of the specimens of *Rhaphidophlus lissocladus* in order to be absolutely certain that such was the case. The whole surface of each specimen was examined under a hand-lens, and also under a low-power binocular microscope; hand- and microtome sections, stained and unstained, were taken from various parts of the surface of each specimen. The sections were tangential, transverse and longitudinal, and in no case was it possible to find either a pore or an oscule, or any trace of a canal running through the ectosome communicating with the exterior and the subdermal crypts. Certain depressions and pits found in the surface (cf. pl. 4 fig. 1) were carefully examined but all proved to be the lodging places of commensal crustacea.

It may be taken as certain therefore that the 5 specimens of *Rhaphidophlus lissocladus* are entirely, or practically entirely, without collared cells, flagellated chambers, pores or oscules, and whether this condition is normal in the adult of the species or not the fact is significant. Some of the specimens, it is true, exhibited patches of moribund tissue but others appeared quite healthy, and as each contained a large quantity of embryos, a fairly high rate of metabolic activity may be assumed. The only conclusion to be drawn is therefore that in even large sponges respiration and nutrition can be effected through the surface and without the aid of a canal-system. Moreover, if all the lipostomous forms hitherto recorded can also be shown to be without pores or collared cells the phenomenon must be very widely spread among the Tetraxonida, either as a temporary or as a permanent phase.

Among the numerous specimens of *Pseudosuberites sulcatus* THIELE in the present collection are a number of lipostomous forms also. All were examined in the same way as the specimens of *Rhaphidophlus lissocladus* and in some cases neither pores nor oscules were seen, while in others the pores were extremely rare. In no case could it be said for certain that the collared cells were absent but the structures which might be accepted as flagellated chambers appeared to consist of collared cells closely crowded together and in a degenerate condition. In this species, therefore, it would appear that the degeneration of the collared cells may be correlated with the disappearance of the pores and oscules, and that both are no more than a temporary phase. But whether the absence of the usual canal-system is a temporary or a permanent phase, widely-spread or confined to a few species, it is still a matter of great interest and it will be profitable to pay more attention to lipostomous forms than has hitherto been the case.

VI. DECAY AND REGENERATION.

The decay and death of a sponge-colony doubtless takes place in various ways and in varying periods of time according to the species, and although it is usually assumed that ultimate death (i. e. the final disintegration of the colony) may not follow for some time after the colony becomes moribund, observations on the point are rare. Certain specimens in the present collection suggest that the process is more gradual than would be suspected on a priori ground. Thus, the first group of specimens suggests that in some species parts of the colony die away, leaving the rest alive and healthy. In the second group, the whole colony on becoming moribund, appears to have been quickly denuded of the normal tissues and the meshes of the skeleton are left bare in a few days except for groups of granular, dedifferentiated cells which resemble closely the experimentally-produced regenerative cell-masses. In a third group, the individuals consist of small but healthy colonies growing on a portion of a denuded skeleton, and these it

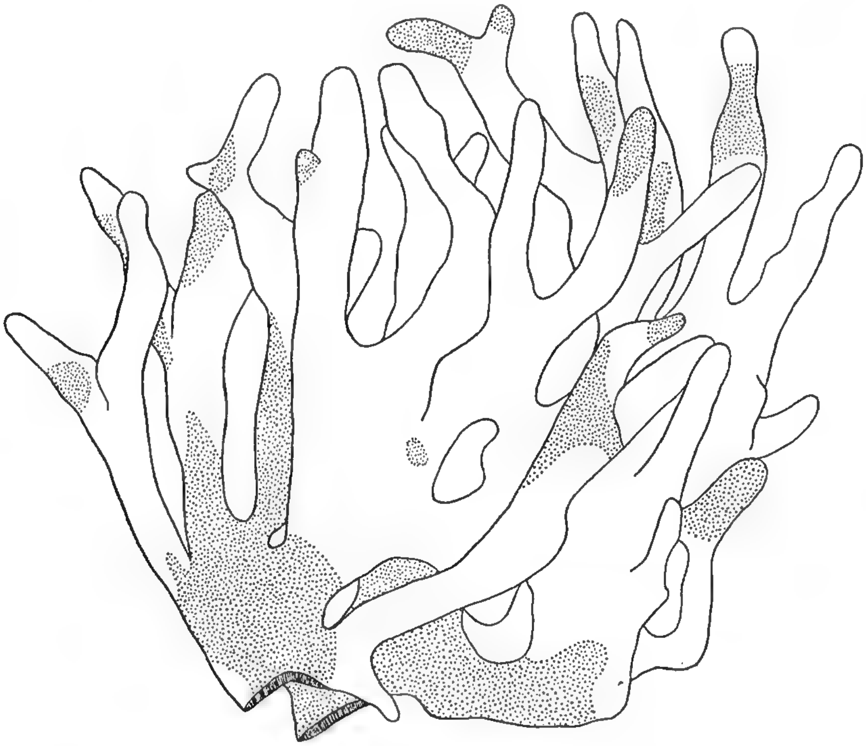


Fig. 16. *Rhaphidophlus lissocladus* sp. n. Specimen showing dead patches (dotted); × ¹/₂.

may be presumed have resulted from the regenerative growth of small groups of dedifferentiated cells like those found in the second group.

One of the most striking examples of the gradual death of the sponge-colony is seen in a specimen of *Callyspongia ramosa* (GRAY) (text-fig. 16). The sponge consists of a number of erect branches, and appears at first to have been quite healthy and complete at the time of capture, but when examined more carefully extensive darkened patches of bare skeleton are seen on various parts of the branches. Sections across these dark patches show that they are composed of skeleton fibres entirely devoid of flesh. The dead areas are not always at or near the bases of the branches but may be at the tips, in the youngest parts of the colony. Moreover, in extreme cases, two or more healthy portions of a branch may be completely separated by areas of bare skeleton so that a single branch consists in effect of two or more isolated colonies of cells having no obvious communication with each other. This phenomenon is commonly met with among preserved specimens of Haplosceridae, to which *Callyspongia ramosa* belongs, and the same holds true for all sponges, such as the Lithistida, Hexactinellida, and some of the Desmacidonidae (Tetraxonida), in which the component spicules are joined to form a continuous network. A further example in the Swedish Antarctic collection is furnished by one of the co-types of *Rhaphidophlus lissocladus* sp. n. in which similar patches of dead tissue may be found, but in this and all others so far examined there is little to indicate how long the process of disintegration of the colony may have been going on. On the other hand, several specimens belonging to *Mycale magellanica* (RIDLEY) do allow a rough estimate of time. In one specimen (Pl. 7, fig. 1), a part of the colony has died leaving only the bare fibres of the skeleton. In the remaining parts of the colony the tissues are, on the whole, quite healthy, although here and there moribund patches may be seen, and it seems from the study of this specimen that as one part of the body has died the adjacent tissues have become reorganized, so that were the skeleton composed of separated spicules, instead of being united by spongin, and therefore more liable to rapid disintegration, there would be little to show what had been taking place. In this same specimen there are at several points (Pl. 7, fig. 1a) young ascidians fixed to the inner parts of the exposed skeleton so that the decay of the tissues at these points must have taken place several weeks at least prior to the moment of capture. We may therefore assume that a large colony of *Mycale magellanica* might take weeks or possibly months, from the initial phases of growing moribund to the final stages of disintegration, the colony dwindling in size and repeatedly undergoing reorganization of the healthy tissues as its separate parts die off.

Other specimens in both the present collection and the 'Discovery' collections, the majority of which belong to *Mycale acerata*, seem to represent a further stage in deterioration. The appearance of these specimens may be best described as emaciated, the regular reticulation of the surface being masked by a general collapse of the colony, which is soft and flaccid and consists only of the naked skeleton with here and there groups of dedifferentiated granular cells (Körnergruppen of HENTSCHEL 1914), each group consisting of 20 to 40 cells. That such regenerative masses may be formed in moribund specimens has already been observed by WILSON (1907 p. 245), but their further behaviour has not received particular attention. By analogy with similar experimentally-produced cell-masses, it is probable that these groups of cells will form plasmodia, wander about over the fibres of the skeleton, ultimately coalescing to grow into a new colony using the old skeleton as a substratum. Indeed, this is what appears to have taken place in another group of three specimens of *Mycale acerata* belonging to the present collection.

These three specimens (pl. 8, figs. 1—4) of *Mycale acerata* KIRKPATRICK consist in each case of a network of fibres, so strongly developed that they could only have been made by a mature colony, with a small and irregular but perfectly-formed colony growing upon it. There is, it is true, no proof that these smaller colonies may not have been produced by larvae which had settled on the skeleton of dead colonies, but their appearance and shape suggests rather the product of regenerative masses. It must, of course, remain a matter of opinion whether these peculiar specimens of *Mycale acerata* represent the final stages of decay in a larger colony, or the growth from larvae which have settled on the fibres of a former colony, or whether they have been developed by regeneration from the dedifferentiated cells of a moribund colony. By analogy and comparison with known data, however, the latter seems the more probable, and it seems reasonable to suggest that these various specimens of the two species of *Mycale* here discussed represent analogous phenomena and together form a series illustrating the progressive and gradual decay of sponge-colonies, the formation of regenerative cell-masses when the process of decay has entered into its final stages, and the production from these regenerative masses of young and healthy, apparently quite normal, colonies which utilise in part the skeleton of the deceased colony.

It may therefore be suggested that:

1. in certain sponges a process of decay, or degeneration, may take place over a relatively long period of time, one or more parts of the specimen dying off completely while the rest continues healthy.

2. the ultimate outcome of this process may be the complete death of the colony but that complete decease may be averted by the formation of groups of regenerative cells which reproduce the colony using the denuded skeleton of the former colony as a substratum.

3. the production of a fresh colony, under these circumstances, is effected entirely by unspecialised amoebocytes, which eventually give rise to all tissues, specialised or unspecialised alike (cf. WILSON 1907, p. 251).

VII. THE SUPPRESSION OF MICROSCLERES.

It is becoming increasingly evident that the microscleres of Tetraxonid sponges are unreliable for taxonomic purposes. This point has already been dealt with in a previous publication (BURTON 1932, p. 377), but a specimen of *Artenisina plumosa* HENTSCHEL, in the present collection, affords the most convincing evidence. This specimen, though normal in all other respects, does not possess any microscleres and should therefore be assigned to the var. *lipochela* HENTSCHEL, the use of which I proposed in 1929 (p. 431) to abandon. On the other hand, the numerous embryos which fill the body of this sponge all contain numerous chelae. This is a most striking fact and suggests either that: 1) lipochelous sponges may produce offspring having chelae, which persist as a normal constituent of the spiculation throughout the lifetime of the individual; or 2) lipochelous sponges may possess chelae in the early stages of the life-history only. In either case, however, the presence or absence of microscleres cannot per se have any taxonomic significance.

LIST OF LITERATURE.

BIDDER, G. P. 1929. On the classification of sponges. Proc. Linn. Soc. London 1929, 502, pp. 4—6.

BOWERBANK, J. S. 1864. A monograph of the British Spongiadae. i. London, 8°, 290 pp., 37 pls.

— 1866. A monograph of the British Spongiadae. ii. London, 8°, 388 pp.

— 1874. A monograph of the British Spongiadae. iii. London, 8°, 376 pp., 92 pls.

BREITFUSS, L. L. 1898. Die Kalkschwämme der Sammlung Plate. Zool. Jahrb. Suppl. iv, pp. 455—470, 1 pl.

BRØNDSTED, H. V. 1923. Sponges from the Auckland and Campbell Islands. Vidensk. Medd. nat. For. Kjøbenhavn, LXXV, pp. 117—167.

BURTON. M. 1926. *Stelletta purpurea* Ridley, and its variations. Ann. Mag. Nat. Hist. London, xviii, pp. 44—49.

— 1929. Porifera. Part II. Antarctic Sponges. British Antarctic ("Terra Nova") Exped., 1910. Natural History Report, Zool. vi, 4, pp. 393—458, 5 pls., 9 figs., London.

— 1930. Report on a Collection of Sponges from South Georgia and from Campbell Island, South Pacific, Obtained by Dr. Kohl-Larsen. Senckenbergiana, Frankfurt, xii, pp. 331—335, 1 fig.

— 1931. The Interpretation of the Embryonic and Post-larval Characters of certain Tetraxonid Sponges. Proc. Zool. Soc. London, pp. 511—525, 1 pl. 6 figs.

— 1932, Sponges. Discovery Reports, Cambridge, vi, pp. 237—392, 9 pls. 56 figs.

DENDY, A. 1916. Report on the Non-Calcareous Sponges Collected by Mr. James Hornell at Okhamandal in Kattiawar in 1905—6. Rep. Government of Baroda on the Marine Zoology of Okhamandal in Kattiawar. Part. II. 4to. London, pp. 93—146.

— 1924. Porifera. Part I. British Antarctic ("Terra Nova") Exped., 1910. Natural History Report, Zool., vi, 3, pp. 269—392, pls. i—xv. British Museum, London.

FERRER HERNANDEZ, F. 1914. Esponjas del Cantabrico. Parte Segunda. III, Myxospongida. IV, Tetraxonida. V, Triaxonida. Trab. Mus. Nación, Cienc. Nat. Madrid, Ser. Zool.. xvii, 1914 (46 pp.).

— 1922. Mas dates para el conocimiente de las esponjas de las costas españolos. Bol. Pesc. Madrid, vii, pp. 247—272, 2 pls.

GRAY, J. E. 1843. Catalogue of Radiated Animals. Travels in New Zealand (Dieffenbach), ii, p. 264.

HALLMANN, E. F. 1914. A revision of the Monaxonid species described as new in Lendenfeld's "Catalogue of the Sponges in the Australian Museum". Part ii, Proc. Linn. Soc. N. S. W., xxxix, pp. 327—376, 10 pls., 12 figs.

HENTSCHEL, E. 1914. Monaxone Kieselschwämme und Hornschwämme der deutschen Südpolar-Expedition, 1901—3. Deutsch. Südpol.-Exped., xv, Zoology, 7, pp. 35—141, pls. iv—viii.

JOHNSTON, G. 1842. A history of British Sponges and Lithophytes. London: Edinburgh: Dublin, 8vo, 264 pp., 25 pls.

KIRKPATRICK, R. 1907. Preliminary Report on the Monaxonellida of the National Antarctic Expedition. Ann. Mag. Nat. Hist., London, xx, pp. 271—291.

— 1908. Tetraxonida. National Antarctic Exped., Natural History, iv, 2, 56 pp., 15 pls.

LENDENFELD, R. von. 1888. Descriptive Catalogue of the Sponges in the Australian Museum, Sydney. London, 8°, 260 pp., 12 pls.

PALLAS, P. S. 1766. Elenchus Zoophytorum. Nürnberg, 4to, pp. 28, 451.

RIDLEY, S. O. 1881. Spongida (Account of the Zoological Collections made during the survey of H. M. S. "Alert"). Proc. Zool. Soc. London, pp. 107—137, 140—141, 2 pls.

RIDLEY, S. O. & DENDY, A. 1886. Preliminary Report on the Monaxonida collected by H. M. S. "Challenger". Ann. Mag. Nat. Hist. London, xviii. pp. 325—31, 470—493.

— 1887. Monaxonida. Rep. Sci. Res. Voy. H. M. S. "Challenger", Zool., xx, 275 pp., pls. i—li.

ROW, R. W. H. 1911. Reports on the Marine Biology of the Sudanese Red Sea, from Collections made by Cyril Crossland, M. A., B. Sc., F. Z. S. — XIX. J. Linn. Soc. London, Zoology, XXXI, pp. 287—400.

SCHULZE, F. E. & KIRKPATRICK, R. 1910. Die Hexactinelliden der Deutschen Südpolar-Expedition, 1901—1903. Deutsche Südpol.-Exped., Berlin, XII, Zoologie 4, 62 pp.

SHAW, M. 1927. On a collection of sponges from Maria Island, Tasmania. Proc. Zool. Soc. London, pp. 419—439, 1 pl., 4 figs.

STEPHENS, J. 1912. Clare Island Survey. Part 59. Marine Porifera. Proc. Roy. Irish Acad., xxxi, 42 pp.

THIELE, J. 1898. Studien über pacifischen Spongien. Zoologica, xxiv, pp. 1—72, 8 pls.

— 1905. Die Kiesel und Hornschwämme der Sammlung Plate. Zool. Jahrb., Jena, Suppl. vi (Fauna Chilensis), pp. 407—496, pls. xxvii—xxxiii.

TOPSENT, E. 1900. Étude monographique des Spongiaires de France. III. Monaxonida (Hadromerina), Arch. zool. expér., Paris, VIII, pp. 1—331.

— 1901. Spongiaires. Expéd. antarct. Belge. Res. Voy. S. Y. "Belgica", 1897—1899, 54 pp., pls. i—vi.

— 1907. Poecilosclerides nouvelles recueillies par le "Français" dans l'Antarctique. Bull. Mus. hist. nat., Paris, pp. 69—76.

— 1908. Spongiaires. Expédition antarctique française (1903—5) (Expédition Charcot). Paris, 4to, 37 pp., pls. i—v.

— 1912. Sur une grande *Tedania abyssale* des Açores (*Tedania phacellina*, n. sp.). Bull. Inst. Océanogr. Monaco. 252, pp. 1—5, 2 figs.

— 1913. Spongiaires de l'expédition antarctique nationale écossaise, Trans. Roy. Soc. Edinburgh, xlix, 3, 9, pp. 579—643, pls. i—vi.

— 1916. Diagnoses d'éponges recueillies dans l'Antarctique par la "Pourquoi pas?". Bull. Mus. hist. nat., Paris, pp. 163—172.

— 1917. Spongiaires. Deuxième expédition antarctique française (1908—10) commandée par le Dr. Jean Charcot. Sciences Physiques: Documents Scientifiques. Paris, 4to, 88 pp., pls. i—vi.

WILSON, H. V. 1907. On some phenomena of coalescence and regeneration in sponges. J. Exper. Zool. Baltimore, v, 2, pp. 245—258, 4 figs.

EXPLANATION OF PLATES.

PLATE 1.

Fig. 1. *Microxina simplex* (TOPSENT), specimen 890, × $^1/_2$.
Fig. 2. *Microxina simplex* (TOPSENT), a portion of specimen 890, enlarged × $1^1/_2$.
Fig. 3. *Adocia tenella* (TOPSENT), specimen 880, natural size.
Fig. 4. *Haliclona variabilis* (THIELE), specimen 1015, × $^3/_4$.
Fig. 5. *Haliclona variabilis* (THIELE), specimen 1039. ii, × $1^1/_2$.

PLATE 2.

Fig. 1. *Hoplochalina glacialis* sp. n., holotype, natural size.
Fig. 2. *Calyx kerguelensis* (HENTSCHEL), specimen 927, × $^1/_3$.
Fig. 3. *Callyspongia ramosa* (GRAY), specimen 948, × $^2/_3$.

PLATE 3.

Fig. 1. *Isodictya cactoides* (KIRKPATRICK), specimen 925, × $^1/_3$.
Fig. 2. *Stylostichon tuberculata* sp. n., specimen 950, × $^2/_3$.
Fig. 3. *Ectyodoryx ramilobosa* (TOPSENT), specimen 887, × $^2/_3$.
Fig. 4. *Kirkpatrickia coulmani* (KIRKPATRICK), specimen 926, × $^1/_3$.

PLATE 4.

Fig. 1. *Rhaphidophlus lissocladus* sp. n., holotype, × $^2/_3$.
Fig. 2. *Clathria toxipraedita* (TOPSENT), specimen 904, natural size.
Fig. 3. *Clathria toxipraedita* (TOPSENT), specimen 906, natural size.
Fig. 4. *Iophon aceratus* HENTSCHEL, specimen 911, × $^2/_3$.
Fig. 5. *Eumastia attenuata* TOPSENT, specimen 939, natural size.

PLATE 5.

Fig. 1. *Adocia tenella* (TOPSENT), growing on the macerated stalks of *Homaxinella balfourensis* (RIDLEY and DENDY), natural size.
Fig. 2. A *Mytilus magellanicus* CHEMNITZ with the shell coated with *Pseudosuberites sulcatus* THIELE and (the dark patch on the lower margin) *Microciona basispinosa* sp. n., × $^3/_4$.
Fig. 3. *Pseudanchinoë toxifera* (TOPSENT), specimen 1000, natural size.

PLATE 6.

Pseudosuberites sulcatus THIELE.

Fig. 1. specimen 953, $\times {}^{2}/_{3}$.
Fig. 2. » 929, side view, natural size.
Fig. 3. » 929, top view, natural size.
Fig. 4. » 993, $\times {}^{2}/_{3}$.
Fig. 5. » 956, $\times {}^{2}/_{3}$.
Fig. 6. » 947, $\times {}^{3}/_{4}$.

PLATE 7.

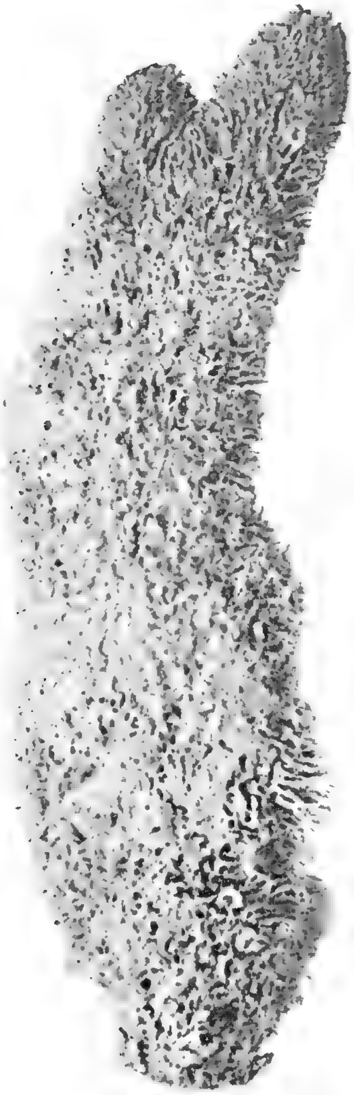
Mycale magellanica (RIDLEY).

Moribund specimens showing exposed skeletons.
Fig. 1. Specimen 970, $\times {}^{1}/_{2}$.
Fig. 2. » 968, $\times {}^{3}/_{4}$.
(a = Ascidians).

PLATE 8.

Mycale acerata HENTSCHEL.

Showing regenerative masses on old skeletons.
Fig. 1. Specimen 923, top view, $\times {}^{2}/_{3}$.
Fig. 2. » 923, side view, $\times {}^{2}/_{3}$.
Fig. 3. » 919, $\times {}^{3}/_{4}$.
Fig. 4. » 903, $\times {}^{3}/_{3}$.



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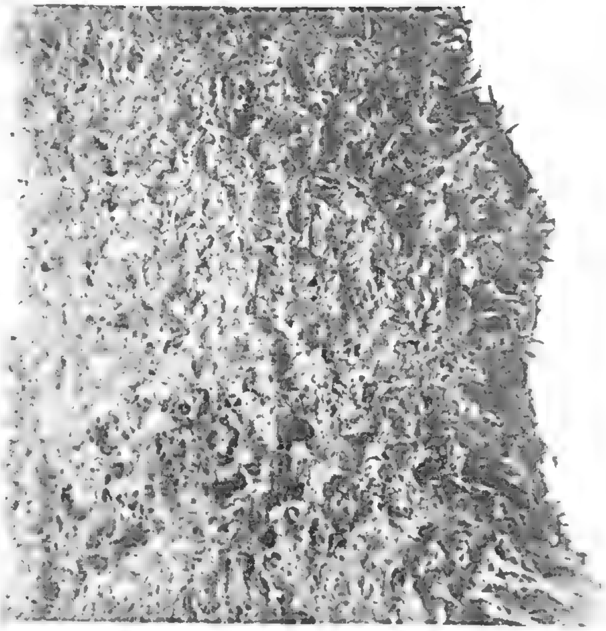

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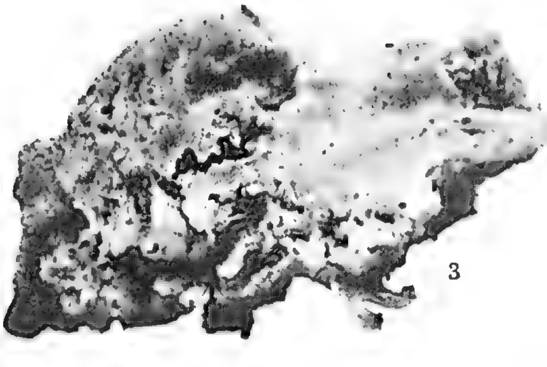

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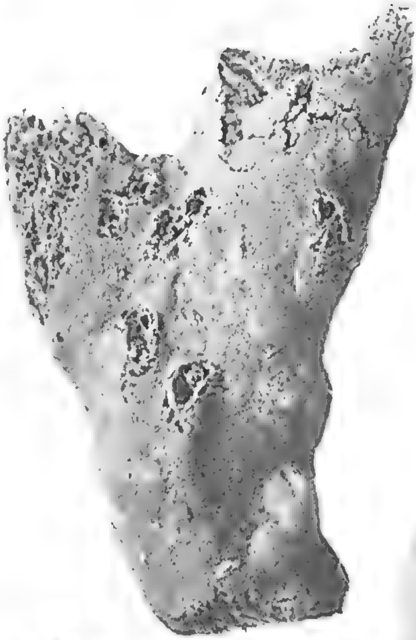

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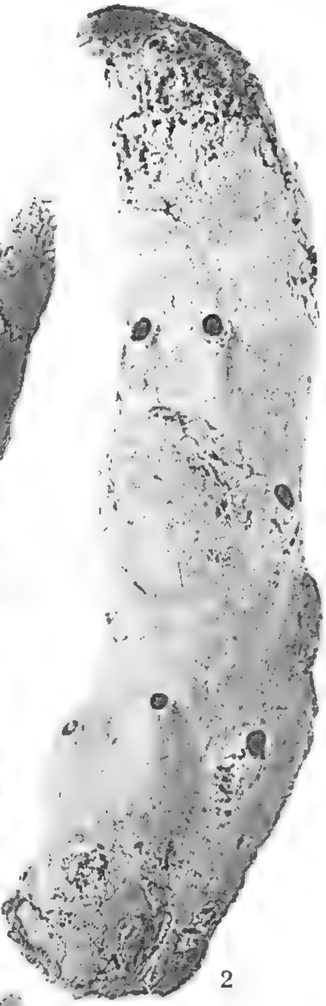

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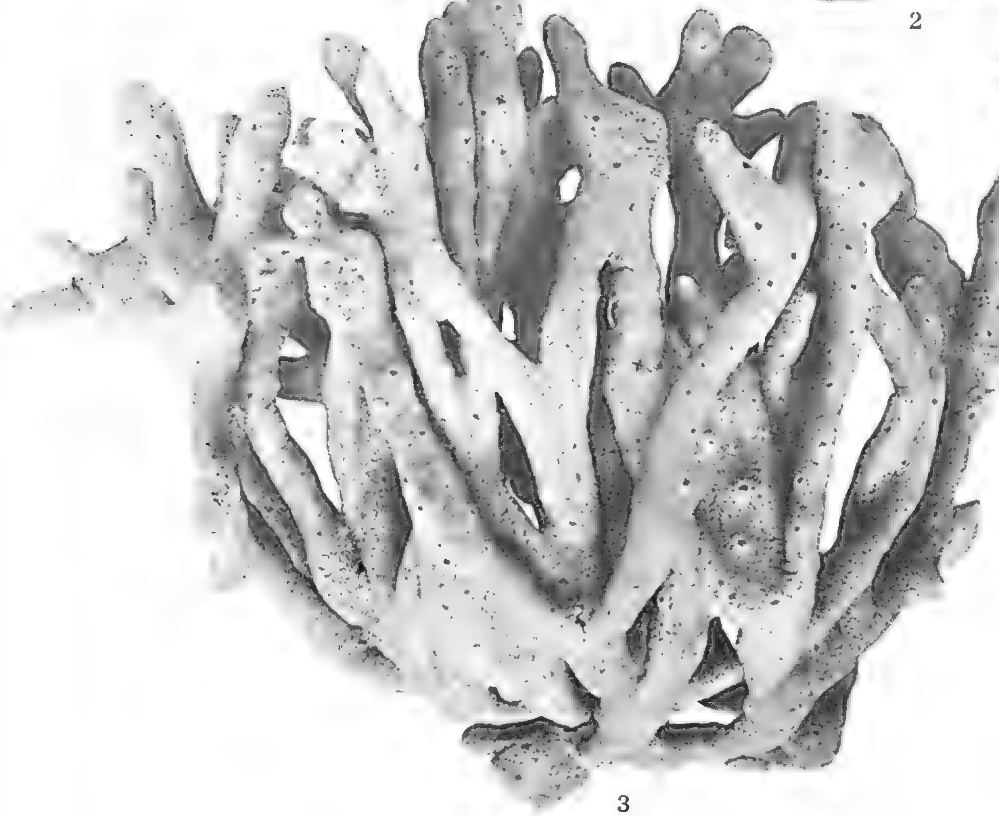

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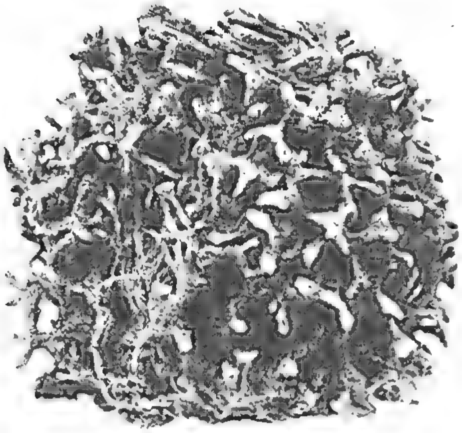

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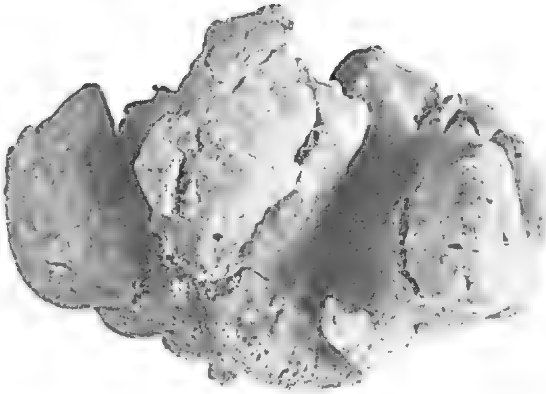

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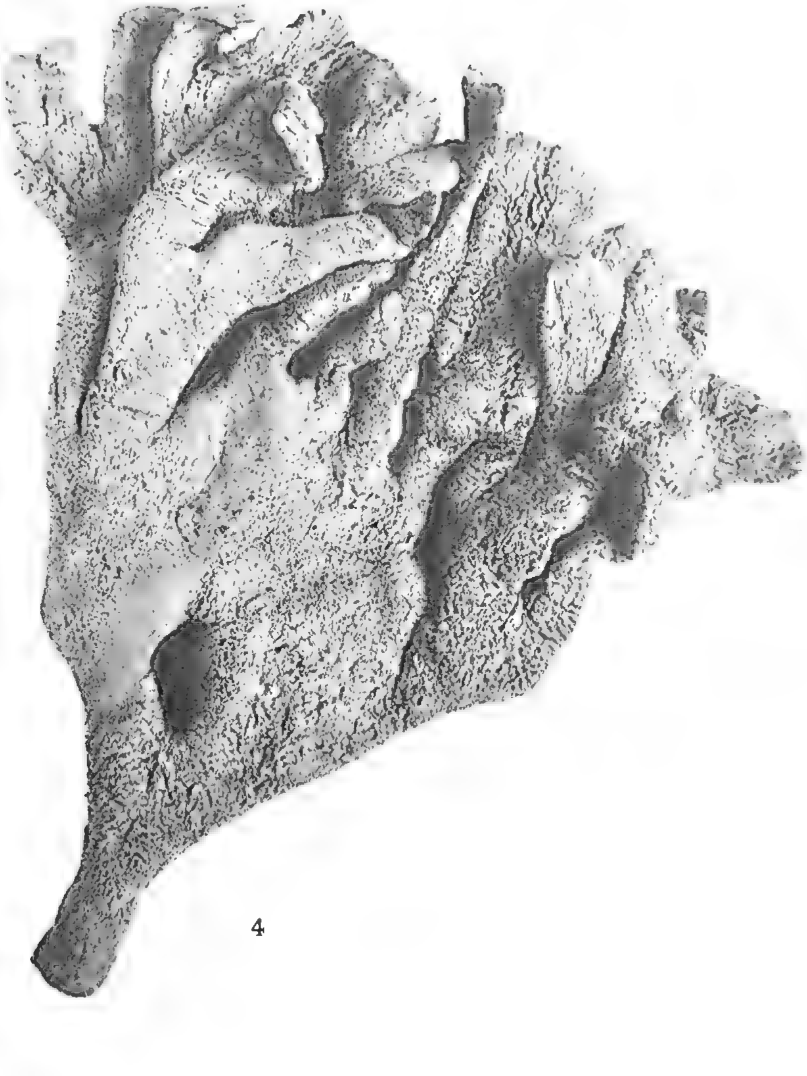

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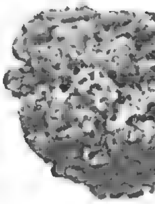

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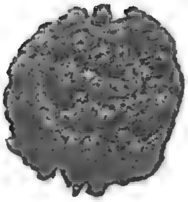

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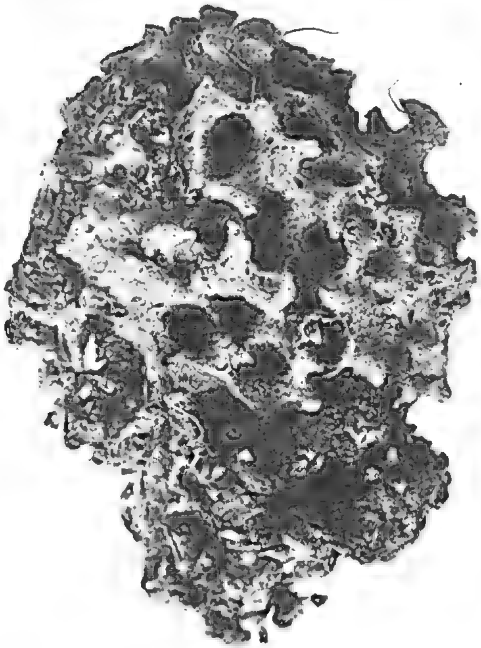

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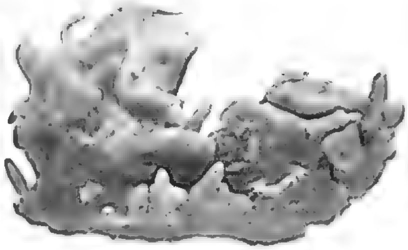

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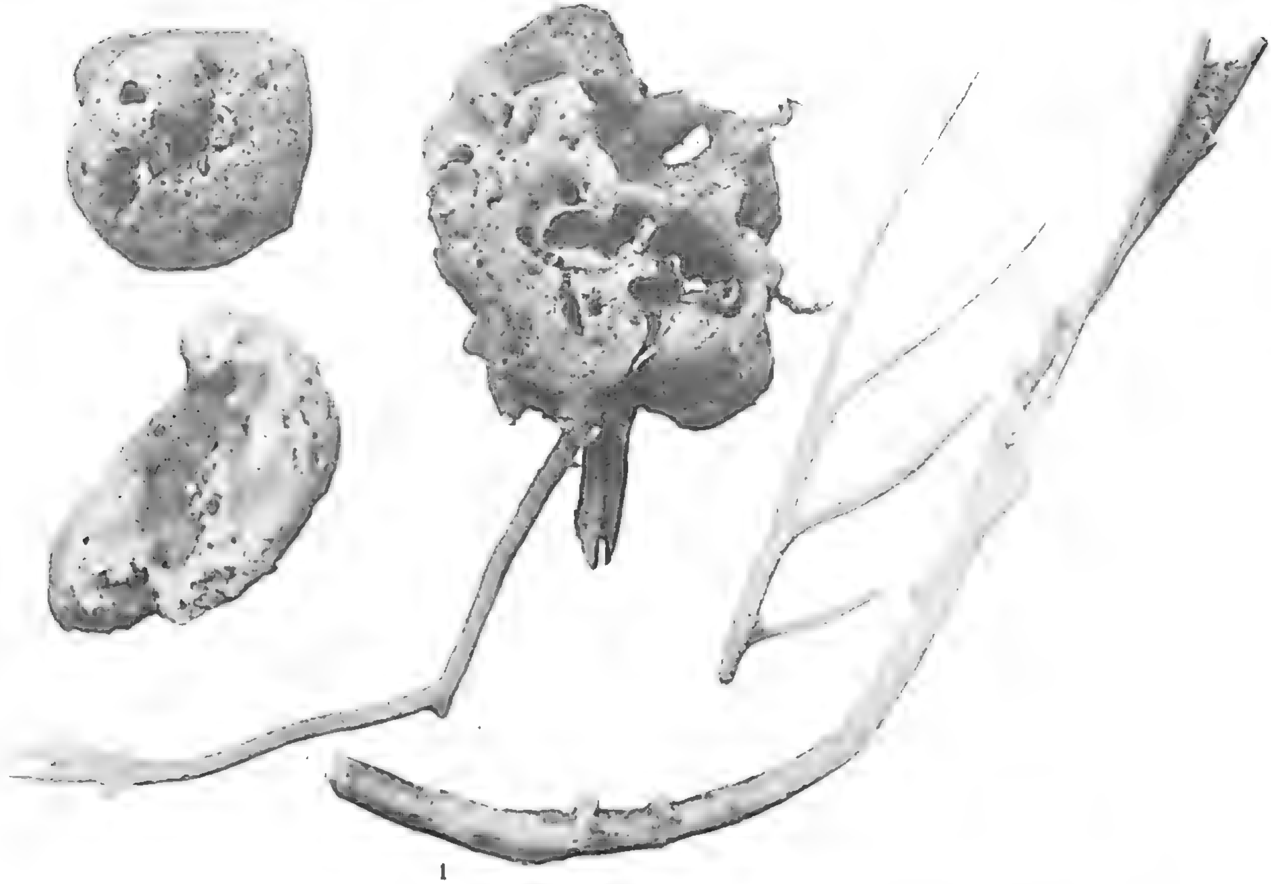

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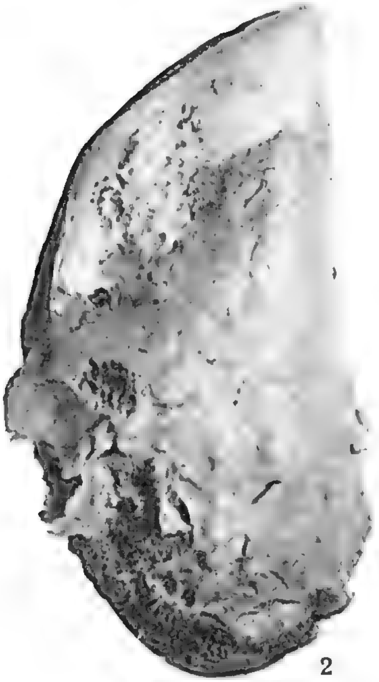

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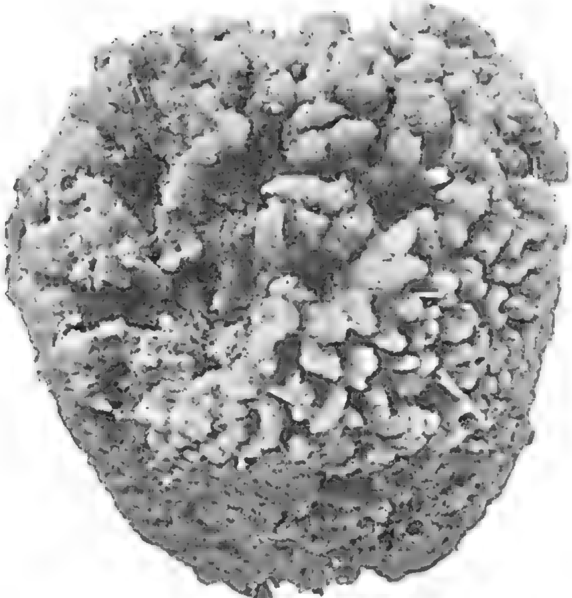

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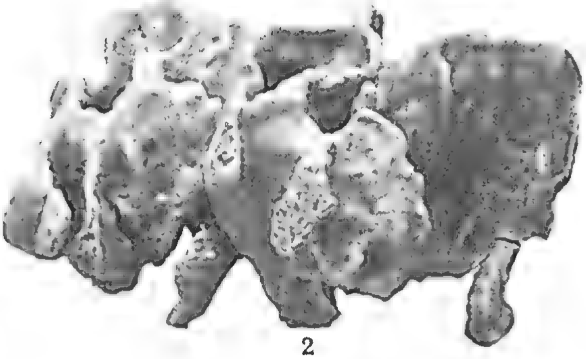

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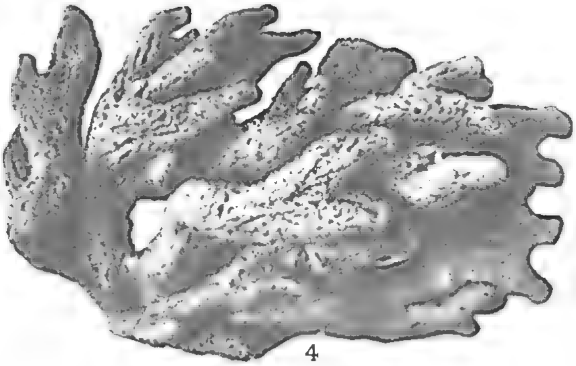

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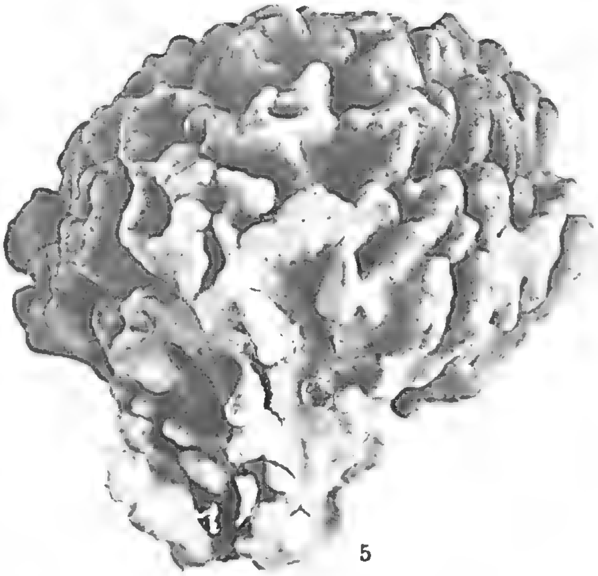

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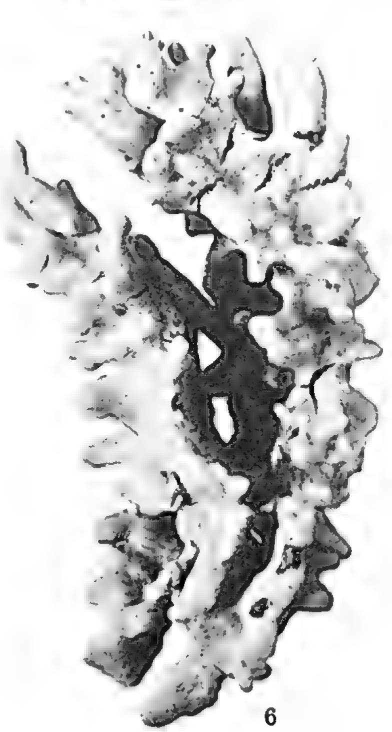

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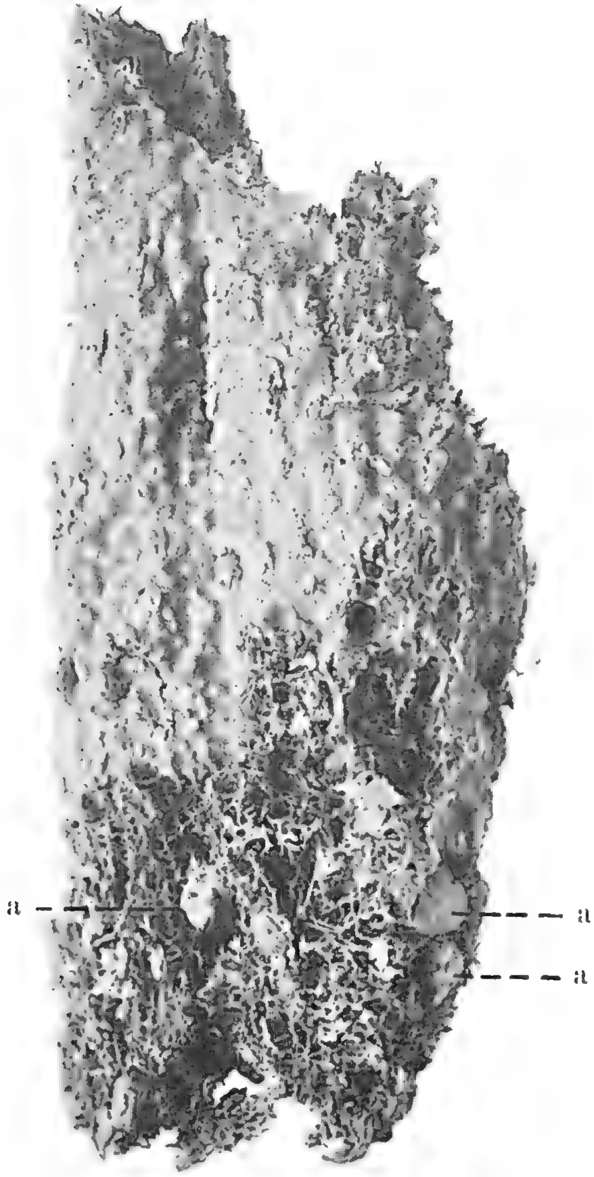

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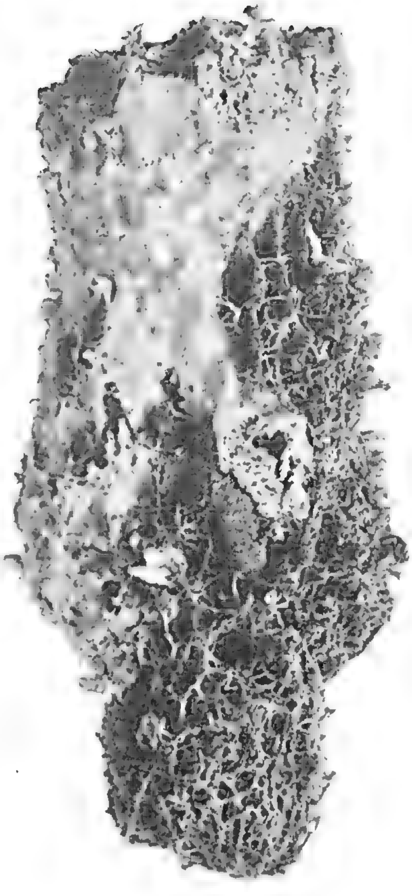

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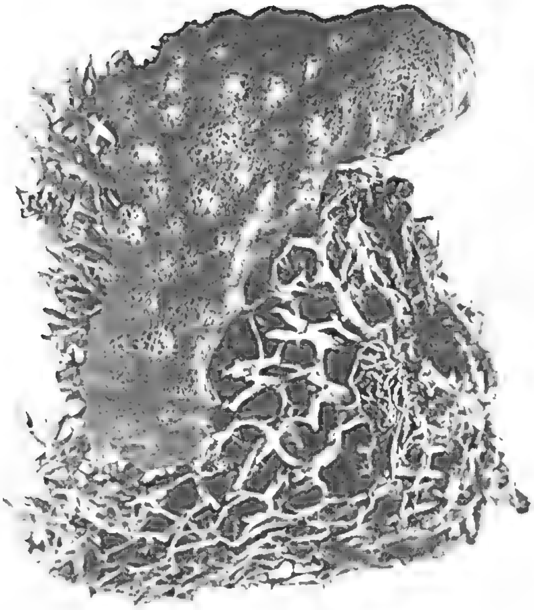

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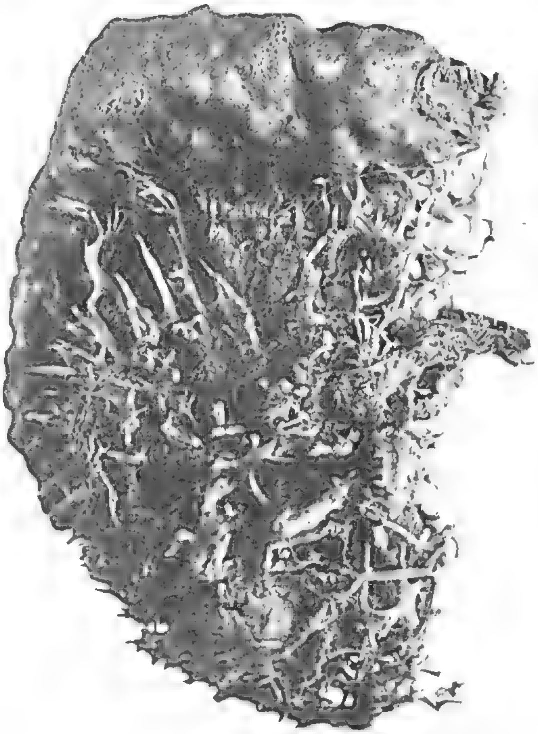

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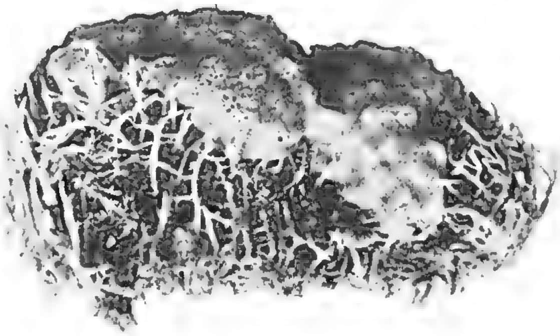

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A BÖRTZELLS TRYCKERI A B STHLM

FURTHER ZOOLOGICAL RESULTS
OF THE SWEDISH ANTARCTIC EXPEDITION
1901—1903
UNDER THE DIRECTION OF DR. OTTO NORDENSKJÖLD
EDITED BY SIXTEN BOCK
VOL. III, No. 3.

COPEPODA HARPACTICOIDA

VON

KARL LANG

STOCKHOLM
P. A. NORSTEDT & SÖNER
Febr. 1936

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EINLEITUNG.

Vorliegende Arbeit behandelt die während der schwedischen antarktischen Expedition 1901—1903 eingesammelten Harpacticiden. Um möglichst reichhaltiges Material zu erhalten, habe ich nicht nur das in der Evertebratenabteilung des schwedischen Reichsmuseums aufbewahrte Material durchgearbeitet, sondern auch zahlreiche von der genannten Expedition mitgebrachten Algenproben untersucht.

Aus Gründen, die ich bereits früher auseinandergesetzt habe (LANG 1934 a), bin ich genötigt gewesen, mich bei der systematischen Aufstellung MONARD (1927) anzuschliessen, obwohl ich, wie sich aus folgendem ergeben wird, in mehreren Beziehungen eine abweichende Ansicht vertrete.

Früher habe ich, im Anschluss an CHAPPUIS (1929), den Nebenast der 2. Antenne als Endopodit aufgefasst. Ich bin aber jetzt dahingekommen, er stelle den Exopodit dar.

Innerhalb der Harpacticidensystematik herrscht zur Zeit eine hoffnungslose Verwirrung. Diese Verwirrung ist so gross, dass man sich niemals völlig sicher fühlt, ob eine Art, die man für neu hält, dies auch tatsächlich ist. Es genügt nämlich nicht, die erhaltene Art mit den früher zur Gattung gerechneten Arten zu vergleichen; ebensowenig ausreichend wäre eine Prüfung nahestehender Gattungen; nichteinmal ein Vergleich mit allen innerhalb der Familie beschriebenen Arten würde genügen. Man findet nämlich bisweilen die Art ganz unerwartet in einer anderen Familie wieder.

Aus dem hier Gesagten ergibt sich, dass eine kritische Prüfung des bereits vorhandenen Harpacticiden-Materials derzeit sehr dringend wäre. Eine solche Prüfung ist indessen äusserst zeitraubend und fordert viel Arbeit. So habe ich zum Beispiel allein für die folgende Untersuchung der *Thalestridae* etwa 300 Figuren kopieren müssen, um sie direkt mit einander vergleichen zu können. Dieses Verfahren ist nämlich nach meiner Erfahrung die einzige sichere Methode hierfür. Selbstverständlich muss man im Falle eines Verdachtes, dass zwei Arten mit einander identisch sein können, auf die Originalbeschreibungen zurückgreifen und diese mit einander vergleichen, indem man sich gleichzeitig davon überzeugt, wie weit Figuren und Text mit einander übereinstimmen.

Um Platz zu sparen habe ich mich darauf beschränkt, in die Synonymenverzeichnisse nur die Originalarbeit für jedes Synonym aufzunehmen. Die Verbreitungsangaben für jede Art habe ich nachgeprüft. Dieselben sind — falls gegen sie kein Einspruch erhoben wird — meines Erachtens richtig.

Da die Tiere im allgemeinen stark kontrahiert sind fehlen oft Grössenangaben. Vom Zoologischen Museum der Universität zu Oslo wurden mir Teile von SARS' Thalestridenmaterial leihweise überlassen, wofür ich hier meinen aufrichtigen Dank ausdrücke.

Herrn Dr. MONARD, Chaux-De-Fonds, von dem ich Kopien einiger Arten erhalten habe und der mir einige seiner Präparate von *Thalestridae*-Arten entgegenkommender Weise zur Verfügung gestellt hat, spreche ich auch an dieser Stellen meinen besten Dank aus. Nach einer mir von MONARD zugegangenen brieflichen Mitteilung bereitet er eine Revision der *Laophontidae* vor, die sicher mit grosser Freude begrüsst werden wird. Denn erst nach Vorliegen einer gründlichen Revision der verschiedenen Gattungen und Familien können wir an den Aufbau eines endgültigen Harpacticidensystems denken.

Es ist mir ferner eine angenehme Pflicht, dem Direktor der Evertebratenabteilung am schwedischen Reichsmuseum, Herrn Professor Dr. SIXTEN BOCK, meinen Dank dafür abzustatten, dass er mir die Bearbeitung des hier behandelten Materials überlassen hat.

HISTORIK.

Die Bearbeitung des während der belgischen antarktischen Expedition 1897—99 eingesammelten Copepodenmaterials erfolgte durch GIESBRECHT. In dieser Bearbeitung werden 10 Harpacticiden genannt, von denen nach GIESBRECHT nicht weniger als 7 der Wissenschaft bis dahin unbekannt waren. Von diesen sind jedoch, wie schon SARS (1905) hervorgehoben hat, *Ectinosoma antarcticum* und *E. australe* BRADY mit einander identisch, und die letztgenannte Art muss, wie von mir gezeigt worden ist (LANG 1934 a), als mit *E. melaniceps* BOECK identisch betrachtet werden. Andererseits hat GIESBRECHT einige Arten fälschlich mit früher bekannten identifiziert, worauf ich bei der Behandlung der betreffenden Arten zurückkommen werde. GIESBRECHTS Beschreibungen und Figuren sind indessen wie immer äusserst sorgfältig ausgeführt, weshalb die Identifizierung seiner Arten auf keinerlei Schwierigkeiten stösst.

BRADYS Bearbeitung der Harpacticiden von der deutschen Südpolarexpedition 1901—1903 ist hingegen äusserst mangelhaft und in einer Weise ausgeführt, dass sie eher zum Schaden als zum Nutzen gereicht. Die Bearbeitung wimmelt von Fehlern, Widersprüchen und Fehldeutungen und es ist oft sogar unmöglich zu entscheiden, zu welcher Gattung eine von BRADY aufgestellte Art gehört. Die von BRADY aufgestellten Gattungen sind oft so ungenügend charakterisiert, dass er seine eigenen Gattungen nicht immer wiedererkennen kann. Ein Beispiel hierfür bietet die Gattung *Perissocope* mit der Art *P. typicus*. Man sollte erwarten, dass BRADY, da er selbst die Gattung aufstellt, zu dieser Gattung gehörige Arten nicht in derselben Abhandlung in eine andere Gattung einreiht. Dies tut er indessen. Im weiteren Verlauf dieser Arbeit beschreibt er nämlich einen *Harpacticus simplex*, der ohne Zweifel der Gattung *Perissocope* angehört, und der nach allem zu urteilen mit *P. typicus* (siehe LANG 1935) identisch ist. BRADYS Gattung *Dactylopina* ist ein weiteres Beispiel für sein Vorgehen. Diese Gattung soll sich nach BRADY von ihr nahestehenden Gattungen dadurch unterscheiden, dass die 2. bis 4. Endopoditen ebenso lang sind wie die Exopoditen. Um seine Behauptung zu stützen, führt BRADY eine Figur an, die indessen zeigt, dass der vermeintliche Endopodit ein Exopodit ist. Nach BRADY soll die erwähnte Figur, auf die ich in anderem Zusammenhang zurückkomme, das Aussehen des 2. Beines veranschaulichen. Er hat indessen — nach der Borstenbewehrung zu beurteilen — den 3. und 4. Exopoditen abgebildet und als Exo- beziehungsweise Endopodit bezeichnet, was MONARD (1928 a) eigentümlicherweise nicht bemerkt hat, da er eine Art zu dieser Gattung aufstellt. Auch BRADYS Identifizierung von Arten mit früher beschriebenen ist oft falsch. So gibt er z. B. an, dass *Amphiascus minutus* (CLAUS) bei den Kerguelen gefangen wurde, eine Angabe, die man in MONARDS (1928 b) Übersicht dieser Gattung wiederfindet. Aus BRADYS Figuren geht indessen hervor, dass es sich hier nicht um *A. minutus* handelt.

Ich habe BRADYS Form wiedergefunden und in der vorliegenden Bearbeitung unter dem Namen *A. gracilis* beschrieben. In den Fällen, wo BRADY angibt, welches Schwimmbein er abgezeichnet hat, sind seine diesbezüglichen Angaben oft unrichtig. Wo er angibt, das 2. Bein abgebildet zu haben, handelt es sich oft um das 3. und umgekehrt. Da BRADY es auch nicht so genau damit genommen hat, die abgebildeten Glieder mit der exakten Anzahl Borsten zu versehen und da die Zahl der Borsten in vielen Fällen zur Entscheidung der Gattungszugehörigkeit einer Art von grosser Bedeutung ist, wird es bisweilen unmöglich, seine Arten mit Sicherheit zu identifizieren. Hierzu kommen die vorhandenen Widersprüche zwischen Text und Figuren. Zuweilen gibt er an, dass die 1. Antenne einer bestimmten Art 7-gliedrig sei, zeichnet sie aber 8-gliedrig. In einem anderen Fall bezeichnet er sie als 9-gliedrig und bildet sie mit 8 Gliedern ab u. s. w. Auch in anderen Einzelheiten — vor allem in Bezug auf die Borstenzahl der verschiedenen Beinpaare — liegen Widersprüche zwischen Text und Figuren vor.

Was oben von BRADYS Behandlung des genannten Materials gesagt wurde, gilt auch für seine Bearbeitung der Harpacticiden von der australischen antarktischen Expedition 1911—1914 und für seine Behandlung der Harpacticiden, die während der Challenger-Expedition eingesammelt wurden. Ich werde im Laufe der vorliegenden Arbeit wiederholt auf BRADYS hier erwähnte Materialbehandlungen zurückkommen und sehe daher an dieser Stelle von weiteren Kommentaren ab. Indessen möchte ich nachdrücklichst davor warnen, sich auf BRADYS Angaben zu verlassen, eine Warnung, die übrigens auch für einen grossen Teil seiner sonstigen Harpacticiden-Arbeiten Geltung hat, auf die ich aber hier nicht näher eingehen kann.

Man muss es bedauern, dass die Bearbeitung des Harpacticidenmaterials der genannten Expeditionen nicht T. SCOTT übertragen worden war, welcher die Harpacticiden der schottischen antarktischen Expedition 1902—1904 in vorzüglicher Weise bearbeitet hat. Selbstverständlich liegen auch hier Arten vor, die anderen Gattungen angehören als denen, welchen sie zugezählt worden sind. Solche Fehler ganz zu vermeiden, ist eben nahezu unmöglich.

Das geringfügige Copepodenmaterial der französischen antarktischen Expedition 1903—1905 ist von QUIDOR bearbeitet worden. Er nennt in seiner Abhandlung nur 3 Harpacticiden, unter ihnen zwei neue *Porcellidium*-Arten. Die dritte Art ist nach QUIDOR *Harpacticus brevicornis* O. F. MÜLLER. Wie ich früher bereits hervorgehoben habe (LANG 1934 a), ist QUIDORS Form wahrscheinlich mit *Tigriopus angulatus* LANG identisch.

Von der britischen antarktischen (»Terra Nova«) Expedition hat FARRAN (1929) 10 früher bekannte Harpacticiden in seine Arbeit aufgenommen. Von diesen wurden indessen nur 4 innerhalb des 60. Parallelkreises und nur 2 innerhalb des Polarkreises eingesammelt.

1932 führen MONOD et DOLLFUS 6 Arten von den Kerguelen an — unter diesen irrigerweise *Amphiascus minutus* (CLAUS).

PESTA (1928) gibt 2 n. spp. aus Süd-Georgien und später (1930) 2 früher aus der gleichen Gegend bekannte Arten an.

Ausserdem muss erwähnt werden, dass T. SCOTT (1914) 6 n. spp. von den Falklandsinseln anführt, und dass BRADY (1875, 1879) über das Vorkommen einer Art bei den Kerguelen berichtet.

DIE GEFUNDENEN ARTEN.

Cerviniidae.

Eine defekte, nicht bestimmbare Cerviniidae in Probe No. 30.

Fundort: Süd-Georgien, Moränenfjord. 54° 24′ s. Br. — 36° 26′ w. L. 125 m. Bodentemp. + 0.25°. Ton mit spärlichen Steinen. $^{26}/_{5}$ 1902.

Ectinosomidae.

Bradya BOECK.

Bradya proxima T. SCOTT.

1912. *Bradya proxima*, T. SCOTT, Trans. Roy. Soc. Edinburgh, Vol. XLVIII, 1913, p. 541, Taf. II, Fig. 1—9.

Meine Art stimmt mit SCOTTS Beschreibung und Figuren so gut überein, dass an ihrer Identität nicht gezweifelt werden kann. Das charakteristische 5. Beinpaar (Fig. 1) unterscheidet sich von SCOTTS Abbildung nur darin, dass die mittlere Borste des Endgliedes etwas länger ist als die innere Borste.

Fundort und Material: Süd-Georgien, Cumberlandbucht, Südfjord, ausserhalb des Gletschers. Kescherung 150—0 m. Der Kescher berührte den Grund. Bodentemp. + 1.40°. $^{31}/_{5}$ 1902. 1 ♀.

Verbreitung: Süd-Orkneys, Scotiafjord, 60° 43′ 44″ s. Br. — 44° 38′ 33″ w. L; Süd-Georgien.

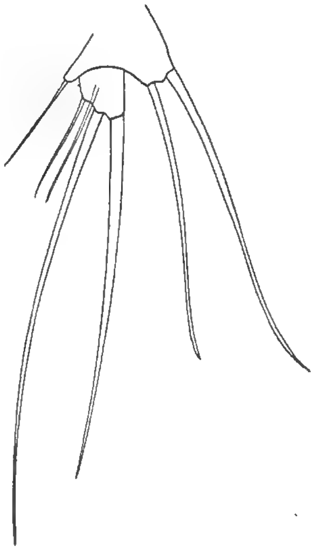

Fig. 1. *Bradya proxima*. T. SCOTT. P. 5 ♀.

Harpacticidae.

Harpacticus MILNE-EDWARDS.

Harpacticus falklandi T. SCOTT.

1914. *Harpacticus falklandi*, T. SCOTT, Ann. Mag. Nat. Hist. Ser. 8, Vol. 13, p. 369, Taf. XIII, Fig. 1—9.

Von mehreren Fundorten liegt eine *Harpacticus*art vor, die sehr gut mit der Form übereinstimmt, die SCOTT von den Falklandsinseln beschreibt.

Fundort und Material: St. 34 b. Atlantischer Ozean, nördlich von den Falklandsinseln und östlich von Patagonien. 44° 49′ s. Br. — 57° 34′ w. L. 700—500 m. $^{27}/_{12}$ 1901. 11 ♀♀.

(Es ist meines Erachtens kaum glaublich, dass die Art tatsächlich aus dieser Tiefe stammt.)

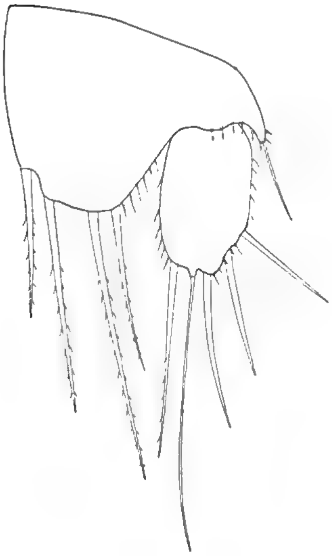

Fig. 2. *Harpacticus faklandi* T. Scott. P. 5 ♀.

St. 36. Süd-Georgien. In der Kochtopfbucht. 54° 22′ s. Br. — 36° 28′ w. L. 1—2 m. Sand und Kies. $^{13}/_{6}$ 1902. 293 ♀♀.

Süd-Georgien, Majbucht. Kescherung auf Steingrund mit Algen. 1—2 m. $^{9}/_{5}$ 1902. 8 ♀♀.

Süd-Georgien, Kochtopfbucht, aus Schlämmung von altem, auf den Strand gespülten *Macrocystis*. $^{22}/_{5}$ 1902. Zwei Proben mit 3 ♀♀ bezw. 17 ♀♀.

St. 40. Falklandsinseln, Berkeley Sund. 51° 43′ s. Br. — 58° 0′ w. L. 16 m. Bodentemp. + 2.75°. Kies und Schalen mit Algen. $^{19}/_{7}$ 1902. 2 ♀♀.

St. 47. Falklandsinseln, Port Louis. Mündung des Carenage Creek. 51° 32′ s. Br. — 58° 7′ w. L. 3—4 m. $^{9}/_{8}$ 1902. 25 ♀♀, davon viele mit Eisack.

St. 51. Falklandsinseln. Port William. 51° 40′ s. Br. — 57° 42′ w. L. 22 m. Sand. $^{3}/_{9}$ 1902. 3 ♀♀.

Verbreitung: Falklandsinseln; Süd-Georgien.

Harpacticus furcatus n. sp.

1902. *Harpacticus chelifer*, Giesbrecht, Exped. Antarc. Belge. Copepoden p. 35, Taf. VIII. Fig. 1—12.

Weibchen: Körperform etwa wie bei *H. chelifer* (Müller). Rostrum vorspringend. Cephalothorax gross. Furcaläste (Fig. 3) länger als breit. Genitalsegment (Fig. 4). 1. Antenne 9-gliedrig mit den folgenden Verhältniszahlen der Glieder:

1	2	3	4	5	6	7	8	9.
23	25	25	21	11	12	7	5	6

2. Antenne normal gebaut. 2. Maxilliped (Fig. 5) gross.

1. Beinpaar (Fig. 6) mit dem 2. Exopoditengliede ein wenig länger als das 1. Glied.

2. bis 4. Beinpaar wie bei *H. littoralis* Sars.

5. Beinpaar (Fig. 7). Endglieder etwa 2-mal so lang wie breit mit je 5 Randborsten. Grösse 1.35—1.52 mm.

Das Männchen ist etwas grösser als das Weibchen (1.6—1.64 mm).

1. Antenne chirocer (siehe Lang 1935). 2. Endopodit (Fig. 8) transformiert. 3. Exopodit (Fig. 9) etwa wie bei *H. uniremis* Kröyer. 5. Beinpaar (Fig. 10) mit 5 Randborsten.

Bemerkung. Giesbrecht (l. c.) beschreibt diese Art als *H. chelifer* O. F. M. Vom *chelifer* unterscheidet sie sich indessen in mehreren Beziehungen. So ist z. B. bei ersterem die 1. Antenne nur 8-gliedrig und das Basalglied des 5. Beines trägt beim Weibchen nur 3 Borsten. Ausserdem hat das Genitalfeld ein ganz anderes Aussehen. Ebenso grosse Un-

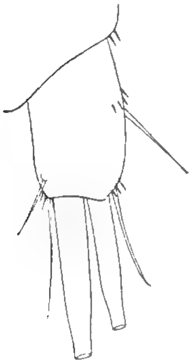

Fig. 3.

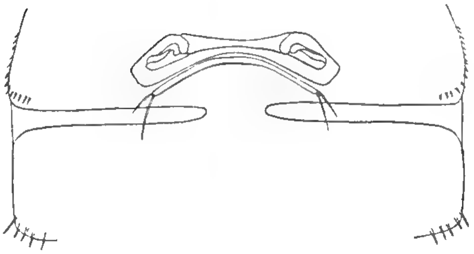

Fig. 4.

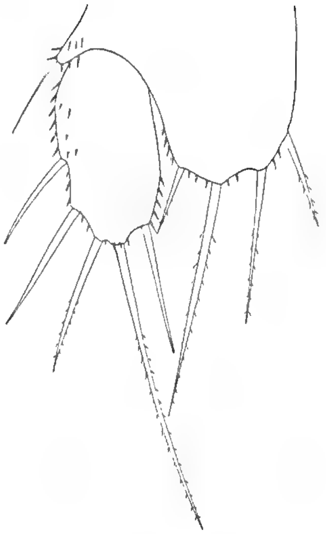

Fig. 7.

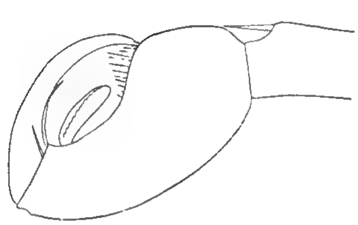

Fig. 5.

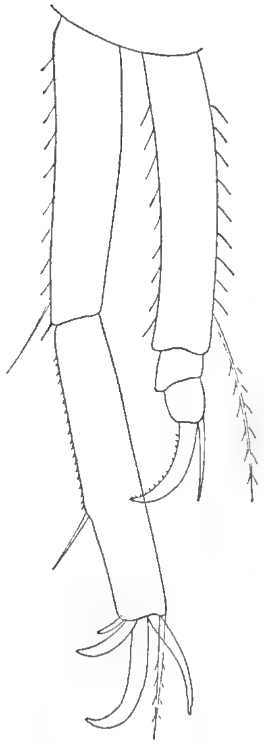

Fig. 6.

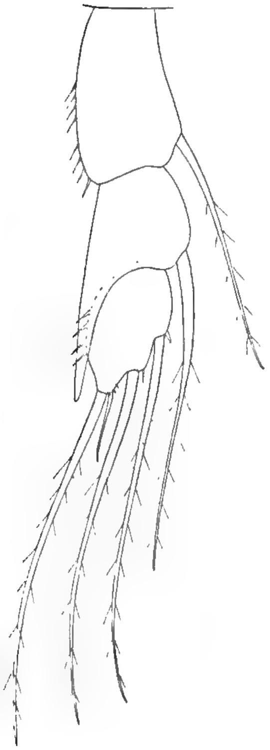

Fig. 8.

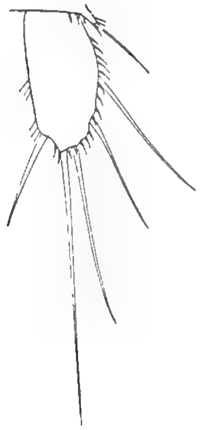

Fig. 10.

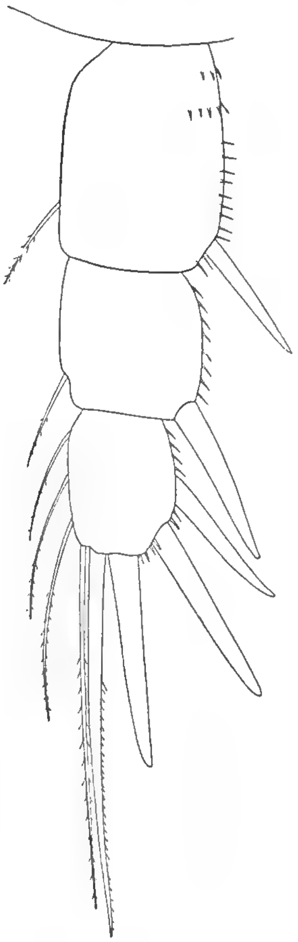

Fig. 9.

Fig. 3—10. *Harpacticus furcatus* n. sp. — Fig. 3. Fu. dorsal ♀. — Fig. 4. Genitalfeld ♀. — Fig. 5. Mp. 2 ♀. — Fig. 6. P. 1 ♀. — Fig. 7. P. 5 ♀. — Fig. 8. Enp. P. 2 ♂. Fig. 9. Exp. P. 3 ♂. — Fig. 10. P. 5 ♂.

terschiede zeigen die Männchen. Beim *chelifer* trägt das 5. Bein nur 4 Borsten, beim *furcatus* dagegen 5. Beim *chelifer* hat das Endglied des 3. Exopoditen nur 3 grobe Dornen, beim *furcatus* liegt ausserdem eine lange, befiederte Borste vor. Die Art scheint *H. littoralis* am nächsten zu stehen, unterscheidet sich aber von diesem hauptsächlich im Bau der Furcaläste.

Fundorte und Material: St. 14 A. Süd-Georgien, Cumberlandbucht. 1 m. Stein. $^{23}/_{4}$ 1902. 1 ♀, 2 ♂♂.

Bransfield-Sund. Unter Steinen bei Niederwasser. $^{10}/_{11}$ 1903. 13 ♀♀.

Verbreitung: Gerlachekanal; Süd-Georgien; Bransfield-Sund.

Zausopsis LANG.

Zausopsis mirabilis LANG.

1934. *Zausopsis mirabilis*, LANG, Lunds Univ. Årsskr. N. F. Avd. 2. Bd. 30. Nr. 14, p. 13. Fig. 17—27.

Von Süd-Georgien liegen 2 Weibchen vor, die genau mit der Form übereinstimmen, die ich früher von der Campbell-Insel beschrieben habe. Vom gleichen Fundort liegt auch ein Männchen vor. Das 5. Bein desselben trägt indessen an der einen Seite am Basalglied 3 Borsten (Fig. 11), auf der anderen Seite dagegen fehlen diese Borsten.

Fundort und Material: Süd-Georgien, Majbucht. Kescherung auf Algen in und unter der Gezeitenzone. $^{5}/_{5}$ 1902. 2 ♀♀, 1 ♂.

Verbreitung: Campbell-Insel; Süd-Georgien.

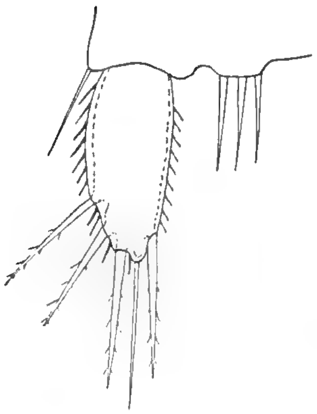

Fig. 11. *Zausopsis mirabilis* LANG P. 5 ♂.

Peltidiidae.

Alteutha BAIRD.

Alteutha trisetosa n. sp.

Weibchen: Körper dorso-ventral abgeplattet. Cephalothorax länger als die 3 folgenden Segmente zusammen. Rostrum gross, vorspringend. Epimeralplatten der 3 ersten Thoracalsegmente lateral nur wenig ausgezogen. Furcaläste (Fig. 12) wenig länger als breit mit 3 terminalen Borsten. 1. Antenne? (abgebrochen). 2. Antenne und Mundteile wie bei *A. depressa* BAIRD.

1. Beinpaar wie bei *A. depressa.*

2. bis 4. Beinpaar mit ebenso langen Endo- wie Exopoditen. 1. Exopoditenglied ohne innere Borste. 2. Exopoditenglied mit 1 kleinen inneren Borste. Letztes Glied des 2. Exopoditen mit 2 (Fig. 13), des 3. und 4. Exopoditen mit 3 inneren Borsten (Fig. 14). 1. Endopoditenglied mit 1, 2. Glied mit 2 kurzen inneren Borsten. Borstenformel:

Fig. 12.

Fig. 13.

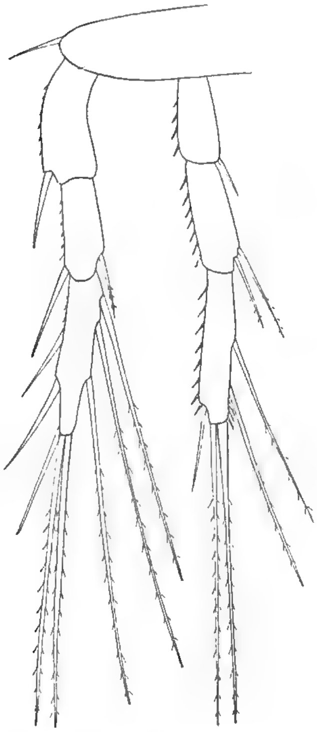

Fig. 14.

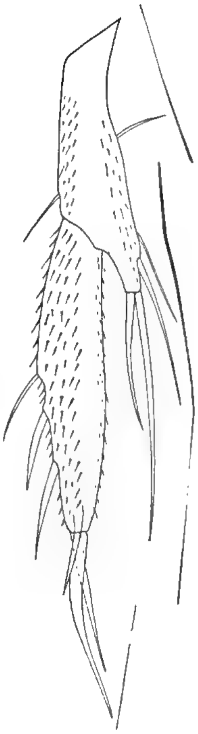

Fig. 15.

Fig. 12—15. *Alteutha trisetosa* n. sp. — Fig. 12. Fu. dorsal ♀. — Fig. 13. Exp. P. 2 ♀. — Fig. 14. P. 3 ♀. — Fig. 15. P. 5 ♀.

Glied	Exopodit			Endopodit		
	1	2	3	1	2	3
P. 2	0	1	2·2·3	1	2	2·2·1
P. 3	0	1	3·2·3	1	2	3·2·1
P. 4	0	1	3·2·3	1	2	2·2·1

5. Beinpaar (Fig. 15) mit 2 Gliedern. Beide Glieder sind an der Oberfläche fein behaart. Das 1. Glied ist an der inneren unteren Ecke etwas ausgezogen und trägt 5 Borsten, von denen die eine hoch oben sitzt. Das 2. Glied ist langgestreckt oval und trägt am äusseren Rande 1 feinen und 2 gröbere Dornen, an der Spitze 3 grobe Dornen. Männchen unbekannt.

Diese Art scheint *A. dubia* T. Scott am nächsten zu stehen, unterscheidet sich aber von ihr im Bau der Furcaläste und des 5. Beinpaares.

Fundort und Material: Süd-Georgien, Moränenfjord. 54° 24′ s. Br. — 36° 25′ w. L. 16 m. Steine mit Algen. $^{26}/_{5}$ 1902. 1 ♀.

Idyaeidae.

Machairopus Brady.

Machairopus antarcticus n. sp.

Weibchen: Körper breit und flach mit deutlich abgesetztem Abdomen. Epimeralplatten der freien Thoracalsegmente wohlentwickelt. 3. Thoracalsegment in der Mitte eingebaucht. Letztes Thoracalsegment klein, unbedeckt. Genitalsegment unvollständig geteilt. Furcaläste länger als breit. 1. Antenne 9-gliedrig, allmählich schmäler werdend mit folgenden Verhältniszahlen der Glieder:

1	2	3	4	5	6	7	8	9.
9	20	15	9	2.5	2.5	4	5	8

2. Antenne und Mundteile wie bei *M. longicauda* (Philippi).

1. Beinpaar (Fig. 16). Exopodit kurz mit stark nach innen gebogenem 2. Glied. 1. Endopoditenglied gross und breit.

Fig. 16. Fig. 17.

Fig. 16—17. *Machairopus antarcticus* n. sp. — Fig. 16. P. 1 ♀. — Fig. 17. P. 5 ♀.

2. bis 4. Beinpaar mit 3-gliedrigen Ästen. 2. Endopodit so lang wie, 3. und 4. kürzer als die entsprechenden Exopoditen.

Borstenformel:

Glied	Exopodit			Endopodit		
	1	2	3	1	2	3
P. 2	1	1	2·2·3	1	2	2·2·1
P. 3	1	1	3·2·3	1	2	3·2·1
P. 4	1	1	3·2·3	1	2	2·2·1

5. Beinpaar (Fig. 17) mit gespaltenem Basalglied und ovalem Endglied, das 5 Reihen Flächendornen und 5 Randborsten trägt. Grösse 1.2 mm.

Männchen unbekannt.

Bemerkungen. In einer im Druck liegenden Abhandlung habe ich gezeigt, dass die beiden Gattungen *Psamathe* PHILIPPI und *Machairopus* BRADY zu einer Gattung vereinigt werden müssen, die, da der Name *Psamathe* vorweggenommen ist, den Namen *Machairopus* BRADY tragen muss. Die hier beschriebene Art steht *M. longicauda* am nächsten, unterscheidet sich aber von dieser durch das Aussehen der 1. Antenne, des 1. und 5. Beinpaares und durch die längeren Furcaläste.

Fundort und Material: Süd-Georgien, Kochtopfbucht. Aus Feinschlämmung alter *Macrocystis*-Wurzeln. $^{22}/_{5}$ 1902. 32 ♀♀.

Thalestridae.

Bemerkungen zu den Gattungen.

Nach MONARD (1927) umfasst die Familie *Thalestridae* nachstehende 23 Gattungen, die hier in chronologischer Reihenfolge angeführt werden:

Idomene PHILIPPI, 1843,
Westwoodia DANA, 1855,
Thalestris CLAUS, 1863,
Amenophia BOECK, 1864,
Parathalestris BRADY et ROBERTSON, 1873,
Xouthous THOMSON, 1882,
Pseudothalestris BRADY, 1883,
Pseudowestwoodia T. SCOTT, 1894,
Flavia BRADY, 1899,
Dactylopusia NORMAN, 1903,
Phyllothalestris SARS, 1905,
Halithalestris SARS, 1905,
Rhynchothalestris SARS, 1905,
Microthalestris SARS, 1905,
Dactylopodella SARS, 1905,
Idomenella T. SCOTT, 1906,
Vallentinia NORMAN et T. SCOTT, 1906,
Megarthrum NORMAN et T. SCOTT, 1906,
Eudactylopus A. SCOTT, 1909,
Tydemanella A. SCOTT, 1909,
Dactylopina BRADY, 1910,
Dactylopodopsis SARS, 1911,
Peltthestris MONARD, 1924.

In einer Fussnote zu *Thalestridae* macht MONARD (l. c. p. 156) folgende Bemerkung: »En outre, le genre *Diarthrodes* THOMSON, que son auteur place parmi les *Canthocamptidae* se rapproche singulièrement des *Pseudothalestris*«.

Nach MONARDS Arbeit sind folgende Gattungen hinzugekommen:

Plesiothalestris BRIAN, 1927,
Dactylopusioides BRIAN, 1928,
Timesus MONARD, 1928 a.

BRIAN (1927) stellt eine Gattung *Ialysus* auf, die er in *Diosaccidae* einreiht, während GURNEY (1927 p. 505) sie zu *Thalestridae* rechnet.

Der Gattungsname *Westwoodia* ist, wie SHARPE (1910) bemerkt, vorweggenommen, weshalb er ihn in *Parawestwoodia* abändert. Die 3 Gattungen *Westwoodia, Pseudothalestris* und *Pseudowestwoodia,* die von MONARD (l. c.) eigentlich als Subgenera aufgefasst werden, fasst SARS 1905 (siehe SARS 1911) in eine Gattung *Westwoodia* zusammen. In der gleichen Weise verfährt PESTA (1932), nennt jedoch die Gattung *Parawestwoodia.* Schon 1895 betonen T. et A. SCOTT (l. c. p. 463), dass *Pseudowestwoodia* mit *Pseudothalestris* identisch ist. Aus Gründen, die ich früher bereits angeführt habe (LANG 1934 a p. 30—32), schlisese ich mich vollständig der Ansicht von SARS und PESTA an. Den Nomenklaturregeln nach, muss aber der Gattungsnahme in *Diarthrodes,* THOMSON (1882), abgeändert werden, da *Pseudothalestris,* BRADY (1883), zweifellos mit *Diarthrodes,* THOMSON (1882) identisch ist. BRADYS kurze Gattungsdiagnose lautet (l. c. p. 100): »Like *Thalestris,* except as to the structure of the first pair of feet, in which the outer branch is very short and only two-jointed, the inner branch long, three-jointed, having the first joint very long, the second and third rudimentary.« Dies stimmt genau mit dem überein, was THOMSON (l. c. p. 99) anführt: »Outer branch of first foot very short, 2-jointed; inner branch 3-jointed, the first joint greatly elongated, second and third very short.« Es ist nicht richtig, diese Gattung, wie MONARD (l. c. p. 161) es tut, *Ameiridae* zuzuzählen. GURNEY (1932) hebt auch hervor, dass *Diarthrodes* entweder mit *Parawestwoodia* identisch ist oder doch dieser Gattung sehr nahe steht. Die Gattung *Microthalestris* ist, wie ich bereits gezeigt habe (LANG 1934 a p. 22), identisch mit der Gattung *Parastenhelia* THOMPSON et A. SCOTT, und die Gattungen *Idomene* und *Idomenella* können nicht von einander unterschieden werden (l. c. p. 28).

Aus der Gattungsdiagnose für *Megarthrum* und aus der Beschreibung, die NORMAN et T. SCOTT (1906 p. 174—176) von der Typenart geben, ist ersichtlich, dass diese Gattung mit der Gattung *Xouthous* identisch ist, die schon 1882 von THOMSON (l. c. p. 103) aufgestellt wurde. Der einzige Unterschied zwischen den beiden Gattungen besteht darin, dass *Megarthrum* an der 2. Antenne einen 2-gliedrigen Exopoditen besitzt, während *Xouthous* einen 3-gliedrigen Exopoditen aufweist. THOMSONS Angabe ist indessen vermutlich unrichtig. Aus seiner Zeichnung (l. c. Taf. X. Fig. 10) kann man ersehen, dass das Endglied des Exopoditen sehr kurz ist. In Fällen, wo der Exopodit 3-gliedrig ist, pflegt das mittlere Glied am kürzesten zu sein und am inneren oberen Rande eine Borste zu tragen. In THOMSONS Zeichnung ist aber das mittlere Glied am längsten und mitten an diesem Gliede sitzt eine Borste, was der Fall zu sein pflegt, wenn der Exopodit 2-gliedrig ist. Wenn das 2. und 3. Glied nur ein einziges Glied bilden — was am wahrscheinlichsten ist — wird der Exopodit fast genau dem von *Megarthrum* gleich. Dazu kommt noch, dass die Typenarten der beiden Gattungen einander so ähnlich sind, dass es äusserst zweifelhaft scheint, ob sie zwei getrennte Arten darstellen.

SARS 1905 (siehe SARS 1911 p. 134) betont, dass *Dactylopusia laticauda* und *D. aemula,* die von THOMPSON et A. SCOTT 1903 beschrieben werden, der Gattung *Idomene* anzugehören scheinen. Diese beiden Arten werden indessen von NORMAN et T. SCOTT (l. c. p. 176) zur Gattung *Megarthrum* gerechnet, während A. SCOTT (1909 p. 216) die erstgenannte Art zur Gattung *Idomene* zählt. Ein Vergleich zwischen diesen beiden Gattungen ergibt, dass sie ohne Zweifel mit einander identisch sind. Abgesehen von dem ersten Endopoditen, der bei *Idomene* 3-gliedrig, bei *Megarthrum* nur 2-gliedrig ist, stimmen die Typenarten der beiden Gattungen exakt mit einander überein. Als für beide Gattungen charakteristisch ist u. a. das von den übrigen Gattungen abweichende Aussehen des Mandibularpalpus zu nennen. Dieser hat bei den Typenarten der beiden genannten Gattungen genau das gleiche Aussehen (vgl. SARS 1911 Taf. LXXXII und NORMAN et T. SCOTT 1906, Taf. X. Fig. 17). Am äusseren Ast des Mandibularpalpus hat SCOTT nur 2 grosse, gezähnte Borsten gezeichnet, während SARS 3 solche Borsten zeigt. Im Text geben indessen NORMAN et T. SCOTT (l. c.) an, dass dieser Ast »armed with two (or three) pecularly strong spines« ist. Im vorliegenden Fall einzig auf Grund des Aussehens des 1. Endopoditen zwei Gattungen zu unterscheiden ist ebensowenig berechtigt wie eine Aufteilung der Gattung *Diarthrodes*. Die Gattung *Idomene* wird demnach auch die zu *Xouthous* und *Megarthrum* gezählten Arten umfassen.

Die Gattung *Dactylopina* BRADY ist vermutlich mit *Eudactylopus* A. SCOTT identisch. BRADY (1910 p. 540) sagt selbst, dass die Gattung sich *Dactylopodella* SARS und *Vallentinia* NORMAN et T. SCOTT nahe anschliesst, sich aber von diesen Gattungen dadurch unterscheidet, dass ihre 1. Antenne eine grössere Anzahl Glieder besitzt und vor allem dadurch, dass die Endopoditen des 2. bis 4. Beinpaares ungefähr ebenso lang sind wie die Exopoditen. In der Gattungsdiagnose (l. c. p. 540) und in der Artbeschreibung (l. c. p. 541) sagt BRADY, dass die 1. Antenne 9-gliedrig ist, obwohl er sie 8-gliedrig gezeichnet hat (l. c. Textfig. XXXII Fig. 1). Das fünfte Beinpaar, welches möglicherweise als Anhalt für die Einreihung der Gattung hätte dienen können, hat BRADY nicht gesehen (l. c. p. 542). Was indessen eine sichere Identifizierung von BRADYS Gattung unmöglich macht, ist seine Behauptung bezüglich des Aussehens des 2. bis 4. Beinpaares. Die Figur (l. c. Fig. 7), die den Bau dieser Beinpaare verifizieren und veranschaulichen soll, ist nämlich — wie bereits erwähnt wurde — unrichtig. Fig. 7 soll das 2. Beinpaar darstellen. Dass der Endopodit hier ebenso lang ist wie der Exopodit liegt daran, dass der »Endopodit« kein solcher, sondern ein—vermutlich zum nächstfolgenden Beinpaar gehöriger — Exopodit ist. Die Aufstellung der Gattung ist demnach auf Grund dieses fast unerklärlichen Irrtums erfolgt. Nach der Borstenbewehrung zu beurteilen sind hier der 3. und 4. Exopodit abgebildet worden und nicht, wie angegeben wird, das 2. Bein. MONARD (1928 a p. 353) stellt eine zu dieser Gattung gehörende neue Art auf und liefert auch eine ausführliche Gattungsdiagnose, während er gleichzeitig hervorhebt, dass sie der Gattung *Eudactylopus* sehr nahe steht. Von dieser Gattung unterscheidet sich indessen MONARDS Diagnose in einigen wesentlichen Punkten. Vor allem gilt dies für das Aussehen des 1. Beinpaares und die Bewehrung der Endopoditen. Das mittlere Exopoditenglied des 1. Beinpaares ist nämlich lang wie bei *Phyllothalestris* und die Bewehrung der Endopoditen ist dieselbe wie bei dieser Gattung. Es unterliegt keinem Zweifel, dass die Gattung *Dactylopina*, so wie MONARD sie charakterisiert, mit *Phyllothalestris* identisch ist. Für die Identität mit dieser Gattung spricht nicht zum wenigsten das Aussehen des 5. Beinpaares (l. c. p. 353 Fig.

XX: 2). Das Endglied dieses Beinpaares zeigt nämlich eine erstaunliche Ähnlichkeit mit dem entsprechenden Glied bei *Ph. mysis* (CLAUS). Ebenso wie bei dieser Art, ist nämlich der zweitäussere Dorn grob und dick. Mit BRADYS Gattung hat MONARDS Gattung nichts zu tun. Dies geht bereits aus den grossen Verschiedenheiten im Bau der 1. Antenne (vgl. BRADY l. c. Textfig. XXXII Fig. 1. und MONARD l. c.) und im Bau des 1. Exopoditen hervor (vgl. BRADY l. c. Fig. 6 und MONARD l. c.). Dagegen zeigen die 1. Endopoditen grosse Ähnlichkeit und sind in derselben Weise ausgebildet wie bei *Eudactylopus*, d. h. sie sind nur mit 2 Gliedern versehen. Zur Gattung *Eudactylopus* ist nur eine einzige Art gezählt worden, die zweimal beschrieben worden ist. Die Gattung wurde von A. SCOTT (1909 p. 219) für *Dactylopus latipes* T. SCOTT (1893 p. 99) aufgestellt. Nach dem letztgenannten Verfasser ist die 1. Antenne 9-gliedrig (l. c. p. 99; Taf. 10 Fig. 39) und der 1. Endopodit (l. c. Pl. 10 Fig. 41) 3-gliedrig. A. SCOTT (l. c. p. 219; Taf. LXIII Fig. 9) sagt, dass die 1. Antenne 7-gliedrig ist, und über den 1. Endopoditen sagt er, er sei »two-jointed or very indistinctly three-jointed«. Die Gliederzahl der Antenne interessiert uns in diesem Zusammenhang weniger. Wichtig ist dagegen, dass die vier ersten Glieder bedeutend dicker sind als die übrigen — ein Merkmal, das sich auch bei BRADYS Gattung findet — während bei MONARDS Gattung diese Glieder bedeutend schlanker sind und genau das gleiche Aussehen besitzen wie bei *Phyllothalestris*. Jeder der sich etwas mit *Thalestridae* beschäftigt hat, weiss wie schwer es sein kann zu entscheiden, ob die beiden Endglieder des 1. Endopoditen von einander abgegrenzt oder mit einander verschmolzen sind. Wie immer es sich hiermit verhalten möge, muss MONARDS Art jedenfalls zu *Phyllothalestris* gezählt werden.

Nach SARS unterscheidet sich die Gattung *Phyllothalestris* von der Gattung *Thalestris* durch folgende Merkmale: Rostrum nicht beweglich aber abgesetzt, Epimeralplatten der Thorakalsegmente wenig entwickelt, Bau des Auges kompliziert, 2. Maxilliped schlank, auf der Innenseite nicht konkav, 5. Beinpaar sehr gross. Dies stimmt jedoch nur für die Typenart *Ph. mysis* (CLAUS). SARS zählt 1909 *Th. frigida* T. SCOTT zu *Phyllothalestris*. Bei *frigida* sind die Epimeralplatten und das Auge in genau der gleichen Weise gebaut wie bei den *Thalestris*-Arten. Bei *Th. normani* T. SCOTT (1903 p. 25, Taf. III. Fig. 12—18) und *Th. sordida* BRADY (1910 p. 528, Taf. LIII, Fig. 16) ist der 2. Maxilliped in der gleichen Weise ausgebildet wie bei *frigida*. Aus SCOTTS (l. c. Fig. 12) Abbildung ergibt sich, dass das 5. Beinpaar bei *normani* nur etwas über die Mitte des Genitalsegments hinausreicht. Diese Art stimmt also mit *Phyllothalestris* im Bau des 2. Maxillipeden und mit *Thalestris* im Bau des 5. Beinpaares überein. Es scheint daher, dass SARS selbst das Hauptgewicht auf das Aussehen des 5. Beinpaares gelegt hat. Dadurch wird es aber unmöglich, eine Erklärung dafür zu finden, dass SARS *Th. rufoviolascens* CLAUS nicht zu *Phyllothalestris* rechnet, da sich diese Art sowohl habituell als auch in der Grösse des 5. Beinpaares aufs engste an *frigida* anschliesst (vgl. SARS 1911, Taf. LXII und SARS 1909, Taf. IV). Bei *Th. longimana* CLAUS (SARS 1911, Taf. LIX) ist das 5. Beinpaar sogar grösser als bei *frigida* und nur unbedeutend kleiner als bei *mysis*. Es ist demnach unmöglich die Gattung *Phyllothalestris* in dem Umfang beizubehalten, den SARS ihr gegeben hat. Da ich Gelegenheit gehabt habe sowohl die Arten, die dieser Gattung zugezählt worden sind, als auch zahlreiche *Th.*-Arten näher zu untersuchen, bin ich zur Überzeugung gelangt, dass die Gattung *Phyllothalestris* für die Arten *mysis* (CLAUS) und *paramysis* MONARD beibehalten werden muss. Die Art *Dactylopina royi* MONARD gehört sicher auch hierher. Diese Gattung würde dann durch das eigentümlich gebaute Auge[1], das Aussehen der Epimeralplatten, die eigenartige Borstenbewehrung des 5. Beinpaares und das Aussehen des weiblichen Genitalfeldes charakterisiert sein. Bei den *Th.*-Arten ist das Genitalfeld im Prinzip in der in Fig. 18 veranschaulichten Weise gebaut. In dieser Beziehung stimmt *frigida* (Fig. 18) ganz mit den *Th.*-Arten überein. Bei *Phyllothalestris* dagegen hat das Genitalfeld ein etwas abweichendes Aussehen (Fig. 19) und ist bei *mysis* und *paramysis* ganz gleich gebaut.

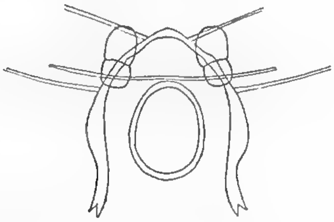

Fig. 18. *Thalestris frigida* T. SCOTT. Rec. seminis.

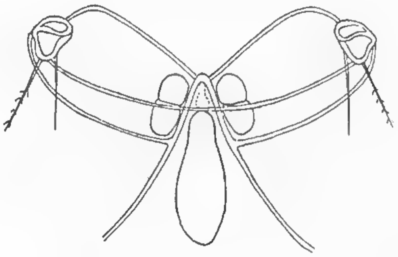

Fig. 19. *Phyllothalestris mysis* (CLAUS). Genitalfeld ♀.

Die zweifellos eigentümlichste der zu *Thalestridae* gerechneten Gattungen ist die 1899 von BRADY aufgestellte *Flavia*. Dort ist der zweite Endopodit 1-gliedrig, länger als der Exopodit und mit einer höchst eigenartigen Borstenbewehrung versehen (l. c. Taf. X. Fig. 30). BRADY hat sich indessen all zu viele Irrtümer, Verwechslungen und Widersprüche zu schulden kommen lassen, als dass man sich unbedingt auf seine Angaben verlassen könnte, und ich fürchte, dass man BRADYS Gattung niemals wiederfinden wird. Falls BRADYS Zeichnung richtig ist, handelt es sich mit nahezu absoluter Sicherheit um eine reine Missbildung. Wie ich festgestellt habe, sind nämlich derartige Missbildungen und ebenso Asymmetrien in dieser Familie recht gewöhnlich. BRADYS Gattungsdiagnose und Artenbeschreibung sind übrigens in einer Weise abgefasst, die eine sichere Identifizierung unmöglich macht. Nach dem 1. Beinpaar zu urteilen (l. c. Fig. 29), scheint es sich jedoch entweder um eine missgebildete *Dactylopusia*-Art oder eine missgebildete *Amphiascus*-Art zu handeln.

Im Jahre 1899 stellt BRADY eine Gattung *Phroso* auf, die von MONARD (1927) unter den »genera incertae sedis« aufgezählt wird und über deren systematische Stellung MONARD (l. c. p. 174) äussert: »Affinités probables: *Thalestridae* ou *Ameiridae*.« BRADYS Beschreibung ist höchst unvollständig und bezüglich der systematisch wichtigsten Punkte fehlen sowohl Figuren als auch Mitteilungen im Text. Über das 1. Beinpaar erfährt man nur, dass seine beiden Äste 3-gliedrig sind (l. c. p. 42); eine Figur fehlt. Das gleiche teilt er über das 2. bis 4. Beinpaar mit und bringt auch eine Zeichnung (l. c. Taf. XI, Fig. 26) des 4. Beines. Dass BRADY hier den Exopoditen 4-gliedrig gezeichnet hat, bedeutet weniger, da es sich hierbei um ein offenbares Versehen handelt. Dagegen wäre es von Interesse genau zu wissen, ob das Endglied des Exopoditen — wie die Figur angibt — nur 2 innere Randborsten trägt, oder ob sich dort vielleicht noch eine weitere Borste befindet. Bei *Thalestridae* kommen in der Regel an diesem Gliede 3 innere Randborsten vor und Ausnahmen in dieser Beziehung sind äusserst selten. Bei *Ameiridae* dagegen befinden sich hier oft 2 innere Randborsten. Die habituelle Übereinstimmung zwischen *Phroso* und *Metaphroso* (vgl.

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[1] Es lässt sich zur Zeit nicht einwandfrei feststellen, ob wir es hier mit einem Gattungsmerkmal zu tun haben.

BRADY l. c. Fig. 19 und BRADY 1910 p. 522, Textfig. 13 Fig. 1) ist auffallend. Die systematische Stellung der letztgenannten Gattung kann unmöglich entschieden werden. MONARD (l. c. p. 174) führt auch sie unter den »genera incertae sedis« an, hebt aber hervor, dass es sich möglicherweise um *Canthocamptidae* handeln könnte. BRADY vergleicht selbst *Metaphroso* mit *Phroso* und sagt, dass diese beiden Gattungen einander nahe zu stehen scheinen (1910 p. 522), sich aber im Bau des 1. Beinpaares unterscheiden. Von *Phroso* lag BRADY nur ein weibliches Individuum vor, von *Metaphroso* nur ein männliches. Von *Phroso* bildet BRADY das 5. Bein ab aber nicht das 1., von *Metaphroso* das 1. aber nicht das 5. Nach BRADY (l. c. p. 521—522) soll bei der letztgenannten Gattung das 5. Bein rudimentär sein. Bei einem Vergleich der beiden Gattungen erhält man aber, da korrespondierende Figuren fehlen, keinen Begriff weder hinsichtlich ihrer gegenseitigen Stellung noch bezüglich ihrer Stellung im System. Noch unmöglicher wird dies dadurch, dass in dem einen Fall nur das Weibchen, im anderen Fall nur das Männchen notizenhaft diagnostiziert worden ist. Völlig falsch ist, wie BRADY es tut, den Bau des 5. Beines als unterscheidendes Merkmal anzunehmen, da es ja bei den Harpacticiden eine gewöhnliche Erscheinung ist, dass dieses Beinpaar beim Männchen rudimentär, beim Weibchen aber gut entwickelt ist.

Die Gattung *Tydemanella* A. SCOTT (1909 p. 216—217; Taf. LXIII, Fig. 16 und 22) gehört nicht *Thalestridae* an, sondern, wie aus dem Aussehen des 1. Beinpaares und der 1. Antenne hervorgeht, *Diosaccidae*. Dass die Gattung nicht zu *Ameiridae* gehört, ergibt sich aus dem Bau des Mandibularpalpus.

Dactylopodella SARS und *Vallentinia* NORMAN et T. SCOTT können nicht als zwei verschiedene Gattungen betrachtet werden. Nach NORMAN et T. SCOTT (1906 p. 173) unterscheiden sich *Vallentinia* und *Dactylopodella* durch das Aussehen des 2. Endopoditen beim Weibchen und Männchen und ausserdem »in one or two other minor points«. Der 2. Endopodit soll beim Weibchen von *Vallentinia* 3-gliedrig (Fig. fehlt) und ebenso gebaut sein wie bei *Dactylopusia rostrata* (T. SCOTT). Der zweite Endopodit beim Männchen, welcher abgebildet ist (l. c. Taf. XVI Fig. 9) zeigt genau die gleiche Bauart wie bei *Dactylopodella*. Das letzte Glied endet in einem groben Dorn und ist auf der Innenseite mit 4 Borsten versehen. Auf SARS' Abbildung (1911 Taf. LXXXI) ist der Enddorn ebenso ausgebildet wie bei *Vallentinia*, doch hat SARS nur 3 innere Randborsten gezeichnet. Bei SARS' Figur findet sich indessen eine Einbauchung, die deutlich zeigt, dass hier noch eine weitere Borste vorkommt. Schon der exakt gleiche Bau dieses Endopoditen beim Männchen beweist, dass die beiden Gattungen identisch sind. Auch aus anderen, anscheinend bedeutungslosen Einzelheiten ist dies ersichtlich. So trägt z. B. das Basalglied des 5. Beines bei den Männchen der beiden Gattungen nur 2 Borsten, ein Merkmal, welches sie mit *Idomene* gemeinsam haben.

Unter den Gattungen, die SARS von *Thalestris* abgetrennt hat, unterscheidet sich *Halithalestris* in keinem wesentlichen Punkt von *Parathalestris*. In seiner Diagnose von *Halithalestris* vergleicht SARS diese Gattung mit *Thalestris*, jedoch nicht mit *Parathalestris*. Der einzige Unterschied zwischen *Halithalestris* und *Parathalestris* ist der, dass erstere pelagisch ist, während die *Parathalestris*-Arten Bodenformen sind. Der zweite Maxilliped, dessen Aussehen SARS in seiner Diagnose von *Halithalestris* hervorhebt (SARS 1905 p. 117) ist in der gleichen Weise gebaut wie der bei *P. clausi* (NORMAN) (vgl. SARS l. c. Taf. LXXXII und Taf. LXV). Die langen Furcaläste, die für *Halithalestris* bezeichnend sind, finden sich, wenn auch in etwas verminderter Form, bei *P. jacksoni* (T. SCOTT) wieder.

BRIAN (1927) stellt eine Gattung *Plesiothalestris* auf, die aber mit *Eudactylopus* identisch ist. Die erste Antenne ist genau der 1. Antenne bei *Eudactylopus* gleich. Dasselbe gilt för das Aussehen des 1. und 5. Beinpaares und für die Bewehrung des 2. bis 4. Beinpaares (vgl. BRIAN l. c. p. 3, Fig. 4, 6 bis 10 und T. SCOTT 1893, Taf. 10, Fig. 39, 41 bis 42 und A. SCOTT 1909, Taf. LXII, Fig. 9, 12, 13). Ich komme auf BRIANS Gattung im Zusammenhang mit *Eudactylopus* zurück.

Ialysus wird von BRIAN ganz richtig zu *Diosaccidae* gezählt. Schon aus dem Bau des 1. Beinpaares bei Weibchen, vor allem aber aus dem Aussehen des 1. Beinpaares und 2. Endopoditen beim Männchen geht hervor, dass diese Gattung entgegen der Ansicht GURNEYS (l. c.) nicht *Thalestridae* angehört.

Die Gattung *Transfuga* SCHMANKEWITSCH, von welcher MONARD (1927 p. 159) sagt, dass sie sich *Thalestris* anzuschliessen scheine, gehört, wie BORUTZKY (1927) gezeigt hat, nicht *Thalestridae* an.

Die Gattung *Tisemus* MONARD weicht durch die reduzierten Mundteile und das Aussehen des weiblichen Genitalfeldes (Fig. 20) so stark von den übrigen Vertretern der Familie ab, dass sie ihr nicht zugezählt werden kann. Es kann derzeit nicht entschieden werden, wo sie einzureihen ist, da das Männchen, das vielleicht bessere Merkmale abgeben wird, noch nicht bekannt ist.

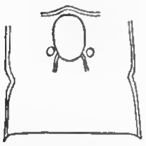

Fig. 20. *Tisemus pulchellus* MONARD. Genitalfeld ♀.

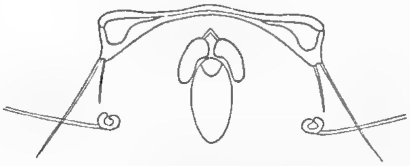

Fig. 21. *Pseudotachidius coronatus* T. SCOTT. Genitalfeld ♀.

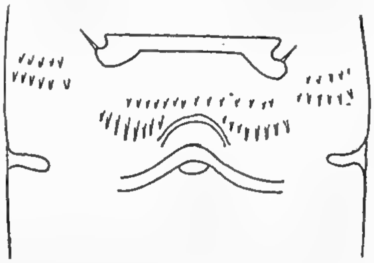

Fig. 22. *Tachidius discipes* GIESBRECHT. Genitalfeld ♀ (nach LANG 1935).

GURNEY (1932) spricht die Ansicht aus, dass *Tachidiidae,* falls *Robertsonia* ausgemerzt wird, eine natürliche Familie bildet. Betreffs *Robertsonia* bin ich mit GURNEY ganz einverstanden, weiter aber nicht. In diesem Zusammenhang interessiert uns nur die Gattung *Pseudotachidius* T. SCOTT. Diese Gattung gehört nicht *Tachidiidae,* sondern *Thalestridae* an. Ein Vergleich zwischen *Pseudotachidius* und *Idomene* zeigt sofort die enge Zusammengehörigkeit dieser beiden Gattungen. Sie stimmen im Bau der Antennen, der Mundteile und des 1. Beinpaares überein. Besonders bedeutungsvoll und von ausschlaggebender Bedeutung scheint mir aber die ganz ähnliche Entwicklung des 2. männlichen Beinpaares dieser beiden Gattungen zu sein. Leider sind die Männchen vieler Tachidiidengattungen noch nicht bekannt; wo sie bekannt sind, ist aber der 2. Endopodit entweder nicht — dann ist aber der Exopodit transformiert — oder etwa in derselben Weise wie bei *Harpacticus* transformiert (die Gattungen *Fultonia* T. SCOTT, *Argestes* SARS und *Argestigens* WILLEY zähle ich zu *Cletodidae*). Bei *Pseudotachidius* ist aber nicht nur der 2. sondern auch der 3. Endopodit anders als beim Weibchen gestaltet, eine Erscheinung, die wir wieder unter den Thalestriden finden und zwar bei *Rhynchothalestris rufocincta* (NORMAN). Das Aussehen des weiblichen Genitalfeldes geht aus Fig. 21 hervor. Von *Idomene intermedia* mihi besitze ich 3 Weibchen, die aber so mit Schmutz bedeckt sind, dass es mir nicht

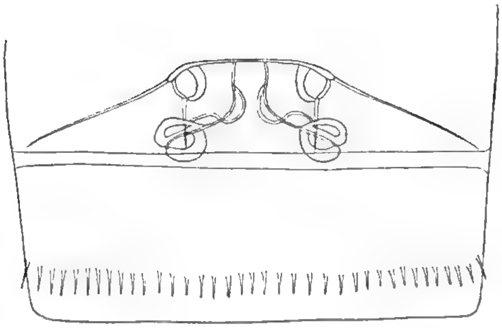

Fig. 23. *Danielssenia fusiformis* Brady. Genitalfeld ♀.

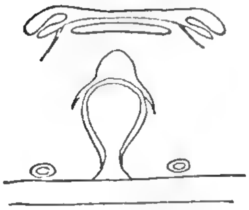

Fig. 24. *Dactypodella flava* (Claus). Genitalfeld ♀ (nach Lang 1934 b).

gelungen ist die Genitalstrukturen hinreichend exakt zu sehen, um sie abbilden zu können. Das Genitalfeld weicht jedoch bei *Pseudotachidius* ganz von dem bei *Tachidius* (Fig. 22) und *Danielssenia* (Fig. 23) ab, ist aber im Prinzip so wie bei *Dactylopodella* (Fig. 24) gebaut, die der Gattung *Idomene* sehr nahe steht. Wie aus den Abbildungen ersichtlich ist, kommen bei *Pseudotachidius* und *Dactylopodella* Receptacula seminis vor, was bei *Tachidius* und *Danielssenia* nicht der Fall ist. Diese anatomischen Verschiedenheiten besitzen meines Ermessens den grössten systematischen Wert.

Thalestridae umfasst demnach folgende Gattungen:

Idomene Philippi, 1843.

Syn.: *Dactylopus* Claus, 1863 (pro part.),
Xouthous Thomson, 1882,
Dactylop(h)usia Norman, 1903 (pro part.),
Idomenella T. Scott, 1906 (pro part.),
Megarthrum Norman et T. Scott, 1906.

Thalestris Claus, 1863.

Syn.: *Harpacticus* Milne Edwards, 1838 (pro part.),
Phyllothalestris Sars, 1905 (pro part.).

Amenophia Boeck, 1864.

Syn.: *Thalestris* Claus, 1863 (pro part.).

Parathalestris Brady et Robertson, 1873.

Syn.: *Harpacticus* Milne Edwards, 1838 (pro part.),
Thalestris Claus, 1863 (pro part.),
Dactylopus » » (» »),
Dactylopusia Norman, 1903 (pro part.),
Halithalestris Sars, 1905.

Diarthrodes Thomson, 1882.

Syn.: *Arpacticus* Baird, 1845 (pro part.),
Westwoodia Dana, 1855,
Pseudothalestris Brady, 1883,
Pseudowestwoodia T. Scott, 1894,
Parawestwoodia Sharpe, 1910.

Pseudotachidius T. Scott, 1898.

Dactylopusia Norman, 1903.

Syn.: *Nauplius* Philippi, 1840 (pro part.),
Dactylopus Claus, 1863 (pro part.).

Parastenhelia Thompson et A. Scott, 1903.

Syn.: *Thalestris* Claus, 1863 (pro part.),
Dactylopus » » (» »),
Microthalestris Sars, 1905.

Phyllothalestris Sars, 1905.

Syn.: *Thalestris* Claus, 1863 (pro part.),
Dactylopina Monard, 1928.

Dactylopodella Sars, 1905.

Syn.: *Dactylopus* Claus, 1863 (pro part.),
Idomenella T. Scott, 1906 (pro part.),
Vallentinia Norman et T. Scott, 1906.

Rhynchothalestris Sars, 1905.

Syn.: *Thalestris* Claus, 1863 (pro part.),
Amenophia Boeck, 1864 (pro part.).

Eudactylopus A. Scott, 1909.

Syn.: *Dactylopus* Claus, 1863 (pro part.),
Thalestris » » (» »),
Parathalestris Brady et Robertson, 1873 (pro part.),
Plesiothalestris Brian, 1927.

Dactylopodopsis Sars, 1911.

Peltthestris Monard, 1924.

Dactylopusioides Brian, 1928.

Genera incertae et incertae sedis.[1]
Flavia Brady, 1899,
Phroso Brady, 1899,
Metaphroso Brady, 1910,
Dactylopina Brady, 1910,
Tisemus Monard 1928.

* * *

Hauptsächlich auf Grunde des Baues des weiblichen Genitalfeldes und des männlichen Kopulationsbeinpaares teile ich die Familie in 4 Unterfamilien ein. Da die Männchen der

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[1] Fischer (1860) erwähnt 2. Harpacticus-Arten — *aquilinus* und *spinosus*. *Aquilinus* scheint Thalestridæ zu gehören, ist aber unmöglich zu identifizieren. *Spinosus* ist wie aus der Abbildung des 1. Beines (l. c. Taf. XXI, Fig. 51) und des 5. Beines (l. c., Taf. XXII, Fig. 66) hervorgeht eine *Parastenhelia-Art*, möglicherweise *P. forficula* (Claus) var. *littoralis* (Sars). Die Unsicherheit einer solchen Identifizierung ist aber so gross, dass es mir am besten scheint, diese Art bei der Seite zu lassen.

Gattungen *Dactylopodopsis*, *Peltthestris* und *Dactylopusioides* unbekannt sind, ist die Stellung dieser Gattungen hypothetisch, und zwar umso mehr, als es mir bei den betreffenden Gattungen nicht gelungen ist, den Bau des weiblichen Genitalfeldes in seinen Einzelheiten klarzulegen. Die Unterfamilien werden durch folgende Merkmale charakterisiert:

Pseudotachidiinae. 1. Exp. nicht oder wenig umgewandelt. A. 1. ♀ 5 bis 7-gliedrig, oft mit Fiederborsten versehen; A. 1. ♂ chirocer.[1] Exp. A. 2 2—3-gliedrig. Das weibliche Genitalfeld mit kleinen Vulvae und einfach gebauten Receptacula seminis[2] (Fig. 21, 24). 2. Exp. ♂ kopulatorisch umgewandelt, 2- oder 3-gliedrig ohne Bewehrung am äusseren Rande. Das Basalglied des 5. Beines trägt beim ♂ nur 2 Borsten (ausgenommen *Pseudotachidius*).

Pseudotachidius, Idomene, Dactylopodella, ? *Dactylopodopsis.*

Dactylopodiinae. 1. Exp. mehr oder weniger umgewandelt. A. 1. ♀ 5—9-gliedrig, ohne Fiederborsten; A. 1. ♂ haplocer. Exp. A. 2 in der Regel 3-gliedrig. Weibliches Genitalfeld im Prinzip in der in Fig. 25—28 veranschaulichten Weise gebaut mit grösseren

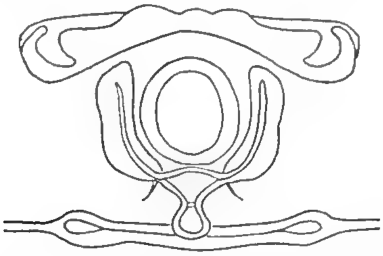
Fig. 25. *Dactylopusia brevicornis* (Claus). Genitalfeld ♀ (nach Lang 1934b).

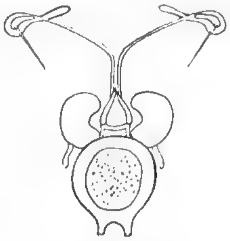
Fig. 26. *Dactylopusia vulgaris* Sars. Genitalfeld ♀.

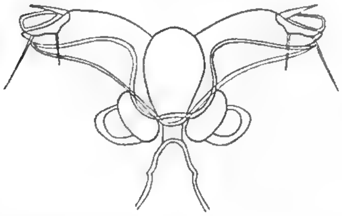
Fig. 27. *Dactylopusia tisboides* (Claus). Genitalfeld ♀.

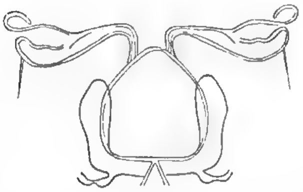
Fig. 28. *Dactylopusia latipes* Boeck. Genitalfeld ♀.

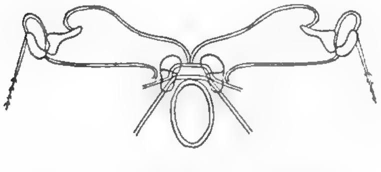
Fig. 29. *Parathalestris harpactoides* Claus Genitalfeld ♀.

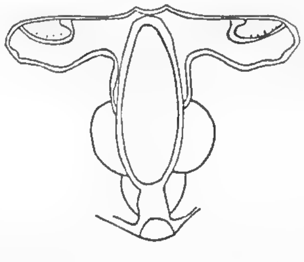
Fig. 30. *Parastenhelia forficula* (Claus) var. *littoralis* Sars. Genitalfeld ♀ (nach Lang 1934a).

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[1] Hinsichtlich der Bezeichnungen chirocer, haplocer und subchirocer vgl. Lang 1935.

[2] Hier wie in den folgenden Diagnosen werden diese Bezeichnungen in Übereinstimmung mit Brian (1921) angewandt.

Vulvae und kompliziert gebauten Receptacula seminis, von denen die lateralen nicht zweiteilig sind. Mittelglied Exp. P. 3—P. 4 mit 2 Borsten versehen. 2. Exp. ♂ kopulatorisch umgewandelt, 2-gliedrig, ohne deutliche Grenze zwischen den beiden verschmolzenen Gliedern; das Endglied trägt 3 Borsten am inneren Rande, am äusseren Rande entweder eine kräftige dornartige Borste oder eine kräftige Behaarung. Das Basalglied des 5. Beines trägt beim ♂ 3 Borsten.

Dactylopusia, Dactylopusioides, Eudactylopus, Diarthrodes, ? Peltthestris.

Thalestrinae. 1. Exp. stark umgewandelt. A. 1 ♀ 9-gliedrig, ohne Fiederborsten. A. 1 ♂ haplocer. Exp. A. 2 in der Regel 3-gliedrig. Weibliches Genitalfeld (im Prinzip in der in Fig. 18, 19, 29 veranschaulichten Weise gebaut) mit grösseren Vulvae und kompliziert gebauten Receptacula seminis, von denen die lateralen quergespalten sind. Mittleres Glied Enp. P. 3—P. 4 mit 1 Borste. 2. Enp. beim ♂ kopulatorisch umgewandelt, 2-gliedrig mit deutlicher Grenze zwischen den beiden verschmolzenen Gliedern; das Endglied trägt 4 Borsten am inneren Rande, am äusseren Rande 2 kräftige, dornatige Borsten (ausgenommen *Rhynchothalestris*). Das Basalglied des 5. Beines trägt beim ♂ 3 Borsten (ausgenommen *Rhynchothalestris helgolandica* (CLAUS)).

Rhynchothalestris, Parathalestris, Thalestris, Phyllothalestris, Amenophia.

Parastenheliinae. 1. Exp. bei verschiedenen Arten verschieden umgewandelt. A. 1 ♀ 8—9-gliedrig ohne Fiederborsten; A. 1 ♂ haplocer. Exp. A. 2 2—3-gliedrig. Weibliches Genitalfeld mit grossen Vulvae und kompliziert gebauten Receptacula siminis (Fig. 30.). Mittelglied Enp. P. 2—P. 4 mit 1 Borste. 3. Enp. beim ♂ kopulatorisch umgewandelt. Das Basalglied des 5. Beines trägt beim ♂ 2 Borsten.

Parastenhelia.

Parastenheliinae nimmt eine Sonderstellung ein, und es wäre vielleicht am besten, sie eine besondere Familie bilden zu lassen. Ob sie möglicherweise *Canthocamptidae* gehört, kann ich noch nicht entscheiden, da ich diese Familie nicht genügend kenne.

Da eine genaue Besichtigung des Genitalfeldes meist auf grosse Schwierigkeiten stösst, habe ich zwecks Erleichterung der Bestimmung der hierher gehörigen Gattungen sämtliche in eine einzige Bestimmungstabelle eingereiht, ohne dabei die oben erwähnte Einteilung in verschiedene Unterfamilien zu berücksichtigen.

Bestimmungstabelle.

1.	Exp. P. 1 3-gliedrig	2.
	» » 1—2- »	*Diarthrodes* THOMSON.
2.	Enp. P. 1 2- oder 3-gliedrig; wenigstens mittleres Glied Enp. P. 2 mit 2 Borsten	3.
	Enp. P. 1 2-gliedrig; mittleres Glied Enp. P. 2—P. 4 mit 1 Borste	*Parastenhelia* THOMPSON et A. SCOTT.
3.	Mittleres Glied Enp. P. 3 mit 1 Borste	4.
	Mittleres Glied Enp. P. 3 mit 2 Borsten	10.
4.	A. 1 6—7-gliedrig	5.
	» 8—9- »	7.
5.	Exp. A. 2 2—3-gliedrig, klein	6.
	» A. 2 3-gliedrig, gross	*Pseudotachidius* T. SCOTT.

6\. Rostrum fehlt oder wenn vorhanden A. 1 in seiner ganzen Länge mit Fiederborsten . . . . *Idomene* Philippi.
Rostrum vorhanden; A. 1. nicht oder nur an der Basis mit Fiederborsten . . *Dactylopodella* Sars.
7\. Körper normal, nicht dorso-ventral abgeplattet . . . . 8.
» breit, dorso-ventral stark » . . . . . *Amenophia* Boeck.
8\. Rostrum abgesetzt; Körper langgestreckt . . . . 9.
» nicht abgesetzt; Körper wenig langgestreckt . . . . *Thalestris* Claus.
9\. Rostrum hervorstehend, beweglich . . . *Parathalestris* Brady et Robertson.
» ventralwärts gerichtet, unbeweglich . . . . . *Phyllothalestris* Sars.
10\. Exp. A. 2 2—3-gliedrig mit mehr als 3 Borsten; Endgl. Exp. P. 2—P. 4 mit 3 äusseren Randdornen . . . . 11.
Exp. A. 2 1-gliedrig mit nur 3 Borsten; Endgl. Exp. P. 2—P. 4 mit 2 äusseren Randdornen . . . . *Dactylopusioides* Brian.
11\. 1. Antennenglied nicht oder wenig länger als 2. Glied . . . . 12.
» » mehr als 2-mal so lang wie 2. Glied . *Peltthestris* Monard.
12\. P. 5 normal . . . . 13.
P. 5 gross, blattförmig, mit sehr kurzen Borsten . . . *Eudactylopus* A. Scott.
13\. Rostrum sehr gross . . . . 14.
» normal . . . . *Dactylopusia* Norman.
14\. A. 1 5-gliedrig, mittleres Glied Exp. P. 1 lang . . . . *Dactylopodopsis* Sars.
A. 1 9- » mittleres Glied Exp. P. 1 kurz . . *Rhynchothalestris* Sars.

Pseudotachidiinae n. subfam.

Diagnose siehe p. 22.

Pseudotachidius T. Scott.

Bezüglich der Gattungsdiagnose verweise ich auf T. Scott 1898 (16th Ann. Rep. Fish. Board Scotland, Part III, p. 267).

Bemerkungen zu den Arten. Brady (1910, p. 512) führt eine *Pseudotachidius minimus* an. Hinsichtlich der Gattungszugehörigkeit ist Brady jedoch unsicher, denn er gibt die Gattung mit Fragezeichen an. Die Borstenbewehrung des 1. Beinpaares, das Aussehen der 1. Antennen und des 5. Beinpaares stimmen nicht mit den Verhältnissen bei *Pseudotachidius* überein. Nach Brady (l. c.) tragen die beiden Glieder des 5. Beinpaares je 1 lange Borste. Die Abbildung dieses Beinpaares (l. c. p. 511, Textfig. VI: 6) zeigt aber, dass das Endglied wenigstens 2, das Basalglied 3 lange Borsten trägt. Wo die Art einzureihen ist, lässt sich nicht entscheiden, da die Diagnose sehr kurz und mangelhaft ist.

Die Gattung umfasst demnach nur 2 Arten:

Pseudotachidius coronatus T. Scott.

1898\. *Pseudotachidius coronatus*, T. Scott, 16th Ann. Rep. Fish. Board Scotland, Part III, p. 267, Taf. XIII, Fig. 22—26, Taf. XIV, Fig. 1—4.
Verbreitung: Norwegen, Schottland.

Pseudotachidius similis T. Scott.

1902. Pseudotachidius similis, T. Scott, Journ. Linn. Soc. Zool. Vol. XXIX, p. 3, Taf. 1, Fig. 1—8.
Verbreitung: Färöer Kanal.

Species incerta sedis.

Pseudotachidius(?)minimus, Brady.

1910. *Pseudotachidius(?)minimus*, Brady, Deutsche Südpol.-Exped. 1901—1903. XI. Zool. III, p. 512, Textfig. VI: 1—6.

Bestimmungstabelle.

1. Enp. P. 1 beinahe 2-mal so lang wie Exp. . . . . . *P. coronatus* T. Scott.
» » nicht länger als Exp. . . . . *P. similis* T. Scott.

Idomene Philippi.

Diagnose: Körper breit, etwas flachgedrückt. 1. Antenne 6—7-gliedrig mit befiederten oder unbefiederten Borsten besetzt. 2. Antenne mit 2—3-gliedringem Exopoditen. Mandibularpalpus gutentwickelt, 2-ästig. Maxillen und Maxillipeden normal gebaut. 1. Beinpaar mit 3-gliedrigen Exo- und 2—3-gliedrigen Endopoditen. 1. Endopoditenglied proximal etwas verbreitert. Schwimmfüsse 3-gliedrig. 2. Endopodit beim Männchen schwach transformiert, 3-gliedrig. 5. Beinpaar mit abgesetzten oder verschmolzenen Gliedern.

Bemerkungen zu den Arten. Wie ich bereits hervorgehoben habe, umfasst diese Gattung auch die Gattungen *Xouthous* Philippi, *Idomenella* T. Scott und *Megarthrum* Norman et T. Scott.

Dactylopus antarcticus Giesbrecht (Giesbrecht 1902 p. 34, Taf. 10. Fig. 1—13) gehört der Gattung *Idomene* an. Man ersieht dies aus dem Bau des 5. Beines bei Weibchen und Männchen (l. c. Fig. 9 und 12) und aus dem Aussehen des 2. Endopoditen beim Männchen (l. c. Fig. 7). Zu dieser Gattung muss auch *Dactylopusia ferrieri* T. Scott gerechnet werden (T. Scott 1912, p. 557, Taf. XII, Fig. 14—22). Scott vergleicht selbst seine Art mit *D. antarcticus.* Ihre Zugehörigkeit zu *Idomene* ergibt sich aus dem Aussehen des 5. Beines (l. c. Fig. 22) und aus der Bewehrung des 4. Endopoditen (l. c. Fig. 21). Dieser trägt nämlich nur 1 innere Borste am mittleren Gliede. Auch *Dactylopus pectinatus* T. et A. Scott (T. et A. Scott 1898, p. 187, Taf. X. Fig. 9—16) gehört zu dieser Gattung, was auch aus den für *ferrieri* angegebenen Merkmalen (l. c. Fig. 15 und 16) hervorgeht.

Bradys Beschreibung von *I. pusilla* (Brady 1910 p. 542, Textfig. XXXIII und Taf. LIV, Fig. 8) und *Megarthrum simulans* (l. c. p. 544 Textfig. XXXV Taf. LIV, Fig. 9—10) ist äusserst mangelhaft. Er hat von beiden Arten nur das 2. Beinpaar gezeichnet und nicht, wie in den betreffenden Figurenerläuterungen angegeben, das 3. Beinpaar. Dass bei der letzterwähnten Art der Exopodit der 2. Antenne fehlt, und dass das 5. Beinpaar nur aus einem Glied besteht, liegt sicher, wie Brady selbst sagt (l. c. p. 545), daran, dass »die fehlenden Teile bei der Zergliederung verloren gegangen sein können«.

Die Gattung umfasst demnach folgende Arten:

Idomene forficata Philippi.

1843. *Idomene forficata*, Philippi, Arch. f. Naturg. p. 65, Pl. III, Fig. 4.
1880. *Dactylopus flavus* (Männchen), Brady, Monogr. British Copepoda, Vol. II, p. 116, Taf. LVI, Fig. 3, 6, 9, 11.
Verbreitung: Norwegen, Britische Inseln, Mittelmeer, Süd-Orkneys.

Idomene novae-zealandiae (Thomson).

1882. *Xouthous novae-zealandiae*, Thomson, Trans. New Zealand. Inst. Vol. 15, p. 103, Taf. X, Fig. 8—15.

Verbreitung: Neu-Seeland.

Idomene coronata (T. Scott).

1894. *Dactylopus coronatus*, T. Scott, 12th Ann. Rep. Fish. Board Scotland, Part III, p. 255, Taf. IX, Fig. 12—20.

1906. *Idomenella coronata*, T. Scott, Proc. Roy, Phys. Soc. No. 7. Vol. XVI, p. 320.

1909. *Idomene coronata*, Sars, 2nd Norweg. Arct. Exped. »Fram« 1898—1902, Nr. 18, p. 26, Taf. VI.

1911. *Idomenella coronata*, Sars, Crust. of Norway. Vol. V, p. 375, Suppl. Pl. 14.

1934. *Idomene coronata*, Lang, Lunds Univ. Årsskr. N. F. Avd. 2, Bd. 30, p. 28.

Verbreitung: Nördlich von Grinnell Land, Norwegen, Schottland.

Idomene pectinata (T. et A. Scott).

1898. *Dactylopus pectinatus*, T. et A. Scott, Ann. Mag. Nat. Hist. Ser. 7, Vol. 1, p. 187, Taf. X. Fig. 9—16.

Verbreitung: Clyde.

Idomene antarctica (Giesbrecht).

1902. *Dactylopus antarcticus*, Giesbrecht, Expéd. Antarc. Belge 1897—1899, Copepoda, p. 34, Taf. 10, Fig. 1—13.

Verbreitung: 69° 59′ S., 82° 39′ W.; 70° 33′ S., 89° 22′ W.; 70° 41′ S., 90° 14′ W.; 70° 44′ S., 90° 58′ W.; 70° 49′ S., 89° 19′ W.; 71° 02′ S., 92° 03′ W.; 71° 24′ S., 89° 12′ W.

Idomene laticaudata (Thompson et A. Scott).

1903. *Dactylophusia laticaudata*, Thompson et A. Scott, Ceylon Pearl Oyster Fisheries, Part I, Roy. Soc., p. 271, Taf. XI, Fig. 1—8.

1906. *Megarthrum laticaudatum*, Norman et T. Scott, Crust. of Devon and Cornwall, p. 176.

1909. *Idomene laticaudata*, A. Scott, Siboga Exp. Copepoda, p. 216.

Verbreitung: Ceylon, Aru-Inseln.

Idomene aemula (Thompson et A. Scott).

1903. *Dactylophusia aemula*, Thompson et A. Scott, Ceylon Pearl Oyster Fisheries, Part I, Roy. Soc. p. 271, Taf. XI, Fig. 9—12.

1906. *Megarthrum aemulum*, Norman et T. Scott, Crust. of Devon and Cornwall, p. 176.

Verbreitung: Ceylon.

Idomene purpurocincta (Norman et T. Scott).

1905. *Dactylopusia purpurocincta*, Norman et T. Scott, Ann. Mag. Nat. Hist. Ser. 7, Vol. XV, p. 295.

1906. *Megarthrum purpurocinctum*, Norman et T. Scott, Crust. of Devon and Cornwall, p. 175, Taf. X, Fig. 17; XII, Fig. 10; XIII, Fig. 10; XIV, Fig. 9; XVIII, Fig. 6; XIX, Fig. 1; XX, Fig. 4—5.

Verbreitung: Devon.

Idomene pusilla Brady.

1910. *Idomene pusilla*, Brady, Deutsche Südpol.-Exped. 1901—1903. XI. Zool. III, p. 542, Textfig. XXXIII: 1—8; Taf. LIV, Fig. 8.

Verbreitung: Gauss-Station.

Idomene australis Brady.

1910. *Idomene australis*, Brady, Deutsche Südpol.-Exped. 1901—1903, XI. Zool. III, p. 543, Textfig. XXXIV: 1—6.

Verbreitung: Kerguelen.

Idomene simulans (Brady).

1910. *Megarthrum simulans*, Brady, Deutsche Südpol.-Exped. 1901—1903. XI. Zool. III, p. 544, Textfig. XXXV: 1—9, Taf. LIV, Fig. 9—10.

Verbreitung: Simonsbai.

Idomene borealis Sars.

1911. *Idomene borealis*, Sars, Crust. of Norway, Vol. V, p. 347, Suppl. Taf. 13, Fig. 2.

Verbreitung: Lofoten.

Idomene ferrieri (T. Scott).

1912. *Dactylopusia ferrieri*, T. Scott, Trans. Edinburgh Roy. Soc. XLVIII (1913), p. 557, Taf. XII, Fig. 14—22.

Verbreitung: Süd-Orkneys.

Idomene intermedia Lang.

1934. *Idomene intermedia*, Lang, Lunds Univ. Årsskr. N. F. Avd. 2. Bd 30, p. 28, Fig. 57—62.

Verbreitung: Campbell-Insel.

Bestimmungstabelle.

A. Weibchen.

1\. Die 3 freien Thoracalsegmente anal-lateral ohne Dornen . . . . 2.
» » » » » mit 3 Dornen . *I. simulans* (Brady).
2\. Die beiden Glieder P. 5 nicht verschmolzen . . . . 3.
» » » » verschmolzen . . . . *I. coronata* (T. Scott).
3\. Basalglied P. 5 mit 5 Borsten . . . . 4.
» » » 6 » . . . . *I. borealis* Sars.
4\. Endglied P. 5 mit 4 Borsten . . . . *I. antarctica* (Giesbrecht).
» » » 5 » . . . . 5.
» » » 6 » . . . . *I. pectinata* (T. et A. Scott).
5\. Basalglied P. 5 erreicht nur die Mitte des Endgliedes . . . . 6.
» » » wenigstens die Spitze des Endgliedes . . . . 9.
6\. 1. Glied Enp. P. 1 nur 2-mal so lang wie breit . . . . 7.
» » » » » 3- » » » » » . . . . . *I. ferrieri* (T. Scott).
7\. Enp. P. 1 2-gliedrig . . . . 8.
» » deutlich 3-gliedrig . . . . *I. forficata* Philippi.
8\. Enp. P. 1 terminal mit 2 gleichlangen Klauen . *I. novae-zealandiae* (Thomson).
Enp. P. 1 terminal mit 2 ungleichlangen Klauen . . . .
I. purpurocincta (Norman et T. Scott).
9\. A. 1 6-gliedrig . . . . 10.
» 7- » . . . . 11.
10\. P. 5 mit langen Borsten . . . . *I. intermedia* Lang.
» » kurzen, dornenförmigen Borsten . *I. laticaudata* (Thompson et A. Scott).
11\. P. 5 mit langen Borsten an beiden Gliedern . . . . *I. pusilla* Brady.
» » breiten kurzen Dornen am Basalglied und etwas feineren Dornen am Endglied . . . . *I. aemula* (Thompson et A. Scott).

B. Männchen.

1\. Enp. P. 1 deutlich 3-gliedrig . . . . 2.
» » nur 2-gliedrig . . . . *I. novae-zealandiae* (Thomson).
2\. Exp. P. 1 etwa so lang wie Enp. . . . . 3.
» » erreicht nicht das 2. Glied des Enp. . . . . . *I. forficata* Philippi.
3\. 1. Glied Enp. P. 1 weniger als 2-mal so lang wie breit . . . *I. australis* Brady.
» » » » mehr als 2-mal so lang wie breit . *I. antarctica* (Giesbrecht).

Dactylopodella Sars.

Diagnose: Körper mehr oder weniger birnenförmig. 1. Antenne 6—7-gliedrig. 2. Antenne mit 2-gliedrigem Exopodit. Mundteile normal. 1. Beinpaar mit 3-gliedrigen Exo- und 2-gliedrigen Endopoditen. 1. Endopoditenglied nicht verbreitert. 2. Endopodit beim Weibchen 2- oder 3-gliedrig, beim Männchen transformiert, 2-3-gliedrig, terminal mit 1 groben Dorn. Schwimmfüsse sonst 3-gliedrig. 5. Beinpaar ziemlich klein mit gut abgegrenzten Gliedern.

Bemerkungen zu den Arten. Dactylopus rostratus T. SCOTT (T. SCOTT 1893, p. 205, Taf. III Fig. 7—20) muss meiner Meinung nach zu *Dactylopodella* gezählt werden. Bei *Dactylopodella* trägt das Basalglied des 5. Beines beim Männchen nur 2 Borsten, während die *Dactylopusia*-Arten 3 Borsten an diesem Gliede besitzen. *D. rostratus* hat nur 2 Borsten. Bei *Dactylopodella* fehlt beim Männchen die Bewehrung am äusseren Rande des letzten Gliedes des 2. Endopoditen, terminal trägt es eine grobe Borste oder richtiger vielleicht einen Dorn. Das gleiche Aussehen hat der Endopodit bei *rostratus*, wodurch er stark von allen übrigen *Dactylopusia*-Arten abweicht. Bei den sonst bekannten *Dactylopodella*-Männchen ist indessen dieser Endopodit nur 2-gliedrig, während er bei *rostrata* 3-gliedrig ist. Ich habe bereits hervorgehoben, dass *Vallentinia ornata* NORMAN et T. SCOTT *Dactylopodella* angehört, weshalb also die Gattung folgende Arten umfasst:

Dactylopodella flava (CLAUS).

1866. *Dactylopus flavus*, CLAUS, Gesellsch. Ges. Naturw. Marburg. Suppl. Bd. 9, p. 28, Taf. III, Fig. 13—16.
1880. *Dactylopus flavus* (Weibchen), BRADY, Monogr. British Copepoda, Vol. II, p. 116, Taf. LVI, Fig. 1—2, 4—5, 7—8, 10.
1905. *Dactylopodella flava*, SARS, Crustacea of Norway, Vol. V, p. 132, Taf. LXXXI.
Verbreitung: Norwegen, Britische Inseln, Mittelmeer.

Dactylopodella rostrata (T. SCOTT).

1893. *Dactylopus rostratus*, T. SCOTT, 11th Ann. Rep. Fish. Board Scotland, Part III, p. 205, Taf. III, Fig. 7—20.
1906. *Idomenella rostrata*, T. SCOTT, Proc. Roy. Phys. Soc. Edinburgh, Vol. XVI, No. 7, p. 320.
Verbreitung: Schottland.

Dactylopodella ornata (NORMAN et T. SCOTT).

1905. *Dactylopusia ornata*, NORMAN et T. SCOTT, Ann. Mag. Nat. Hist. Ser. 7, Vol. XV, p. 294.
1906. *Vallentinia ornata*, NORMAN et T. SCOTT, Crustacea of Devon and Cornwall, p. 173, Taf. XIII, Fig. 11; XIV, Fig. 10; XVI, Fig. 8—10; XVIII, Fig. 7; XIX, Fig. 2; XXI, Fig. 4—5.
Verbreitung: Britische Inseln.

Dactylopodella clypeata SARS.

1911. *Dactylopodella clypeata*, SARS, Crustacea of Norway, Vol. V, p. 373, Suppl. Pl. 13, Fig. 1.
Verbreitung: Norwegen.

Bestimmungstabelle.

A. Weibchen.

1. Enp. P. 2 2-gliedrig . . . . 2.
» » 3- » . . . . 3.
2. Abdomen etwa $^1/_2$ so lang wie der Vorderkörper . . . . *D. flava* (CLAUS).
» » $^1/_3$ » » » » » . . . . *D. clypeata* SARS.
3. A. 1 6-gliedrig; Basalglied P. 5 mit 5 Borsten . *D. ornata* (NORMAN et T. SCOTT).
» 7-gliedrig; » » » 4 » . . . . . *D. rostrata* (T. SCOTT).

B. Männchen.

1. Enp. P. 2 2-gliedrig . . . . 2.
» » 3-gliedrig . . . . *D. rostrata* (T. SCOTT).
2. Enp. P. 1 terminal mit 2 langen Klauen . . . . *D. flava* (CLAUS).
» » » » 1 langen Klaue und 1 feineren Borste . . . .
D. ornata (NORMAN et T. SCOTT).

Dactylopodopsis Sars.

Hinsichtlich der Gattungsdiagnose verweise ich auf Sars 1911 (Crust. of Norway, Vol. V, p. 371).

Diese Gattung zählt nur eine Art:

Dactylopodopsis dilatata Sars.

1911. *Dactylopodopsis dilatata*, Sars, Crust. of Norway, Vol. V, p. 372, Suppl. Taf. 12.
Verbreitung: Norwegen.

Dactylopodiinae n. subfam.

Diagnose siehe p. 22.

Dactylopusia Norman.

Bezüglich der Gattungsdiagnose verweise ich auf Sars 1911 (Crust. of Norway, Vol. V. p. 125).

Bemerkungen zu den Arten: Zahlreiche Arten, die früher zu dieser Gattung gezählt wurden, sind zu anderen Gattungen überführt worden. Dies gilt von folgenden Arten:

I. Zur Gattung *Amphiascus:*

Dactylopus abyssi Boeck, 1872,
» *brevifurcus* Czerniavski, 1868,
» *brucei* T. Scott, 1901.
Dactylophusia ceylonica Thompson et A. Scott, 1903,
Dactylopus cinctus Claus, 1866,
» *crassus* Giesbrecht, 1902,
» *debilis* Giesbrecht, 1882,
Dactylophusia dentata Thompson et A. Scott, 1903,
» *hamiltoni* » » » , » ,
Dactylopus Hanseni Brady, 1899,
Dactylophusia havelocki Thompson et A. Scott, 1903,
» *hirsuta* » » » , » ,
Dactylopus jugurtha Blanchard et Richard, 1891,
» *littoralis* T. Scott, 1902,
» *longirostris* Claus, 1863,
» » var. *finmarchicus* T. Scott, 1903[1]
» *maldivensis* Wolfenden, 1905,
» *minutus* Claus, 1863,
» *mixtus* T. Scott, 1902,
» *nasutus* Boeck (Sars 1911),
» *propinquus* T. Scott, 1894,
» *robinsoni* A. Scott, 1902,

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[1] Monard (1928) gibt in seiner Tabelle über *Amphiascus* an, dass *Dactylopus longirostris* var. *arctica* Scott mit *A. longirostris* (Claus) identisch ist. Diese Angabe hat Monard wohl von Sars (1911 p. 159) übernommen. Hier liegt jedoch wahrscheinlich eine Verwechslung vor. Scott hat nicht — so weit ich finden konnte — diese Varietät aufgestellt, sondern eine *D. Strömii* var. *arcticus* (T. Scott 1898 p. 106). Diese Verwechslung ist vermutlich dadurch entstanden, dass T. Scott (1903 p. 21) eine *D. longirostris* var. *finmarchicus* aufstellt. Beide genannten Varietäten gehören zu *Amphiascus*.

Dactylophusia robusta THOMPSON et A. SCOTT, 1903,
Dactylopus similis CLAUS, 1866,
» *Strömii* var. *arcticus* T. SCOTT, 1898,
» » » *faröensis* T. SCOTT, 1902,
» *tenuiremis* BRADY, 1880,
» *vararensis* T. SCOTT, 1903.

II. Zur Gattung *Diosaccus:*
Dactylopus tenuicornis CLAUS, 1863.

III. Zur Gattung *Idomene:*
Dactylophusia aemula THOMPSON et A. SCOTT, 1903,
» *laticaudata* THOMPSON et A. SCOTT, 1903,
Dactylopusia purpurocincta NORMAN et T. SCOTT, 1905.

IV. Zur Gattung *Dactylopodella:*
Dactylopusia ornata NORMAN et T. SCOTT, 1905.

V. Zur Gattung *Eudactylopus:*
Dactylopus latipes T. SCOTT, 1893.

VI. Zur Gattung *Mesochra:*
Dactylopus pygmaeus CLAUS, 1863.

VII. Zur Gattung *Nitocra:*
Dactylopus inuber SCHMANKEWITSCH, 1875.

Wahrscheinlich ist *Dactylopusia platysoma* THOMPSON et A. SCOTT (1903 p. 272, Taf. XI, Fig. 13—18) trotz des Aussehens des 1. Beinpaares keine *Thalestridae*. Nach Körperform, Aussehen der Schwimmbeine und Lage der Eier gehört sie *Peltidiidae* an, kann aber dort in keine der beschriebenen Gattungen eingereiht werden.

Dactylopusia perplexa T. SCOTT (1912 p. 558, Taf. II, Fig. 26—30, Taf. VI, Fig. 1—2) unterscheidet sich wenig von *Dactylopus platycheles* BRADY (1903 p. 61, Taf. III, Fig. 1—10). Von den übrigen *D.*-Arten unterscheidet sie sich dadurch, dass der 1. Exopodit ebenso lang ist wie der Endopodit, was auf *Thalestris* und *Parathalestris* hindeutet. Nach SCOTT (l. c. Taf. VI, Fig. 2) trägt das mittlere Glied des 4. Endopoditen bei *perplexa* nur eine innere Borste, was gleichfalls darauf hinweist, dass man es hier mit einer *Thalestris*- oder *Parathalestris*-Art zu tun hat. Nach BRADY (l. c. Fig. 8) hat *platycheles* nur 1 innere Borste am mittleren Glied des 2. Endopoditen. Mit grösster Wahrscheinlichkeit kommen hier jedoch 2 Borsten vor. Die beiden Arten müssen zufolge des allgemeinen Aussehens ihrer Körperform zu *Parathalestris* gezählt werden.

Im Jahre 1905 beschreiben NORMAN et T. SCOTT (p. 293) eine *Dactylopusia valida*. In demselben Jahr beschreibt SARS eine *Dactylopusia micronyx*. Diese beiden Arten sind identisch. Da NORMAN et T. SCOTT vor 1906 keine Figuren mitteilten, halte ich es für das richtigste den Namen beizubehalten, den SARS der Art gegeben hat. Dass es sich hier um dieselbe Art handelt, geht unmittelbar aus dem charakteristischen Aussehen des 1. Exopoditen hervor, (vgl. NORMAN et T. SCOTT 1906, Taf. XX, Fig. 6 und SARS Taf. LXXIX), dem die Art ihren Namen verdankt. Nach NORMAN et T. SCOTT ist die 1. Antenne 8-gliedrig (l. c. p. 293), während sie nach SARS (SARS 1911 p. 129) 9-gliedrig ist. SARS fügt indessen (l. c.) hinzu »penultimate and antepenultimate joints less distinctly defined«.

Dactylopus bahamensis, EDWARDS (1891 p. 77, Taf. III, Fig. 1—15) ist unmöglich zu identifizieren. Aus EDWARDS' Abbildungen geht jedoch hervor, dass es sich um zwei Arten handelt und nicht, wie er selbst angibt, um ein Männchen und ein Weibchen der gleichen Art. Dass das als Männchen beschriebene Individium ein Weibchen ist, geht zum Teil daraus hervor, dass die 1. Antenne (l. c. Fig. 1) nicht umgewandelt ist, und teils daraus, dass das Basalglied des 5. Beines (l. c. Fig. 11) 5 Borsten trägt. Da bei mehreren Figuren nicht angegeben wird, ob sie sich auf das »Weibchen« oder das »Männchen« beziehen, und da dies auch nicht aus dem Text ersehen werden kann, ist jegliche Identifizierung ausgeschlossen.

Dactylopus longipes BOECK (1872 p. 56) ist mit *Parastenhelia forficula* (CLAUS) identisch. Die Artbeschreibung ist nur in norwegischer Sprache abgefasst. BOECK hebt u. a. folgende Merkmale hervor. 1. Antenne 9-gliedrig. 1. Exopodit lang und schlank, kürzer als das 1. Glied des Endopoditen. 1. Endopodit 2-gliedrig mit sehr langem 1. Glied, das im oberen Viertel 1 Borste trägt. Endglied des 5. Beines mit 8 Borsten. Hieraus ergibt sich deutlich die Identität dieser Art mit *P. forficula*.

BRADY (1910 p. 547, Textfig. XXXVII: 1—8) stellt eine *Amphiascus mucronatus* auf, die nach MONARD (1928 p. 385) *Dactylopusia* angehört, was indessen nicht der Fall zu sein scheint. Nach allem zu urteilen handelt es sich hier um eine *Ameiridae*. Hierfür spricht die 8-gliedrige 1. Antenne, der 2-gliedrige Exopodit der 2. Antenne, der nicht modifizierte 1. Exopodit und das langgestreckte Endglied des 5. Beines.

Dactylopus macrolabris CLAUS gehört *Dactylopusioides* an (siehe unten). Zur Gattung *Dactylopusia* gehören demnach folgende Arten:

Dactylopusia tisboides CLAUS.

1863. *Dactylopus tisboides*, CLAUS, Die freilebenden Copepoden, p. 127, Taf. XVI, Fig. 24—28.
Verbreitung: Bäreninsel, Franz-Josephsland, Grönland, Norwegen, Kieler Bucht, Britische Inseln, Frankreich, Mittelmeer, Adriatisches Meer, Rotes Meer, Madeira, Neu-Seeland, Kerguelen, Chappaquiddick Inseln, Woods Hole, Marthas Vineyard.

Dactylopusia porrecta CLAUS.

1863. *Dactylopus porrectus*, Die freilebenden Copepoden, p. 126, Taf. XVI, Fig. 16.
Verbreitung: Helgoland, Adriatisches Meer.

Dactylopusia nicaeensis CLAUS.

1863. *Dactylopus nicaeensis*, CLAUS, Die freilebenden Copepoden, p. 126, Taf. XVII, Fig. 1—2.
Verbreitung: Nizza.

Dactylopusia latipes BOECK.

1864. *Dactylopus latipes*, BOECK, Christ. Vid.-Selsk. Forh. p. 270.
1906. *Dactylopus brevicornis*, T. SCOTT, 24th Ann. Rep. Fish. Board Scotland, p. 276, Taf. XIV, Fig. 10—18.
Verbreitung: Norwegen, Helgoland, Schottland.

Dactylopusia brevicornis CLAUS.

1866. *Dactylopus brevicornis*, CLAUS, Gesellsch. Ges. Naturw. Marburg, Suppl. Bd. 9, p. 29, Taf. III, Fig. 20—25.
Verbreitung: Grinnel Land, Norwegen, Britische Inseln, Mittelmeer, Woods Hole, Chappaquiddick Insel, Marthas Vineyard.

Dactylopusia neglecta SARS.

1880. *Dactylopus tisboides* (»brakish water variety«), BRADY, Monogr. Brit. Cop. Vol. II, p. 108, Taf. LIV, Fig. 14—16.
1905. *Dactylopusia neglecta*, SARS, Crust. of Norway. Vol. V. p. 127, Taf. LXXVIII, Fig. 2.
Verbreitung: Norwegen, Britische Inseln, Frankreich (Roscoff).

Dactylopusia micronyx SARS.

1905. *Dactylopusia micronyx*, SARS, Crust. of Norway. Vol. V. p. 129, Taf. LXXIX, Fig. 2.
1905. » *valida*, NORMAN et T. SCOTT, Ann. Mag. Nat. Hist. Ser. 7. Vol. 15, p. 293.
Verbreitung: Norwegen, Kieler Bucht, Britische Inseln.

Dactylopusia vulgaris SARS.

1882. *Dactylopus tisboides*, GIESBRECHT, 4. Ber. Commis. Unters. deutsch. Meere, Jahrg. 7—11, p. 125, Taf. I, Fig. 10, 21; IV, Fig. 13—14, 23; V, Fig. 9; VI, Fig. 7; VII, Fig. 12; VIII, Fig. 5; IX, Fig. 12; X, Fig. 14, 28; XI, Fig. 19—20, 30—31; XII, Fig. 12, 24, 26—27.
1905. *Dactylopusia vulgaris*, SARS, Crust. of Norway, Vol. V. p. 128, Taf. LXXIX, Fig. 1.
Verbreitung: Grinnel Land, Norwegen, Bohuslän, Kieler Bucht, Helgoland, Frankreich, Mittelmeer, Rhode Island, Woods Hole, Hudsonsbai.

Bemerkung. Viele Verfasser geben an, dass diese Art bei den Britischen Inseln gefunden worden ist, eine Angabe, die von BRADY stammen soll. BRADY (1880 p. 111, Taf. LV, Fig. 1—13) nimmt aber *D. Strömii* BAIRD auf. Aus BRADYS Abbildungen geht hervor, dass es sich hier um *Amphiascus thalestroides* SARS handelt.

Dactylopusia glacialis SARS.

1909. *Dactylopusia glacialis*, SARS, Rep. 2nd Norweg. Arct. Exped. Nr. 18, p. 25, Taf. V.
Verbreitung: Arktisches Meer (»the exact locality not indicated«).

Dactylopusia crassicornis BRADY.

1910. *Dactylopusia crassicornis*, BRADY, Deutsche Südpol.-Exped. 1901—1903. Vol. XI, Zool. III, p. 537, Textfig. XXIX: 1—7.
Verbreitung: Kerguelen.

Bemerkung. BRADY bildet auch das 1. Bein einer Varietät dieser Art ab.

Dactylopusia simillima BRADY.

1910. *Dactylopusia simillima*, BRADY, Deutsche Südpol.-Exped. 1901—1903. Vol. XI, Zool. III, p. 538, Textfig. XXX: 1—9.
Verbreitung: Kerguelen.

Dactylopusia spinipes BRADY.

1910. *Dactylopusia spinipes*, BRADY, Deutsche Südpol.-Exped. 1901—1903. Vol. XI, Zool. III, p. 540, Textfig. XXXI: 1—5.
Verbreitung: Kerguelen.

Dactylopusia frigida T. SCOTT.

1912. *Dactylopusia frigida*, T. SCOTT, Trans. Roy. Soc. Edinburgh, Vol. LXVIII, p. 556, Taf. II, Fig. 19—25.
Verbreitung: Süd-Orkneys.

Dactylopusia signata WILLEY.

1920. *Dactylopusia signata*, WILLEY, Rep. Canad. Arct. Exped. 1913—18. Part K, p. 35, Fig. 50—52.
Verbreitung: Bernard Harbour (Canada).

Dactylopusia vulgaris var. *dissimilis* BRIAN.

1921. *Dactylopusia vulgaris* n. var. *dissimilis*, BRIAN, Stud. Lab. Mar. Di Quarto Dei Mille, p. 81, Taf. X. Fig. 1.
Verbreitung: Genua Bucht.

Dactylopusia oculata GURNEY.

1927. *Dactylopusia oculata*, GURNEY, Trans. Zool. Soc. London, 22, p. 503, Fig. 132.
Verbreitung: Port Taufiq.

Dactylopusia fragilis MONARD.

1928. *Dactylopusia fragilis*, MONARD, Arch. Zool. Expér. et Générale, 67, p. 352, Fig. XIX: 3, XX: 1.
Verbreitung: Banyuls.

Dactylopusia mediterranea LANG.

1934. *Dactylopusia mediterranea*, LANG, Kungl. Fys. Sällsk. i Lund Förh. Bd. 5, Nr. 9, p. 3, Fig. 7—12.
Verbreitung: Neapel.

Species incertae et incertae sedis.

Dactylopusia bahamensis EDWARDS.

1891. *Dactylopus bahamensis*, EDWARDS, Arch. f. Naturg. 57 Jahrg. p. 77, Taf. III, Fig. 1—15.

Dactylopusia platysoma THOMPSON et A. SCOTT.

1903. *Dactylophusia platysoma*, THOMPSON et A. SCOTT, Ceylon Pearl Oyster Rep. p. 272, Taf. XI, Fig. 13—18

Bestimmungstabelle.

Bemerkung. D. porrecta CLAUS und *D. nicaeensis* CLAUS sind so unvollständig beschrieben, dass es unmöglich ist, sie in eine Bestimmungstabelle aufzunehmen. Betreffs dieser Arten muss ich daher auf die Originaldiagnosen verweisen.

A. Weibchen.

1. 1. Antenne 5-gliedrig . . . . 2.
» » 6—7-gliedrig . . . . 5.
» » 8—9-gliedrig . . . . 6.
2. Mittleres Glied Enp. P. 4 mit 2 Borsten . . . . 3.
» » » » » 1 Borste . . . . *D. fragilis* MONARD.
3. Innere Furcalborste an der Basis erweitert . . . . 4.
» » » » » nicht erweitert . . . . *D. brevicornis* CLAUS.
4. Basalglied P. 5 ohne Dornen am inneren Rande . . . . . . *D. latipes* BOECK.
» » mit » » » » . . . . . . *D. oculata* GURNEY.
5. Abdominalsegmente lateral ohne Dorne; Furcaläste nicht länger als breit . . .
D. crassicornis BRADY.
Abdominalsegmente lateral mit 1 Dorn; Furcaläste länger als breit . . . . . .
D. similima BRADY.
6. Basalglied P. 5 ohne Dornen am inneren Rande . . . . 7.
» » mit » » » » . . . . . . *D. spinipes* BRADY.
7. Endglied P. 5 mit 6 Borsten . . . . 8.
» » » 7 » . . . . 14.
8. Innere Furcalborste an der Basis nicht erweitert . . . . 9.
» » » » » erweitert . . . . 13.
9. Basalglied P. 5 erreicht etwa die Mitte des Endgliedes . . . . 10.
» » » die Spitze » » . . . (*D. vulgaris* SARS) 12.
10. Endglied P. 5 langgestreckt oval, länger als breit . . . . 11.
» » rund, nicht oder nur wenig länger als breit . . *D. glacialis* SARS.
11. Basalglied P. 5 ohne »Fenster« am inneren Rande . . . . . *D. frigida* T. SCOTT.
» mit »Fenstern« » » » . . . . . *D. tisboides* CLAUS.
12. Innere Borste Basalglied Enp. P. 1 sitzt etwa in der Mitte . *D. vulgaris* s. str.
» » » » » » näher and der Basis . . . .
D. vulgaris var. *dissimilis* BRIAN.

13. Beide Glieder P. 5 ohne »Fenster« am inneren Rande . . . *D. signata* WILLEY.
» » » mit »Fenstern« » » » . . *D. mediterranea* LANG.
14. Basalglied P. 5 erreicht etwa die Mitte des Endgliedes . . . . *D. neglecta* SARS.
» » » die Spitze » » . . . *D. micronyx* SARS.

B. Männchen.

1. Furcaläste breiter als lang . . . . 2.
» länger als breit . . . . *D. similllima* BRADY.
2. Basalglied P. 5 mit 5 Borsten . . . . 3.
» » » 7 » . . . . 5.
3. Basalglied P. 5 mit der zweitinneren Borste am längsten . . . . 4.
» » » » mittleren Borste am längsten . . . . *D. oculata* GURNEY.
4. 2. Enp. ohne Dorn am äusseren Rande . . . . *D. brevicornis* CLAUS.
» » mit » » » » . . . . *D. tisboides* CLAUS.
5. Basalglied P. 5 erreicht etwa die Mitte des Endgliedes . . . . 6.
» » » die Spitze des Endgliedes . . . . 8.
6. 2. Endopodit mit ungleich langen apicalen Dornen . . . . 7.
» » » gleich » » » . . . . . . *D. neglecta* SARS.
7. 2. Endopodit mit dem äusseren apicalen Dorn borstenförmig, länger als der innere . . . . *D. micronyx* SARS.
2. Endopodit mit 2 Dornen, von denen der innere länger ist als der äussere . . . *D. mediterranea* LANG.
8. Äusserer Dorn am 2. Enp. reicht über die Spitze des Gliedes hinaus . . . . . . *D. vulgaris* SARS.
» » » » » erreicht nicht die Spitze des Gliedes *D. glacialis* SARS.

Dactylopusia tisboides CLAUS.

Von dieser Art liegen mir 3 Weibchen vor, die in allen Einzelheiten mit vorliegenden Individuen aus dem Öresund übereinstimmen. Fundort und Material:

St. 42. Falklandsinseln, Berkeley Sund, Port Louise, $^{6}/_{8}$ 1902, 3 ♀♀.

Dactylopusioides BRIAN.

Bemerkungen. Von dieser Gattung, die bis jetzt nur 1 Art umfasst, ist kein Männchen bekannt. Es ist daher unmöglich, eine Gattungsdiagnose anzugeben. Von den übrigen Gattungen unterscheidet sie sich aber hauptsächlich durch folgendes. 1. Antenne 7-gliedrig, 2. Antenne mit 1-gliedrigem Exopodit, der nur 3 Borsten trägt. Die innere Borste am 1. Endopoditen sitzt nahe an der Basis des Gliedes befestigt. 2. bis 4. Exopoditen mit nur 2 äusseren Randdornen.

Die von BRIAN (1928 p. 338, Fig. 53—59) beschriebene Art — *D. stampaliae* — muss *D. macrolabris* (CLAUS) genannt werden, da CLAUS schon 1866 die Art als *Dactylopus macrolabris* anführt (CLAUS l. c. p. 29, Taf. III, Fig. 26—29). Die Identität der beiden Arten geht bereits aus den vorliegenden Abbildungen hervor. Noch deutlicher wird ihre Identität, wenn man die Beschreibungen vergleicht. Ich gebe nachstehend einige Angaben von

CLAUS (l. c.) wieder: »Mit gelblichem Panzer. ——— Die innere befiederte Randborste erhebt sich nahe der Basis. ——— Der Nebenast der unteren Antennen schmächtig, einfach und nur mit 3 Borsten an der Spitze besetzt.« Die entsprechenden Stellen bei BRIAN (l. c.) lauten: »Con colore fulvo piuttosto scuro tendente al bruno. ——— Setola interna dell'endopodite che è inserita molto in basso, presso la base del 1° articolo ...... Quasi rudimentale con 3 setola fissate verso l'apice«. Es ist überraschend, dass BRIAN seine Art nicht mit der von CLAUS identifiziert, da er in sein Literaturverzeichnis die Arbeit mit aufgenommen hat, in welcher CLAUS *D. macrolabris* beschreibt. Noch eigentümlicher wird diese Tatsache dadurch, dass BRIAN, wie ich weiter unten zeigen werde, bei einer anderen Art in gleicher Weise vorgegangen ist.

Die Gattung umfasst nur folgende Art:

Dactylopusioides macrolabris (CLAUS).

1866. *Dactylopus macrolabris*, CLAUS, Gesellsch. Ges. Naturw. Marburg. Suppl. Bd. 9, p. 29, Taf. III, Fig. 26—29.
1928. *Dactylopusioides stampaliae*, BRIAN, Arch. Zool. Ital. 12, p. 338, Fig. 53—59.
Verbreitung: Nizza, Insel Stampalia.

Eudactylopus A. SCOTT.

Gattungsdiagnose siehe A. SCOTT 1909 (Siboga Exped., p. 219).

Bemerkungen zu den Arten. Wie bereits hervorgehoben, ist BRIANS Gattung *Plesiothalestris* mit der Gattung *Eudactylopus* identisch. Die von BRIAN beschriebene Art, *P. opima* (BRIAN 1927, p. 2, Fig. 1—12), ist ohne jeden Zweifel identisch mit *Thalestris robusta* CLAUS (1863, p. 129, Taf. XVIII, Fig. 17—23, Taf. XIX, Fig. 1), was sofort bei einem Vergleich der Zeichnungen und Artbeschreibungen dieser beiden Forscher festgestellt werden kann. Im Jahre 1923 stellt BRIAN (1923 p. 133, Taf. IV) eine *Parathalestris clausi* var. *spectabilis* auf. Dass diese »Varietät« mit *P. clausi* nichts zu schaffen hat, hat BRIAN später erkannt; 1927 (l. c. p. 4) stellt er sie nämlich als selbständige Art — *Parathalestris spectabilis* — auf. Schon MONARD (1928, p. 356, Fig. XIX: 2) hat entdeckt, dass wir es hier mit einer *Eudactylopus*-Art zu tun haben. Die Ähnlichkeit der beiden oben genannten Arten BRIANS ist verblüffend, und es ist unerklärlich, dass BRIAN sie verschiedenen Gattungen zuzählen konnte. Zwischen den Weibchen dieser beiden Arten kann ich keinen sicheren Unterschied finden. Bei *spectabilis* ist das erste Antennenglied bedeutend länger als die übrigen (BRIAN 1923, Taf. IV, Fig. 3). Wie die erste Antenne bei *opima* eigentlich aussieht, ist schwer zu entscheiden. Auf einer von BRIANS Zeichnungen (BRIAN 1927, Fig. 1) scheint das 1. Glied fast ebenso lang zu sein wie das Rostrum, welches hier lang und schmal ist. In Fig. 4, welche das Aussehen der Antenne veranschaulichen soll, ist das 1. Glied viel kürzer, das Rostrum dagegen breit und gross. Die Männchen unterscheiden sich von einander nur durch den Bau des 2. Endopoditen. Dieser Unterschied ist indessen so gross, dass wir sie, wenigstens bis auf weiteres, als 2 verschiedene Arten betrachten müssen. MONARDS Diagnose von *spectabilis* weicht etwas von BRIANS Diagnose ab. So hat z. B. nach MONARD (l. c.) das Endglied des 5. Beines ein etwas anderes Aussehen als auf BRIANS Zeichnung (l. c. Fig. 5). Dies ist indessen von geringer Bedeutung. Dagegen scheint es mir wichtig, dass nach BRIAN (l. c. Fig. 1) das Genitalsegment beim Weibchen unvollständig geteilt ist — wie bei *opima* — während MONARD (l. c. p. 356) angibt, dass »les deux segments génitaux sont soudés«. Es scheint mir daher etwas zweifelhaft, ob MONARDS Art mit BRIANS Art identisch ist.

Unter dem Namen *Thalestris robusta* sind 2 verschiedene Arten beschrieben worden, teils CLAUS' oben erwähnte Art, teils eine andere Art von BRADY (1905 p. 218). WILSON (1925 p. 17) ändert daher den Artnamen für BRADYS Art in *valida* ab. Den Nomenklaturregeln nach muss diese Änderung beibehalten werden, obwohl CLAUS' Art eine *Eudactylopus*- BRADYS eine *Thalestris*-Art ist. *E. latipes* ist, wie ich bereits erwähnt habe, zweimal beschrieben worden, und die beiden Beschreibungen weichen etwas von einander ab. Es unterliegt aber keinem Zweifel, dass es sich bei beiden um die gleiche Art handelt.

Die Gattung umfasst folgende Arten:

Eudactylopus latipes (T. SCOTT).

1893. *Dactylopus latipes*, T. SCOTT, Trans. Linn. Soc. 2nd Ser. Vol. VI, Zool., p. 99, Taf. X, Fig. 38—43.
1909. *Eudactylopus latipes*, A. SCOTT, Siboga Exped., p. 219, Taf. LXIII, Fig. 8—14.
Verbreitung: Guinea Bucht, Ceylon, Aru-Inseln.

Eudactylopus robustus (CLAUS).

1863. *Thalestris robusta*, CLAUS, Die freilebenden Copepoden, p. 129, Taf. XVIII, Fig. 17—23, Taf. XIX, Fig. 1.
1927. *Plesiothalestris opima*, BRIAN, Boll. Mus. Zool. e Anat. Comparata, Vol. VII, Nr. 18, p. 2, Fig. 1—12.
Verbreitung: Nizza, Messina, Simi Insel.

Eudactylopus spectabilis (BRIAN).

1923. *Parathalestris Clausi n. var. spectabilis*, BRIAN, Monit. Zool. Ital., 34, p. 133, Taf. IV.
1927. *Parathalestris spectabilis*, BRIAN, Boll. Mus. Zool. e Anat. Comparata, Vol. VII, Nr. 18, p. 4.
1928.? *Eudactylopus spectabilis*, MONARD, Arch. Zool. Expér. et Générale, 67, p. 356, Fig. XIX: 2.
Verbreitung: Adriatisches und Ägäisches Meer,? Banyuls.

Bestimmungstabelle.

A. Weibchen.

1. Exp. A. 2 1-gliedrig . . . . 2.
» » 2-gliedrig . . . . *E. latipes* (T. SCOTT).
2. Grösse 1.1 mm. Furcaläste breiter als lang . . . . *E. spectabilis* (BRIAN).
» 1.35—1.4 mm. Furcaläste so breit wie lang . . . . . . *E. robustus* (CLAUS).

B. Männchen.

1. Äusserer Dorn Enp. P. 2 etwa in der Mitte des Gliedes befestigt, nicht gespaltet . *E. spectabilis* (BRIAN).
» » » » apical befestigt, an der Spitze 2-gespaltet . . . . *E. robustus* (CLAUS).

Diarthrodes THOMSON.

Gattungsdiagnose siehe SARS 1905 (Crust. of Norway, Vol. V, p. 139 — *Westwoodia*).

Bemerkungen zu den Arten. Diarthrodes purpureus (GURNEY 1927 p. 508) unterscheidet sich nur wenig von *D. nobilis* (BAIRD 1845 p. 155). Die 1. Antenne ist bei beiden Formen exakt gleich und der 1. Exopodit ist 1-gliedrig. Bezüglich der 2. bis 4. Beinpaare sagt GURNEY (l. c. p. 509), dass diese in derselben Weise ausgebildet sind wie bei *D. nobilis*, und fügt hinzu, »but with the following formula«. Hierauf folgt eine Borstenformel, die mit der von *D. nobilis* (vgl. GURNEY l. c. und SARS 1911, Pl. LXXXVI) völlig übereinstimmt. Irgend ein Unterschied in der Bewehrung dieser Beinpaare liegt demnach nicht vor — was man doch aus GURNEYS Angabe hätte erwarten können. Das Basalglied des fünften Beines ist bei GURNEYS Form in derselben Weise ausgebildet wie bei *D. nobilis.* Das Endglied dieses Beines trägt aber bei *purpureus* nur 4 Borsten und nicht, wie bei *nobilis*, 5. Im Bau der 2. Maxillipeden und der 2. Antennen liegen auch einige kleine Unterschiede vor. Wenn ich diese Form als eigene Art anführe, geschieht dies mit ausdrücklichem Vorbehalt. Möglicherweise handelt es sich hier um eine Kümmerform von *nobilis.*

Der Grösse der *Diarthrodes*-Arten kann keine systematische Bedeutung zugemessen werden, da sie offenbar innerhalb weiter Grenzen variieren. So weist z. B. BRIAN (1927 p. 7) nach, dass das Weibchen von *D. dubius* eine Länge von 0.6—0.65 mm haben kann, dass aber die Weibchen der gleichen, nur an einem anderen Fundort angetroffenen Art nur 0.37 mm lang waren. Zwischen *D. saturni* (FARRAN), *D. dubius* (BRIAN) und *D. mediterraneus* (MONARD) liegen keine Unterschiede vor. Das Endglied des 5. Beines trägt bei allen 5 Borsten, von denen die 3. und 5., von aussen gerechnet, bedeutend kürzer sind als die übrigen. Die 1. Antenne soll bei *D. saturni* und *D. dubius* 6-gliedrig sein, bei *D. mediterraneus* hingegen 5-gliedrig. FARRAN (1913 Taf. 1, Fig. 2) zeichnet auch wirklich die Antenne bei *D. saturni* deutlich 6-gliedrig, BRIAN (1927, p. 7, Fig. 26) deutet eine Spaltung des Endgliedes bei *D. dubius* nur an, während MONARD (1928, p. 361, Fig. XXII: 5) sie bei *D. mediterraneus* 5-gliedrig zeichnet. Es liegt jedoch kein tatsächlicher Unterschied im Bau der Antenne vor. Ebensowenig zeigt das 1. Bein irgend welche Unterschiede.

Diarthrodes assimilis var. *antarcticus* (T. SCOTT) ist mit *D. imbricatus* (BRADY) identisch. Dies ergibt sich sowohl aus dem Aussehen des 2. als aus dem des 5. Beines (vgl. BRADY 1883 Taf. XLII, Fig. 5 und 7, und T. SCOTT 1912, Taf. IX, Fig. 7—8).

Diarthrodes major (T. und A. SCOTT) ist nicht, wie SARS (1911 p. 142) angibt, identisch mit *D. minutus* (CLAUS). Dagegen ist *D. monensis* (BRADY) identisch mit *D. major.* SARS (l. c.) betrachtet die erstgenannte Art zunächst als identisch mit *D. minutus*, ändert aber später seine Ansicht in dieser Beziehung (l. c. p. 377) und will *D. monensis* als selbständige Art betrachten. Dass *D. monensis* dieselbe Art ist, die früher als *D. major* beschrieben wurde, geht deutlich bei einem Vergleich der beiden Formen hervor (vgl. T. et A. SCOTT 1895 p. 56, Taf. VI, Fig. 17—20 und BRADY 1903 p. 59, Taf. III, Fig. 11—16).

Diarthrodes minutus (SARS 1905) scheint nicht mit *D. minutus* (CLAUS) identisch zu sein. CLAUS' Beschreibung ist indessen so kurz gefasst, dass es unmöglich ist, seine Art sicher zu identifizieren. Ich führe daher im folgenden diese Art als *Diarthrodes minutus* (CLAUS) fide SARS an.

Diarthrodes intermedius (T. SCOTT 1912, p. 559, Taf. IX, Fig. 1—4, Taf. XII, Fig. 27—29) und *D. nanus* (T. SCOTT 1914, p. 372, Taf. XV, Fig. 1—11) sind wie GURNEY (1927, p. 507, 509) hervorhebt, mit einander identisch. Die Art muss aber *intermedius* und nicht *nanus* heissen.

Diarthrodes novae-zealandiae THOMSON heisst in der Figurenerklärung (THOMSON 1882, p. 116) *D. minuta.* Die Textangaben stimmen mit den beigefügten Figuren nicht immer überein. Das erste Beinpaar ist bei dieser Art in derselben Weise ausgebildet wie bei *D. tumidus*, welche von BRADY 1910 beschrieben wird. Indessen soll nach THOMSON *novae-zealandiae* eine 9-gliedrige Antenne haben, während *tumidus* nach BRADY eine nur 8-gliedrige Antenne hat. Ausserdem liegen Unterschiede im Bau des 5. Beines vor.

Die Gattung umfasst demnach folgende Arten:

Diarthrodes nobilis (Baird).

1845. *Arpacticus nobilis*, Baird, Trans. Berw. Nat. Club. Vol. II, p. 155.

1880. *Westwoodia nobilis*, Brady, Monogr. British Copepoda. Vol. II, p. 141, Taf. LXIII, Fig. 1—13.

Verbreitung: Franz-Josephsland, Norwegen, Bohuslän, Helgoland, Neustädter- und Kieler Bucht, Britische Inseln, Frankreich, Madeira, Canarische Inseln, Mittelmeer, Adriatisches Meer, Woods Hole, Chappaquiddick Insel.

Diarthrodes novae-zealandiae Thomson.

1882. *Diarthrodes novae-zealandiae*, Thomson, Trans. New Zealand Inst. Vol. 15, p. 99, Taf. VIII, Fig. 15—22.

Verbreitung: Neu-Seeland.

Diarthrodes imbricatus (Brady).

1883. *Pseudothalestris imbricata*, Brady, Rep. H. M. S. Challenger 1873—76. Zool., Vol. VIII, p. 101, Taf. XLII, Fig. 1—8.

Pseudothalestris assimilis var. *antarctica*, T. Scott, Trans. Roy. Soc. Edinburgh. Vol. XLVIII, p. 560, Taf. IX, Fig. 5—9.

Verbreitung: Kerguelen, Süd-Orkneys, Ceylon, Campbell Insel.

Diarthrodes andrewi (T. Scott).

1894. *Pseudowestwoodia Andrewi*, T. Scott, 12th Ann. Rep. Fish. Board. Scotland. Part III, p. 257, Taf. IX, Fig. 21—29.

Verbreitung: Schottland.

Diarthrodes major (T. et A. Scott).

1895. *Pseudowestwoodia major*, T. et A. Scott, Ann. Mag. Nat. Hist. Ser. 6, Vol. 15, p. 56, Taf. VI, Fig. 17—20.

1895. *Pseudothalestris major*, T. et A. Scott, Ann. Mag. Nat. Hist. Ser. 6, Vol. 15, p. 463.

1903. *Pseudothalestris monensis*, Brady, Nat. Hist. Trans. Northumberland, Vol. 14, p. 59, Taf. III, Fig. 11—16.

1911. *Westwoodia monensis*, Sars, Crustacea of Norway. Vol. V, p. 377, Suppl. Taf. 15.

Verbreitung: Norwegen, Britische Inseln.

Diarthrodes pygmaeus (T. et A. Scott).

1895. *Pseudowestwoodia pygmaea*, T. et A. Scott, Ann. Mag. Nat. Hist. Ser. 6, Vol. 15, p. 55, Taf. VI, Fig. 8—16.

1895. *Pseudothalestris pygmaea*, T. et A. Scott, Ann. Mag. Nat. Hist. Ser. 6, Vol. 15, p. 463.

1905. *Westwoodia pygmaea*, Sars, Crustacea of Norway. Vol. V, p. 143, Taf. LXXXVIII.

Verbreitung: Norwegen, Helgoland, Britische Inseln, Frankreich (Roscoff, Banyuls), Woods Hole.

Diarthrodes assimilis (Sars).

1905. *Westwoodia assimilis*, Sars, Crustacea of Norway. Vol. V, p. 141, Taf. LXXXVII.

Verbreitung: Grinnell Land, Norwegen.

Diarthrodes minutus (Claus) fide Sars.

1863.? *Westwoodia minuta*, Claus, Die freilebenden Copepoden, p. 118, Taf. XXI, Fig. 10—14.

1905. *Westwoodia minuta*, Sars, Crustacea of Norway. Vol. V, p. 142, Taf. LXXXVIII, Fig. 1.

1932. *Pseudothalestris minuta*, Wilson, Bull. U. S. Nat. Mus. 158, p. 211, Fig. 141 a—d.

Verbreitung: Norwegen, Bohuslän, Helgoland, Britische Inseln, Frankreich, Mittelmeer, Adriatisches Meer, Woods Hole, Chappaquiddick Insel.

Diarthrodes sarsi (A. Scott).

1909. *Pesudothalestris Sarsi*, A. Scott, Siboga-Exped., p. 218, Taf. LXIII, Fig. 1—7.

Verbreitung: Paternoster Inseln.

Diarthrodes pusillus (Brady).

1910. *Pseudothalestris pusilla*, Brady, Deutsche Südpol.-Exped. 1901—1903. Vol. XI. Zool. III, p. 530, Textfig. XXI. Verbreitung: Am Fusse des Gaussberges.

Diarthrodes tumidus (Brady).

1910. *Pseudothalestris tumida*, Brady, Deutsche Südpol.-Exped. 1901—1903. Vol. XI. Zool. III, p. 531, Textfig. XXII.

Verbreitung: Kerguelen.

Diarthrodes saturni (FARRAN).

1913. *Westwoodia saturni,* FARRAN, Proc. Roy. Irish Acad. Sect. 2. Vol. 31, Nr. 45, p. 10, Taf. I, Fig. 1—4.
1921. *Westwoodia assimilis* var. *dubia,* Brian, I Copepodi Harp. del Golfo di Genova, p. 85, Taf. III, Fig. 1, 8, Taf. X, Fig. 2—5.
1927. *Westwoodia dubia,* BRIAN, Boll. Mus. Zool. e Anat. Comparata, Vol. VII, Nr. 18, p. 7, Fig. 26—35.
1928. *Westwoodia mediterranea,* MONARD, Arch. Zool. Expér. et Générale, Vol. 67, p. 362, Fig. XXII: 5, XXIII: 5.
Verbreitung: Irland, Mittelmeer.

Diarthrodes intermedius (T. SCOTT).

1912. *Pseudothalestris intermedia,* T. SCOTT, Trans. Roy. Soc. Edinburgh, Vol. XLVIII, p. 559, Taf. IX, Fig. 1—4, Taf. XII, Fig. 27—29.
1914. *Pseudothalestris nana,* T. SCOTT, Ann. Mag. Nat. Hist. Ser. 8, Vol. 13, p. 372, Taf. XV, Fig. 1—11.
Verbreitung: Port Taufiq, Falklandsinseln, Süd-Orkneys.

Diarthrodes purpureus (GURNEY).

1927. *Parawestwoodia purpurea,* GURNEY, Trans. Zool. Soc. London, 22, p. 508, Fig. 134 B—H.
Verbreitung: Ismaïlia.

Diarthrodes aegidaeus (BRIAN).

1927. *Westwoodia pygmaea* var. *aegidaea,* BRIAN, Boll. Mus. Zool. e Anat. Comparata, Vol. VII, Nr. 18, p. 5, Fig. 13—25.
1934b. *Parawestwoodia aegidaea,* LANG, Kungl. Fysiogr. Sällsk. i Lund Förh. Bd. 5, Nr. 9, p. 8, Fig. 18—24.
Verbreitung: Ägäisches Meer, Mittelmeer (Neapel).

Species incerta.

Diarthrodes ponticus KRITSCHAGIN.

1873. *Westwoodia pontica,* KRITSCHAGIN, Materialen z. Fauna des östlichen Ufers des Schwarzen Meeres. Pubblic. Soc. Nat. Kiew, T. III, p. 370.

Bestimmungstabelle.

A. Weibchen.

1. Exp. P. 1 1-gliedrig . . . . 2.
» » 2- » . . . . 3.
2. Basalglied P. 5 mit 4 Borsten . . . . . . *D. purpureus* (GURNEY).
» » » 5 » . . . . . . *D. nobilis* (BAIRD).
3. Basalglied P. 5 mit 4 Borsten . . . . . . *D. pusillus* (BRADY).
» » » 5 » . . . . 4.
» » » 6 » . . . . . . *D. novae-zealandiae* THOMSON.
4. Endglied P. 5 mit 5 Borsten . . . . 5.
» » » 6 » . . . . . . *D. assimilis* (SARS).
5. A. 1 5—6-gliedrig . . . . 6.
» 7- » . . . . 9.
» 8- » . . . . 11.
6. Endglied P. 5 nicht mit 4 Dornen und 1 Borste . . . . 7.
» » mit » » » » » . . . . *D. andrewi* (T. SCOTT).
7. Mittlere Borste Endglied P. 5 viel kürzer als die zweitäussere . . . . 8.
» » » » » » länger » » » . . . .
D. minutus (CLAUS) fide SARS.
8. Die 2 äusseren Borsten Endglied P. 5 dornenförmig . . . . *D. sarsi* (A. SCOTT).
» » » » » » nicht dornenförmig . *D. saturni* (FARRAN).

9. Basalglied P. 5 erreicht wenigstens die Mitte des Endgliedes . . . . 10.
» » » nicht » » » » . . . .
D. pygmaeus (T. et A. SCOTT).
10. Die 2 terminalen Borsten Exp. A. 2 grob und dick . . . *D. aegidaeus* (BRIAN).
» » » » » » unterscheiden sich nicht von den übrigen .
D. intermedius (T. SCOTT).
11. 3. Glied A. 1 mehr als 2-mal so lang wie 4. Glied . . . . *D. tumidus* (BRADY).
» » » nicht » » » » » » . . . *D. major* (T. et A. SCOTT).

B. *Männchen.*

1. Exp. P. 1 2-gliedrig . . . . 2.
» » 1- » . . . . *D. nobilis* (BAIRD).
2. Endglied P. 5 mit 5 Borsten . . . . 3.
» » » 6 » . . . . 8.
3. Basalglied P. 5 vorspringend . . . . 4.
» » nicht vorspringend . . . . *D. pygmaeus* (T. et A. SCOTT).
4. Basalglied P. 5 erreicht die Spitze des Endgliedes . . . . 5.
» » » » Mitte » » . . . . 6.
5. Die 2 äusseren Borsten Basalglied P. 5 etwa 2-mal so lang wie die innere Borste .
D. imbricatus (BRADY).
Diese Borsten sind nur so lang wie oder kürzer als die innere Borste . . . . .
D. saturni (FARRAN).
6. Die innere Borste Enp. P. 1 sitzt in der Mitte des Gliedes . . . . 7.
» » » » » » nahe an der Basis des Gliedes . . . .
D. minutus (CLAUS) fide SARS.
7. Enp. P. 2 apical mit 2 groben Dornen oder Borsten, von denen die äussere klauenförmig und nach innen gebogen ist . . . . *D. aegidaeus* (BRIAN).
Enp. P. 2 apical nur mit 1 groben, nach aussen gebogenen Borste . . . . . .
D. intermedius (T. SCOTT).
8. Enp. P. 2 mit äusserem apicalem Dorn klauenförmig und an der Basis behaart .
D. assimilis (SARS).
Enp. P. 2 mit äusserem apicalem Dorn nicht klauenförmig und an der Basis unbehaart . . . . *D. major* (T. et A. SCOTT).

Peltthestris MONARD.

Gattungsdiagnose siehe MONARD 1924 (Bull. Soc. Zool. France, 49, p. 666).
Die Gattung umfasst nur eine Art:

Peltthestris tripartita MONARD.

1924. *Peltthestris tripartita*, MONARD, Bull. Soc. Zool. France, 49, p. 667, Fig. 24—32.
Verbreitung: Banyuls.

Thalestrinae n. subfam.

Diagnose siehe p. 23.

Rhynchothalestris SARS.

Gattungsdiagnose siehe SARS 1905 (Crust. of Norway. Vol. V, p. 119).

Bemerkungen zu den Arten. Amenophia tenuicornis BRADY ist keine *Amenophia.* Dies ergibt sich sowohl aus dem Bau des 2. Maxillipeden und des 1. und 5. Beinpaares als auch aus dem Aussehen des Abdomen und der Furcaläste. In diesen Beziehungen und ebenso im Bau der 1. Antenne stimmt BRADYS Art mit den *Rhynchothalestris*-Arten und unter diesen vor allem mit *R. helgolandica* (CLAUS) überein. BRADYS Beschreibung ist indessen sehr fragmentarisch und hierzu kommt noch, dass Figuren welche gleiche Dinge darstellen sollen, einander sehr widersprechen (vgl. BRADY 1910 p. 534, Fig. V und Taf. LIV, Fig. 5, 7). In Fig. 5 ist das Abdomen deutlich 4-gliedrig, während es in Fig. 6 nur 2-gliedrig ist. Fig. 5 und 7 zeigen 2 gut entwickelte Furcalborsten, während Fig. 6 nur 1 solche zeigt Nach Fig. 6 fehlt das Rostrum vollständig. Die Morphologie des Tieres stimmt aber im übrigen mit der der *Rhynchothalestris*-Arten so gut überein, dass kaum ein Zweifel über seine Zugehörigkeit zu dieser Gattung möglich ist. Von *R. helgolandica* unterscheidet sie sich dadurch, dass die beiden Äste des 1. Beinpaares gleich lang sind. Da ausserdem das 5. Beinpaar nach den Abbildungen etwas von dem bei *helgolandica* abweicht, halte ich es für das Richtigste, sie als selbständige Art zu betrachten.

Dagegen unterliegt es kaum einem Zweifel, dass *R. similis* A. SCOTT mit *R. rufocincta* (NORMAN) identisch ist. Nach SCOTT (1909 p. 215) unterscheidet sich *similis* von *rufocincta* u. a. dadurch, dass das 7. und 8. Antennenglied gleich lang sind, während das 8. Glied bei *rufocincta* »distinctly smaller than the seventh joint« ist. Nach SARS (1905, Taf. LXXIII) sind indessen bei *rufocincta* diese beiden Glieder gleich lang, während nach MONARD (1928 p. 345, Fig. XVIII: 3) das 8. Glied deutlich kürzer ist als das 7. Glied. MONARD (l. c. p. 347) hebt auch hervor, dass das Aussehen der Antennen etwas wechselt. Auch der 2. Maxilliped ist bei den verschiedenen Verfassern verschieden gezeichnet. Nach BRADY (1880 Taf. 57, Fig. 4) ist bei *rufocincta* »the terminal claw longer than the hand«, nach SARS (l. c) dagegen kürzer, während er bei *similis* (SCOTT l. c. p. 215, Taf. LXII, Fig. 8) ebenso lang ist wie »the hand«. Auch im Bau des 5. Beines kommen offenbar geringe individuelle Verschiedenheiten vor. Nach BRADY (l. c. Fig. 7) sitzt sonach bei *rufocincta* die innere Borste ungefähr in der Mitte des Basalgliedes, nach SARS (l. c.) dagegen bedeutend näher seiner Basis. Bei SCOTT (l. c. Fig. 15 A) ist diese Borste mit etwas höherer Lage angegeben als bei SARS. MONARD (l. c. Fig. XVIII: 1) zeichnet sie in gleicher Weise wie BRADY. Auch in anderen Beziehungen variiert das 5. Bein. SCOTTS (l. c.) Behauptung, dass bei *similis* »the furcal joints are one and a half times longer than broad«, ist vermutlich auf einen Schreibfehler zurückzuführen, da aus seiner Figur (l. c. Fig. 11) das Umgekehrte hervorgeht, d. h. mit anderen Worten, dass die Furcaläste in genau der gleichen Weise gebaut sind wie bei *rufocincta.*

R. vanhöffeni BRADY (1910 p. 532—533) ist sehr unvollständig beschrieben. Es unterliegt aber keinem Zweifel, dass die Art der hier in Rede stehenden Gattung angehört. Eigentümlich ist indessen BRADYS Äusserung (l. c. p. 532), dass das Rostrum »ziemlich kurz und stumpf, nicht deutlich dem Kopf eingelenkt« ist, da das Rostrum bei dieser Gattung nach SARS (l. c. p. 119) «very prominent» und »very mobile« sein soll. Aus BRADYS Figur (l. c. Textfig. XXIII, Fig. 1) ergibt sich hingegen, dass das Rostrum gut entwickelt und stark vorspringend ist. Mit *rufocincta* zeigt diese Art grosse Übereinstimmungen —

vor allem in der Entwicklung des 5. Beines —, unterscheidet sich aber dadurch von ihr, dass das Analoperculum gezähnt ist, sowie dadurch, dass das Genitalsegment in der Mitte nur unvollständig geteilt ist.

Die Gattung umfasst sonach folgende Arten und Varietäten:

Rhynchothalestris helgolandica (Claus).

1863. *Thalestris helgolandica*, Claus, Die freilebenden Copepoden, p. 131, Taf. XVII, Fig. 12—21.
1864. » *curticauda*, Boeck, Christ. Vid.-Selsk. Forh., p. 267.
1905. *Rhynchothalestris helgolandica*, Sars, Crust. of Norway. Vol. V, p. 121, Taf. LXXV.
Verbreitung: Franz-Josephsland, Spitzbergen, Norwegen, Helgoland, Britische Inseln, Grönland, Hudsonbai.

Rhynchothalestris rufocincta (Norman).

1880. *Thalestris rufocincta*, Brady, Monogr. British Copepoda, Vol. II, p. 125, Taf. LVII, Fig. 1—9.
1895. *Thalestris rufocincta*, Wesenberg-Lund, Medd. om Grönland, 19 H, p 142.
1905. *Rhynchothalestris rufocincta*, Sars, Crust. of Norway. Vol. V, p. 120, Taf. LXXIII, LXXIV.
1909. *Rhynchothalestris similis*, A. Scott, Siboga-Exped., p. 215, Taf. LXII, Fig. 12—20.
Verbreitung: Grönland, Norwegen, Britische Inseln, Frankreich, Mittelmeer, Ägäisches Meer, Aru Inseln.

Rhynchothalestris vanhöffeni Brady.

1910. *Rhynchothalestris Vanhöffeni*, Brady, Deutsche Südpol.-Exped. 1901—1903, Vol. XI, Zool. III, p. 532, Textfig. XXIII.
Verbreitung: Kapland.

Rhynchothalestris tenuicornis (Brady).

1910. *Amenophia tenuicornis*, Brady, Deutsche Südpol.-Exped. 1901—1903, Vol. XI, Zool. III, p. 534, Textfig. XXV, Taf. LIV, Fig. 6—7.
Verbreitung: Kerguelen.

Rhynchothalestris helgolandica (Claus) var. *campbelliensis* Lang.

1934. *Rhynchothalestris helgolandica* (Claus) var. *campbelliensis*, Lang, Lunds Univ. Årsskr. N. F. Avd. 2, Bd. 30, Nr. 14, p. 20, Fig. 40—48.
Verbreitung: Campbell Insel.

Bestimmungstabelle.

A. Weibchen.

1. Analoperculum ohne Dorne . . . . 2.
» mit 2—3 Dornen . . . . *R. vanhöffeni* Brady.
2. Genitalsegment unvollständig geteilt; Basalglied P. 5 erreicht nicht die Mitte des Endgliedes . . . . 3.
Genitalsegment vollständig geteilt; Basalglied P. 5 reicht über die Mitte des Endgliedes hinaus . . . . *R. rufocincta* (Norman).
3. Enp. P. 1 deutlich kürzer als Exp. . . . . [*R. helgolandica* (Claus)] 4.
» » so lang wie Exp. . . . . *R. tenuicornis* (Brady).
4. Äussere terminale Borste Exp. P. 2—P. 4 nicht oder wenig gröber als die übrigen Borsten . . . . *R. helgolandica* s. str.
Äussere terminale Borste Exp. P. 2—P. 4 viel gröber als die übrigen Borsten . . *R. helgolandica* var. *campbelliensis* Lang.

B. Männchen.

1. Endglied P. 5 mit 6 Borsten . . . . [*R. helgolandica* (Claus)] 2.
» » » 7 » . . . . *R. rufocincta* (Norman).

2. Obere äussere Borste Endglied P. 5 in der Mitte des Gliedes befestigt . . . . . *R. helgolandica* s. str.
Obere äussere Borste Endglied P. 5 viel näher an der Basis befestigt . . . . . . *R. helgolandica* var. *campbelliensis* Lang.

Parathalestris Brady et Robertson.

Gattungsdiagnose siehe Sars 1905 (Crust. of Norway. Vol. V, p. 110).

Bemerkungen zu den Arten. Brady (1910 p. 530) erwähnt *P. harpactoides* von den Kerguelen. Aus Bradys Abbildungen (l. c. Textfig. XX, Taf. LIV, Fig. 5) geht jedoch hervor, dass es sich hier nicht um diese Art handeln kann. So ist z. B. der 1. Exopodit bedeutend kürzer als der Endopodit (l. c. Fig. 4), während diese beiden Äste bei *harpactoides* (siehe Sars 1905 Pl. LXVII) beinahe gleich lang sind. Das Endglied des 5. Beines trägt nach Brady (l. c. Fig. 6) 7 Borsten und das Basalglied (l. c.) 6 Borsten, während *harpactoides* an diesen Gliedern 6 bzw. 5 Borsten tragen. Es dürfte aber unzweifelhaft sein, dass wir es hier mit einer *Parathalestris*-Art zu tun haben. Da sie unmöglich mit irgend einer der früher beschriebenen Arten und ebensowenig mit der nachstehend neu beschriebenen Art identifiziert werden kann, stelle ich sie als neue Art unter dem Namen *P. paraharpactoides* auf.

P. clausi wird von T. Scott (1912 p. 553) von 4° 15′ S. — 33° 38′ W. erwähnt. In der Probe kam nur ein Männchen vor, welches nach Scott (l. c.) »undoubtdly belongs to this species«. Gleichzeitig äussert er sein Erstaunen darüber, dass diese Art so weit im Süden vorkommt, und fügt hinzu: »its presence in this gathering may have therefore been accidental«. Scotts sämtliche Abbildungen (l. c. Taf. II, Fig. 15—18) weichen aber mehr oder weniger von sowohl Bradys (1880 Taf. 62, Fig. 1—12) als Sars' (1911 Taf. LXV, LXVI) ab. Besonders augenfällig sind die Verschiedenheiten im Bau des 1. und 5. Beinpaares. In Scotts (l. c. Fig. 16) Figur ist der 1. Exopodit bedeutend kürzer als in den entsprechenden Figuren bei Brady und Sars und an den Basalgliedern des 5. Beinpaares fehlen nach Scotts Abbildungen (l. c. Fig. 18) die charakteristischen Dornenreihen. Auch in Bezug auf den 2. Maxillipeden und den 2. Endopoditen kommen geringere Abweichungen vor. Es scheint daher am richtigsten, Scotts Form als eine besondere Art — *P. incerta* — anzusehen.

Nach T. Scott (1903 p. 27) ist *Thalestris normani* »a connecting-link between the two genera *Thalestris* and *Dactylopus*«, während Gurney (1930 p. 323) hervorhebt, dass diese Art der Gattung *Parathalestris* anzugehören scheint. Aus dem Bau des 2. Endopoditen beim Männchen (Scott l. c. Taf. III, Fig. 15) geht hervor, dass diese Art unmöglich zur Gattung *Dactylopusia* gezählt werden kann, mit welcher sie im übrigen gewisse Merkmale gemeinsam hat, wie beispielsweise den 3-gliedrigen Exopoditen an der 2. Antenne, wodurch sie von den *Thalestris*- und *Parathalestris*-Arten abweicht. Scotts Angabe in diesem Punkt muss indessen noch kontrolliert werden, da es oft sehr schwer zu entscheiden ist, wieviel Glieder dieser Ast hat. Auch aus dem Bau des 5. Beines beim Männchen (l. c. Fig. 17) ergibt sich, dass wir es hier kaum mit einer *Dactylopusia*-Art zu tun haben. Das Endglied dieses Beines trägt nämlich bei den *D.*-Arten — soweit bisher bekannt — eine ungerade Borstenzahl (5 oder 7), während die *Th.*- und *P.*-Arten, mit wenigen Ausnahmen, 6 Borsten tragen, was bei *normani* der Fall ist. Wenn sich also auch leicht feststellen lässt, dass es sich um keine *D.*-Art handelt, so ist es um so schwerer zu entscheiden, ob wir die Art zur

Gattung *Thalestris* oder *Parathalestris* zu zählen haben. In der Beschreibung wird der Bau des Rostrums nicht erwähnt und dieser geht nicht mit Sicherheit aus den Figuren hervor. Dagegen ist das Cephalosom (l. c. Fig. 12) unzweideutig in der für Thalestris charakteristischen Weise ausgebildet. Sonstige Merkmale, die deutlich für die eine oder andere Möglichkeit sprechen könnten, sind nicht angegeben. Ich zähle daher die Art zur Gattung *Thalestris*. Wie ich bereits hervorgehoben habe, muss *Halithalestris croni* (KRÖYER), *Dactylopusia platycheles* BRADY und *Dactylopusia pectinata* T. SCOTT zur Gattung *Parathalestris* gerechnet werden.

Diese Gattung wird demnach folgende Arten umfassen:

Parathalestris croni (KRÖYER).

1842. *Harpacticus Croni*, KRÖYER, in »Gaimard's Voyages en Scandinaviæ«, Taf. XLIII, Fig. 3 a—n.
1880. *Thalestris serrulata*, BRADY, Monogr. British Copepoda. Vol. II, p. 133, Taf. LIX, Fig. 2—11.
1905. *Halithalestris Croni*, SARS, Crust. of Norway. Vol. V, p. 118, Taf. LXXII.
Verbreitung: Spitzbergen, Grönland, Norwegen, Britische Inseln, Cape Cod.

Parathalestris harpactoides (CLAUS).

1863. *Thalestris harpactoides*, CLAUS, Die freilebenden Copepoden, p. 133, Taf. XIX, Fig. 2—11.
1905. *Parathalestris harpacticoides*, SARS, Crust. of Norway, Vol. V, p. 112, Taf. LXVII.
Verbreitung: Norwegen, Bohuslän, Britische Inseln, Weser-Jade, Helgoland, Mittelmeer, Adriatisches Meer.

Parathalestris clausi (NORMAN).

1868. *Thalestris Clausii*, NORMAN, Brit. Assoc. Rep. (1868), p. 297.
1905. *Parathalestris Clausi*, SARS, Crust. of Norway. Vol. V, p. 111, Taf. LXV, LXVI.
Verbreitung: Norwegen, Britische Inseln, Frankreich.

Parathalestris hibernica (BRADY et ROBERTSON).

1873. *Thalestris hibernica*, BRADY et ROBERTSON, Ann. Mag. Nat. Hist. Ser. 4. Vol. XII, p. 135, Taf. VIII, Fig. 17—19.
1905. *Parathalestris hibernica*, SARS, Crust. of Norway. Vol. V, p. 113, Taf. LXVIII.
Verbreitung: Norwegen, Britische Inseln.

Parathalestris jacksoni (T. SCOTT).

1899. *Thalestris Jacksoni*, T. SCOTT, Journ. Linn. Soc. Vol. XXVII, p. 109, Taf. 8, Fig. 3—9.
1905. *Parathalestris Jacksoni*, SARS, Crust. of Norway. Vol. V, p. 114, Taf. LXIX.
Verbreitung: Franz-Josephsland, Grinnell Land, Norwegen.

Parathalestris platycheles (BRADY).

1903. *Dactylopus platycheles*, BRADY, Nat. Hist. Trans. Northumberland, Vol. XIV, p. 61, Taf. III, Fig. 1—10.
Verbreitung: England (Roker).

Parathalestris paraharpactoides n. sp.

1910. *Parathalestris harpactoides*, BRADY, Deutsche Südpol.-Exped. 1901—1903, Vol. XI. Zool. III, p. 530, Textfig. XX, Taf. LIV, Fig. 5.
Verbreitung: Kerguelen.

Parathalestris incerta n. sp.

1912. *Parathalestris Clausi*, T. SCOTT, Trans. Edinburgh Roy. Soc. Vol. XLVIII (1913), p. 553, Taf. II, Fig. 15—18.
Verbreitung: 4° 15′ S., 33° 38′ W.

Parathalestris coatsi T. SCOTT.

1912. *Parathalestris coatsi*, T. SCOTT, Trans. Edinburgh Roy. Soc. Vol. XLVIII (1913), p. 553, Taf. III, Fig. 7—16.
Verbreitung: Süd-Orkneys.

Parathalestris perplexa (T. SCOTT).

1912. *Dactylopusia perplexa*, T. SCOTT, Trans. Roy. Soc. Edinburgh. Vol. XLVIII, p. 558, Taf. II, Fig. 26—30, Taf. VI, Fig. 1—2.
Verbreitung: Süd-Orkneys.

Parathalestris affinis T. Scott.

1912. *Parathalestris affinis*, T. Scott, Trans. Edinburgh Roy. Soc. Vol. XLVIII (1913), p. 554, Taf. III, Fig. 17—25.
Verbreitung: Süd-Orkneys.

Parathalestris intermedia Gurney.

1930. *Parathalestris intermedia*, Gurney, Zool. Anz. Vol. 87, p. 321, Fig. 1—8.
Verbreitung: Norfolk.

Parathalestris similis n. sp.

Verbreitung: Feuerland, Falklandsinseln.

Bestimmungstabelle.

A. Weibchen.

1. Furcaläste nicht länger als breit . . . . 2.
» wenigstens 2-mal so lang wie breit . . . . 11.
2. Endklaue Mp. 2 kürzer als die Hand . . . . 3.
» » so lang wie » » . . . . *P. intermedia* Gurney.
3. Innere apicale Klaue Enp. P. 1 höchstens 0.5- bis 1-mal so lang wie die äussere . 4.
» » » » » wenigstens 2.5- bis 3-mal so lang wie die äussere.
P. hibernica (Brady et Robertson).
4. Basalglied P. 5 erreicht die Spitze des Endgliedes . . . . 5.
» » reicht höchstens etwas über die Mitte des Endgliedes hinaus . . 8.
5. Unter dem Basalgliede P. 5 kommen keine Dornen vor . . . . 6.
» » » » kommt eine Dornenreihe vor *P. clausi* (Norman).
6. Basalglied P. 5 mit 5 Borsten . . . . 7.
» » » 6 » . . . . *P. paraharpactoides* n. sp.
7. Genitalsegment vollständig geteilt . . . . *P. similis* n. sp.
» unvollständig geteilt . . . . *P. harpactoides* (Claus).
8. Enp. P. 1 erreicht nicht das 3. Glied des Exp. . . . . 9.
» » reicht weit über das 3. Glied des Exp. hinaus . . . . 10.
9. Endglied P. 5 langgestreckt oval . . . . *P. affinis* T. Scott.
» » beinahe kreisrund . . . . *P. perplexa* T. Scott.
10. Furcalborsten dick, nicht mehr als 2-mal so lang wie die Furcaläste . . . . . .
P. coatsi T. Scott.
» schlank, mehr als 4-mal so lang wie die Furcaläste . . . .
P. platycheles (Brady).
11. Furcaläste etwa 2-mal so lang wie breit . . . . *P. jacksoni* (T. Scott).
» » 4- » » » » » . . . . *P. croni* (Kröyer).

B. Männchen.

1. Furcaläste nicht länger als breit . . . . 2.
» wenigstens 2-mal so lang wie breit . . . . 7.
2. Endglied P. 5 mit 6 Borsten . . . . 3.
» » » 5 » . . . . *P. hibernica* (Brady et Robertson).
3. Unter dem Basalgliede P. 5 kommen keine Dornen vor . . . . 4.
» » » » kommt eine Dornenreihe vor . *P. clausi* (Norman).

4. Exp. P. 1 deutlich länger als 1. Glied des Enp. . . . . 5.
» » » kürzer » » » » » . . . . *P. incerta* n. sp.
5. Endglied P. 5 birnenförmig, nicht 2-mal so lang wie breit . . . . 6.
» » oval, etwas mehr als 2-mal so lang wie breit . . . .
P. harpactoides (CLAUS).
6. Enp. P. 2 apical mit 1 Borste . . . . *P. similis* n. sp.
Diese Borste sitzt am äusseren Rande . . . . *P. intermedia* GURNEY.
7. Furcaläste etwa 2-mal so lang wie breit . . . . *P. jacksoni* (T. SCOTT).
» » 4- » » » » » . . . . *P. croni* (KRÖYER).

Parathalestris similis n. sp.

Weibchen: Körper ziemlich schlank. Cephalothorax etwa so lang wie die 4 folgenden Segmente zusammen. Rostrum abgesetzt. Genitalsegment deutlich geteilt. 2. und 3. Abdominalsegmente ventro-lateral mit Dornenreihen. 4. Abdominalsegment ventral mit einer Dornenreihe über dem hinteren Rande. Furcaläste breiter als lang. Innere apicale Furcalborste etwa 2-mal so lang wie die äussere Borste. 1. Antenne 9-gliedrig mit den folgenden Verhältniszahlen der Glieder: $\frac{1\quad 2\quad 3\quad 4\quad 5\quad 6\quad 7\quad 8\quad 9}{10\cdot 10\cdot 7.5\cdot 7.5\cdot 4\cdot 5\cdot 3\cdot 3\cdot 4}$. 2. Antenne mit 2-gliedrigem Exopodit. Mundteile wie bei *P. harpactoides* (CLAUS).

1. Beinpaar (Fig. 31) mit gleich langen Ästen. Endglied des Exopoditen apical mit 2 starken Klauen und 1 Borste. Am äusseren Rande sitzt 1 lange glatte und 1 kurze behaarte Borste. Innere apicale Klaue des Endopoditen länger und dicker als die äussere.

2. bis 4. Beinpaar (Fig. 32) 3-gliedrig. 2. und 3. Endopodit länger als die 2 ersten Glieder des Exopoditen. 4. Endopodit nur so lang wie die 2 ersten Exopoditenglieder. Borstenformel:

Glied	Exopodit			Endopodit		
	1	2	3	1	2	3
P. 2	1	1	2·2·3	1	2	2·2·1
P. 3	1	1	3·2·3	1	1	3·2·1
P. 4	1	1	3·2·3	1	1	2·2·1

5. Beinpaar (Fig. 33) gross und breit. Das Basalglied erreicht die Spitze des Endgliedes und trägt 5 Borsten. Endglied oval mit 6 Borsten, von denen die 2 zweitinneren unbefiedert sind.

Männchen: 2. und 3. Abdominalsegmente ventral mit Dornenreihe nahe am hinteren Rande. 4. Abdominalsegment ventral mit einigen Dornen in der Mitte des hinteren Randes. 5. Abdominalsegment wie das 4. beim Weibchen. 1. Antenne haplocer. 2. Endopodit transformiert (Fig. 34). 5. Beinpaar (Fig. 35) mit 3 Borsten am Basal- und 6 Borsten am Endglied.

Diese Art ist *P. coatsi* T. SCOTT sehr ähnlich, unterscheidet sich aber von dieser durch den Bau des 1. und 5. Beinpaares.

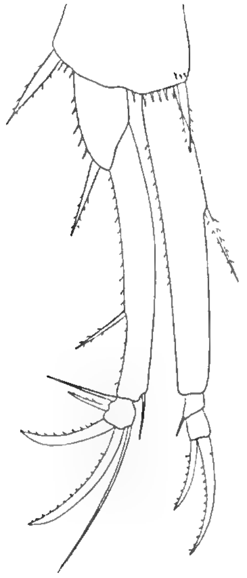

Fig. 31.

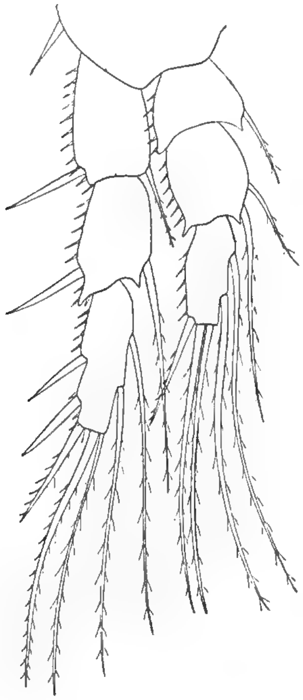

Fig. 32.

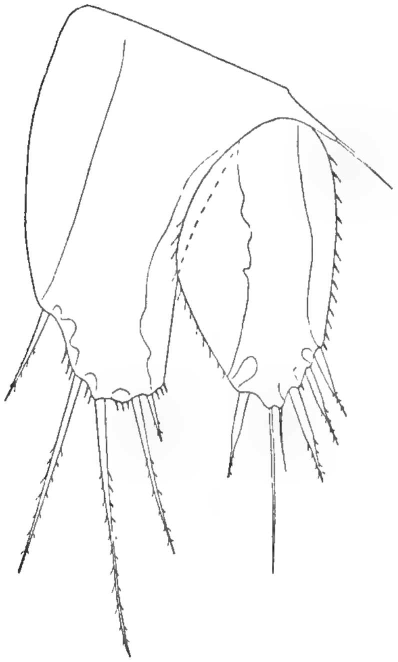

Fig. 33.

Fig. 34.

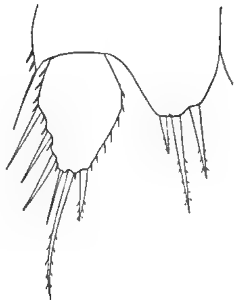

Fig. 35.

Fig. 31—35. *Parathalestris similis* n. sp. — Fig. 31. P. 1 ♀. — Fig. 32. P. 2 ♀. — Fig. 33. P. 5 ♀. — Fig. 34. Enp. P. 2 ♂. — Fig. 35. P. 5 ♂.

Fundort und Material: Feuerland, Beagle Kanal. Litoral, $^{15}/_{3}$ 1902. 2♀♀, 1 ♂. Falklandsinseln, Port Louise, Mündung von Carenage Creek, 51° 32′ s. Br. — 58° 7′ w. L. 3—4 m $^{9}/_{8}$ 1908. 1♀.

Phyllothalestris SARS.

Gattungsdiagnose siehe SARS 1905 (Crust. of Norway. Vol. V, p. 115).

Bemerkungen zu den Arten. MONARDS Art *Dactylopina royi* (MONARD 1928 p. 354, Fig. XX: 2) muss, wie ich bereits hervorgehoben habe, zur Gattung *Phyllothalestris* gezählt werden. Leider besitzt MONARD kein Exemplar dieses Tieres mehr, weshalb ich nicht in der Lage war, ein solches zu untersuchen. Es ist jedoch meines Erachtens zweifelhaft, dass diese Form eine selbständige Art repräsentiert. Die Ähnlichkeit im Bau des 5. Beines mit dem entsprechenden Bein bei *Phyllothalestris mysis* ist so gross, dass stark in Frage gesetzt werden kann, ob nicht MONARDS Form eine noch nicht voll entwickelte *Ph. mysis* ist. Ich führe sie hier nur mit sehr grossem Zaudern und unter ausdrücklichem Vorbehalt als selbständige Art an.

Thalestris pontica CZERNIAVSKI (1868 p. 46, Taf. II, Fig. 13—23) ist zweifellos identisch mit *Ph. mysis* CLAUS. Dies geht vor allem aus dem Bau des 5. Beines beim Männchen (l. c. Fig. 23) hervor. Ob *Th. brevicornis* CZERNIAVSKI (1. c. p. 48, Taf. II, Fig. 24—26, Taf. III, Fig. 1—2) eine selbständige Art ist, oder nur eine noch nicht voll entwickelte *Ph. mysis*, kann nicht entschieden werden, da die Beschreibung sehr kurz gefasst ist und die Figuren teilweise recht eigentümlich sind. Alles deutet aber darauf hin, dass es sich um eine *Ph.*-Art handelt.

Die Gattung umfasst folgende Arten:

Phyllothalestris mysis (CLAUS).

1863. *Thalestris mysis*, CLAUS, Die freilebenden Copepoden, p. 130, Taf. XVIII, Fig. 12—16.
1868. *Thalestris pontica*, CZERNIAVSKI, Trudy 1. Sězda russkich estesivoispytatelej, p. 46, Taf. II, Fig. 13—23.
1905. *Phyllothalestris mysis*, SARS, Crust. of Norway. Vol. V, p. 116, Taf. LXX, LXXI.
Verbreitung: Norwegen, Britische Inseln, Madeira, Mittelmeer, Suez-Kanal, Ceylon, Obi Inseln.

Phyllothalestris paramysis MONARD.

1928. *Phyllothalestris paramysis*, MONARD, Arch. Zool. Expér. et Générale, Vol. 67, p. 345, Fig. XVII:2.
Verbreitung: Banyuls.

Phyllothalestris royi MONARD.

1928. *Dactylopina Royi*, MONARD, Arch. Zool. Expér. et Générale, Vol. 67, p. 354, Fig. XX:2.
Verbreitung: Banyuls.

Species incerta.

1868. *Thalestris brevicornis*, CZERNIAVSKI, Trudy 1. Sězda russkich estesivoispytatelej, p. 48, Taf. II, Fig. 24—26, Taf. III, Fig. 1—2.

Bestimmungstabelle.

Bemerkung. Die Männchen sind — *Ph. mysis* ausgenommen — unbekannt.

Weibchen.

1. Basalglied P. 5 reicht über die Spitze des Endgliedes hinaus . . . . 2.
» » » nur etwas über die Mitte des Endgliedes hinaus . . . . . . *Ph. royi* (MONARD).
2. Zweitäussere Borste Endglied P. 5 grob, zahnförmig . . . . *Ph. mysis* (CLAUS).
» » » » weicht von den übrigen Borsten nicht ab . . *Ph. paramysis* MONARD.

Thalestris Claus.

Gattungsdiagnose siehe Sars 1905 (Crust. of Norway. Vol. V, p. 103).

Bemerkungen zu den Arten. Thalestris australis Brady (1899 p. 43, Taf. XII, Fig. 1—5) ist sehr mangelhaft beschrieben worden und es kann in Zweifel gezogen werden, ob die Art wirklich dieser Gattung angehört. Das Aussehen des 5. Beines (l. c. Fig. 5) spricht allerdings dafür, dass die Art hierher gehört, aber das 1. Bein weicht stark von dem der *Thalestris*-Arten ab und ist eher in der für *Dactylopusia* charakteristischen Weise gebaut.

Bradys Beschreibung und Figuren von *Th. robusta* (=*valida*) und *denti* sind so gehalten, dass jede Artenidentifizierung unmöglich scheint. Das gleiche gilt für die von Boeck (1872) aufgestellten Arten *longipes* und *curticornis* und Claus' Art *microphylla.* Die kurzgefassten Beschreibungen dieser Arten sind nämlich nicht von Figuren begleitet.

Willey (1923 p. 26 Fig. 21—22) behauptet, das noch unbekannte Männchen zu *Th. brunnea* gefunden zu haben. Die Beschreibung desselben ist indessen äusserst kurz gefasst und gibt keine Anhaltspunkte, weshalb es unmöglich in eine Bestimmungstabelle aufgenommen werden kann.

Die Gattung umfasst folgende Arten:

Thalestris gibba (Kröyer).

1842. *Harpacticus gibbus*, Kröyer, in »Gaimards Voyages en Scandinaviae«, Taf. 43, Fig. 2a—p.
1898. *Thalestris polaris*, T. Scott, Journ. Linn. Soc. Zool. Vol. XXVII, p. 106, Taf. 7, Fig. 8—16.
1905. » *gibba*, Sars, Crust. of Norway. Vol. V, p. 105, Taf. LXI.
Verbreitung: Franz-Josephsland, Finmark Küste, Norwegen, Devon, Mittelmeer, Woods Hole.

Thalestris longimana Claus.

1863. *Thalestris longimana*, Claus, Die freilebenden Copepoden, p. 130, Taf. XVIII, Fig. 1—11.
Verbreitung: 70° 32′ n. Br. — 8° v. L., Norwegen, Britische Inseln, Mittelmeer, Canada.

Thalestris rufoviolascens Claus.

1866. *Thalestris rufoviolascens*, Claus, Gesellsch. Ges. Naturw. Marburg, Suppl. Bd. 9, p. 33, Taf. IV, Fig. 18—22.
Verbreitung: Norwegen, Mittelmeer.

Thalestris pectinimana Car.

1884. *Thalestris pectinimana*, Car, Arch. f. Naturg. Jahrg. 50, p. 248, Taf. XVIII, Fig. 1—8.
Verbreitung: Triest.

Bemerkung. Der Ansicht Pestas (1920, p. 590), dass diese Art mit *Phyllothalestris mysis* (Claus) identisch sei, kann ich nicht zustimmen. Die beiden Arten weichen u. a. im Bau des 5. Beinpaares von einander ziemlich erheblich ab.

Thalestris frigida T. Scott.

1898. *Thalestris frigida*, T. Scott, Journ. Linn. Soc. Zool. 1899—1900, Vol. XXVII, p. 108, Taf. 7, Fig. 17—23, Taf. 8, Fig. 1—2.
1909. *Phyllothalestris frigida*, Sars, 2nd Norweg. Arct. Exped. »Fram« 1898—1902, Nr. 18, p. 23, Taf. IV.
Verbreitung: Franz-Josephsland, Ellesmereland.

Thalestris ciliata Brady.

1899. *Thalestris ciliata*, Brady, Trans. Zool. Soc. London, Vol. 15 (1901), p. 43, Taf. XI, Fig. 28—33.
Verbreitung: Neu-Seeland.

Thalestris normani (T. Scott).

1903. *Thalestris Normani*, T. Scott, Ann. Mag. Nat. Hist. Ser. 7, Vol. 11, p. 25, Taf. III, Fig. 12—18.
Verbreitung: Finmark Küste.

Thalestris brunnea SARS.

1905. *Thalestris brunnea*, SARS, Crust. of Norway. Vol. V, p. 108, Taf. LXIII.
1923. ? » » ♂, WILLEY, Contrib. Canad. Biol. New Ser. Vol. I, Nr. 16, p. 26, Fig. 21—22.
Verbreitung: Norwegen, Britische Inseln,? Hudsonbai.

Thalestris purpurea SARS.

1905. *Thalestris purpurea*, SARS, Crust of Norway. Vol. V, p. 109, Taf. LXIV.
Verbreitung: Norwegen.

Thalestris sordida BRADY.

1910. *Thalestris sordida*, BRADY, Deutsche Südpol.-Exped. 1901—1903, Vol. XI, Zool. III, p. 528, Taf. LIII, Fig. 14—23.
Verbreitung: Gauss-Station.

Species incertae et incertae sedis.

Thalestris microphylla CLAUS.

1863. *Thalestris microphylla*, CLAUS, Die freilebenden Copepoden, p. 130.
Verbreitung: Messina.

Thalestris longipes, BOECK.

1864. *Thalestris longipes*, BOECK, Christ. Vid.-Selsk. Forh., 1864—65, p. 266.
Verbreitung: Oslofjord.

Thalestris curticornis BOECK.

1864. *Thalestris curticornis*, BOECK, Christ. Vid.-Selsk. Forh., 1864—65, p. 267.
Verbreitung: Oslofjord.

Thalestris australis BRADY.

1899. *Thalestris australis*, BRADY, Trans. Zool. Soc. London, Vol. 15 (1901), p. 43, Taf. XII, Fig. 1—5.
Verbreitung: Neu-Seeland.

Thalestris denti BRADY.

1905. *Thalestris denti*, BRADY, Trans. Nat. Hist. Soc. Northumberland. Ser. 2, Vol. 1. 1904—1907, p. 218, Taf. VI, Fig. 10—15.
Verbreitung: Northumberland s. Durham.

Thalestris valida WILSON.

1905. *Thalestris robusta*, BRADY, Trans. Nat. Hist. Soc. Northumberland. Ser. 2, Vol. 1. 1904—1907, p. 216, Taf. V, Fig. 11—17.
1925. *Thalestris valida*, WILSON, Proc. U. S. Nat. Mus. Vol. 64, Art. 17, p. 17.
Verbreitung: Northumberland.

Bestimmungstabelle.

A. Weibchen.

1. Furcaläste nicht oder nur wenig länger als breit . . . . 2.
   » beinahe 3-mal so lang wie breit . . . . *Th. gibba* (KRÖYER).
2. Hand des Mp. 2 an der Innenseite konkav . . . . 3.
   » » » » » » nicht konkav . . . . 4.
3. Furcaläste länger als breit . . . . *Th. longimana* CLAUS.
   » breiter als lang . . . . *Th. rufoviolascens* CLAUS.
4. A. 1 9-gliedrig . . . . 5.
   » 8- » ; Endglied P. 5 mit 7 Borsten . . . . *Th. pectinimana* CAR.
5. Exp. P. 1 deutlich kürzer als Enp. . . . . 6.
   » » so lang wie oder länger als Enp. . . . . 7.

6\. Innere apicale Klaue Enp. P. 1 etwa so lang wie Enp. . *Th. normani* T. SCOTT.
» » » » » kurz, nur $^1/_3$ des Enp. . . . *Th. ciliata* BRADY.
7\. Basalglied P. 5 mit 5 Borsten . . . . 8.
» » » 6—7 » . . . . *Th. sordida* BRADY.
8\. Hand des Mp. 2 nur 1.5-mal so lang wie breit . . . . 9.
» » » wenigstens 2.5-mal so lang wie breit . . . *Th. frigida* T. SCOTT.
9\. Vorletztes Abd.-Segm. bildet dorsal ein Dreieck mit nach hinten gerichteter Spitze *Th. brunnea* SARS.
Vorletztes Abd.-Segm. bildet dorsal nach rückwärts 4 abgerundete Loben . . . . *Th. purpurea* SARS.

B. Männchen.

1\. Furcaläste nicht oder nur wenig länger als breit . . . . 2.
» beinahe 3-mal so lang wie breit . . . . *Th. gibba* (KRÖYER).
2\. Endglied P. 5 mit 5 Borsten . . . . *Th. sordida* BRADY.
» » » 6 » . . . . 3.
» » » 7 » . . . . *Th. longimana* CLAUS.
3\. Exp. P. 1 so lang wie oder länger als Enp. . . . . 4.
» » viel kürzer als Enp. . . . . *Th. normani* T. SCOTT.
4\. Hand des Mp. 2 an der Innenseite konkav . . . . . . *Th. rufoviolascens* CLAUS.
» » » » » » gerade oder schwach konvex . . . . *Th. frigida* T. SCOTT.

Amenophia BOECK.

Gattungsdiagnose siehe SARS 1905 (Crust. of Norway. Vol. V, p. 135).
Die Gattung umfasst folgende Arten:

Amenophia peltata BOECK.

1864\. *Amenophia peltata*, BOECK, Christ. Vid.-Selsk. Forh. p. 269.
1880\. *Thalestris peltata*, BRADY, Monogr. British Copepoda, Vol. II, p. 138, Taf. LIII, Fig. 11—19.
Verbreitung: Grinnell Land, Norwegen, Bohuslän, deutsche Nordseeküste, Schottland, Scilly Inseln.

Amenophia pulchella SARS.

1906\. *Amenophia pulchella*, SARS, Crust. of Norway. Vol. V, p. 138, Taf. LXXXIV, Fig. 2.
Verbreitung: Norwegen (Christiansund).

Amenophia ovalis BRADY.

1910\. *Amenophia ovalis*, BRADY, Deutsche Südpol.-Exped. 1901—1903. Vol. XI. Zool. III, p. 533, Textfig. XXIV.
Verbreitung: Kerguelen.

Bestimmungstabelle.

Weibchen und Männchen.

1\. Enp. P. 1 etwas länger als Exp. . . . . 2.
» » nicht » » » . . . . *A. peltata* BOECK.
2\. Innere Borste Enp. P. 1 sitzt unterhalb der Mitte des Gliedes . *A. pulchella* SARS.
» » » » » oberhalb » » » » . . *A. ovalis* BRADY.

Parastenheliinae n. subfam.

Diagnose siehe p. 23.

Parastenhelia Thompson et A. Scott,.

Die Gattungsdiagnose Sars' [1905, Crust. of Norway. Vol. V, p. 122 (*Microthalestris*)] ist nur dahin abzuändern, dass der Exopodit der 2. Antenne 2- bis 3-gliedrig sein kann.

Bemerkungen zu den Arten. Diese Gattung habe ich (Lang 1934 a p. 22—25) schon früher ausführlich behandelt und bei dieser Gelegenheit u. a. hervorgehoben, dass *P. littoralis* Sars nur eine Varietät von *P. forficula* darstellt. Hierbei war mir eine Angabe Monards (1928 p. 348) entgangen, in welcher dieselbe Ansicht bezüglich *forficula*, die ich vertreten habe, schon klar angedeutet wird. Monard schreibt u. a.: »L'espèce est fort variable, et *littoralis* rentre certainement dans les limites de variabilité de *forficula.*« Bezüglich der übrigen Arten verweise ich auf meine oben erwähnte Arbeit.

Meine Ansicht, dass die Gattung *Microthalestris* Sars mit *Parastenhelia* Thompson et A. Scott identisch ist, wird ferner noch dadurch gestützt, dass ich *P. gracilis* Brady wiedergefunden habe und daher feststellen konnte, dass der Exopodit der 2. Antenne bei dieser Art nur 2-gliedrig ist (dies gilt wenigstens von meinen Exemplaren).

Die Gattung umfasst folgende Arten und Varietäten:

Parastenhelia forficula (Claus).

1863. *Thalestris forficula*, Claus, Die freilebenden Copepoden, p. 131, Taf. XVII, Fig. 7—11.
1863. » *karmensis*, Boeck, Christ. Vid.-Selsk. Forh. 1864—65, p. 266.
1872. *Dactylopus longipes*, Boeck, Christ. Vid.-Selsk. Forh. 1872 p. 56.
1894. *Thalestris forficuloides*, T. et A. Scott, Ann. Mag. Nat. Hist. Ser. 6, Vol. XIII, p. 142, Taf. IX, Fig. 4—9.
1897. *Thalestris forficula*, Vanhöffen, Grönland Exped. 1891—93, Vol II, p. 282.
1905. *Microthalestris forficula*, Sars, Crust. of Norway. Vol. V, p. 123, Taf. LXXVI.
1932. » » , Wilson, Bull. U. S. Nat. Mus., Vol. 158, p. 204, Fig. 135 a—d.
1934. *Parastenhelia forficula*, Lang, Lunds Univ. Årsskr. N. F. Avd. 2. Bd. 30, p. 25.
Verbreitung: Grinnell Land, Grönland, Franz-Josephsland, Spitzbergen, Norwegen, Bohuslän, Kieler Bucht, Britische Inseln, Mittelmeer, Adriatisches Meer, Woods Hole.

Parastenhelia forficula (Claus) var. *littoralis* (Sars).

1882. *Thalestris forficula*, Thomson, Trans. New Zealand Inst., Vol. 15, p. 104, Taf. X, Fig. 16—21.
1893. » » , T. Scott, Trans. Linn. Soc. 2nd Ser., Vol. VI, Zool., p. 100, Taf. XII, Fig. 33—41.
1911. *Microthalestris littoralis*, Sars, Crust. of Norway, Vol. V., p. 369, Suppl. Taf. 11. Fig. 1.
1912. » » , Steuer, Verh. zool.-bot. Ges. Wien, 62, p. 64.
1913. » » , Farran, Proc. Roy Irish Acad. 31. Sect. 2. Nr. 45, p. 10, Taf. I, Fig. 1—4.
1921. » » , Brian, Stud. Lab. Mar. Die Quarto Dei Mille, p. 77, Taf. IX, Fig. 9—14.
1928. » *forficula*, Monard, Arch. Zool. Expér. et Générale, Bd. 67, p. 348, Fig. XVIII: 2.
1932. » *littoralis*, Wilson, Bull. U. S. Nat. Mus., Vol. 158, p. 205, Fig. 136 a—b.
1934. *Parastenhelia forficula* var. *littoralis*, Lang, Lunds Univ. Årsskr. N. F. Avd. 2. Bd. 30, p. 25, Fig. 49—56.
Verbreitung: Norwegen, Irland, Banyuls, Adriatisches Meer, Guinea Bucht, Neu-Seeland, Campbell-Insel, Woods Hole.

Parastenhelia hornelli Thompson et A. Scott.

1903. *Parastenhelia hornelli*, Thompson et A. Scott, Ceylon Pearl Oyster Fisheries, Part I, Roy. Soc., p. 263, Taf. VII, Fig. 1—10.
1903. *Parastenhelia similis*, Thompson et A. Scott, Ceylon Pearl Oyster Fisheries, Part I, Roy. Soc., p. 264, Taf. X, Fig. 8—14.
Verbreitung: Ceylon.

Parastenhelia anglica Norman et T. Scott.

1905. *Parastenhelia anglica*, Norman et T. Scott, Ann. Mag. Nat. Hist. Ser. 7, Vol. XV, p. 289.
Verbreitung: Cornwall.

Parastenhelia gracilis Brady.

1910. *Parastenhelia gracilis*, Brady, Deutsche Südpol.-Exped. 1901—1903, Vol. XI. Zool. III, p. 513, Textfig. VIII: 1—5.

1912. *Parastenhelia antarctica*, T. Scott, Trans. Edinburgh Roy. Soc. Vol. XLVIII (1913), p. 561, Taf. IV, Fig. 25—33.

Verbreitung: Kerguelen, Süd-Orkneys, Falklandsinseln.

Species incerta sedis:

1910. *Parastenhelia tenuis*, Brady, Deutsche Südpol.-Exped. 1901—1903, Vol. XI. Zool. III. p. 514, Textfig. IX.

Bestimmungstabelle.

A. Weibchen.

1. Enp. P. 1 nicht 2-mal so lang wie Exp. . . . . 2.
» » 2-mal so lang wie Exp. . . . . . *P. anglica* Norman et T. Scott.
2. 2. Glied Exp. P. 1 wenigstens 3-mal so lang wie 3. Glied . . . . 3.
» » » nicht oder nur wenig länger als 3. Glied . . . . *P. hornelli* Thompson et A. Scott.
3. Innere Borste Enp. P. 1 sitzt nahe an der Basis . . . . . [*P. forficula* (Claus)] 4.
» » » » » beinahe in der Mitte . . . . . *P. gracilis* Brady.
4. Endglied P. 5 mit 8 Borsten . . . . *P. forficula* s. str.
» » » 6 » . . . . *P. forficula* var. *littoralis* (Sars).

B. Männchen.

1. Enp. P. 3 läuft in einen Dorn aus; äusserer Rand ohne Bewehrung . . . . [*P. forficula* (Claus)] 2.
Enp. P. 3 trägt apical 1 feine und 1 grobe Borste; an der äusseren unteren Ecke sitzt 1 grober Dorn . . . . *P. hornelli* Thompson et A. Scott.
2. Obere äussere Borste Endglied P. 5 kürzer als die nächst folgende . . . . *P. forficula* s. str.
Obere äussere Borste Endglied P. 5 länger als die nächst folgende . . . . *P. forficula* var. *littoralis* (Sars).

Parastenhelia gracilis Brady.

Die beiden mir vorliegenden Individuen stimmen so gut mit der Beschreibung Bradys überein, dass kein Zweifel über die Identität herrscht. Das letzte Glied des 3. Endopoditen trägt aber 1 kleine und 2 lange innere Borsten (Fig. 37).

Fundort und Material: St. 42. Falklandsinseln, Berkeley Sund, Port Louise, $^6/_8$ 1902. 2♀♀.

Verbreitung: Süd-Orkneys, Falklandsinseln.

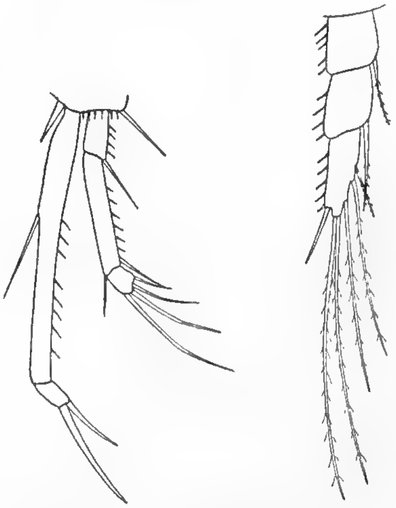

Fig. 36—37. *Parastenhelia gracilis* Brady. — Fig. 36. P. 1 ♀. — Fig. 37. Enp. P. 3 ♀.

Diosaccidae.

Amphiascus Sars.

Amphiascus falklandiensis n. sp.

Weibchen: Körper schlank. Abdomen wenig verschmälert. Cephalothorax etwa so lang wie die 4 folgenden Segmente zusammen. Rostrum gross, vorspringend. Auge fehlt. Abdominalsegmente ventral mit einigen Dornen latero-caudal. Furcaläste breiter als lang. 1. Antenne 8-gliedrig (Fig. 38). 2. Antenne mit 3-gliedrigem Exopoditen (Fig. 39).

1. Beinpaar mit 3-gliedrigen Ästen. 1. Endopoditenglied länger als der Exopodit. 3. Endopoditenglied länger als 2. Glied.

2. bis 4. Beinpaar (Fig. 40—41) ohne innere Borste am 1. Exopoditenglied.

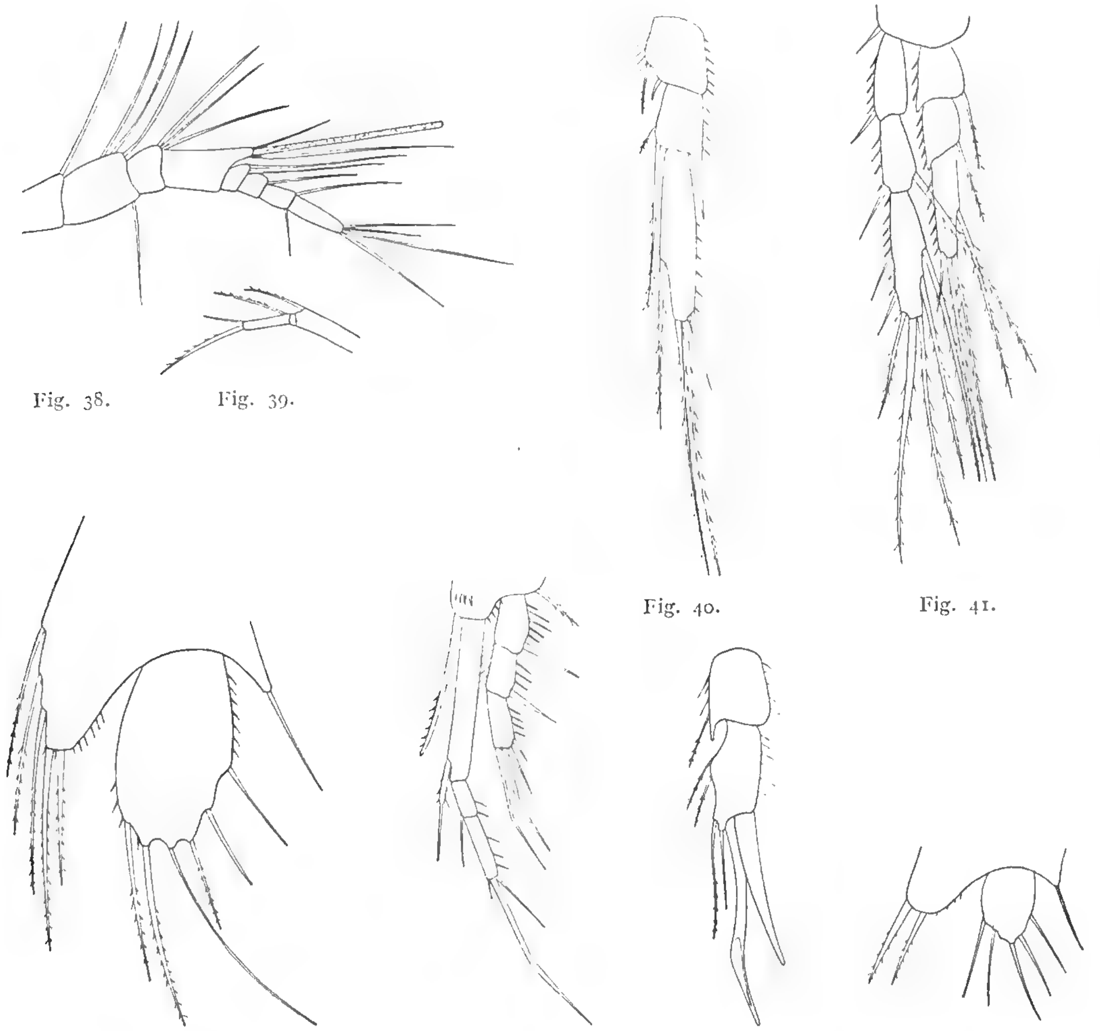

Fig. 38. Fig. 39. Fig. 40. Fig. 41. Fig. 42. Fig. 43. Fig. 44. Fig. 45.

Fig. 38—45. *Amphiascus falklandiensis* n. sp. — Fig. 38. A. 1 ♀. — Fig. 39. Exp. A. 2 ♀. — Fig. 40. Enp. P. 2 ♀. — Fig. 41. P. 4 ♀. — Fig. 42. P. 5 ♀. — Fig. 43. P. 1 ♂. — Fig. 44. Enp. P. 2 ♂. — Fig. 45. P. 5 ♂.

Borstenformel:

Glied	Exopodit			Endopodit		
	1	2	3	1	2	3
P. 2	0	1	1·2·3	1	2	1·2·1
P. 3	0	1	1·2·3	1	1	2·2·1
P. 4	0	1	2·2·3	1	1	1·2·1

5. Beinpaar (Fig. 42). Endglied etwa 2-mal so lang wie breit mit 6 Borsten.

Männchen: 1. Beinpaar (Fig. 43) mit der inneren Borste des Basalgliedes sehr lang. 2. Endopodit transformiert (Fig. 44). 5. Beinpaar (Fig. 45) klein, mit 2 Borsten am Basal- und 5 Borsten am Endglied.

Bemerkung. Unter den von MONARD unterschiedenen Gruppen steht diese Art der *Typhlops*-Gruppe am nächsten, obwohl sie den Vertreter einer neuen Gruppe — die ich *Paratyphlops*-Gruppe nennen will — darstellt. Die Art ist *A. sinuatus* SARS sehr ähnlich, weicht aber von dieser in vielen Merkmalen ab.

Fundort und Material: St. 30. Süd-Georgien, Cumberland Bucht, Grytviken. 1—8 m. Felsen mit Stein und Kies. $^{12}/_{6}$ 1902. 1 ♀.

St. 42. Falklandsinseln, Berkeley Sund, Port Louise. $^{6}/_{8}$ 1902. 12 ♀♀, 4 ♂♂.

Amphiascus gracilis n. sp.

1910. *Amphiascus minutus* BRADY, Deutsche Südpol.-Exp. 1901—1903. XI. Zool. III, p. 546, Textfig. XXXVI: 1—6.

Weibchen: Körper langgestreckt, gleich breit. Cephalothorax etwa so lang wie die 3 folgenden Segmente zusammen. Rostrum gross, vorspringend. Auge vorhanden. Abdominalsegmente dorsal und ventral glatt, aber lateral mir Dornengruppen. Furcaläste breiter als lang. Innere Furcalborste an der Basis verbreitert, etwa 2-mal so lang wie die äussere Borste. 1. Antenne 8-gliedrig mit den folgenden Verhältniszahlen der Glieder:

$$\frac{1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8}{10 \cdot 14 \cdot 7 \cdot 10 \cdot 4 \cdot 6 \cdot 5 \cdot 8}.$$

2. Antenne mit 3-gliedrigem Exopodit (Fig. 46).

1. Beinpaar (Fig. 47) mit dem 1. Endopoditenglied länger als den Exopodit.

2. bis 4. Beinpaar (Fig. 48—50). 2. und 3. Endopodit so lang wie die entsprechenden Exopoditen. Der 4. Endopodit erreicht kaum die Mitte des 3. Exopoditengliedes.

Borstenformel:

Glied	Exopodit			Endopodit		
	1	2	3	1	2	3
P. 2	1	1	2·2·3	1	2	1·2·1
P. 3	1	1	2·2·3	1	2	3·2·1
P. 4	1	1	3·2·3	1	1	2·2·1

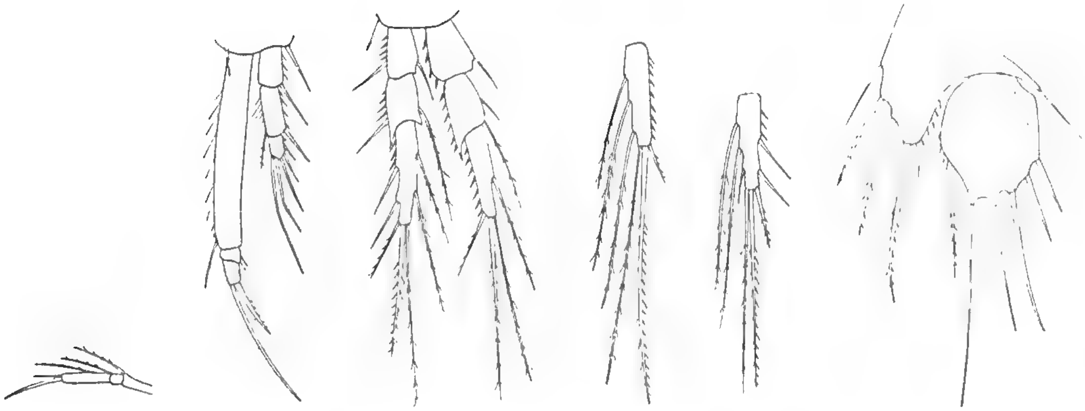

Fig. 46. Fig. 47. Fig. 48. Fig. 49. Fig. 50. Fig. 51.

Fig. 46—51. *Amphiascus gracilis* n. sp. — Fig. 46. Exp. A. 2 ♀. — Fig. 47. P. 1 ♀. — Fig. 48. P. 2 ♀. — Fig. 49. Endglied Enp. P. 3 ♀. — Fig. 30: Endglied Exp. P. 4 ♀. — Fig. 51. P. 5 ♀.

5. Beinpaar (Fig. 51). Das Basalglied erreicht etwa die Mitte des Endgliedes und trägt 5 Borsten, von denen die äussere sehr klein ist. Das Endglied ist breit oval und trägt 6 Borsten.

Grösse 0.7 mm.

Bemerkung. Die hier beschriebene Art ist von Brady (1910 p. 546, Textfig. XXXVI) als *A. minutus* (Claus) angeführt worden. Sowohl aus dem Bau des 1. und 5. Beinpaares als auch aus dem Aussehen der Furcalborsten geht jedoch hervor, dass sie nicht mit dieser Art identisch ist. Die Art gehört der *Cinctus*-Gruppe an und steht *A. fucicolus* T. Scott am nächsten.

Fundort und Material: St. 30. Süd-Georgien, Cumberlandbucht, Kochtopfbucht. 1—8 m. Felsen mit Stein und Kies. $^{12}/_{6}$ 1902. 2 ♀♀.

Verbreitung: Gauss-Station; Süd-Georgien.

Amphiascus south-georgiensis n. sp.

Weibchen: Körper langgestreckt mit schlankem Abdomen. Cephalothorax etwa so lang wie die 3 folgenden Segmente zusammen. Rostrum gross, vorspringend. Abdominalsegmente ventral mit Dornen nahe an hinterem Rande. Furcaläste etwa so lang wie breit. 1. Antenne 8-gliedrig mit den folgenden Verhältniszahlen der Glieder:

$$\frac{1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8}{15 \quad 11 \quad 9 \quad 9 \quad 5 \quad 9 \quad 6 \quad 8}.$$

2. Antenne mit 3-gliedrigem Exopoditen (Fig. 52).

1. Beinpaar mit dem Exopoditen kürzer als das I. Glied des Endopoditen. 2. Glied des Exopoditen etwa 2-mal so lang wie das 1. Glied. 3. Glied mit 4 Dornen und 1 langen Borste. 3. Glied des Endopoditen mit 2 apicalen Klauen, von denen die innere am längsten ist.

2. bis 4. Beinpaar wie bei *A. cinctus* (Claus).

Borstenformel:

Glied	Exopodit			Endopodit		
	1	2	3	1	2	3
P. 2	1	1	2 · 2 · 3	1	2	1 · 2 · 1
P. 3	1	1	3 · 2 · 3	1	2	3 · 2 · 1
P. 4	1	1	3 · 2 · 3	1	1	2 · 2 · 1

5. Beinpaar (Fig. 53). Das Basalglied reicht über die Mitte des Endgliedes hinaus und trägt 5 Borsten. Das Endglied ist rund und trägt 6 Borsten.

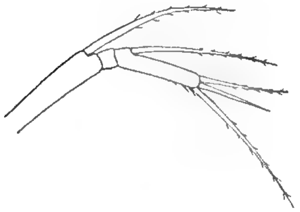

Fig. 52.

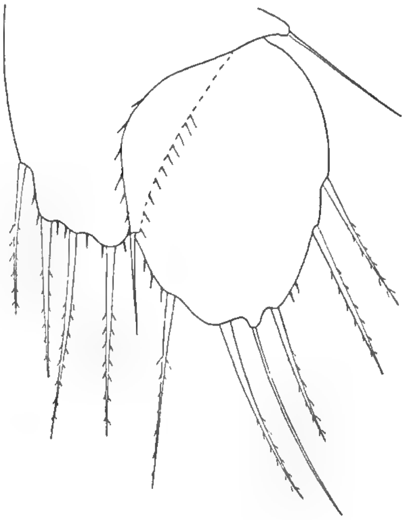

Fig. 53.

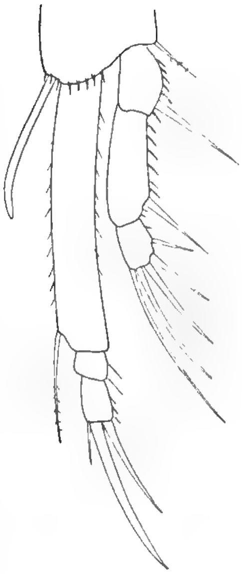

Fig. 54.

Fig. 55.

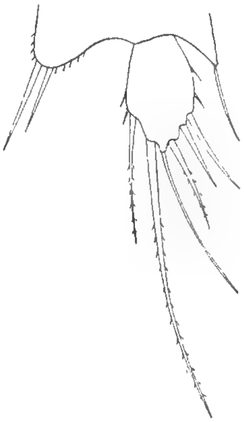

Fig. 56.

Fig. 52—56. *Amphiascus south-georgiensis* n. sp. — Fig. 52. Exp. A. 2 ♀. — Fig. 53. P. 5 ♀. — Fig. 54. P. 1 ♂. — Fig. 55. Enp. P. 2 ♂. — Fig. 56. P. 5 ♂.

Grösse 1.2 mm.

Männchen: Abdominalsegmente ventral mit Dornen nahe am hinteren Rande. 1. Beinpaar (Fig. 54) etwa wie bei *A. cinctus*. 2. Endopodit transformiert (Fig. 55). 5. Beinpaar (Fig. 56) mit 2 Borsten am Basal- und 6 Borsten am Endglied.

Bemerkung. Diese Art scheint *A. cinctus* am nächsten zu stehen, unterscheidet sich aber von dieser durch den Bau des Exopoditen der 2. Antenne und das Aussehen des 1. und 5. Beinpaares sowie durch die Grösse. Das Männchen weicht vor allem im Bau des 2. Endopoditen von *cinctus* ab.

Fundort und Material: St. 27. Süd-Georgien, ausserhalb der Kochtopfbucht, 54° 22′ s. Br.-36° 27′ w. L. 20 m. *Macrocystis*-Formation. $^{21}/_{5}$ 1902. 9 ♀♀, 4 ♂♂.

Canthocamptidae.

Mesochra Boeck.

Mesochra nana Brady, 1910.

1910. *Mesochra nana*, Brady, Deutsche Südpol.-Exped. 1901—1903. XI. Zool. III, p. 522, Textfig. XIV: 1—6.

Brady (1910 p. 522—523) gibt an, dass die 1. Antenne bei dieser Art 7-gliedrig ist, und dass das 5. Glied einen langen Sinneskolben trägt. Brady zeichnet auch (l. c. Textfig. XIV, Fig. 2) die Antenne in dieser Weise. Eine der Angaben Bradys muss jedoch irrig sein. Entweder ist die Antenne 6-gliedrig und Brady hat ein Basalglied zu viel gezeichnet oder sie ist 7-gliedrig, jedenfalls muss aber der Sinneskolben am 4. Glied sitzen.

Nach Brady (l. c. Fig. 5) trägt das Endglied des 3. Exopoditen nur 2 äussere Randdornen, aber 3 innere Randborsten. Er hat zwar nur 2 innere Randborsten gezeichnet, aber eine Einkerbung nahe an der Basis des Gliedes deutet darauf hin, dass dort noch 1

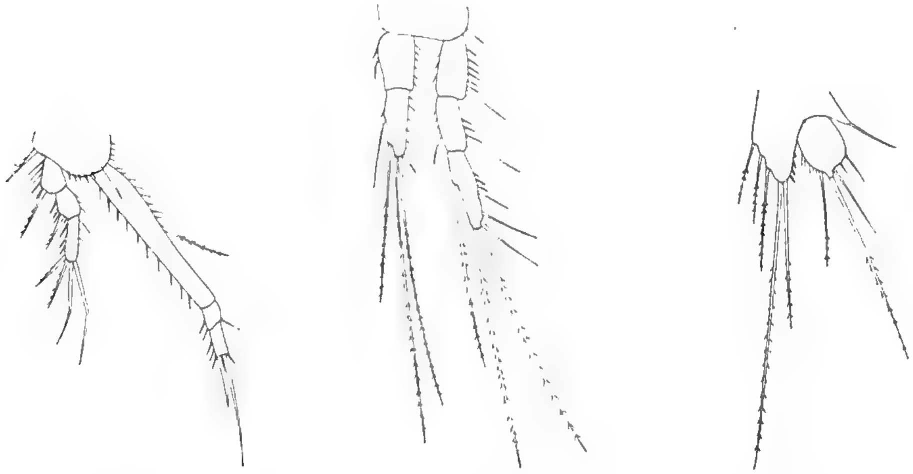

Fig. 57. Fig. 58. Fig. 59.

Fig. 57—59. *Mesochra nana* Brady. — Fig. 57. P. 1 ♀. — Fig. 58. P. 2 ♀. — Fig. 59. P. 5 ♀.

Borste vorhanden ist. Wahrscheinlich sind die Borsten in der Zeichnung Bradys nach innen verschoben.

Mir liegen 2 Weibchen vor, die zweifellos mit Bradys Art identisch sind (Fig. 57—59). Die 1. Antenne ist 7-gliedrig und der Sinneskolben geht vom 4. Gliede aus. Sämtliche Endglieder der Exopoditen tragen 3 äussere Randdornen. Die Beschreibung Bradys sei folgendermassen ergänzt. Rostrum klein, aber vorspringend. Abdominalsegmente lateral mit Dornen.

Furcaläste etwa so lang wie breit. Borstenformel:

Glied	Exopodit			Endopodit	
	1	2	3	1	2
P. 2	0	1	1 · 2 · 3	1	2 · 2 · 1
P. 3	0	1	2 · 2 · 3	1	2 · 2 · 1
P. 4	0	1	2 · 2 · 3	1	2 · 2 · 1

Fundort und Material: St. 42. Falklandsinseln, Berkeley Sund, Port Louise, $^6/_8$ 1902. 2 ♀♀.
Verbreitung: Kerguelen; Falklandsinseln.

Laophontidae.

Laophonte Philippi.

Laophonte gracilipes Brady, 1910.

1910. *Laophonte gracilipes*, Brady, Deutsche Südpol.-Exped. 1901—1903. XI. Zool. III, p. 526, Textfig. XVIII:1—9.

Mir liegen 5 Weibchen und 2 Männchen einer Art vor, die sehr gut mit der Beschreibung Bradys von *L. gracilipes* übereinstimmen (Fig. 60—67). Zu der Beschreibung Bradys sei folgendes ergänzend zugefügt.

2. Antennenglied nicht so kurz und breit, wie Brady es zeichnet. Wie ich an meinen Tieren festgestellt habe, muss Brady die Antenne in schräger Stellung gezeichnet haben. Endglied des 1. Exopoditen trägt 4 Borsten.

Borstenformel:

Glied	Exopodit			Endopodit	
	1	2	3	1	2
P. 2	0	1	1 · 2 · 3	0	2 · 2 · 0
P. 3	0	1	2 · 2 · 3	0	2 · 2 · 1
P. 4	0	1	2 · 2 · 3	0	1 · 2 · 1

5. Beinpaar beim Weibchen (Fig. 61) mit grossem, breitem Basalglied, das 4 Borsten trägt. Endglied mit 5 Borsten, von denen die zweitäussere sehr klein ist.

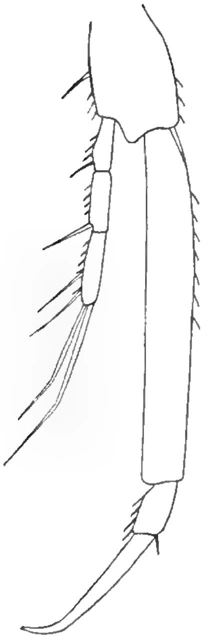

Fig. 60.

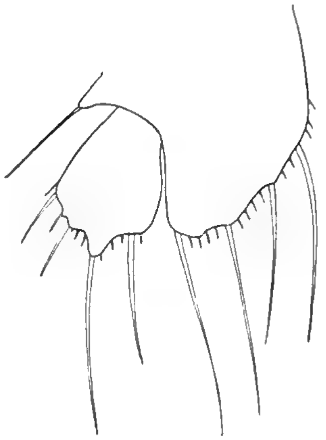

Fig. 61.

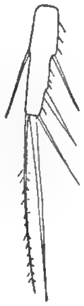

Fig. 62.

Fig. 63.

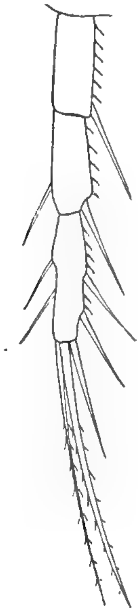

Fig. 64.

Fig. 65.

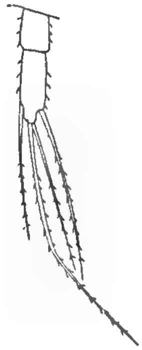

Fig. 66.

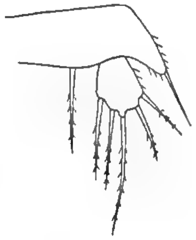

Fig. 67.

Fig. 60—67. *Laophonte gracilipes* BRADY. — Fig. 60. P. 1 ♀. — Fig. 61. P. 5 ♀. — Fig. 62. Endglied Exp. P. 2 ♂. — Fig. 63. Enp. P. 2 ♂. — Fig. 64. Exp. P. 3 ♂. — Fig. 65. Enp. P. 3 ♂. — Fig. 66. Enp. P. 4 ♂. — Fig. 67. P. 5 ♂.

Das Männchen weicht von der Beschreibung BRADYS nur im Bau des 2. Endopoditen geringfügig ab (Fig. 63) (vgl. BRADY l. c. Fig. 7).

Fundort und Material: St. 42. Falklandsinseln, Berkeley Sund, Port Louise, 6/8 1902. 5 ♀♀, 2 ♂♂.

Verbreitung: Kerguelen; Falklandsinseln.

Laophonte campbelliensis LANG.

1934a. *Laophonte campbelliensis*, LANG, Lunds Univ. Årsskr. N. F. Avd. 2. Bd. 30. Nr. 14, p. 44, Fig. 115—125.

Fundort und Material: Feuerland. 15/3 1902. 2 ♀♀, 1 ♂.

Verbreitung: Campbell-Insel; Feuerland.

Laophonte cornuta Philippi var. **dentioperculata** n. var.

Diese Varietät unterscheidet sich von der Hauptart dadurch, dass das Analoperculum mit 2 bis 3 kleinen Zähnen versehen ist (Fig. 68 a—b). Im übrigen stimmt sie vollständig mit der Hauptart überein.

Fig. 68 a.

Fig. 68 b.

Fig. 68a—b. *Laophonte cornuta* Philippi var. *dentioperculata* n. var. Analoperc.

Fundorte und Material: St. 42. Falklandsinseln, Berkeley Sund, Port Louise, $^6/_8$ 1902, 17 ♀♀, 6 ♂♂; Ser. V. St. 44. $^9/_8$ 1902. Falklandsinseln. Berkeley Sund, Port Louise, 1 ♀. St. 47. Falklandsinseln. Port Louise. Mündung des Carenage Creek. 51° 32′ s. Br.-58° 7′ w. L. Schalen und Stein. $^9/_8$ 1902. 1 ♀.

Laophonte pauciseta n. sp.

Weibchen: Alle Körpersegmente stark abgesetzt. Cephalothorax etwa so lang wie die 4 folgenden Segmente zusammen. Rostrum kurz. 1. Antenne 7-gliedrig mit den folgenden Verhältniszahlen der Glieder: $\frac{1 \quad 2 \quad 3 \quad 4 \; 5 \; 6 \; 7}{10 \cdot 10 \cdot 10 \cdot 5 \cdot 5 \cdot 5 \cdot 8}$. Furcaläste (Fig. 69) wenig länger als breit. Exopodit der 2. Antenne mit 4 Borsten.

1. Beinpaar (Fig. 70) mit 2-gliedrigen Exopoditen. 2. Exopoditenglied etwa 2-mal so lang wie 1. Glied. Endopoditen mit je 1 langen Klaue.

2. bis 4. Beinpaar (Fig. 71—73) mit sehr kleinen inneren Exopoditenborsten.

Borstenformel:

Glied	Exopodit			Endopodit	
	1	2	3	1	2
P. 2	0	1	1·2·3	0	1·2·0
P. 3	0	0	1·2·3	0	1·2·1
P. 4	0	0	0·2·3	0	1·2·0

5. Beinpaar (Fig. 74). Endglied oval mit 6 Borsten. Das Basalglied erreicht etwa die Mitte des Endgliedes und trägt 5 Borsten.

Männchen: 1. Antenne etwa wie bei *L. cornuta* Philippi 2. bis 4. Beinpaar (Fig. 75—77) transformiert. 1. Glied des 2. Exopoditen länger als das 2. Glied. Endglied mit 4 sehr starken Dornen und 2 kleinen inneren Randborsten. 2. Endopodit mit langem, nach innen

Fig. 69.

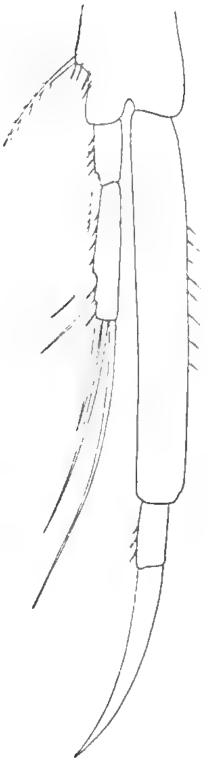

Fig. 70.

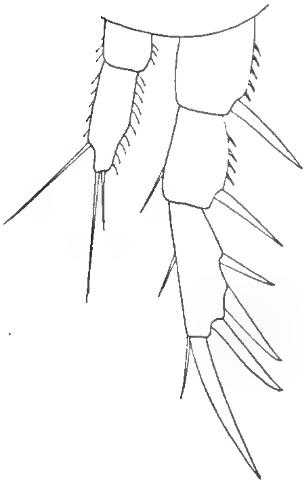

Fig. 71.

Fig. 72.

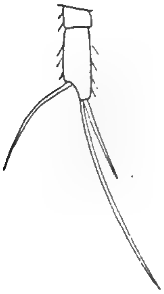

Fig. 73.

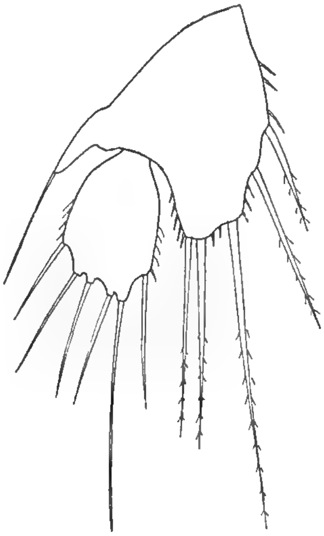

Fig. 74.

Fig. 69—78. *Laophonte pauciseta* n. sp. — Fig. 69. Fu. ♀. — Fig. 70. P. 1 ♀. — Fig. 71. P. 2 ♀. — Fig. 72. Enp. P. 3 ♀. — Fig. 73. Enp. P. 4 ♀. — Fig. 74. P. 5 ♀.

gerichtetem Dorn an der Innenseite des Endgliedes. Letztes Glied des 3. und 4. Exopoditen mit je nur 1 inneren Borste.

5. Beinpaar (Fig. 78) klein, 1-gliedrig, mit 4 Borsten.

Bemerkung. Diese Art scheint *L. discophora* WILLEY am nächsten zu stehen, unterscheidet sich aber von ihr im Bau des 1. Exopoditen, des 5. weiblichen Beinpaares und des 2. und 3. männlichen Beinpaares.

Fundorte und Material: St. 14 a. Süd-Georgien. Cumberlandbucht. 1. m. Stein. $^{23}/_{4}$ 1902. 1 ♀, 1 ♂.

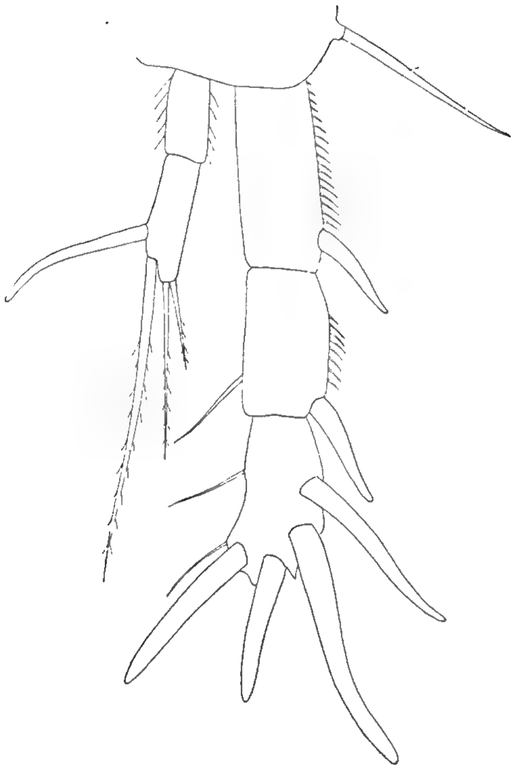

Fig. 75.

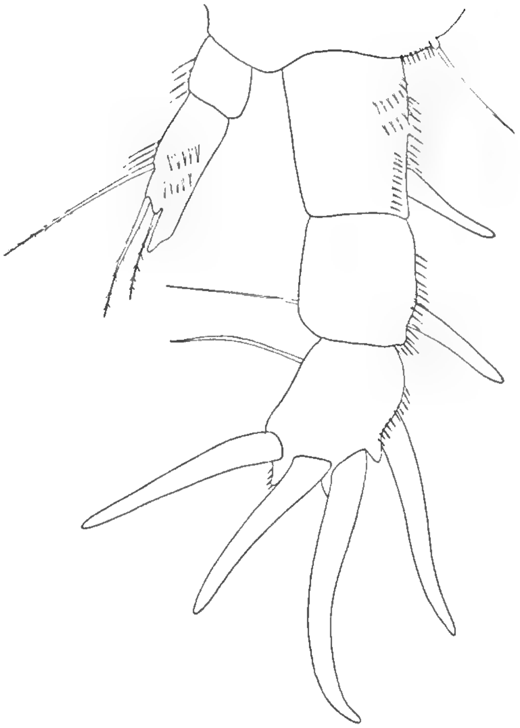

Fig. 76.

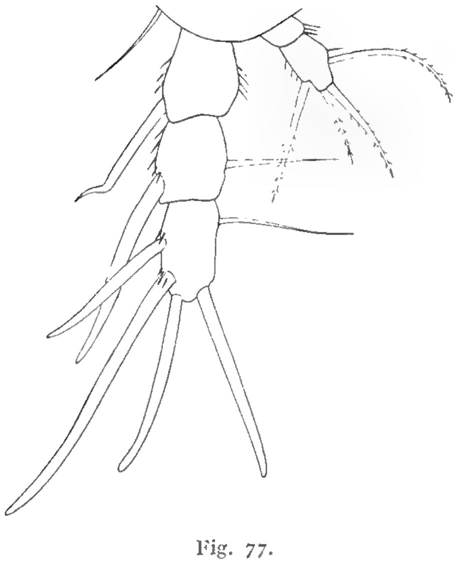

Fig. 77.

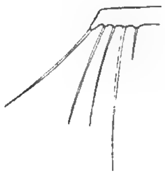

Fig. 78.

Fig. 75—78. *Laophonte pauciseta* n. sp. — Fig. 75. P. 2 ♂. — Fig. 76. P. 3 ♂. — Fig. 77. P. 4 ♂. — Fig. 78. P. 5 ♂.

Laophontodes T. Scott.

Laophontodes armatus n. nom.

1930. *Laophonte echinata,* Willey, Ann. Mag. Nat. Hist. Ser. 10, Vol. VI, p. 109, Fig. 68—73.

Es unterliegt keinem Zweifel, dass die mir vorliegende Art mit der von Willey beschriebenen identisch ist (Fig. 79—90). Die Beschreibung Willeys ist aber ganz fehler-

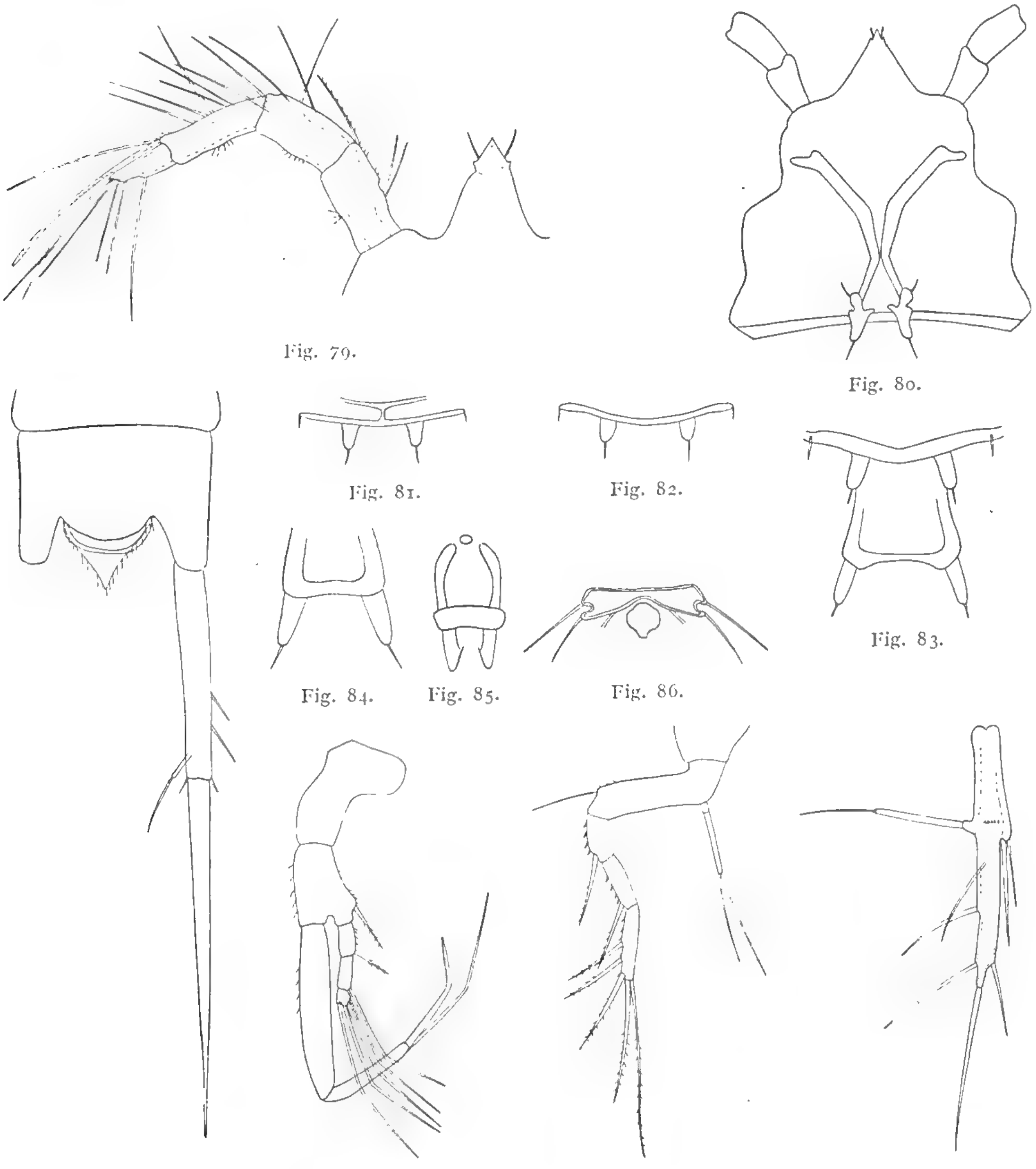
Fig. 79. Fig. 80. Fig. 81. Fig. 82. Fig. 83. Fig. 84. Fig. 85. Fig. 86. Fig. 87. Fig. 88. Fig. 89. Fig. 90.

Fig. 79—90. *Laophontodes armatus* n. nom. — Fig. 79. Rostrum und A. 1 ♀. — Fig. 80. Cephalothorax ♀. — Fig. 81. Das Ornament des 1—3. Thoracalsegmentes ♀. — Fig. 82. Das Ornament des 4. Thoracalsegmentes ♀. — Fig. 83. Das Ornament des Genitalsegmentes ♀. — Fig. 84. Das Ornament des 2. Abdominalsegmentes ♀. — Fig. 85. Das Ornament des 3. Abdominalsegmentes ♀. — Fig. 86. Genitalfiel ♀. — Fig. 87. Fu. ♀. — Fig. 88. P. 1 ♀. — Fig. 89. P. 2 ♀. — Fig. 90. P. 5 ♀.

haft. Der 1. Exopodit (Fig. 88) ist 3-gliedrig und das Endglied trägt 1 Klaue und 1 Borste. Sämtliche Endopoditen des 2. bis 4. Beinpaares (Fig. 89) sind 2-gliedrig und tragen je 2 terminale Borsten.

Bemerkung. Da schon BRADY (1918) einen *L. echinatus* beschrieben hat, gebe ich der Art WILLEYS den Namen *L. armatus.*

Fundorte und Material: St. 42. Falklandsinseln, Berkeley Sund, Port Louise, $^{6}/_{8}$ 1902. 1 ♀. St. 51. Falklandsinseln. Port William. 51° 40′ s. Br.-57° 42′ w. L. 22 m. Sand. $^{3}/_{9}$ 1902, 1 ♀.

Verbreitung: Bermudasinseln; Falklandsinseln.

Cletodidae.

Orthopsyllus BRADY.

Orthopsyllus linearis (CLAUS), 1866.

1866. *Lilljeborgia linearis,* CLAUS, Gesellsch. Ges. Naturw. Marburg, Suppl. Bd. 9. p. 22, Taf. II, Fig. 1—8.

Bei den mir vorliegenden Individuen sind die beiden Glieder des 5. Beinpaares deutlich getrennt (Fig. 91—92).

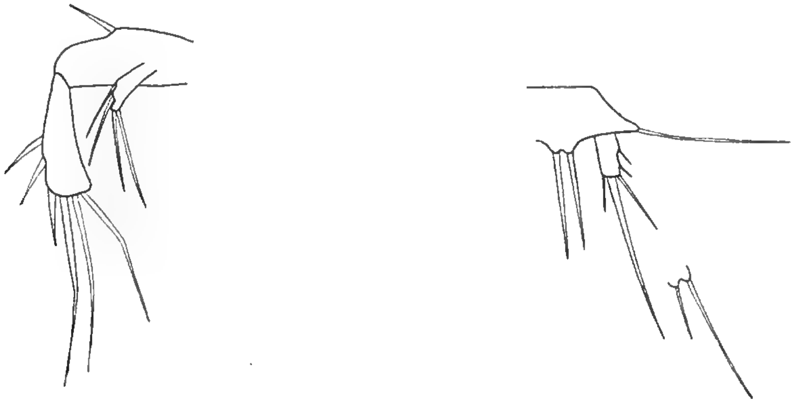

Fig. 91. Fig. 92.

Fig. 91—92. *Orthopsyllus linearis* (CLAUS). — Fig. 91. A. 2 ♀. — Fig. 92. P. 5 und P. 6 ♂.

Fundorte und Material: St. 21. Süd-Georgien. Possession-Bucht. 54° 8′ s. Br.-37° 3′ w. L. 200 m. Bodentemp. + 1.5°. Ton. $^{9}/_{5}$ 1902. 1 ♀. St. 42. Falklandsinseln, Berkeley Sund, Port Louise, $^{6}/_{8}$ 1902. 1 ♂.

Verbreitung: Norwegen, Britische Inseln, Frankreich, Mittelmeer, Suez-Kanal, Guinea Bucht, São Thomé Inseln, Ceylon, Obi Inseln, Süd-Orkneys, Süd-Georgien, Falklandsinseln.

NACHSCHRIFT.

Nach Fertigstellung meines Manuskripts erschien eine Arbeit von WILLEY (1935), in der u. a. folgende Arten von den Bermudas-Inseln erwähnt werden: *Dactylopusia brevicornis* (CLAUS) f. *insolita* nov., *D. falcifera* n. sp., *D. tisboides* CLAUS, *Parawestwoodia purpurea* GURNEY, *Phyllothalestris mysis* (CLAUS) f. *harringtoni* nov. und *Rhynchothalestris rufocincta* (NORMAN).

LITERATUR.

1845. BAIRD, W., Natural History of British Entomostraca. — Trans. Berw. Nat. Club. II.
1864. BOECK, A., Oversigt over de ved Norges Kyster iagttagne Copepoder henhörende til Calanidernes, Cyclopidernes og Harpacticidernes Familier. — Forh. i Videnskabs-Selsk. i Christiania 1864—1865.
1872. — Nye Slaegter og Arter af Saltvandscopepoder. — Ibid. 1872.
1875. BRADY, G. S., Note on Entomostraca from Kerguelen's Land and the South Indian Ocean. — Ann. Mag. Nat. Hist. Ser. 4. Vol. 16.
1879. — Entomostraca. — Philos. Trans. Roy. Soc. London. Extra Vol. 168.
1883. — Report on the Copepoda obtained by H. M. S. Challenger the years 1873—76. — The Voyage of H. M. S. Challenger. Zool. Vol. VIII.
1899. — On the Marine Copepoda of New Zealand. — Trans. Zool. Soc. London. Bd. 15, 1901.
1903. — On Copepoda and other Crustacea taken in Ireland and on the North East Coast of England. — Trans. Nat. Hist. Soc. Newcastle-on-Tyne. Bd. 14. 1897—1903.
1905. — On Copepoda and other Crustacea taken off Northumberland and Durham in July, 1904. — Trans. Nat. Hist. Soc. Newcastle-on-Tyne. 2nd Ser. Bd. 1. 1904—1907.
1910. — Die marinen Copepoden. I. — Deutsche Südpolar-Expedition 1901—1903. XI. Zool. III.
1918. — Copepoda. — Australasian Antarctic Expedition 1911—1914. Ser. C. Vol. V. Part. 3.
1873. BRADY, G. S., et ROBERTSON, Contributions to the Study of the Entomostraca. — Ann. Mag. Nat. Hist. Ser. 4. Vol. XII.
1921. BRIAN, A., I copepodi harpacticoidi del Golfo di Genova. — Genova 1921.
1923. — Descrizione della Parathalestris Clausi NORM. n. var. spectabilis mihi. — Monitore Zool. Ital. Bd. 34.
1927. — Descrizione di specie nuove o poco conoscuite di copepodi bentonici del mare Egeo. — Bull. Mus. Zool. e Anat. Comparata della R. Univ. di Genova. Vol. VII. Nr. 18.
1928. — I Copepodi Bentonici marini. — Arch. Zool. Ital. 12. N. S. 2.
1929. CHAPPUIS, P. A., Die Unterfamilie der Canthocamptinae. — Arch. f. Hydrob. Bd. XX.
1863. CLAUS, C., Die frei lebenden Copepoden. — Leipzig.
1866. — Die Copepodenfauna von Nizza. — Gesellsch. Ges. Naturw. Marburg. Suppl. Bd. 9.
1868. CZERNIAVSKI, Materialia ad Zoogr. Pont. comparatam., Bas. Geneal. Crust. — Trudy 1. Sězda russkich estesivoispytatelej.

1855. Dana, J. D., Crustacea of the United States Explor. Exped.

1891. Edwards, C. L., Beschreibung einiger neuen Copepoden. — Arch. f. Naturg. Jahrg. 57.

1913. Farran, G. P., A Biological Survey of Clare Island. Marine Entomostraca. — Proc. Roy. Irish Acad. Vol. 31, Sect. 2. Nr. 45.

1929. — British Antarctic (»Terra Nova«) Expedition, 1910. Nat. Hist. Rep. Zool. Vol. VIII, No. 3. Crustacea. Part X. Copepoda.

1860. Fischer, S., Beiträge zur Kenntniss der Entomostraceen. — Abh. Mat. Phys. Classe d. Bayer Akad. d. Wissensch. Bd. 8.

1902. Giesbrecht, W., Résultats du Voyage du S. Y. Belgica en 1897—1898—1899. Copepoden.

1927. Gurney, R., Zoological Results of the Cambridge Expedition to the Suez Canal, 1924. XXXIII. Report on the Crustacea: Copepoda (Littoral and Semi-parasitic). — Trans. Zool. Soc. London. Bd. 22. 1926—1929.

1932. — British Fresh-Water Copepoda. Vol. II. — Roy. Soc. London.

1934a. Lang, K., Marine Harpacticiden von der Campbell-Insel und einigen anderen südlichen Inseln. — Lunds Univ. Årsskr. N. F. Avd. 2. Bd. 30. Nr. 14.

1934b. — Harpacticiden aus dem Mittelmeer. — Kungl. Fysiogr. Sällsk. i Lund Förh. Bd. 5. Nr. 9.

1935. — Über Umfang und systematische Stellung einiger Harpacticidengenera. — Ibid. Bd. 5. Nr. 21.

1924. Monard, A., Note sur quelques formes nouvelles d'harpacticides marins de la région de Banyuls. — Bull. Soc. Zool. France. 49.

1927. — Synopsis universalis generum Harpacticoidarum. — Zool. Jahrb. Abt. Syst. Bd. 54. 1928.

1928a. — Les Harpacticoides Marins de Banyuls. — Arch. Zool. expér. et générale. Tome 67.

1928b. — Le genre Amphiascus (Copépodes Harpacticoides). — Rev. Suisse Zool. Tome 35. Nr. 19.

1932. Monod T. et Dollfus, R., Sur quelques animaux rapportés par E. Aubert de la Rue des îles australes (Kerguelen et St.-Paul). — Bull. Soc. Zool. France. 57.

1903. Norman, A. M., New Generic Names for some Entomostraca and Cirripedia. — Ann. Mag. Nat. Hist. Ser. 7. Vol. 11.

1905. Norman, A. M. et Scott, T., Crustacea Copepoda new to Science from Devon and Cornwall. — Ann. Mag. Nat. Hist. Ser. 7. Vol. 15.

1906. — The Crustacea of Devon and Cornwall. — London.

1928. Pesta, O., Eine Crustaceenausbeute aus Süd-Georgien (Antarktis). — Ann. Naturhist. Mus. Wien.

1930. — Notiz zu einer Dredge-Probe mariner Copepoden aus Südgeorgien (Antarktis). — Senckenbergiana. Bd. 12.

1932. — Harpacticoida. — Tierwelt Deutschlands, 24. Teil.

1840. Philippi, A., Zoologische Bemerkungen. — Arch. f. Naturg.

1843. — Beobachtungen über die Copepoden des Mittelmeeres. — Ibid.

1920. Quidor, M. A., Copépodes. — Expédition Antarctique Française (1903—1905).

1905. Sars, G. O., Pacifische Plankton-Crustaceen. — Zool. Jahrb. Abt. Syst. Bd. 21.

1909. — Report of the Second Norwegian Arctic Expedition in the »Fram« 1898—1902. No. 18. Crustacea.

1903—1911. Sars, G. O., Crustacea of Norway. V. Copepoda Harpacticoida.

1909. Scott, A., The Copepoda of the Siboga Expedition. — Leiden 1909.

1893. Scott, T., Report on the Entomostraca from the Gulf of Guinea, collected by John Rattray. — Trans. Linn. Soc. Zool. 2 Series. Bd. VI, 1894.

1894. — Additions to the Fauna of the Firth of Forth. — 12th Ann. Rep. Fish. Board for Scotland.

1898. — Report on the Marine and Freshwater Crustacea from Franz-Josef Land. — Journ. Linn. Soc. Zool. Vol. XXVII. 1899—1900.

1903. — Notes on some Copepoda from the Arctic Seas. — Ann. Mag. Nat. Hist. Ser. 7. Vol. 11.

1906. — A Catalogue of Land, Fresh-Water, and Marine Crustacea found in the Basin of the River Forth and its Estuary. Part II. — Proc. Roy. Phys. Soc. Edinburgh. Vol. 16. Nr. 7.

1912. — The Entomostraca of the Scottish National Antarctic Expedition 1902—1904. — Edinburgh Roy. Soc. Trans. XLVIII. 1913.

1914. — Remarks on some Copepoda from the Falkland Islands collected by Mr. Rupert Vallentin. — Ann. Mag. Nat. Hist. Ser. 8. Vol. 13.

1895. SCOTT, T. et A., On some new and rare Crustacea from Scotland. — Ibid. Ser. 6. Vol. 15. No. 85, 90.

1898. SCOTT, T. et A., Descriptions of three apparently new Copepods from the Clyde. Ibid. Ser. 7. Vol. 1.

1910. SHARPE, R. W., Notes on the Marine Copepoda and Cladocera of Woods Hole and adjacent Regions, including a Synopsis of the Genera of the Harpacticoida. — Proc. U. S. Nat. Mus. Vol. 38. Washington. 1911.

1903. THOMPSON, I. C. et SCOTT, A., Report on the Copepoda. — Ceylon Pearl Oysters Fisheries and Marine Biology. Part 1. Roy. Soc.

1882. THOMSON, G., On the New Zealand Copepoda. — Trans. and Proc. of the New Zealand Instit. Vol. XV. Wellington 1883.

1935. WILLEY, A., Harpacticoid Copepoda from Bermuda. Part II. — Ann. Mag. Nat. Hist. Ser. 10. Vol. XV.

1925. WILSON, C. B., New North American Parasitic Copepods, new Hosts, and Notes on Copepod Nomenclature. — Proc. U. S. Nat. Mus. Vol. 64.

FURTHER ZOOLOGICAL RESULTS
OF THE SWEDISH ANTARCTIC EXPEDITION
1901—1903

UNDER THE DIRECTION OF DR. OTTO NORDENSKJÖLD

EDITED BY SIXTEN BOCK

VOL. III, No. 4.

ASCIDIACEA

PART I

BY

A. ÄRNBÄCK-CHRISTIE-LINDE

WITH 4 PLATES AND 11 TEXT-FIGURES

STOCKHOLM
P. A. NORSTEDT & SÖNER
1938

Wissenschaftliche Ergebnisse
der
Schwedischen Südpolarexpedition
1901—1903.

Unter leitung von

Prof. Dr. O. NORDENSKJÖLD

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CONTENTS.

INTRODUCTION.

When the material brought back by the Swedish Antarctic Expedition (1901—1903) was distributed among the investigators, the collection of Ascidians was sent to Professor HARTMEYER of Berlin for examination. But serious illness prevented him from undertaking the work, and the collection remained without attention for many years. After HARTMEYER's death in 1923, it was returned to the Stockholm Riksmuseum without any communication from his hand. Afterwards it was entrusted to me for examination.

The present paper, representing the first part of the work, covers two families of the Ptychobranchian Ascidians, namely *Molgulidae* and *Pyuridae*, and further the Dictyobranchian Ascidians of the collection, the families *Rhodosomatidae*, *Agnesiidae* and *Ascidiidae*.

A new genus, a new subgenus and 7 new species have been established. *Paracynthia* is a Pyurid genus with the species *distincta*. Of the same family one more new species, *Pyura echinops*, has been described. Of the *Molgulidæ* three new species, *Molgula malvinensis*, *M. setigera*, and *M. angulata*, and also a new forma of the species *Paramolgula gigantea*, f. *capax*, have been established. Of the interesting family *Agnesiidae* a new subgenus, *Caenagnesia*, with a peculiar new species, *Caenagnesia bocki*, has been established. That is the first Agnesiid collected in Antarctic waters. Of the *Ascidiidæ* a new species, *Ascidia dispar*, has been distinguished.

The rest of the material, namely the Ptychobranchian family *Styelidae* incl. the rich finds of Polyzoid Ascidians, and further the abundant collection of Krikobranchian genera and species, will be dealt with in the second part of the work.

A summary of the zoogeographical results cannot be given until the investigation of the whole collection has been completed.

I should like to take this opportunity of expressing my sincere thanks to the Director of the Evertebrate Department, Professor Dr. SIXTEN BOCK, for the continuous interest he has taken in the progress of my work.

LIST OF SPECIES.

- Order Ptychobranchia.
  - Family Molgulidae.
    - Genus Molgula FORBES.
      - *M. malvinensis* n. sp.
      - *M. setigera* n. sp.
      - *M. angulata* n. sp.
      - *M. bacca* HERDMAN.
    - Genus Paramolgula TRAUSTEDT.
      - *P. gigantea* CUNNINGHAM f. *typica.*
      - *P. gigantea* CUNNINGHAM f. *capax* n. f.
    - Genus Ascopera HERDMAN.
      - *A. gigantea* HERDMAN.
      - *A. pedunculata* HERDMAN.
  - Family Pyuridae.
    - Genus Paracynthia n. gen.
      - *P. distincta* n. sp.
    - Genus Pyura MOLINA.
      - *P. echinops* n. sp.
      - *P. discoveryi* HERDMAN.
      - *P. legumen* LESSON.
      - *P. georgiana* MICHAELSEN.
      - *P. turqueti* SLUITER.
- Order Dictyobranchia.
  - Family Rhodosomatidae.
    - Genus Corella ALDER & HANCOCK.
      - *C. eumyota* TRAUSTEDT.
  - Family Agnesiidae.
    - Genus Agnesia MICHAELSEN.
      - Subgenus *Caenagnesia* n. subgen.
        - *C. bocki* n. sp.
  - Family Ascidiidae.
    - Genus Ascidia v. LINNÉ.
      - *A. translucida* HERDMAN.
      - *A. challengeri* HERDMAN.
      - *A. dispar* n. sp.

SYSTEMATIC NOTES AND DESCRIPTIONS OF SPECIES.

Order **Ptychobranchia.**

Family **Molgulidae.**

Molgula malvinensis n. sp.

Pl. 1, figs. 1—3. Text-fig. 1.

Occurrence.

Falkland Islands, Port Louis, Greenpatch, close by the bridge, 51° 33′ S—58° 9′ W, in front of the inner border of the Macrocystis zone, at a depth of a few metres, stone and algae, 3 sps. (July 28 1902).

Description.

External appearance. The body is transversely oval in shape, somewhat compressed laterally. The surface of the test bears irregular hair-like processes, most of which are short and most conspicuous around the siphons. To these processes a great quantity of gravel and shell fragments adheres (fig. 3).

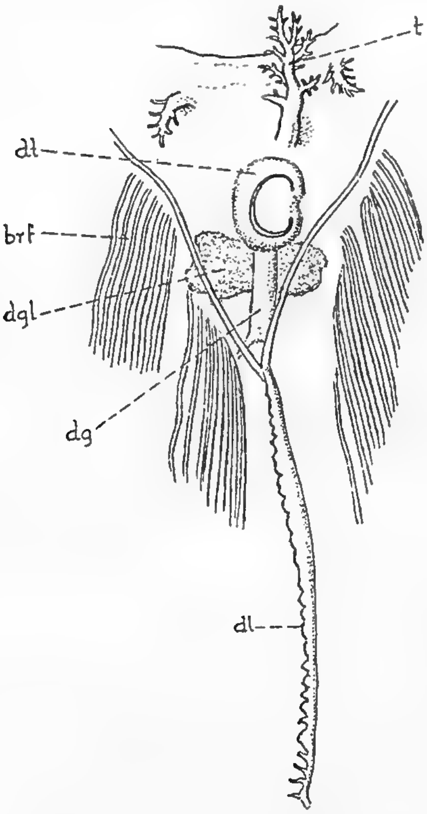
The siphons are drawn in and hidden by a furrow-like fold of the test, which forms a few irregular thick lobes surrounding them (cf. fig. 3). The siphons are a short distance apart, the atrial in the middle line (fig. 1). The specimens appear to have been attached to loose gravel or sand.

The largest of the three specimens in the collection measures 23 mm in length and 17 mm in height, the second largest 21 × 14 mm, and the third and smallest specimen 12 × 9 mm.

Internal structure. The mantle is thick and not transparent. The mantle musculature is strongly developed on both sides of the body, forming a coat enclosing the inner organs, which is easily removed in preserved specimens. It consists of irregularly arranged muscle bands with numerous short transverse bundles, and the sphincters around the siphons are strongly developed. Short broad longitudinal muscle bundles are seen radiating from the siphons.

The tentacles are finely branched. They are about 14 in number and of various sizes, only 5 of them being large. A few rudiments of tentacles are also present (text-fig. 1).

The aperture of the dorsal tubercle is C-shaped, and the opening between the horns is turned to the left. The dorsal ganglion is situated in the angle of the peripharyngeal band, and the dorsal gland is crossed by its branches; the gland in the specimen illustrated is rather large and visible on both sides of the ganglion (text-fig. 1). In an other specimen it is less developed.



Text-fig. 1. *Molgula malvinensis* n. sp. Dorsal region of anterior end of body, from inside. × 14.
brf. Branchial fold dg. Dorsal ganglion.
dgl. Dorsal gland. dl. Dorsal lamina.
dt. Dorsal tubercle. t. Tentacle.

On the greater part of the dorsal lamina the margin is bluntly serrate; posteriorly it bears small triangular teeth.

The branchial sac exhibits a peculiar structure, having six folds on the left side and seven on the right; the folds are well developed, with 10—11 longitudinal vessels each, except the 6th fold on the left side, along the endostyle, which has about 5 longitudinal vessels only. On the interspaces between the folds there is one longitudinal vessel. On both sides of the endostyle and the dorsal lamina respectively, it runs near the basis of the folds and is not easily distinguished from the vessels of the folds.

The stigmata are mostly small and short and rather irregularly arranged on the interspaces between the folds, their arrangement becoming concentric on the infundibula under the folds. The transverse vessels are of various orders; between each pair of the first order there are two infundibula. Small papillae are present on the branchial wall here and there between the folds.

The stomach is elongated and externally not conspicuonsly marked off from the intestine. A thick glandular mass, the "liver", consisting of numerous rounded caeca, covers a considerable part of its mesial side, i. e. the side next to the branchial sac, and is also visible on the outer side of the cardiac part (figs. 1—2).

The intestine forms a loop, whose branches are rather widely separated for some distance from the reflected end, which is bent up dorsally. The loop forms a deep angular curve, wide open dorsally. The intestine then approaches its proximal part and the stomach, along which it runs. The distal part of the rectum is curved, ending at the base of the atrial siphon. The margin of the anus is smooth (cf. fig. 1).

One of the most striking characteristics of this species is exhibited by the gonads. They are distinguished by their peculiar position and unusual length. The left one is bent round the intestinal loop; its distal end is sharply curved forward, ending at the base of the atrial siphon (fig. 1). The right gonad is bent round the kidney, enclosing almost its whole length except the posterior part. The distal end of the gonad is curved in the direction of the atrial siphon (fig. 2). Each gonad consists of an elongated, central ovary, bordered by the testicular glands. The eggs contained in the ovary are small and few, and the testicular lobes appear to be devoid of sperma. The ovaries both open in long wide oviducts at the base of the atrial siphon. The numerous vasa efferentia can be seen on the inner surface of the ovary; they unite to form a stout vas deferens, which runs along the ovary on the side next to the branchial sac. It opens in a long duct not far from the oviduct, as is shown in figs. 1—2.

The kidney is large, with a bean-shaped outline, being very slightly curved, with the concavity dorsal.

Remarks.

So far as the literature goes, there is no *Molgula* species described which can be regarded as closely allied to *Molgula malvinensis*, either in Antarctic waters or elsewhere. Owing to the peculiar shape and position of the gonads, it is easily recognized, the left gonad exhibiting the best distinguishing feature.

In some forms of *Molgula* a similar condition of the right gonad might occur, but then that of the left side does not show any aberration with regard to the usual condition, being situated in the second bend of the intestinal loop, and, as a rule, not being very long. Such a condition is met with in the *arenata* group, in which the right gonad is bent round the anterior end of the kidney (cf. ÄRNBÄCK 1928), for instance in *Molgula impura* HELLER from the Mediterranean, and *M. occidentalis* TRAUSTEDT from the West Indian region and the Florida coasts (TRAUSTEDT 1883; VAN NAME 1921). It might be noted that in *M. occidentalis* too the left gonad is of great length, being U-shaped, as is shown in the figures given, and with both branches situated in the second bend of the intestine.

Other peculiar features in *M. malvinensis* are the structure of the branchial sac, the toothed margin of the dorsal lamina, the strongly developed mantle musculature. Owing to the above-mentioned peculiarities, especially the structure and shape of the gonads and the branchial sac, *M. malvinensis* and its allies seem to require a separate position, being perhaps the representatives of a subgroup of the genus *Molgula*. But a more comprehensive material is necessary before such a suggestion can be definitely advanced.

Molgula setigera n. sp.

Pl. 1, figs. 4—8. Text-fig. 2.

Occurrence.

Falkland Islands: Port Louis, Greenpatch, close by the bridge, 51° 33′ S—58° 9′ W, in front of the inner border of the Macrocystis zone, at a depth of a few metres, stone and algæ, 3 sps. (July 28 1902). — Stanley Harbour, 51° 42′ S—57° 50′ W, 10 m, mud with shells, 2 sps. (September 3 1902).

Description.

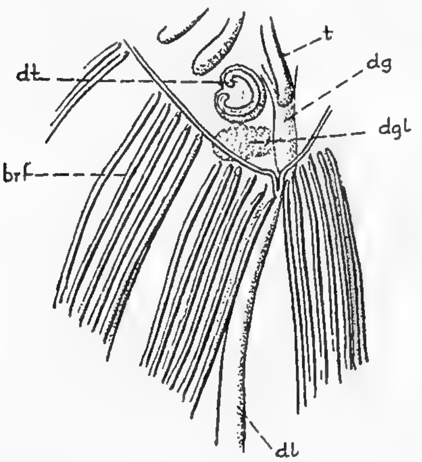
External appearance. This species is easily recognized by its peculiar external aspect, the surface of the test being more or less densely provided with long bristle-like hairs. (figs. 4—5.) In the largest specimen in the collection these processes form something like a bristly coating, which covers almost the whole body, except the basal side; in the others they are more sparsely arranged on the sides of the body, but around the siphons they form long tufts (fig. 5). Besides these bristles, the test bears an abundant growth of short, hair-like processes, to which sand and shell fragments adhere. The siphons are in the shape of short protuberances, covered with numerous small papillæ. They are difficult to discern, projecting very little and being hidden by the long bristles surrounding them. They are rather widely separated, being situated near the anterior and posterior edges of the body respectively.

The body is of almost globular shape, or ovate, somewhat flattened on the basal side. The attachment of the body appears to be to loose gravel and shells, possibly algae, the basal side being flattened and without bristles.

The two largest specimens measure 20 × 15 mm and 18 × 13 mm respectively; the three others are much smaller in size.

Internal structure. The mantle is thin but firm, and the mantle musculature well developed. Its arrangement is seen from figs. 6—7. On the area around the siphons it consists, as usual, of radiating and circular bundles, which continue on the sides of the body. The longitudinal bands are strong and broad, passing into delicate bundles on the basal region of the body; the transverse muscles are rather slender.

The tentacles are of various sizes; 16 larger ones alternate with a few of very small size. The former are long and with broad membranes; they are finely branched, being three times compound (fig. 8). The dorsal tubercle is situated to the right of the dorsal ganglion. The aperture is horseshoe-shaped with the horns bent a little inward. The opening between the horns is directed to the right. The dorsal gland and the dorsal ganglion are visible, for the most part, anterior to the pharyngeal band, which does not form a deep angle in this species, only a short fold, from which the dorsal lamina extends.



Text-fig. 2. *Molgula setigera* n. sp. Dorsal region of anterior end of body, from inside. × 7.

brf. Branchial fold.	dg. Dorsal ganglion.
dgl. Dorsal gland.	dl. Dorsal lamina.
dt. Dorsal tubercle.	t. Tentacle.

The dorsal lamina is represented by a broad membrane, and extends beyond the oesophageal mouth. Its margin is smooth, except in the posterior part, where the margin is irregularly laciniate (text-fig. 2).

The branchial sac has seven folds on each side, bearing stout longitudinal vessels, 7—10 in number; on the 7th fold, that on either side of the endostyle, there are 5 vessels only.

No intermediate vessels are to be distinctly seen. The transverse vessels are of various sizes. On the interspaces between the folds occur short irregular interstigmatic vessels. The stigmata are short and rather wide, almost straight, or only slightly curved, arranged in low infundibula under the folds.

The alimentary canal is of great length. The intestinal loop is nearly horizontal in position; only the anterior end shows a slight bend upwards; it is narrow, the branches being in contact with each other for a great part of its length. The stomach and the rectum form nearly a right angle with the intestine. A large branched gland or liver is developed around the upper part of the stomach, visible a little on the outer side. The margin of the anus is smooth and slightly recurved (fig. 6).

The gonads are, as usual, situated above the intestinal loop and the kidney respectively. That of the right side is somewhat bent down against the kidney at the ventral end, as appears from fig. 7. The ovary forms the central part of each gonad. It is situated on the inner side, bordered by testicular glands and visible only in a small part on the outer side of the gonad. The testis covers the outer side of the gonad. The oviduct and the vas deferens are attached to the inside of the mantle and directed to the base of the atrial siphon. They are of uncommon length, and their openings are widely separated from each other; the oviduct opens at a short distance from the anus, and the vas deferens at a short distance from the end of the gonad, a little way from the base of the oviduct, in a long narrow papilla.

The kidney is slightly curved and about as long as the right gonad.

Remarks.

This species is very unlike a *Molgula* in external appearance. At first glance it would much more readily be referred to the *Pyuridae,* similar long bristle-like processes of the test being often met with in Pyurid forms, though apparently more spine-like. When in the Molgulids the test is provided with processes, which is very common, they are usually root-like or hair-like, and foreign material often adheres to them. Such processes occur also in *M. setigera,* as was mentioned above. The bristle-like covering occurs in all five specimens in the collection and is most probably constant. It seems to be characteristic of this species and might be of use in distinguishing it from other *Molgula* forms.

With respect to the internal structure, the branchial sac, the gonads, and also the alimentary canal, exhibit peculiar features, and, so far as I can see, these peculiarities, external and internal, are not found combined in any other form yet described from cold or warm waters.

Molgula angulata n. sp.

Pl. 1, figs. 9—11. Text-fig. 3.

Occurrence.

Antarctic, Graham region, at Paulet Island, 63° 36′ S—55° 48′ W, 100—150 m, gravel and stone, 1 sp. (January 15 1902).

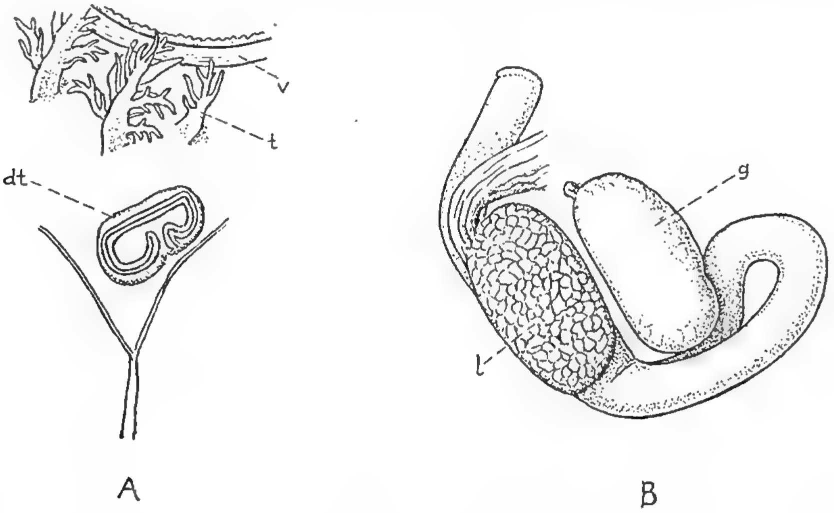
Description.

External appearance. This small *Molgula* was attached to a Synoicid colony, and is represented in the collection by a single specimen. The body is of rounded oblong outline, somewhat narrowed at the basal end. The test is thin and half transparent. Its surface is provided with rather thick processes, sparsely arranged. Around the siphons they are shorter and there form a dense coating. Except for a few sand grains adhering to the processes, the test is free from foreign matter (fig. 9).

The apertures are on low papillae which are quite conspicuous, owing to the densely arranged processes which cover their surface. They are widely separated, being situated at a distance of about 9 mm from each other.

The specimen measures 15 × 15 mm.

Internal structure. The mantle is thin, allowing the viscera to be clearly seen. The musculature of the mantle consists of a layer of transverse muscles, which are rather slight; between the siphons and around them, the muscle bundles are stronger and more closely situated. The longitudinal muscle bands are slender and extend a long way on the sides of the body (cf. figs 10—11).



Text-fig. 3. *Molgula angulata* n. sp.
A. Dorsal region of anterior end of body, from inside. × 15.
B. Alimentary canal and left gonad, mesial side. × 4.
dt. Dorsal tubercle. g. Gonad. l. Liver. t. Tentacle. v. Velum.

The larger tentacles number about 14 of various sizes, 4 of them being very large and of great length, and about 7 much smaller ones are placed between the former. The larger ones are twice compound with long slender branches, the small ones are unipinnate. Anterior to the tentacles there is a distinct oral velum (text-fig. 3 A).

The aperture of the dorsal tubercle is horseshoe-shaped, but narrow and transversely elongated, with the horns a little bent inward. The opening between the horns is directed obliquely to the left.

The dorsal lamina is a broad membrane with an uneven, undulating margin.

The branchial sac has seven folds on each side. The longitudinal vessels on each fold are stout, but few, about 11 in number; on the 7th fold not quite as many. The intermediate vessels number about 1—2. The stigmata are apparently short and straight, with a concentric arrangement under the folds. As the tissues of the branchial sac are greatly contracted, further details could not be exactly made out.

The alimentary canal is long and has a characteristic bend of the intestine at right-angles (cf. fig. 10). The position of the intestinal loop is almost vertical, the reflected end being directed upwards. The sides of the loop are separated for a short distance near the reflected end, but are elsewhere close and overlapping. Especially on the mesial side of the stomach i. e. the side next to the branchial sac, there is a thick glandular mass, the "liver", consisting of numerous small caeca, part of it being visible on the outer side (text-fig. 3 B). The rectum is bent almost at right-angles to the intestine. The anus has a smooth, thickened margin.

The reproductive organs are represented by two compact gonads, one on each side, in the usual positions in the angle of the intestinal loop and dorsal to the kidney (figs. 10—11). The left gonad has a dorso-ventral direction, the right gonad lies almost horizontal. The ovary has a central position on the outer side of the gonad, bordered by testicular lobes. The part of the gonad adjacent to the branchial sac is occupied by the large testis. The oviduct is conspicuons, as is shown in figs. 10—11; the vas deferens was not distinctly observable.

The kidney is of considerable size, not quite as long as the right gonad, and has a slight curvature.

Remarks.

In his work on the Antarctic Ascidians, HARTMEYER (1911) called attention to the resemblances between *Molgula maxima* SLUITER and three species described by HERDMAN, namely *M. pedunculata*, *M. concomitans*, and *M. hodgsoni*. Later (1914) SLUITER combined them under the name *M. pedunculata*, which is the oldest specific name. It seems probable that *M. angulata* is closely allied to this species or group of species, but not identical with it. This suggestion is based on several points of agreement and disagreement in the internal structure and in the external appearance, to a certain degree.

In comparing them, the description and figures of *M. maxima* given by HARTMEYER are especially taken into account. In both forms the branchial sac has 7 folds on each side, but the number of their longitudinal vessels differs as also the number of the intermediate vessels. The opening of the dorsal organ is horseshoe-shaped in both, but in *M. maxima* the horns are spirally inrolled; in *M. angulata* they are in-curved; moreover the ratio length to breadth is reversed, as is seen from the figures given.

The number of the tentacles is not the same, nor is the way of branching. In the former species they are about 16 in number, of various sizes, and greatly branched; in the latter 20 or a few more, the largest ones being bipinnate.

The alimentary canal in *M. maxima* as described by HARTMEYER, shows great variation in shape and position; this is also the case with the gonads. And in these essential points the dissimilarity is striking. As to the intestine, the characteristic angular bend occurring in *M. angulata* is wanting. With respect to the gonads, the position of the left one is dissimilar; in this point there may be greater agreement with the condition shown in HERDMAN's figure of *M. hodgsoni*, which is identical with *M. maxima*, according to SLUITER (HERDMAN 1910).

It may be added that the species *M. pedunculata* s. *M. maxima* comprises stalked forms as well as stalkless forms. So far as one can judge from the single specimen in the collection, *M. angulata* is a stalkless form. In the individual examined no trace of a stalk occurs, the specimen being attached by the side to the test of an other Ascidian. The study of a larger material is, however, necessary for an amplification of our knowledge of this interesting form with respect to both internal and external structure.

Molgula bacca HERDMAN 1910.

Text-fig. 4.

Syn. *Caesira bacca*, HARTMEYER 1911.

Occurrence.

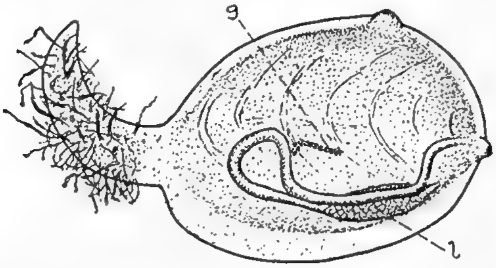
Antarctic, Graham region, S. E. of Seymour Island, 64° 20′ S—56° 38′ W, 150 m, sand and gravel, 1 sp. (January 16 1902).

Further Distribution.

Antarctic: Mc Murdo Bay, Nat. Ant. Exp. (HERDMAN 1910). — Kaiser Wilhelm II Land, 385 m, "Gauss" exp. (HARTMEYER 1911).

Remarks.

The collection contains a specimen of *Molgula* which is identifiable without hesitation as *M. bacca*, described by HERDMAN (1910) and re-examined by HARTMEYER (1911). The condition of its external and internal organization conforms in all essential points to the results of HARTMEYER's re-examination; a few remarks only may be added.



Text-fig. 4. *Molgula bacca* HERDMAN. Left side. × 1.5. g. Gonad. l. Liver.

The specimen at my disposal exceeds in size the two specimens described previously. It measures about 27 mm in length, about 20 mm in height, baso-apically, and the length of the stalk is 15 mm. The stalk projects from the ventral side and is provided with slender processes of great length, which are entangled in a colony of a Bryozoon, to which it was attached.

The surface of the test is not quite smooth, minute processes being sparsely scattered on it. The atrial siphon is situated on the dorsal side opposite to the base of the stalk, and the branchial is at a considerable distance anterior to it (text-fig. 4).

With respect to internal anatomy, it shows some difference in that the branchial folds are higher, having about 14 longitudinal vessels each, except the 7th, which has about 8—9 vessels. The intermediate vessels are rather slender and about 3—4 in number. The aperture of the dorsal tubercle is horseshoe-shaped and less elongated than HERDMAN's figure shows, and the opening between the horns is directed obliquely to the left. The dorsal ganglion and the gland are placed dorsally to the tubercle.

The tentacles are of 5 orders and branched, except those of the 5th order, which are unbranched. The longer tentacles are about 16 in number. Anterior to the tentaculated area a broad oral velum with undulating margin is to be seen.

The alimentary canal shows the typically characteristic structure and position. On the mesial side of the stomach is visible the "liver", a glandular mass of considerable extension.

The gonads are represented by a string-like ovary, about 5 mm in length, on each side, situated in the concavity of the intestinal loop and dorsal to the kidney. The anterior end of the left ovary adheres to the reflected end of the intestinal loop; the testis was hardly developed on either side. The kidney is large, about 8 mm in length, and decidedly curved.

On examining the type specimen of *M. bacca*, HERDMAN admitted "some superficial resemblance" to an Arctic species, *Pera pellucida* STIMPSON (syn. *Molgula chrystallina* MÖLLER, *M. griffithsi* MAC LEAY). He did not recognize the close relationship between the two forms; according to him they could not even be placed in the same genus, owing to the difference in the number of folds in the branchial sac, the Arctic species having five folds and the Antarctic one seven folds.

Later HARTMEYER got an opportunity of re-examining a specimen of *M. bacca*, dredged by the German Antarctic Expedition. He pointed out that this species agrees with *M. griffithsi* MAC LEAY — the modern name of *Pera pellucida* STIMPSON — in all essential anatomical points; according to him the difference in the number of the branchial folds is to be considered of specific, not generic, value, a view which has been accepted by modern Ascidiologists. Consequently he considered *M. bacca* to be closely allied to the Arctic *M. griffithsi* (syn. *M. chrystallina*), which, according to him, offers "ein schönes Beispiel bipolarer Verbreitung". (l. c. p. 416).

In discussing the relationship between the two above-mentioned species, an anatomical detail in the structure of the branchial sac in *M. griffithsi* might be of interest, namely the occurrence of a surnumerary longitudinal vessel on the right side, running on the row of infundibula situated between the first fold and the dorsal lamina. In my paper on the Northern and Arctic Molgulids in the Riksmuseum collection, I have stated that this vessel is present in all examined specimens in the collection and may probably represent the vestigial trace of a fold, indicating ancestors provided with a number of folds exceeding 5 on each side (cf. ÄRNBÄCK 1928, p. 48). In this species there is a series of more or less developed infundibula on either side of the endostyle and dorsal lamina respectively, but they bear no vessels, except the series on the right side of the dorsal lamina, which has one, the above-mentioned surnumerary vessel. HUNTSMAN is of opinion that the three other series of spirally arranged stigmata also represent folds, though they are insignificant in comparison with the others, which possess from three to four vessels. He states that in *M. griffithsi* "there are in reality more than ten folds. In fact there are fourteen rows of infundibula, and therefore fourteen folds", which, as we know, is the number occurring in *M. bacca*.

Though it does not seem to be impossible that this interpretation of HUNTSMAN's might point in the right direction, his conclusion as to fourteen folds in *M. griffithsi* appears a little too bold, since intermediate forms to prove it still remain to be found. And I am not inclined to apply it in judging of the relationship between the two above-mentioned species, since at present no forms are known bridging over the disparity in the number of the developed branchial folds. Owing to this difference, they are regarded in the present paper as distinct, but closely allied, species, agreeing in essential anatomical points: in the general shape, the presence of a stalk, the position of the siphons. The result of my re-examination thus agrees with that arrived at by HARTMEYER, as appears from what is said above, and no doubt the relationship between the two forms favours the view of bipolar distribution.

There is, however, a statement of HARTMEYER on the phylogenetic position of *M. griffithsi* (syn. *M. chrystallina*), to which I cannot agree without further evidence. He writes: "Phylogenetisch dürfen wir die Formen mit nur 5 Falten wohl als die ursprünglicheren ansehen. Bei der nordischen Art ist die Entwicklung des Kiemensackes über dieses primitivere Verhalten, das sich übrigens auch in der geringeren Anzahl der inneren Längsgefässe auf den Falten äussert, nicht hinausgelangt, während die antarktische Form in diesem Organ den höchsten Organisationsgrad ihrer Gattung, nämlich jederseits 7 Falten, erreicht hat, mit deren Ausbildung auch eine beträchtliche Steigerung der Zahl der Längsgefässe Hand in Hand ging." (l. c. p. 416).

Molgula bacca is no doubt to be reckoned among the most specialized species of the genus, owing to the great differentiation, especially of the branchial sac. That is also the case with *M. griffithsi*, apart from the low number of the branchial folds and the longitudinal vessels on them. The question is then, whether this difference in the development of the branchial sac is due to a progression, as HARTMEYER states, or a reduction. It will not be discussed in this paper whether the above statement of HARTMEYER is right in principle, only whether it is appliable in judging of the relation between the two species in question. In my opinion, the facts adduced above seem hardly to favour HARTMEYER's view, but rather the contrary one, i. e., that in *M. griffithsi* there is a vestigial trace of a fold, indicating an origin from forms with more than ten folds and with a greater number of longitudinal vessels. The presence of only a few vessels on the folds in *M. griffithsi* seems to accord with the assumption that a reduction has taken place in the northern species.

In the present specimen of *M. bacca* the number of longitudinal vessels on the folds is 14, but in the two examples known before, there are not so many — not exceeding 7 in HARTMEYERS's specimen, 6 in that examined by HERDMAN. This discrepancy might be referred, in the former case, to the smaller size of the individual, which measures 19 × 11 mm. The specimen examined by HERDMAN is larger, measuring 22 × 16 mm, thus not quite equal in size to the present specimen. The statement that there are only 6 vessels is perhaps not correct. We have reason to presume that HERDMAN may have counted the vessels of one side of the folds only, as is his wont in other cases. If so, there might be little difference between his species and the present one. HERDMAN has also noted that there are three vessels between the folds, which agrees with the condition in the specimen at my disposal. Another explanation of the above-mentioned difference is possible, namely that the number of the vessels may vary — which is not uncommon in the Molgulids — though not so greatly as in the forms here dealt with.

Molgula bacca is a rare species, being known at present in three specimens only. It is probably a deep-water form; the present specimen was collected at a depth of 150 m, the specimen obtained at Kaiser Wilhelm II Land, at a depth of 385 m. For that described from Mc Murdo Bay, the type specimen, HERDMAN does not give any information as to the depth.

HERDMAN also described one more *Molgula* species from Mc Murdo Bay, namely *M. longicaulis*. It was obtained in a single specimen in none too good a condition, which might have rendered the identification difficult. So far as one can judge from the description and figures given by HERDMAN, it does not exhibit the characteristics of *Molgula*, but rather those of *Ascopera*. In external appearance and internal structure it agrees with the members of this genus. HARTMEYER (1911) was the first to question the systematical position of this specimen, and later the author himself (1923) stated that it was possible that, as HARTMEYER suggested, *Molgula longicaulis* ought to be placed in the genus *Ascopera* rather than in *Molgula*.

Paramolgula gigantea CUNNINGHAM 1871 f. **typica.**

Pl. 3, figs. 24—28.

Syn. *Cynthia gigantea*, CUNNINGHAM 1871. *Molgula gigantea*, HERDMAN 1881, 1882.

Occurrence.

Tierra del Fuego, Ushuaia, 10—30 m, shells and gravel, 3 sps. (March 1902).

Falkland Islands: Berkeley Sound, 51° 33′ S—58° W, 16 m, bottom temp. + 2.75°, gravel and shells with algae, 5 sps. (July 19 1902); 51° 34′ S—57° 55′ W, 25 m, bottom temp. + 2.75°, sand and stone, 2 sps. (August 10 1902). — Port Louis, 51° 33′ S—58° 9′ W, 7 m, mud, 1 sp. (August 12 1902). — Port William, 51° 40′ S—57° 47′ W, 12 m, sand and gravel, 4 sps; 51° 40′ S—57° 44′ W, 17 m, sand, 1 sp. (September 3 1902). — Stanley Harbour, 51° 42′ S—57° 50′ W, 10 m, mud with shells, 1 sp. (September 3 1902).

Further Distribution.

Patagonian Bank, 41° 30′ S—52° W, 90 m (HERDMAN 1882).
Straits of Magellan, 3—5 m (MICHAELSEN 1900).
Tierra del Fuego, down to 100 m (HERDMAN 1882, MICHAELSEN 1900).
Falkland Islands, 1.8 m (MICHAELSEN 1900).

Remarks.

The specimens referred to the species *P. gigantea* are of about the same external form, as illustrated by figs. 26—27. The test shows a varying aspect, being wrinkled and with irregular protuberences in the upper part, especially around the siphons; or it may be smooth and mammillated in young specimens (figs. 24—25). In older ones it is provided with processes of various lengths, mostly short, densely arranged, and is incrusted with sand, in some specimens over the whole body, in others on the basal part. In the three specimens from Tierra del Fuego, comprised in the collection, the test looks spotted as it were, being smooth and colourless here and there (cf. fig. 27). The attachment is usually by the posterior end of the left side.

The species attains a great size. The largest individual has been obtained at Tierra del Fuego and measures 125 × 120 mm. Many of HERDMAN's specimens exceed those dimensions, the largest measuring 330 × 175 mm.

As to the internal structure, the specimens in the collection agree in the chief points with the descriptions of *P. gigantea* given by HERDMAN and MICHAELSEN. It seems to be a form of varying organization, if MICHAELSEN's list of identical species proves to be right.

Especially the species established by PIZON (1898) ought to be submitted to re-examination. According to this author the number of the tentacles is very different in the forms described by him, being 32 in *P. lebruni* and *P. rugosa*, but 8 in *P. villosa*. In *P. gigantea* they are 16, according to HERDMAN, which is the case with some of the specimens examined; in others they are 10—12 in number.

The dorsal lamina is short, the margin is uneven, but without incisures. The dorsal tubercle is large and prominent, both horns much coiled, with several turns. The dorsal ganglion is situated to the left of the tubercle (fig. 28).

The branchial sac has seven broad longitudinal vessels. The transverse vessels converge towards the dorsal lamina. In the interspaces they form an irregular network. The stigmata are irregular, arranged in small infundibula here and there between the vessels (cf. fig. 28). In large specimens they remind us of the condition shown in the figures given by TRAUSTEDT and HERDMAN for *P. gigantea* and *P. schulzei;* in young specimens they are of more regular shape and arrangement.

The alimentary canal is of typical shape; the intestinal loop is strongly curved dorsally, forming a secondary loop; the descending branch is in contact with the stomach. The "liver" is large, being composed of numerous glands, which cover the upper part of the stomach.

The gonads show the characteristic position, the left one being placed above both the primary and secondary intestinal loops, the right one dorsal to the kidney. The testis opens in a varying number of vasa deferentia — 2—3 in the specimens examined — and the number is not always the same on both sides. In *P. patagonica* there are 1—2 vasa deferentia, in *P. villosa* 4, and in *P. filholi* 1 vas deferens on either side (l. c.).

The kidney is distinctly curved in the present species.

Paramolgula gigantea CUNNINGHAM f. **capax** n. f.

Pl. 3, fig. 29. Text-figs. 5—6.

Occurrence.

Falkland Islands, Port Louis, Carenage Creek, 51° 32′ S—58° 7′ W, 1 m, sand with masses of Codium, 1 sp; 3—4 m, shells and stone, 1 sp. (August 9 1902).

Description.

External appearance. The body is irregular and sacciform in shape. The upper end is somewhat narrower than the basal end, which is wide and inflated, but little compressed laterally. It is attached by the basal side to a flat stone (cf. fig. 29). The test is leathery, thin, and tough. Its surface is finely wrinkled and shagreened, as it were, owing to very minute, short processes abundantly distributed over it. The basal part is covered with adherent foreign matter, gravel and algae. The lining of the test is smooth and glistening.

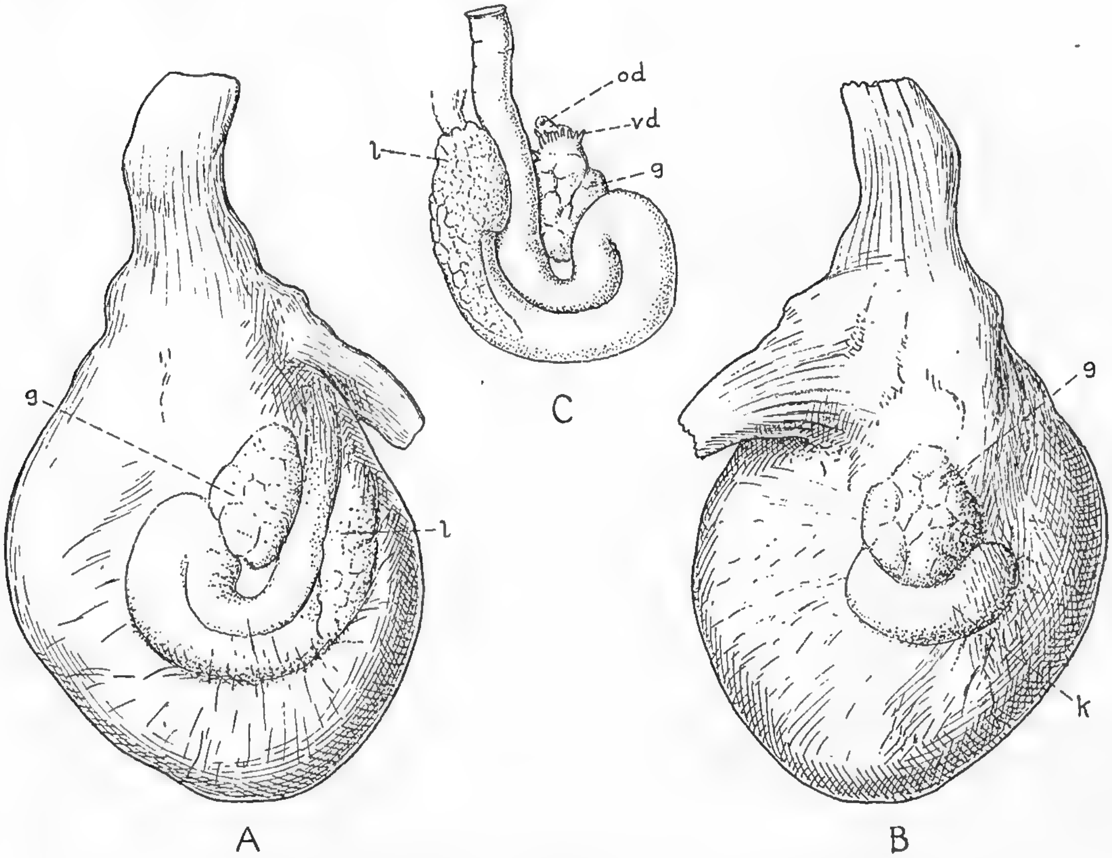
The apertures are on prominent tubular siphons; the branchial is of greater length, and has six irregular lobes; the atrial is shorter, with four fringed lobes. They are both at the upper end and about 20 mm apart.

The collection contains two specimens; one measures 77 mm in height, baso-apically, and 70 mm in breadth, dorso-ventrally; the other is somewhat larger, about 85 × 70 mm. The colour is yellowish gray.

Internal structure. The mantle is thick and the mantle musculature strongly developed. Around the siphons there are broad longitudinal muscle bands crossed by well developed circular bundles. On both sides of the body a strong network is formed by longitudinal, transverse and oblique bundles, which extend over the whole length of the body.

The tentacles are large and much branched, bush-like. They are 10 in number in the one specimen, 12 in the other. At the bases of some of them there are a few of smaller size. It is, however, difficult to decide whether they represent tentacles or branches of the large tentacles, as they are situated very near them.

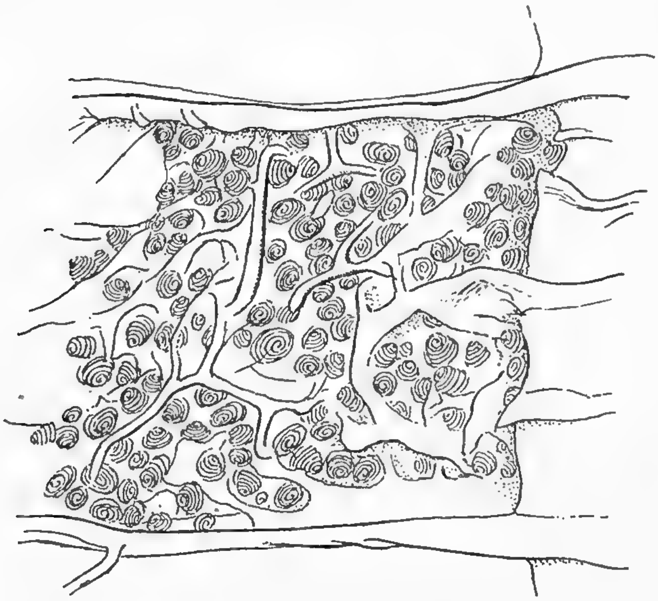
The dorsal tubercle is situated to the right of the dorsal lamina. It is large and prominent, with the aperture horseshoe-shaped and the horns much coiled. The open interval between the horns is directed obliquely forward.



Text-fig. 5. *Paramolgula gigantea* CUNNINGHAM f. *capax* n. f.
A. Left side, test removed. Nat. size.
B. Right side, test removed. Nat. size.
C. Alimentary canal and left gonad, mesial side. Nat. size.
g Gonad. k. Kidney. l. Liver. od. Oviduet. vd. Vas deferens.

The dorsal lamina is represented by a well-developed membrane, rather long and broad and undulating. The margin is even.

The branchial sac is without folds, but has in their place seven broad, stout longitudinal vessels on each side, which are curved, the posterior ends converging towards the oesophageal mouth, which is characteristic of the genus. They are crossed by numerous transverse vessels of various orders, which branch and anastomose to form an irregular network. The meshes are crowded with a great number of spirally coiled stigmata, arranged in small projecting infundibula. The infundibula are simple, dextral or sinistral, consisting each of a few long stigmata (cf. text-fig. 6).



Text-fig. 6. *Paramolgula gigantea* CUNNINGHAM f. *capax* n. f. Part of branchial sac, from inside. × 12.

The alimentary canal is of peculiar shape. The intestine forms a short, simple loop directed upward (text-fig. 5 A). The loop is not open, its branches being in contact for practically the whole length. The stomach is elongated and not delimited from the intestine. It has a large "liver", which consists of a great number of caeca and constitutes an hepatic organ of great bulk, covering the outer and mesial sides of the stomach to a considerable extent. The rectum runs straight upward, its margin is smooth and thickened.

Gonads are present on both sides of the body, the left one lies in the concavity between the intestinal loop and the rectum, partly above the loop; the right one is situated dorsal to the kidney. The gonads are compact bodies of rounded shape, as illustrated in text-fig. 5. The ovary occupies the outer side and opens in a wide oviduct. The testis is composed of several clusters of small testicular glands, situated on the mesial side of the gonad. It opens in numerous short vasa deferentia; in the one specimen there are 12 on each side, arranged almost in a row, near the end of the oviduct (text-fig. 5 C); in the other 8 on the right side and 5 on the left.

The kidney is large and sharply curved, the concave side surrounding the basal end of the right gonad (text-fig. 5 B).

Remarks.

The principal characters which are employed for distinguishing *Paramolgula* from other Molgulid genera are that the branchial sac has seven stout longitudinal vessels in place of folds, the dorsal lamina has a smooth margin, the opening of the dorsal tubercle is horseshoe-shaped with the horns spirally inrolled; further, the intestinal loop is strongly curved, forming a secondary loop, the gonads are two in number, one on each side, the left above both primary and secondary intestinal loops, the vasa deferentia one to several (cf. HUNTSMAN 1922). This diagnosis seems to hold with regard to the species hitherto included in the genus. But it seems doubtful whether they are distinct species; among them there are no doubt several synonyms. MICHAELSEN (1900) has given a list of some possible synonyms, to which I refer.

A revision of the *Paramolgula* group is still a desideratum. At present the specific distinctions are uncertain, and the limits of variation have not yet been made out.

As appears from the description above, two specimens in the collection deviate in some points from the typical organization of *P. gigantea*, to which they are here referred provisionally as a forma. They differ apparently in the structure of the branchial sac, the shape of the intestinal loop, the position of the gonads, and in external form and appearance.

In the branchial sac there are numerous regular simple infundibula on the interspaces between the broad longitudinal vessels, recalling the condition in *Molgula horrida* HERDMAN. If a re-examination of this form proves it to be not a *Molgula* but a distinct *Paramolgula* species, which is suggested with good reasons, the specimens in question might be referred to it. Also the external appearance of this form appears similar, though the specimens described by HERDMAN are of smaller size, the body measuring 50 mm in both length and breadth.

The intestinal loop is almost straight in the specimen figured (text-fig. 5 A, C); in the other it shows a faint dorsal bend. The left gonad is situated in the concavity between the intestinal loop and the rectum, partly beside, partly above the recurved end of the loop. Whether this position of the left gonad is due to increase in size is an open question.

In both specimens the same deviations from the typical organization are to be seen, but they are more accentuated in the specimens figured. In the other the intestinal loop shows a faint dorsal bend, the vasa deferentia are fewer, the siphons apparently somewhat shorter, but the structure of the branchial sac is similar, and they were obtained in the same locality.

Ascopera gigantea HERDMAN 1881.

Pl. 3, fig. 30.

Occurrence.

South Georgia: Cumberland Bay, the mouth of West Fjord, 54° 15′ S—36° 25′ W, 250 m, bottom temp. + 1.2°, clay, 1 sp. (April 22 1902). — Off the mouth of Cumberland Bay, 54° 11′ S—36° 18′ W, 252—310 m, bottom temp. + 1.45°, clay with stone, 4 sps. (June 5 1902). — Antarctic Bay, 54° 12′ S—36° 50′ W, 250 m, stone, 1 sp. (May 6 1903).

Further Distribution.

S. of Kerguelen Island, 270 m, "Challenger" Exp. (HERDMAN 1882).

Antarctic, Kaiser Wilhelm II Land, 380 m, "Gauss" Exp. (HARTMEYER 1911).

Ascopera pedunculata HERDMAN 1881.

Occurrence.

Antarctic, Graham region, at Paulet Island, 63° 36′ S—55° 48′ W, 100—150 m, gravel and stone, 17 sps. (January 15 1902).

Further Distribution.

S. of Kerguelen Island, 270 m, "Challenger" Exp. (HERDMAN 1882).

Remarks on Ascopera gigantea and Ascopera pedunculata.

The validity of the species included in the genus *Ascopera* is questioned by HARTMEYER (1911). The distinguishing features are exhibited in the external appearance of the body, chiefly the length of the stalk. *A. gigantea* and *A. pudunculata* are both stalked forms, but in the former the body is of greater length than the stalk, the ratio being 1: 0.5; in the latter the relation is the reverse, the ratio being 1: 2.4. In the internal structure no essential differences have been pointed out. According to HERDMAN, the branchial sac of the two species seems different at first sight, but a comparison shows that the two are not so very different after all, although in *A. pedunculata* the stigmata are less curved and run longitudinally. As to other organ systems, similar peculiarities are to be seen in both. Hence it seems possible that they represent formae of one and the same species.

The present material consists of several specimens, but all of them are poorly preserved, not allowing of any study of the internal structure conclusive as to the relation between the two forms. Provisionally the two species are retained in the present paper, only to afford the opportunity of making some observations referring to differences in the external aspect and structure, leaving it to future workers to decide their systematic value.

In the specimens from South Georgia, which have been referred to the species *A. gigantea*, there is almost complete conformity in the external appearance. The body is of pyriform shape, usually of greater length than the stalk — the swollen basal end excepted — in some specimens of about the same length. The stalk is narrow, projecting from the ventral side; the basal end is swollen, forming a kind of hollow ball, by which the animal is apparently anchored in the clay (cf. fig. 30).

The siphons are long and tubular, at a great distance from each other; the branchial one is directed downwards. The test is of leathery consistency; its surface is shagreened, as it were, being covered with very small processes densely arranged. On the stalk the processes are larger, and on the swollen basal part they are of great length, forming a kind of tangled covering of filaments.

The body is up to 70—80 mm in length and 50 mm in breadth, without stalk.

The specimens were found on clay, or clay with stone; depth, 250—310 m.

The collection also contains a great many specimens of *Ascopera* obtained in the Antarctic, which are here named *A. pedunculata.* They are very contracted and wrinkled, which makes it difficult to give an exact figure or description of the form and size of the body.

The shape of the body resembles that of the above-mentioned species, but appears to be more elongated and may be characterized as rounded rhombic.

The stalk is always of much greater length than the body. In the largest specimens the body varies from 90 to 110 mm in length, and the stalk from 180—230 mm.

The breadth of the body is about 70—80 mm, that of the stalk about 30 mm. The basal end is somewhat swollen and widened, apparently for attachment to stone or other hard object.

The siphons seem to be somewhat shorter than in *A. gigantea;* the atrial one is situated opposite the stalk. The test in the present specimens is paper-thin and practically without processes either on the body or on the stalk. In a small specimen a few short papillae are sparsely scattered on the test of the body. The expanded base of the stalk is provided with long filaments as in *A. gigantea.*

As mentioned above, the material does not allow of a thorough investigation of the internal structure, but the following notes may be given from my examination. In a small specimen, measuring 38 mm in body length and 80 mm stalk length, the tentacles are 28 in number, of three sizes, and there are a few rudiments of some more. A well developed oral velum is seen anterior to the tentaculated area.

The aperture of the dorsal tubercle is horseshoe-shaped with the horns incurved, the open interval is directed obliquely to the left. The dorsal ganglion is large, being rather broad. The dorsal lamina is represented by a short membrane with even margin.

The branchial sac has 7 folds on each side, with numerous longitudinal vessels on the interspaces between them. The stigmata are longitudinal and more regularly arranged on the sides of the endostyle than between the folds, where they exhibit a concentric arrangement here and there, especially at the crossing of the folds with the broad transverse vessels.

The alimentary canal is of typical structure: the intestinal loop is open for a short distance only in the upper recurved part, the intestine being in contact with the stomach. A large "liver" is developed, consisting of short flat blind-sacs along the sides of the stomach.

The gonads are greatly elongated, and their position longitudinal and dorsal to the intestinal loop and the kidney respectively. The posterior end of each gonad is produced into a short oviduct. The testis opens in several short vasa deferentia situated on the mesial side of the gonad.

The kidney is a large, wide, and elongated body, with a distinct curvature.

The specimens were found on a bottom of gravel and stone; depth, 100—150 m.

As was mentioned in another place, *Molgula longicaulis* HERDMAN ought probably to be placed in the genus *Ascopera.* As appears from the description given by HERDMAN, it agrees in generic characteristics with the latter genus, not with *Molgula.* But its species cannot be determined at present.

Family **Pyuridae.**

Paracynthia distincta, gen. et sp. n.

Pl. 2, figs. 12—14. Text-figs. 7—8.

Occurrence.

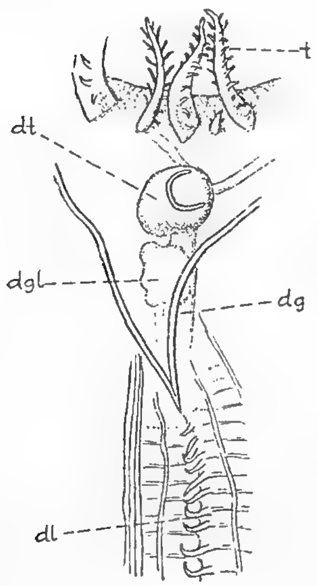
Falkland Islands, Port Louis, Greenpatch, close by the bridge, 51° 33′ S—58° 9′ W, in front of the inner border of the Macrocystis zone, at a depth of a few metres, stone and algae, 2 sps. (July 28 1902).

Description.

External appearance. The body is of elliptical outline, being elongated in the antero-posterior dimension. Apparently it has been attached to some algae, as it bears traces of algae on its sides. The surface of the test is covered with grains of sand and fragments of shells (fig. 12).

In one specimen the siphons are extended; they are rather long and four-lobed. In the other specimen they are drawn in and not very conspicuous, the individual looking like an oblong aggregation of gravel and shell fragments. The branchial siphon is situated near the anterior edge of the body, the atrial one on the dorsal side at a short distance from the former (cf. figs. 12—14).

The largest specimen measures 28 mm in length and 21 mm in height.



Text-fig. 7. *Paracynthia distincta,* gen. et sp. n. Dorsal region of anterior end of body, from inside. × 14. dg. Dorsal ganglion. dgl. Dorsal gland. dl. Dorsal languets. dt. Dorsal tubercle. t. Tentacle.

Internal structure. The test is not very thick and is of firm consistency. The mantle musculature is well developed on both sides of the body, as is shown in figs. 13—14. It consists of numerous transverse bundles, forming strong sphincters around the siphons. The longitudinal muscle bands run along both sides of the body and extend to the ventral border; their distal parts are branched and form delicate muscle bundles, which cover the ventral region.

The tentacles are about 18 in number and of unequal sizes. They are simply pinnate and provided with broad membranes.

The dorsal tubercle is large and prominent, the aperture is C-shaped, and the open interval turned to the left. The dorsal ganglion is partly covered by the dorsal gland and crossed by the left branch of the peripharyngeal band, which forms an acute angle (text-fig. 7). The dorsal lamina is represented by a series of short, narrow, pointed processes, densely arranged.

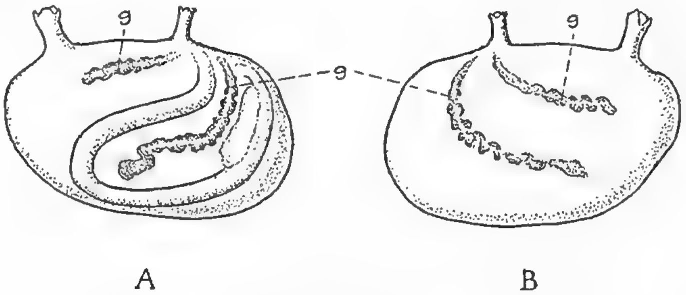
The branchial sac has six folds on each side. All of them are well developed and high, with 12—14 longitudinal vessels each, except the 6th pair, on the sides of the endostyle, which is lower, each fold having 4—5 slender vessels.

On the intervals between the folds there are about 2 vessels; on each side of the endostyle and the dorsal languets there is only one vessel.

The transverse vessels are numerous and of various sizes; the small ones cross the stigmata here and there. The stigmata are longitudinal, delicate, oval in shape and rather numerous.

The alimentary canal is curved in a wide, broad loop. The stomach is elongated and provided with a large "liver", consisting of a mass of short, small blind-sacs or hepatic glands, mostly situated on its mesial side, i. e. next to the branchial sac, and along its inner margin. The rectum is short, and the margin of the anus is finely lobated (fig. 13, text-fig. 8 A).

The best distinguishing feature of the species is exhibited by the reproductive organs. Owing to the thinness of the mantle, they are distinctly visible through it, when the aminal is removed from the test. They are represented by two gonads on each side of the body.



Text-fig. 8. *Paracynthia distincta*, gen. et sp. n.
A. Left side, test and mantle musculature removed. × 2.5.
B. Right side, test and mantle musculature removed. × 2.5.
g. Gonad.

The situation of the gonads is shown in figs. 13—14 and text-fig. 8. On each side they are situated at an angle, their distal ends approaching each other, while the proximal parts are widely separated. One of those on the left side, the longest one, lies in the intestinal loop.

The gonads are elongated and narrow in shape, more or less sinuous. The proximal end of the longest one on the right side has the proximal part bent at right angles in the larger specimen, illustrated in figs. 13—14. But that is not a constant shape; in the specimen of smaller size both gonads on the right side are straight in their proximal parts (text-fig. 8 B). They are unequal in length, the anterior one on the left side is the shorter. On the right side the difference in size is not nearly so great, as is evident from fig. 14 and text-fig. 8 B, which show that the posterior one exceeds the other but little in length.

The gonads are composed of numerous small flat spheric polycarp-like sacs or groups of glands arranged in two rows. Each group contains both ovary and testis. The ovaries are situated on the outer side of the gonad, i. e. the side lying against the mantle, and consist of both small eggs and very large ones. The testes are on the side next to the branchial sac, the mesial side, opening by numerous efferent ducts in the vas deferens. Each sac contains numerous small pear-shaped testicular glands. Both oviduct and vas deferens open by long ducts, side by side at the base of the atrial siphon.

The new genus *Paracynthia* is chiefly characterized by having two gonads on each side of the body; the lower one on the left side is situated in the intestinal loop. Further distinguishing features are the position, shape, and structure of the gonads. Each gonad is composed of numerous small polycarp-like sacs, arranged in two rows and containing both ovary and testis. The vasa efferentia are numerous and unite in a common vas deferens, opening at the side of the oviduct.

The diagnosis of the genotype, *P. distincta,* is the same. Further specific characters are the number of the branchial folds, which are six on each side, and the shape of the alimentary canal.

Remarks.

In the classification of the Pyurids the number of the gonads is a valuable character, for instance, in distinguishing the genera *Pyura* and *Halocynthia.* The former is characterized by one gonad on each side, the latter by at least three, in most cases many, gonads on each side. But also in the structure, the gonads might exhibit generic distinguishing features. In some species of the genus *Pyura,* the gonads are represented by compact hermaphroditic bodies, in others they are composed of a number of small polycarp-like sacs. Differences in this respect might justify a subdivision. HARTMEYER already called attention to the fact that *Pyura* is a heterogenous genus and suggested a subdivision, but without carrying it out. In establishing the genus *Paracynthia* an attempt is made in this direction.

The above-described form was collected together with two new *Molgula* species, *M. malvinensis* and *M. setigera,* described in the present paper. It appears to be a rare species; it is not represented in previous collections at the Falkland Islands, so far as is known, and the Swedish collection contains only two specimens.

In the number and the structure of the gonads this species differs from other *Pyura* forms from this region; the peculiar features exhibited by these organs have not as yet been found combined in any other form. For *Cynthia paessleri,* as described by MICHAELSEN (1900), can not be referred to *Paracynthia.* It is most probably a distinct *Pyura* species and not very closely allied to *Paracynthia distincta.* They agree in having two gonads on each side of the body, one on the left side lying within the intestinal loop. But, if MICHAELSEN's description is correct, the structure of the gonads is different. In *Paracynthia distincta,* as is seen from the above, the gonads consist of a great number of round polycarp-like sacs, each containing both ovary and testis. In *Pyura* (*Cynthia*) *paessleri* there are two large hermaphroditic reproductive organs on each side of the body. "Der Gonadentheil derselben hat die Gestalt eines dicken, sehr lang gestreckten Polsters — — —. Die centralen Partien des Polsters werden vom Ovarium gebildet ———. Die äusseren Partien des Gonadenpolsters werden von der massigen Hode eingenommen". (l. c. p. 108).

Also the shape and the position of the gonads are different. As is shown in figs. 13—14, the gonads in *P. distincta* are long, slender bodies. Though both ovaries and testes are well developed, the lower gonad does not fill up the interspace in the intestinal loop, and the upper one is straight and short.

As to the gonads in *P. paessleri,* MICHAELSEN writes: "Die beiden Geschlechtsorgane der linken Seite zeigen folgende Lage: Das untere ist in die Darmschlinge eingebettet, dieselbe fast vollkommen ausfüllend — — —. Das obere Geschlechtsorgan schmiegt sich in den vom rücklaufenden Ast der Darmschlinge gebildeten Bogen ein — — —. Die beiden Geschlechtsorgane der rechten Körperseite zeigen eine entsprechende Stellung." (l. c. p. 108—109).

There are also differences in the following characters.

In *Paracynthia distincta* the branchial folds have 12—14 longitudinal vessels, the 6th fold 4—5 vessels, and on the intervals between the folds about 2 vessels. In *P. pæssleri* the folds are higher, bearing up to 21 vessels; the 6th fold has 6 vessels. On the intervals between the folds there are 2—5 vessels.

In the former the aperture of the dorsal tubercle is C-shaped and the open interval directed to the left. In the latter the aperture is bent into about two thirds of a circle, the horns being somewhat bent inwards, and the opening between the horns is turned forwards.

The tentacles in *Paracynthia distincta* are about 18 in number, of moderate length, and simply pinnate, in *P. pæssleri* there are 14 tentacles; the largest are up to 3 mm in length and bipinnate.

In the former the branchial siphon is situated near the ventral border, the atrial one is anterior to the middle of the body, not far away from the branchial one.

In the latter the branchial and atrial siphons are widely separated from each other and at equal distances from the anterior and posterior ends of the body respectively (cf. fig. 12 with MICHAELSEN's fig., pl. 2, fig. 6).

In the former the body is of elliptical shape. In the latter the body is nearly globular.

There are, however, other *Pyura* species which might be referred to *Paracynthia;* for instance, a close correspondence in the number and structure of the gonads of *Paracynthia distincta* is found in a *Pyura* species, *P. duplicata,* described by VAN NAME from warmer waters, from the Philippines (VAN NAME 1918, p. 80). In this species the gonads are two on each side, consisting of small irregularly shaped sacs arranged in two rows. The short one dorsal to the loop consists of a single row of sacs, thus differing from that in *Paracynthia distincta,* which has two rows. Specific differences are exhibited by, e. g., the branchial sac, which has seven folds on each side, and the dorsal tubercle, the aperture being of about the same shape but directed forwards.

It might be worth mentioning that also in certain *Pyura* species characterized by only one well developed gonad on each side, such a small gonad with sacs in a single row is present dorsal to the intestinal loop, for instance, in *Pyura vittata* STIMPSON from the Bermuda Islands and the West Indian region (cf. VAN NAME 1902, 1921). But the significance of this feature for the relationships of the species in question will not be discussed in this paper.

Pyura echinops n. sp.

Pl. 2, figs. 15—19.

Occurrence.

North coast of Argentina, 37° 50′ S—56° 11′ W, 100 m, gravel and sand, 1 sp. (December 23 1901).

Description.

External appearance. With respect to the shape of the body, an upper elliptical cap-like part and a lower cup-like part are to be distinguished, the former overlapping the latter a little. The boundary between them is well conspicuous when the animal is seen from the side, the surface of the test being differently differentiated. In the upper part it is covered with short spines, which arise from distinct tubercles on the test. The spines are numerous and may be coarse or fine, simple or branched (cf. fig. 15). In the lower part the tubercles and spines are much reduced.

The apertures are symmetrically placed, on short siphons, on the upper ovate surface. They are 13 mm apart.

The animal is attached to a shell fragment by the surface opposite that which bears the siphons. The colour is dark brown.

The single specimen measure 25 mm in length, dorso-ventrally, 18 mm in height, baso-apically, and 17 mm from side to side, the animal being somewhat compressed in this dimension.

Internal structure. The test is thick and of leathery consistency. The mantle musculature consists of strong longitudinal muscle bands, which radiate from the siphons and run along both sides of the body as far as to the upper border of the gonads (cf. fig. 18.), covering the upper, overlapping part of the body. They are overlaid by a thin transverse layer, with more or less continous bundles spread over the upper part of the body and forming strong sphincters around the siphons.

The tentacles are about 38 in number and of several, at least three, sizes or orders. The largest ones number about 12; they are long and delicate and bipinnately branched; those of smaller size are also branched (fig. 19).

The aperture of the dorsal tubercle is horseshoe-shaped, the horns are incurved and the open interval directed anteriorly.

The dorsal lamina is represented by a broad membrane, whose margin is serrated, except in the most anterior part, which is narrow, with the margin almost even (fig. 19). The dorsal ganglion is elongated.

The branchial sac is of characteristic structure, having only four folds on each side, a rare number in the Pyurids, met with in only two species of this family before. The folds on each side of the endostyle are a little lower than the others. There are 2 longitudinal vessels on each side of the endostyle and the dorsal lamina respectively, and 5 to 8 vessels on the interspaces between the folds. The following scheme shows the approximate number and distribution of the vessels on the right side:

dorsal lamina 2 (12) 8 (12) 8 (12) 5 (10) 2 endostyle.

The number and arrangement of the vessels is about the same on the left side, except that they might show some variation, being fewer than the above-mentioned numbers by one or two vessels. It is also probable that an examination of an ampler material might show differences in this respect, depending on varying sizes and ages of the individuals. The transverse vessels are of different orders. The stigmata are straight and narrow (fig. 19).

The intestinal loop is long and open and almost straight; it is horizontally situated. The stomach is hardly marked off externally, gradually tapering off into the intestine. Its wall has a "liver", consisting of rather numerous irregular folds, arranged in a peculiar way in groups, as is shown in figs. 16—17. Most of them are situated on the mesial side of the stomach (fig. 17), some of them are visible on the outer side (fig. 16). The rectum is short and bent upwards almost at right angles. Margin of anus with many, about 15, low blunt lobes.

The reproductive organs are represented by two elongated band-like gonads, one on each side; the left one fills the intestinal loop. The testes extend over the outer side of the gonad and are also visible on its inner side, bordering the central ovary. The testicular glands are mostly cleft into lobes. Their ducts unite into the vas deferens, which runs along the ovary, ending in a papilla beside the opening of the oviduct (cf. figs. 17—18).

Remarks.

The above described species shows an anatomical structure which is peculiar to it in several respects. Its most characteristic feature is exhibited by the branchial sac, which has four folds on either side. It has this number in common with only two Pyurid species hitherto known: the European species *P. tesselata* FORBES and *P. stubenrauchi* MICHAELSEN. The latter was found in a single specimen in the Strait of Magellan by the Swedish expedition to Tierra del Fuego 1895—96. It was described by MICHAELSEN in 1900 under the name of *Cynthia stubenrauchi*.

The European and the Argentine forms prove to be distinct species without further evidence. But between the latter and the Magellan species there is no doubt a close relationship. MICHAELSEN gives a figure showing the external appearance, but no illustration of the internal organization. As the specimen is in a very bad state, a re-examination has been of little service. Hence in comparing the two forms we have to rely on the description given by MICHAELSEN.

In both the test is covered with spines over the upper surface. In *P. stubenrauchi* they are mostly simple and of great length, about 5 mm; in *P. echinops* they are mostly branched, short and coarse, giving the test a brush-like aspect. In the former the apertures are flat and hardly visible, the siphons being lacking externally; in the latter they are on short siphons and well conspicuous. With regard to the shape of the body, there is a striking difference between the two individuals, which manifests itself on comparing the figures given of their external appearance. This difference might, however, be of a secondary value, as the shape of the body is often dependent on the substratum to which the animal is attached.

In *P. stubenrauchi* the tentacles are about 190 in number, 30 of which are branched, the others, about 160, are simple. In *P. echinops* the tentacles number about 38; they are of several sizes, and all of them are branched; even in those of very small size a commencing branching is also visible. Thus, though the individual is of greater size, it has a less number of tentacles than the smaller one which measures 18 × 14 × 3.5 mm.

In MICHAELSEN's species the dorsal lamina is "glatt mit unregelmässig, hinten stärker gekerbtem Rande, der hinten wie in kurze, zungenförmige Lappen zerschlitzt erscheint." In the species described in this paper the dorsal lamina is a broad membrane, with the margin finely serrated in its whole length, with the exception of the most anterior part.

In the former, the aperture of the dorsal organ is in the shape of a horse-shoe with a narrow gap. In the latter it is horseshoe-shaped with the horns incurved.

Whether the stomach in the former is of a similar peculiar structure as in the latter cannot be stated, there being no figure to illustrate the description. It seems probable that there might be some difference in the arrangement of the hepatic folds.

The habitat of the two forms is different: the one was dredged in Admiralty Sound, Strait of Magellan, depth 90 m; the other off the north coast of Argentina, 37° 50′ S—56° 11′ W, depth 100 m, in the region of the cold Falkland current. Both are thus cold-water forms, but as the depths of the localities are somewhat different, it might be suggested that, in these latitudes, there might be some difference in the conditions under which they live. The fauna of the Argentine coast is too little known to allow of any certain conclusions with regard to the biological conditions. The possibility is not excluded that the region off the Argentine coast might represent a transition zone. At present, however, our knowledge of the distribution of the Ascidian species there is too imperfect.

According to HARTMEYER's classification, the two species in question are to be referred to the genus *Pyura*, notwithstanding that they have four folds only on each side. The usual number in *Pyura* is six, or more, folds on either side. *Forbesella* was the representative of a Pyurid group with four folds. HARTMEYER's view is that this generic character has proved of no value, intermediate forms with five folds having been found, for instance, *Pyura* (*Cynthia*) *pulla* SLUITER, a Pacific species. For that reason *Forbesella* was united with *Pyura*.

The other instances of intermediate forms mentioned by HARTMEYER can hardly be considered, namely, *P. transversaria* SLUITER from the Indian Archipelago and *P. squamata* HARTMEYER. In both the branchial sac has five folds on each side, but also a rudimentary 6th fold. Moreover, the first-mentioned species has transversely elongated stigmata, which characteristic proves that it should be included in the genus *Boltenia*, the name used in the sense proposed by HUNTSMAN (1912). The name of this form should therefore be *Boltenia transversaria*.

The occurrence of forms such as *P. echinops* and *P. stubenrauchi* makes it doubtful, however, whether the genus *Pyura* ought to be retained in the sense proposed by HARTMEYER. It seems probable that the diagnosis as given by him is to be emended, or the genus *Pyura* should be subdivided, on following grounds:

According to the earlier diagnosis of *Pyura*, the branchial folds number six on each side. In *Pyura echinops* and its allies there are four folds on either side. Apparently this difference might be bridged over, as mentioned above.

In the former the gonad on each side is divided into two series of small hermaphroditic glands with the ducts between them. In the latter the gonad is elongated; the testis extends on its outer side, bordering the central ovary on the inner side. The vas deferens runs along the ovary.

In the former the dorsal lamina consists of a series of long languets. In *Pyura echinops* the lamina is represented by a broad membrane with a fine serrated margin, and in *P. stubenrauchi* its posterior part is divided into short languets, the anterior part having the margin "eingekerbt."

Differences in the arrangement of the longitudinal vessels and the number of the tentacles might also be present.

However, the two species in question are provisionally referred to the genus *Pyura*. They are known in a single specimen each, a material too limited to allow of any definite change, for the present, in the classification proposed by HARTMEYER.

Pyura discoveryi HERDMAN 1910.

Pl. 4, fig. 35.

Syn. *Halocynthia discoveryi*, HERDMAN 1910. *Pyura discoveryi var. septemplicata*, SLUITER 1914.

Occurrence.

South Georgia: Off May Bay, 54° 17′ S—36° 28′ W, 75 m, bottom temp. + 1.5°, clay and algae, many sps. (May 14 1902). — South Fjord, in front of the Nordenskjöld glacier, 54° 24′ S—36° 22′ W, 195 m, bottom temp. + 1.45°, clay and stones, many sps. (May 29 1902).

Antarctic, Graham region, S. W. of Snow Hill Island, 64° 36′ S—57° 42′ W, 125 m, gravel and stone, 2 sps. (January 20, 1902).

Further Distribution.

Antarctic: Mc Murdo Bay, shallow water, Nat. Ant. Exp. (HERDMAN 1910). — Kaiser Wilhelm II Land, 170—385 m, "Gauss" Exp. (HARTMEYER 1911). — Alexander I Land, 250 m; South of Jenny Island, 250 m; Port Lockroy, 70 m; South Shetland, King George Island, Admiralty Bay, 75 m, Charcot Exp. II (SLUITER 1914). — Off the coast of Wilkes Land, in shallow water and also at greater depths, 216—637 m, Austral. Ant. Exp. (HERDMAN 1923).

Remarks.

Several aggregations, consisting of a great many individuals, have been obtained off South Georgia, and there are only two small individuals from Graham Land in the present collection.

The specimens are typical in regard to external appearance: the body is low and elongated dorso-ventrally, the test is rugose and brown or grey-brown in colour. The apertures are on long siphons and distinctly 4-lobed. The condition of the siphons is characteristic; they are widely separated, in preserved specimens the branchial one is often more extended than the atrial; the surface of both is sharply wrinkled (fig. 35).

The aggregations from South Georgia are composed of individuals of varying sizes, the largest measuring up to 40 mm dorso-ventrally, and 26 mm baso-apically. They exceed in size those described by HERDMAN (1910) and HARTMEYER (1911), but they equal in size those obtained in the Antarctic by the Charcot Expedition (cf. SLUITER 1914). The largest individuals examined before measure 50 × 40 mm and one even 60 × 50 mm. They were obtained in the Antarctic, off Wilkes Land (HERDMAN 1923).

HERDMAN's description of the internal structure has been completed by HARTMEYER. There are, however, several anatomical facts and corrections to be added.

The tentacles are not much branched. The total number is about 22 in smaller specimen's, up to 30 or a few more in large ones, the larger tentacles being about 20 in number. This suggests that the number may depend on the age of the animal. The small number mentioned by HARTMEYER, who had small specimens at his disposal, seems to favour this supposition.

The aperture of the dorsal tubercle is of complicated shape, though generally less complicated in the specimens here examined than is shown in HERDMAN's and SLUITER's figures (l. c). Both horns are coiled, the left one is directed to the side, the right forwards. — Exceptionally a more complicated shape has been observed.

The dorsal ganglion is situated to the left of the dorsal tubercle, extending for the most part behind this organ and measuring about 8 mm in length in large specimens. The dorsal lamina is represented by a series of long pointed languets.

The branchial sac has seven folds on each side; the seventh fold — i. e. that on each side of the endostyle — is well developed in its upper part, having about 8—9 longitudinal vessels, but flattened in the posterior part and represented by a few, 2—3, vessels. The other six folds, 1—6, are well developed, having 13, 15, 17 longitudinal vessels respectively. Between each pair of folds there are two intermediate vessels, those along the basal sides of the fold, and sometimes a little separated from it, having been referred to the vessels of the fold. On the interspace between the seventh fold and the endostyle there is a single longitudinal vessel.

The arrangement and average number of the longitudinal vessels will be as follows:

right side: dorsal lamina 2 (15) 2 (15) 2 (17) 2 (17) 2 (15) 2 (13) 2 (8) 1 endostyle.

In small specimens, measuring about 15 mm dorso-ventrally, which have been examined, the longitudinal vessels are not so numerous, and the seventh fold is represented by 2—3 slender longitudinal vessels only.

According to the description given by HERDMAN (1910) and confirmed by HARTMEYER (1911), the number of folds in *P. discoveryi* is six, and there are seven or eight longitudinal vessels on a fold. Later (1923), after the examination of specimens from Wilkes Land, HERDMAN altered the original description, in as much as he writes that the branchial sac may have six or seven folds on each side, and six to nine longitudinal vessels on more dorsally situated folds.

SLUITER (1914), who has examined the Ascidians collected by the second Antarctic Charcot Expedition, has set up a variety, *Pyura discoveryi septemplicata*, on the ground that in the specimens in the collection at his disposal, the branchial sac has seven folds on each side. Further, the number of the longitudinal vessels on the folds does not agree with that given by the two above-mentioned authors. In all other respects, external as well as internal, the individuals examined by SLUITER agree perfectly with those described by these authors.

As appears from the above, it is evident that the specimens brought back by the Swedish Antarctic Expedition and described in this paper are identical with the variety described by SLUITER. But the relation of this variety to the typical form was anything but clear and could not be elucidated without a comparison with and re-examination of the forms which had been examined by HERDMAN or HARTMEYER. Thanks to the courtesy of Professor SCHELLENBERG of Berlin, I have had the opportunity of re-examining the specimen of *P. discoveryi* which was investigated by HARTMEYER in 1911.

The result of this re-examination is rather surprising. In HARTMEYER's specimen the branchial sac was prepared with the well-known skill of this ascidiologist, but it is not in a good state, the endostyle and the parts along it being missing. At first sight six well developed folds were distinguished on each side of the series of dorsal languets, but no trace of a seventh fold. But in scrutinizing the rest of the inner organs a fragment of the missing part of the branchial sac, i. e. the endostyle with neighbouring parts, was observed attached to the mantle. Along the endostyle, on the left side, a low fold, the 7th fold, was observed, and on the right side there was a fragment of a fold, which most probably is a bit of the right 7th fold.

HERDMAN, as well as HARTMEYER, states that there are about seven or eight longitudinal vessels on a fold. That may be right, if the vessels of the one side of the fold are counted, but the total sum is in reality higher, for the middle folds in HARTMEYER's specimen have at least twelve to fourteen vessels, thus a number which agrees better with that found in the specimens at my disposal. According to HARTMEYER, the intermediate vessels are two in number, which agrees with the scheme given above.

SLUITER remarks that the arrangement of the longitudinal vessels differs from that mentioned by HERDMAN and HARTMEYER. "Sur les plis les plus dorsaux et ventraux, je trouve de six à huit côtes longitudinales, sur les plis du milieu, il y en a dix. Entre deux plis, situés plus ventralement et dorsalement, il y a cinq côtes longitudinales; au milieu du sac branchial, il n'y a que trois côtes." (l. c. p. 9).

This arrangement agrees well with that shown in the scheme above, the difference being only apparent and due to a different view of what is to be considered an intermediate vessel or one of the folds. If we count two intermediate vessels, the others are to be considered as belonging to the folds respectively, which results in about 9 to 11 longitudinal vessels on a fold. For it is a well-known fact that the number of the longitudinal vessels varies, though hardly so much as up to seven or eight vessels, in specimens of moderate size, as was stated before.

From the above comparison and re-examination it is to be concluded that the specimens examined by HARTMEYER and SLUITER are identical with those described in this paper. They are characterized by seven folds on each side of the branchial sac, with numerous vessels on each fold, that on either side of the endostyle, i. e. the 7th, being the lowest one. Consequently these specimens are to be dealt with under a common specific name and referred either to *Pyura discoveryi* HERDMAN or to *P. discovery* var. *septemplicata* SLUITER.

But this was dependent on whether HERDMAN's description of the type specimen could be verified. Hence it was necessary to re-examine the type. I am indebted to Dr. ANNA B. HASTINGS, assistant keeper of the British Museum, for this re-examination, the result of which agrees with what was found on re-examining HARTMEYER's specimen. In a letter to me Dr. HASTINGS writes that in the type specimen the branchial sac has seven folds on each side, with numerous longitudinal vessels, the fold nearest the endostyle being the smallest. Most probably this number occurs also in the specimens from Wilkes Land examined by HERDMAN; the type specimen is from Mc Murdo Bay.

The small number of longitudinal vessels found by HERDMAN is most probably due to HERDMAN's having counted those of the one side of the fold, for, according to HASTINGS' observation, when the large folds are lying flat, there are 7 or 8 vessels visible on the lateral surface. No doubt the number given by HERDMAN does not include the closely placed vessels on the edge of the fold nor half the lateral ones. If so, the diagnosis of the species *P. discoveryi* is to be changed, in as much as the branchial sac has seven folds on each side with numerous longitudinal vessels. If the vessels on both sides of a fold in the type specimen are counted, the total will be about the same as that shown in the scheme above, allowing for the known variability of the longitudinal vessels.

The above investigation shows that the specimens hitherto described as *Pyura discoveryi* and *P. discoveryi* var. *septemplicata* are identical, and that consequently the latter name is no longer valid, the changed diagnosis removing the grounds for establishing a variety.

Further facts on the internal structure of *Pyura discoveryi* are to be noticed. The alimentary canal has a horizontal position. Its structure agrees with the description given by HARTMEYER. The stomach is elongated and not sharply marked off from the intestine; it has a large digestive gland or "liver" profusely branched. The intestinal loop is long and wide. The rectum is short and extends forwards almost at right angles; the margin of the anus has a few blunt lobes.

The reproductive organs are represented by one elongated gonad on each side of the body, that of the left side lying within the intestinal loop. Each gonad is composed of numerous small hermaphroditic glands or polycarps of round shape, arranged on both sides of the gonoducts and more numerous on one side, being about 27 in number on the left side and 37 on the right side in large specimens; but the number varies, the polycarps being less numerous in several specimens, which may be due to their increasing with increasing age. In the polycarps the ovary is attached to the inside of the mantle, the testis being situated on the inner free side of the polycarp, mostly covering the female gland. The vas deferens accompanies the oviduct, giving off lateral branches to the male glands in the polycarps.

The gonoducts open on each side of, and not far from, the atrial opening, the vas deferens at the side of the oviduct.

The above description of the reproductive organs does not agree in several points with that given by HARTMEYER (l. c. p. 438). According to him, only one gonad, that on the right side, was developed, which may be due to a retardation in the development of the left gonad. Further, the gonad is composed of about 40 polycarp-like genital sacs, "Geschlechtssäckchen". "Jedes derselben steht durch einen besonderen Ausführgang mit dem gemeinsamen, zwischen den beiden Reihen verlaufenden Hauptausführgang in Verbindung und erscheint dadurch gestielt. Die Säckchen sind hermaphroditisch. Das Ovarium nimmt die proximale, d. h. dem Ausführgang zunächst gelegene Partie ein, der lappenartig zerschlitzte Hoden die distale und lagert sich kappenartig über das Ovarium."

If HARTMEYER's description is to be interpreted literally, the meaning would be that the polycarps open by a short duct each into a common large duct: "Jedes derselben steht durch einen besonderen Ausführgang mit dem gemeinsamen zwischen den beiden Reihen verlaufenden Hauptausführgang in Verbindung — — —." But this is not the case, as appears from the description above; the male and female glands open by separate ducts into the gonoducts, and the opening of the vas deferens is at the side of the oviduct, an arrangement commonly met with in the Acidians. In re-examining HARTMEYER's specimen, I have found a similar arrangement, which also accords with SLUITER's statement: "— — — je trouve vingt-six et vingt-sept vésicules de chaque côté des canaux collectifs". (l. c. p. 10).

As to the occurrence of one gonad, on the right side only, in the specimen examined by HARTMEYER, it might be an aberrant feature and most probably not due to any retardation in the development of that on the left side. The right gonad is well developed, being composed of about 40 polycarps, a number exceeding that on the right of specimens of greater size here examined, but no rudiment of the left gonad was observed in this stage.

As mentioned above, the number of polycarps varies. SLUITER found a remarkably large number: "— — — chez le plus grand animal je trouve vingt-six et vingt-sept vésicules de chaque côté des canaux collectifs. Chez les autres, je trouve des nombres variant de vingt à vingt-quatre, ce qui ne diffère guère de la description de HARTMEYER." (l. c. p. 10).

The largest specimen examined by SLUITER measures 40 × 25 mm and equals in size the largest ones in the present collection. In the former, each gonad has 26—27 polycarps on each side of the gonoducts, i. e. 52—54 in each gonad; in the latter there are about 27 in the left gonad and 37 in the right one. In those of smaller size SLUITER counts 40—48 polycarps in each gonad, and in the smaller specimens examined by me each gonad has 24—31 polycarps.

I only wish to point out the difference in the development of the gonads. Possibly it may be due to different localities and depths or age, or to the collecting having taken place at different seasons. The former suggestion may be supported by the fact that in a specimen from the West Antarctic, Graham Land, measuring only 25 × 15 mm in size, the left gonad has 33 small polycarps and the right one 37, thus about the same number as that found in the above-mentioned large specimens; but these were obtained off South Georgia. The specimens examined by SLUITER were also collected in the West Antarctic. The Antarctic specimens were dredged during the months November—January, those from South Georgia in May.

Pyura legumen LESSON 1830.

Pl. 4, figs. 33—34. Text-fig. 9.

Syn. *Boltenia legumen*, LESSON 1830.
» » HERDMAN 1882.
» » f. typica, MICHAELSEN 1900.
» *coacta*, GOULD 1852.

Occurrence.

Falkland Islands: Port Louis, Green patch, 51° 33′ S—58° 9′ W, at a depth of a few metres, stone and algæ, 6 sps. (July 17, 28 1902); in the mouth of the Carenage Creek, 51° 32′ S—58° 7′ W, 3—4 m, shells and stone, 1 sp. (August 9 1902). — Berkely Sound, 51° 33′ S—58° W, 16 m, bottom temp. + 2.75°, gravel and shells with algæ, many sps. (July 19 1902); 51° 34′ S—57° 55′ W, 25 m, bottom temp + 2.75°, sand and stones, many sps. (August 10 1902); 51° 35′ S—57° 56′ W, 25—30 m, stones and shells, 4 sps. (August 10 1902). — Port William, 51° 40′ S—57° 42′ W, 22 m, sand, 1 sp. (September 3 1902). — Stanley Harbour, 51° 42′ S—57 °50′ W, 10 m, mud with shells, 2 sps. (September 3 1902). — Port Albemarle, 52° 11′ S—60° 26′ W, 40 m, sand with algæ, 1 sp. (September 8 1902).

Further Distribution.

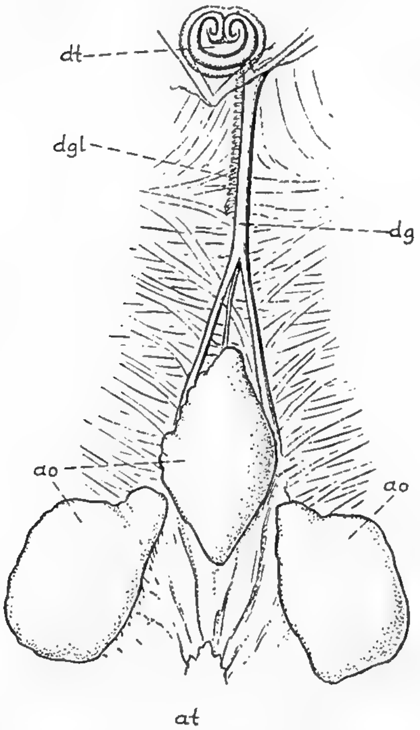
Straits of Magellan, 18—90 m.
Tierra del Fuego, 1.8—45 m.
Falkland Islands, 1.8—21 m.
(cf. HERDMAN 1882; MICHAELSEN 1900).

According to HARTMEYER (BRONN's Tierreich, p. 1629), *Pyura legumen* occurs in the West Indian region, GOULD's species *Boltenia coacta*, which no doubt is identical with *P. legumen*, having been obtained there. This statement seems, however, unlikely, as *P. legumen* has never been recorded from tropical waters. I agree with VAN NAME's interpretation that a confusion in the localities has taken place, Orange Harbour in Tierra del Fuego being the habitat of GOULD's species (cf. GOULD 1852; VAN NAME 1921, p. 488).

Remarks.

The collection contains a great many specimens obtained at the Falkland Islands. They are of various sizes; the largest individuals measure 59 to 68 mm dorso-ventrally and 22 to 35 mm baso-apically.

Only a few remarks need be added to the previous descriptions, the specimens agreeing with them in the main points with regard to the external and internal structure (cf. fig. 33).



Text-fig. 9. *Pyura legumen* LESSON. Dorsal region of body, from inside, dorsal lamina removed. × 4.
at. Atrial aperture. ao. Atrial organ. dg. Dorsal ganglion. dgl. Dorsal gland. dt. Dorsal tubercle.

The ovate shape, the short stalk, and the furrowed test give a characteristic aspect to this species. The test is yellowish brown with many wrinkles; these are mainly horizontal on both sides of the body. It is relatively smooth in a few specimens of smaller size only. The surface is covered with short stiff hairs (cf. fig. 33). Internally the test has a thin nacreous lining.

The outer layer of the mantle musculature is thin, the inner is strong, consisting of numerous muscle bands, regularly arranged and running along the sides of the body.

The branchial sac has seven strong folds on each side (cf. fig. 34). The dorsal lamina is represented by a low brim with closely placed small languets, or the edge may be toothed as is shown in fig. 34. The dorsal tubercle is large, the aperture is horseshoe-shaped and directed forward.

The dorsal ganglion attracts attention, owing to its great length — about 6 mm in this species — a peculiarity in many Pyurids which has not been heeded in previous descriptions. As appears from text-fig. 9, its anterior nerve trunks are situated at the left side of the dorsal tubercle, the ganglion extending backward, ending at a short distance from the "atrial organs". Also the dorsal gland is of great extension, running along the anterior part of the ganglion.

With regard to the alimentary canal, the long narrow intestinal loop is to be noticed; it has a horizontal position. The stomach is short and wide with closely placed longitudinal folds in great numbers. The rectum is short.

The reproductive organs are represented by two gonads, one on each side of the body, the left one in the intestinal loop. They are of great length and lobated, terminating in wide ducts; the vas deferens opens at the side of the bulbous oviduct.

The "atrial organs" are three well defined masses of yellowish tissue, lying near the atrial opening (cf. text-fig. 9). Their structure and function have not yet been conclusively made out. MICHAELSEN concludes that they are swelling pads, "Schwellkörper", as they are richly furnished with blood-vessels.

In *Pyura legumen*, as in several other Pyurids, the stalk projects from the anterior ventral part of the body. The stalk is short (cf. fig. 33), and the mantle extends into it.

Pyura georgiana MICHAELSEN 1898.

Pl. 4, fig. 31. Text-fig. 10.

Syn. *Boltenia georgiana*, MICHAELSEN 1898, 1900.

Occurrence.

North coast of Argentina, 37° 50′ S—56° 11′ W, 100 m, gravel with sand, 2 sps. (December 23 1901).

South Georgia: Antarctic Bay, 54° 12′ S—36° 50′ W, 250 m, stone, many sps. (May 6 1902). — May Bay, 54° 17′ S—36° 28′ W, 75 m, bottom temp. + 1.5°, clay with algæ, many sps. (May 14 1902). — Morain Fjord, 54° 24′ S—36° 26′ W, 125 m, bottom temp. — 0.25°, clay with some stone, 1 sp. (May 26 1902). — South Fjord, 54° 24′ S—36° 22′ W, 195 m, bottom temp. + 1.45°; 210 m, bottom temp. + 1.5°, clay with stone, many sps. (May 29 1902).

Further Distribution.

South Georgia, 16—25 m (MICHAELSEN 1900).

Remarks.

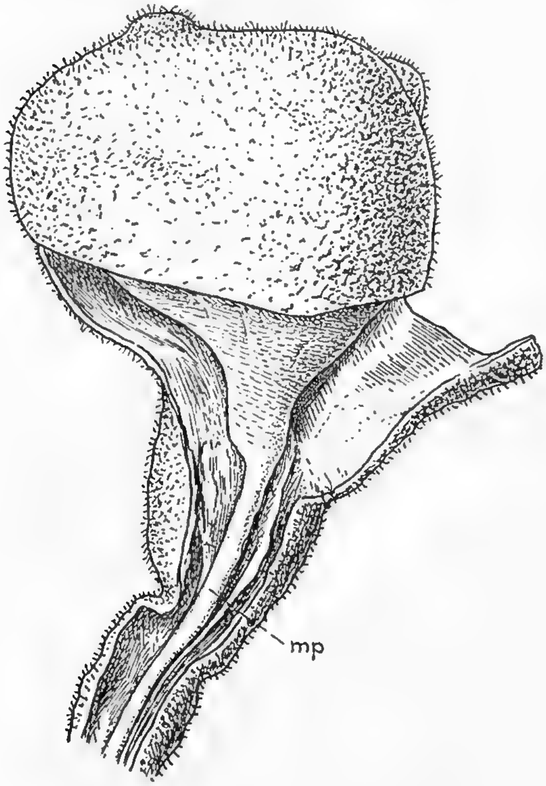
MICHAELSEN's figure of *P. georgiana* (1900, pl. 2, fig. 5) gives little idea of the external appearance of this interesting form, as is evident from a comparison with fig. 31. His description must be completed by the following notes referring to the external and internal structure.

The shape of the body is mostly cordate, sometimes globular. The apertures are a great distance apart and on low, but well conspicuous four-lobed siphons.

The stalk is of great length, in some individuals up to five times the height of the body, but generally somewhat shorter (fig. 31). It projects from about the middle of the ventral side, sometimes rather broad in its upper part, for the rest narrow, attaching the animal to the substratum by the expanded basal end.

The test is thin and of leathery consistency. It is of dark grey colour with a coating of slender hairs all over the surface, also on the stalk and on the short siphons.

The collection contains a large number of specimens obtained at South Georgia, and two specimens from the north Argentine coast. They are of various sizes; an average specimen measures about 32 mm baso-apically and 29 mm dorso-ventrally, the stalk 70 mm; the largest ones measure 30 × 38 mm, the stalk 90 mm. In one specimen the stalk is about 140 mm in length.



Text-fig. 10. *Pyura georgiana* MICHAELSEN. Test of stalk cut open to show the mantle process. × 1.5. mp. Mantle process.

When the test is cut open, we find that the mantle continues in the stalk by a long prolongation, the proximal part of which is rather broad, as is seen in text-fig. 10. The stalk is thus not a mere prolongation of the test for fixing the body in place, as is the case with certain structures present in other genera, such as hair-like or root-like processes occurring in some Molgulid and Styelid forms, or stalk-like projections in some Ascidiids. An investigation of the origin and development of the stalk in the Pyurids should be of great interest, but must be left to future workers.

The mantle musculature is strongly developed around the siphons; it is represented in its inner layer by broad longitudinal muscle bands, forming a net on the sides of the body by crossing each other.

The tentacles and the dorsal tubercle are of typical structure.

The dorsal ganglion is of considerable length, about 6 mm; also the dorsal gland is extended. The dorsal lamina is represented by closely placed, large, tapering languets in its posterior part, more sparsely arranged in the anterior part.

The branchial sac has seven large folds on each side; the 7th on the left side might be a little lower, but notwithstanding that, is well conspicuous. MICHAELSEN writes: "Der Kiemensack trägt rechterseits 7, linkerseits 6(?) Falten." This detail in his diagnosis cannot be accepted.

There are about 18 longitudinal vessels, perhaps a few more, on a fold and 2 on the interspaces between the folds. The transverse vessels are numerous and of varying breadth. The stigmata are short and not always of regular shape and arrangement.

As to the alimentary canal, the intestinal loop is long and lies horizontally. The stomach is short and well marked off from the intestine; it has numerous and closely placed longitudinal folds in its wall. The margin of the anus has a few blunt lobes.

The gonads are represented by elongated compact glands of typical position, the left one in the intestinal loop. They open in long ducts; the vas deferens opens at the side of the oviduct.

No atrial organs like those described in *P. legumen* were observed. An atrial velum with even edge is present around the base of the atrial siphon.

Two Antarctic species, *Pyura scotti* HERDMAN and *Pyura antarctica* VAN BENEDEN bear a resemblance to *P. georgiana* in several points. Of *Pyura scotti* only very small specimens have been obtained, measuring 15 × 10 mm, stalk 40 mm; they are probably young ones. Though the description of the species is scanty it shows that it agrees with *P. georgiana* in the shape of the body and in most internal anatomical details. They differ with respect to the number of branchial folds — if HERDMAN's statement that *P. scotti* has six folds on one side and seven on the other proves to be correct — further in the structure of the test, which in *P. scotti* is provided with minute spines.

The resemblance between *P. antarctica* and *P. georgiana* is striking with regard to both external and internal structure. The two species are of similar shape, the stalk is long (cf. fig. 31 in this paper and that given by VAN BENEDEN 1913, pl. 3, figs. 1—3). The branchial sac has seven folds on each side; the stomach is marked off from the intestine and has numerous longitudinal folds in its wall. As no material of *P. antarctica* is available, the relation of the two species to each other cannot be conclusively stated for the present. In comparing them the difference in habitat must be considered, also some anatomical details, for instance the shape of the reproductive organs, the condition of the test, which, in *P. antarctica*, as in *P. scotti*, is provided with low protuberances bearing minute spines. In this respect the two latter species agree with *P. turqueti*, as will be mentioned below. But at present their relation to either *P. georgiana* or *P. turqueti* cannot be conclusively decided, material being lacking.

Pyura turqueti SLUITER 1905.

Pl. 4, fig. 32.

Syn. *Boltenia turqueti*, SLUITER 1906. *Boltenia salebrosa*, SLUITER 1906, 1914.

Occurrence.

Antarctic, Graham region: Off Paulet Island, 63° 36′ S—55° 48′ W, 100—150 m, gravel and stone, 2 sps. (January 15 1902). — S. E. of Seymour Island, 64° 20′ S—56° 38′ W, 150 m, sand and gravel, 1 sp. (January 16 1902). — S. W. of Snow Hill Island, 64° 36′ S—57° 42′ W, 125 m, gravel and stone, 1 sp. (January 20 1902). — 65° 19′ S—56° 48′ W, 400 m, gravel and clay, 1 sp. (February 18 1902).

Further Distribution.

Antarctic: Booth Wandel Island, 25—40 m, Charcot Exp. I (SLUITER 1906). — The mouth of Marguerite Bay, between Jenny Island and Adelaide Island, 254 m; Alexander I Land, 250—297 m; Matha Bay, 380 m; Petermann Island; King George Island, Admiralty Bay, 75 m, Charcot Exp. II (SLUITER 1914).

Remarks.

The species is represented by five specimens. The largest one is 42 mm in length, dorso-ventrally, and 24 mm in height, baso-apically; the stalk measures more than 300 mm, the basal part is missing. The smallest specimen measures 10 × 10 mm, and the stalk 20 mm.

In larger individuals the body is elongated in dorso-ventral direction, in those of smaller size the body shape is almost square, somewhat compressed from side to side (cf. fig. 32). The stalk proceeds from the anterior ventral part; it is slender and always of great length, usually many times the length of the body. It ends in a tuft of branched processes, by which the animal is attached to the substratum (fig. 32).

The test is less regularly folded than is shown in the figure given by SLUITER; its surface looks rather rough, being provided with small round elevations bearing a short spine-like bristle each. In one specimen it is smoother. Also on the stalk the test is horizontally wrinkled or irregularly rugose. It is of leathery consistency. The apertures are on distinct siphons, at a great distance from each other; the branchial siphon is usually bent down.

The mantle musculature is thin but well developed; delicate longitudinal muscle bands are seen on both sides of the body. The mantle extends into the stalk as a long thin-walled string.

The aperture of the dorsal tubercle is horseshoe-shaped, with spirally inrolled horns.

The dorsal lamina is short and is represented by densely arranged, slender languets. Also the dorsal ganglion is short, about 2—3 mm, differing from that of *P. georgiana* and some other species, in which it is of considerable length, up to 8 mm.

The branchial sac is of typical structure with seven strong folds on each side of the body.

To the original description is further to be added that, with respect to the alimentary canal, the stomach is elongated, with a broad raphe and numerous longitudinal folds in its wall, arranged in a characteristic way. The margin of the anus is even and reflected, forming a broad border. In SLUITER's figure it is lobated.

An atrial velum with even margin is present.

The gonads are elongated and composed of a series of polycarp-like lobes. In the specimen examined the lobes number five, which agrees with what is shown in SLUITER's figure; from which it also appears that the left gonad is, as usual, situated in the intestinal loop. The oviduct and the vas deferens open at the side of each other at the base of the atrial siphon.

In this species there are a pair of "parietal organs" consisting of two well defined bodies, one on each side of the mantle, situated above the intestinal loop and the right gonad respectively.

Such structures occur in certain Pyurid species, for instance in *Pyura bouvetensis* and *Pyura antarctica*, in which the "parietal organs" are well developed, being represented by compact bodies. In his description of the former species, MICHAELSEN (1904) states that the male and female organs are represented by completely separated glands; he has erroneously interpreted the above-mentioned bodies as testes (cf. VAN BENEDEN 1913,

p. 27). They have, however, no relation to the sexual organs, being completely separated from them.

Van Beneden, who has investigated the structure of these organs in *P. antarctica*, referred them to the category of formations known under the names of endocarps, parietal vesicles etc., but without arriving at any certain result as to their function: "Dans le cas de *Boltemia antarctica* il ne s'agit toutefois nullement de vésicules, mais bien de masses compactes — quoique vascularisées — auxquelles le nom de coussinets pariétaux pourrait être appliqué, le rôle de ces organes étant vraisemblablement d'empêcher que, lors des contractions violentes de l'animal, la cavité péribranchiale ne soit complètement oblitérée."

Another suggestion is that they serve as dilatation organs, "Schwellkörper", by their turgescence facilitating the restitution of the normal conditions of the body, when, after violent contractions, the muscles relax.

In *Pyura legumen* and *P. georgiana* a mass of whitish tissue of irregular outline and elongated shape, rather thin and flat, has been observed in several specimens. It is situated on both sides of the mantle, dorsally to the intestinal loop and the right gonad respectively. Under the microscope the surface appears granulated or bladdery. Whether this structure might be analogous to "les organes énigmatiques" mentioned above is an open question.

Structures of similar tissue have been observed also in other groups. In his description of *Perophora japonica* Oka (1927) writes: "Was beim Examen der Einzeltiere unter dem Mikroskop zunächst auffällt, sind die mit farblosen Körneln erfüllten Blutlakunen, die in Form eines feines Netzwerkes die ganze Körperwand durschziehen". (p. 558). In *Perophoropsis herdmani* Lahille (1890) has observed a similar tissue covering the peribranchial wall: "Si maintenant on examine l'animal à la loupe, on est de suite frappé par le réseau de lacunes sanguines de la paroi péribranchiale." (p. 286). The significance of these tissues is still problematic. Without venturing anything conclusive at all as to their function, I only wish to point to the possibility that, owing to the richness of blood sinus, a turgescence might take place. More complete investigations are, however, necessary, before anything can be stated for certain with respect to this kind of parietal tissues.

In the first Charcot report Sluiter (1904) described a Pyurid species, *Pyura salebrosa*, as a distinct species from *P. turqueti*, but later (1914) he has combined the two forms under the latter specific name. This change is confirmed by the supplementary notes made above, which agree with the later observations of Sluiter.

Sluiter suggests that also *Pyura* (*Boltenia*) *scotti* Herdman may be identical with *P. turqueti*, notwithstanding the lack of spines: "Quoiqu'on ne trouve plus chez *P. turqueti* les petites épines aiguës d'une couleur jaune décrites par Herdman chez la petite *B. scotti*". This statement is due to a mistake. Under the microscope or the loupe these spines are well conspicuous even in adult specimens, especially on the siphons. And this is a point of agreement between *P. turqueti* and *P. scotti*. It is also a point of agreement between these two species and *P. antarctica*, as has been pointed out above. As to *P. scotti*, Sluiter suggests that it may possibly represent a young stage of *P. turqueti*.

Order **Dictyobranchia.**

Family **Rhodosomatidae.**

Corella eumyota TRAUSTEDT 1882.

Syn. *Corella antarctica*, SLUITER 1905, 1906.
» » HARTMEYER in BRONN's Tierreich.
» *novarae*, v. DRASCHE 1884.

Occurrence.

Falkland Islands, Port Louis, Greenpatch, close by the bridge, 51° 33′ S—58° 10′ W, in front of the outer border of the Macrocystis zone, 7 m, mud and gravel with algæ, 1 sp. (July 28 1902).

Antarctic, Graham region: At Paulet Island, 63° 36′ S—55° 48′ W, 100—150 m, gravel with small stones, 1 sp. (January 15 1902). — S. E. of Seymour Island, 64° 20′ S—56° 38′ W, 150 m, sand and gravel, 2 sps. (January 16 1902).

Further Distribution.

Corella eumyota is widely distributed in the southern hemisphere. The type specimen was obtained at Valparaiso and described by TRAUSTEDT (1882). The same author also mentions a locality for it in the tropical region, namely Bahia, off the coast of Brazil. As finds of the species have been reported, hitherto, from cold waters only, this locality seems uncertain and is not considered below; apart from this mention the species has not yet been reported from warm waters elsewhere, so far as I can discover. Its range of distribution comprises:

South America: Coast of Chili, several localities as far to the north as Valparaiso (TRAUSTEDT 1882; HARTMEYER 1920). — Guaitecas Islands, low water, down to 23 m (ÄRNBÄCK 1929). — Magellan region, 9 m (MICHAELSEN 1900). — Juan Fernandez Islands, 30—45 m (HARTMEYER 1920).

South west coast of Africa: Tafel Bay, 5—9 m (SLUITER 1897). — Lüderitzbucht, 0.5—10 m (MICHAELSEN 1915).

Indian Ocean, St. Paul (v. DRASCHE 1884).

Tasmania (HARTMEYER 1920).

New Zealand, in several localities, 5—18 m (MICHAELSEN 1921).

Chatham Islands (MICHAELSEN 1921).

Auckland Islands (HERDMAN 1910).

Antarctic: Graham region, 40—200 m, Charcot Exp. I—II (SLUITER 1906, 1914).—Kaiser Wilhelm II Land, 380—385 m ,"Gauss" Exp. (HARTMEYER 1911).

If the forms *Corella benedeni* and *Corella dohrni* mentioned below should prove to be identical with *C. eumyota*, its range of distribution comprises also the neighbourhood of the Graham region, 436—580 m, "Belgica" Exp. (VAN BENEDEN & de SELYS-LONGCHAMPS 1913), and Wilkes Land, 644 m (HERDMAN 1923).

Remarks.

The first find of the species in Antarctic waters was made by the first Charcot Expedition. The collection contained 27 specimens, which were described by SLUITER (1906) under the name of *Corella antarctica*, synonymous with *C. eumyota* according to HERDMAN (1910) and HARTMEYER (1911). Most of the specimens were of small size, but one measured 130 mm in length, showing that this species of *Corella* can attain giant dimensions.

In the present collection, one of the Antarctic specimens is of great size, measuring 90 × 50 mm; the others are of small size, and in far from a good state, the tissues being greatly contracted. They are of typical structure, though they exhibit some variations, owing to differences in age.

In the large specimen the tentacles number about 50. The number varies from 50 to 100, specimens from the subantarctic region usually having a greater number than those obtained in the Antarctic (cf. HARTMEYER 1911). The aperture of the dorsal tubercle is elongated, horseshoe-shaped, with the horns incurved; the open interval is directed forward. In specimens of small size the aperture is of semi-circular shape. The dorsal ganglion is narrow and of great length.

The dorsal lamina is represented by a long series of languets, long and short ones alternately. In the branchial sac the longitudinal vessels are about 60 in number on each side. The spirals consist of a few turns.

In the report on the Ascidians of the "Belgica" Expedition (1897—99), M. de SELYS-LONGCHAMPS (1913) described two new species of *Corella*, *C. benedeni* and *C. dohrni*, obtained near Graham Land. Later (1923) HERDMAN reports 4 specimens of *C. dohrni* from a locality in the neighbourhood of Wilkes Land. As HERDMAN remarks, the question remains whether the latter is a distinct species or may be identical with *C. eumyota*. It seems to me that also the validity of *C. benedeni* as a species distinct from *C. eumyota* might be questioned. The material not being available, the validity of the two species cannot be decided in this paper. A more ample collection of Antarctic *Corellae* is also necessary to determine the boundaries of variation of the species *eumyota*.

An interesting fact is noticeable, namely the difference in the depths for this species in Subantarctic and Antarctic waters. In the former region the specimens have usually been obtained in shallow water; the greatest known depth is 45 m. In the Antarctic most finds are from deeper water. The greatest depth hitherto known is 385 m; if *Corella dohrni* should prove to be synonymous with *C. eumyota* the greatest depth will be 644 m.

Family **Agnesiidae.**

Caenagnesia bocki, subgen. et sp. n.

Pl. 2, figs. 20—22.

Occurrence.

Antarctic, Graham region, 65° 19′ S—56° 48′ W, 400 m, gravel and clay, 3 sps. (Februari 18 1902).

Description.

External appearance. Seen from the side, the animal has a squarish aspect, seen from above, it is of regular oval shape (fig. 22). The upper part of the body is high and vaulted, overlapping the lower (basal) part, which is compressed from side to side and more or less keel-shaped. The attachment is by the basal part, which apparently lies buried in the clay or fine sand of the sea bottom, the body being anchored by very delicate filaments, with which the test of the basal part is provided. A shallow furrow filled with fine sand shows the outline of the attached part of the body. The surface of the upper part of the test is smooth, except for a few low wrinkles, and almost free from sand, at least in the preserved state, only a few traces of fine clay being visible between the wrinkles.

There are no distinct siphons, but the apertures are well conspicuous, situated on the upper side (fig. 22). They are some distance apart. The branchial aperture has 6—7 lobes, the atrial one 6 lobes.

The collection contains 3 specimens of this peculiar species. The largest specimen measures 20 mm in length, antero-posteriorly, 17 mm in height, baso-apically, and 13 mm in thickness, from side to side.

The species is named after the Director, Professor SIXTEN BOCK.

Internal structure. The test is cartilaginous and transparent, allowing much of the internal organism to be seen. It is of moderate thickness, somewhat thinner and softer on the lower keel-shaped part of the body.

The mantle musculature consists of narrow separated muscle bands; the circular bands around the siphons are well developed, on the sides weak transverse bundles cross the stronger longitudinal ones; these radiate from the base of the siphons and run along the sides of the upper part of the body, with their ends forked (cf. fig. 20).

The tentacles are simple and arranged in several circles on the inner wall of the branchial siphon, by which arrangement a broad tentaculated band is formed. The tentacles are of several, at least four, sizes. The largest ones lie in the inmost circle and the smallest in the outmost one. The larger tentacles are about 37 in number in the larger specimen examined, about 12 of which represent the largest ones and belong to the inmost series. The total sum is about 50, perhaps a few more. The anterior border of the tentaculated wall of the branchial siphon is provided with a series of very small pointed processes, closely arranged, forming a toothed circular brim, as it were (fig. 21). Whether they might develop into real tentacles or remain in a rudimentary state, is an open question.

A narrow oral velum with smooth surface is developed at the base of the branchial siphon on the interspace between the tentacles and the peripharyngeal band (fig. 21). The prebranchial zone is smooth.

No atrial tentacles or velum have been observed.

The dorsal tubercle is situated partly under the left branch of the peripharyngeal band; it is small and rounded. The shape of the aperture could not be distinctly distinguished. The ganglion is on the left side of the tubercle, and the dorsal gland is seen in the angle of the peripharyngeal band (fig. 21).

The dorsal lamina reaches as far as the oesophageal mouth. It is of characteristic structure, being represented by a broad lamina with an almost even margin (fig. 21).

The branchial sac, like the dorsal lamina, extends as far as the oesophageal mouth. The stigmata are coiled, with 3—5 turns in each spiral, forming short infundibula. The spirals are squarish, as is shown in fig. 21, and simple, sinistral or dextral, and regularly arranged. Each spiral generally consists of two stigmata, an inner one of great length and a short outer one, so that the outer winding is interrupted. The stigmata are crossed by four thin vessels, radiating from the centre of each spiral (cf. fig. 21).

There are 12 transverse rows of spirals on each side in the specimen examined; also, between them, a few accessory small spirals are to be seen on each side of the dorsal lamina. The number of infundibula in a row on each side reaches 13 or 14.

The transverse vessels separating the rows of spirals are 11 in number on each side; moreover, there are 3—4 short, incomplete transverse vessels, occurring between the anterior pairs of transverse vessels on each side of the dorsal lamina (cf. fig. 21). No complete longitudinal vessels are present, but the transverse vessels bear bifid papillae, 37—38 papillae on each vessel, and 1—4 papillae on the short incomplete ones (fig. 21). The bifid papillae represent longitudinal vessels in an early stage of development, and are, no doubt, a constant feature in this species.

The shape and position of the alimentary canal are illustrated by fig. 20. The stomach extends a little beyond the branchial sac, which reaches as far as the oesophageal mouth. The oesophagus is short, running backwards from the postero-dorsal corner of the branchial sac. The stomach is of globular shape, and sharply marked off from the intestine; the wall is raised into numerous small areolations irregularly distributed. The intestinal loop is short and open, nearly horizontal in position. The rectum is long, forming nearly a right angle with the intestine. The margin of the anus is two-lipped, with 12—13 small lobes (fig. 20).

The reproductive organs are situated in the intestinal loop. As is shown in fig. 20, the ovary has a central position, being surrounded by the testis, which consists of numerous elongated glands, mostly cleft into lobes. The testicular glands cover part of the stomach and the intestine; also on the mesial side, i. e. next to the branchial sac, they are spread over the proximal part of the intestine. The gonoducts accompany the rectum, running along the dorsal border of its inner side.

For the present I am not inclined to establish a new genus for the above described species, but owing to the important differences between it and the *Agnesia* species, a new subgenus, *Caenagnesia*, is proposed for it.

The new subgenus is characterized by having the dorsal lamina in the shape of a broad membrane with even margin; no continuous longitudinal vessels, but in their place bifid papillae on the transverse vessels.

The diagnosis of the genotype, *C. bocki*, is the same. Further specific distinguishing marks are the presence of numerous, up to 37—38, bifid papillae on each transverse vessel in the branchial sac; few, apparently two, stigmata in each spiral, forming 3—5 turns.

Remarks.

The family *Agnesiidæ* comprises a single genus, *Agnesia*. It is intermediate between the Ascidiids and the Rhodosomatids. With the former it has in common the position of the alimentary canal on the left side, and with the latter the structure of the branchial sac, and — according to the definition accepted hitherto — the structure of the dorsal lamina. The species, *C. bocki,* described in this paper shows that it may have a feature more in common with the Ascidiids, namely the structure of the dorsal lamina, which in the species hitherto known is represented by languets, as in the members of the *Rhodosomatidae,* but in *Caenagnesia bocki* by a smooth membrane, as in the *Ascidiidae.*

The family is also characterized by having the branchial sac without internal longitudinal vessels but with transverse vessels bearing processes, which are unbranched in all species of *Agnesia* hitherto known. In *Caenagnesia bocki,* however, the transverse vessels bear bifid papillae, and according to the common view, the bifid papillæ, as well as the unbranched ones, represent longitudinal vessels in an early developmental stage.

Consequently HUNTSMAN's diagnosis of the family *Agnesiidae* is to be emended in the following points: The dorsal lamina is represented by a series of languets or by a lamina; further, with regard to the branchial sac, continuous longitudinal vessels are wanting, but they are represented by papillae unbranched or bifid.

Whether these papillæ represent rudiments or vestigial traces of longitudinal vessels is not decided in this paper. It seems most probable that they are rudiments of longitudinal vessels. According to this suggestion, *Cænagnesia bocki,* as compared with the known *Agnesia* species, represents a higher degree of development, having bifid papillae. It might also be supposed that, in the *Agnesiidae,* the papillae, branched or unbranched, will remain in this stage throughout the whole life of the animal. A similar modification of the branchial sac occurs in another Ascidian from Antarctic waters, namely *Tylobranchion,* in which the occurrence of bifid papillae is a constant feature. And a European species, *Perophora listeri* FORBES, affords an instance of the constant character of unbranched papillae on the transverse vessels. In these Ascidians the papillae are considered to be rudiments of longitudinal vessels.

Owing to the above-mentioned peculiarities in the structure of the dorsal lamina and the branchial sac of the species *bocki,* in which it differs from the species referred to *Agnesia,* the single genus of the family, a new subgenus, *Caenagnesia,* is proposed for it. In the above respects the diagnosis of the family ought to be made broader in order to include it and other forms of similar organization; in other respects *C. bocki* proves a typical member, as is evident from the description and figures given.

The specific distinguishing marks will appear from the following comparison with the different forms of *Agnesia,* the single genus of the family. Six species have been described hitherto: Four species from the North Pacific: *A. beringia* RITTER, *A. septentrionalis* HUNTSMAN, *A. himeboja* OKA and *A. sabulosa* OKA, two species from the Patagonian region: *A. glaciata* and *A. krausei* both described by MICHAELSEN (1900, 1911). In all of them, as has been mentioned above, the dorsal lamina is represented by a series of languets, and the transverse vessels bear unbranched papillae, which are broad and tongue-like, or conical in shape, with the free end often curved or hooked, characters proving them to be true members of the genus *Agnesia.*

In *C. bocki* the transverse vessels bear a great number of papillae; the number on each complete vessel reach 37—38. In the species of *Agnesia* the transverse vessels are armed with only few, 5—9, processes (with the reservation that the authors have not stated the exact number in *A. glaciata, A. beringia* and *A. sabulosa*).

In *C. bocki* there are 11 transverse vessels and rudiments of 3—4 more. In the *Agnesia* species the number is only given for *A. septentrionalis*, which has 11—12 transverse vessels, and *A. krausei*, which has only 5—6.

In *C. bocki* the stigmata forming the spirals are usually two in each spiral. In *A. glaciata* each spiral is composed of numerous stigmata, as appears from MICHAELSEN's figure (l. c. pl. 3, fig. 21), in *A. krausei* by only one stigma.

In *C. bocki* there are 3—5 turns in each spiral. In *A. glaciata* each spiral is composed of up to 9, usually 7—8, turns, but in *A. krausei* of 4—5 turns, in *A. septentrionalis* of only 3 turns; in the two Japanese species the spirals each have 6—7 and 5—6 turns respectively.

C. bocki differs from the *Agnesia* species also in the shape of the body, as well as in several minor points.

The distribution of the members of the family *Agnesiidae* is of special interest. Four species have been collected in the North Pacific: *Agnesia beringia* in the south-eastern Bering Sea, *A. himeboja* and *A. sabulosa* off the coast of Japan, *A. septentrionalis* off the coast of British Columbia; three species are known from cold southern waters, namely *A. glaciata* and *A. krausei* from the Patagonian region and the here described *Caenagnesia bocki* from the Antarctic, Graham region. The latter is the first species of the family recorded from the Antarctic. Thus the genus *Agnesia*, incl. the subgenus *Caenagnesia*, is bipolar in its distribution, being represented in Arctic as well as Antarctic waters.

According to MICHAELSEN's statement (1896—1907, p. 18—19), confirmed by HARTMEYER (cf. BRONN's Tierreich), the Arctic genus *Corellopsis* HARTMEYER and the Antarctic *Agnesia* afford an instance of typical bipolar distribution. "Einen Fall typischer Bipolarität repräsentiert auch die Gattung *Agnesia*, deren einzige Art, *A. glaciata* MICHAELSEN, von Süd-Feuerland stammt. Dieser südlichen Art entspricht als nächste Verwandte die bei Spitzbergen gefangene *Corellopsis pedunculata* HARTMEYER". This statement has proved incorrect. Thanks to a clearer conception arrived at subsequently with regard to the anatomical differences between these genera, they cannot be considered to be closely allied. They have even been subordinated to different families: The former, the genus *Corellopsis*, remained in the *Rhodosomatidae*, and for *Agnesia* the family *Agnesiidae* was established.

Family **Ascidiidae.**

Ascidia translucida HERDMAN 1880.

Pl. 3, fig. 23.

Occurrence.

South Georgia: Antarctic Bay, 54° 12′ S—36° 50′ W, 250 m, small stones, 3 sps. (May 6 1902). — Grytviken, 54° 22′ S—36° 28′ W, 22 m, clay and algæ, 6 sps. (May 30 1902); 20 m, mud with algæ, 1 sp. (June 14 1902).

Further Distribution.

Kerguelen Island, about 50 m, "Challenger" Exp. (HERDMAN 1882); Gazelle Bassin, "Valdivia" Exp. (HARTMEYER 1912).

Remarks.

The collection contains ten specimens of the remarkable species *translucida*. They are all of great size, the largest measuring up to 110 mm in length and 50—60 mm in breadth. Thus they exceed in size the specimens obtained previously, which are much smaller, from 22—56 mm in length.

The species was reported before from Kerguelen Island in six specimens only: Three specimens by the "Challenger" Expedition and as many by the "Valdivia" Expedition; it was redescribed by HARTMEYER (1912). Owing to the clear indications of the anatomical peculiarities of *A. translucida*, given by the last-mentioned author, the present *Ascidiae* can be referred without hesitation to this species, notwithstanding some differences in external aspect, which might be due to the much greater size of these individuals (cf. fig. 23).

A few details might be added to complete the redescription of HARTMEYER. In the present specimens the attachment is by the left side or its basal part, almost always by means of a broad irregular process from the test. The test is cartilaginous, half-transparent, and wrinkled; the surface is smooth and without foreign matter on the right side; on the left side fragments of algæ or small stones are seen, to which the animal was attached.

The larger tentacles in one specimen examined number 16, of two sizes, and there are several rudiments of tentacles between them; in another the number inclusive of the rudiments is about 27, or a few more.

The dorsal tubercle is of still more complicated structure than is shown in HARTMEYER's figure (pl. 42, fig. 11), the serpentiform openings being present in still greater numbers. The dorsal tubercle shows the same peculiar structure in all specimens examined. It seems to be constant and is, no doubt, a valid specific character.

The dorsal ganglion is elongated and narrow, situated at a distance of about mm from the dorsal tubercle.

The dorsal lamina extends as far as the oesophageal mouth. It is ribbed transversely on the left side, and the margin is even. To the right of the oesophageal mouth a series of long pointed languets is to be seen.

The branchial sac has about 34—35 longitudinal vessels on the left side, a few more, up to 39, on the right. High papillae are present at the crossing of the longitudinal vessels and the transverse ones. Intermediate papillae are developed in some places, wanting in others.

The alimentary canal agrees in shape and structure with HARTMEYER's description. The second bend of the intestine is wide, and the rectum ends on the level with the intestinal loop or a little above it.

Ascidia challengeri HERDMAN 1882.

Syn. *Ascidia charcoti*, SLUITER 1905. *Phallusia charcoti*, HARTMEYER 1911.

Occurrence.

Antarctic, Graham region, S. E. of Seymour Island, 64° 20′ S—56° 38′ W, 150 m, sand and gravel, 2 sps. (January 16 1902).

Further Distribution.

The species *A. challengeri* (syn. *A. charcoti*) is widely distributed in Antarctic seas. It seems to be a common species, having been obtained in several dozen specimens. It occurs at various depths; the greatest depth hitherto known for it is 637 m, in Commonwealth Bay, Adelie Land.

Its habitat is:

Kerguelen Island, at several localities, greatest depth 108 m, "Challenger" Exp. (HERDMAN 1882), "Gazelle" Exp. and "Valdivia" Exp. (HARTMEYER 1912).

Antarctic: S. Shetlands, Admiralty Bay, 75 m. — At several localities along the coast of Graham Land, 36—380 m, Charcot Exp. I—II (SLUITER 1906, 1914). — Kaiser Wilhelm II Land, 350—385 m, "Gauss" Exp. (HARTMEYER 1911). — At several localities along the coast of Wilkes Land, 100—637 m, Austr. Ant. Exp. (HERDMAN 1923).

Tasmania, off Maria Island, 117 m (Austr. Ant. Exp. (HERDMAN 1923).

Remarks.

The collection contains two specimens of *Ascidia*, identified as *A. challengeri*, providing that HARTMEYER is right in his suggestion that *A. challengeri* and *A. charcoti* SLUITER are identical species. The diagnosis of these two forms might be appliable to the present material, which is scanty: one, the larger, measures 43 mm in length, baso-apically, and 28 mm in breadth, dorso-ventrally, and is in a poorly preserved state; the other is a young one, measuring 23 × 15 mm.

The body is of rounded rectangular shape, in the larger specimen the posterior part is somewhat broader than the anterior part. The attachment is by the left side.

The test is cartilaginous and smooth, provided with bladder-like processes, sparsely distributed; around the apertures the processes are rather long and densely arranged. Numerous blood vessels, profusely branched, are seen in the test and show very distinctly from the outer surface. The siphons are low and at a distance of about 6—7 mm from each other.

The tentacles are about 16 in number. The aperture of the dorsal tubercle is semi-circular in shape, the open interval between the horns directed forward. The dorsal lamina extends behind the oesophageal mouth, the margin is not quite even, being faintly toothed in some parts. The lamina on the opposite side of the oesophageal mouth has a denticulated margin.

The branchial sac has about 30—32 longitudinal vessels on each side. Intermediate papillae are present. The stigmata are ovate, in the younger specimen of various lengths.

The alimentary canal agrees in shape with the figures given by HARTMEYER (1912), the intestinal loop being straight, and the second bend narrow. The rectum ends a little above the recurved end of the intestinal loop.

Ascidia dispar n. sp.

Text-fig. 11.

Occurrence.

South Georgia, Grytviken, 54° 22′ S—36° 28′ W, 22 m, clay and algæ, 1 sp. (May 30 1902).

Description.

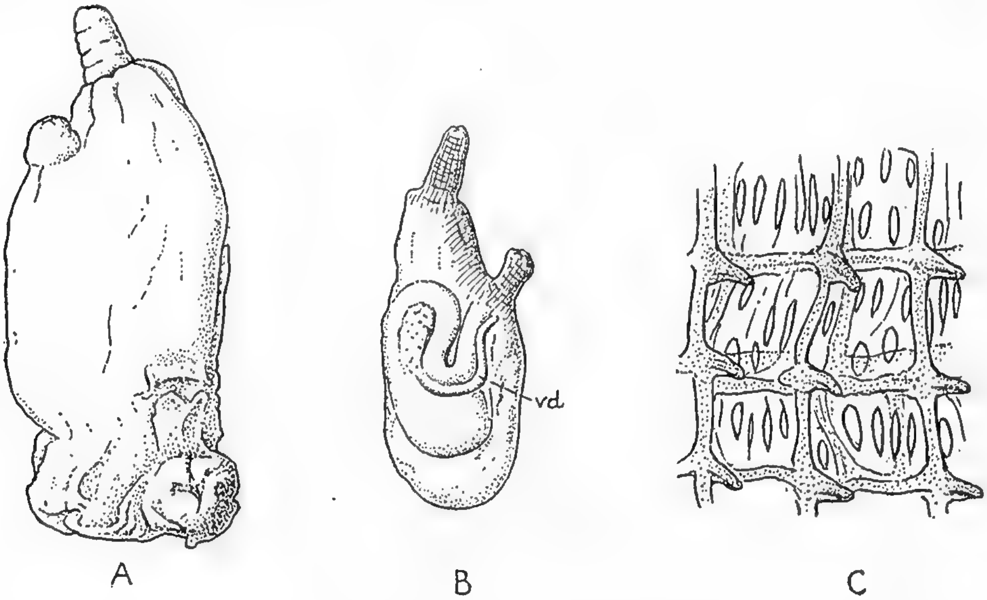
External appearance. The body is elongated, measuring about 58 mm in length, baso-apically, and 25 mm in breadth, dorso-ventrally. The posterior end has a broad process from the test, by which it is attached, apparently to algæ.

The siphons are prominent and conical, the branchial is terminal and median, while the atrial is a little way down on the dorsal side, at a distance of about 9 mm from the former. The branchial siphon has 7 lobes, the atrial 6 (text-fig. 11 A).

The test is thin and transparent, the surface is smooth, but on the siphons it has some microscopic, pointed papillae sparsely distributed.

Internal structure. The mantle is thin and the mantle musculature well developed on the right side and on the area between the siphons. Around the siphons, the muscle bands have the usual circular and longitudinal directions; on the body they are numerous, though slender, and cross each other in various directions, forming an irregular network.

The tentacles number about 50, or a few more, of various sizes. The aperture of the dorsal tubercle is sharply curved, of subcircular shape, the horns being a



Text-fig. 11. *Ascidia dispar* n. sp.

A. Right side. Nat. size.
B. Left side, test removed. Nat. size.
C. Part of branchial sac, from inside. × 30.
vd. Vas deferens.

little separated; the open interval is directed forward. The dorsal ganglion is situated at a distance of about 2 mm from the tubercle.

The dorsal lamina has an even margin, it extends far beyond the oesophageal mouth to the bottom of the branchial sac. On the right side of the oesophageal mouth is seen a thin lamina with an almost even margin, extending backward as far as the dorsal lamina.

The branchial sac extends about 6 mm beyond the stomach. It has 50, or a few more, longitudinal vessels on the right side, and 40 on the left. The transverse vessels are also numerous. The longitudinal vessels bear well-developed curved papillae at the points of intersection with the transverse vessels, but no intermediate papillae could be discerned in this specimen. The meshes between the vessels are small, and the wall perforated by mostly short, longitudinal stigmata, irregularly arranged (text-fig. 11 C).

The shape and structure of the alimentary canal is seen from text-fig. 11 B. The intestinal loop is slightly bent dorsally; the second bend is narrow. The stomach wall is longitudinally folded. The rectum ends a little below the recurved end of the intestinal loop; the margin of the anus is profusely lobated.

The reproductive organs are situated on the sides of the intestinal loop; the gonoducts accompany the rectum and open beside the anus.

Remarks.

Ascidia dispar is represented by a single specimen in the collection. It was obtained together with *A. translucida* at the same locality. It is distinctly distinguished from this species, as appears from the descriptions given. At first sight, it seems to have points of resemblance with *A. challengeri* in regard to the elongated shape of the body, the position of the siphons, the process from the posterior end of the test. A more detailed comparison shows, however, that it cannot be referred to this species.

The essential points of difference are as follows:

In *A. challengeri* the tentacles are few, occasionally 20 in number, usually, even in large specimens, not so many. In the specimen of *A. dispar* here examined the tentacles number 50, or a few more.

In the former the dorsal lamina extends backward hardly more than as far as the area surrounding the oesophageal mouth. In the latter it extends far beyond the oesophageal mouth, to the bottom of the branchial sac.

In the former the lamina on the right side of the oesophageal mouth is short and its margin is denticulated. In the latter it is of great extension and the margin is almost even.

In the former the branchial sac has about 30—32 longitudinal vessels on each side. In the latter the branchial sac has about 50, perhaps a few more, longitudinal vessels on the the right side, and about 40 on the left. With regard to the number of the branchial vessels in *A. challengeri*, I have to rely on observations on the two specimens in the present collection, previous authors having omitted to state anything as to this anatomical character in the individuals described by them, either under the name of *challengeri* or *charcoti*. But the figures given hardly suggest the occurrence of a greater number of vessels.

In *A. challengeri* the longitudinal vessels bear papillae at the points of intersection with the transverse vessels and usually smaller intermediate ones. In *A. dispar* no intermediate papillae could be distinguished, all papillae being well developed and placed each at the intersections with the transverse vessels.

In the former the stigmata are, as a rule, regular and elongated, in the latter they are short and of varying lengths and irregularly situated (text-fig. 11 C).

Of secondary value are the differences in the following characters: shape of the siphons, nature of test, distribution and form of the papillae on the test, geographical distribution.

LIST OF WORKS REFERRED TO.

ÄRNBÄCK-CHRISTIE-LINDE, A., Northern and Arctic Invertebrates in the Collection of the Swedish State Museum (Riksmuseum). XI. Tunicata. 3. Molgulidae and Pyuridae. Sv. Vet. Ak. Handl. Vol. 4. Stockholm 1928.

— Chilean Tunicates. Arkiv f. Zoologi. Bd. 21 A. Stockholm 1929.

BENEDEN, E., Van, et SELYS-LONGCHAMPS, M. de, Tuniciers. Résultats du voyage du S. Y. "Belgica". Anvers 1913.

HARTMEYER, R., Tunicata (Manteltiere). Bronn's Kl. und Ordn. d. Tierreichs. Vol. 3. Suppl. Leipzig 1909—1911.

— Die Ascidien der Deutschen Südpolar Expedition 1901—1903. D. Südpolar-Exp. Vol. 12. Berlin 1911.

— Die Ascidien der Deutschen Tiefsee-Expedition. Ergeb. D. Tiefsee-Exp. Vol. 16. Jena 1912.

— Ascidien von Juan Fernandez. Nat. Hist. Juan Fernandez and Easter Island. Ed. Dr. Carl Skottsberg. Vol. 3. Uppsala 1920.

HELLER, C., Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres. Denk. Ak. Wien. Vol. 37. Wien 1877.

HERDMAN, W. A., Preliminary Report on the Tunicata of the "Challenger" Expedition. P. R. Soc. Edinb. Vol. 11. Edinburgh 1881.

— Report on the Tunicata collected during the Voyage of H. M. S. "Challenger" during the years 1873—76. Ascidiæ simplices. Vol. 6. Edinburgh 1882.

— Tunicata. Nat. Antarc. Exp. 1901—1904. London 1910.

— Ascidiæ simplices. Austr. Ant. Exp. 1911—1914. Vol. 3. Sidney 1923.

HUNTSMAN, A. G., Holosomatous Ascidians from the coast of Western Canada. Contr. Canad. Biol. Ottawa 1912.

— Ascidiacea. Rep. Canad. Arc. Exp. 1913—18. Vol. 6. Ottawa 1922.

MICHAELSEN, W., Die holosomen Ascidien des magalhaensisch-südgeorgischen Gebietes. Zoologica. Vol. 12. Stuttgart 1900.

— Die stolidobranchiaten Ascidien der deutschen Tiefsee-Expedition. Ergeb. D. Tiefsee-Exp. Vol. 7. Jena 1904.

— Tunicaten. Hamb. Magalhaens. Sammelreise. Vol. 7. Hamburg 1896—1907.

— Die Tethyiden (Styeliden) des Naturhistorischen Museums zu Hamburg, nebst Nachtrag und Anhang, einige andere Familien betreffend. Mt. Mus. Hamburg. Vol. 28. Hamburg 1911.

OKA, A., Eine neue Ascidienart aus der Gattung Agnesia Michaelsen. Annot. Zool. Japon. Vol. 9. Tokyo 1915.

— Eine zweite japanische Art der Gattung Agnesia. Proc. Imp. Ac. Vol. 5. Tokyo 1929.

PIZON, A., Étude anatomique et systématique des Molgulidées appartenant aux collections du Muséum de Paris. Ann. Sci. nat. Sér. 8. Vol. 7. Paris 1898.

RITTER, W. E., The simple Ascidians from the northeastern Pacific in the collection of the United States National Museum. Proc. U. S. Nat. Mus. Vol. 45. Washington 1913.

SLUITER, C. PH., Tunicaten aus dem Stillen Ocean. Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896—1897). Zool. Jahrb. Syst. Vol. 13. Jena 1900.

— Die Tunicaten der Siboga-Expedition. 1 Abt. Die sozialen und holosomen Ascidien. Siboga-Exp. Vol. 56 a. Leiden 1904.

— Tuniciers. Exp. Ant. Franç. (1903—1905). Paris 1906.

— Les Tuniciers. Deuxième Exp. Ant. Franç. (1908—1910). Paris 1914.

TRAUSTEDT, M. P. A., Die einfachen Ascidien (Ascidiae simplices) des Golfes von Neapel. Mt. Stat. Neapel. Vol. 4. Berlin 1883.

— Ascidiæ simplices fra det stille Ocean. Vid. Meddel. 1884. København 1885.

VAN NAME, W. G., The Ascidians of the Bermuda Islands. Tr. Connect. Ac. Arts and Sci. Vol. 11. New Haven 1902.

— Ascidians from the Philippines and adjacent waters. Bull. U. S. Nat. Mus. Vol. 1. p. 2. Washington 1918.

— Ascidians of the West Indian region and southeastern United States. Bull. Americ. Mus. Nat. Hist. Vol. 44. New York 1921.

EXPLANATION OF PLATES.

PLATE 1.

Fig. 1. *Molgula malvinensis* n. sp., left side, test and mantle musculature removed. × 3.
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Fig. 5. The same. Photo. × 3.
Fig. 6. The same, left side, test removed. × 3.
Fig. 7. The same, right side, test removed. × 3.
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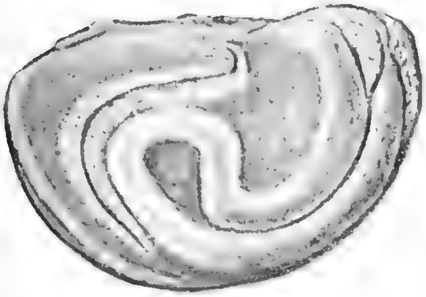
Figures drawn at the Department of Evertebrata, Riksmuseum, Stockholm:

Drawings in the text and on the plates by Mr. S. EKBLOM, photographs by Mr. C. G. SVEDÉN and Miss D. BERG.



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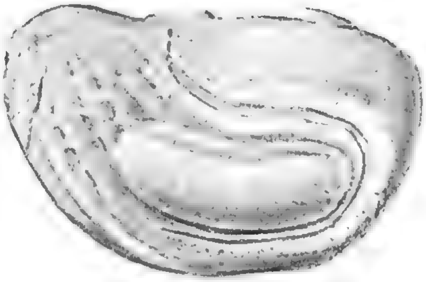

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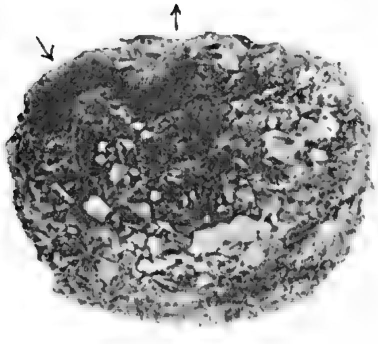

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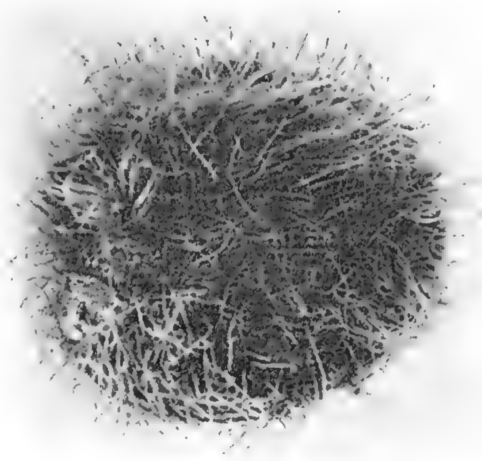

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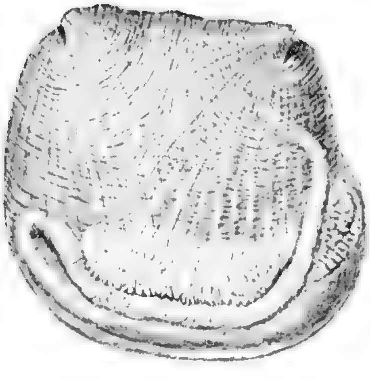

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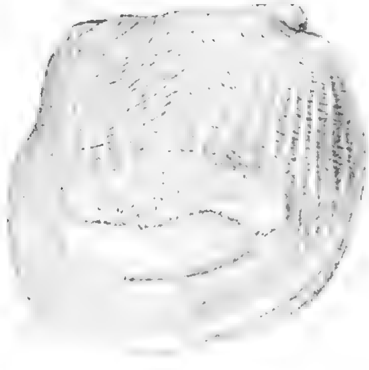

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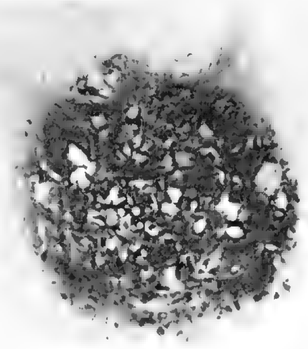

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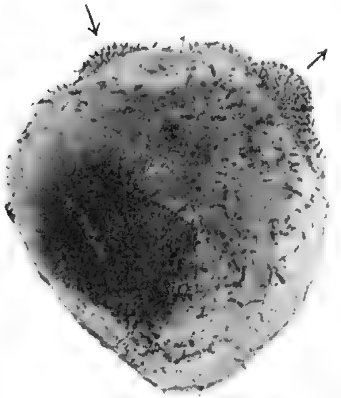

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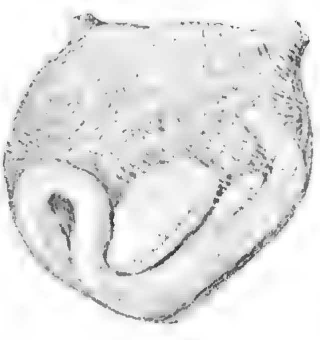

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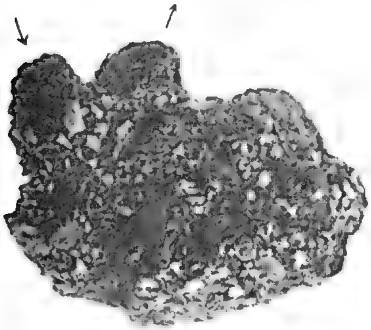

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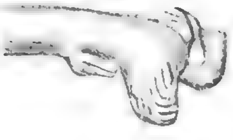

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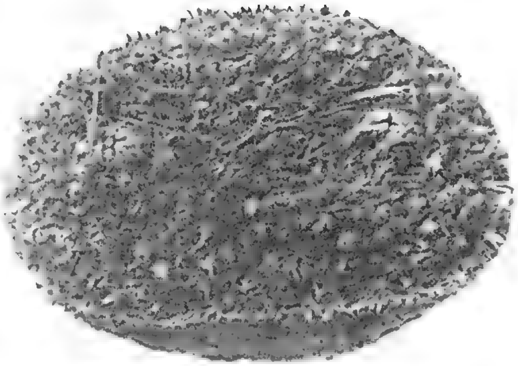

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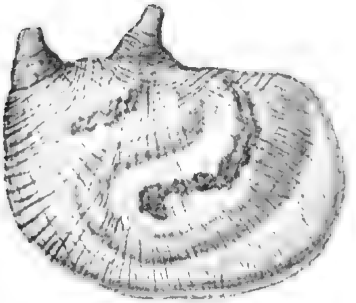

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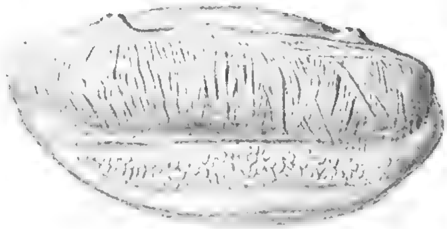

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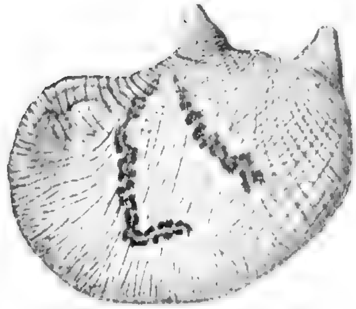

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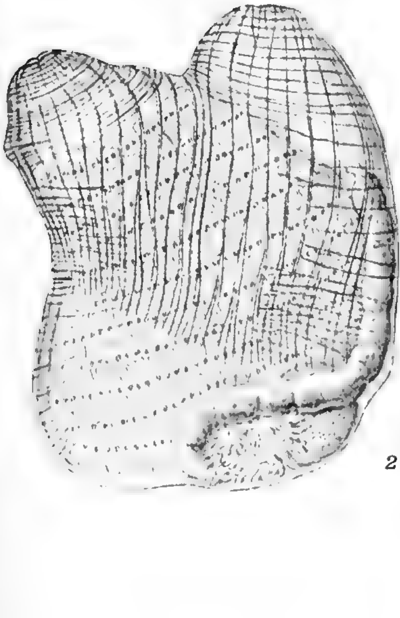

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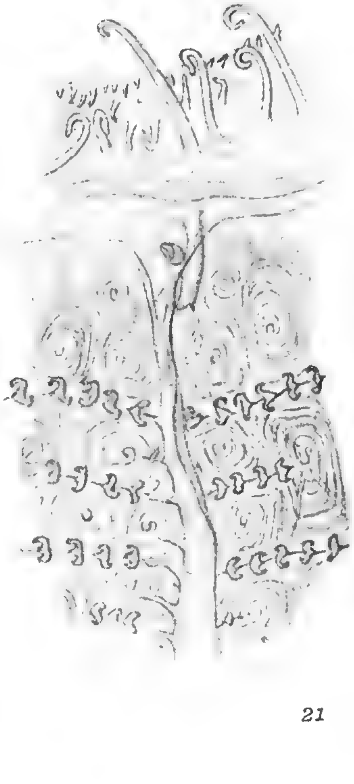

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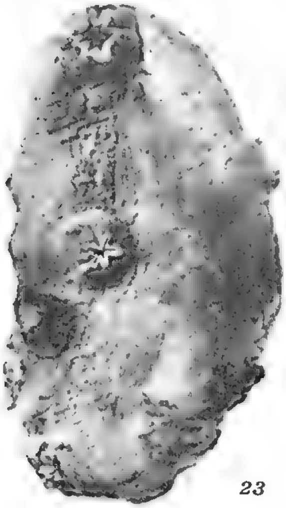

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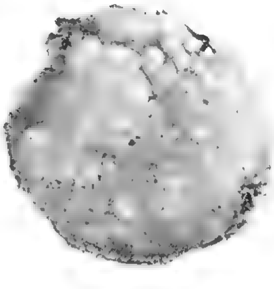

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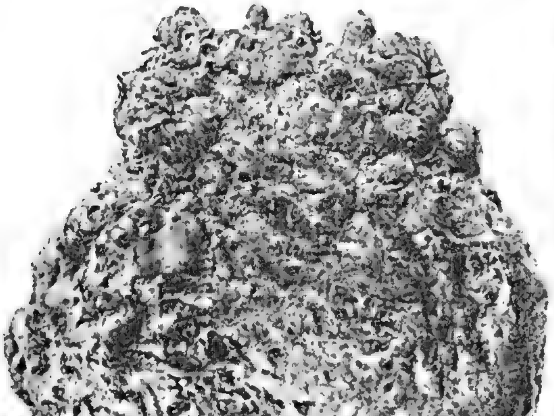

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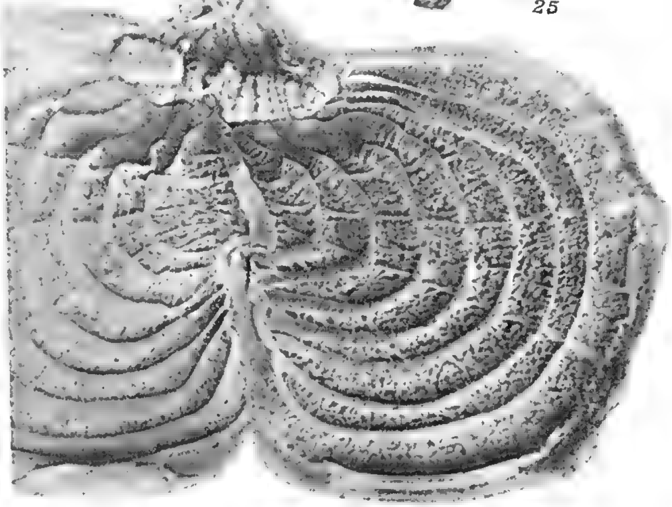

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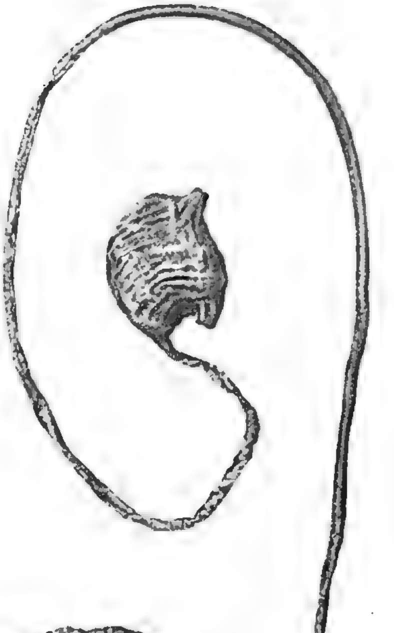
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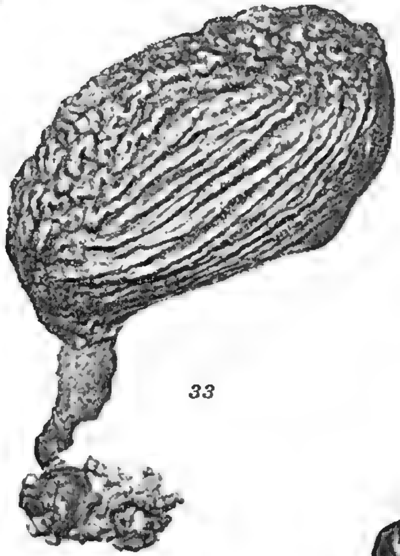
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FURTHER ZOOLOGICAL RESULTS
OF THE SWEDISH ANTARCTIC EXPEDITION
1901—1903

UNDER THE DIRECTION OF DR. OTTO NORDENSKJÖLD

EDITED BY PROFESSOR SIXTEN BOCK
NATURHISTORISKA RIKSMUSEUM
STOCKHOLM

THE STENOLAEMATOUS BRYOZOA

BY

FOLKE BORG

Vol III · No 5

With 16 Plates and 26 Figures in the Text

Utgivet med statsbidrag och anslag från Längmanska kulturfonden

STOCKHOLM
P. A. NORSTEDT & SÖNER
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PREFACE.

When about twentyfive years ago through the kindness of the late Professor A. Appellöf, the Collection of Bryozoa brought home by the Swedish Antarctic Expedition (1901—1903) was placed at my disposal, this was an advantage that not many a young zoologist has had a similar one. In spite of the fact that the ship of the Expedition, the "Antarctic", was shattered by the pressure of the ice and sunk at which occasion unfortunately a considerable part of the scientific material was lost, yet the remaining Collection of Bryozoa, brought together by the zoologist of the Expedition, Dr. K. A. Andersson, was certainly far the richest one, that had up to that time been taken home from these regions.

As Dr. Andersson himself had not the opportunity of examining this Collection, as had originally been his intention, it was now handed over to me, who had then just begun my studies in Bryozoa. For me this meant, first, an immense amount of material highly encouraging my researches and, secondly, many years of work in order to investigate thoroughly the whole of the collection. The results of this work hitherto issued have mostly had a bearing upon morphological, anatomical and embryological problems, for I soon found that this was necessary in order to lay the indispensable foundations for a somewhat reliable systematic work. I did not think, when first beginning my task, that it would take so long a time, before the systematic part of the work could be published. I think, however, that the delay has on the whole not been disadvantageous; for I have had occasion to go through the material more than one time, which has enabled me to form a distinct opinion on several points at first obscure and to strengthen the one already obtained on many others.

I wish to express here my profound gratitude to my friend Professor Sixten Bock, Director of the Invertebrate Department of the Swedish Museum of Natural History, Stockholm, who has greatly facilitated the publication of this research and with never failing kindness has placed the technical staff of his Institute at my disposal at every occasion I wished. My thanks are likewise due to Miss Anna B. Hastings, M. A., Sc. D., in charge of the Collections of Bryozoa at the British Museum (Nat. Hist.), for kindly aiding me in all ways she could when I was working at the Museum and for sending at my request at different occasions the rather numerous specimens preserved in the Museum that I wished to see.

Lund, July 1943. *Folke Borg.*

LIST OF DISTRIBUTION.

A. Swedish Expedition to Patagonia 1895—96.
Cape Valentyn, 150 fathoms.

B. Swedish Antarctic Expedition 1901—03:
St. 3. 6. 1. 1902. — Tierra del Fuego, 54° 43′ S. 64° 8′ W. 36 m. Stones and gravel.
St. 4. 15. 1. 1902. — Graham Region, off Paulet Island. 63° 36′ S. 55° 48′ W. 100—150 m. Gravel with small stones.
St. 5. 16. 1. 1902. — Graham Region, SE. of Seymour Island. 64° 20′ S. 56° 38′ W. 150 m. Sand and gravel.
St. 6. 20. 1. 1902. — Graham Region, SW. of Snow Hill Island. 64° 36′ S. 57° 42′ W. 125 m. Stones and gravel.
St. 7. 22. 1. 1902. — Graham Region. 65° 56′ S. 54° 35′ W. 920 m. Ooze mixed with stones.
Ushuaia, 13. 3. 1902.
St. 13. 15. 3. 1902. — Tierra del Fuego. Shallow water off Ushuaia. 54° 50′ S. 68° 16′ W. 8 m. Shells, stones and gravel with algae.
St. 17. 19. 4. 1902. — Between Falkland Island and S. Georgia, on the Shag Rock Bank. 53° 34′ S. 43° 24′ W. 160 m. + 2,05° C. Stones and gravel.
S. Georgia, Cumberland Bay, shallow water.
St. 20. 6. 5. 1902. — S. Georgia, Antarctic Bay. 54° 12′ S. 36° 50′ W. 250 m. Small stones.
St. 22. 14. 5. 1902. — S. Georgia, off May Bay. 54° 17′ S. 36° 28′ W. 75 m. + 1,5° C. Clay with some algae.
St. 25. 21. 5. 1902. — S. Georgia, off Grytviken (Pot Bay). 54° 22′ S. 36° 27′ W. 24—52 m. Gray clay with some algae.
S. Georgia, Grytviken (Pot Bay), 23. 5. 1902. — On kelp near or on the shore, and on Ascidians, on Patella sp., on Flustra sp. and some other Chilostomes growing on the kelp.
St. 26. 24. 5. 1902. — S. Georgia, off Grytviken (Pot Bay). 54° 22′ S. 36° 27′ W. 30 m. Stony bottom overgrown with Algae, outside the kelp-association.
St. 27. 24. 5. 1902. — S. Georgia off Grytviken (Pot Bay). 54° 22′ S. 36° 27′ W. 20 m. In the kelp-association.
St. 28. 24. 5. 1902. — S. Georgia, in the mouth of Grytviken (Pot Bay). 54° 22′ S. 36° 28′ W. 12—15 m. Sand and Algae.
St. 30. 26. 5. 1902. — S. Georgia, Moraine Bay. 54° 24′ S. 36° 26′ W. 125 m. −0,25° C. Clay with a few stones.
St. 32. 29. 5. 1902. — S. Georgia, South Bay, off the Nordenskjöld glacier. 54° 24′ S. 36° 22′ W. 195 m. + 1,45° C. Clay with stones.
St. 34. 5. 6. 1902. — S. Georgia, off the mouth of Cumberland Bay. 54° 11′ S. 36° 18′ W. 252—310 m. + 1,45° C. Gray clay with a few stones.
St. 39. 4. 7. 1902. — Falkland Islands, Port William. 51° 40′ S. 57° 41′ W. 40 m. Sand and small stones with algae.

St. 40. 19. 7. 1902. — Falkland Islands, Berkeley Sound. 51° 33′ S. 58° 0′ W. 16 m. + 2,75° C. Gravel and shells with algae.

St. 41. 23. 7. 1902. — Falkland Islands, Berkeley Sound, Port Louis, shallow water. 51° 33′ S. 58° 9′ W. 2—4 m. Gravel and ooze.

St. 44. 28. 7. 1902. — Falkland Islands, Port Louis, Greenpatch, near the bridge. 51° 33′ S. 58° 10′ W. 7 m. Outer limit of the kelp-association. Ooze and gravel with algae.

Port Louis, Greenpatch, 30. 7. 1902.

St. 48. 10. 8. 1902. — Falkland Islands, Berkeley Sound. 51° 34′ S. 57° 55′ W. 25 m. + 2,75° C. Sand and stones.

St. 49. 10. 8. 1902. — Falkland Islands, Berkeley Sound. 51° 35′ S. 57° 56′ W. 25—30 m. Shells and stones.

St. 50. 12. 8. 1902. — Falkland Islands, Port Louis. 51° 33′ S. 58° 9′ W. 7 m. Ooze.

St. 51. 3. 9. 1902. — Falkland Islands, Port William. 51° 40′ S. 57° 42′ W. 22 m. Sand.

St. 52. 3. 9. 1902. — Falkland Islands, Port William. 51° 40′ S. 57° 44′ W. 17 m. Sand.

St. 53. 3. 9. 1902. — Falkland Islands, Port William. 51° 40′ S. 57° 47′ W. 12 m. Sand and gravel.

St. 54. 3. 9. 1902. — Falkland Islands, Stanley Harbour. 51° 42′ S. 57° 50′ W. 10 m. Ooze and shells.

St. 55. 8. 9. 1902. — Falkland Islands, Port Albemarle. 52° 11′ S. 60° 26′ W. 40 m. Sand with algae.

St. 56. 8. 9. 1902. — Falkland Islands, Port Albemarle, Albemarle Harbour. 52° 9′ S. 60° 33′ W. 15 m. Sand with algae.

St. 58. 11. 9. 1902. — S. of W. Falkland. 52° 29′ S. 60° 35′ W. 197 m. + 4,1° C. Sand and gravel.

St. 59. 12. 9. 1902. — S. of W. Falkland, on the Burwood Bank. 53° 45′ S. 61° 10′ W. 137—150 m. Stones and fragments of shells.

St. 60. 15. 9. 1902. — Archipelago of Tierra del Fuego, eastern opening of the Beagle Channel. 55° 10′ S. 66° 15′ W. 100 m. + 5,0° C. Fragments of shells.

St. 64. 13. 10. 1902. — Archipelago of Tierra del Fuego, northern shore of the Beagle Channel, between Ushuaia and Lapataia. 54° 52′ S. 68° 25′ W. 35 m. Shells and Algae.

St. 67. 16. 10. 1902. — Archipelago of Tierra del Fuego, Ushuaia. 54° 49′ S. 68° 18′ W. 6 m. Ooze.

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St. 89. 3. 12. 1902. — Graham Region. 63° 57′ S. 60° 50′ W. 479 m. Coarse gravel.

St. 94. 21. 12. 1902. — Graham Region, N. of Joinville Island. 62° 65′ S. 55° 57′ W. 104 m. Gravel mixed with clay and stones.

St. 95. 28. 12. 1902. — N. of Astrolabe Island. 63° 9′ S. 58° 17′ W. 95 m. 1°.0 C. Clay mixed with sand and some stones; algae.

C. Antarctic Expedition of Dr. S. Vallin in 1924:
S. of New Zealand, either at Stewart Island or at Campbell Islands.

D. Swedish State Museum Collections:
Coast of Tasmania.

INTRODUCTION.

From the Antarctic and Subantarctic regions as well as from the neighbouring seas numerous Collections of animals have been brought home by several expeditions. Of these expeditions I shall mention here, however, only those that have succeeded in finding Bryozoa, and the Collections of which, as far as this group is concerned, have been mentioned in the literature.

The eldest of these collections is the one described by QUOY & GAIMARD (1824), consisting of a small number of species from the Littoral of the Falkland Islands and the Cape of Good Hope.

Fifteen years later, D'ORBIGNY (1839), reporting on the results of his journey to S. America, recorded no less than about fifty spesies of Bryozoa from the southern part of that continent including Patagonia, Tierra del Fuego and the Falkland islands. D'ORBIGNY's descriptions were not bad and his figures were excellent for that time, and so his work forms the foundation of our knowledge of the Bryozoan fauna of the seas round S. America.

BUSK's Catalogue of the marine Bryozoa in the British Museum (1852, 1854, 1875) includes among others the Bryozoa collected by CHARLES DARWIN on board the "Beagle" when staying at Patagonia and the Tierra del Fuego, as well as a number of species from S. Australia and New Zealand and from South African waters, thus augmenting our knowledge of the Bryozoa of these regions, though the determinations are often uncertain and sometimes wrong.

The transit of Venus expeditions in the year 1874 to Kerguelen and other isolated islands in this part of the world did not gain important results in Astronomy only but brought together some material of marine animals too. Thus, BUSK (1876, 1879) and STUDER (1879, 1889) have described collections of Bryozoa from these voyages.

In 1881, RIDLEY recorded a number of Bryozoa found during the survey of the "Alert" in the Strait of Magellan and on the coast of Patagonia; and in 1888 JULLIEN gave an account of the Bryozoa from the "Mission scientifique du Cap Horn" on board the "Romanche", which was later on supplemented by WATERS (1905); yet, part of this material probably still remains undescribed.

In the eighties the Challenger Reports by BUSK (1884, 1886) and WATERS (1888) contributed largely to our knowledge of the Bryozoan fauna of, among other regions, the Subantarctic, where the Expedition dredged off several of the islands, as, for instance, the Heard islands, Kerguelen, Possession island and Tristan du Cunha. Further GOLDSTEIN (1882) diagnosed a couple of the Challenger species from Marion island (one of the

Prince Edwards islands). Unfortunately, owing to the age and decreasing health of their author, the BUSK reports leave much to be desired as to the reliableness of determination and description.

So far not a single species of Bryozoa had been brought home from the Antarctic region proper. But during the last years of the old and the first ones of the new century several expeditions were dredging and collecting in Antarctic (as well as in Subantarctic) waters: the English "Southern Cross", the Belgian "Belgica", the French "Francais", the German "Gauss" and the Swedish "Antarctic"; and as a result of this intense work a number of papers were soon issued, dealing with the material thus caught. As far as Bryozoa are concerned, the memoirs of KIRKPATRICK (1902), WATERS (1904), CALVET (1909) and KLUGE (1914) are to be mentioned here. Through these communications much new information was brought to light, and a number of species from Antarctic waters proper were noticed.

Some later papers have dealt with the same subject. Thus, Miss THORNELY (1924) and LIVINGSTONE (1928) have reported on the Bryozoa from the Mawson Antarctic Expedition (1911—14), and HASENBANK (1932) has described a number of species dredged in Subantarctic localities during the German Deep-sea Expedition with the "Valdivia". MONOD & DOLLFUSS (1932) have noted a Cheilostomatous Bryozoan from Kerguelen, and BORG (1933) has described a Heteroporidan species from one of the "Discovery" Expeditions.

It deserves to be added, finally, that much material as yet unexamined from these regions still rests in the Museums, not only from the "Discovery" and other Expeditions in later years, but from older ones as well.

No one of the adjoining areas seems to be so rich in Bryozoa as the south Australian, including New Zealand and the neighbouring islands. Partly this may depend upon the fact that they have been explored more intensely than any other region of the Southern hemisphere. The foundations were laid down by BUSK, describing the Bryozoa from the "Rattlesnake" voyage as well as some other, smaller collections (1852 a, 1852 b, 1854, 1875) and the Challenger Australian Bryozoa (1884, 1886). These were followed by a number of contributions by P. H. MACGILLIVRAY (1859 a, 1859 b, 1869, 1878—90 [MCCOY], 1881 a, 1881 b, 1882, 1883 a, 1883 b, 1883 c, 1884 a, 1884 b, 1885 a, 1885 b, 1886, 1887 a, 1887 b, 1887 c, 1887 d, 1889, 1890 a, 1890 b, 1891, 1895), by HINCKS (1881 a, 1881 b, 1882, 1883, 1884 a, 1884 b) and by WATERS (1887, 1889).

Other authors working upon South Australian Bryozoa in the seventies and eighties were HUTTON (1877, 1878), HASWELL (1879, 1880, 1881), MAPLESTONE (1882), WHITELEGGE (1888, 1890) and KIRKPATRICK (1888 a, 1888 b, 1890).

The Bryozoa in the seas around New Zealand became known at about the same time through the investigations of BUSK (1879), HUTTON (1873, 1876, 1880, 1891, 1904), WATERS (1888) and HAMILTON (1898).

Though pioneer work was thus done, still much remained to be ascertained. It may be especially noticed here that the identification of the different species in the works just cited is as a rule not very reliable and that new species are often incompletely described and unsufficiently diagnosed. As a result of this much uncertainty was aroused and many grave mistakes have been made.

In later years some work has been done too on the Bryozoa from the area now in question. Thus, MAPLESTONE has recorded a number of species from Lord Howe Islands (1905) and from the Tasman Sea (1909, 1911), and LIVINGSTONE (1924, 1925, 1926 a, 1926 b, 1927, 1928) and STACH (1935 a, 1935 b) have examined and described a number of South Australian species. LIVINGSTONE, working thoroughly and critically, has been able to correct several of the mistakes of his predecessors.

Some years ago (1933), I diagnosed some Heteroporidan Bryozoa from S. Australia and the waters round New Zealand. A New Zealand list of Cheilostomata was given by LIVINGSTONE (1929), while Bryozoa from Chatham Island and d'Urville Island had been checked earlier by WATERS (1906), while those from the Auckland and Camphell islands were investigated by MARCUS (1921 d).

In comparison to the South Australian region the seas around South Africa as far as Bryozoa are concerned are rather incompletely known as has often been pointed out. Nevertheless about a dozen papers are to be recorded here. There are, first, some rather small and not very important contributions by BUSK (1850, 1867), HINCKS (1881, 1890) and WATERS (1916). Further in BUSK's Catalogue of the Bryozoa in the British Museum (1852, 1854, 1875), in the Challenger Reports (1884, 1886, 1888), in the great work of LEVINSEN (1909) and in KLUGE's memoir on the Bryozoa of the "Gauss" Expedition (1914) some South African species are described. Then in later years MARCUS (1922) has given a list of Bryozoa from the Littoral east of the Cape of Good Hope (San Sebastian Bay), and O'DONOGHUE (1924) has recorded the Bryozoa dredged by the "Pickle" round the coasts of the Union. The last mentioned work is by far the most important one dealing with South African Bryozoa, though in 1937 O'DONOGHUE & DE WATTEVILLE gave another valuable contribution to our knowledge of the South African Bryozoa. In 1938, finally, MARCUS published a list of Bryozoa from St. Helena.

As for South America, most of the papers concerning this region have already been mentioned when reviewing the literature on Subantarctic and Antarctic Bryozoa. Collections of Bryozoa from the South American area, the Falkland islands and South Georgia have been described by Miss PRATT (1898) and by CALVET (1904 a, 1904 b); and some species have been noticed by HINCKS (1881) as well.

The memoir of MARCUS (1921) on the Bryozoa of Juan Fernandez as well as those of CANU & BASSLER on the Bryozoa of Brazil (1928) and of the Galapagos islands (1930) may be mentioned here in addition, because of the probable relations of the faunas of these areas with that of the South American shores. The works just cited, and especially those of CANU & BASSLER, are however far from reliable. The Bryozoan fauna of Brazil has become much better known through the publication, in 1937—38—39, of the three parts of MARCUS' "Bryozoarios Marinhos Brasileiros".

There remain a few words to be said about some works treating especially Zoogeographical problems concerning the areas now in question. The first of these dealing with Bryozoa together with other groups of animals or with Bryozoa only, viz. those of PFEFFER (1890), MURRAY (1896) and Miss PRATT (1898), were based on unreliable determinations and insufficient knowledge of the matter concerned. They were opposed by WA-

TERS (1904) and CALVET (1904 a, 1904 b), who put things more the right way; but much remains to be done in this field as yet.

A work of general interest for marine Zoogeography, so far as Bryozoa are concerned, is — in spite of its obvious deficiences — that of ORTMANN (1890) upon the Bryozoan Fauna of Japan. MARCUS (1921 c) has compiled some views on the distribution of marine Bryozoa that are not without interest.

Finally, EKMAN's "Tiergeographie des Meeres" (1935) is a useful work when going into zoogeographical matters concerning marine animals.

Several authors, as, for instance, KÜKENTHAL (1938), BROCH (1939), and others, have treated the problem of Bipolarity in later years.

* * *

In spite of the numerous works thus dealing with Bryozoa from Antarctic and Subantarctic areas, our knowledge of the Bryozoan fauna of these districts is far from satisfactory.

This is especially true regarding the Stenolaemata.

The causes for this fact are to be sought for mainly in two circumstances. The first of these is that many of the collections contained but few Stenolaemata — the "Southern Cross" material, for instance, only two species (KIRKPATRICK 1902) and the "Francais" Collection six (CALVET 1909) — or that the Stenolaemata have not yet been examined, as is the case with, among others, the materiel from the "Gauss" and the "Valdivia" expeditions; from both of these so far only a portion of the Cheilostomata (Anasca) have been investigated.

The other cause is still more important. In not few cases the Bryozoa found are simply catalogueed without descriptions nor figures. As instances of this kind the lists of MAC GILLIVRAY (1887), WHITELEGGE (1890), HAMILTON (1898) and HUTTON (1904) may be mentioned, and among works from later years that of Miss THORNELY (1924), which has, however, been revised by LIVINGSTONE (1928).

Now as the determination of the Stenolaemata admittedly meets as a rule more serious difficulties than that of Gymnolaemata — which is often by no means a simple task either — it may be understood that such "lists" as far as Stenolaemata are concerned are almost valueless, for one can seldom be sure as to what species is really meant and the correctness of the determination can never be proved. As for the majority of the works, the fact is, regarding the Stenolaemata, that most determinations unfortunately must be looked upon as more or less unreliable.

This, of course, is not true of D'ORBIGNY (1839), the pioneer whose species were all new, but it is true to a very high degree of his successors. Taking BUSK as an example, he sometimes identified in a quite inadmissible way recent species from Subantarctic (or other) areas with Cretaceous fossils from Europe. Thus a "*Supercytis*" from near New Zealand is said to be *S. digitata* D'ORBIGNY, a Cretaceous fossil from Meudon and some other places in France, and a *Stomatopora* from Tristan da Cuñha was determined (1886, p. 22) as *S. granulata* (MILNE EDWARDS), a fossil from the lower greensand at Vassy (Haute-Marne, France). WATERS and others followed the same path. The author just named, for instance, describing a recent Heteroporidan species from the South Australian area (*Densipora corrugata* MACGILLIVRAY), identified it with *Plethopora cervicornis*, a Cretaceous fossil from the neighbourhood of Tours (France). These examples could, unfortunately, be multiplied. Of course I will not deny that certain species living in Cretaceous or even older ages might persist until recent time; but I should like to point out that, when identifying a recent species with a fossil one or vice versa, one has to be extremely careful. Never can such an identification be based upon a similar habitus only as in the examples chosen.

This state of matters was further contributed to through the habit of some authors to identify, upon the loosest possible grounds, a Southern species with some European Boreal or even Arctic form. BUSK (1886, pp. 23 ff), for instance, thought he had found *Tubulipora flabellaris* and *fimbria*, *Diastopora patina* and *Disporella hispida* in Subantarctic waters, and CALVET (1904 b, p. 36) recorded the so called *Idmonea serpens* (= *Tubulipora liliacea* [PALLAS]) from the south American region, while MACGILLIVRAY put the last-mentioned species in his Catalogue (1887, p. 218) as occurring in Australian waters. In no one of these cases — not to mention a great many others — was there any sufficient reason given for the determination thus made. I certainly think with DÖDERLEIN and MARCUS (1921, p. 214) that it is hardly admissible "als Hauptunterscheidungsmerkmal für gewisse Arten oder Artengruppen das geographische Vorkommen anzugeben" and thus to adapt a "Fundortssystematik"; but on the other hand I find it necessary that when species from distant areas are identified with one other, reliable grounds for this identification and figures of the species in question should be given. This I think is yet more necessary the more distant the areas concerned are located, for it is *a priori* not very likely that many species should be common for both; hence, when such a case seems to occur, it ought to be thoroughly gone into. Some Bryozoa are Cosmopolitans it is true; but their number is not large and none of those just mentioned belong so far as known to this group.

The confusion will in no way be diminished by giving a number of synonyms, indicated without much criticism and often on rather subjective grounds. An instance of this we find by WATERS (1904, pp. 96 f.) — only too many others could have been mentioned as well — when speaking of *Lichenoporae* from Southern seas. Besides, in different works of the named author (cf. for instance, 1887 and 1889) *Lichenopora canaliculata*, *ciliata*, *echinata* and *fimbriata* are sometimes considered as independent species but sometimes one or more of them are thought to be synonymous to one another or to some other species within the genus. It is the same thing with numerous other forms belonging to several different genera.

Further the species created are often very insufficiently described. For an instance of this we may return to the so-called *Diastopora patina* of BUSK (1886, p. 24) from Tristan da Cuñha, which is diagnosed as follows: "Zoarium, when mature, discoid, circular, cupped, and bordered by a thin expansion. Central zooecia [zoids] immersed and usually occluded; marginal ones erect and open, usually disposed in irregular wavy lines radiating from the centre". There is simply nothing in this diagnosis to characterize a species; all that is said is strictly applicable to the whole genus or at least to most species within the genus. The gonozoid is not even mentioned; and there is no figure. As for the species created by D'ORBIGNY (1839), which have often been criticized, they are much more thoroughly characterized and are always figured; but unfortunately most of his successors, and above all BUSK, MACGILLIVRAY and WATERS, have produced "generic" diagnoses such as that referred to, though it must be admitted that they are often accompanied by figures that are however not always very instructive.

The result of all this, finally, became the inevitable one, viz. that the classification of Stenolaemata was brought into complete disorder and that it was almost a hopeless task to try to determine a Stenolaematous species with even a moderate amount of certainty. Regarding characters available for classification not much was known, and there was no decision as to whether zoarial or zoidal ("zooecial") characters should be preferred. It is extremely regrettable that the methods used in Taxonomy in later years by CANU and by CANU & BASSLER (1920, 1922, 1926 and elsewhere) have successfully increased the disorder already existing; but as they have been criticized before by myself (1926 b, pp. 468 ff.) and by HARMER (1931, pp. 147 ff.) I shall not dwell any further here upon this subject.

Matters beginning at last to take a turn for the better was in the first place due to HARMER (1891, 1896, 1898), who stated the importance of the brood-chamber in classification. Then in 1923, 1924, 1926 and 1933, I had the opportunity of making certain facts known which in my opinion must be accounted for, should a natural and reliable classification be brought about. In the memoir here presented these facts as well as other ones set forth here form the basis for the system adopted.

Order **Stenolaemata.**

Syn.: *Stenolaemata* Borg 1926 b, p. 490. *Cyclostomata* auctt.

Zoids narrow, cylindrical, tapering proximally, with terminal aperture; cystids with calcified walls; polypide enclosed in a membranous sac acting as a hydrostatic apparatus; embryonic development within the membranous sac of a fertile polypide which itself degenerates; polyembryony.

The results arrived at in 1926 enabled me to state that the old classification of the Bryozoa in Phylactolaemata and Gymnolaemata (Allman 1856, p. 10), which latter group was divided into the three suborders Cyclostomata, Cheilostomata, and Ctenostomata, had to be altered. The Cheilostomata and Ctenostomata are nearly related to each other and should remain, therefore, in the Gymnolaemata; but the Cyclostomata hold a separate position and are not more related to these two groups than to the Phylactolaemata. As a consequence of this they should be separated from the Gymnolaemata — which is to include the Cheilostomata and the Ctenostomata only (together with the fossil Cryptostomata) — and should form an order co-ordinate with the Phylactolaemata and the Gymnolaemata (Cheilo-Ctenostomata). This order I named Stenolaemata (1926 b, p. 490).

During the time passed, so far as I know there has been no objection as to the facts upon which this new classification of the Bryozoa was based. Harmer, the excellent investigator of recent Bryozoa, reviewing my researches (1930, pp. 99 ff.) so far as I can see accepts the conclusions arrived at. He is of the opinion, however, that the new group is not happily named (op. cit., p. 111), as the word Stenolaemata »is presumably an allusion to the narrowness of the zooecia [cystids], and would be misleading if translated literally".

I have much respect for the opinion of Sir Sidney Harmer, but I do not think it necessary to be quite as particular in this case as he is. If one admits that the conclusions arrived at make the establishing of a new order indispensable — as he obviously does — this order must have a convenient name; and I cannot find but that a name ending in "laemata" is quite appropriate as it is formed in accordance with Phylactolaemata and Gymnolaemata. The prefixed component, "steno", may be taken as an allusion to the fact that the cystids are much narrower than in the two other Orders, as Harmer (l. c.) thinks; but it is literally correct as well, for, according to the shape of the cystid, the polypide, i. e. the alimentary canal (including the pharynx), is distinctly narrower too.

Accepting Harmer's view would as far as I can see inevitably lead to the rejection of many other names. To begin with Cheilostomata and Ctenostomata, first the "stomata" are no mouths but something totally different, viz. the apertures of the cystids (zoids); secondly, "cheilo-"clearly indicates a zoarial character while "cteno-" just as clearly alludes to a zoidal one, which moreover does not exist! Yet I have no intention to propose other names instead of those illogical ones and I do not think HARMER has either.

As for the name Cyclostomata, it should be pointed out that in many of the animals referred to that group (Horneridae, Lichenoporidae) the "mouths", i. e. the apertures of the cystids, are not circular nor even rounded (cf., for instance, HARMER 1915, Pl. 11, figs 8—12, and 1896, Pl. 7, figs 4—7). So this name is likewise inappropriate.[1]

MARCUS (1938, pp. 115 f., 123), however, follows his own line. He is not able to deny the anatomical facts that I have set forth (1926 b), all speaking decidedly in one and the same direction, viz. that the Stenolaemata ("Cyclostomata") are very well separated from the Cheilo-Ctenostomata; but he "intends to preserve the useful and clearly distinguished groups introduced by ALLMAN" and so places the "Cyclostomata" within the Gymnolaemata. The facts that the mode of development of the zoarium, the mode of budding of the polypide, the embryogeny etc. follow quite other lines in the Stenolaemata than in the Gymnolaemata will, however, nevertheless stand, other things, as, for instance, the existence of a membranous sac, indicating the same direction.

SILÉN (1942, p. 2), in a work mostly dealing with the possible phylogeny of the Cheilo-Ctenostomata, follows on the whole the lines represented by MARCUS (op. cit.). Nevertheless, this author is obliged at several places in his memoir to notice characters common for the "Cyclostomata" and the Phylactolaemata but contrary to those found in the Cheilo-Ctenostomata; and at last he arrives (p. 38) at the conclusion that "it is impossible that one of the groups Cheilo-Ctenostomata, 'Cyclostomata', and Phylactolaemata, has been derived directly from any one of the other groups. They must have developed independently from common ancestors"; — which is, almost literally, what I have written in 1926 (1926 b, pp. 489 f.) and which was — and is — the reason why I stated that the Bryozoa must be divided into three independent Orders. One of these is the Stenolaemata, with which we are dealing here.

As a result of my researches I am dividing here the Stenolaemata into five Divisions. Two of these (Acamptostega, Camptostega) are characterized by the body-wall being simple and can be brought together in a Suborder Cyclostomata; if it seems for some grounds desirable, they could be termed "Tubuliporina" and "Articulata" instead of Acamptostega and Camptostega, as this of course in no way alters the existing facts.

The other three Divisions, viz. the Pachystega, the Calyptrostega and the Heteroporina, develop their zoaria along other lines than the Cyclostomata s. str., their body-wall is double and there are several other characters uniting them, but distinguishing them sharply from the Cyclostomata s. str. On the other hand, they have many structures common with the Trepostomata. I have been able to study, in later years, the astogeny of several Trepostomata and I have found thereby that these Bryozoa have developed their zoaria in such a way, that their body-wall must have consisted of two layers just as in the Divisions just mentioned. It has long been my intention to set forth all the facts here alluded to in a separate work. The main results, however, are quite clear: the

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[1] Cf. the real Cyclostomes: *Petromyzon* and its relatives!

Trepostomata are not an extinguished group; the three Divisions Pachystega, Calyptrostega and Heteroporina are no "Cyclostomata" but should, according to the mode of development of their zoaria and, as a result of this, the structure of their body-wall, be placed in the Suborder Trepostomata, the Stenolaemata thus being divided into two very well separated Suborders.

The arrangement here proposed is not entirely new; it was, partly at least, anticipated by GREGORY (1909, p. 122 ff.). It will of course have much bearing upon classification in Palaeozoology, the whole group of fossil Trepostomata being in strong need of rearrangement now, but I wish not to go further into these problems here. It should be expressly noticed, however, that the fossil Trepostomata represent a rather mingled assembly of forms; thus, the Fistuliporidae and the Ceramoporidae, for instance, belong, I suppose, to the Calyptrostega, while the Halloporidae and probably some other families as well are related to the Pachystega; and other genera ought to be counted as predecessors of the recent Heteroporina.

These facts will encourage, I hope, to future investigations in a field, where much remains to be done. Though I shall not be able to partake in them, I am sure that rich fruits will be brought in and I will look forward to them with vivid interest.

Review of Divisions of Stenolaemata.

1 (4) Zoarium adnate, suberect, or erect; wall of zoarium simple, consisting of a two-layered cuticle with an outer chitinous and an inner calcareous layer, ectoderm and mesoderm; brood-chamber a gonozoid more or less dilated in its middle portion (Sub-order Cyclostomata. .... 2.

2 (3) Zoarium adnate, suberect, or erect, of varying shape, rather massive, never jointed; polypide of gonozoid degenerating first after having reached maturity .... 1. *Divisio* ACAMPTOSTEGA.

3 (2) Zoarium erect, narrow, gracile, jointed; rhizoids present; terminal membrane and vestibulum of autozoids separated by means of a vestibular sphincter; polypide of gonozoid degenerating before reaching maturity .... 2. *Divisio* CAMPTOSTEGA.

4 (1) Zoarium adnate or erect; wall of zoarium double, consisting of a gymnocyst and a cryptocyst separated by a slit-like hypostegal coelomic cavity. Gymnocyst composed of chitinous cuticle, ectoderm, and mesoderm; cryptocyst consisting of a calcareous layer surrounded on both sides by ectoderm and mesoderm, calcareous layer of cryptocyst increasing in thickness during life of zoarium through new calcareous matter being deposited on both sides of it, and particularly on the outside; embryos lodged in a gonozoid or in a zoarial brood-chamber (Sub-order Trepostomata) .... 5.

5 (6) Zoarium erect, branched; considerably increasing in thickness through secondary thickening of cryptocyst, by which appearance of zoarium becomes gradually much changed; brood-chamber a gonozoid strongly dilated in its middle portion .... 3. *Divisio.* PACHYSTEGA.

6 (5) Zoarium of varying shape; embryos lodged in a zoarial brood-chamber .... 7.

7 (8) Zoarium adnate or, usually, erect, much varying in shape, often erect, cylindrical and branching, or stud-like, or sometimes of yet another shape; composed of autozoids and kenozoids, apertures of both forming surface of zoarium; brood-chamber brought about through absorption of middle portion of numerous kenocystids all around a fertile zoid .... 4. *Divisio.* HETEROPORINA.

8 (7) Zoarium adnate, disc-like, wart-like, or half-globular in shape, sometimes complex and irregular through new, secondary zoaria being formed from original one; zoids radiating at all directions from centre, separated by alveoli, *i. e.* coelomic spaces enclosed by calcareous walls; brood-chamber part of zoarial coelomic cavity often brought about through amalgamation of a number of alveoli around one or more fertile zoids.. 5. *Divisio.* CALYPTROSTEGA.

1. Divisio **Acamptostega.**

Syn: *Inarticulata*, part., BUSK 1859, p. 93; *Tubuliporina*, part., MILNE EDWARDS 1838, p. 233; V. HAGENOW 1851, p. 9; BASSLER 1935, p. 9; *Parallelata*, part., WATERS 1887, p. 337; *Tubulata*, part., GREGORY 1909, p. XLI; *Acamptostega* BORG 1926 b, p. 474.

Char.: Primary zoid adnate to the substratum, not separated from the pro-ancestrula by any kind of joint; zoarium adnate, suberect or erect, never jointed; rhizoids lacking; wall of zoarium simple (a gymnocyst); zoids without a vestibular sphincter; brood-chamber a gonozoid more or less dilated in its middle portion; polypide of gonozoid degenerating first after having reached maturity.

The Acamptostega include the majority of recent Stenolaemata and, I should think, of fossil ones as well. The structure of the zoarium is simpler perhaps than in the other Divisions. The lack of rhizoids and, except in some few species, of other specially differentiated kenozoids as well; further the missing of a vestibular sphincter; and, finally, the fact that the polypide of the developing gonozoid reaches maturity before degenerating make it probable, in my opinion, that the Acamptostega should be ascribed a position more primitive than that of any other group within the Stenolaemata. On the other hand it is quite possible to discern, within the Acamptostega, a phylogenetic line running from simple and obviously primitive forms such as the species of *Stomatopora* (cf., for instance, LANG 1904, 1905, 1907) to more complicated ones as the families Corymboporidae, Fascigeridae, and others.

On the whole I think the Acamptostega must be said to constitute a group rather well circumscribed. The relations to the Camptostega (Crisiidae) are obvious but from the other Divisions of Stenolaemata both Divisions are sharply separated by the fundamental difference in the structure of the zoarial wall.

The structure and appearance of the genera and species belonging here is rather uniform, on the whole, and it is not always an easy task, therefore, to discern even the genera and families from one another. On account of this it is necessary to study thoroughly the structure and development of the zoaria of the different species in order to state some definite points to be used in taxonomy. This is what I have tried to do below.

As the central family of the Division I think, the Tubuliporidae should be denoted. Most characters are rather varying here, and it does not seem difficult to trace the zoaria of other adnate families, *e. g.* the Diastoporidae, nor, I should think, the somewhat wart-like, cup-shaped or cylindrical zoaria of the Corymboporidae from some of its members. The Idmoneidae, as here grasped, I think can be likewise derived from some Tubuliporidan forms with the zoids arranged in transverse series; and the same is probably the case with the Terviidae though the gonozoid is of a rather different type here. The ancestors of the Hastingsiidae with their highly irregular zoarium, and of the Frondiporidae (not represented in the present Collections) and the Fascigeridae are dubious; but since the zoaria of at least most species belonging here when quite young pass through a stage where they are very similar to a young *Tubulipora*, I think they may be sought for among the Tubuliporidae; and the same is in all probability true for the Entalophoridae as well.

Synopsis of the Families of Acamptostega.

1 (6) Zoarium adnate, suberect, or erect; zoids disposed in quincunx or in transverse or radiating series, or, sometimes, in fascicles, opening on frontal side of zoarium only .... 2.
2 (5) Zoarium of varying shape, usually more or less adnate, flattened, particularly when young, or in proximal portions of older zoaria; zoids arranged quincunxially or in transverse or, more seldom, in longitudinal series, sometimes in fascicles .... 3.
3 (4) Zoarium in most cases elongated; uniserial, biserial, or multiserial; zoids not depressed, often with long protruding distal portions; disposed in varying ways; dilated portion of gonozoid as a rule more long than broad .... *Fam.* TUBULIPORIDAE.
4 (3) Zoarium of varying shape, much widened, when fully developed often becoming flat and discoid; zoids depressed, arranged quincunxially; dilated portion of gonozoid polygonal or, usually, much more broad than long .... *Fam.* DIASTOPORIDAE.
5 (2) Zoarium wart-like, or erect, cup-shaped or cylindrical; zoids radiating from centre, usually in complex fascicles or series, gonozoid between two such series or fascicles.. .... *Fam.* CORYMBOPORIDAE.
6 (1) Zoarium erect, branching dichotomously .... 7.
7 (10) Zoarium with branches somewhat flattened; zoids arranged in transverse rows; on basal side of zoarium one or more layers of kenozoids .... 8.
8 (9) Zoids disposed in transverse rows across stem, well separated in the middle line; innermost cystids the longest; gonozoid with its dilated portion on frontal side of elongated zoarium, situated medially between the two halves of a number of autozoids; kenozoids on basal side of zoarium forming a layer of considerable thickness............. .... *Fam.* IDMONEIDAE.
9 (8) Zoids disposed in transverse though rather irregular rows, meeting in an angle in middle line, median cystid of each series the shortest and most proximal one, outermost cystid the longest; dilated portion of gonozoid either on frontal or basal side or, sometimes, wedged in in the axil of a bifurcation, its shape varying . . *Fam.* TERVIIDAE.
10 (7) Zoids opening all around erect stem of zoarium or on frontal side or at top of it... 11.
11 (12) Zoids opening all around stem .... *Fam.* ENTALOPHORIDAE.
12 (13) Zoids opening on frontal side or at top of zoarium .... 13.
13 (14) Zoarium irregular; zoids arranged quincunxially or, most of them, in fascicles opening at frontal surface of zoarium or, rather often, at top, or, exceptionally, on basal surface; gonozoids wedged in in axils of branches .... *Fam.* HASTINGSIIDAE.
14 (13) Zoarium with cylindrical branches, often anastomosing at top; zoids opening exclusively at top of zoarium .... *Fam.* FASCIGERIDAE.

Fam. **Tubuliporidae** JOHNSTON.

Syn: *Tubuliporidae*, part., FLEMING 1828, p. 529; *Tubuliporidae*, part., JOHNSTON 1838, p. 267; 1847, p. 265; *Tubuliporidae* SMITT 1867, pp. 398, 434; BUSK 1875, p. 23; *Tubuliporidae*, part., HINCKS 1880, p. 424; *Tubuliporidae* + *Idmoneidae*, part., HARMER 1915, p. 118.

Zoarium adnate or suberect, sometimes nearly wholly erect, with a broad base; no supporting disc; linear, ligulate, flabelliform, reniform or, at later stages, even circular or almost so in some cases, simple or dividing dichotomously or split up into a varying number of lobes.

Autocystids when uninjured normally with rather long, tubular distal portions, protruding upwards or, at the same time, forwards, arranged in quincunx or in transverse or radiating series or, sometimes, in fascicles. Gonocystid with its middle portion rather strongly dilated, much varying in shape, forming an inflation on frontal surface of zoarium, often produced into a number of lobes coalescing sometimes so as to enclose one or more autozoids.

It is no easy task to characterize the Tubuliporidae as they are extremely variable. The family holds, as we know, a central position within the Acamptostega, and most if not all of the families of this Division may be assumed to have developed from it. It is natural, then, that the limits are not sharp between the Tubuliporidae and some of the other families. This is particularly true of the Diastoporidae and there are species, *e. g. D. dichotoma* D'ORBIGNY, that could be almost equally well referred to the one family as to the other. I feel, however, not inclined on this ground to suppress the Diastoporidae as a separate family. This, however, will be further discussed later on.

In the Tubuliporidae as taken here, I place only *Stomatopora, Reptotubigera* and *Tubulipora*, while a separate family is maintained for some of the species formerly referred to "*Idmonea*". The causes for this are explained below under Idmoneidae.

Synopsis of the genera of Tubuliporidae.

1 (2) Zoarium narrow, uniserial .... Genus *Stomatopora* BRONN.
2 (1) Zoarium biserial or multiserial .... 3.
3 (4) Zoarium adnate throughout, narrow, zoids arranged in transverse series, each series consisting of but few zoids abreast .... Genus *Reptotubigera* D'ORBIGNY.
4 (3) Zoarium adnate or partly erect, of varying shape, often strongly broadening; when wholly adnate the fully developed, *e. g.* fertile, zoarium not with the zoids in transverse rows .... Genus *Tubulipora* LAMARCK.

Genus **Stomatopora** BRONN.

Syn: *Alecto* LAMOUROUX 1821, p. 84; D'ORBIGNY 1839, p. 20; BUSK 1875, p. 23; 1886, p. 22, and others (preoccupied by *Alecto* LEACH 1815); *Stomatopora* BRONN 1825, p. 27; D'ORBIGNY 1853, p. 833; GREGORY 1896, p. 42; CANU & BASSLER 1920, p. 652; BORG 1926 b, pp. 184, and elsewhere; MARCUS 1938, p. 193; *Stomatopora*, part., BUSK 1875, p. 23; 1886, p. 22; HINCKS 1880, p. 424; MACGILLIVRAY 1887, p. 218; WATERS 1904, p. 87; auctt.

LAMOUROUX (1821, p. 84) founded his genus *Alecto* for adnate, uniserial species; and BRONN (1825, p. 27, when making the necessary change of name — *Alecto* being preoccupied — made no alteration of the definition of the genus. Later authors, among which BUSK (1875, p. 23, and elsewhere), HINCKS (1880, p. 424), and many others following them have enlarged the genus so as to comprise biserial, triserial or even multiserial species as well. The result was that any real limits between *Stomatopora* and *Tubulipora* no longer exist. As a matter of fact, however, there are a number of species in which the zoarium — except in the fertile portion — seems on the whole to remain uniserial. I think GREGORY (1896, p. 42) was right, therefore, when restricting *Stomatopora* to enclose uniserial species only. This course has, moreover, been generally followed by authors of later years (cf. BORG 1926 b, p. 184 ff.; MARCUS 1938, pp. 193 f.); and it will be followed here.

It should be understood, however, that the zoarium of a so-called uniserial species is not necessarily always uniserial. The fertile portion or portions form an exception, the zoarium here being triserial or irregular. The gonozoid is thus surrounded by several autozoids; — which is in all probability necessary, should a sufficient nutrition of the developing embryos within the gonozoid be effected. Were the zoarium uniserial, there would be only two zoids connected directly with the gonozoid, *viz.* the one immediately preceding the fertile zoid and the one succeeding it; and it is hardly to be assumed that the production of nutritive matter brought about by them would be sufficient for the embryos or for a tolerably large number of embryos, in any case. If, on the other hand, we assume the zoarium, in its fertile portions, to be triserial and the gonozoid to extend for a distance equal to the length of two gonozoids — which is what actually occurs in, for instance, *Stomatopora eburnea* — then the fertile zoid would be surrounded by six zoids at least but probably by eight, for the triserial stage is mostly preceded as well as followed by a biserial one transitional between the uniserial and triserial portions of the zoarium, and the amount of nutritive matter at disposal for the embryos would, therefore, be at least four times that in the former case.

The nutritive matter passes, as we know, from the neighbouring zoids to the fertile one through the pores piercing the interzoidal walls. Provided the pores are uniformly scattered in the said walls, it follows that the amount of nutritive substance passing through the walls is straight proportional to the total area of the interzoidal walls directly in contact with the gonozoid. This I think may form an explanation of the fact that, while the zoarium as a whole is adnate, the fertile portion or portions of it are often, in *Stomatopora*, more or less erect. By this arrangement it is made possible for the neighbouring zoids to surround the gonozoid from all sides which would otherwise be impossible.

Here and there, the zoarium of a *Stomatopora* is biserial. This may be in a zone transitional between the uniserial and triserial ones, as just mentioned; or it may occur where the zoarium is bifurcating or else in places where, due to the nature of the substratum or to some other cause, the growth has become somewhat irregular.

In spite of these facts there is, so far as I can see, nothing that prevents us from terming the zoarium in *Stomatoporae* of this kind a uniserial one, only it must be born in mind what is really meant by this term here, *viz.* that it is used in the first place to separate conveniently the species here alluded to (*Stomatopora* s. str.) from those characterized by the zoarium after the first two or three zoids have become biserial, triserial and, finally, multiserial, remaining then permanently so (*Reptotubigera* and *Tubulipora*).

Stomatopora is generally held to be a primitive genus to which several other genera of Acamptostega can be traced back, the early stages of their zoaria repeating the *Stomatopora*-like condition, as has been demonstrated, above all, by SMITT (1867, pp. 413 ff.). This I think to be correct; and it is not without interest, from a phylogenetic point of view, that representatives for the other Divisions of Stenolaemata so far as is known do not pass through a *Stomatopora*-stage like that of the Acamptostega (cf. BORG 1926 b, p. 472; 1933 b, p. 271).

Geologically *Stomatopora* is believed to be a very old genus, reaching as far back as the Ordovician, which is thus completely in accordance with its supposed primitive position. I am far from sure, however, that all the forms from Paleozoic times that have hitherto been referred to *Stomatopora*, really belong to that genus. A renewed and perhaps a little more critical investigation of this material seems highly desirable.

1. **Stomatopora eburnea** (D'ORBIGNY) 1839.

Pl. 1, figs 1 and 2.

Syn: *Alecto eburnea* D'ORBIGNY 1839, p. 20, Pl. 9, figs 14—16; *Stomatopora eburnea* D'ORBIGNY 1853, p. 833; ? WATERS 1904, p. 88, Pl. 9, figs 7 a—b, cf. 1905, p. 14; BORG 1926 b, pp. 184, and elsewhere; ? *Stomatopora granulata* CALVET 1904, p. 34.

Zoarium adnate, uniserial or, sometimes, biserial; where a gonozoid is developed, triserial; bifurcating repeatedly; cystids long and large, cylindrical, their distal portions erect, free, when uninjured about as long as the adnate part, their walls pierced by numerous and rather large pseudopores; gonozoid elongated, simple, its middle portion moderately swollen, unlobed or with lobes but slightly developed, its tube rather long, erect, free and narrow, placed a little distance proximally of the distal portion of an autocystid; aperture of gonozoid circular, distinctly smaller than those of the autocystids.

Measurements in μ.

(1) Total length of zoid 1 300—1 500.
(2) Length of uninjured erect portion of zoid 600—800.
(3) Distance from aperture to aperture, at one and the same side, average 800.
(4) Diameter of aperture of autozoids 170—220, average 190.
(5) Length of tube of gonozoid 200—300.
(6) Diameter of aperture of gonozoid 80—100, average 90.

The specimens upon which the present species was founded were re-examined by WATERS (1905, p. 14) before determining the "Belgica" material. It was thus to be assumed that the *S. eburnea* of WATERS (1904, p. 88) should be identical with that of D'ORBIGNY (l. c.), though, in my opinion, the description given by WATERS (l. c.) of his *S. antarctica* fits in better with D'ORBIGNY's specimen than with the specimen to which WATERS attributes the name given by D'ORBIGNY. I am doubtful, therefore, if the WATERS species will prove to be identical with *S. eburnea* D'ORB. or not. I had an opportunity of examining D'ORBIGNY's material of the species in question during a visit at the Museum d'Histoire Naturelle in Paris some years ago.

The zoarium varies much in shape according to the nature of the substratum, the series of zoids being much closer together and, frequently, much more irregular when this is a narrow stem of some Bryozoan or Hydroid, than if the substratum is flat. In the former case the series are often growing on all sides of the stem and may be so close to one another that the whole gives at the first moment the impression of some sort of gracile *Entalophora*. In such cases the gonozoids give an especially good indication, for they have of course conserved their typical characters, those of the tube and aperture inclusive.

On a stone or on the shell of some Mollusc, on the other hand, the series spread over a much larger area. It is in such cases that one can study what may be said to be the normal mode of growth in the present species (Pl. 1, fig. 1). The first bifurcation occurs as a rule after two zoids have occurred. The angle originating between the two branches is large and may amount to about 160°. The bifurcations following next are frequently repeated, there being only 1—3 zoids between two successive bifurcations. The angle of the axils has now diminished until something about 90°, indeed, in not a few cases, very exactly so (cf. Pl. I, fig. 1). In the distal portions of the zoaria, finally, the angle has diminished to an acute one, often amounting to not more than about 45°. At the same time the number of zoids intercalated between two bifurcations is augmented to 4 or 5; and the uniserial arrangement of the zoids is succeeded by a biserial or even an irregular one, all these being signs that the zoarium in question has now attained its fertile stage and that gonozoids are about to develop.

The zoids often give the impression of being wholly adnate, without an erect portion or with but a very short one. This, however, is not so, for the distal portion is, as a matter of fact, long and free, but as natural it is rather often broken off. In not a few zoids the erect portion is seen to have been regenerated.

The zoids are cylindrical in shape, forming at about half their length a soft curve marking the transition from the adnate to the free portion; the angle of the curve is about 100—120°. The aperture is circular, a little smaller as a rule than the diameter of the cystid. As we see from the measurements (2, 4) the zoids are rather large, indeed they are larger than in most other Stenolaemata. The number of the tentacles is 12—14.

The gonozoids have been described and figured in an earlier paper of mine (1926 b, pp. 358 f.; Text-fig. 66). Since then I have had access to some more material and may therefore add some details as to their shape and position. It is not quite usual that the zoarium transforms, when a gonozoid is about to develop, from a uniserial arrangement of the zoids to a triserial one, though this occurs in some cases. More often the zoarium becomes first biserial and then triserial, the gonozoid belonging then to the latter portion. In the same way the zoarium, continuing its growth distally of the gonozoid, becomes usually again at first biserial and then uniserial. The gonozoid itself seems always to represent the middle one of the three zoids being surrounded on both sides by autozoids. The zoid or zoids just proximally of the gonozoid are adnate to the swollen portion of the gonozoid with almost the whole of their erect part, and the same is often the case with some at least of the zoids at both sides of the gonozoid.

The swollen portion of the gonozoid is sometimes unlobed, but often there are some small lobes stretching in between the neighbouring zoids though never completely surrounding them. On the whole the gonozoid may be said to be but slightly lobed.

The position of the narrow distal portion, the tube, of the gonozoid, seems to be very constant, as in all gonozoids investigated by me it is always situated just proximally of the distal portion of an autozoid though quite free from it (Pl. 1, fig. 2). The tube when uninjured is rather long, cylindrical, slightly narrowing towards the circular aperture (Pl. 1, fig. 2). Often the tube seems to be short, however, which so far as I am able to judge is always due to its having been broken or to some other kind of damage. The small size of the aperture is remarkable (6), its diameter being less than half that of the aperture of an autozoid.

The pseudopores are relatively large, longitudinally oval and rather densely scattered. As usual they are fewer in the walls of the free distal portions of the zoids than in the rest of the wall. They are not more densely scattered or but slightly so in the swollen portion of the gonozoid than in the walls of the autozoids, though they are perhaps a little larger here.

Habitat: On stones, shells, other Bryozoa, and Hydroids.

Occurrence: Swedish Antarctic Expedition 1901—03, St. 17, on a Cellaria; St. 22, on the shell of a Gastropod and on some Hydroids; St. 25; St. 59, some colonies on incrusting Cheilostomes growing on a mussel shell and on this shell itself; St. 60, on some other Cheilostomes.

Distribution: Sur les pierres prises à de grandes profondeurs aux iles Malouines [Falkland Islands] (D'ORBIGNY 1839, p. 20); ? Lat. 70° 15′ S, Long. 84° 06′ W, 569 m, + 0.8 C (WATERS 1904, p. 88). — ?? Straits of Magellan: Punta Arenas (CALVET 1904, p. 34).

Stomatopora sp.

Text-fig. 1.

There are some fragments of another uniserial, adnate species, though they are too poor to be determined with certainty. They are easily separated from *S. eburnea*, in any case, because the cystids are shorter and the free distal portions even when uninjured are short; further, the distance between two apertures is much shorter than in the species just mentioned. In this, the free tubes of the autocystids are directed upwards and, at the same time, more or less forwards. In the present species, on the other hand, the cystids though still arranged uniserially curve alternately to the right and to the left (Text-fig. 1). Unfortunately, there is no trace of a gonozoid. The pseudopores are relatively numerous, circular in shape and rather large.

In the majority of the autozoids degenerative and regenerative processes have obvously occurred (cf. Text-fig. 1), which processes seem to have altered, in a rather considerable degree, the normal appearance of the zoids.

Measurements in μ.

(1) Transverse diameter of stem 400—480.
(2) Distance from aperture to aperture on one and the same side, average 500.
(3) Diameter of aperture of autozoid, average 100.

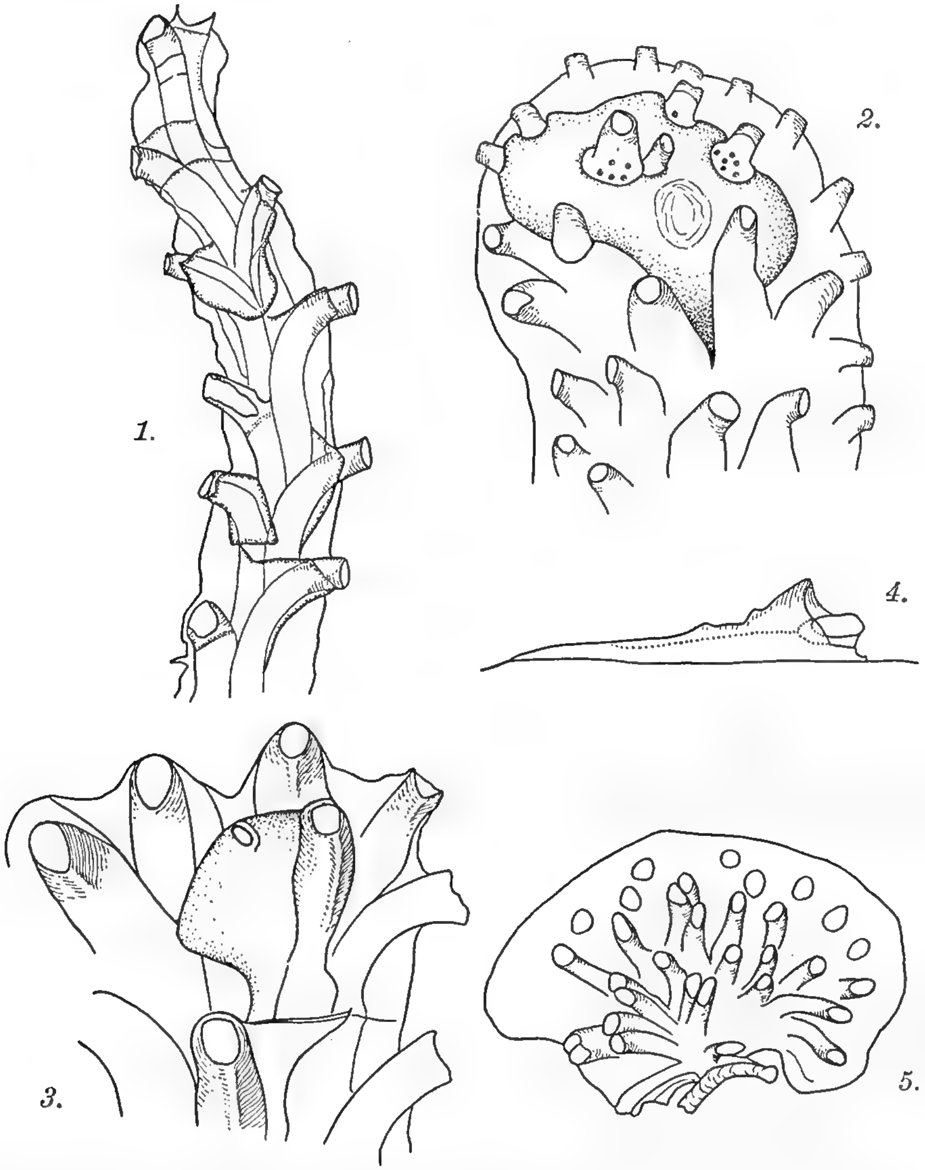
Occurrence: St. 59. Swedish Antarctic Expedition 1901—03. On shells.

Genus **Reptotubigera** D'ORBIGNY.

Syn: *Reptotubigera* D'ORBIGNY 1853, p. 751; CALVET 1911, p. 4; HARMER 1915, pp. 119 f.; CALVET 1931, p. 26; OKADA 1928, p. 492; OKADA & MAWATARI 1935, p. 146.

The genus *Reptotubigera* of D'ORBIGNY has usually been regarded as synonymous with *Proboscina* AUDOUIN (cf. GREGORY 1896, p. 59). It was revived as a separate genus by CALVET (1911, l. c.) and by HARMER (l. c.), both of which placed a recent species (*R. harmeri* and *R. philippsae* respectively) in it. A third species (*R. incrustata*) was described by OKADA (l. c.).

Reptotubigera was characterized by its author as having a zoarium "rampante dans toutes ses parties" and whose branches are "pourvue alternativement à droite et à gauche, mais peu séparées au milieu, de lignées espacées transverses de cellules — — — saillantes en tube à leur extremité". D'ORBIGNY placed 10 fossil species and 2 recent ones in this genus, the latter two without any description.



Text-fig. 1. *Stomatopora* sp. Zoarium from frontal side. × 31.
» » 2. *Reptotubigera elegans.* Fertile lobe of zoarium with gonozoid seen from frontal side. × 31.
» » 3. *Tubulipora carinata.* Part of fertile lobe of zoarium with gonozoid seen from frontal side. × 52.
» » 4. *Tubulipora carinata.* Autozoid seen from one side to show aperture and carina. × 52.
» » 5. *Diastopora dubia.* Young zoarium from frontal side. × 15.

It is evident that *Reptotubigera* has to be placed within the Tubuliporidae; but it may well be discussed whether the species belonging here ought to be referred to a separate genus or whether their proper position should not be in *Tubulipora.* On account of the mode of arrangement of the autozoids, which becomes visible at a rather early stage, I think it better, however, not to place the species discussed in *Tubulipora.* There is another reason for this as well, viz. that *Tubulipora* is so large a genus that it is not desirable to enlarge it if not necessary. On the other hand, the differences between *Reptotubigera* and *Tubulipora* are by no means important.

Canu & Bassler (1920, p. 759) made *R. philippsae* Harmer the type of a new genus, *Platonea*, characterized by the gonozoid being "subsymmetrical, lobate, median, elongate, spread out between the fascicles over the entire zoarial width". The "gemmation" is said to be "linear".

There is nothing in the above diagnosis to separate *Platonea* from *Reptotubigera* (nor from *Tubulipora*). Canu & Bassler say that "noting the great difference between this ovicell (meaning that of *R. philippsae*) and that of *Tubulipora*, Harmer in 1915 believed that the old genus *Reptotubigera* of d'Orbigny might be restored". As a matter of fact, it was first restored by Calvet in 1911, as just mentioned. In the work quoted, Harmer says not a word as to the "great difference" (which does not exist) between the gonozoids in *Reptotubigera* and *Tubulipora* (nor, so far as I am aware, in any other work either).

I am unable to accept the genus *Platonea* Canu & Bassler, which seems to me unnecessary.

Reptotubigera elegans n. sp.

Text-fig. 2.

Zoarium wholly adnate, branching repeatedly dichotomously, with straight branches that are long and narrow for the greatest part of their length but widening slightly at their ends. Zoids arranged in transverse series, that occur at moderate distances from one another, separated in the median line. Each series, to the right or to the left of the median line, consisting of 2—4 zoids, the distal portions of which protrude moderately. Gonozoids situated in middle or distal part of stem, their middle portion suddenly and strongly dilated and occupying nearly the whole breadth of the stem between two or more subsequent series of autozoids. Tube (distal portion) of gonozoid distinct, cylindrical, straight, well set off from the inflated portion, contiguous basally to the proximal side of one of the transverse series of autozoids, narrowing slightly towards the aperture which is much smaller than that of an autozoid. The aperture is circular in shape and facing upwards (frontally).

Measurements in μ.

(1) Breadth of stem 866—1 066, average 900.
(2) Breadth of distal lobe 1 100—1 366, average 1 200.
(3) Distance from one series of zoids to the next one, on one and the same side 300—430, average 360.
(4) (Longer) Diameter of aperture of autozoid average 100.
(5) Diameter of aperture of gonozoid c:a 60.

The zoarium begins as usual with a primary zoid which is the only member of its series. The pro-ancestrula is half-globular without any denticles around its basal edge. After the primary zoid there follow at first a single zoid, then another and, finally, a third one, so in these early stages the zoarium is, as a matter of fact, uniserial. The zoids mentioned are bending alternatively to the right and to the left though their free distal portions are so far quite short. Thus, in one of my zoaria, the primary zoid and the third zoid are bending to the right, while the 2nd and 4th zoids are bending to the left. The 4th zoid is bent to one side a little more distinctly than are the other members of the young zoarium. The series following next, and bending again to the right, consists of two zoids (n:r 5 and 6), and the same is the case with the two subsequent series. After having thus developed ten zoids in all, the young zoarium bifurcates for the first time, the two stems or lobes having thus originated forming an angle of not far from 180° with one another.

It may well happen, however, that a zoarium becomes multiserial even at a somewhat earlier stage than that just described, but it seems to be an invariable rule that the primary stem, if I may say so, divides dichotomously at an early stage as noticed above.

The two secondary stems usually soon bifurcate again, and this may be repeated, by which a number of straight, narrow, divergent stems come into existence. The angle between these stems is less than that of the first bifurcation, amounting to something between 100—120°. In most cases the stems comprising a zoarium are of the 1st to the 4th order. At one occasion only I have seen, in part of a zoarium, two stems of the 5th order developing. The nature of the substratum or the occurrence of other animals fixed upon it, in the immediate neighbourhood of the zoarium, may cause the suppression of one or more of the stems.

In the secondary stems and in those following subsequently, the series of zoids are arranged in the same way as in the distal portion of the primary one, *i. e.* there are, as a rule, at each side of the median line, series of zoids consisting at first of two zoids each, then — in the tertiary, etc., stems — mostly of three or four zoids. The series alternate to a certain degree, *i. e.* a series on one side is followed a little more distally of the corresponding series bending to the other side (Text-fig. 2). While the average distance between two subsequent series on one and the same side is 360 μ (cf. Measurements), the distance between a series and the corresponding one on the other side is only about a third of this distance, thus about 120 μ. It is easy to see that the alternate series to the right and to the left belong, as a matter of fact, to one and the same transverse row of zoids, that has been split up into two halves, one on each side of the median line; and, further, that the alternate arrangement is brought about simply by one half of each row having grown a little longer than the other. In the distal portions of the zoaria and especially in the fertile stems as well as in the widened terminal lobes the alternate arrangement becomes, however, more indistinct and the two halves of the rows are nearly level here with one another. On the whole the arrangement of the series is more irregular in the terminal lobes than in the rest of the zoarium. These lobes certainly represent the final stage of zoarial development, which is corroborated by the fact that they often contain gonozoids.

Both sides of the stem are sloping down from the median line towards the substratum. The stem may be said, therefore, to be about triangular in cross-section, the triangle in question being a low one with a top angle considerably larger than 90°. The median portion (the top of the "triangle") is rounded and there is no ridge marking out the median line, so it would perhaps be better to describe the shape of a transverse section of the stem as semicircular as is done by HARMER for *R. philippsae*; the slopes on both sides of the median line are, however, not curved, this portion of the section forming thus an almost straight line.

When the series consist of only two zoids, these are connate throughout the whole of their length, except for the portion nearest the apertures. Often, however (specially in the stems of 3rd or 4th order), there are three zoids in each series, the two more medially placed being connate throughout, while the distal portion of the third one is placed some small distance more laterally and is thus partially free from the two other ones. Only seldom are four zoids found composing a series; if so three of them are connate with one another while the distal portion of the fourth one appears a little more to one side.

For the greatest part of their length the zoids are horizontal, forming part of the frontal surface of the zoarium. The ultimate free portion, protruding above the surface of the zoarium, is usually, even in the distal lobes, quite short; but in most of these cases the cystids have certainly been damaged, for where a zoarium grows in a sheltered position (as is the case with three of my colonies) the distal portions are distinctly longer, nay, in the distal lobes, that are a little widened, even very long, free, and protruding in different directions. The apertures in these cases are perfectly cylindrical while in zoids with quite short distal portions (probably damaged) they are transversely oval, which is the shape of the larger (horizontal) portion of the cystids as well.

The end portions of the cystids with the aperture are directed in the narrow stems forwards and half upwards but in the widened distal lobes they are looking as a rule nearly straight upwards.

The pseudopores in the walls of the autocystids are relatively few, quite small and circular in shape. Where free distal portions exist these are practically wholly deprived of pseudopores.

There is a rim of varying breadth bordering the colony and consisting either of the proximal-lateral portions of the peripheral autozoids or of zoids stunted in their growth and closed, *i. e.* of kenozoids. Some observations, and especially the fact that the rim is present from the distal rim of the pro-ancestrula on to the latero-distal end of the terminal lobes, seem to me to speak in favour of the latter of the two possibilities. The end of the lobes is occupied, as usual in the Stenolaemata, by a honeycomb-like mass of developing zoids (a "common bud"), and there are no "porous areas" like those described by HARMER (1915, p. 121) for *Reptotubigera phillipsae.*

I have seen four gonozoids, two of which were in one zoarium and two in another. Both gonozoids in the one of these zoaria are in quarternary stems, some distance from their ends and before the stem has begun to widen; while the other two, in another zoarium, are in two terminal lobes, near the end of the zoarium, one gonozoid in each lobe. These two gonozoids are very similar to one another. Each of them seems to represent the innermost zoid of a series, in one case that of a left series, in the other that of a right one. The proximal part widens rather suddenly into the middle portion which is rather strongly inflated, sending two or, in the other case, three pairs of lobes in between the subsequent series of autozoids. In both cases there is, in addition, a small median lobe proceeding a little distance distally along the median line of the stem. The terminal portion of each of these gonozoids is a rather short but distinct tube, set off sharply from the dilated portion. The base of the tube is contiguous to one of the series of zoids that are half surrounded by the lateral lobes of the gonozoid. In one of the cases mentioned the tube is attached to the second, in the other one to the third member of the series affected.

As for the two other gonozoids, both situated in the narrow portion of a stem, some distance from the end of the zoarium, each of them seems to represent, too, the innermost member of a transverse series, one bending to the left and the other to the right. In one of them the proximal portion widens very suddenly and there seem to have been two pairs of lobes; but the gonozoid has obviously degenerated, as there is no tube left and only the proximal half of the middle, dilated portion is preserved, its cavity having been closed by a calcareous roof. In the other gonozoid most of the dilated portion is left but distally it has been damaged and the tube is, therefore, lacking.

The pseudopores piercing the calcareous wall of the dilated portions of the gonozoids are thickly scattered and much more numerous than those of the autozoids. They are about circular in shape; and from the pore-ducts it is easy to ascertain that the calcareous wall pierced by them is of considerable thickness; — which is especially true for the two gonozoids described last.

I have seen several zoaria of this species. Most of them are on shells while two zoaria are on a *Retepora.* These two are similar to the other ones in all essentials but the arrangement of the zoids in the distal parts of the stem is a little less regular, the free portions of the cystids are longer and the gonozoids are larger, the dilated portion having developed one or two pairs of lobes more than in the zoaria on shells. Otherwise there is a close resemblance between the zoaria from the two kinds of substrates, and I feel convinced that the deviations mentioned are within the limits of normal variation.

HARMER (1915, p. 120 ff.) has described a species of *Reptotubigera*, *R. philippsae*, from the Malayan Archipelago and the Loyalty Islands (Lifu). This obviously comes near to *R. elegans*, but I do not think they are identical. The porous areas mentioned and figured by HARMER (l. c.) as occurring in the former species represent in all probability only a number of apertures of incipient zoids that have been closed and are, therefore, certainly restricted to a distinct period in the life-cycle of the species; but the distance between the different series of zoids in *R. philippsae* seems to be less than in *R. elegans*, the gonozoids are not identical and the tube seems to be clearly distinct in the two species, the aperture being, in *R. philippsae*, transversely oval and a little larger in diameter than those of the autozoids, while in *R. elegans* it is circular and much smaller than the aperture of an autozoid (cf. Measurements, 4, 5). HARMER says further (l. c.) that the gonozoid in *R. phillipsae* is "not very distinctly outlined" which is certainly the case in *R. elegans*.

The two species *R. harmeri* CALVET (1911, p. 4, Text-fig. 2; 1931, pp. 26 f., Pl. 1, figs 5 a, 5 b) and *R. incrustata* OKADA (1928, pp. 492 f.; Text-fig. 9, Pl. 24, fig. 7) both seem to be well separated from the present species so far as I can judge from the description and the figures. The gonozoid is, however, unknown in both.

Habitat: On shells and on *Retepora* sp.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 59.

Genus **Tubulipora** LAMARCK.

Syn: *Tubulipora* LAMARCK 1816, p. 161; *Idmonea* LAMOUROUX 1821, p. 80; *Proboscina* AUDOUIN 1826, p. 236; *Criserpia* MILNE EDWARDS 1838, p. 238 (234); *Pencilletta* GRAY 1848, p. 139; *Phalangella* GRAY 1848, pp. 139, 149; *Phalangella* HAMM 1881, p. 26; *Tubulipora* HARMER 1898, pp. 86 ff.; 1915, pp. 122 f.; *Liripora* CANU 1908, p. 310 (nec MACGILLIVRAY 1887, p. 182); *Peristomoecia* CANU & BASSLER 1920, p. 692; *Stomatopora*, part.; *Diastopora*, part.; *Tubulipora* + *Idmonea*, part., auctt.

Genotype: *Tubulipora transversa* LAMARCK 1816, p. 182 (recent, Mediterranean; possibly identical with the well-known "*Idmonea serpens*" = *Tubulipora liliacea* PALLAS 1766, p. 248).

The genus *Tubulipora* was founded by LAMARCK (l. c.) and has since then been extensively used by a great many authors, though not always in one and the same meaning. Other genera have been created as well for species that did not differ generically from *Tubulipora*; and these genera were then often used side by side with it.

The genotype of *Proboscina*, for instance, which is *P. boryi* AUDOUIN (l. c.; Pl. 6, figs 4: 1, 2), a recent form on algae from the Mediterranean, is clearly a *Tubulipora*, though the genus has been applied both to uniserial and multiserial, adnate and partially erect species with the zoids arranged quincunxially on the frontal side of the zoarium; and has been regarded, partly at least, as a synonym of *Stomatopora* (cf. SMITT 1867, pp. 402, 458 ff.; HINCKS 1880, p. 436). The gonozoid in *Proboscina boryi*, as reproduced in Pl. 6, fig. 4: 2, of SAVIGNY's work (1809), seems to form an inflation of the "peristome" or free terminal portion of one single zoid; but this is no doubt simply an error of the artist. It has caused CANU & BASSLER (l. c.), however, to form a new genus (*Peristomoecia*) for *P. boryi* and some other species, the type selected by these authors being *Stomatopora divergens* WATERS 1904, p. 89, though it is very evident that, should the said character be considered sufficient to characterize a genus, then of course *Proboscina* must be maintained. BASSLER (1935, p. 176) correctly places *Peristomoecia* as a synonym of *Proboscina*; which in its turn, as far as I can see, we are forced to regard as a synonym of *Tubulipora*.

The same is true of *Phalangella* GRAY (l. c.), which was created for two typical species of *Tubulipora*, viz. *T. phalangea* and *T. flabellaris*, as pointed out by HARMER (1915, p. 123); and it is true of the subgenus *Penciletta* of the same author (l. c.) as well; the latter genus was founded for *Tubulipora penicillata* JOHNSTON. HAMM (l. c.) gives *Tubulipora*, *Proboscina* (part.) and *Stomatopora* (part.; sensu HINCKS nec BRONN) as synonyms of his *Phalangella*. As for *Liripora* CANU (l. c.), nec MACGILLIVRAY, cf. HARMER 1915, p. 123.

MILNE EDWARDS (l. c.) used *Criserpia* for a species (*C. michelinii*, a fossil from Méhon, dep. Manche, France) which earlier in the same memoir he had referred to *Diastopora*. BASSLER (1935, p. 83) thinks that *Criserpia* "may possibly be held for non-fasciculated *Tubulipora*" which in my opinion is correct. This view is further strengthened by a study of the figures given by MILNE EDWARDS (l. c., Pl. 16, figs 4, 4 a).

There remains to say a few words on *Tubulipora* and *Idmonea* in their relation to one another. A very valuable history of the former genus was given by HARMER (1898, pp. 86 ff.; 1915, pp. 122 f.). This author points out that MILNE EDWARDS (1838), according to a statement made by him (p. 218, note), has examined and figured (Pl. 9, figs 3, 3 a) the specimen upon which *Tubulipora transversa* LAMARCK was founded. MILNE EDWARDS considers this species to be an *Idmonea*, "a course which is hardly justifiable considering that it was the type-species of the earlier genus *Tubulipora*" (HARMER 1898, p. 88). If MILNE EDWARDS figures are to be accepted as a correct representation of LA-

MARCK's species, the consequence is, of course, that *Idmonea* becomes a synonym of *Tubulipora*. "This", HARMER (l. c.) thinks, "is a regrettable conclusion, since it results in the substitution of *Tubulipora* for *Idmonea*"; but he suggests that "the evidence is perhaps not quite certain", so both genera could possibly be maintained after all. In a later work (1915, l. c.) HARMER seems to have come to a more definite conviction, giving *Idmonea* as a synonym of *Tubulipora*.

I think there was really no reason to doubt the statement of MILNE EDWARDS just quoted; and thus the suppression of *Idmonea* in favour of *Tubulipora* was inevitable. It should be noticed, moreover, that *T. transversa* is described by LAMARCK (l. c.) as having "cellulis tubulosis, serialiter coalitis; seriebus transversis", so the "*Idmonea*"-like appearence of this species seems to me to be undeniable, whether the figures of MILNE EDWARDS are accepted as evidence or not. The genus *Tubulipora*, on the other hand, is characterized by "cellulis confertis, fasciculatis vel serialibus" (LAMARCK, l. c.) and thus encloses, obviously, both *Idmonea* and *Tubulipora*, as they were generally understood. It is true that LAMARCK states that the zoids, in *Tubulipora*, "sont désunies et n'ont entr'elles aucune adhérence sur les cotés", but this only means that they are "en grande partie libres", *i. e.* their distal portions are not contiguous, and it does not prevent them from being "ramassées, fasciculées ou sériales", "verticillées, et quelquefois disposées par rangées laches". It should be remembered that all the seven species originally referred to *Tubulipora* were recent ones, where the distal portions of the zoids are not necessarily damaged or broken.

Tubulipora as understood in this work is a very large genus, including a great many recent species and a yet larger number of fossil ones; holding a central position within the Acamptostegous Stenolaemata, and reminding in this respect of the original giant-genera *Membranipora* and *Eschara* among the Cheilostomata. It is clear, then, as HARMER (1915, p. 123) has pointed out, that on practical grounds if not for other reasons some subdivision of the genus may be desirable. This, however, is secondary; what is important is, in the first place, to make a clean sweep of everything in this domain.

Some of the old genera now incorporated in *Tubulipora*, as, for instance *Proboscina* and *Phalangella*, have mostly been used "in a zoarial sense" (CANU & BASSLER 1920, p. 659), *i. e.* to designate a certain shape and appearance of the zoarium of certain species; but the uncertainty as to the designation and separation of the genera in *Tubuliporidae* — *Tubulipora* and *Idmonea* being an illuminating example — is nevertheless very obvious and has been demonstrated in the review given above. It is, moreover, generally acknowledged.

The old genera were founded, mainly or exclusively, upon the general appearance of the zoarium and, to some extent, upon the mode of arrangement of the zoids; but, as we know, one and the same species may show, under different conditions, an adnate or a semi-erect or, sometimes, even an almost erect growth. The arrangement of the zoids may likewise vary within wide limits as is the case in many species of *Tubulipora* (cf., for instance, HARMER 1915, p. 122, where examples of this are given), and it may change considerably with increasing age of the zoarium.

The new genera or subgenera, when such are to be erected, must therefore be based upon a study of the development of the zoarium and of its structure in the different stages until maturity is attained and gonozoids are developed; and the morphology and anatomy of the autozoids and gonozoids — and of the kenozoids as well, if such exist — must be investigated. It is most important that the genera or subgenera resulting from studies of this kind should be independent from the very beginning of those previously existing both for their limits and for the diagnoses; though it may be possible that one or the other of the old genera will turn out still to be applicable according to the Rules of priority.

Marcus (1938, p. 193) thinks that *Proboscina* could be used in the future and that *Reptotubigera* should be enclosed in it. I do not think this would be a fortunate arrangement and I am unable to see what would be gained by it. *Proboscina*, being used by most authors to designate a certain mode or stage of growth, is admittedly very vaguely defined and we know practically nothing of the gonozoids of the species originally enclosed in it. Enclosing *Reptotubigera* in *Proboscina* would enable us to refer almost every adnate species of *Tubulipora* to it, which is by no means desirable. In my opinion *Proboscina*, being a synonym of *Tubulipora*, must be definitely suppressed.

It will certainly be no easy task in the future, just as now, to determine the species of *Tubulipora*, whether recent or fossil. In any case it will require a detailed study of the characters available, in the first place of the structure of the zoarium based upon an investigation into the astogeny; further a thorough study must be made of the gonozoids. In all probability many species are at present described two or even more times under different names, and this is true, I think, not only of fossil species but of not a few recent ones as well.

1. **Tubulipora carinata** n. sp.

Pl. 1, figs. 3; Text-figs. 3 and 4.

Zoarium wholly adnate, elongate, broadening distally, consisting of from two to five zoids abreast. Zoids arranged alternately, protuding distal portions lacking but apertures well separated from one another. Each cystid with a well marked carina running along the median frontal line to the rim of the aperture, which is longitudinally oval in shape. Gonozoid wedged in between the neighbouring zoids, its middle portion moderately inflated, otherwise unlobed; tube of gonozoid very short, aperture slightly transversely oval, decidedly smaller than apertures of autozoids, facing upwards.

Measurements in μ.

(1) Breadth of middle (triserial) portion of zoarium 400—430.
(2) » » zoid neighbouring the gonozoid a little distance proximally of its aperture 120.
(3) Breadth of gonozoid's inflated portion 180.
(4) Diameter of aperture of autozoid 90—100 × 60—70.
(5) » » » » gonozoid 50 × 40.

There is but one specimen of this form, and as this is small and probably would have grown out further, I have been doubtful if I ought to create a new species for it. The occurrence of a strong carina is very characteristic for the zoids, however, and though some indications of a similar formation can sometimes be seen in other adnate species — as, for instance, in *Diastopora dichotoma* (d'Orb.) — it is not so strongly developed by far as in the present one. Yet more distinctive is the fact that the zoarium in question though small is obviously fertile, carrying a structure which I think can hardly be interpreted in any other way than as representing a gonozoid.

The zoarium (Pl. 1, fig. 3) begins as usual with the primary zoid which is damaged in its proximal portion. Then two zoids are developed simultaneously, upon which follow three zoids abreast. The development of the zoarium thus follows so far strictly the laws set forth by me in an earlier memoir (1926 b, pp. 275 ff.). Then for some reason — probably the nature of the substratum — there is a constriction of the zoarium, merely two zoids abreast existing at this place, whereupon follows again a portion of the zoarium with three zoids abreast, passing over in its turn into the distal portion of the zoarium (Pl. 1, fig. 3). This is somewhat widened, there being at first four and then, in the outermost row, five zoids abreast, the lateral ones bending a little to each side. It may be noticed that, so far as I can see, there are no buds developing between the terminal zoids or distally of them; so it may be concluded either that development has come to a standstill or that it may have proceeded quite slowly. As the specimen was procured amidst the Antarctic summer (6/1), one would otherwise have thought that growth should have been at its height, as it actually seems to be in specimens of some other species from the same Station.

The distal portions of the cystids are not contiguous with one another and no connate series are therefore formed, neither transversely nor longitudinally (Text-fig. 3). In shape the cystids are somewhat remarkable, for the free, cylindrical, distal portion growing more or less upwards that otherwise occurs in most if not all adnate species of the *Tubuliporidae* is completely lacking here. Even where the aperture is obviously undamaged, no such structure can be discerned. It has been replaced by a low calcareous peristome, forming the actual rim of the aperture. This is situated just above the surface of the zoarium — with which the cystids are otherwise continuous during the whole of their length — and at the same time just below the end of each cystid's median carina (Text-fig. 4). The apertures proper are oval with the longer axis of the oval in the frontobasal direction. The carina is a very conspiciuous formation, though it may vary a little in different cystids. In most of them it is high and strongly pronounced. Studying the youngest zoids one can state that the carina comes into existence simply by a considerable thickening of the median portion of the zoid's calcareous frontal wall. As to its function I have no theory.

It deserves to be noticed that several of the cystids are closed by a calcareous diaphragm a little distance inside the aperture; — which strengthens the impression alluded to above that we have before us here a zoarium for the moment at rest.

One of the zoids in the outermost row but one deviates as to its shape from all the other individuals of the zoarium (Pl. 1, fig. 3; Text-fig. 3). Its middle portion is flattened and distinctly broader than the corresponding portion of the neighbouring zoids, and there is no trace of a carina. Just distally of this portion is a very short tube, which is directed upwards, a little obliquely to one side, and which terminates in an aperture that is distinctly smaller than those of the autozoids.

It seems to me most probable that the formation described is a gonozoid which, if this is correct, may be said to represent an unusually simple type. I am not sure, however, that it is typical. Just where the triserial portion of the zoarium is passing into the widening one there are some signs that a process of degeneration and regeneration has taken place in the zoarium, which might possibly have affected the gonozoid too, viz. its proximal portion (cf. Text-fig. 3). Or, if development has come to a standstill for some reason in the present zoarium, the gonozoid may have been stunted in its growth.

So far as I have been able to ascertain, no kenozoids exist in the specimen described.

The pseudopores are round or slightly oval, of moderate size. They are scattered on both sides of the carina being more scarce gradually as we approach the aperture. The carina proper does not seem to be pierced by any pores. In the middle, dilated portion of the gonozoid the pores are a little more close together than otherwise.

From the description given it will seem that the present species will be easily separated from all other members of *Tubulipora,* so I think it must be regarded as well established. The description founded upon one single specimen must naturally be incomplete, however, and I hope more material will soon enable us to make it more complete and to decide if the characters given are constant or not. If the former be the case, the question probably will arise if on account of, inter alia, the type of the gonozoid represented by this species and the characteristic shape of its autozoids, it may deserve to be made the type of a new subgenus or even genus.

Habitat: On a small stone (together with an encrusting Cheilostome, a Spirorbis and a Foraminiferan).

Occurrence: Swedish Antarctic Expedition 1901—03: St. 3.

2. **Tubulipora gracillima** n. sp.

Pl. 1, figs 4—6.

Zoarium wholly or, sometimes, partly adnate, small, flabelliform or consisting of two lobes growing in opposite directions. Zoids arranged at first in quincunx, then, in the distal portions of the lobes, in more or less pronounced, diverging rows or fascicles which consist usually of from two to five zoids; these are partly but never wholly contiguous with one another. In shape the zoids are long, narrow, and slender, with long, free distal portions. Gonozoids in distal portions of lobes; their middle, widened part simple, about triangular in shape when seen from above, moderately inflated; tube placed just proximally of an autozoid's free, distal portion, rather long, straight, compressed transversely, aperture transversely oval with a proximal and a distal lip.

Measurements in μ.

(1) Length of fertile zoarium with onelobe 2 300.
(2) Breadth of distal part of fertile, one-lobed zoarium 1 400.
(3) Length and breadth of 2-lobed zoarium 1 500 × 3 300.
(4) Diameter of aperture of autozoids 70—90.
(5) Diameter of aperture of gonozoids 60—70 × 110—130.

I have seen some dozen zoaria of this species, many of which were fertile. The characters both of the autozoids and of the gonozoids seem to be very constant.

The zoarium (Pl. 1, fig. 4) grows out from a semi-globular pro-ancestrula of the ordinary type. The edge of this is surrounded, in most cases at least, by a number of minute calcareous denticles. The primary cystid is shorter than the cystids of the zoids following. On both sides of it is a well-marked border. The cystids coming next are bent alternately to the left and to the right. Their number augments gradually and in this way the fan-shaped zoarium characteristic of the present species originates. I have seen many zoaria of that kind, winding around narrow, cylindrical stems of some other, erect Bryozoan. Usually these zoaria are adnate throughout the whole of their length, but sometimes the nature of the substratum — rootlets of a *Flustra*, for instance — causes them to be free in their distal portions.

When the zoarium is growing on a flat surface, *e. g.* on the leaf of a *Flustra*, it is tolerably certain that it consists of two diverging lobes (Pl. 1, fig. 4). The formation of the two lobes seems always to begin at a rather early stage, after three or four zoids have been developed. It is caused through the number of zoids increasing rapidly, the common bud at the edge of which they originate dividing simultaneously into two halves.

In one or two cases I have observed a (primary) lobe forking into two secondary ones; but, to judge from the material before me, this seems to be a process rather seldom occurring.

The species is rather well characterized by the arrangement of the zoids. In young and small zoaria most of the zoids are in quincunx, but the clustering together of the zoids in radiating bundles or series is usually indicated in the distal portions. In older zoaria this arrangement is rather well marked as a rule. The zoids of the rows or clusters are connate along the greater part of their length, but their long distal portions are always protruding freely. Nevertheless, the rows or small fascicles formed by zoids clustering together in groups are easily ascertained and give a characteristic appearance to the zoaria of most specimens of the present species (Pl. 1, figs 4, 5). Most of the groups consist of but few zoids, usually of two or three forming either a uniserial row or a small fascicle; but sometimes these fascicles are a little larger, being composed of up to five zoids. It is not always, however, that the groups of zoids are clearly distinguishable, for in zoaria bending round a narrow stem the zoids often protrude in all directions, the free distal tubes usually being very long here.

Slender and narrow in form, the cystids are strictly cylindrical up to the rim of the aperture, which is circular (Pl. 1, fig. 6). It is easy to state that the calcification of their walls is unusually feeble which is true, in the first place, for the free tubes. So far as I can judge, the diameter of the apertures is smaller than is the case in the majority of species within *Tubulipora.*

One is rather often able to observe that the surface of the zoarium, *i. e.* the ensemble of the cystids, is crossed by a system of transverse wrinkles. In the zoarium shown in Pl. 1, fig. 4, for instance, this is well marked. Even on the primary zoid these wrinkles are numerous and easily ascertained, and the same is true for the zoids following next. In the middle portion of the zoarium the wrinkles, though visible at several places, are not so numerous, but in the distal parts, *i. e.* in the two diverging lobes constituting most of the zoarium, they form again a prominent feature. Sometimes the free distal tubes of the cystids may be transversely wrinkled but often this is not the case. Where wrinkles exist, they usually occur on several cystids neighbouring one another and at about the same height on each of them. In other zoaria, again, the wrinkles may be but few or may even be absent altogether. As to the meaning of the wrinkles I have no definite opinion, Their mode of occurrence suggests that they are formed as a result of degenerative and regenerative changes undergone by the zoarium and of the zoids composing it; but whether this is true of all the wrinkles must be considered doubtful. They seem to me to be sometimes a little too many for that.

The proximal portion of the gonozoid is of about the same shape as that of an ordinary zoid. It widens gradually and passes slowly into the inflated portion, the shape of which is relatively simple, it being wedged in, so to say, between two rows of zoids (Pl. 1, fig. 5). One or two zoids or rows of zoids sometimes partly conceal it from above. The tube is sharply set off from the inflated portion. Its position just proximal of the tube of an autozoid though not adnate to it seems to be constant as all tubes of gonozoids I have observed occupy that position. The aperture of the gonozoid is very characteristic in shape (Pl. 1, fig. 6).

So far as I am aware, this rather well-marked species has not been described before; in any case, the gonozoid has hitherto remained unknown, and I have not been able, therefore, to identify it with any other species of *Tubulipora.* The specific name has been given on account of its delicate appearance and feeble degree of calcification. It is obviously a rather typical member of its genus.

Habitat: On *Cellaria, Flustra* and some other erect Cheilostomatous Bryozoa.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 94, and St. 95.

3. **Tubulipora bocki** n. sp.

Pl. 1, figs 7—9.

Syn: *Tubulipora ?aperta* CALVET 1904, p. 34.

Zoarium adnate, flattened, broadening at a very early stage so as to assume an almost semicircular shape; lateral lobes meeting later on proximally of pro-ancestrula, by which shape of zoarium becomes almost perfectly circular. Zoids large, arranged quincunxially; assuming at first an almost horizontal position, then softly curving upwards, their free distal portions of varying length, narrowing towards the aperture, directed forwards and at the same time, upwards; apertures circular; gonozoids complicated and voluminous formations, their middle portion much dilated and pierced by numerous zoids; tube of gonozoids not sharply set off from middle portion, rather short, adnate to an autozoid, slightly curving to one side; aperture slightly oval longitudinally, smaller than that of an autozoid.

Measurements in μ.

(1) Diameter of young semicircular (fertile) zoarium: about 3 000 (2 800—3 200).
(2) Diameter of older, circular zoarium: about 4 000 (3 800—5 660).
(3) a) Diameter of aperture of eldest autozoids, the primary one inclusive, 120—130.
  b) Diameter of aperture of other autozoids 130—180.
  c) Diameter of horizontal, adnate portion of autozoids 180—210, average 200.
(4) Diameter of aperture of gonozoid 120 × 90.

My material has consisted of about a dozen colonies, many of which were, unfortunately, rather severely damaged.

The strong broadening and flattening out of the zoarium so characteristic of the present species is started already when the first two or three zoids originate (Pl. 1, fig. 7). The primary zoid is usually curved, in its distal half, sharply to one side, and the 2nd zoid bends equally sharply to the other side, while the 3rd zoid is straight. This is the usual condition; but I have seen, in some cases, that the primary zoid has grown straight forwards, while instead the 2nd and 3rd zoids have been curved, one to each side. The result is about the same as in the former case. The curves formed are so sharp, as a rule, that the apertures of the two zoids curving look almost in the direction of the pro-ancestrula.

Through the mode of development of these three zoids the shape of the future zoarium is foreshadowed, so to say. As the zoids following take their origin between the three eldest ones, in the common bud, owing to the sharp curving of two of these zoids the developing zoarium must obviously become about semicircular in shape. I have seen several zoaria in this condition. Some of them are fertile while others are not. Sometimes it may occur, that in one of the lateral lobes a gonozoid has developed, while this is not the case in the other one. One can often observe that one of the two lobes is a little larger than the other one; and, where this is the case, it is the large lobe, of course, that has become fertile.

The further development of the zoarium is characterized by the lateral lobes growing in a proximal direction and, at the same time, towards each other (cf. Pl. 1, fig. 7). The result is that, sooner or later, the two lobes meet proximally of the pro-ancestrula, which becomes then, as a rule, more or less completely overgrown. The spaces just proximally of the two sharply curved zoids mentioned remain for some time, two holes thus piercing the zoarium on both sides of the base of the primary zoid. Later on, however, these holes disappear through fresh zoids developing, by which the final stage of astogeny in this species seems to have been attained, the zoarium now filling up an almost circular space, though its edge is somewhat wavy (Pl. 1, fig. 7).

The zoids are generally arranged in a regular quincunx throughout the whole of the zoarium (Pl. 1, fig. 9). It may occur that two or even three zoids are contiguous up to the rim of their apertures; but these cases are exceptional and seem to affect zoids that are situated at or near the edge of the zoarium only.

The first cystids of a zoarium are rather slender but otherwise I think the cystids may be said to be unusually large, the horizontal, adnate part of them being as much as 200 or even a little more in diameter (3 c). The free, tubular parts are often damaged, but where this is not the case it is easy to see that they become distinctly narrower towards the terminal end with the aperture. Nevertheless, with the exception of those of the eldest zoids, the apertures are larger in diameter than is the case in most species of *Tubulipora* so far as I know (3 b).

In the central portion of some of the zoaria there are a number of transverse wrinkles on the surface of the autozoids and on the proximal portion of the gonozoid or gonozoids, if any such exist here. Less frequently such wrinkles are found on the zoids in the middle portion of the zoarium. On the other hand, the wrinkles sometimes seem to be lacking and, at any rate, they never form any conspicuous feature in the zoaria of this species.

In young zoaria that have become fertile there are only one or two gonozoids, as a rule, and these are situated in one or both of the lateral lobes. It is thus easy in these cases to state their shape and to observe their circumference. The gonozoid takes its origin in the proximal part of the lobe, being more or less wedged in between the neighbouring cystids. So far as I have been able to ascertain, it represents, in most cases at least, one of the zoids developing immediately after the five eldest zoids have been formed (usually the 6th—11th). The pseudopores in this proximal part of the gonozoid are rather few and those existing are quite small. This condition changes when the proximal portion of the gonozoid passes into the middle one. This happens rather suddenly, the gonozoid now becoming strongly widened and at the same time the pseudopores becoming larger and much more thickly distributed. The dilated portion of the gonozoid occupies the greater portion of a lobe, from near the edge of one side to near the edge of the other. It is pierced by several zoids and sends lobes in between many of those surrounding it (cf. Pl. 1, figs 8, 9), its shape, consequently, being very irregular. Through these lobes meeting during the continued growth of the gonozoid and coalescing on the distal side of the zoids in question, the space enclosed by this part of the gonozoid is augmented and the number of zoids piercing it is, at the same time, increased.

In larger zoaria that have assumed a circular shape the number of the gonozoids does not seem, as a rule, to be higner than is the case in the younger, semicircular ones, but the middle portion of the gonozoids has been dilated so strongly that nearly the whole of the frontal surface of the zoarium may be occupied by it, the individual autozoids protruding like columns out through the inflated, thickly porous wall of the gonozoid (cf. Pl. 1, fig. 9). I have not been able to ascertain, in such cases, the limits between the different gonozoids, but I do not wish to state on account of this that they have coalesced with each other; indeed I think it more probable that they have not. The number of the individual gonozoids can be discovered, in zoaria of this kind, by observing the number of the tubes and apertures — provided that these have been formed and still exist which in my material owing to its somewhat poor condition is not always the case — or by tracing the proximal portions of the gonozoids wedged in between the neighbouring autozoids; which I think to be the best method. Thus in the large zoarium reproduced in Pl. 1, fig. 7, there are but three gonozoids in all.

The middle portion of the gonozoid passes on to the distal one, the tube, without any sharp limit marking the transition from one to the other. The tube is moderately long, narrowing towards the aperture. When still developing, as is the case in Pl. 1, fig. 8, the tube is close to one side of an autozoid and is probably adnate to it. At any rate it becomes adnate when, finishing its growth, it makes a curve so that its distal end protrudes laterally from the autozoid to which it clings, the aperture facing now obliquely frontally and, at the same time laterally (Pl. 1, fig. 9).

It is interesting to compare the type of gonozoid represented in the present species with that occurring in, for instance, *Diastopora patina*. In both cases the inflated portion of the gonozoid is very broad and is pierced by several autozoids; but in *Tubulipora bockii* this part of the gonozoid is irregular or polygonal, covering a very large portion of the surface of the zoarium, and the distance from the proximal portion of the gonozoid to the distal one is considerable. In *Diastopora*, on the other hand, this distance is small and the lateral lobes of the gonozoid are long but rather narrow, so the gonozoid occupies a much smaller amount of space in the zoarium. It is evident, thus, that the development of the gonozoid has proceeded along different lines in the two forms compared.

The pseudopores are sparse and rather small in the walls of those autozoids that are not surrounded by part of the gonozoid. Where the distal portion of an autozoid protrudes after having pierced the inflated portion of the gonozoid it is interesting to note that the pseudopores in its wall are at first numerous and large but a little nearer the aperture, where the cystid begins to narrow, become fewer and, at the same time, much smaller. In the vicinity of the aperture there are, in an autozoid the distal portion of which is uninjured, hardly any pores at all. The pseudopores both in the autozoids and the gonozoids are circular or, rather often, more or less oval longitudinally.

The present species does not seem to have been described before though I think it quite possible that it may have been enclosed in the assembly of forms that seems to have been mingled together by BUSK (1879, 1886, and elsewhere) and some other authors under the names of *Tubulipora organisans*, *T. fimbria* and, perhaps, *T. stellata.*

As CALVET (1904, l. c.) has given no description nor any figure of the specimens referred by him, though with some doubt, to *Tubulipora aperta,* it must remain an open question if they possibly belong to the present species; that they are not identical with the Northern *T. aperta* HARMER I think may be considered certain.

I have named the present species in honour of my estimated friend Professor S. BOCK, Director of the Invertebrate Department in the Swedish State Museum, Stockholm.

Habitat: All colonies I have seen are on kelp.

Occurrence: Swedish Antarctic Expedition 1901—03. Ushuaia 13. 3. 1902. 10 m. — St. 13. — St. 51. 3. 9. 1902.

4. **Tubulipora stellata** BUSK 1876.

Pl. 2, figs 1—4.

Syn: *Tubulipora stellata* BUSK 1876, p. 118; 1879, p. 199, Pl. 10, fig. 26. ?*Tubulipora dichotoma* D'ORBIGNY var. nov. *serialis* RIDLEY 1881, pp. 59 f., Pl. 6, fig. 10. ??*Tubulipora flabellaris* BUSK 1886, p. 23, Pl. 5, figs 1, 1 a, b, c.

Zoarium wholly or, sometimes, partly adnate, at first of a narrow, strap-like or flabelliform shape, later on bifurcating into two or more, broad, in cross-section subtriangular lobes, which may bifurcate in their turn, the lobes thus originated broadening gradually and often coalescing more or less completely; in this way the zoarium may assume a "stellate" shape, *i. e.* become rounded but with the ends of the lobes extending so as to represent the (short and broad) arms of the "star"; thus a considerable variation in zoarial shape characterizes the species. The arrangement of the autozoids is likewise an object of much variation. There is a tendency of transverse, alternating series of autozoids being formed, that meet in the median line. In many zoaria this arrangement is well pronounced, while in others the series are more or less completely disintegrated, the free distal portions of the cystids assuming instead a quincunxial arrangement. Distal portions of cystids protruding above the surface of the zoarium, of varying length; in some cases rather long, curving upwards and at the same time to one side, but most often short and protruding in such a way that the aperture, which is circular, faces upwards and slightly forwards. Gonozoids large and voluminous, of irregular shape. Middle portion of gonozoid very strongly dilated, much widened laterally, and pierced by numerous autozoids. Distal portion a short, straight tube directed upwards and adnate with its base or with its lower half to the proximal or lateral side of a zoid or a transverse row of zoids. Aperture about circular, only slightly smaller than that of an autozoid.

Measurements in μ.

(1) Diameter of large, stellate zoarium 8 600 × 7 200.
(2) » » fertile lobe (normal breadth), average 1 200—1 800.
(3) » » apertures of autozoids 90—120, average 100.
(4) » » aperture of gonozoid 80—90, average 85.

I have had an opportunity of examining a very rich amount of material of the present species, including some hundred colonies in very different stages of development; — which is necessary, I think, should one be able to form a correct appreciation of its extreme variability. There are, however, not many zoaria of the final, stellate stage, but a great number of younger ones; and, above all, there are very numerous zoaria representing all kinds of stages transitory between quite small ones and those fully developed.

It is extremely difficult to give a thorough description of this really proteus-like species; and I must restrict myself here to a few words about the stages I think are most characteristic, omitting much that could have been added as to the various growth-forms and the modifications in the arrangement of the zoids. Indeed, were it not for the transitory stages, one could have had reason to believe that the material here reviewed represented at least three different species.

The primary zoid is followed at first by one, then by two and three zoids respectively, the zoarium at these early stages being consequently quite narrow (cf. Pl. 2, fig. 1).

Development may proceed for some time along this line, an elongated, strap-like, unbranched zoarium thus originating, whether growing on a shell or coral or along the stem of an Alga or winding around the narrow branch of some Hydroid; but often the young zoarium instead bifurcates, the two lobes thereby coming into existence stretching in about opposite directions (Pl. 2, fig. 1—3). I have seen one or two zoaria of this kind bifurcate immediately after the primary zoid had been fully formed — the 2nd zoid thus belonging to one and the 3rd to the other of the two lobes — but usually the first bifurcation does not occur until the zoarium is a little larger, comprising 8—10 zoids or something like that. The distal portions of the lobes may often, in such zoaria, become free from the substratum, finishing in erect and rounded or even somewhat capitate ends (cf. Ridley 1881, Pl. 6, fig. 10).

On the other hand it may sometimes occur that the zoarium conserves a narrow shape but branches repeatedly, thus assuming a shape reminding of that of, for instance, *Tubulipora dilatans* or some species of *Reptotubigera* (cf. Pl. 2, fig. 1). But where space is available the zoarium may broaden rather quickly and the formation of distinct lobes is then postponed until a later stage.

The final, stellate stage is not attained by all zoaria, nor even by the majority of them, the possibilities of it being realized depending mainly, as it seems, upon the nature of the substratum. Fully developed zoaria of the said shape I have found only on flat surfaces, e. g., on the fronds of kelp where they are not uncommon.

In young zoaria that ought probably to be considered typical the occurrence of transverse series of zoids is indicated, as a rule, by the free distal portions of the cystids bending, in those situated to the left of the median line, to the left, in the others, to the right. As long as the zoarium remains narrow the series thus originated consist of but a few zoids, which are usually not contiguous with one another. The arrangement just described, which may be more or less regular, moreover, may develop, as the zoarium grows larger, in two ways. Either the series become more distinctly pronounced, the distal portions of the cystids composing them being close to one another or even adnate; or else all signs of the zoids being arranged in transverse rows disappear gradually and become substituted by a quincunxial arrangement. The former condition is most often found in zoaria growing on a tolerably even substratum, while the latter occurs in the first place in zoaria growing on a narrow stem and the distal lobes of which are, therefore, free. Of course there are numerous transitions between these two extremes (cf. Pl. 2, figs 1—4).

Where the free distal portion of a cystid is well developed, the rim of the aperture is often more or less exserted laterally. The free tubes are frequently, in such cases, transversely wrinkled, but not a few tubes exist with no wrinkles at all. I am inclined to suppose the existence of the wrinkles to be a sign that one or more processes of degeneration and regeneration have occurred.

It ought to be noticed that the autozoids of the present species differ from those of several others, as, for instance, *T. organisans* D'ORBIGNY (cf. below, p. 50), in being relatively short. They never have the long and slender appearance as is the case in the species named and in some others as well, because the free distal portions of the cystids are shorter — sometimes much shorter — as in these; nor have I seen the zoids clustered together into fascicles or radiating series as in *T. fasciculifera* and *tubigera* (cf. below, pp. 00 and 00), among others.

Gonozoids are sometimes formed in zoaria astonishingly young. Thus, in one case I have found the first fertile individual to be the 7th zoid, counted from the primary one, and in many other cases gonozoids have been found in the distal portion of small zoaria. The middle dilated portions of such gonozoids are mostly rounded in circumference, their lobes having coalesced around half a dozen zoids. The gonozoids found in most of the lobes of old zoaria, on the other hand, are very voluminous structures, their dilated portions surrounding a great many autozoids (Pl. 2, fig. 4).

The tube, however, is the same in gonozoids of both young and old zoaria. It is not always easy to ascertain because it looks not unlike the short distal portion of some autozoid (cf. Pl. 2, fig. 4).

One might be inclined to believe, on account of the wide range of variation of the present species, that I have enclosed two or more species in what is called here *T. stellata*. Naturally I was myself of the opinion, at first, that I had more than one species before me; but four facts, above all, have convinced me that this is not the case. These facts are, (i) the existence of all kinds of transitory stages between zoaria of very different appearance, (ii) the establishing, through an investigation of the zoarial development, of the different types of zoaria as subsequent development stages, (iii) the appearance of the gonozoids which is one and the same in zoaria of even very different aspects, and, (iv), the existence of some other characters, such as the shape and size of the autozoids, which are common for all sorts of zoaria of *T. stellata*.

The pseudopores are numerous and relatively large, circular in shape in the horizontal portions of the autozoids, while in the free distal tubes they are almost entirely lacking. As for the gonozoids, the calcareous wall of the dilated portion is as usual thickly pierced by pseudopores (Pl. 2, fig. 4) that are rather large.

The identification of the species here described with *T. stellata* of BUSK is based upon the very short and incomplete descriptions given by the named author (1876, p. 118; 1879, p. 199) and upon one of the figures in the latter work (Pl. x, fig. 26), showing a zoarium in natural size. The identification is thus far from certain; the coincidence both as to the description and figure is, however, unmistakable, so I think there is perhaps more than a possibility that my specimens will prove to belong to BUSK's species.

It seems to me not improbable that *T. dichotoma* v. *serialis* RIDLEY, that has been well described by that author (1881, pp. 59 f.) represents one of the stages in the astogeny of the present species. If this supposition turns out to be correct, *serialis* should be suppressed, *stellata* being the correct name; but at present it is impossible to settle this point.

BUSK's description and figures, in his Challenger Report (1886), of a species determined by him as *T. flabellaris* FABR. show in my opinion that the species examined by BUSK is, in all probability, not identical with that of FABRICIUS. It might possibly be *T. stellata* instead, though I have never seen, in the latter species, any transverse punctured bars on the basal side of the zoarium like those figured by BUSK in his Pl. 5, fig. 1 c.

Habitat: The species is found on diverse substrata. It occurs in great numbers on kelp and other marine algae, on Hydroids, erect Cheilostomatous Bryozoa, worm tubes, etc., but it is sometimes found on shells of Lamellibranchs and Gastropods as well and on the carapaces or legs of some Decapods.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 3. On algae. — St. 5. On a Flustra sp. — St. 13. On algae. — St. 39. On Hydroids, on algae and on a species of *Flustra*, and on the shell of a large crab (*Paralomis granulosa* JACQ.), a large number of small colonies together with *T. fasciculifera* HINCKS and some Cheilostomes. — St. 40. On the same. — St. 48. On a crab and on a Hydroid. — St. 50. On algae. — St. 51. On *Flustra* sp., and on Hydroids. — St. 52. On a Hydroid (*Sertularia operculata* L.). — St. 53. On algae. — St. 54. Numerous colonies together with *T. anderssoni* on *Flustra* sp. — St. 55. On algae, Hydroids and crabs. — St. 59. On Hydroids (*Graminaria stentor* and *Sertularia operculata*). — St. 60. A small colony on a claw of a crab. — St. 64. On small algae.

5. **Tubulipora anderssoni** BORG 1926.

Pl. 2, figs 5, 6; Pl. 3, figs 1, 2.

Syn: *Tubulipora organisans* (part.?) BUSK 1879, pp. 198 f., Pl. 10, figs 20—25; RIDLEY 1881, pp. 58 f.; JULLIEN 1888, p. 82; KIRKPATRICK 1902, p. 288; WATERS 1904, p. 92; CALVET 1909, p. 40. (?)*Idmonea serpens* var. *radiata* CALVET 1904, p. 36. *Tubulipora anderssoni* nom. nov. BORG 1926 b, p. 184, Text-figs 40—44, 70; nec *Tubulipora organisans* D'ORBIGNY 1839, p. 19; Pl. 9, figs 1—3.

Zoarium adnate, consisting of a varying number of elongate, rather narrow, strap-like lobes, radiating in all directions from centre and often dividing dichotomously. Well-marked conical or flattened outgrowths along latero-basal sides of lobes and on basal side help to fix zoarium to substratum. Zoids arranged in each lobe in distinct transverse series, separated in middle line, each series composed of from two to six or occasionally even more zoids. In each series most zoids are connate throughout their whole length, which is especially true of those nearest the median line, while the more laterally placed ones may be more or less free. Distal portions of cystids protruding normally a considerably distance above surface of zoarium, curving upwards so the apertures are looking frontally or nearly so. Gonozoid a rather voluminous formation, occupying distal or, sometimes, middle part of fertile lobes. Middle portion of gonozoid very much dilated, sending lobes in between transverse rows of autozoids along a considerable distance of fertile stem. Tube issuing from one of the lateral lobes, relatively long, widening slightly towards aperture, rather well set off from dilated portion but, for the greater part of its length, adnate to one of the zoids of a neighbouring transverse series. Aperture transversely oval; rim of aperture a little outflared.

Measurements in μ.

(1) Diameter of young lobe 1 400—1 500.
(2) » » fertile lobe average 2 400.
(3) Length of young lobe, about 3 000.
(4) » » fertile lobe, average 5 000—6 000.
(5) Diameter of large zoarium (Pl. 2, fig. 5) with 13 lobes 1 200.
(6) » » aperture of autozoid 120—170, average 140.
(7) » » aperture of gonozoid 170—190, average 180.

This is a very distinct species and easy to recognize; moreover, it seems to be common both in Antarctic and Subantarctic waters. It seems a bit unnecessary, therefore, that it should have been confounded with the *Tubulipora organisans* of D'ORBIGNY, which is quite another species. The mistake was first made by BUSK (l. c.). His grounds for referring a number of specimens from Kerguelen examined by him to D'ORBIGNY's species were very vague indeed, for he says (p. 198) that, "as M. D'ORBIGNY's figure appears to represent the mode of growth of this form and as the species is extremely abundant on the kelp at Kerguelen", he has little hesitation in applying to it the appellation given by the named author to specimens from the Falkland islands. BUSK was followed as usual by a number of other authors, though some of them, as, for instance, RIDLEY (l. c.), could not avoid observing the lack of coincidence in the descriptions and figures of D'ORBIGNY on the one hand, and those of BUSK, on the other, and, therefore, to express their doubts as to the identity of the two forms. I have had occasion to establish the differences between them (cf. BORG 1926 b, p. 184, note), because of which a new name became necessary for the present species.

My material has been extremely rich, and I have examined some hundreds of colonies. In an earlier paper I have described to some extent the development of the zoarium (1926 b, pp. 283—85, Text-figs 40—44) and the structure of the gonozoids (pp. 363—64, Text-fig. 70) in this species, so I may restrict myself here to a few remarks only.

There is a fine denticulation all round the circumference of the pro-ancestrula described and figured already by BUSK (l. c.), but, as WATERS (1904, p. 00) remarks, this character is common for several species.

The same seems to be true of the conical outgrowths, too, along the latero-basal sides of the lobes as well as of the flattened ones at the basal side of the zoarium. In the present species these are very well developed and rather characteristic. In all probability they represent a kind of kenozoid. They are often more or less branched, especially the lateral ones. In spite of their being normally quite characteristic for the present species they may sometimes be lacking, which happens when the zoarium is fixed to some hard substratum such as a shell, a calcareous Bryozoan, a stone, etc., though they may be indicated, in these cases, in the neighbourhood of the pro-ancestrula, which may or may not maintain its fine denticulation under the said circumstances. It must be assumed, therefore, that the outgrowths discussed have developed for the special purpose of fixing the zoarium to flexible and soft substrates such as, for instance, the fronds of kelp. Probably the same may be suggested for formations of a similar kind occurring in other species of *Tubulipora.*

The zoarium is wholly adnate as a rule. The radiating lobes composing a complete zoarium originate through a repeated bifurcation of the colony when quite young. The number of the lobes varies; in fine specimens they are as many as 12—15 (Pl. 2, fig. 5) though one or two of them may be stunted owing to others developing in too close a proximity to them. The central portions of large zoaria among my material are very often lacking, obviously owing to their having degenerated and been broken down; but I should not like to state that this is characteristic especially for the present species. The lobes, which are broader when fertile (Pl. 3, fig. 2) than when sterile (Pl. 3, fig. 1), become gradually narrower in a rather characteristic way towards the top.

When the substratum is narrow or uneven, for instance, the stem of some erect Cheilostome or a worm's tube, the disposition of the zoids in transverse series is, naturally, less regular than in those growing on kelp etc., but can nevertheless be ascertained at least in some of the lobes. When the zoarium is in a sheltered position, all or most cystids have, as a rule, very well-developed and wholly uninjured free distal tubes.

In young zoaria the transverse series consist usually of but two or three zoids on each side of the median line, the distal portions of which are, in most cases, free. Soon, however, the number of zoids of the series augments to four and now the two innermost zoids are as a rule connate throughout. When the number has increased to six, which is a very common number, three or four of the innermost zoids are connate, while the others are free (cf. Pl. 2, fig. 6; Pl. 3, figs 1, 2). But there are sometimes exceptions to this rule, and it may occur, especially near the ends of the fertile lobes, that all zoids of a row are completely connate. I have seen as many as eight connate zoids constituting a series but cases of that kind are not common.

The arrangement of the zoids in transverse series is on the whole very regular (Pl. 2, fig. 5), with the exception that at the ends of the lobes the series are a little more irregular, sometimes giving the impression of being, to a certain extent, radiating. The series on both sides of the middle line are often level with one another but rather often they are instead alternate more or less distinctly (cf. Pl. 3, fig. 1).

The long protruding portions of the zoids form a regular curve in the frontal direction, so the apertures become directed frontally and, at the same time, slightly distally. Where the distal portions are free, the apertures are perfectly circular, while in those zoids that are connate throughout the apertures naturally are more or less quadrangular (Pl. 2, fig. 6).

When a lobe becomes fertile, it seems always to be one of the innermost zoids of a transverse series that is transformed into a gonozoid. I have seen not a few cases where it is the innermost zoid of a series that develops into a gonozoid, or it may be the innermost but one that undergoes this transformation (cf. Pl. 2, fig. 6). So far as I have found these two possibilities are realized about equally often. On the other hand, I have no positive evidence that any other zoids develop into gonozoids though it may well happen occasionally.

Owing to the arrangement of the cystids, the shape of the dilated portion of the gonozoid becomes on the whole very regular (Pl. 2, fig. 6). The paired lobes protrude in between the transverse rows of zoids to a somewhat varying degree but often to near the lateral border of the fertile stem. The number of the lobes is an object of some variance; in well-developed zoaria there may occur six or seven pairs of lobes but it is rather common that their number is restricted to two or three pairs.

Near the distal end of a stem the lobes of the gonozoid may be more irregularly disposed owing to the corresponding arrangement of the series of cystids at this place. There is often a median lobe finishing the dilated portion of the gonozoid distally.

The tube (Pl. 2, fig. 6) seems always to be adnate to one of the zoids of a neighbouring series for the greater part of its length; but if it is adnate to the proximal side of a series or to the distal one seems to be different and I have seen both cases. The former condition seems to be about as equally common as the latter one. It should be noted that the dilated portion of the gonozoid continues as a rule a considerable distance distally of the tube.

The pseudopores are numerous in the walls of both the autozoids and the gonozoids. They occur even rather high up in the free tubes of the autozoids. In the dilated portion of the gonozoids they are as usual larger and much more thickly scattered than in the rest of the zoarium. In shape the pseudopores are circular.

I suppose that *T. anderssoni* should be said to be a relatively highly differentiated species. This is indicated, among others, by the occurrence of kenozoids of a special kind at the latero-basal edges of the stem, forming a fixing apparatus for the zoarium, and by the type shown by the gonozoid, the tube being non-terminal.

When reporting his *Idmonea serpens* var. *radiata* from the Subantarctic region, CALVET (1904, p. 36) refered to Pl. 60, fig. 2, and Pl. 61, figs 2 and 3, of HINCKS (1880). These figures show zoaria or parts of such that have a certain resemblance with those of *T. anderssoni* and I have, therefore, not much doubt that it was this species that CALVET had before him, as it is utterly improbable that *T. liliacea* (= *I. serpens* CALVET) should occur in Subantarctic waters. Some of the figures given by BUSK (1879) and, particularly, his fig. 20 (Pl. 10) seems to me very decidedly to indicate that *T. anderssoni* was the species that this author termed erroneously *T. organisans*. As for the other figures there is nothing to contradict this supposition.

Habitat: The typical substratum for this species seems to be the kelp where it occurs in extreme abundance. On a few square inches of this alga there might be dozens of zoaria crowded on both sides of the thallus. Kelp is not the only substratum for it, however, as it may sometimes occur on the shells of Gastropods or Crustacea, particularly Decapods and Balanids, on other Bryozoa, on Hydroids, stones, etc.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 3. On algae. — St. 39. On the Decapode *Paralomis granulosa* JACQ., and on *Flustra* sp. — St. 40. On kelp.

— St. 44. — St. 48. On algae and Hydroids. — St. 49. On Balanids and Hydroids. — St. 54. On *Flustra* sp. and on a Terebellid's tube. — St. 55. — St. 56. On algae. — St. 60. On other Bryozoa, wormtubes, etc.

Distribution: (?) Kerguelen Island, Swain's Bay and Observatory Bay, abundant on *Macrocystis* (Busk 1879, p. 198); Elizabeth Island, on "Fucus" (Ridley 1881, p. 59); (?) Orange Bay, "recouvre toutes les frondes de *Macrocystis pyrifera* de ses innombrables petites colonies" (Jullien 1888, p. 82); Cape Adare, 18 fathoms, encrusting *Spirorbis antarctica* (Kirkpatrick 1902, p. 288); Porto Torro, île Navarin, Magellanes, Chili (Waters 1904, p. 93); Magelhaens Strait, Punta Arenas, on algae at shore (Calvet 1904, p. 36); Moreau and Booth-wandel Islands, on algae (Calvet 1909, p. 40).

6. **Tubulipora spatiosa** n. sp.

Pl. 2, fig. 7.

Zoarium wholly adnate, branching dichotomously, very broad through a layer of kenozoids developing along latero-basal edge on both sides of stem fastening it steadily to substratum. Transverse section of stem subtriangular or, where a gonozoid occurs, almost quadrangular, with the layer of kenozoids extending at both sides from the basal plane like a pair of wings. Autozoids arranged in transverse series separated in the middle line and alternating as a rule with one another, each series composed of 2—5 zoids, in fertile branches usually of five; distal erect portion of cystids constituting series directed laterally and, at the same time, frontally; middle (in most cases 3rd) cystid the longest; innermost cystid of series in fertile branches usually more or less detached from rest of series and opening nearer middle line, its free distal portion short and its aperture facing upwards; terminal portion of outermost cystid sometimes detached from the series to which it belongs, in which case its aperture looks laterally. Medial portion of frontal surface of fertile branch (= roof of gonozoid's dilated portion) flat. Gonozoid situated proximally of a bifurcation, not forking with the stem, or in distal portion of branch. Proximal portion of gonozoid passing gradually into dilated portion that is rather extended (as long as 4—6 series) and narrow, narrowing where passing the series but expanding somewhat between them, extending laterally into quite small and short lateral lobes. One of the lobes, in distal half of gonozoid, is transformed into a tube that is rather long but not sharply separated from dilated portion. Tube adnate with the whole of its length to distal side of erect portion of innermost cystid but one of a series, or intercalated between the first two cystids (nearest to the median line) of a series. Aperture of gonozoid transversely oval.

Measurements in μ.

(1) Diameter of stem (kenozoids not encountered) 1 000.
(2) Diameter of stem (kenozoids inclusive) 2 300.
(3) Distance between two subsequent series on one and the same side of the stem 250—340.
(4) Diameter of aperture of autozoids 80—160 × 80—130.
(5) Diameter of aperture of gonozoid 140 × 60.

My material consists of five zoaria or, rather, fragments of zoaria. There are eight gonozoids in all but most of them are incomplete or fragmentary. In two cases only the tube and aperture are visible.

After the primary zoid there follow some single zoids that are bent in their distal half alternately to the right and to the left. It seems to be the rule that the young zoarium at a very early stage is divided into two lobes growing in opposite directions. In one case the fission was brought about when only two zoids had developed, and it seems always to take place at an early stage. The proximal end of the two lobes is constituted by one or two single zoids. Then follow the series. The first series is composed of but two zoids each, which number is soon augmented into three. In the fertile portions of the zoaria the number of zoids of a series is usually five.

In the proximal portion of a zoarium there are, as a rule, no kenozoids or only a few running, like the autozoids, parallel to the longitudinal axis of the stem; one or two sets of such kenozoids forming the border of the stem. At a somewhat later stage, however, the ends of these kenozoids bend abruptly outwards; and new incipient kenozoids parallel to the end portions of those just mentioned develop in large numbers on the distal side of them. In this way a layer of kenozoids originates growing out at both sides and forming almost a right angle to the autozoids composing the stem proper. Gradually as the kenozoids grow longer the layer constituted by them on both sides of the stem becomes broader, until, through the existence of this layer, the zoarium has become more than two times as broad as the stem proper (cf. the Measurements, 1 and 2). At the edge of the kenozoidal layer new kenozoids are intercalated between those existing in the ordinary way. *i. e.* through fission of the septa.

Through their growing in a lateral direction the kenozoids described are different from those known to exist in other species of the present genus, though probably they should be considered homologous with them. I suppose they are homologous, too, with the kenozoids forming the supporting disc characteristic of the genus *Idmidronea* (cf. below, p. 77).

The arrangements of the autocystids is very regular, reminding of that in *Idmidronea*, though in that genus the innermost cystid is always the longest. The distance between the series is comparatively small. It deserves to be noticed that the width of the aperture of the eldest autocystids, both the single ones and those forming the first two or three series are considerably smaller than those in the fertile portions of the zoaria (cf. Measurements, 4), the former passing gradually into the latter.

The strongly flattened aspect of the frontal surface of fertile branches (Pl. 2, fig. 7) seems to be characteristic of the present species. It comes about partly through the dilated portion of the gonozoid being wedged in, so to say, between the series on both sides of the median line and provided with an almost flat roof, and partly because it is not the innermost cystid of a series that is the longest (as in the Idmoneidae) nor the outermost (as in the Terviidae) but the middle one, that is the third one, if there are five cystids constituting a series, as is often the case.

I have seen two gonozoids situated proximally of a bifurcation. Neither of these forks with the stem. One of the gonozoids has finished its growth just before the bifurcation, while in each of the two branches a new gonozoid is formed that is well separated from the older one. The other gonozoid proximally of a bifurcation continues its growth into the right one of the new branches, its tube and aperture being formed here, while in the left branch no gonozoid is found until near its distal end.

The pseudopores are circular in cross-section. In the walls of the autocystids they are rather sparsely scattered and quite small while in the gonocystids they are as usual larger and more numerous.

The present species is easily distinguished by the broad rim of kenozoids on both sides of the adnate stem. The arrangement of the autozoids is otherwise similar to that in *T. anderssoni*, but in this species the number of the zoids composing the series is larger on the whole. In *T. stellata* a kenozoidal layer can be ascertained though it never seems to be so strongly developed by far as in *T. spatiosa*, nor are the kenozoids directed laterally; further the transverse series are much less regular than in the present species, the number of zoids composing them is larger and the gonozoid is of a decidedly different shape. On the whole I think *T. spatiosa* is well characterized from other species of *Tubulipora*.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 4. On an Ascidian.

7. **Tubulipora organisans** D'ORBIGNY 1839.

Pl. 3, figs 3, 4; Pl. 4, fig. 1.

Syn: *Tubulipora organisans* D'ORBIGNY 1839, p. 19, Pl. 9, figs 1—3; nec *Tubulipora organisans* BUSK 1879, p. 198; RIDLEY 1881, p. 58; KIRKPATRICK 1902, p. 288; WATERS 1904, p. 92; ?CALVET 1909, p. 40; ??*Tubulipora organisans* JULLIEN 1888, p. 82; ?*Tubulipora fimbria* BUSK (nec *Fabricius*) 1886, pp. 23 f., Pl. 5, fig. 2.

Zoarium adherent, irregular in shape, in earlier stages usually flabelliform, sometimes broadening so as to assume finally an almost circular shape, consisting of one, two or more lobes. Zoids long and rather narrow, directed forwards and, at the same time, slightly upwards or outwards; sometimes single, but more often clustered together into small rows or fascicles consisting of two, three or, rather frequently, of more zoids, three being in many colonies a common number. Apertures of autozoids circular. Gonozoids wedged in between two or more clusters of zoids, about conical in shape, though often with some small lobes extending in between the neighbouring rows or fascicles of autozoids; tube of gonozoid situated just proximally of an autozoid's distal portion, short, straight, strongly compressed from proximal and distal sides, aperture of corresponding shape, looking upwards, its longer (= transverse) diameter as large as or slightly larger than that of an autozoid, its shorter (= longitudinal) diameter much smaller.

Measurements in μ.

(1) Size of large fertile zoarium 1 300 × 1 100.
(2) Diameter of subcircular, fertile zoarium 7 200.
(3) Diameter of semicircular colony (with 3 gonozoids) 6 100.
(4) Diameter of aperture of autozoids 146—180, average 160.
(5) Diameter of aperture of gonozoid 160—220 × 82—95, average 170 × 87.

I have seen a rather large number of zoaria of this species in different stages of development. Most of them were on Hydroids, on some erect Cheilostomatous Bryozoa or on other narrow, more or less cylindrical stems, along which or around which the zoarium climbs; but some were on fronds of kelp, where they occur together with *Tubulipora bocki*, *stellata*, and *anderssoni*.

The shape of the zoarium varies according to the substratum. Where this is a small cylindrical stem, the zoarium is not able to grow out into a broad colony but remains narrow, with the zoids near to one another, the circumference of the zoarium becoming often very irregular. It may then consist of one lobe only or sometimes of two lobes growing in opposite directions. The lobe or lobes may run parallel to the stem (the substratum), but in other cases they surround it more or less completely, the zoarium thus acquiring the shape of a hollow cylinder. On a flat surface such as a kelp frond, on the other hand, the zoarium widens so as to assume a semicircular shape, being divided though very incompletely into two or more lobes. Thus in the zoarium reproduced in Pl. 3, fig. 3, four lobes are indicated, three of which may be designated as main lobes while the fourth (lowest to the left) is smaller and has only just begun to grow out. In two of the three main lobes there is a gonozoid while in the third (right) one there are two, one of which is as yet incomplete. In one or two cases I have seen old zoaria that form almost circular patches, the lateral lobes meeting or almost so proximally of the pro-ancestrula. Zoaria of this kind are thus similar in shape to those of *Tubulipora bocki* but differ in the arrangement of the zoids and are further recognized without difficulty through the shape and position of the gonozoid's distal portion.

The zoids are arranged in a rather characteristic way, though there is a certain variation as to this. Single zoids occur, especially in the more central part of a colony, but in most zoaria they are not common. As a rule one receives immediately, when inspecting a zoarium, the impression that the zoids or, at any rate, most of them are grouped together into series diverging in all directions from centre — the zoarium reproduced in Pl. 3, fig. 3, is a good example of this — or that they form numerous small fascicles, some stretching in a distal direction while others bend to the right or to the left. The former arrangement is most obvious in zoaria growing on a flat surface and, therefore, broad, while the latter one is found, in the first place, in zoaria climbing on narrow stems. As is natural there are numerous forms transitory between these two extremes.

The fig. 1 of D'ORBIGNY (1839, Pl. 9) shows that he had before him some zoaria growing upon the narrow stem of an Alga and, consequently, belonging to the latter of the two types characterized above. In his fig. 2, of the same Plate, the arrangement of the zoids in small clusters is well shown though it is perhaps a little exaggerated. Most zoids are in fascicles of three but there are some single zoids as well and others that stand two, four or six together.

The number of zoids composing the fascicles is more varying than indicated by D'ORBIGNY but otherwise his figures are on the whole correct. Two zoids adnate to one another are frequently found and three are very common in most zoaria, while four, five and even six are not unusual. A higher number may sometimes be found, and there are fascicles, mostly in the distal portions of some zoaria, that are composed of up to 8 or 10 zoids, though this is not a common condition. Many of the fascicles when uninjured may be split up in their distal portions, the terminal ends of the cystids, one by one or in small groups, diverging more or less from one another.

The arrangement of the zoids characteristic of the present species becomes still more evident through the shape of the cystids themselves, as these are long and slender and, in most cases, unusually straight (cf. Pl. 3, fig. 3). Sometimes, and especially where they are strongly curved to one side, the cystids show wrinkles arranged transversely. They form no constant character, however, though they may be rather strongly pronounced in some zoaria, while in others they may be lacking altogether.

The type of gonozoid represented by *T. organisans* is rather simple (Pl. 3, fig. 4; Pl. 4, fig. 1). The proximal portion, which is similar to that of an autozoid, widens gradually and passes on slowly to the middle one. This is situated between two rather strong diverging fascicles and is covered, as a rule, by one or sometimes by two other fascicles but, on account of the almost horizontal position of the zoids, it does not surround any of these. When seen from above, this part of the gonozoid is about triangular in shape, there being but few and small lobes. The lobes existing seem to be restricted to the distal rim of the widened portion of the gonozoid, from where they extend a short distance in between the zoids or fascicles distally of the gonozoid, surrounding about half of their circumference.

I have seen the tube and aperture of about a dozen gonozoids. The tube proceeds from about the middle line of the triangular widened portion of the gonozoid, quite near its distal rim, and seems to be situated invariably just proximally of an autozoid which is the innermost member of a fascicle (Pl. 3, fig. 4; P. 4, fig. 1). It is adnate to this with its base but is otherwise free from it. In the majority of gonozoids the tube, though uninjured so far as I was able to judge, is quite short but in one or two cases it is a little longer. The almost slit-like shape of the cavity of the tube, as well as the transversely oval one of the aperture, is common to all gonozoids of the present species.

The pseudopores of the autozoids are small but rather numerous. I can confirm for the zoaria examined by me the statement made by Busk (l. c.) for what he calls *T. fimbria*, viz. "the tubular portions of the zooecia being punctate up to the border of the orifice", though I have not found the pores in this region so numerous as indicated by that author. The pseudopores in the wall of the proximal part of the gonozoid are similar to those of the autozoids. They slowly augment in number and become gradually a little larger when passing into the middle, widened portion. In this the pores may sometimes be arranged in somewhat obscure transverse rows but often no such arrangement can be ascertained and the pseudopores are scattered irregularly. In shape all pseudopores are circular.

From my inspection of the d'Orbigny Collection in Paris I am fairly sure that the species here described is the real *T. organisans* of that author. Moreover, both the description and the figures in d'Orbigny's work (l. c.) conform to that opinion while, on the other hand, it is perfectly clear that they do not fit in with the species to which that name has been attributed by Busk (l. c.) and others. *T. organisans* is obviously a common littoral species in Subantarctic waters, especially those around the Falkland Islands. This is the region, too, from which the so-called *Tubulipora fimbria* of Busk (1886, p. 23) was brought home. As this is clearly not identical with the northern *T. fimbria* of Lamarck and as the shape and arrangement both of the autozoids and the gonozoids seem to come rather near those of the present species I think it probable that the two may be identical.

Habitat: On stalks of Hydroids, on small branches of Algae, etc.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 5. On Hydroids. — St. 13. On kelp. — St. 40. On a Hydroid, and on diverse algae. — St. 48. On Hydroids and algae. — St. 51. On an alga (together with *Diastopora ridleyi*). — St. 52. On Hydroids. — St. 54. On *Flustra* sp. and on algae. — St. 55. On Hydroids and algae. — St. 60. On Hydroids and on some Bryozoa (together with *Stomatopora eburnea*). — St. 89. On algae.

— St. 94. On Hydroids, worm-tubes, and Bryozoa. — St. 95. — Ushuaia 13. 3. 1902. On kelp. — Port Louis, Green patch 30. 7. 1902. On roots of kelp.

Distribution: Falkland Islands, on "Fucus" (D'ORBIGNY 1939, p. 19); ? Lat. 51° 40′ S, Long. 57° 50′ W (NE of Falkland Islands), 12 fathoms, sand and gravel (BUSK 1886, p. 23, under the name of *T. fimbria*).

8. **Tubulipora fasciculifera** HINCKS var. **calveti** n. var.

Syn: ?*Tubulipora fasciculifera* HINCKS 1884, p. 206; Pl. 9, figs 6, 6 a; ?*Tubulipora fasciculifera* Calvet 1904, p. 35, 1909, p. 40; *Tubulipora fasciculifera* BORG 1926 b, pp. 286 f., 364 f., Text-fig. 71.

Zoarium wholly adnate, in early stages flabellate, then broadening swiftly so as to assume finally, in many cases, a subcircular or even circular shape. Zoids at first single, bending alternately to the right and to the left, then connate with one another either into fascicles or, in peripheral part of zoarium, into complex radiating rows. Fascicles consisting of a varying number of individuals, from 2—4 to more than 30, protruding considerably over surface of zoarium. In some zoaria the zoids are almost exclusively in fascicles, in others again for the most part in radiating series. Gonozoids situated in distal half of zoaria, wedged in between the complex radial rows of autozoids. Middle portion of gonozoids much inflated and forming, as a rule, 2—5 lobes, each occupying the interspace between two series of autozoids. Frequently several gonozoids existing side by side in distal parts of large zoaria. Tube of gonozoid situated just proximally of one of the series or fascicles of autozoids near median line of gonozoid. In shape it is rather short, straight, subcylindrical at its base but widening upwards. Aperture outflared into a distinct lip surrounding the aperture proper, which is transversely oval or, sometimes, subcircular, facing upwards.

Measurements in μ.

(1) Diameter of normal fertile zoarium 7 000—8 000.
(2) » » largest zoarium observed 11 700.
(3) Diameter of apertures of autozoids 130—160, average 143.
(4) » » » » gonozoids 210—230 × 130—200.

My material of this species has been rich, consisting of a rather large number of zoaria with more than a dozen gonozoids.

The pro-ancestrula gives rise to a primary zoid bending either to the right or to the left but with an upright and free distal portion. There follow a number of single zoids that may vary in the different zoaria but which seem always to be restricted to the proximal part of the zoarium. In many zoaria these zoids are seemingly lacking and the primary zoid cannot be ascertained either; which depends upon the fact that the lateral lobes of the broadening zoarium have met, in these cases, distally of the primary zoid, over the pro-ancestrula, and have coalesced and gradually grown over and concealed the proximal part of the zoarium or most of it anyhow, thus forming a zoarium circular in shape or almost so. Other zoaria are irregular in shape, but they are always broad with lobes diverging on both sides of the pro-ancestrula.

The zone with single zoids passes into another, where the zoids are connate two or three together. These small fascicles are substituted gradually by larger ones which may form the rest of the frontal surface of the zoarium; or they may give room to an arrangement of the zoids in complex radial series. These series, then, occupy the distal half or, sometimes, even the larger portion of the zoarium. The number of zoids constituting such a series becomes larger from the centre peripherally, the series starting with one zoid, but, proceeding in the distal direction, gradually comes to comprise two, three or at last even four zoids abreast. The shape of such a series is thus almost that of a wedge the edge of which faces the centre of the colony. The number of zoids of a fascicle does not increase ad infinitum, however, for new zoids are intercalated at the budding rim here and there between those previously existing (cf. BORG 1926 b, p. 287) and series consisting of more than four zoids abreast are not often seen. Complex series may often consist of more than 30 zoids.

There are several zoaria with numerous fascicles but without any radial series; and others, again, where the fascicles are few but the complex radial series are very well pronounced, occupying most of the zoarium's frontal surface. One is naturally inclined to think, when first meeting with these conditions, that the two kinds of zoaria represent two different species. This seems not to be the case, however, for there are numerous transitory stages; and such stages can, moreover, be observed sometimes in one and the same zoarium. So far as I am able to judge, the gonozoids are quite the same in both kinds of zoaria, but, as a matter of fact, most gonozoids are met with in zoaria where the central part is occupied by fascicles and the distal one by radial series; the gonozoids are found, then, in the distal zone.

There are other variations as to the arrangement of the zoids as well. In some zoaria there are numerous very long, diverging fascicles, in others complex series making the zoarium look like that of a small *Domopora*, while in others again the arrangement is more irregular, both single zoids, fascicles and complex series occurring.

In a former paper of mine (1926 b, p. 287) I have said that the topmost part of the cystids, with the aperture, is free, while the rest is adnate to the other members of the fascicle. This is correct but it is seldom seen, the distal portions of the cystids being usually adnate up to the very rim of the aperture, which is in these cases polygonal while, when free, it is circular. The difference is due to the fact that the top portions of the cystids are frequently more or less injured and sometimes rather severely so.

It ought to be noted that both the fascicles and the radial series protrude rather a considerable distance above the surface of the zoarium. The one exception to this is where a gonozoid is developed, its middle portion, situated between some of the fascicles or series, being inflated to such a degree that it reaches more than half the way up the distal portions of the cystids or even nearly up to the rim of the apertures.

The gonozoids of the present species have been described and figured earlier by me (1926 b, pp. 364 ff.; Text-fig. 71). I should like to add that, where the gonozoid's middle, inflated portion is situated between a number of protruding fascicles some of these are usually wholly surrounded by lobes of the gonozoid, that have coalesced distally of the fascicles. If there are instead radial series of zoids, these are as a rule only partly surrounded by the inflated portion of the gonozoid, though it may sometimes occur that one or two of the smaller series pierce the gonozoid. As I have mentioned before, the gonozoids are placed side by side, in the peripheral zone of the fertile zoaria, but though lobes of different gonozoids are, thus, often adnate to one another, there is no difficulty in distinguishing the limits between them. I do not deny the possibility that the lobes of two adjacent gonozoids may coalesce with one another but I have not seen any such case. It is hard to understand, moreover, even if such a process of amalgamation of two or more gonozoids may occur exceptionally, what advantage this would mean, as the membraneous sacs (enclosing the embryos) of different gonozoids cannot possibly be assumed to amalgamate.

The tube of the gonozoid is always near to the proximal end of a radial series or a fascicle of zoids which is a sign that the gonozoid is to be regarded as the proximal member of this series or fascicle. The base of the tube is adnate to the innermost autozoid of the group while the rest of it is free as a rule. I have met with one or two cases where the tube was free altogether but, on the other hand, there are some gonozoids the tubes of which are adnate to the neighbouring autozoid with the whole of their basal portion.

The aperture of the gonozoid when wholly uninjured it well outflared, the lip surrounding the end of the funnel being broad and distinct. As the lip passes gradually into the wall of the tube proper, there being no limit discernible between them, the measurements here given (4) are taken from one edge of the lip to the other. The shape of the aperture of the gonozoid is a little varying but in most cases it is transversely oval, the lip being somewhat compressed in the proximal and distal directions.

The pseudopores are circular. They are very numerous and relatively larger than in the species of *Tubulipora* treated above. In the walls of the autocystids they occur, in uninjured cystids, until near the rim of the apertures, though they become more sparse when approaching the rim. Sometimes, in the distal portions of the autozoids, they may be arranged here and there in transverse series, while otherwise they are usually in quincunx or irregularly scattered. In the wall of the swollen portion of the gonozoid they are extremely numerous and very thickly scattered. The transition from the proximal to the middle, inflated portion of the gonozoid is, so far as the pseudopores are concerned, a gradual one.

There are pseudopores of a different shape in the basal wall of the zoarium, which I have described at an earlier occasion (1926 b, p. 200).

Calvet (1904, p. 35), when examining the Bryozoa of the Hamburg Magellan Expedition, identified some specimens from South Patagonia and the Straits of Magellan with the *T. fasciculifera* described by Hincks (l. c.) from the Queen Charlotte Islands. The identification was repeated by the same author some years later (1909) when meeting the same species among the Collections of the French Antarctic Expedition 1903—1905 under the command of J. Charcot; but on neither of these occasions a description or any figure is given, so the identification made must remain somewhat uncertain. In 1926 I described a species from Subantarctic waters brought home by the Swedish Antarctic Expedition 1901—03 and identical, in all probability, with the *T. fasciculifera* of Calvet. Following the example of Calvet I considered this species to be the same as the one originally catalogued under that name by Hincks (l. c.). A repeated study of the Subantarctic species before me and a closer comparison with the diagnosis given by Hincks have made me doubt, to a certain extent, the correctness of the identification made. From what Hincks says it will seem that the zoarium in his species is thin and flabellate, and in one of the figures given clusters of autozoids occur distally of the series. I am no longer sure, therefore, of the correctness of the identification made, though, so far as I can judge, the Subantarctic specimens must be considered as representing a form closely related to the species of HINCKS. Under such circumstances, until it will be possible through direct comparison of the specimens to settle the question, I think it best to refer the Subantarctic specimens hitherto considered identical with *T. fasciculifera* to a separate variety of that species, which I propose to name var. *calveti* n. var.

CALVET (1904, p. 35) mentions the resemblance between the present species (including the variety), on one hand, and the Cretaceous fossil *Multifascigera campicheana* D'ORBIGNY, on the other, which was first pointed out by HINCKS; but he says that "es ist jedoch schwer, sich für eine derartige Synonymie zu entscheiden". This seems to indicate that the meaning of HINCKS has been misunderstood by CALVET. HINCKS only says that there is a curious resemblance between *Multifascigera campicheana* D'ORBIGNY and *T. fasciculifera* of his "so far as the character and arrangement of the zooecial series are concerned" but does not seem to think that they are in any way identical nor even related. In my opinion there can be no question of such an identification, the similarity as to the mode of arrangement of the zoids in the two forms being in all probability merely a superficial one.

The *Tubulipora campicheana* of WATERS (1887, p. 343, Pl. 18, fig. 15), a Tertiary fossil from New Zealand, has certainly nothing to do either with *T. fasciculifera* HINCKS or with *Multifascigera campicheana* D'ORBIGNY. Another species, *Tubulipora biduplicata*, described by WATERS in the same paper, is considered by its author as being nearly related to the former species and "it is probable that *T. fasciculifera* HINCKS is a variety of this species" (WATERS, l. c.). There is so far as I can see nothing that speaks in favour of this supposition. From the figures given (WATERS, op. cit. Pl. 18, figs 12 and 14) it would seem to me more likely that what is called by WATERS *T. biduplicata* may represent some large colonies of *T. stellata* BUSK.

In the zoaria of *T. fasciculifera* var. *calveti* from Subantarctic waters there is a marked tendency of the zoids to arrange themselves, especially in the distal portions of the zoaria, into strongly protruding, complex radiating series. In this way the zoaria, which, moreover, often are about circular in shape, become distinctly similar to those existing in *Domopora*; and the gonozoids are not very unlike those occurring in that genus either. The similarity is evidently not a superficial one but is caused through a coincidence in structure. The mode of development of the zoarium thus points in the direction of a *Domopora*-like stage finally resulting. There seems not to be any serious objection against the assumption that *Domopora* may have developed from ancestors similar to *T. fasciculifera.*

One could ask, then, ought not the present species to be referred to *Domopora* instead of *Tubulipora* ? This I think is not the case. The development of the zoarium in *T. fasciculifera* shows that it is in the distal parts only that it assumes a *Domopora*-like appearance; it is always closely adnate to the substratum while the series of functional zoids in *Domopora* become elevated, the zoarium assuming an erect shape; and the distal portions of the more centrally placed zoids are not broken down nor are their cavities closed by means of a calcareous diaphragm, no "central area" thus coming into existence as in *Domopora.* The conclusion is that *T. fasciculifera* has not yet attained the stage represented by *Domopora* and should, therefore, not be referred to that genus.

The arrangement of the autozoids into fascicles protruding distinctly above the surface of the zoarium indicates, on the other side, a possible relationship with *Frondipora* which genus may well be thought to have developed from ancestors characterized by such an arrangement of the zoids; and there is nothing to prevent the type of gonozoid occurring in *Frondipora* having developed from the one existing in the present species.

Habitat: On stones, shells of Lamellibranchs and, often, of Balanids, Decapods, etc.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 39. Numerous colonies on the Decapod *Paralomis granulosa* JACQ. together with numerous colonies of *Tubulipora stellata* BUSK, some of *Tub. anderssoni* BORG, one or two of a species of *Diastopora*, and several incrusting Cheilostomes. Numerous colonies from the same Station, on old Balanids' shells, together with *Disporella* sp., *Tubulipora stellata* and several incrusting Cheilostomes. — St. 40. Some colonies on an old shell of a Lamellibranch nearly wholly overgrown by several species of incrusting Cheilostomes. — St. 48. Several colonies on the carapace of a Hyas-like Decapod. — St. 49. Some colonies on an old Balanid's shell. — St. 54.

Distribution: Queen Charlotte Island (the typical species) HINCKS, l. c.; — Smyth Channel, Puerto Beno and Long Island Bank; Magellan Strait, Punta Arenas; S:t Jago Bay, near the Triton Bank, Dungeness Point; S. Tierra del Fuego, Ushuaia, on algae, Balanids and shells of Lamellibranchs, 8—10 fathoms, or on the shore (CALVET 1904, p. 35); off Booth-Wandel Island, 30 m, on an alga (CALVET 1909, p. 40).

9. **Tubulipora tubigera** (BUSK) 1886.

Pl. 3, fig. 5.

Syn: *Supercytis tubigera* BUSK 1886, p. 29, Pl. 5, figs 4, 4 a; *Supercytis tubigera* CALVET 1904, p. 35; 1909, p. 41; *Tubulipora tubigera* BORG 1926 b, pp. 184, 287 f., 366, Textfig. 72 (p. 365).

Zoarium irregular in shape, usually broadening at an early stage so as to form a semicircular, and later on a subcircular or circular patch. Zoids long, slender, arranged usually in fascicles or sometimes in series radiating from centre, directed peripherally and, at the same time, obliquely upwards or, sometimes, nearly horizontally. Single zoids rare; fascicles composed of a varying number of zoids, usually 4—12. Fascicles may divide dichotomously one or more times. Distal portions of autozoids detached from fascicle and protruding free. Apertures of autozoids circular. Gonozoid wedged in as a rule between two fascicles, its proximal portion concealed, the middle portion about conical, widening distally. Tube close to a fascicle or series, rather long, straight, distinctly set off from dilated portion, strongly compressed from proximal and distal sides; end of tube outflared into two broad lips, a proximal and a distal one, surrounding the narrow, transversely oval aperture.

Measurements in μ.

(1) Diameter of largest zoarium examined (with several gonozoids) 13 200.
(2) » » small fertile zoaria from 2 400 upwards.
(3) » » aperture of autozoid 130—150.
(4) » » » » gonozoid (measured from edge to edge of lip) 170—190 × 80—90.

The material that I have had an opportunity of examining consists of some dozen of zoaria, many of which are provided with gonozoids.

The pro-ancestrula is in no way remarkable. The primary zoid developing from it is rather short and bent slightly either to the right or to the left. The formation of new incipient zoids within the common bud goes on so swiftly that the distal portion of the primary zoid becomes distinctly elevated; and this is even more the case with the zoids following next. These zoids which are free from one another may be 5—7 in number but often fewer.

The zoids then following are connate in fascicles or, sometimes, in radiating series, and it is only occasionally that an autozoid is free in its distal half. When such a zoid occurs, it is usually situated at the proximal end of a fascicle or series (cf. BUSK, op. cit., Pl. 5, fig. 4 a).

The fascicles comprising as a rule most of the zoids of a zoarium are eminently characteristic for the present species, being very long and spreading from centre in all directions (Pl. 3, fig. 3). The number of the main or primary fascicles may vary from 6 to 12. In most cases they seem to be 5—8 but in the largest zoarium I have examined, which is 13,2 mm in diameter (Measurements, 1), they are 12 or perhaps even more. In old zoaria it is always difficult to state the number of the primary fascicles exactly, because these fascicles soon bifurcate which process may be repeated several times, secondary, tertiary, etc., fascicles thus coming into existence. These are often close to one another, but I have not observed any case where two fascicles anastomose with one another.

There is no sharp limit between a fascicle or cluster of autozoids, on one hand, and a ray or series, on the other. Sometimes the zoids are clustered together so as to form a fascicle consisting of about as many zoids in the proximal distal direction as in the transverse one. In other cases the radial axis of the fascicle is longer than the transverse one and where this condition is more strongly pronounced, a series may be said to occur. The series are in most cases complex, consisting of two or more adnate rows of autozoids; but simple, uniserial rays may occur here and there. Stages transitional between those here described are numerous.

In small zoaria, where development has not proceeded so far — which, however, does not prevent them from being sometimes fertile — the arrangement of the autozoids in fascicles or series is not so strongly pronounced as is usually the case in larger ones. Free, single zoids are often seen in such zoaria and most if not all of the fascicles are composed of relatively few zoids that are often detached from one another distally. There is much variation as to these characters, however, and I have seen rather many young zoaria where the fascicles are very distinct and where the zoids composing them are adnate up to the rim of the apertures.

During the development of new zoids grouping themselves into fascicles or series the zoarium grows continually broader. It swiftly assumes an almost semicircular shape with two diverging lateral lobes, growing in opposite directions, and it may occur that the zoarium remains in that stage; but often new lobes may develop, giving the colony a very irregular outline. This, however, is not common; instead, in most cases the lateral lobes grow nearer to one another and meet finally over the pro-ancestrula, thus giving rise to a subcircular or circular zoarium. The edge of such a zoarium is constituted by a budding region comprising a rather large number of "stories" of developing autozoids (cf. BORG 1926 b, pp. 275 ff.) on the top of which a number of fascicles protrude in different directions. This latter condition may give to the zoarium, especially when it has attained a more considerable size, the appearance of being composed of a capitulum and a stalk or peduncle (cf. BUSK, l. c.). In such zoaria not only the pro-ancestrula and the primary zoid have been completely overgrown and concealed; but the same fate may have been met with by a varying number of the following single zoids as well. This is the reason why these zoids are usually fewer in old and well advanced zoaria than in young ones. It is easy to understand that through the mode of zoarial development described a "central area" (BUSK, l. c.) may be formed in the middle of the zoarium, on top of the overgrown eldest portion of the colony.

So far as I can see, it is a zoarium of this latter kind that BUSK has figured (op. cit., Pl. 5, fig. 4 a), it being the only specimen upon which the present species was originally founded. BUSK's specimen was a large one, as can be taken from the scale given; and though I have not been able to examine it, the coincidence of some of my largest zoaria with it is so close that I have little doubt in referring them to the same species.

With the exception of the oldest ones the cystids are very long and slender (Pl. 3, fig. 5). When they are wholly adnate to one another the apertures are polygonal but circular when the ends of the cystids are free. The pseudopores piercing the walls of the cystids are small, circular and not very numerous. They seem to be always scattered irregularly. Nearer the aperture, in uninjured cystids, they become gradually fewer, and in the free distal portions pseudopores are often lacking altogether.

The gonozoids have been described and figured by BUSK (op. cit., p. 29; Pl. 5, fig. 4 a) and, more in detail, in an earlier memoir of mine (1926 b, p. 366, Text-fig. 72), to which description I have little to add. The zoarium seems to become fertile, as a rule, at a rather early stage, for I have met with many small semicircular zoaria, 2—3 mm in diameter, in which one or sometimes two fully developed gonozoids can be observed (Measurements, 2). These are situated in the peripheral portion of the young zoarium, most often in one or both of the lateral lobes, and are wedged in, as usual, between two fascicles or series (Pl. 3, fig. 5). In one case, however, I have found a gonozoid in the central part of a young, semicircular zoarium which, then, must have become fertile at an early stage indeed.

In large zoaria no trace can be observed of the gonozoids just mentioned. There is every reason to believe, therefore, that they have degenerated and disappeared. On the other hand, in such zoaria gonozoids are found in rather large numbers, usually several in each zoarium. For instance, in a large zoarium measuring between 12 and 13 mm in diameter I observed 8 fully developed gonozoids, and, on account of the very irregular shape of this zoarium, it seems probable that some were missed. These gonozoids are all in the distal half of the zoarium. Most of them are wedged in between two primary fascicles or series or between two secondary or even tertiary ones. Here and there, however, a gonozoid may occur that is not located in this way but is adnate laterally to a series of autozoids. It is interesting to note that even in such a case the swollen portion of the gonozoid maintains the simple, unlobed shape that is otherwise characteristic for the present species (cf. BORG, l. c.).

The pseudopores in the wall of the gonozoid's middle portion are as usual larger and more numerous than in the walls of the autozoids but the difference is by no means prominent and the pseudopores are not by far so thickly placed as is the case in *T. fasciculifera*.

When first describing the present species, BUSK (l. c.) referred it to the genus *Super-*

cytis D'ORBIGNY (1854, p. 1060). WATERS (1914, p. 837), on the other hand, states that "it is not related to *Supercytis* nor is it correctly described, as the series are not uniserial but biserial". As a matter of fact, the series may be from uniserial to multiserial, as described above. WATERS thinks that the species "looks more like a *Tubulipora*" which is correct; and I see no reason why it should not be referred to that genus, BUSK, as mentioned, having to a certain extent misunderstood the structure of its zoarium. I should like to add that the gonozoid characteristic for *Supercytis* and well visible in one of D'ORBIGNY's figures (op. cit., Pl. 798, fig. 8) is in the central area of which it occupies a large part; it thus belongs to a type different from that occurring in *T. tubigera.*

On the other hand it may well be discussed if the species here treated ought to be placed in *Tubulipora* (s. str.) or if it would better be referred to a separate subgenus or even genus within the Tubuliporidae. The mode of arrangement of the autozoids which is very characteristic and the relatively simple type of gonozoid probably point in the latter direction, though future researches are required to settle the question. In the present state of matters I think it best to leave the species discussed within *Tubulipora,* provisionally at least.

Habitat: On Algae, Hydroids, Cheilostomatous Bryozoa, Ascidians, worm-tubes, stones, etc.

Occurrence: Swedish Antarctic Expedition 1901—03. On kelp on the shore of Grytviken [Pot Bay]. 23. 5. 1902. — St. 4. On *Cellaria* sp. — St. 5. On algae. — St. 17. On Hydroids, Ascidians, worm-tubes, and Algae. — St. 20. On Hydroids and on small stones. — St. 22. On *Flustra* sp. and on Hydroids. — St. 25. On *Cellaria* sp. — St. 26. On algae. — St. 27. On algae. — St. 28. On the stem of a kelp. — St. 30. On algae, Hydroids, and worm-tubes. — St. 34. On Hydroids, Ascidians, *Flustra* sp., on the spines of an Echinid, and on stones. — St. 48. On Hydroids and algae. — St. 94. Numerous colonies on *Cellaria* sp. and *Flustra* sp. and on a small stone. — St. 95. On *Cellaria* sp.

Distribution: off Heard Islands [SE of Kerguelen] (BUSK 1886, p. 29); Straits of Magellan, Punta Arenas, 10 fathoms, on an alga (CALVET 1904, p. 35). Isls Wynche and Booth-Wandel, off Graham Land (CALVET 1909, p. 41).

Fam. **Diastoporidae** BUSK.

Syn: *Diastoporidae* BUSK 1859, pp. 91, 113; SMITT 1867, pp. 395, 415; BUSK 1875, p. 27; HARMER 1915, p. 113; auctt.; *Tubuliporidae*, part., HINCKS 1880, p. 424.

Zoarium adnate or partially erect, forming a rather thin crust or foliaceous expansion. Zoids depressed and immersed, as it were, in the crust, with or without free, protruding, tubular portions. Gonozoids expanded to a very varying degree, sometimes oval or polygonal but in other species strongly dilated transversely in their middle portion. Nanozoids may occur.

The family Diastoporidae is commonly used for adnate or foliaceous forms in which the zoids to a large extent have the appearance of being immersed forming a continuous sheet, and in which the distal, tubular part of the zoids in the proximal (or central) portion of the zoarium are as a rule relatively little developed (cf. HARMER, l. c.). The shape of the zoarium may be varying, it being always broad, sometimes irregular, but often circular or oval, the lateral lobes meeting and coalescing proximally of the pro-ancestrula. The zoids are usually arranged in quincunx or, sometimes, in series, but never form fascicles of any kind. The zoids of the distal or peripheral portion of a zoarium may protrude, having long, free, distal portions, while the older ones, and sometimes all the individuals of a zoarium, are much shorter, the protruding portions being almost wholly lacking.

Zoids without a functional polypide are occluded by a calcareous covering of characteristic appearance, often pierced in the middle by a calcareous tubule.

Nanozoids may occur in some genera while in others they are lacking. The middle portion of the gonozoid is dilated to a very varying degree, being sometimes but little expanded laterally, while in other species it is very considerably widened in a transverse direction. It will perhaps be possible to discern two or more different genera owing to the shape of the gonozoid though I am not sure of that as there are species representing transitory stages as well.

Genus **Diastopora** LAMOUROUX.

Syn: *Diastopora* LAMOUROUX 1821, p. 42; JOHNSTON 1847, p. 276; *Berenicea* GRAY 1848, p. 142; REUSS 1867, p. 4; *Diastopora* SMITT 1867, pp. 395, 416; BUSK 1875, p. 28; HINCKS 1880, p. 457; WATERS 1914, p. 835; auctt.; *Diastopora* + *Berenicea* GREGORY 1896, pp. 76, 116; BASSLER 1935, pp. 55, 92; *Berenicea* HARMER 1915, p. 114; BORG 1926 b, p. 184.

Genotype (by monotypy): *Diastopora foliacea* LAMOUROUX 1821, p. 42; Pl. 73, figs 1—4, a fossil from the Bathonian of France (Caen).

Zoarium forming a thin lamina, usually adnate, sometimes partly rising into foliaceous expansions, in shape irregular, oval or circular. Horizontal portions of autozoids depressed, with or without erect, protruding tubular parts. Nanozoids lacking. Gonozoids with their middle, dilated portion oval, polygonal, or strongly expanded transversely.

In 1821, LAMOUROUX founded two genera, *Diastopora* and *Berenicea*. REUSS (1867, p. 4) and others have been of the opinion that the former was for foliaceous species and the latter for encrusting ones. Some authors, as, for instance, GREGORY (1896) and BASSLER (1935) have, therefore, accepted both genera, while others, among those most investigators of recent Bryozoa, e. g. SMITT (1867), BUSK (1875), and HINCKS (1880, and elsewhere) use *Diastopora*. In 1915, HARMER advanced his reasons for not accepting DIASTOPORA but instead Berenicea. In 1926 I followed him in this.

Studying the species enclosed by LAMOUROUX in the two genera and the figures that he gave of them, I have now arrived, however, at the conclusion previously set forth by NORMAN (1903 p. 172; 1909, p. 299, note), *viz.* that LAMOUROUX' figures of his *B. annulata* show that this species is no Stenolaeme at all but a Cheilostome, in NORMAN's opinion a species of *Chorizopora*. I may add that the other figures of species of *Berenicea* given by LAMOUROUX (Pl. 80, figs 1—4) seem to me to be of Cheilostomatous instead of Stenolaematous forms too. LAMOUROUX' figures are otherwise not really inexact; I may refer to the figures 7 and 8 of Pl. 73, for instance, where there can be no doubt at all as to what is meant. At any rate this much is clear, that it is extremely uncertain, not to say more of it, if LAMOUROUX has really intended any Stenolaematous species at all by his description and figures of some species of "*Berenicea*". On the other hand, there seems to me not to be any doubt as to his description and figures of *Diastopora foliacea* (l. c., p. 42; Pl. 73, figs 1—4) referring to a Stenolaematous species.

For me, this is decisive. Otherwise, *Berenicea* would have been preferable, as it is founded upon some recent species (from the Mediterranean). As both *Diastopora* and *Berenicea* were published in one and the same work, neither of the two has priority before the other. It has no weight, in that connection, that *Diastopora* is on p. 42, *Berenicea* on p. 80. That *Diastopora* was created for foliaceous forms but *Berenicea* for adnate ones is without importance, too, as it is quite evident, that the genus must include both kinds of growth-forms as they are sometimes represented in one and the same zoarium.

1. **Diastopora dichotoma** D'ORBIGNY 1839.

Pl. 3, figs 6—8.

Syn: *Criserpia dichotoma* D'ORBIGNY 1839, p. 19, Pl. 9, figs 9—13; *Proboscina dichotoma* D'ORBIGNY 1853, p. 847; *Tubulipora (Proboscina) dichotoma* BUSK 1875, p. 27; ?*Stomatopora dichotoma* WATERS 1904, p. 87; cf. WATERS 1905, p. 14; ?*Tubulipora dichotoma* MARCUS 1938, pp. 192 ff., Text-figs 3 A and B; nec *Alecto dichotoma* LAMOUROUX 1821, p. 84, Pl. 81, figs 12—14, MILNE EDWARDS 1838, p. 206, Pl. 15, figs 4, 4 a. (This is a uniserial fossil species that ought to be referred to *Stomatopora*, not to *Tubulipora*); nec *Tubulipora dichotoma* var. *serialis* RIDLEY 1881, pp. 59 f., Pl. 6, fig. 10; nec *Proboscina dichotoma* CANU & BASSLER 1929, p. 518, Pl. 76, figs 1, 2.

Zoarium wholly adnate, irregular in shape, creeping along the substratum and frequently branching. Stem at first narrow, sometimes of that shape throughout its whole length, but in most cases gradually broadening, flattened and spreading out in a somewhat fan-like fashion. Zoids arranged quincunxially, depressed, stretching horizontally and marked out by very distinct lines; free distal portions usually quite short, curving upwards; apertures circular or longitudinally oval. Gonozoids wedged in between the neighbouring zoids, sometimes pierced by one or two of them; middle portion strongly dilated, about polygonal, of irregular shape, its longitudinal axis at least equally long but most often longer than the transverse one; tube reduced, extremely short; aperture transversely oval, with the margin a little outflared, situated just proximally of an autozoid's distal portion, looking upwards and, at the same time, a little proximally.

Measurements in μ.

(1) Breadth of 5 zoids abreast 740—760, average 755.
(2) Breadth of 1 zoid 150—160.
(3) Diameter of aperture of autozoid 100—120 × 90—110.
(4) Length of middle dilated portion of gonozoid 680—900.
(5) Breadth of middle dilated portion of gonozoid 630—870.
(6) Length and breadth of middle dilated portion of some gonozoids 900 × 870, 860 × 730, 690 × 630.
(7) Aperture of gonozoid 100—110 × 55—70.

In the initial stages the zoarium is quite narrow, reminding of that of a *Stomatopora* or, rather, of the early stages of such species as, for instance, *Tubulipora dilatans*, *Reptotubigera philippsae* and *elegans*. Thus, in one of the zoaria before me, after the primary zoid there follows one single zoid and then another, whereafter at first two and then three zoids occur abreast. These are succeeded by half a dozen rows with 3—6 zoids abreast. Then the zoarium divides into two lobes, both starting with 3 zoids abreast, which number soon increases to 6—8. The left lobe now divides into two, one starting with four, the other with six zoids abreast and both finishing with 12, while the right lobe widens swiftly, assuming a fan-like shape. This lobe is fertile while the other, smaller one, is not. Other zoaria are similar to this in their mode of growth, though it may often be observed that the narrow, initial portion is shorter, not consisting of so many subsequent rows of zoids as in the zoarium just described. In such cases the zoarium divides as a rule at an earlier stage, the two stems thus brought into existence being at first narrow, consisting mostly of but 2—4 zoids side by side but soon widening each into a fan-shaped lobe with up to 15—20 zoids or even more abreast. Or, as is the case in another zoarium, one of the two narrow stems may bifurcate again before widening, with the result that three fan-shaped lobes are formed, two of which have, in the colony alluded to, come into contact with one another and have begun to anastomose.

In one of my zoaria the shape is another, as the whole colony in this case has remained narrow. After the pro-ancestrula there follows a short primary stem with two or three zoids abreast. Then the zoarium bifurcates, and in the two secondary stems there are 3—6 zoids side by side, these stems thus being a little broader than the primary one. In their turn the two secondary stems bifurcate, and the same process is repeated with some of the tertiary stems thus brought into existence. In the distal lobes, which belong either to tertiary or to quaternary stems, the number of zoids side by side is continually low and is usually but 6—8. Thus there is no fan-like widening of these lobes. One of the distal lobes is fertile but even in this lobe, the central portion of which is occupied by the gonozoid, there are not more than 10 zoids abreast, the gonozoid inclusive.

The fan-shaped lobes, which constitute normally the distal portions of the zoaria never widen so as to assume the circular shape characteristic of the zoarium in most species of the present genus. Instead, in *Diastopora dichotoma* development continues along quite other lines. Either a fan-shaped lobe may divide into two broad secondary lobes or a narrow outgrowth is formed at some place on the distal rim of such a lobe, and from here a new lobe is formed, beginning usually with 3—4 zoids abreast but widening rapidly. Such an outgrowth just about to originate is seen in Pl. 3, fig. 8 (at *ogr*).

The formation of a well-developed zoarium with fan-shaped lobes probably requires more than one period of growth. As a matter of fact most of the lobes in larger zoaria show signs of periodical growth; and indications of processes of degeneration and regeneration having taken place are frequently to be observed. Thus in the zoarium reproduced in Pl. 3, fig. 6, there are in both lobes three lines running across the lobes and denoting, in all probability, that the zoarium has persisted during at least four periods of active growth (summers?), it having been collected when the last one of these periods was yet at its height.

The cystids as already mentioned are almost horizontal in most cases with quite short free terminal portions. Very often the free portions are totally absent, because the zoids have been damaged and regeneration, if any, has been incomplete. On the other hand, where in sheltered positions the zoids may occasionally develop rather long, cylindrical distal portions, upright like so many chimney-pipes; but such a condition is not often seen in this species.

Though the zoids are formed as usual in transverse rows (cf. BORG 1926 b, pp. ff.), which is easy to see, above all in the narrow portions of the zoaria, there is no trace whatever of their distal portions and apertures being connate serially. They are always free from one another and alternate regularly, an arrangement that is most evident in the fan-shaped lobes (cf. Pl. 3, fig. 8).

The portions of the cystids visible from above are very distinctly set off from one another (Pl. 3, fig. 8). This is not due to any furrows or the like between them — such do not exist here or are in any case very little marked — but to the fact that while the frontal walls of the zoids are thickly pierced by pseudopores the interzoidal walls are not. Being rather thick these walls give therefore at first sight the impression of representing distinct dark lines separating the cystids, while the frontal walls owing to the numerous pseudopores have a more whitish appearance. The said walls are highly transparent, so one is able to see deep under the surface, here and there, one or two pore-canals piercing them and thus uniting the cavities of the cystids with each other.

The gonozoids in most zoaria I have seen are found in the distal, fan-shaped lobes; but this does not mean, necessarily, that they are always situated there. It may sometimes happen that gonozoids are developed in lobes of smaller zoaria that are not so strongly widened (cf. MARCUS 1938, p. 193, Text-fig. 3 B), and a few cases of that kind exist in the material before me. When such zoaria have grown older and a period of renewed activity sets in, the previous gonozoids may be assumed to degenerate, while fresh ones originate in the distal portions of the lobes newly formed. Sometimes, moreover, old gonozoids may remain or are probably regenerated.

In shape the gonozoid is variable, but it is characteristic that its lateral parts are not much developed, it being mostly about polygonal or rounded triangular with the top of the triangle represented by its proximal portion. In some cases, which ought perhaps to be regarded as typical, the gonozoid is about cordate in shape (cf. Pl. 3, fig. 8). Like the autozoids the gonozoids are distinctly set off from their neighbours by dark (transparent) lines.

The proximal portion of a gonozoid is not different from those of the autozoids. The middle portion is wedged in between the neighbouring zoids in such a way that its surface is not much above the ensemble of theirs, the peripheral portions of it being about level with them. The transition from the proximal to the middle portion is quite sudden.

It is common that some of the zoids situated on the lateral and distal sides of the widened portion of the gonozoid are partly surrounded by its lobes, and sometimes one or two of them are wholly encircled; which gives the impression that the gonozoid is pierced by them.

The tube of the gonozoid when undamaged is very short and is curved in such a way that its aperture faces upwards and at the same time somewhat proximally. Its situation just proximally of an autozoid's distal portion seems to be perfectly constant. The aperture is surrounded by a thin, elevated rim or border.

The pseudopores piercing the frontal calcareous walls of the autozoids are numerous but rather irregularly scattered. As usual they are but few or are even absent in the free distal portions of the autozoids, especially where these are well developed. In the proximal portions of the gonozoids the pseudopores are quite the same as in the autozoids, but in the middle, widened portion they are much more numerous and very thickly placed. In shape all pseudopores seem to be circular.

I have seen at least some of the material upon which D'ORBIGNY (1839) founded his description, and I am tolerably sure that my specimens belong to the same species. One of D'ORBIGNY's zoaria, reproduced in his Pl. 9, figs 9 and 10, is rather narrow and does not seem to have developed any fan-shaped lobes; another specimen (Pl. 9, figs 7, 8) contrary to MARCUS (1938, p. 192) I think belongs to the same species and represents a lobe of the kind just mentioned. The *Alecto dichotoma* of LAMOUROUX (1821) and MILNE EDWARDS (1838) is quite another species. WATERS has examined D'ORBIGNY's material (1905, p. 14), but I am not able to decide if the specimens referred by WATERS (1904, p. 87) to "*Stomatopora*" *dichotoma* really belong to this species, as there is no figure nor any description; but, as WATERS says this "would seem to be the species subsequently described as *S.* (*Alecto*) *dilatans* JOHNST.", there must be some doubt as to the correctness of the determination, *D. dichotoma* in its final stage being very well separated from *T. dilatans*. The gonozoid described and figured by MARCUS (l. c.) in what he calls *Tubulipora dichotoma* is so similar to those occurring in the zoaria here described that I suppose the specimens are identical. On the other hand, to judge from the photographs by CANU & BASSLER (1929, Pl. 76, figs 1, 2), there seems hardly to be any reason to think that the specimens reproduced there are referable to *D. dichotoma*.

The authors last named state (p. 518) that "specific determination can not be rigorously exact in this genus" (viz. in *Proboscina*, to which genus they refer the species) — which is to a certain extent correct — and continue by saying that "it is necessary — — — to be content with simple approximation", to which I oppose most decidedly.

It may be added that *Diastopora dichotoma* seems to me to be rather closely related to *Diastopora simplex* BUSK (1859, p. 113), that is, to *Diastopora suborbicularis* HINCKS (1880, pp. 464 ff.; Pl. 66, figs 11, 11 a), though the two do not seem to be identical. The shape of the gonozoid is, however, very similar in both.

In his description of the Antarctic Bryozoa collected by the "Belgica" Expedition WATERS mentions (1904, p. 90) a "*Diastopora* sp.", which may possibly be identified with the present species.

Habitat: On stones and shells, together with *Disporella crassa* n. sp., incrusting Cheilostomes, Spirorbis spp., calcareous Algae, Foraminiferans, etc.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 3, numerous colonies in different stages. — St. 59, on fragments of shells (2 colonies). — St. 60, on some Cheilostomes.

Distribution: on stones from deep water "à l'atterage des îles Malouines" and off Cap Horn (D'ORBIGNY 1839, p. 19); —? Exp. Antarct. Belg. Lat 70° 23′ S, Long 82° 47′ W, 480 m, +0,8° C (WATERS 1904, p. 87); — ? St. Helena: Jamesbay, c:a 36 m, off Jamestown, 36—55 m.; Manatee Bay, 75 m (MARCUS 1938, p. 192).

2. **Diastopora ridleyi** n. sp.

Pl. 4, fig. 2; Pl. 5, fig. 1.

Syn: *Diastopora patina* RIDLEY 1881, p. 56.

Zoarium flabelliform when quite young but expanding rapidly, its lateral lobes soon meeting and coalescing on the proximal side of the pro-ancestrula, which thus becomes covered and concealed. When fully developed the zoarium is, however, not circular as a rule but usually more or less oval or, sometimes, of a rounded triangular shape. It is a thin, flattened crust, uniformly depressed. Zoids arranged quincunxially, narrow throughout, proximal portions horizontal, contiguous with one another, terminal portions half erect, free. Pseudopores often in transverse rows giving surface of zoarium an aspcet of being slightly wrinkled transversely. Gonozoids simple, middle portion longitudinally oval, sometimes almost globular, lobes missing or poorly developed; distal portion a short tube, curved so that the aperture, which is transversely oval, looks frontally and, at the same time, somewhat proximally.

Measurements in μ.

(1) Length and breadth of four well-developed and fertile zoaria:
(a) 3 900 × 2 800; (b) 3 000 × 2 500; (c) 2 800 × 2 200; (d) 2 300 × 2 600.
(2) Breadth of horizontal portion of zoids 70—95, average 80.
(3) Diameter of apertures of young autozoids 65—80 × 60—80; of older (circular) ones 55—60.
(4) Length and breadth of (typical) gonozoid 430—440 × 340—430.
(5) Diameter of aperture of gonozoid, average 50 × 35.

My material has consisted of a dozen zoaria in different stages of development. Five of these are fertile; two of them (*b* and *d* above) have each one gonozoid, while two others (*a* and *c*) have two, and the fifth which is an old zoarium has no less than three. The initial stages, in which the zoarium looks like that of some gracile, flattened *Tubulipora*, rapidly pass by, the zoarium soon assuming a semicircular shape. The two lateral lobes are now situated on both sides of the pro-ancestrula and quite near to it. The coalescing of the lobes proximally of the pro-ancestrula and the overgrowing of this formation are two processes that are obviously completed at one and the same time. The young zoarium now is about circular or it may even be a little broader than long (cf Measurements, 1 d). As growth continues and the diameter of the zoarium increases gradually, it is obviously of little importance which was its original longitudinal axis; for when the zoarium assumes the oval shape that is characteristic for it as a rule, its definite axis may be about the same as the original one or it may be transverse or even oblique to it. The oval shape seems to be brought about simply by some part or another of the zoarium growing a little more rapidly than the others, and, since most of my colonies are on a large *Flustra*, which substratum cannot probably be thought to offer any hindrance to the growing out of the zoarium in any direction. I suppose the cause for the zoarium assuming regularly a more or less oval shape is to be sought for in the laws ruling the astogenic processes in this very species. Even in fully developed zoaria there may be a hole or slit left on both sides of the primary zoid, now situated not far from the middle of the zoarium (cf. Pl. 4, fig. 2).

A feature that should not remain unnoticed is that the basal lamina that forms in many species of *Diastopora* a broad rim around the colony, is lacking here (cf. Pl. 4, fig. 2). This is observed even in quite young zoaria, where the pro-ancestrula has not yet been concealed (Pl. 5, fig. 1); — the only exception being, as it seems, the lateral lobes that before having coalesced are provided with a narrow free border.

None of my zoaria except one seems to be very old, which forms perhaps the explanation of the fact that there is no depressed centre nor any closures of the kind characteristic of the cystids of several other species of *Diastopora.*

The cystids do not form clusters or series and I have never seen two of them with their distal portions connate. In worn colonies the free distal portions of the zoids may be for the greater part missing, but in uninjured zoaria they are well developed and rather long. At first each cystid has an almost horizontal position, forming together with the other cystids the frontal surface of the zoarium. Then its distal portion rises rather suddenly, the erect portion constituting at first an angle of about 45° to the horizontal one but bending slightly upwards so the aperture looks upwards and but a little forwards (cf. Pl. 5, fig. 1). What has just been said is true of the central zoids as well as of those occupying a middle position in the zoarium; while the marginal, young ones have the erect, free distal portions but slightly developed. It is worth noticing, too, that while the long erect portions of full-grown zoids are slender and their apertures narrow, the short ones of the young zoids are distinctly wider and the apertures larger (cf. Measurements, 3.). Further, the apertures of the young zoids with quite short erect portions form longitudinally rounded ovals while those of the older ones are perfectly circular. It is clear, thus, that the distal portions of the cystids continue to grow until they have become rather long. One may ask, if the polypides are functional continually, while the growing out of the erect tubes is going on gradually, or if this is accompanied by a process of degeneration and regeneration of the polypides. There is some evidence speaking in favour of the latter supposition, for instance the fact that there is in not a few cases rather a sudden transition from zoids with short free portions and relatively wide apertures to long narrow ones. In some cases at least I have found brown bodies in zoids holding a middle position.

While in the erect portions of the cystids the pseudopores are very few or even totally absent, they are numerous in the adnate portions. Sometimes they are scattered irregularly here but most often they are arranged in transverse rows. Between them are transverse thickenings of the calcareous layer and in this way the slightly wrinkled surface of the zoarium comes about that is characteristic of the present species (cf. Pl. 5, fig. 1).

The gonozoids are situated at or near the margin of some of the larger colonies, one or two in each of them. They are of an uncommonly simple type when compared with those of most other species of *Diastopora* (cf. Pl. 4, fig. 2, *gz*). The proximal portion, which does not differ from the adnate portions of the autozoids, widens suddenly into the middle one, which is inflated and protrudes distinctly — unlike the gonozoïd of the species next preceding — above the surface of the zoarium. In shape it is oval or sometimes even nearly globular, framed by some of the neighbouring zoids but not pierced by anyone of them. It may happen that one or two small lobes extend from the gonozoid proximally or distally of the neighbouring autozoids, but these lobes are mostly quite short.

The tube proceeds from the centre of the distal rim of the inflated portion. Though short it is quite distinct. It is sharply bent, forming about a right angle or sometimes even an acute one to the widened portion and curving so the aperture looks halfway proximally. It is free for the greater part of its length and there is no definite relation between it and the neighbouring cystids.

The pseudopores of the inflated portion of the gonozoid do not form any transverse rows but are rather regularly scattered. They are a little more numerous than those of the autozoids though by far not so much so as in the preceding species. As is the case in the autozoids all the pseudopores in the wall of the gonozoid seem to be perfectly circular.

Ridley (1881, pp. 56 f.) has mentioned a *Diastopora* from Subatlantic waters in which the cystids appear to be obscurely annulated, "a very slight annular depression connecting the serially arranged puncta", though according to him this structure is restricted to the erect portions of the cystids, which a priori does not seem very probable. Otherwise no description is given; but owing to the arrangement of the pseudopores I think it possible that the specimen in question may belong to the present species which I have named after the author mentioned. RIDLEY referred it to the well-known *D. patina* from the Boreal of Europe with which it is, however, certainly not identical.

I think it is evident that the form here described belongs to the same group of species as *D. suborbicularis* HINCKS, with which it shares the quincunxial arrangement of the zoids (which is found in many other *Diastoporae* as well), the very moderately enlarged gonozoid and the lack of a free lamina bordering the zoarium. There are differences, however, both regarding the autozoids and the gonozoids, inter alia. The two species, though probably nearly related, are, therefore, certainly not identical.

Habitat: on the back side of a one-layered *Flustra* and on part of a leaf-like alga.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 51 (3. 9. 1902). — St. 60. On some incrusting and erect Cheilostomes and on an Isopod.

Distribution: ? Open sea off S. E. Patagonia, Lat. 50° 35′ S., Long. 66° 31′ W., 58 fathoms (RIDLEY 1881, p. 57).

3. **Diastopora reticulata** n. sp.

Pl. 4, figs 3—8.

Syn: ??*Tubulipora concinna* MACGILLIVRAY 1885, pp. 94 f., Pl. I, figs 10, 10 a, 10 b; ??*Diastopora concinna* WATERS 1905, pp. 247; ??*Diastopora concinna* CALVET 1909, p. 41.

Zoarium at first narrow, oblong, then flabelliform, but soon strongly broadening, assuming at last a discoid or almost discoid shape, wholly adnate, surrounded by a narrow extension of the basal lamina. Zoids moderately large, radiating from centre, arranged in more or less distinct, uniserial rays, some of the zoids of most rays being partially or wholly contiguous with each other, especially in peripheral portions of zoaria, by which series of two, three or sometimes even more connate zoids come into existence. Distal portions of zoids protruding moderately, curving half upwards, narrowing slightly towards the aperture, which is longitudinally oval. Zoids separated by distinct white lines between which are well-marked bars, equally white, the whole forming a characteristic network, enclosing in its meshes a number of pseudopores that are arranged accordingly in groups or in transverse series. Gonozoids occuring in small numbers in peripheral zone of zoaria, near their edge; middle portion short but rather strongly dilated transversely, pierced by a few zoids only. Tube proceeding from distal edge of dilated portion at about right angle to it, free from neighbouring zoids, short but distinct, straight, circular and distinctly smaller than distal portions of autozoids. Aperture of gonozoid when fully uninjured looking straight upwards or nearly so, outflared into a thin lip, its diameter about the same as that of an autozoid.

Measurements in μ.

(1) Diameter of fertile zoarium 4 200 × 3 900.
(2) Breadth of autozoid (horizontal part) 105—115.
(3) Diameter of aperture of autozoid 90 × 78.
(4) Length and breadth of gonozoid's dilated portion: 1 200—600 × 2 000.
(5) Diameter of tube of gonozoid 60—62, diameter of outflared aperture 110.

This species seems to be rather common in Antarctic (and Subantarctic) waters since it has been found at several localities. I have been able to examine a rather large number of zoaria in different stages of development, though but few of these are provided with fully developed gonozoids. Many of the zoaria are young (Pl. 4, figs 4—7).

At an early stage, when consisting of about a dozen zoids or so, the zoarium is oblong, reminding of that of some small *Tubulipora*. The pro-ancestrula characteristic for it is often rather more quadrangular or rectangular than circular and provided with a single row of small, circular pseudopores just inside its edge. After the primary zoid there follow two zoids, one bending to the left and the other to the right. The 4th zoid is situated between the 2nd and the 3rd; it is long and straight, growing straight forwards. From now on the broadening of the zoarium goes on through numerous zoids originating in rapid succession, by which the zoarium is soon transformed into an almost semicircular formation. At this stage the zoids begin to arrange themselves in radiating rays. Though it is not always observed, it seems to be characteristic for the present species that one of the lateral lobes of the young zoarium — in some cases the left, in others the right one — develops more rapidly than that of the other side (Pl. 4, figs. 4—7). As a result of this the whole of the young, developing zoarium curves gradually to the side where growth proceeds faster.

At both sides of young zoaria some conical outgrowth can be ascertained, proceeding laterally from the zoids next to the primary one. Through these protuberances the attachment of the zoarium to the substratum is strengthened.

The discoidal shape assumed at a later stage by the zoaria (Pl. 4, fig. 3) is brought about in the same way as in the species next preceding, viz. by the lateral lobes coalescing on the proximal side of the pro-ancestrula which by the completion of this process is grown over and concealed, together with the proximal half of the primary zoid. In those zoaria, where development in the early stages has proceeded assymmetrically, the pro-ancestrula seems to be grown over as a rule by the larger one only of the two lateral lobes. The process of coalescing of the lobes having been completed, a circular budding zone has come into existence all round the zoarium, which from now on continues to grow concentrically.

It should be noticed that the final shape assumed by the zoarium in the present species is not necessarily a circular one, though this is what occurs in many cases. Sometimes the shape is instead a rounded oval one, or it may happen to be somewhat irregular, one or more lobes making its outline somewhat wavy.

In young zoaria yet flabelliform, the free basal lamina surrounding the budding zone is distinct though usually not very broad. The lamina still exists in circular colonies but as a rule it is narrower here. In *Diastopora*, so far as I am aware, the rule seems to hold good that in those species where the lamina is narrow, the shape of the zoarium is somewhat variable and sometimes far from circular, while species with a broad and conspicuous free lamina form colonies of a rather regular discoid shape.

The arrangement of the zoids in radiating rays (Pl. 4, fig. 3) is very characteristic, though in quite young zoaria it may sometimes be difficult to see. The rays are always uniserial; and new rays are not intercalated between the old ones, as the zoarium grows larger, but take their origin through bifurcation of those existing. The rays are not very regular, especially in the central region of the zoaria, but they become more and more distinct peripherally; and it is in the peripheral zone only that two or more of the zoids of a ray are connate with one another.

The zoids occupying the centre of well-developed zoaria are often more or less depressed, because they have lost their free distal portions. Uninjured zoids curve softly upwards, the tubes protruding above the surface of the zoarium being more strongly developed the more peripherally they are situated, those situated near the budding zone thus being the longest as a rule. The free distal portions of the zoids, especially of older ones in or near the centre of the zoarium, are often more or less wrinkled transversely, but this character is not very distinct and may be lacking. Young zoids are as a rule not wrinkled.

The apertures are oval, being like the cystids pressed together a little from both sides. It ought to be noticed that the border of the apertures is normally not produced into any kind of pointed process though of course by injury it may accidentally assume that shape.

Not a few of the cystids, in the larger zoaria, are closed. The closure is a typical "Diastoporidan" one, viz. a calcareous diaphragm pierced by a calcareous tubule in the centre.

One of the most characteristic features in well-developed zoaria of the present species is formed by the well-marked, somewhat wavy white lines, indicating, at the surface of the zoarium, the walls separating the individual zoids from one another, and the transverse white bars uniting them (Pl. 4, fig. 3). The white network thus brought into existence is seen even in rather early stages of zoarial development, though it is not always distinct in all portions of a colony. Usually it is very easily discernible but I have seen cases — most of them zoaria of an irregular shape obviously owing to the nature of the substratum — in which the network is visible at a few places only in the zoarium. It is the existence of this network that has caused the specific name given, as through it *Diastopora reticulata* is distinguished at once from all other species of the same genus that I know of.

Just as the shape of the zoarium in *D. reticulata* is similar, to a certain extent, to that in the species of Lichenoporidae (Calyptrostega), so the network mentioned when well developed reminds one of the alveoli occurring in the members of the said family. In both cases, however, the resemblance is a purely superficial one. The discoidal shape of the zoarium is brought about, as we know, in a quite different way in *Diastopora* and in *Lichenopora*, the zoarium of *Diastopora* being no widened common bud, and no gymnocyst — nor any living tissues at all — existing outside the calcareous surface of the zoaria in that genus. The formation of the white network in *D. reticulata* goes on in a mode very wide apart from that through which the alveoli in the Lichenoporidae are brought into existence. The transverse bars originate, in *D. reticulata*, simply by certain parts of the surface of the marginal zone of the zoarium, between the fully developed autozoids, growing thicker. This surface is constituted, of course, by the frontal walls of incipient zoids. The pseudopores piercing the calcareous walls of these young zoids are not scattered irregularly but are arranged in transverse rows or, sometimes, in small groups, and between these rows or groups, separating them from each other, the transverse bars are formed. Their purpose may be assumed to be a strengthening of the zoarium in order to prevent it from being broken when the substratum is moved by the waves.

In the species next preceding there are transverse bars of a similar kind, as we know, but these are merely indicated (wrinkles), while in *D. reticulata* the bars are very well developed and as a rule form a conspicuous feature in the appearance of the zoaria. An inspection of the budding region from outwards convinces us, moreover, that not only are the frontal walls of the developing zoids thickened, forming transverse ribbons, but the same structure can be observed in the lateral walls as well and, though not so distinctly, in the basal wall of the upper "story" of incipient cystids, if there exist more than one layer of zoidal buds, which is frequently the case.

Fully developed gonozoids are not common among my material, though several incomplete ones have been observed. In some of the zoaria there are signs indicating that gonozoids have occurred earlier but that they have degenerated and have not yet reappeared. Those existing are found in most cases not far from the budding edge (Pl. 4, figs 3, 8: *gz*), though in one or two zoaria a gonozoid occurs some distance from the border. The highest number of gonozoids recorded in one and the same zoarium was four; only one of these, however, was complete.

The gonozoids are of a pronounced Diastoporidan type, *viz.* they are rather strongly enlarged transversely. The middle, inflated portion of the gonozoid fills up, in the present species, the gaps between 4—8 rays, that is, it occupies at least three and at most six interserial spaces (cf. Pl. 4, figs 3, 8). Owing to its considerable extension laterally it i natural that some zoids might be completely surrounded by it; these zoids are, however, but few. Most of the zoids neighbouring the gonozoid are adnate to it for some part of their length only but are not encircled by it (Pl. 4, figs 3, 8).

The radial diameter of the inflated portion of the gonozoid is somewhat varying. In older parts of the zoaria it is longer than otherwise and there are often, in such a case, distinct transverse lines on the surface of the inflation, indicating that one or more processes of degeneration and regeneration of the gonozoid may have occurred.

The short tube which is situated in about the middle line of the gonozoid, at its rim, forms a sharp angle to the dilated, middle portion, as a result of which the aperture is looking upwards or, sometimes, a little forwards too (Pl. 4, fig. 8). The tube is distinctly smaller than that of an autocystid. When wholly uninjured it is seen to widen distally, however, into the trumpet-shaped aperture that is surrounded by a lip giving it about the same diameter as the aperture of an autocystid.

There is a possibility that this species might prove to be identical with *D. concinna* (MacGillivray 1885, p. 94), though I do not think this very probable. In MacGillivray's species the zoids are likewise "arranged in radiating, linear series" and the gonozoids are "long, narrow inflations transverse to the rows of cells (zoids)"; but, contrary to what is the case in *D. reticulata*, the basal half of the rim of the aperture of the autocystids is produced into a long, pointed process; one would have thought, too, that MacGillivray should have observed the network of white, transverse bars so distinctive for the present species, had any such formation existed in the specimens before him.

What is called by Waters (1905, p. 247) *Diastopora concinna* is obviously another species than that described by MacGillivray under that name, as Waters says the gonozoid "is a small round inflation, with the — — — tube turned back towards the centre of the zoarium"; and for the same reason it cannot, in all probability, be identical with the species here described.

Calvet (1909, p. 41) has referred with some doubt a specimen from off Graham Land to *D. concinna* MacGillivray. As there is no description given and as the specimen was "en très mauvais état", it is impossible to say if this determination is correct, but it does not seem very probable as the author says that "il est un certain nombre des caractères zoéciaux qui ne peuvent être vérifiés". Possibly CALVET's specimen will turn out to belong instead to *D. reticulata*.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 3, on Algae. — St. 39, on a carapace of the Decapod *Paralomis granulosa* JACQ., and on *Flustra* sp. — St. 51, on *Flustra*. — St. 54, on *Flustra*. — St. 60, on *Retepora* and on some other Bryozoa.

Distribution: ? "sur un gravier recolté sur le plage de l'île Booth-Wandel" (CALVET 1909, p. 41).

4. **Diastopora gracilis** n. sp.

Pl. 4, figs 9—10; Pl. 5, fig. 2.

Zoarium discoid, flat, somewhat depressed in the centre. Zoids radiating from centre in all directions, either arranged quincunxially or forming short rays through two or more zoids though not connate being placed in a line with one another. Cystids remarkably thin-walled, those in the centre short, with short free tubes, the others long, straight, slender, with long, free distal portions stretching more forwards than upwards; apertures relatively large, longitudinally oval in shape. Gonozoid short but very broad, its middle portion being much dilated transversely and extended into two long lobes that are pierced by numerous autozoids; distal portion a rather long, cylindrical, straight tube, proceeding from frontal side of dilated portion of gonozoid in about its middle line and quite free from neighbouring autozoids; aperture circular, facing upwards and, at the same time, a little forwards.

Measurements in μ.

(1) Diameter of zoarium 6 100.
(2) Diameter of adnate portion of autozoids 140—150.
(3) Diameter of apertures of young autozoids 120—130 × 112, of older 100—110 × 100.
(4) Length of gonozoid 1 190.
(5) Breadth of gonozoid (= extension from end to end of lateral lobes) 2 380.
(6) Diameter of aperture of gonozoid 85.

My material has been rather poor, consisting of one zoarium only and of fragments of one or two others; but as in one of these fragments there is a fully developed gonozoid, it has been possible to form a tolerably complete diagnosis of the species.

The zoarium is as usual flabelliform in its early stages but widens swiftly, soon passing into a circular shape, the pro-ancestrula being grown over and completely concealed by the coalescing lateral lobes. The basal lamina forms a border round the edge of the colony though this is not broad (Pl. 4, fig. 9).

The centre of the zoarium is depressed, because the zoids situated here seem to have degenerated, their free distal portions having, as a result of this, been broken down, wholly or partly. The other cystids are very characteristic, for their free distal portions, being very long, are not curved upwards or but slightly so. Instead the cystids are straight almost from the beginning (Pl. 4, fig. 10), the angle between the free tubes and the frontal surface of the zoarium being decidedly acute and less than 45°. The apertures look, therefore, more forwards than upwards (Pl. 4, fig. 10).

There is no indication of any transverse lines on the surface of the zoarium nor on the free distal portions of the zoids either, though it sometimes may occur that some of these are slightly wrinkled, which is probably a sign that the zoid in question has degenerated and then regenerated again.

When the zoids in a Stenolaematous species are relatively large, the calcification of their walls as a rule is strong. This is however not the case in the present species, where it is instead remarkably weak, the walls being quite thin and the whole zoarium giving an impression of being gracile which has caused the specific name given.

Though there are, in the material before me, several zoids that have lost their distal portions and have obviously degenerated, I have not seen any of the "closures" peculiar for several other species of *Diastopora*. Instead, one or two cystids have their cavities closed, a little below the actual aperture, by a simple calcareous diaphragm pierced by a few pseudopores but with no tubule in its centre.

The gonozoid (Pl. 5, fig. 2) is interesting because it represents a somewhat more advanced stage than those of the preceding species. In *D. dichotoma* and *D. ridleyi* the middle, dilated portion of the gonozoid is roughly oval or globular. In *D. reticulata*, then, we have an example of a gonozoid the lateral lobes of which have developed strongly while other lobes are lacking. This shape of the dilated portion of the gonozoid is still more pronounced in the present species, just as is the case in, for instance, the European *D. patina* and others. The change in shape of the gonozoid in different species of *Diastopora* thus indicated obviously offers a parallel to the development of the zoarium in the same genus, for the more swiftly it performs its transformation into a discoidal one, the more strongly is the gonozoid widened transversely. Further in the gonozoid of *D. gracilis* the tube does not proceed from the distal rim of the middle dilated portion but from a place situated some distance more proximally, thus, from the gonozoid's frontal side. This certainly is not a primitive feature either. When compared with what is found in other species of the present genus the tube of the gonozoid in *D. gracilis* is remarkable both because of its length and for it being sharply set off from the dilated portion. It is unusual, too, in *Diastopora* that the tube is straight so that the aperture does not look proximally but upwards and forwards (Pl. 5, fig. 2).

In the walls of the autozoids the pseudopores are numerous. They are irregularly scattered, and there is no sign whatever of their being arranged in transverse lines as was the case in the two species preceding. In the free distal portions of the autozoids they become gradually fewer but some pseudopores may exist even near the rim of the aperture. In the dilated portion of the gonozoid the pseudopores are as usual larger and a little more densely placed though not much so. In shape all the pseudopores are circular.

So far as I am aware this species has not been described before. In the mode of arrangement of the free distal portions of the zoids as well as in the type shown by the gonozoid it comes rather near to the European *Diastopora patina*, though both the shape of the autozoids and the form and position of the tube and aperture of the gonozoid in the two species are different.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 94. One colony on a Serpulid's tube; and some loose fragments.

5. **Diastopora gemelligera** n. sp.

Pl. 4, fig. 11.

Syn: ??*Diastopora solida* WATERS 1904, p. 90, Pl. 9, fig. 11.

Zoarium discoid, somewhat irregular, adnate, bordered by a free basal lamina of moderate breadth; surface sometimes with more or less distinct wrinkles transversely. Zoids mostly in quite short radial series, consisting of but two cystids contiguous up to their apertures; single, not connate zoids may be scattered here and there between the series. Free distal portions of cystids when uninjured rather long, curving half upwards, somewhat compressed from both sides; apertures longitudinally oval, moderately large, looking upwards and a little forwards. Gonozoid much dilated transversely.

Measurements in μ.

(1) Diameter of a zoarium 4 700 × 4 200, of another 5 200 × 5 000.
(2) Diameter of zoid (horizontal part) 160—180.
(3) Diameter of zoid's free distal portion, near its base: 130—140.
(4) Diameter of aperture of zoid, longitudinal × transverse 100—120 × 85—95, average 110 × 90.

The material on which the above diagnosis and measurements are based is poor, consisting merely of two zoaria, so the description must be, necessarily, somewhat incomplete.

I can say nothing definite as to the usual shape of the zoarium, but the smaller of my colonies forms a not very regular oval while the larger one is yet more irregular in shape which may, however, depend to some extent upon the substratum (a worn piece of an incrusting Cheilostome). Moreover, its edge is damaged here and there, so it is not easy to make out the real shape of the zoarium.

The extension of the basal lamina round the edge of the zoarium is varying. In the larger of the two colonies it is rather narrow, except at one or two places, where it is broader. In the other zoarium it is moderately broad round nearly its whole circumference, which is simply explained by the fact that the lamina was, in the latter case, much less damaged.

In shape the zoids are in no way remarkable but it is very characteristic for the species that most of them are united two and two (Pl. 4, fig. 11). This is true of the centrally placed zoids as well as of the peripheral ones. On the other hand it seems very seldom to occur that more than two zoids are united, indeed, I have seen but one or two cases, where a series was formed by three connate zoids. Single zoids are more common, in some parts of the zoaria about as common as the connate ones, while in others a single zoid occurs here and there among those united two and two.

The horizontal portions of the cystids have rather thick walls, and the limits between them, though sometimes distinct, are not always discernible. One has often the impression, therefore, that the free distal tubes protrude from out of a common calcareous mass. Where the separating walls are distinct, they are whitish in colour.

The free distal tubes of the cystids so far as I have seen do not present any wrinkles but such may occur on the horizontal parts. These are more distinct in the smaller of the two zoaria here described than in the larger one. The arrangement of the zoids is otherwise the same in both zoaria, the short series of two connate zoids being characteristic of both. As the smaller zoarium seems to be more strongly calcified than the larger one (though it is perhaps somewhat stunted in its growth) this might explain the differences mentioned.

Some of the more centrally placed zoaria are closed by a calcareous diaphragm with a minute perforation in its centre or a little to one side. Just as in many other species of *Diastopora*, the diaphragm may be found at the top of the free distal portion, *i. e.* closing the actual aperture; but it is commonly formed at or near the base of the tube, after the greater part of it has been broken off; — which in its turn must be supposed to have taken place simultaneously with the degeneration of the polypide of the zoid in question or very soon after this has occurred.

The single gonozoid I have seen is in the larger of my two zoaria (Pl. 4, fig. 11); but as it is rather severely damaged I can give but few details as to its shape and structure. It is in the peripheral portion of the zoarium, a little proximally of the budding zone. It is strongly dilated at both sides and thus shows the type common for the more advanced species of *Diastopora*; and not a few "twins" of autozoids pass like pillars through it (Pl. 4, fig. 11); but the tube and part of the roof of the dilated part unfortunately have been destroyed.

The pseudopores are numerous and rather large, circular or slightly oval in diameter. As usual they are more thickly scattered in the horizontal parts of the zoids than in the free tubes where they become gradually fewer when approaching the aperture. The pseudopores of the zoids' horizontal portions are sometimes arranged in almost transverse rows, especially in the peripheral zone of the zoaria, but this is not always the case.

I have noted above the possibility that the present species might be identical with *Diastopora solida* Waters, though I do not think it very probable. The said species was instituted for some fragments, and there is no description, so without access to the material it is impossible to decide what it looks like. The aperture, however, is longitudinally oval (cf. Waters 1904, Pl. 9, fig. 13) and the zoids are strongly calcified.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 49. On an incrusting Cheilostome. One colony. — St. 52. On a carapace of the Decapod *Eurypodius latreillei* Guérin. One colony.

6. **Diastopora dubia** n. sp.

Text-fig. 5.

Among my material there are three zoaria obviously belonging to *Diastopora*, but I am not able to say to which species they should be referred. Two of them are quite young and narrow, while the remaining one is somewhat older. This latter colony is about semicircular in shape though the pro-ancestrula is not yet overgrown. Unfortunately, it is rather worn and the free distal portions of nearly all the cystids have been broken off. As is natural, none of the colonies is fertile.

As for the shape of the zoarium nothing definite can be said, though to judge from the largest of the colonies it may be supposed to be oval or about so. All the zoaria are completely adnate to the substratum (a *Flustra*). In no one of them there is any extension at all of the basal lamina round the border of the zoarium.

In the quite young colonies the zoids are arranged so as to form a small number of radiating rows, the few zoids of each series (only two or three) being connate with one another, while the primary zoid and the zoids following next are free. In the larger zoarium the centrally placed zoids form more or less distinct rays (the eldest ones being free) but those occupying the peripheral zone are mostly arranged alternately.

The free distal tubes will seem to have been moderately long and to have been directed forwards more than upwards. The calcification is not very strong and the interzoidal walls are well seen, forming rather broad, white lines at the surface of the peripheral half of the zoarium, while in the central half they are not so distinct. The frontal walls of the cystids are very distinctly transversely wrinkled in the older zoids, while in the younger ones they are smooth and semitransparent. Here and there, in the horizontal portions of the cystids, there is some indication of transverse thickenings existing but there are no distinct transverse bars as in *D. reticulata.*

The pseudopores are minute but rather numerous. As a matter of fact they are smaller than in most if not all other species of the present genus that I have seen. In shape they are slightly oval. Most of the pseudopores are scattered but here and there in the horizontal portions of the cystids there are some pores arranged in transverse lines.

I cannot see that the zoaria here described fit in with certainty with any species of *Diastopora* hitherto known. There is some resemblance as to the arrangement of the zoids to *D. reticulata* but this is true of the zoids in the central portion of the zoaria only; and as there is no network of white bars occupying the zoarium's frontal surface, I do not think the present zoaria are referable to the species mentioned.

Measurements in μ.

(1) Diameter of largest zoarium, longitudinal 3 700.
(2) Diameter of largest zoarium, transverse 2 200.
(3) Diameter of horizontal portion of zoids, 160—170.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 39, On a *Flustra.* — St. 51. 3. 9. 1902. On a *Flustra.*

Fam. **Idmoneidae** Busk, char. emend.

Syn.: Idmoneidae, part. Busk 1859, p. 94; 1875, p. 10; auctt.; Tubuliporidae, part., Johnston 1838, p. 267; 1847, p. 265; Smitt 1867, pp. 398, 434; Hincks 1880, p. 424; Harmer 1915, p. 118; Borg 1926 b, p. 184; Bassler 1935, p. 12; auctt.

Zoarium erect, narrow, branching dichotomously; autozoids in transverse series, that are parted in the middle, opening on frontal side of zoarium only; innermost cystids the longest; basal side covered, partly or wholly, by one or more layers of kenozoids forming a sort of secondary thickening; gonozoid with its middle, dilated portion occupying space between series of autozoids in middle line of frontal side of zoarium.

The family Idmoneidae in the sense of Busk can hardly be supposed to be a natural one; and the limits between it and the Tubuliporidae are all but sharp. It was natural, therefore, that by many writers, on both recent and fossil forms, the two were united into one family, the Tubuliporidae. The result was that the Tubuliporidae became a very large and rather heterogenous family.

As a result of my studies on recent Idmoneidae (sensu Busk), I have come to the conclusion that a number of genera ought to be separated from it and transferred instead to other families or groups.

First, *Crisina* must be removed from it and, on account of its structure and mode of development, placed instead in a separate family, the Crisinidae, among the Pachystega (cf. Borg 1941). Probably some fossil genera hitherto referred to the Idmoneidae should be referred to the same division.

Second, there are some species reminding of *"Idmonea"* in the general appearance of the zoarium, but the outermost zoids of the series instead of the innermost ones are the longest and the gonozoid, when frontal, is immersed, or else may be lateral or basal. The so-called *Idmonea milneana* represents a species of this kind. These are transferred instead to *Nevianipora* or *Tervia* (fam. Terviidae); cf. below.

Third, a large number of species that are half erect and the zoids of which are in more or less distinct transverse series — the well-known *"Idmonea" liliacea* being an example of this — are generally considered nowadays to belong to the Tubuliporidae and I think they are correctly placed there.

There remains a group of species that on account of a number of distinctive features is clearly separated from all other ones. These species, in my opinion, should remain in the Idmoneidae.

Genus **Idmidronea** Canu & Bassler.

Syn.: *Idmidronea* Canu & Bassler 1920, p. 784; Bassler 1935, p. 132.

Zoarium erect; autozoids in transverse series parted in the middle, on frontal side of zoarium; gonozoid frontal, median; kenozoids forming one or more layers on basal side of zoarium.

Genotype: *Idmonea coronopus* Defrance 1824, p. 555.

Idmidronea is one of the rather few instances in which I think a genus that was created by Canu & Bassler should be accepted, though the diagnosis given by these authors is extremely incomplete. The "firmatopores" of Canu & Bassler and the "canaux de renforcement" of Pergens (1889, p. 339) and others are one and the same thing, viz. the layer or layers of kenozoids just alluded to.

1. **Idmidronea obtecta** n. sp.

Text-figs. 6—8.

Zoarium large, erect, subdivided repeatedly, stem and branches almost cylindrical, relatively narrow but much thicker proximally than distally, which depends upon a process of secondary thickening by means of one or more layers of kenozoids affecting basal side of older portions of zoaria. Autozoids arranged in transverse series, opening on frontal side of stem only. Series very regular, composed each of two halves well separated medially and more or less distinctly alternating; each half series consisting, as a rule, of four zoids adnate to one another and forming a simple row. Distal parts of autocystids relatively short but protruding some distance above surface of zoarium, innermost cystid the longest, aperture of outermost cystid almost level with wall of zoarium. Gonozoids situated just below bifurcations; middle portion of gonozoid much elongated, bifurcating with the branch, occupying median part of frontal side of stem but not extending in between series, corresponding in length with 7—8 or even more series of zoids (on one side); tube of gonozoid extremely short, situated just medially of a half series of zoids, its rim a little thickened. Aperture of gonozoid circular.

Measurements in μ.

(1) Diameter of old stem with secondary thickening 2 100—4 800.
(2) Diameter of branch unaffected by secondary thickening 1 150—1 530.
(3) Diameter of autozoid measured at base of its erect, distal portion 320—360.
(4) Diameter of uninjured aperture of autozoid 220—270.
(5) Diameter of aperture of gonozoid 280—350.

I have had a rich material of this species, consisting of several colonies and fragments of such.

Superficially there is much resemblance to some robust species of *Hornera*, both regarding the general shape of the zoarium, the mode of branching inclusive, and the strong secondary thickening of the older portions of the zoarium. This resemblance is solely due to convergence, for there are no gymnocyst and cryptocyst here, *i. e.* no soft tissues outside the calcareous zoarial wall.

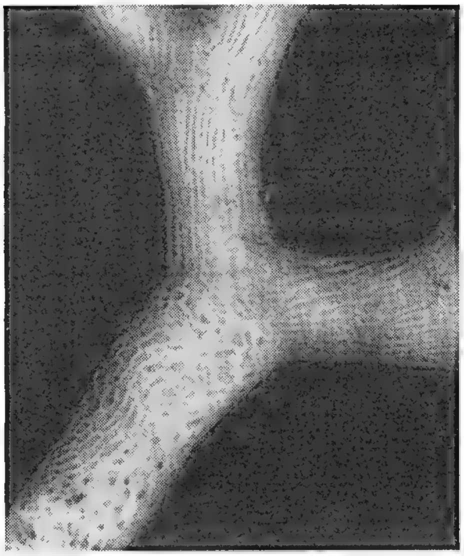
The largest zoarium among my material is 5,8 *cm* in height, and this seems by no means to be an unusual height for I have several fragments that are between 3 and 4 cm in length and that must have belonged to zoaria much larger than these fragments. In comparison with the dimensions of the zoaria, the stems and branches must be considered narrow.

The early stages in the development of the zoarium are difficult to make out because of the secondary calcification, but so far as I have been able to see with the exception of the proximal half of the primary zoid the zoarium is erect from the very beginning.

The mode of branching is dichotomous though not very regular. Frequently one of the two branches originated by a bifurcation is stunted, the other forming the continuation of the stem, while in the majority of cases the two branches are about equal in strength, either diverging from each other or being about parallel like the tines of a tuning-fork.

The arrangement of the autozoids (Text-fig. 6) is characteristic, and it is interesting to compare it with the arrangement in certain other species as, for instance, in *Nevianipora milneana* (cf. below). The transverse rows of autozoids are common for these as well as for many other Stenolaematous species of different genera, but nevertheless there are important differences. In *I. obtecta* no median autozoids exist, and as a result of this the visible portion of each series is split up distinctly into two halves. The innermost cystid of each half series — not the outermost one as in *Nevianipora* — is the longest. The number of the zoids constituting a half series is usually four or, sometimes, three, though I have seen five in one case and two in one or two cases. In old stems it is common that the rim of the outermost cystid is level with the zoarial wall and that this cystid is closed by a calcareous diaphragm pierced by pseudopores; and it may occur that two subsequent cystids of a series are closed.

Text-fig. 6.



Text-fig. 7.

Text-fig. 8.

Text-fig. 6. *Idmidronea obtecta.* Part of zoarium seen from frontal side to show arrangement of autozoids, etc. × 10.
» » 7. *Idmidronea obtecta.* Part of zoarium seen from basal side to show secondary thickening layer (in lower half of figure). × 10.
» » 8. *Idmidronea obtecta.* Distal portion of branch seen from basal side to show concentric lines marking out periods of growth. × 10.

There is no carina along the middle line of the stem, but the stem slopes rather sharply at both sides and the distal portions of the cystids are on the slopes, on each side of the median line. The cystids are adnate to each other up to the rim of the aperture, except the longest, innermost one, the end of which is free for a short distance, its aperture being therefore circular, while those of the other cystids are more or less angular.

The pseudopores in the frontal wall of the autocystids are small, circular and not very densely scattered.

The gonozoid is of a typical "Idmonean" character, being long and narrow but rather strongly inflated, the inflated portion occupying the space available in the median portion of the stem between the two halves of the series. Considerably more space has been gained through the fact that the gonozoid is situated near a bifurcation and forks with the branch, the portion in the axil being the broadest part of it. The gonozoid has come into existence through transformation of the innermost zoid of one of the half series, to the right or to the left. The transition from the proximal to the middle, dilated portion is a gradual one. The aperture is similar to that of an autocystid though it is somewhat larger and, because of the extreme shortness of its tube, is quite near to the surface of the gonozoid.

The pseudopores piercing the gonozoid's frontal wall are as usual much more thickly scattered than those of the autocystids, but like these they are quite small and circular in shape.

Studying the top of a branch one becomes easily aware that there are numerous quite small incipient cystids at the basal edge of the budding region. So far as I have found these do not develop into autocystids but become closed at a rather early stage and thus form a layer of kenozoids, the ensemble of its basal walls constituting the basal wall of the zoarium, this wall being characterized, therefore, by numerous, almost parallel, longitudinal lines, indicatiing the limits of the kenozoids. Between the lines the wall is pierced by rather numerous, quite small, almost circular pseudopores. Here and there the wall is crossed by concentric lines marking out, as in the species mentioned, periods of growth of the zoarium. Many kenocystids can be seen to finish their growth at one and the same height, new cystids, substituting them, taking their origin at the same place. The layer of kenozoids described, on account of its origin at the basal edge of the common bud of the stem, cover the whole of the zoarium's basal side.

Another formation of the same kind, as it will seem, comes into existence in the proximal portion of the zoarium, probably at the edge of the supporting disc. From there it grows distally along the basal side of the stem and branches, though it does not reach the distal ends of the zoarium.

The end portion of the last-named layer is ligulate and rather narrow, covering only the median portion of the basal side of the branch; but some distance from its end it has become considerably broader, for it does not grow merely in a distal direction but at both sides as well. A little more proximally in the zoarium, therefore, the whole of the basal side is covered by it. Later on continued growth causes the layer to extend up the slopes on both sides of the frontal side as well; and it may happen, finally, that two portions of the growing edge of the layer described meet and coalesce in about the middle line of the frontal side of a branch. Old branches are usually completely surrounded by this layer, and the same seems always to be the case with the primary stem, all around which a supporting disc is formed of about the same appearance as in the species of Pachystega.

It is remarkable that the secondary layer here treated, though quite thin at its edge, is otherwise of considerable thickness and seems to be composed of numerous layers that are not or only very indistinctly separated from each other. The greatest thickness is attained by the secondary thickening layer round the primary stem, as is evident from the measurements given (1, 2).

Finally I have seen repeatedly that isolated patches of an accessory thickening layer are formed, independently of each other and of the other layers, here and there on the basal side of the stem and branches. Growing out both distally and proximally they soon coalesce.

It has been assumed above that the layers just discussed are composed of a number of kenocystids, and it is difficult to see that it could be made up of any other units of the zoarium. If this is correct there exist in the present species three sources from which a thickening of the stem originates, viz. (i) the kenozoids formed at the basal edge of the common bud at the distal ends of the stem and branches, (ii), the layer or layers of kenozoids formed in the proximal portion of the zoarium and growing distally, and, (iii), the isolated "patches" later on coalescing. The secondary layer (ii) is not very similar to the one mentioned first, for it is constituted of elongated, rhomboidal or sometimes rounded spaces, closed by a calcareous lamina that is pierced by rather numerous small pseudopores.

The function of the kenozoidal layers here described must be, obviously, to strengthen the zoarium, particularly its proximal half, making it possible for it to form an erect growth of considerable extension. As is known, a thickening of the basal surface of the zoarium in a corresponding way occurs in other species of the genus as well, as, for instance, in *I. atlantica* (cf. HARMER 1915, p. 126; BORG 1926 b, p. 290), though there are some differences. I have never seen a well-developed zoarium of *I. obtecta* without the secondary layer and, as this seems to be of considerable importance for the life of the colony, it may be assumed never to be absent. The specific name is taken from the fact, that this layer in old colonies covers and conceals a good deal of the original surface of the zoarium.

Nature often solves one and the same problem in different ways. The solution here given is parallelized by that in the Pachystega, where a secondary thickening of the erect zoarium is brought about in quite another way, viz. through an addition of calcareous matter mainly from the outside to the original cryptocyst. Other methods are applied in the Reteporina and in different other Cheilostomes as well.

Though the present species is unusually large and robust, I see no objection to uniting it with smaller and much more delicate species in one and the same genus, as the principal characters, viz. the arrangement of the autozoids, the type of the gonozoid and the mode of formation of the secondary thickening are the same. Though it is found at several stations in Subantarctic waters, and, therefore, is presumably not uncommon there, it does not seem to have been described before. Possibly it may have been confounded with *Nevianipora milneana* which it resembles superficially. From this it is, however, very well separated.

Occurrence: Swedish Antarctic Expedition. — St. 5. — St. 6. — St. 7. — St. 17. — St. 88. — St. 94.

2. **Idmidronea pseudocrisina** n. sp.

Text-fig. 9; Pl. 5, figs 3, 4.

Syn. ?? *Idmonea atlantica*, part., CALVET 1909, pp. 41 f.

Zoarium erect, delicate, repeatedly subdividing, branches diverging. Stem and branches sub-triangular in transverse section; median portion of frontal side arched, about semicircular, with a sharp slope on each side; edges of basal side likewise rounded, not marked by any ridge. Autozoids small and gracile, arranged in transverse series across stem; each series parted in the middle line, the half series thus originated alternating regularly and bending successively to the right and to the left. Each half series composed of two or, sometimes, of three zoids connate for the greatest part of their length but with the terminal portion free. Erect portions of autocystids moderately long, the innermost one by far the most prominent, widening in a trumpet-like way towards the aperture that is, therefore, wider than rest of cystid. Basal wall in distal portion of zoarium flat, with distinct longitudinal lines indicating limits of cystids, but for the greater part slightly arched because covered by a secondary thickening layer marked by longitudinal ridges and "pits" between them. Gonozoid unknown.

Measurements in μ.

(1) Height of zoarium 9 000.
(2) Length of fragment 6 800.
(3) Diameter of erect primary stem 500.
(4) Diameter of branch 320—400.
(5) Breadth of autozoid forming part of stem 80—100.
(6) Diameter of aperture of autozoid 155—190 × 100—130.

My material consists of a complete zoarium and a fragment of another. The zoarium is reproduced in Pl. 5, fig. 3, and a portion of it, at a somewhat higher scale of magnification, in fig. 4, of the same Plate. Further there is the broken basal portion of a third zoarium fixed to the stem of a Hydroid.

The primary zoid of the fragment just mentioned is adnate to the substratum for the greatest part of its length. There follow two zoids and then three, all of which have long free distal portions with the aperture facing right upwards. The apertures are rounded, oval in shape and but slightly expanded. Three zoids forming a transverse series follow next, one zoid bending to the right and the two others to the left. The next series is composed of four zoids, two on each side of the median line. The fragment is broken here, but there is no difficulty in imagining the subsequent development.

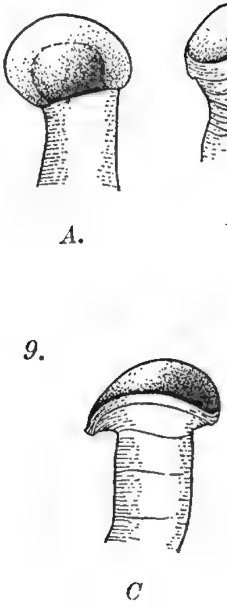
The five first zoids after the primary one are adnate, so the species may well be said to go through a *Stomatopora*-stage. Simultaneously as the first transverse series are formed, however, a supporting disc originates at the basal side of the young stem, by means of which the zoarium becomes half erect and later on, after the disc has been completed, erect. The disc comes into existence in the same way as described for *I. atlantica* (BORG 1926 b, p. 290) and I have no doubt that the tubes composing it should be regarded as kenozoids. In the complete zoarium examined the supporting disc is very well developed, measuring in diameter 2,5 mm (while the diameter of the erect primary stem is 0,5 mm) and thus fixing the zoarium firmly to the substratum.

The zoarium is very delicate and the shape of the branches as well as the arrangement of the autozoids are such that it reminds strongly of some small and gracile species of the Crisinidae (cf. Pl. 5, fig. 3). As in this the branches are sub-triangular in shape and the zoids are on the slopes on both sides of the middle line, there being no median zoid.

The autocystids are very characteristic, the expanded aperture giving them a funnel-like appearance separating them at once from those of all other species known of the same genus (cf. Pl. 5, fig. 4). The expansion is in most cases rather sudden, forming a kind of wide collar, as it were, round the aperture; or it may be outflared so the aperture reminds of that of the gonozoid in certain species. Owing to this curious expansion, the purpose of which is so far unknown, the shape of the aperture is irregular, though usually it is longitudinally oval.

The calcification of the walls of the cystids is feeble, particularly in the distal portions of the autocystids. As is regularly the case in such species, the pseudopores are small and sparse, being scattered irregularly. In the erect portion of the cystids they are especially few.

Unfortunately there is no gonozoid in the material investigated. The whole struc-



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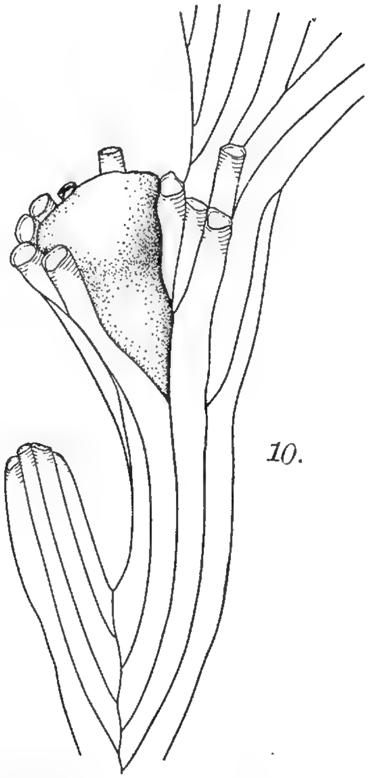

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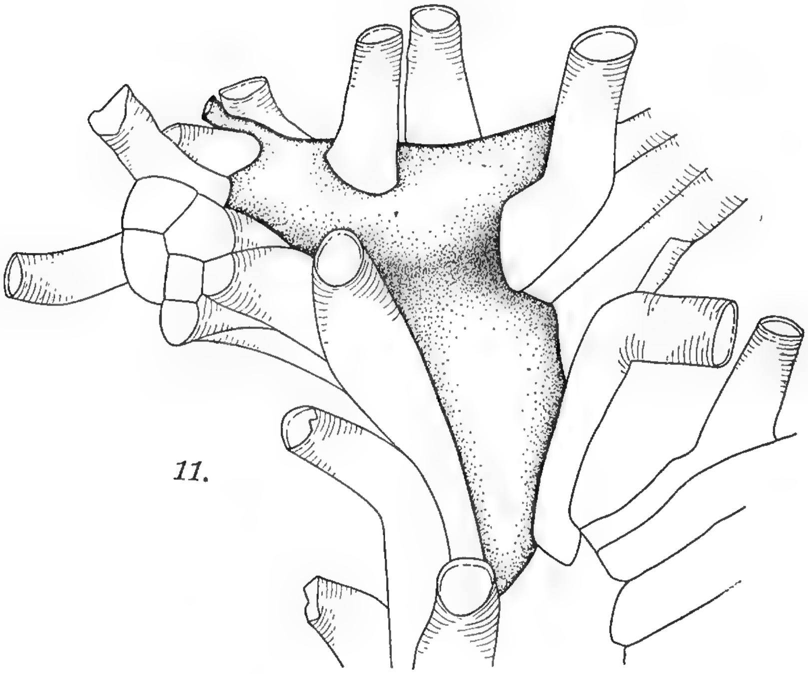

11.

Text-fig. 9. *Idmidronea pseudocrisina.* The figure shows some different shapes of expanded apertures of autozoids (A, B, C). × 90.
» » 10. *Hastingsia irregularis.* Part of zoarium with gonozoid seen obliquely from frontal side. × 23.
» » 11. *Entalophora australis.* Part of fertile lobe to show arrangement of autozoids and gonozoid. × 24.

ture of the zoarium indicates, however, that this is of an "Idmonean" type; in all probability it will be found, by some future investigator, to occur just proximally of a bifurcation, on the frontal side of the stem, and to bifurcate with the stem.

The secondary thickening layer is well developed in both colonies I have seen. In one of them it reaches almost to the end of the branches and in the other it covers the greatest portion of the basal surface of the zoarium. It seems to be restricted to the basal side, at least I have not seen it stretching over on the frontal one. It develops from the basal supporting disc by some kenozoids growing in a distal direction along the "back" side of the stem (cf. BORG 1926 b, p. 290). The end portion of the secondary layer is characterized by a number of longitudinal ridges with holes between them (apertures of kenozoids) separated by thin transverse calcareous bars (interzoidal walls). More proximally the ridges become gradually stronger and the openings smaller, the whole structure reminding decidedly of the aspect of the basal side of some species of *Crisina*, though the holes are not so frequent as the pits in that genus. It is this similarity, in the first place, that has caused the specific name given. It is hardly necessary to point out that the secondary thickening comes into existence here in a quite different way than in *Crisina.* The similarity, therefore, is merely a superficial one.

The relationships between the present species and other erect so-called *Idmoneae*, such as *I. atlantica*, are unmistakable. *I. obtecta* is a much more robust species but the identity in all principal characters between it and *I. pseudocrisina* makes it evident, I think, that they should belong to one and the same genus.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 58. On a Hydroid.

3. **Idmidronea antarctica** n. sp.

Pl. 6, fig. 4; Pl. 7, figs 1 and 2.

Syn.: ? *Idmonea serpens* CALVET 1904, p. 36.

Zoarium erect, rather small, subdividing repeatedly in one plane. Branches straight and short, rather narrow and diverging, triangular in transverse section, their laterobasal edges sharply marked. Frontal side with a blunt median edge, a sharp slope on either side of it. Basal side flat, with a secondary thickening layer partly covering it. Transverse series of autozoids interrupted medially, the half series on both sides of median line alternating with one another, consisting each of four-six, in most cases of five zoids; the three innermost of them at least are connate. Series of autocystids when uninjured protruding strongly, innermost cystids the longest, outermost one shorter than the other cystids and often distinctly so, situated quite near the latero-basal edge. Gonozoid rather long but decidedly narrow, its middle dilated portion occupying as usual median portion of frontal side of stem, small lobes stretching on both sides in between halves of transverse series. Tube of gonozoid rather long, adnate to distal or medial-distal side of erect portion of innermost cystid; terminal portion free, forming nearly a right angle to rest of tube, by which the aperture faces in a distal or medial-distal direction. Aperture of gonozoid rounded, transversely oval.

Measurements in μ.

(1) Length (height) of fertile zoarium (Pl. 6, fig. 4) 4 300.
(2) Diameter of stem 480—1 050.
(3) Distance between series (on one and the same side) 430—510.
(4) Diameter of aperture of autozoid 100—140.
(5) Diameter of aperture of gonozoid 140—160 × 110—130.

I have examined half a dozen complete zoaria of this species, most of which were fertile, and about as many fragments of some others. The species is not a large one though it is much stouter than *I. pseudocrisina.* In size and shape it reminds somewhat of the well-known northern *Tubulipora liliacea,* though there is no doubt whatever as to the distinctness of the two forms.

The early stages of a zoarium as seen in Pl. 6, fig. 4, are those of a typical *Idmidronea.* After the primary zoid (not visible in the figure) there occur two zoids, one bending to the right and the other to the left. Then the first series follows, composed of two zoids on one side and three on the other. In the subsequent series the number of the zoids increases rapidly, the number typical for the species (five) soon being attained. Simultaneously with the formation of the first series a supporting disc originates in the usual way; and at the same time the zoarium becomes erect. The early stages of other zoaria I have seen are similar to this.

The cystids constituting the supporting disc are easily distinguishable in a young disc like the one shown in Pl. 6, fig. 4. They are numerous but short and with small openings all around the edge of the disc so I think there cannot be much doubt that they are kenozoids. In older zoaria the supporting disc is larger and there are several kenozoids developing along the basal edge of the disc. I have not seen any case where the disc has grown round the zoarium on its frontal side, covering and concealing the pro-ancestrula and the eldest zoids; though I think it may possibly happen in old zoaria. On the other hand no zoarium is without a disc; — which is, in all probability, a formation necessary to fix the zoarium strongly to the substratum and to make possible its erect growth.

As in other species of the present genus a secondary thickening layer grows from the supporting disc along the basal side of the stem in the direction distally. It consists of numerous tubes of the same appearance as those composing the disc. I have not seen any case where this layer covers a more considerable portion of the basal side, but it is usual that secondary thickening layers develop at other places of the basal side of the zoarium, particularly in its distal portion.

Thus the sharp line seen in Pl. 7, fig. 1, and separating the proximal portion of the zoarium reproduced from the distal one, marks out at the same time the limit of the secondary thickening layer developed distally of it and covering the whole of this part of the zoarium's basal side. A similar condition can be observed in other zoaria as well, though the limit is not always so sharp. The appearance of such a distal thickening layer is much the same as that in the proximal portion of the zoarium though the kenozoids composing it seem always to be closed. The limits between the kenozoids are well marked by white, almost parallel lines, indicating the vertical walls.

The rest of the basal side of the zoarium, not covered by any secondary layer, is marked by similar lines yet more distinctly, and the "back" side of the cystids, between the lines, are somewhat arched. The basal side as a whole is, on the other hand, remarkably flat.

The branches are in most cases narrow near the base but becoming gradually broader distally. This is well seen in Pl. 6, fig. 4, and Pl. 7, fig. 1. The proximal portion of a branch may measure about 0,5 mm in diameter, while in its distal half it amounts to 1 mm or even a little more.

The shape and arrangement of the autocystids is rather characteristic and reminds somewhat of that found in fine colonies of *Tubulipora andersson*i. The erect portions of the three innermost cystids of a series are long and very prominent, which condition becomes augmented by the fact that the slope on both sides of the middle line of the stem is very sharp. The three cystids just mentioned are wholly connate, their apertures facing upwards and a little forwards, while the terminal portions of the two or three lateral cystids that are on the slope nearer the latero-basal edge are free for a short distance. The apertures of these cystids look in a distal-lateral direction. In shape they are transversely oval, while those of wholly connate cystids are rectangular.

The pseudopores are small and not very numerous. They are rather irregularly scattered in the walls of the cystids, both on the frontal and basal sides. In the erect portions of the cystids they become gradually fewer until near the aperture they are sparse.

The gonozoid is of a characteristic "Idmonean" type, quite narrow with only very small lateral lobes, no series nor any single zoids being encircled by them. It often seems to be very long, occupying the space between as many as 10 series of zoids, but this is in reality not the case, for where such an unusually long gonozoid has been observed I have always been able to demonstrate that there are two or more tubes and apertures during its course, indicating that two or more successive gonozoids exist here, though any limit between them is not discernible. It is the innermost zoid of a half series or the innermost but one that is transformed into a gonozoid.

The first gonozoid seems to come into existence, as a rule, at a rather early stage, the first fertile zoid in the zoaria I have examined being a member, in one case of the 2nd series, in three cases of the 3rd and in the other cases of the 4th series, when counted from the first, proximal one.

The tube and aperture of the gonozoid are very characteristic. The tube seems always to be adnate normally and the aperture to look in a distal or medial-distal direction. I have seen one case, where the tube was free and situated between two subsequent half series, but this was obviously an abnormal case, as a bifurcation had just been performed and the series, to which the tube should have belonged, were somewhat in disorder. The aperture is rounded oval, about as large or slightly larger than that of an autocystid. Tube and aperture of the gonozoid seem always to be developed not far from the distal end of the gonozoid.

CALVET (1904, p. 36) has reported what he termed *Idmonea serpens* (L.) [= *Tubulipora liliacea* (PALLAS)] from Subantarctic waters, though it is evident, I should think, that this determination was incorrect. As I have mentioned above there is a superficial resemblance between the species referred to by CALVET and the present one, so it might possibly have been the latter that was examined by CALVET, but as there is no description and no figure, this is impossible to decide at present.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 4. On some stalked Ascidians and on a Cellaria.

Distribution: ? Magellans Strait, Punta Arenas, on Algae at shore (CALVET 1904, p. 36).

4. **Idmidronea hula** n. sp.

Pl. 6, figs 1—3.

Zoarium erect, rather delicate, subdividing repeatedly though not frequently. Branches diverging, narrow, in transverse section more rounded than subtriangular. Frontal side of zoarium rounded, no keel along its middle line; basal side arched, its greater part covered by a secondary thickening layer; no edge separating basal and frontal side. Autozoids arranged in transverse series, separated in the middle line, the two half series on each side of median line alternating regularly; usually three or four zoids, more rarely two in each half series; distance between two series relatively long. Distal erect portion of autocystids rather short, curving softly upwards and, at the same time, outwards; innermost cystid of a series the longest. The two or three cystids nearest the middle line connate for almost the whole of their course, the other, lateral cystids with short free distal portions. On basal side of zoarium one or more layers of kenozoids forming a secondary thickening layer. Gonozoids originating some distance below a bifurcation, often forking with the branch, occupying frontal median space between half series of autocystids for the length of five or six series, as a rule. Middle portion of gonozoid usually broad, swollen, with well developed pair of lobes extending in between series of autozoids. Tube of gonozoid short, curved, adnate to base of erect portion of first autocystid but one from middle. Aperture transversely oval, facing horizontally and, at the same time, a little upwards.

Measurements in μ.

(1) Diameter of sterile branch 460—510.
(2) Diameter of fertile branch with broadest portion of gonozoid 760—900.
(3) Distance between two subsequent series of autozoids 350—540.
(4) Diameter of aperture of autozoids 80—90.
(5) Diameter of aperture of gonozoid 110 × 160.

I have had an opportunity of examining about twenty fragments belonging, I suppose, to at least two or three zoaria. Seven of them were provided with gonozoids.

There was no proximal portion of a zoarium preserved, but one or two of the fragments had been fixed by part of their basal side to some foreign object. In these cases a "secondary" supporting disc had developed quite similar to the primary one as observed in other species. The conclusion will be that a supporting disc, composed of numerous kenozoids, exists at the base of the zoarium.

The secondary thickening is brought about, as usual, by one or more layers of kenozoids. The limits between the kenozoids are visible as whitish, somewhat elevated lines running about parallel at the basal side of the branches. Near the top of some of the branches this secondary layer is sometimes lacking.

The branches seem to be sparse, and as they are decidedly narrow the zoarium looks rather gracile. In cross-section the branches are almost circular and there is no trace of an edge separating the basal and frontal sides from each other.

The arrangement of the autocystids is the usual one in this genus. The cystids are small and narrow (cf. Measurements, 4), the connate ones with quadrangular aperture, while the aperture of the lateral ones is perfectly circular. The end portion of the lateral cystids is often a little prolonged, and the aperture faces laterally or frequently even in a latero-basal direction.

The gonozoid is of a somewhat unusual type. It originates often shortly before a bifurcation and forks with the branch; but frequently it occurs between two subsequent bifurcations, in which case the gonozoid does not reach the distal bifurcation or only just attains it, the tube and aperture being then placed in the bifurcation. As in other species of the present genus the gonozoid fills up the median space on the frontal side of the fertile branch, but as we see in Pl. 6, fig. 2, the branch is much broader where the gonozoid is situated and the middle portion of the gonozoid is strongly inflated. The paired lobes that have grown in between the series of zoids on both sides are of varying size. Sometimes they are small but in most cases they are broad, reaching until near the latero-basal edge.

The tube is in the distal portion of the gonozoid. It is not unlike that of the species next preceding but it is shorter and in all cases I have seen it is adnate to the base of the erect portion of the middle cystid but one. There is no distinct limit between the swollen portion of the gonozoid and the tube, the former passing gradually into the tube that narrows in its turn gradually as it approaches the aperture. The tube is curved so the aperture, which is a little larger than that of an autocystid, looks almost horizontally (Pl. 6, fig. 2).

The pseudopores are rather small, in transverse section circular. As usual the pores piercing the wall of the gonozoid are more numerous and a little larger than those of the autocystids. The pseudopores on the basal side of the zoarium are again smaller than those on the frontal.

There is a certain resemblance between the present species and the well-known *I. atlantica*, but they are by no means identical. I have had access to a rich material of *I. atlantica* from northern localities. A direct comparison gives the result that though the mode of branching is not disimilar and the branches are narrow in both species, the shape of the branches is different, being subtriangular in *I. atlantica* but almost circular in *I. hula*. The autocystids in the former species are much more protruding; the distance between the series is smaller in relation to the breadth of the stem; and the middle, dilated portion of the gonozoid is much longer but distinctly narrower than in *I. hula*. Further, the shape of the tube and aperture of the gonozoid is different in the two species.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 94. On the "back" side of the zoarium are colonies of *Terebripora irregularis* D'ORBIGNY.

5. **Idmidronea curvata** n. sp.

Pl. 5, figs 5 and 6.

Zoarium erect, branching dichotomously. Branches narrow, more or less curved backwards, subtriangular in transverse section, no sharp limit between basal and frontal side. Basal side slightly arched, partly covered by a secondary thickening layer, particularly in distal portion of branches. Where a gonozoid occurs, the branch is broader and its frontal side is somewhat flattened. Autozoids arranged in transverse series interrupted in the middle, each half series consisting of 3—5 zoids connate for almost the whole of their length, long and strongly protruding when uninjured, Innermost cystid of each half series the longest. Gonozoid situated just proximally of a bifurcation, not forking with the branch, or between two bifurcations; its middle portion well dilated and rather broad but relatively short, as long as four or five series of zoids; paired lobes stretching in between series well developed, often extending to the edge of basal wall. Tube of gonozoid long though not sharply set off from widened portion, gradually narrowing towards aperture, its base adnate to erect portion of innermost cystid but one, its distal half free and situated between two subsequent half series of autocystids, flattened from proximal and distal side. Aperture bilabiate, almost slit-like, looking upwards and, at the same time, a little proximally.

Measurements in μ.

(1) Transverse diameter of sterile branch 760—1 000.
(2) Transverse diameter of fertile branch 1 310—1 480.
(3) Distance between two series on one and the same side 420—630, exceptionally only 260.
(4) Diameter of aperture of autozoids 155—180.
(5) Diameter of aperture of gonozoid 220 × 110.

My material has been scarce, consisting of two young zoaria, rising each from a pro-ancestrula, and three broken fragments. One of the former has shortly after its origin given rise to another erect stem and is about to form a third one. These stems are seen in Pl. 5, fig. 5, while the larger of the two fragments is reproduced in fig. 6, of the same Plate.

The origin of the zoarium is that of a typical *Idmidronea*. In the larger of my zoaria the primary zoid is semi-erect in its distal half, and this is true of the three zoids immediately following as well; the first and third of these bend to the left, while the 2nd one just as the primary zoid curves to the right. Then follow the series. The first two or three half series consist of two zoids each, but the following ones comprise three and, later on, four zoids, while five zoids are not commonly found to compose a half series until more distally.

Simultaneously as the first series occur a supporting disc is formed through a layer of kenozoids growing out around the stem that from now on becomes erect (cf. Pl. 5, fig. 5). The disc extends at both sides; and to the right of the first stem another is formed from part of the edge of the disc. The zoids composing the disc are transformed here in their distal portions directly into autozoids constituting part of the first series. This process makes it difficult to state that there exist any permanent difference between autozoids and kenozoids. It reminds us of the fact that secondary stems may develop from rhizoids, *i. e.* from kenozoids, in Camptostega (cf. BORG 1926 b, p. 268) and from stolons, that are again kenozoids, in Ctenostomata Stolonifera.

On the left side of the first stem the rim of the supporting disc tends to form another stem, and here it can be distinctly seen that the disc consists of more than one layer, the uppermost one being composed of zoids of an almost "normal" appearance, while the basal layer contains small incipient cystids that are destined, in all probability, to give rise to the supporting disc of the future stem.

The other zoarium I have examined has come into existence in the same way as the larger one but the single zoids originated immediately after the primary one are more numerous here. After the 2nd zoid there follow six zoids close together which is probably due to some irregularity; as there are signs of a process of regeneration having taken place here one may suppose that the zoarium when quite young had been damaged but recovered. Two zoids with very long distal portions come to the right; and then, finally, the first half series are formed, with two connate zoids in each.

In one of the two fragments examined there is a small secondary supporting disc near the proximal end where the zoarium has been attached to a Hydroid's stalk.

The distal portion of the stem described first, viz. the original (primary) stem of the larger of the two zoaria, is curved backwards (Pl. 5, fig. 5) and the same is the case with both of the fragments examined; — which is the cause of the specific name. In all of the curved branches there are gonozoids, five in all; so it seems possible that the curving of the branches may be characteristic of the species or, at least, of its fertile stage.

On the basal side of the branches there are very distinct transverse lines indicating, in all probability, periods of growth, as in *I. obtecta* and other species.

There is no secondary thickening layer on the two youngest stems, but on the primary stem of the larger one of my zoaria and on the two fragments this layer is very distinct. On the primary stem just mentioned it is not developed from the supporting disc but is found instead in the distal half of the zoarium covering its basal side. It consists of an elongated network, the walls of which are white and coincide, partly at least, with the vertical walls of the cystids composing the basal wall proper. So far as I can judge, it has taken its origin in the common bud at the basal edge of the stem and is growing in a proximal direction along the zoarium's basal surface.

Though the autozoids are arranged in regular transverse series, the halves of which alternate with one another on each side of the median line, I have sometimes seen single zoids occurring. In these cases it always seems to be the innermost zoid of a half series that is detached from the others. In most gonozoids examined a single zoid is seen in the proximal half of the dilated portion of the gonozoid. It may be in about the middle of the stem or more to one side, thus nearer to one of the series. This is not the fertile zoid for this is transformed, as usual, into a gonozoid, but it is the innermost zoid of the series of which the fertile zoid (the gonozoid) is usually the innermost member but one. In one instance the gonozoid was instead the innermost member of its half series; then there was no single, detached autozoid to be seen. All autozoids of a half series are otherwise connate, as a rule, the terminal portions of the lateral ones not being detached as in the two species next preceding. The apertures of all autocystids face upwards and, at the same time, forwards.

The gonozoids are rather short but broad; and unlike what is found in most species of the genus no one of the five gonozoids I have seen forks with the branch. Otherwise the shape of the gonozoids is somewhat varying, the two situated just proximally of a bifurcation being shorter and broader than those that are in the distal portion of a stem. The tube with the aperture has its place at one side, between two subsequent half series that are closer together than the other series (cf. Pl. 5, fig. 6). The dilated portion of the gonozoid proceeds some distance distally of the tube the latter being situated at about 2/3 of the length of the dilated portion of the gonozoid.

The pseudopores in the walls of the autocystids are unusually sparse, both on the frontal and basal side, and in the erect portions pseudopores are seldom seen. In the wall of the dilated portion of the gonozoid they are much more numerous. All pseudopores are circular in cross-section, those of the autocystids are quite small, while those of the gonozoid are a little larger.

The present species seems to be well characterized by the appearance of its zoarium, by the shape and arrangement of its autozoids and, yet more, by its gonozoid. It probably comes near to *I. antarctica*, but the sharp edge between the frontal and basal side found in that species is absent here, the basal side is not flattened but arched, though rather slightly so, and the gonozoid is clearly different. The oval tube, the distal portion of which is free, and the slit-like, bilabiate aperture of the gonozoid make it impossible, I should think, to confound the present species either with any other form within the same genus.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 5. -- St. 94. On a *Flustra* and on the stalk of a Hydroid.

Fam. **Terviidae** CANU & BASSLER.

Syn.: *Terviidae* CANU & BASSLER 1920, p. 788. *Idmoneidae*, part., auctt.

The genus *Tervia* was founded by JULLIEN (1882, p. 500) for four species dredged in the Bay of Biscay (*T. superba, discreta, jolini,* and *solida*), all of which were new. At the same time JULLIEN expressed the opinion that *Idmonea irregularis* MENEGHINI (1844, p. 12) ought likewise to be referred to *Tervia.*

BUSK (1886, p. 14) who reported *Tervia irregularis* MENEGHINI as found by the "Challenger" off the Azores, thought that *T. jolini* was probably a synonym of *T. irregularis.* JULLIEN & CALVET (1903, p. 114) admitted the identity between the two species. Some years later CALVET (1906, p. 472) considered *Filisparsa pourtalesi* SMITT (1872, p. 9) as well to be probably identical with *T. irregularis,* in which I do not think he was correct; and NORMAN (1909, p. 280) was disposed to believe that two other of JULLIEN's species, viz. *T. solida* and *discreta,* "are also only conditions of *F. irregularis*". The fourth species, *T. superba,* was ranged by this author as a variety of *T. irregularis.* BASSLER (1935, p. 215), however, gives *T. solida* as the type-species of the genus *Tervia.*

CALVET (op. cit., pp. 472 f.) referred the whole of this assembly of species to *Filisparsa* instead of *Tervia* and he was followed in this course by NORMAN (op. cit., p. 279), while HARMER (1915, p. 143) and CANU & BASSLER (1920, p. 788) went back to *Tervia,* HARMER creating a new recent species (*T. jellyae*) which he placed within that genus, and CANU & BASSLER referring a number of new fossil species (as well as *Idmonea tumida* SMITT) to it. I see no reason whatever why *Idmonea tumida* SMITT should be placed in *Tervia.* The latter authors also instituted the family Terviidae, in which *Tervia* and the two fossil genera *Prosthenoecia* CANU (1918, p. 327) and *Lagonoecia* CANU & BASSLER (op. cit., p. 792) were placed.

The character by which *Tervia* was originally distinguished by JULLIEN (l. c.) was that the zoids, all opening on the frontal side of the zoarium, were "isolées ou disposées par séries transversales ou obliques sur les bords des branches, et dispersées sans ordre dans leur milieu". The descriptions that JULLIEN gave of his species were incomplete and in no one of the four cases the gonozoid was known; but WATERS (1884, p. 687) pointed out that in "*Idmonea*" *irregularis* MENEGHINI the gonozoid was "dorsal", *i. e.* that it was situated on the basal side of the zoarium; and later on he figured two gonozoids of MENEGHINI'S species (WATERS 1889 a, Pl. 14, figs 5, 6). A third gonozoid of the same species, equally dorsal, was reproduced by JULLIEN & CALVET (1903, Pl. 14, fig. 7). Fossil species of *Tervia* provided with gonozoids of the same kind have been figured by NEVIANI (1891, 1905) and by CANU & BASSLER (1920).

On the other hand, the gonozoid of *Tervia jellyae* HARMER (1915, pp. 143 ff., Pl. 11, figs 1—3) is in an axil between two branches. HARMER describes it as being "developed on the basal surface of the branch, extending into a bifurcation, in the angle of which is situated a short ooeciostome which may be visible in frontal view". It seems to me doubtful, therefore, owing to the position of its gonozoid, if *T. jellyae* should remain in *Tervia* or if a separate genus ought to be created for it.

The genus *Lagenoecia* CANU & BASSLER (l. c.) is characterized by its authors as having a symmetrical, globular gonozoid that is "suspended on one of the sides of the zoarium".

The well-known genus *Filisparsa* was founded by D'ORBIGNY (1853, p. 814) for erect, branching species with the zoids opening on the frontal side, the apertures being arranged in quincunx. From the description given it is further clear that the wall of the zoarium is simple, the genus being referable, consequently, to the Acamptostega. The species referred by D'ORBIGNY to *Filisparsa* are somewhat heterogeneous and there has been much uncertainty as to the circumference of the genus. The gonozoid was for a long time unknown, but BUSK says, describing his "*Hornera*" *tubulosa* (1875, p. 19; Pl. 18, figs 2—4), that it is situated on the frontal side of the branch and this is confirmed by WATERS (1884, p. 687) and by HARMER (1915, p. 143). WATERS refers the species in question to *Filisparsa*, but it seems uncertain if this is correct, though it is evident that the species does not belong to *Hornera*.

The genus *Prosthenoecia* of CANU (1918 a, p. 327) was described by its author as having the gonozoid "antérieure, tres allongée entre les fascicules d'un zoarium idmonéiforme". It was founded for *Proboscina* (*Reptotubigera*) *lateralis* D'ORBIGNY (1853, p. 846), which is a wholly adnate species. *Prosthenoecia* does not seem, therefore, to belong in the neighbourhood of *Tervia*, nor do I see any reason why it has been created at all.

The species described below does not seem to fit in with any of the genera hitherto known within Terviidae. The mode of arrangement of its autozoids is very decidedly that of a *Tervia* but the gonozoid is not basal nor it is placed laterally nor in an axis. Instead it is entirely frontal, though it is of quite another type than that characteristic of, for instance, Tubuliporidae and Idmoneidae. I feel it necessary, therefore, to form a new genus (*Nevianipora*) for it.

I should like to add that when I place the new genus in the Terviidae this is only provisionally. The position of the gonozoid as well as its structure seems to indicate that the creation of a separate family for it would be desirable, though the mode in which the autozoids are disposed is that of *Tervia*. If future researches show that *Filisparsa* is to be maintained — at present I am somewhat doubtful of this — and that its gonozoid is really frontal, it seems possible that *Filisparsa* and *Nevianipora* should be brought together in one and the same family (Filisparsidae).

Nevianipora n. gen.

Zoarium erect, branching dichotomously, branches flattened. Autozoids opening on frontal side of zoarium, disposed in transverse series not interrupted in the middle, instead there is a median zoid from which the row of zoids deviates at both sides in a lateral-distal direction, median zoid thus being a little more proximally placed than rest of series. Median autocystid with short distal portion, lateral cystids the longest. At bifurcations the serial arrangement of the zoids more or less disintegrated. Gonozoid occupying median part of frontal side of zoarium, usually just before a bifurcation, its middle, dilated portion deeply immersed, irregular in shape, with indistinct limits; aperture trumpet-shaped.

I have named this genus in honour of the celebrated Italian Bryozoologist Professor ANTONIO NEVIANI.

Though there is only one species referred to *Nevianipora* here, I have no doubt but that several forms, both recent and fossil, ought to be placed in it. In most cases they have hitherto been thought to belong to "*Idmonea*". Among such species "*Idmonea*" *rustica* D'ORBIGNY (1853, p. 731; cf. ORTMANN 1890, p. 60, Pl. 4, figs 22 a, b, c) ought to be mentioned here.

Nevianipora milneana (D'ORBIGNY) 1839.

Pl. 7, figs 3—5.

Syn.: *Idmonea Milneana* D'ORBIGNY 1839, p. 20, Pl. 9, figs 17—21; 1853, p. 732; *Idmonea milneana* RIDLEY 1881, p. 56; CALVET 1904, p. 36; WATERS 1905 b, p. 249; ? *Idmonea Milneana* MACGILLIVRAY 1882, p. 29, Pl. 68, figs 1, 1a, 1b; 1887, p. 217; ?? *Idmonea milneana* SMITT 1872, pp. 8 f., Pl. 3, figs 14—17; ? *Idmonea milneana* BUSK 1875, p. 12, Pl. 11, figs 1—4; 1879, p. 198, Pl. 10, figs 15, 16; 1886, pp. 13 f; nec *Idmonea Milneana* WATERS 1889, p. 279, Pl. 14, fig. 8; nec *Idmonea Milneana* CALVET 1906, p. 469. For further synonymy, cf. CANU & BASSLER 1920, pp. 773 f.

Zoarium large and robust, erect from the first zoids, fixed to the substratum by strong supporting pillars composed of kenozoids produced from basal side. Stem flattened, narrow when compared with its length, slightly broadening distally, its distal edges usually broadest. Branching often though not always in one plane, dichotomous, rather frequently repeated; branches occasionally though not commonly anastomosing. Autozoids arranged to form transverse series across stem, five to nine abreast; their terminal portions, on the frontal side of the zoarium, assume such a position that there is one cystid in the middle of the stem from which the other cystids deviate at each side; cystid in middle line of stem situated a little more proximally than lateral ones, which are somewhat obliquely arranged, the most lateral one, on each side, being at the same time the most distal one, to the effect that each series of zoids forms, on the frontal surface of the stem, a V open distally; median cystid shortest, most lateral one on each side the longest, its free distal portion, when uninjured, protruding considerably above level of surface of zoarium, curving in the direction frontally and, at the same time, a little laterally. Sometimes the arrangement deviates from that described, median cystid being situated more proximally to the rest of the series. Frontal surface of autocystids pierced by numerous pseudopores; limits between cystids distinct, while free from pores. Basal side of stem even, thickly porous, with distinct concentric transverse ridges. Gonozoid rather small, visible from frontal side only, usually occupying fertile branch before a bifurcation; its dilated portion irregular in shape, indistinctly limited, deeply immersed; tube of gonozoid short, free, trumpet-shaped with an oval aperture.

Measurements in μ.

(1) Diameter of stem in basal portion of zoarium 1 000—1 120.
(2) Diameter of branch 1 mm from top 1 350—2 000.
(3) Diameter of fertile branch with gonozoid 1 280—1 750.
(4) Diameter of autozoid at base of its free, distal portion 330—410.
(5) Diameter of uninjured aperture of autozoid 220—270.
(6) Diameter of aperture of gonozoid, outer 220—300 × 160—200, inner 120—130 × 70—80.

When examining this interesting species I have had a large amount of material, consisting of numerous fragments of two or more fertile zoaria. Many of the fragments are large, being 20—30 mm in length, and there are seven gonozoids in all.

A well-developed zoarium is in all probability 5 cm or more in length, spreading almost horizontally in different directions from basal portion of stem. It is fixed to the substratum not only by the pro-ancestrula but by a varying number of supporting pillars, each consisting of about half a dozen kenozoids wholly adnate to one another, the ensemble of them thus forming the pillar. Sometimes such a pillar may branch.

The primary zoid is half erect almost from the point where it proceeds from the pro-ancestrula. A second and a third zoid are then developed side by side, becoming likewise half erect, and these two zoids form together with the primary one the incipient suberect stem. Their free end portions are long, forming about half of the cystids' total length and the apertures face upwards. The first supporting pillar, composed of but few kenozoids, grows out, as a rule, from the "back" side of these two zoids, fixing them in a half erect position to the substrate, from which they are otherwise free, except of course at their base. Then follow two more zoids abreast, with long free tubes directed upwards. The third series consists of three zoids, again with long free terminal tubes. In the fourth of the transverse series constituting the stem the free tubes are shorter, and this is true for all the following series as well. The fourth series is formed by three zoids, two bending to the left and one to the right of the median line. The next (5th) series is composed of four zoids, of which three are to the left and one to the right of the median line. The number of transverse series with three and with four zoids may vary, however, in different stems. As growth continues the number of zoids in a series soon augments to five, which is a frequent number in the older portions of a zoarium, while more distally there are often seven or sometimes even more zoids constituting a series (Pl. 7, fig. 3).

Irregularities in the arrangement of the zoids are rather frequent and it often happens, particularly, that the two halves of a series are not level but more or less distinctly alternating with one another.

The transition from the adnate to the erect portion of the cystids is a gradual one. The cystids of each half series are usually adnate to one another though not quite up to the rim of the aperture. The end of the outermost cystid of a series protrudes in most cases, being longer than that of its neighbour, which, in its turn, is a little longer than the cystid at its inner side, and so on. The erect portion of the middle cystid is quite short. Where a bifurcation occurs, the series are sometimes more or less disintegrated, the distal portions of all or most cystids in this region being free and arranged irregularly; but this is not the case at all bifurcations.

On the whole the arrangement of the zoids is such that the frontal side of the stem is arched, though not strongly so, sloping gently at both sides from the middle line, which is marked by a longitudinal row of zoids being the median zoids of the transverse series (cf. Pl. 7, fig. 3). This is in strong contrast with what occurs in the Idmoneidae, where each series is split up into two halves, as we know, there being no median zoid.

The horizontal portions of the autocystids are thick-walled, but the distal, erect ones have thin walls becoming gradually thinner towards the aperture. This when uninjured is circular or transversely oval. The pseudopores are in the horizontal parts of the walls of the autocystids extremely thickly scattered, while in the erect tubes they become gradually more sparse nearer the aperture. All the pseudopores are quite small and the ducts are circular in shape.

When studying a longitudinal section of a stem it is easy to see that the zoids take their origin along the basal side of the stem, growing obliquely upwards and forwards, new zoids being formed continually at the basal side of the old ones. The top of a stem is cut off, as it were, transversely (cf. Pl. 7, fig. 3) and is filled up by incipient zoids, the oldest ones situated as usual near the frontal edge and the youngest at the basal one. The latter are small and very numerous and it is evident that many of them do not develop into full-grown zoids. Instead they become stunted in their growth and become finally closed being thus transformed into a kind of kenozoid. It is possible that the supporting pillars develop from such kenozoids, though I have no direct evidence of that. There is a possibility that the tubes composing the pillars grow out from autozoids instead.

The concentric lines visible on the basal side of the stems (Pl. 7, fig. 4) probably indicate the limits between the different portions of the zoarium formed during two subsequent periods of growth. Sometimes it is very obvious that regeneration has started from such a line, the basal layer of kenozoids having become closed at the same time. The regenerative process may comprise the whole width of the stem or else only part of the stem has been regenerated. Sometimes the regenerating zoids have grown out obliquely, not to mention other irregularities that may occur. I suppose that each of the concentric lines mark off in most cases at least the growth of a year. If this is true, most of the fragments examined represent the growth of several years and a colony must be assumed to reach a rather considerable age. There is nothing, so far as I can see, to speak against that assumption.

The gonozoids are situated, as a rule, a little below a bifurcation. It will seem that they are far from frequent as there are remarkably few gonozoids among my material, a great many stems being deprived of them. Perhaps the time when the colonies were taken (15 sept.) may have been unsuitable.

The type of gonozoid represented in the present species (Pl. 7, fig. 5) is rather peculiar, reminding somewhat of the type characteristic of the Frondiporidae (cf. Borg 1926 b, p. 380, Text-fig. 81). As in these the gonozoid is deeply immersed, the inflation of its frontal wall being, on the other hand, only slight. As is natural, the occurrence of a gonozoid causes some irregularity in the arrangement of the autozoids, those surrounding the developing gonozoid being forced to alter more or less their course in order to make room for it. It seems to be the innermost zoid of a half series, *i. e.* the zoid nearest to the median one, to the right or to the left, that is transformed into a brood-chamber. Its proximal portion can be followed proximally in between the autozoids and it is of almost the same appearance as these. It widens rather suddenly, thus passing into the middle, dilated portion which sends one or two pairs of lobes in between two or three subsequent series of autozoids. These lobes are remarkably small and proceed but a short distance in between the series, that seem never to be enclosed by them. The limits of the dilated portion of the gonozoid are, moreover, remarkably indistinct.

The trumpet-shaped tube that proceeds from about the middle of the frontal side may face in different directions, proximally, distally, or to one side, but it is always free, not adnate to any neighbouring autocystid. The end of the tube is distinctly outflared, forming a thin rim round the oval aperture (Pl. 7, fig. 5).

There can be no doubt as to the correctness of the determination of this species. I have examined D'ORBIGNY's material in the Museum d'Histoire Naturelle, Paris, and so far as I can judge, the specimens here described are identical with those of D'ORBIGNY, the deeply immersed gonozoid, occurring in the Museum specimen nr 13743 *bis* and noticed by WATERS (1905 a, p. 12; 1905 b, p. 249) proximally of a bifurcation being identical with that just characterized above. The fig. 19, Pl. 9, in D'ORBIGNY's work (1839) gives a good representation of the arrangement of the autozoids, and the median zoids characteristic of the transverse arrangement of the zoids in the present species are well seen. It is possible that MACGILLIVRAY (1882, l. c.) has seen this species, as his figures (Pl. 68, figs 1 a, 1 b) come rather near to it. On the other hand it seems probable to me that SMITT (1872, l. c.) has described and figured another species of the same genus under the name of "*Idmonea*" *milneana*, the stem being narrower, as it will seem, and the gonozoid, though frontal, belonging to another type as it is traversed by several autozoids. To judge from the figures given by BUSK (1875, Pl. 11, figs 2, 3) of what he thinks to be "*Idmonea*" *milneana* it seems not probable that the specimens examined by this author are identical with those of D'ORBIGNY; or the figures are bad.

WATERS (1889, Pl 14, fig. 8) figures a specimen from the Mediterranean (Capri) that is clearly not identical with *N. milneana* as the gonozoid that is frontal seems otherwise to be very different, not being immersed but with its outlines quite distinct. There is no tube or aperture visible. From the figure it is impossible to decide if the specimens should be referred to *Nevianipora* at all. I do not think that *N. milneana* occur in the Mediterranean.

During a visit in Paris I have re-examined a specimen brought home by the "Travailleur" et "Talisman" Expedition and termed *Idmonea milneana* by CALVET (1906, p. 469). This is not identical with the present species.

Occurrence: Swedish Expedition to Patagonia in 1895—96: Cape Valentyn, 150 fathoms, dead shells, R. M. nr 278.

Swedish Antarctic Expedition 1901—03 — St. 59 — St. 60.

Distribution: Falkland Islands, from considerable depths (D'ORBIGNY 1839); Smyth Channel, Long Island, 8 fathoms; Magelhaens Strait, Punta Arenas (CALVET 1904); off Cape Horn (WATERS 1905 b, p 249); ? Tierra del Fuego and Patagonia; Chonos Archipelago (DARWIN; *fide* BUSK 1875); ? Kerguelen (BUSK 1879); Tom Bay, near Madre de Dios Islands, S. W. Chili, 0—30 fathoms (RIDLEY 1881, p. 56); ? Port Phillip Heads, Victoria, S. Australia (MACGILLIVRAY 1882).

Nevianipora milneana var. CANUI n. var.

Pl. 7, figs 6—8.

Syn.: ?? *Filisparsa superba* WATERS 1904, p. 91.

Zoarium a narrow, erect stem, branching dichotomously though not frequently, oval in transverse section, broader and more flattened at bifurcations, not broadening distally. Transverse series of autocystids composed as a rule of four units, one middle, two bent to one side and one to the other. Just before a bifurcation the number of zoids constituting a series may be a little larger, amounting to five or six. The middle autocystid, the shortest one, situated a little more proximally than the other ones. Autocystids of a half series often detached from each other distally, their free, erect portions of varying, sometimes of a considerable length. Basal side of zoarium with indistinct transverse ridges. Gonozoid situated between two bifurcations or in distal portion of branch, rather small, elongated, unlobed, its roof arched, tube free, transversely oval, aperture trumpet-shaped.

Measurements in μ.

(1) Diameter of stem between two bifurcations 500—750.
(2) Diameter of stem at bifurcation 1 000—1 200.
(3) Diameter of fertile branch with gonozoid 910.
(4) Diameter of horizontal portion of autozoid at base of erect, distal portion 260—290.
(5) Diameter of uninjured aperture of autozoid 220—250.
(6) Diameter of aperture of gonozoid, outer 320 × 220, inner 130 × 90.

The material I have been able to examine consists of a dozen fragments, one of which was fertile.

I have long been doubtful whether the present form ought to be incorporated in *N. milneana* or whether it should be ranged as a separate species. That certain specimens of a species are distinctly smaller than normal is not quite unusual among Stenolaemata, *Crisina radians* f. *minor*, for instance, being a fine example of this. On the other hand, a comparison with the typical *N. milneana* shows that not only is the stem much narrower and the number of zoids forming the series smaller (cf. Pl. 7, fig. 8), but the branching does not seem to be so frequent and the long narrow branches are often curved and do not become broader at their distal end. Further, the autozoids are not arranged in quite the same way, the middle zoid being separated more distinctly, as a rule, from the lateral ones. Where there are two or even more cystids in a half series, their erect portions are often not detached from each other until some distance above the surface of the zoarium. The free portions of the cystids, whether single or detached, are often rather long and even the middle cystid may be provided with a free tube of some length (cf. Pl. 7, figs 7, 8).

Much weight must be ascribed to the position and shape of the gonozoid. I have seen but two gonozoids. One of these is in a broken branch, probably near its base, and the other near the distal end of the same branch. Thus neither of them is at a bifurcation. The distal gonozoid is unlobed and pear-shaped, reminding of that of some species of *Crisia*. There are two half series, each composed of two autozoids, on both sides of it and adnate to it. The aperture is not yet fully formed, though its transversely oval shape is unmistakable. The other gonozoid is situated a little to one side, with three autozoids on one side and one on the other. It is remarkably small, unlobed, with an arched roof, in the middle of which the tube proceeds. Its rim is much outflared so as to form a trumpet-shaped aperture facing distally.

To judge from the two gonozoids described it will seem, thus, that though the type of gonozoid is much the same as in *N. milneana*, there are some differences that cannot be neglected. A future study of a richer material will show whether these differences occur permanently or not.

For the present I think it best, owing to the facts reviewed, to range the form here characterized as a variety of *N. milneana*.

As WATERS (l. c.) has not given any description nor any figure of what he calls *Filisparsa superba* JULLIEN, it is impossible to say whether it is identical with the present form or not.

Occurrence: Swedish Expedition to Patagonia in 1895—96: Cape Valentyn, 150 fathoms, dead shells. R. M. nr. 278.

Swedish Antarctic Expedition 1901—03. St. 17.

Fam. **Hastingsiidae** n. fam.

Zoarium erect, irregular in shape, zoids single or in fascicles, opening on frontal side of stem or at top or, in occasional cases, on basal surface of stem. Gonozoids in axils. Kenozoids, or autozoids prematurely closed, may occur.

The species which I have referred here to the genus *Hastingsia* have so many characters in common and are, on the other hand, separated from all other Acamptostega known in so many respects, that it seems to me best to create a separate family for them, as I know of no other family to which they should be referable.

Genus **Hastingsia** n. gen.

The only genus.

Among the three species here described the two, viz. *H. irregularis* and *H. pygmaea*, are obviously rather nearly related while the third one, *H. gracilis*, is well separated from them and would, perhaps, better be placed in a separate genus within the Hastingsiidae. My material has been too sparse to enable me to settle that question.

I have not much doubt that some species of "*Filisparsa*" might better be placed with *Hastingsia*.

I have named the new genus (and family) in honour of Miss ANNA B. HASTINGS, the well-known English Bryozoologist.

1. **Hastingsia irregularis** n. sp.

Pl. 8, and Text-fig. 10.

Zoarium from a *Tubulipora*-like base erect, fixed by means of a supporting disc irregular in shape, soon dividing into two or usually into several stems branching in their turn one or more times, dichotomously or irregularly, in more than one plane. Stems in their proximal portions compressed from right and left but becoming gradually broader distally, their distal ends more or less flattened from frontal and basal sides. Each stem composed of about twenty long and slender zoids clustered together, the limits of those nearest surface of zoarium well visible from all sides of stem. Where a bifurcation occurs, the cluster of zoids may fork into two almost equal halves, but it is very common that branches detach themselves containing only a small part of a cluster. Such small branches may divide or not, but as a rule they soon cease to grow. Sometimes, particularly in distal portion of zoarium, a stem may split up simultaneously into three or four branches. Autocystids opening on frontal side of zoarium only, their distal portions protruding to a very variable degree above frontal surface, being disposed neither in transverse series nor in quincunx but wholly irregularly as it will seem. Most cystids clustered together in small fascicles constituted each of 2—5 units, as a rule, but single cystids occur frequently between fascicles. Frontal surface of zoarium between autocystids and fascicles of autocystids formed by cystids that have been closed at an early stage. Basal side shows limits between cystids very distinctly, no secondary thickening layer being present. Gonozoid wedged in between two or more branches of an axil, in distal portion of zoarium, unlobed, about conical in shape, its proximal end forming the apex of the cone. Tube very short, protruding from distal surface of dilated portion of gonozoid, adnate to base of end portion of an autozoid at one side of gonozoid. Tube of gonozoid strongly curved so the oval or, sometimes, almost semilunar aperture faces about horizontally.

Measurements in μ.

(1) Height and width of well developed zoarium 6 700 × 9 800.
(2) Diameter of stem in proximal portion of zoarium 570—820.
(3) Diameter of flattened distal portion of stem 1 000—1 230.
(4) Diameter of aperture of autozoid 140—150.
(5) Diameter of aperture of gonozoid 130—150 × 80—90.

There is a rather large material consisting of about a dozen complete zoaria, some of which are fertile, and of numerous fragments.

The species is very characteristic but as it is extremely variable in shape it is not an easy task to give an adequate description of it.

The pro-ancestrula is of the ordinary type and the primary zoid is adnate in its proximal portion but semi-erect in its distal half, where it is underlayered by new zoids beginning to develop. This is distinctly seen in the youngest of my colonies counting only three zoids. The primary zoid may be bent to one side but this is not always the case, it being sometimes straight or nearly so.

New zoids are developing rapidly and the young zoarium becomes, therefore, swiftly broader. At both sides of it a layer of kenozoids grows out, forming the beginning of a supporting disc; and at the same time the zoarium becomes erect (Pl. 8, fig. 2). The creeping, *Tubulipora*-like base consists always of but few zoids, usually of about half a dozen. These are not arranged in series or fascicles nor in any other definite way. It is common that one or more of the zoids are detached from the others, giving rise to another erect stem or sometimes two. These are smaller, as a rule, than the first one, and growing more horizontally. The origin of other erect stems does not take place until at a somewhat later stage; they develop, then, from those already existing.

The supporting disc (Pl. 8, fig. 2) consists of a simple layer of kenozoids of about the same width as the autozoids but much shorter than these. All or, at any rate, most of the kenozoids are closed. New kenozoids are intercalated at the edge of the disc by fission of the interzoidal septa. In well-developed zoaria the disc is relatively large, fixing the zoarium well to the substratum. This seems to consist, as a rule, of some narrow, cylindrical subject (a stem of a Cellariid, the stalk of some Hydroid, etc.). The disc never gives rise to kenozoids growing up the basal side of the stem, this not being covered by any kind of a secondary thickening layer. Instead, the wall being semitransparent, the individual cystids and the limits between them are very distinctly seen.

The mode of branching is varying. Sometimes it may be rather regularly dichotomous, reminding of that of some species of *Hornera*, as in Pl. 8, fig. 1; but commonly it is much more irregular with large and small branches alternating (Pl. 8, fig. 4) or it may be seemingly wholly without order (Pl. 8, fig. 5).

The irregular arrangement of the autozoids can hardly be understood, I think, until we take into consideration the structure of the distal ends of the branches and the processes occurring there. The ends of the branches are flattened (Pl. 8, figs. 3, 4) and the polygonal openings of incipient cystids occupy usually not only the top but a good deal of the frontal surface as well. In these cases the frontal surface slopes slightly towards the top like the end of a wedge. As a consequence of this the distal end of such a branch is unusually flat, forming the edge, as it were, of the wedge and consisting, sometimes, of merely one or two layers of cystids. Contrary to what is otherwise the case there is no sharp limit then between the frontal side and the top or budding region of the branch.

While the cystids at the top are all open, this is often not the case with the frontal ones, the apertures of which may be closed by means of a semitransparent, porous, calcareous diaphragm. Only few cystids form an exception to this, being continually open. Some of the open cystids are single but most of them are in clusters, two or more together. At first all apertures, closed or not, are at one and the same level, but while the closed cystids cease growing, the open ones continue to do so. In this way single cystids and clusters of cystids protruding considerably from the frontal surface come into existence. Between them, forming the rest of the surface but at a lower level, are the other, closed cystids, the limits of which, while being free from pseudopores, are very easily distinguishable.

It deserves to be noticed that the arrangement of the autozoids is subject to much variation. The incipient cystids may be more or less parallel to the stem and sometimes they are almost wholly longitudinal, opening at the top of the branches mainly, in which case there are, consequently, but few closed apertures at the frontal surface of the zoarium, most of them being situated in the axils.

I am uncertain whether the closed zoids ought to be taken as kenozoids or not. From what I have seen in other Stenolaemata, I think it probable that they have contained a polypide when young and yet open and that, therefore, they should be regarded as autozoids prematurely closed.

In shape the autocystids are long and slender, their endportions when free almost perfectly cylindrical but, when in clusters, more or less polygonal. The aperture, which is circular when wholly uninjured, is of moderate size (cf. Measurements, 4).

The gonozoids (Pl. 8, figs. 4—9) are characteristic both as to their position and their shape. They are found in the distal portions of the zoaria, as a rule, but to judge from the material available they are rather sparse. Owing to their position in the axils they are visible both from the frontal and the basal side but cannot be said to belong to either of them (Pl. 8, figs 6—9). The type represented by the gonozoid is simple. Each gonozoid is almost wholly wedged in between the neighbouring branches, only its distal surface and parts of the frontal and basal ones (between the branches) being free. In one case I have seen two gonozoids, closely adnate to each other, in one and the same axil. The proximal portion of the gonozoid passes gradually into the middle one which is rather moderately dilated. It has no lobes as a rule, and it is only exceptionally that an autocystid is surrounded by it. The tube seems always to be adnate either to a single cystid or to a unit of a fascicle (Pl. 8, fig. 6).

The pseudopores are circular and rather numerous. In the wall of the gonozoids they are as usual much more densely scattered than in those of the other zoids. Where the interzoidal walls reach the surface there are no pores as a rule. Here and there the pores are in transverse rows but usually they are placed irregularly.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 5. — St. 6. — St. 7. — St. 88. — St. 94.

2. **Hastingsia pygmaea** n. sp.

Pl. 9, figs 3—6.

Zoarium erect, small and narrow, zigzag-shaped, branching irregularly. Stem formed of a bundle of about ten long and slender zoids. Autozoids open on frontal side of stem single or, sometimes, in small bundles two or three together, each bundle usually split up at top into its components; no distinct limit between frontal and basal side; exceptionally a zoid of a bundle is detached opening laterally or even on basal side of stem. Autozoids with long, protruding end portions, especially in axils; apertures circular. Closed zoids between ordinary ones seldom occurring. Gonozoids in distal portions of zoaria, wedged in between the autozoids of an axil, visible both from frontal and basal side, unlobed, about conical in shape; tube distinct, adnate with its proximal half to one of the neighbouring autozoids. End portion of tube free, directed horizontally; aperture of gonozoid facing the same direction, transversely oval in shape.

Measurements in μ.

(1) Length of zoarium (Pl. 9, fig. 5). 6 600.
(2) Width of another zoarium (Pl. 9, fig. 4) 6 200.
(3) Breadth of zoarium (Pl. 9, fig. 4) 460—580.

(4) Breadth of another zoarium (Pl. 9, fig. 6) 270—310.
(5) Diameter of aperture of autozoids 125—140.
(6) Diameter of aperture of gonozoid 140 × 80.

The material I have had an opportunity of examining consists of ten zoaria, some of which were fertile, and of a few fragments. I have seen four gonozoids in all.

The zoaria are in many respects similar to those of the species immediately preceding though they are much smaller and more gracile than these. The early stages are much the same, however, and the zoarium becomes erect after a few creeping or half erect zoids have formed the base for the erect colony. On both sides of the *Tubulipora*-like initial stage there are a number of kenozoids growing out so as to form a well-developed supporting disc (Pl. 9, fig. 4). So far as I have seen, the kenozoids are invariably closed and new ones originate through fission of the interzoidal septa all around the edge of the disc.

When the zoarium is still quite young, a branch is developed often growing in an almost opposite direction to that of the rest of the zoarium (Pl. 9, fig. 4). Otherwise the branching seems to be restricted mainly to the distal portion of the zoarium and even there it is usually sparse. It is very irregular so it is not easy to find out any rules for it.

The branches are more high than broad though the difference in the two dimensions is not great. I have seen zoaria where the bundle of zoids composing the stem opens on the frontal side proper only, but it is rather common that a torsion, more or less pronounced, of the bundle around its own axis takes place and that, as a result of this, the zoids of the bundle open laterally or even at the basal side of the zoarium or that some of them do so. It may also occur that one or two zoids of a bundle are detached from the rest and open laterally or basally. I should like to point out, however, that it is not often that any apertures are found on the basal side. It is by no means probable that because of the arrangement of the zoids the species should be considered as nearly related to the Entalophoridae. So far as I can judge, it is simply an instance of the irregularity in structure so characteristic of the present genus.

As a rule the zigzag-shape of the zoarium is rather obvious and the apertures of single zoids or, sometimes, of whole bundles are at the curves of the zigzag-line (Pl. 9, figs 3—5). Most or, in many zoaria, all apertures are, however, on the frontal side (cf. Pl. 9, fig. 4). Here the zoids are usually free from the bundle, their end portions projecting freely. Sometimes and, especially, where there are several zoids close to one another, these are relatively short, but in many, perhaps in most cases they reach a considerable length, strongly protruding above the surface of the branch (Pl. 9, fig. 4). The disposition of the zoids is often very irregular but sometimes one can ascertain an arrangement in transverse rows across the stem, but without the rows being interrupted in the middle line, as in the Idmoneidae.

A bundle may become detached distally into single zoids, but here and there small bundles of zoids remain, consisting often merely of two or three individuals. These small bundles are then detached in their turn near the top into single zoids opening rather close to one another. The apertures when uninjured are almost perfectly circular (Pl. 9, figs 4—6).

Closed autozoids forming part of the frontal surface of the stem seem seldom to occur. I have seen but very few in each zoarium; and in some small zoaria I have observed none.

The gonozoid (Pl. 9, fig. 6, gz) is of the same type as in the species preceding. It has the same position too, being wedged in between two branches, as a rule, at or near the top of the zoarium. So far as I have observed, it is always unlobed, about conical in shape. The tube is near the edge of the distal surface and is always adnate, in its proximal half, to one of the zoids surrounding the gonozoid (Pl. 9, fig. 6). The tube is longer and more distinct than in the preceding species. In one of the specimens the tube is straight and the aperture almost circular, but in the majority of cases it is curved so the aperture faces horizontally or almost so. Usually the aperture is transversely oval (Pl. 9, fig. 6, gzap). In one case its rim is outflared, bilabiate. My material is too sparse to allow me to decide which condition is the more common; but as the gonozoid with a straight tube and a circular aperture seems to have gone through one or more processes of degeneration and regeneration, I suppose it is as a result of these that the tube and aperture in this case are of a somewhat deviating shape.

The pseudopores are rather small and numerous, circular in shape. Those in the wall of the gonozoid are as usual a little larger and more thickly scattered; they are more often longitudinally oval than circular.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 34. On the stalk of a Hydroid, on a stone, and on a simple Ascidian.

3. **Hastingsia gracilis** (MacGillivray) 1883.

Pl. 10, figs 1—3.

Syn.: *Fasciculipora gracilis* MacGillivray 1883, p. 292, Pl. 1, fig. 2; 1887, p. 220; 1888 (MacCoy), p. 213, Pl. 157, figs 1, 1a.

Zoarium erect, rather large, tuft-like with a narrow base. Branching in proximal portion of zoarium sparse, dichotomous, in distal portion rich and irregular, all branches straight and close together while directed more or less upwards. Stem and branches compressed from both sides and, therefore, much higher than broad. Each branch composed of a varying number of long, slender autozoids disposed longitudinally. Some of them curve frontally and open, single or in small bundles, on frontal side of zoarium but most apertures are at distal end of branches, these apertures all facing upwards. Free distal portions of autocystids of very varying length, sometimes short but sometimes very long. Between the open autocystids here and there, at a much lower level, closed ones occur, though these are usually but few, being restricted mainly to axils. Gonozoids always in axils, wedged in between two or more branches, visible both from frontal and basal side, conical in shape, with an arched roof. Tube extremely short, adnate to a cystid of one of the bundles surrounding gonozoid, at base of its protruding portion; aperture semi-ovate, facing upwards.

Measurements in μ.

(1) A portion of a well-developed zoarium (Pl. 10, fig. 1) has a height of 13 000.
(2) Its main stem measures, near base of zoarium, 800 × 1 300.
(3) Distally its total breadth (the ensemble of branches inclusive) is 14 000.
(4) Diameter of aperture of autozoids 160—190.
(5) Diameter of aperture of gonozoid 80 × 200.

My material has consisted of a dozen fragments of rather different dimensions. The largest fragment is measured (cf. Measurements, 1—3) and is reproduced in Pl. 10, fig. 1. It represents, in my opinion, probably the greater portion of a zoarium. But as the base is not preserved and as there seems to be a branch broken near the place where the main stem divides into two, it may well be possible that the zoarium was much larger and that the fragment alluded to represents merely one of the main branches. The other fragments are smaller, but, so far as I can judge, their structure and mode of branching indicate that the zoarium or zoaria to which they have belonged were rather large.

The present species is easily distinguished from those preceding. The mode of branching is another and more definite, the very rich branching in the distal portion, where the branches split up more and more while all directed upwards, is very characteristic. To mention one example, a branch divides distally into three bundles (one with six zoids and two with three zoids each) and one single zoid. Another branch gives origin to three separate bundles, one of which splits up further into two; — and so on. The result is that the whole of the distal portion of the zoarium is occupied by a great number of larger and smaller bundles of zoids and single zoids close to each other (Pl. 10, figs 1—2). The bundles or clusters are often split up at the top in single cystids, the free end portions of which are, as a rule, rather short. On the other hand, the free portions of those cystids that are situated between the clusters are in most cases of a very considerable length. The ensemble of zoids and bundles has a rather characteristic semi-transparent and almost glassy appearance when seen through the magnifying lens.

It must not be forgotten, however, that other cystids — though representing a smaller part of the total number — open on the frontal side of the stem and branches. These zoids are often single though it may happen that they are in bundles of two or three or sometimes even more zoids together. They are curving softly in a frontal direction, the apertures looking more distally than frontally.

Between the open autocystids, here and there, are closed ones forming part of surface of the zoarium. I have observed, both on the frontal side and at the distal end of many branches, that some of the autocystids — either single or forming part of a cluster — are closed by means of a calcareous diaphragm. Sometimes the end portion of such a cystid is shorter than those of its neighbours. A thorough inspection gives the result that there are stages transitory between closed autocystids the end portion of which still remains and others where this is broken down so that their end is level with the surface of the branch. I think this must be taken as conclusive evidence that the closed cystids in the present species are not true kenocystids but autocystids that have for some reason been closed prematurely and that have previously contained a functional polypide.

The gonozoids are usually situated in the distal portion of the zoarium, but I have seen one or two more proximally placed as well. One of this kind is shown in Pl. 10, fig. 2. It is wedged in, as we see, between the two main branches of the fragment figured, and there is, in addition, a bundle of two connate cystids, on the third side of it. The position of the gonozoid is typical, not only for the present species but for the whole genus. Its dilated portion is unlobed (Pl. 10, fig. 3) and there are no autocystids nor any bundles of such traversing it. The tube is always closely adnate to a cystid at the edge of the gonozoid's distal surface. Both in shape and position it reminds of the tube of some species of *Crisia* and, just as in that genus, there is a very distinct valve marking the limit between the middle, dilated portion and the distal one (the tube). Where the tube is adnate to a cystid, this may be somewhat depressed.

The pseudopores in the walls of the autocystids, whether open or closed, are numerous, small, circular in shape. In the walls of the gonozoids they are a little larger and yet more numerous. In both cases they are arranged quincunxially or irregularly.

The coincidence between the species here described and that diagnosed and figured by MACGILLIVRAY (l. c.) under the name of *Fasciculipora gracilis* is so obvious that I suppose there can be little doubt that the two are identical, though the gonozoid of MAC GILLIVRAY's species is unknown. That it is not referable to *Fasciculipora* is quite evident, as the autocystids open not only at the top of the branches but on the frontal side as well, which is seen from one of MACGILLIVRAY's own figures (1883, Pl. 1, fig. 2; 1888, Pl. 157, fig. 1 a) though he does not mention it in the text. It may further be added that the gonozoid is of quite another type than in *Fasciculipora*.

MACGILLIVRAY says (without giving any measurements) that the zoarium is small but that depends wholly upon its age. To judge from MAC COY's Pl. 157, fig. 1 (1888) which is said to be drawn in natural size, it measures about 6 × 11 mm. Many Stenolaematous species are considerably smaller.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 5.

Distribution: Port Phillip Heads, Victoria, Australia (MACGILLIVRAY).

Fam. **Entalophoridae** REUSS.

Syn.: *Entalophoridea*, part., REUSS 1869, p. 285; *Entalophoridae* PERGENS & MEUNIER 1886, p. 19 (201); GREGORY 1896, p. 137; HARMER 1915, p. 107; BORG 1926 b, p. 184; BASSLER 1935, p. 10; *Idmoneidae*, part., BUSK 1875, p. 10, 1886, p. 8; *Mecynoeciidae* CANU 1918, p. 326; CANU & BASSLER 1920, p. 722; *Pustuloporidae* and *Pustuliporidae*, auctt.

Zoarium after a quite short, adnate, Stomatoporidan stage erect, cylindrical or more or less flattened, usually branching dichotomously; autocystids long, for the greatest portion of their length forming part of stem, their distal portions free and opening all around stem and branches, apertures disposed in quincunx or spirally or in annular series or, sometimes, irregularly. Gonozoid situated somewhere on surface of stem, often at or near its distal end; middle portion of gonocystid dilated, of varying shape, sometimes traversed by autocystids.

The erect stem with the cystids opening all around is a tolerably good characteristic of this family. The disposition of the apertures may otherwise vary a good deal. In *Entalophora* LAMOUROUX they should be in quincunx (cf. LAMOUROUX 1821, p. 81, Pl. 80, fig. 11), while in *Spiropora* LAMOUROUX they are in a spiral or disposed in transverse or oblique circles around the stem (LAMOUROUX, op. cit., p. 47, Pl. 73, figs 20,22; DE BLAINVILLE 1834, p. 421). These characters, however, are so variable that I do not think it possible always to say, if a certain species ought to be referred to one or the other of the two genera, and there are many instances where authors have placed a species in *Entalophora* that should correctly have been referred to *Spiropora* or the reverse. WATERS (1884, p. 680) noticed an annular disposition of the autozoids in one portion of a zoarium (of what he calls *Spiropora conferta* REUSS) and a quincunxial one in another; and I have seen some instances of the same kind. A gonozoid has, so far as I am aware, never been found in *Spiropora*. I think it would be best not to maintain two separate genera on account of the arrangement of the apertures of the autocystids; it would then be best to drop *Spiropora*.

On the other hand there seem to exist at least two groups of (recent) species within the Entalophoridae. In one the autozoids are large and the gonozoids are not traversed by any autocystids. The zoaria are composed of autozoids and gonozoids only, kenozoids occurring only quite occasionally, as, for instance, in the axils; and it would probably be more correct to designate these zoids as autozoids stunted in their growth owing to the position they have happened to acquire. In the other group the autozoids are smaller and more numerous, the gonozoids are very strongly dilated in their middle portion which is traversed, as a rule, by numerous autocystids, and there is a layer of small kenozoids forming the surface of the zoarium through which layer the distal ends of the autozoids protrude.

For the former group the genus *Entalophora* is here maintained, while for the latter one a new genus, *Bientalophora*, is proposed.

Gregory (1899, p. 217) thinks that the Entalophoridae are closely related to the Diastoporidae because in some species of the former family the erect stems grow from a *Diastopora*-like expansion. There are other species, however, in which the basal expansion is similar to an early stage of a *Tubulipora* or a *Stomatopora;* and, moreover, there are hardly any other erect members of the Acamptostega in which the earliest stages of the zoarium are not similar to those of one or the other of the three genera mentioned. This indicates, I think, that the erect Acamptostega can be traced from simple, incrusting forms but does not necessarily imply their being nearly related to a certain genus among them.

Entalophora Lamouroux.

Syn.: *Entalophora* Lamouroux 1821, p. 81; 1824, p. 322; d'Orbigny 1853, p. 777, part.; MacGillivray 1887, p. 219; Gregory 1896, p. 137; 1899, p. 216; Lang 1906, p. 462; Harmer 1915, p. 107; Borg 1926 b, p. 184 and others; *Spiropora* Lamouroux 1821, p. 47, Pl. 73, figs 19—22; *Intricaria* Defrance 1822, p. 546; *Ceriopora*, part., Goldfuss 1826, p. 32; *Cricopora* de Blainvile 1834, p. 420; *Pustulopora* Milne Edwards 1838, p. 219; Roemer 1840, p. 22 part.; Michelin 1844, p. 210; Reuss 1848, p. 41; Busk 1875, p. 20; 1886, p. 18; auctt.; nec de Blainville 1830, p. 382; 1834, p. 418; *Pustulipora* von Hagenow 1851, p. 16 auctt.; *Clavisparsa* (part. ?) d'Orbigny 1853, p. 775 (*Cl. clavata*, Pl. 621, figs 8—12); ? *Pergensia* Walford 1894 a, p. 73; ? *Cisternifera* Walford 1894 b, p. 80; *Mecynoecia* Canu 1918, p. 326; Canu & Bassler 1920, p. 722; *Diaperoecia*, part., Canu 1918, p. 329; Canu & Bassler 1920, p. 740.

Genotype: *Entalophora cellarioides* Lamouroux 1821, p. 81, Pl. 80, fig. 11 (fossil, Bathonian of France).

Zoarium erect, branching dichotomously; branches cylindrical or nearly so, composed of autozoids and one or more gonozoids. Kenozoids lacking or occurring only occasionally in axils. Autozoids large, opening all around stem. Gonozoids with their middle portion moderately dilated, not traversed by any autozoids or only exceptionally so.

A very large number of species, both recent and fossil and particularly of the latter kind, have been referred to *Entalophora*. After the creation of *Bientalophora* as a separate genus a large assemblage of species yet remains. In most of these the gonozoid is unknown and the description is incomplete in other respects as well. It will afford a large amount of work before they have been brought tolerably in order.

As Harmer has pointed out (1915, p. 108) some of the specific names have been used for both recent and fossil species, but it is extremely difficult to decide if or how far this procedure is justifiable.

LANG (1906, pp. 462 ff.) has given a key to the published figures of the Cretaceous forms of *Entalophora*. It is very valuable, including 48 species in all and giving a good impression of the almost hopeless state of confusion in which, in the first place, the fossil species are.

I am doubtful if *Pergensia* and *Cisternifera* WALFORD (l. c.) are to be regarded as synonyms of *Entalophora* or not. The zoarium of *Cisternifera*, particularly, seems not to be different from that of a typical *Entalophora*. As to the Cheilostome affinities of these genera supposed by WALFORD, they do not seem very probable; at any rate a renewed investigation is necessary in order to prove the correctness — or the contrary — of this supposition.

1. **Entalophora proboscidea** MILNE EDWARDS **var. watersi** n. var.

Pl. 10, fig. 4.

Syn.: *Pustulopora proboscidea* BUSK 1886, p. 19, Pl. 4, figs 1, 1 a, 1 b; *Entalophora proboscidea* WATERS 1904, pp. 91 f., Pl. 9, figs 4 a, 4 b; *Entalophora proboscidea* WATERS 1905, p. 247; *Entalophora proboscidea* BORG 1926 b, p. 184; ? *Entalophora proboscidea* HARMER 1915, pp. 108 f., Pl. 10, fig. 12; ? *Mecynoecia proboscidea* CANU & BASSLER 1929, pp. 531 f., Pl. 80, figs 7—9.

Zoarium consisting of a straight, rather narrow, cylindrical stem and branches composed usually of 4—6 zoids; branching sparse, dichotomous. Autocystids long and unusually large, their free distal portions at rather considerable distances from each other, moderately long, forming an angle of about 65° to rest of cystid; frontal side of autocystids, forming part of surface of stem, flattened, with thickly scattered pseudopores; limits between autocystids on surface of stem very distinct. Gonocystids with their middle portion dilated, piriform, unlobed, forming an inflation on surface of stem; tube and aperture at distal end of inflation.

Measurements in μ.

(1) Diameter of stem 840—880, of branches 500—560.
(2) Breadth of autozoids forming part of surface of stem 240—360.
(3) Diameter of aperture of autozoids 160—210, average 180.

The material I have had access to has been rather poor, consisting only of half a dozen fragments of at least two zoaria. Unfortunately, neither of these was provided with a gonozoid, nor was the basal portion preserved. As for the latter one WATERS states (1914, p. 841) that the zoarium of *E. proboscidea*[1] "grows from a multiserial *Stomatopora*-like base, which often spreads for some distance before the erect growth commences". In "*Mecynoecia*" *proboscidea* of CANU & BASSLER (l. c.) the base is said to have "the *Proboscina* growth form".

The stem and branches are almost perfectly straight, and the branching, as represented in my fragments, is a very regular dichotomous one, though it may sometimes happen that one of the branches is more strongly developed than the other.

The dimensions of the autocystids are larger than in most other Stenolaemes. In

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[1] It is a little uncertain which species is meant by that designation (cf. below).

one of the zoaria, some of the cystids had become detached so it was possible to measure their total length. This was 3,3—3,5 mm, which is more than is usually found. It was further to be observed, that for the greater part of that length the cystid formed part of the surface of the zoarium. An autocystid measuring 3,50 mm, for instance, had been part of the surface of its branch for a length of 2,40 mm, *i. e.* for a little more than $^2/_3$ (70 %) of its total length. This part of the cystid was of an almost uniform breadth throughout, while the part that was not visible on the surface of the stem was narrowing swiftly towards its end.

The free distal portions of the autocystids are very often broken or damaged. Where this is the case, the aperture is transversely oval, the cystid being somewhat flattened. Uninjured tubes are straight, forming a very distinct angle to the rest of the cystid, and their aperture is circular. In length the free tubes are somewhat varying, as is natural. The longest tube I have seen was 430 μ, but I should not like to state that the tubes cannot sometimes be longer; the one measured, which was uninjured, I think however to be rather typical for normal autozoids.

A figure given by WATERS (op. cit., Pl. 9, fig. 4 b) shows that some of the autocystids may have very long free distal portions that do not form as distinct an angle to the stem as is normally the case, and in another figure by HARMER (op. cit., Pl. 10, fig. 12) of what is perhaps a specimen of the present species some cystids of the same type are visible too, the distal portions of which are rather irregularly arranged. In all probability these cystids have degenerated and then regenerated again, because of which they are not typical for the species.

It is interesting to note that some of the zoids are stunted and ought possibly to be designed as kenozoids. These are the zoids situated in the axils. The proximal portion of such a cystid is very narrow while the distal one is, on the other hand, unusually broad, the whole cystid being closed. These cystids probably never contained a polypide, but as it is their position in the zoarium that has made them stunted, not any special function they have to fulfill, I think it better to treat them as abnormal autozoids than as kenozoids. Should the latter term be used, then all abnormal and closed zoids — and such can be found in the zoaria of many species of Bryozoa — must be considered to be kenozoids, which would not be very appropriate.

The limits between the individuals composing the stem and branches, *i. e.* between the parts of them visible on the surface of the zoarium, are easily ascertained mainly because they are quite free from pseudopores; and as the vertical walls separating the cystids from one another are relatively thick, zones deprived of pseudopores very easily ascertained thus come into existence, limiting the flattened frontal area of each cystid from its neighbours.

The pseudopores, which are relatively very numerous, are scattered irregularly. In the free distal portions they become as usual gradually more sparse nearer the aperture. In transverse section the pore-ducts are mostly circular or, sometimes, longitudinally oval. It is easy to observe that the calcareous frontal wall pierced by the pseudopores is of considerable thickness, just as is the case with the vertical ones. On the whole the present species must be said to be a strongly calcified one.

The interzoidal pores, putting the cavities of the different zoids in communication with one another, are much fewer than the pseudopores and especially near the proximal end of the cystids they are sparse. They are distinctly larger than the pseudopores, in shape mostly decidedly oval but in exceptional cases almost circular.

As I have not seen any gonozoids I can say nothing about their structure and position. What is stated in the diagnosis above as to the gonozoid is taken from Waters (op. cit.), who gives a figure (Pl. 9, fig. 4 b) that one should have wished a little more detailed.

Describing the gonozoid drawn by him, Harmer (op. cit.) points out that "there has been an interruption in the continuity of the growth of the ovicell" and that "another sudden change in the direction of growth is indicated by a kind of collar present near the base of the ooeciostome". Both these structures are well seen in the figure in question (1915, Pl. 10, fig. 12). I should think that they are due to two subsequent processes of degeneration and regeneration of this gonozoid.

When describing originally his *Pustulopora* (*Entalophora*) *proboscidea*, Milne Edwards (1838, p. 219; Pl. 12, fig. 2) referred to it some recent specimens from the Mediterranean and the figure given is drawn from such a specimen. Since then, many recent and fossil specimens from very different parts of the world have been identified with *E. proboscidea*. It would seem, then, that *E. proboscidea* was a cosmopolitan species (cf. Waters 1905, o. 247) but I am not so sure about that, many of the identifications having been made upon rather insufficient grounds.

Waters identified specimens from the Antarctic proper (1904, p. 91) and from off Cape Horn (1905, p. 247) with *E. proboscidea* M. Edw. and I have followed him in this (1926 b, p. 184), but I am not quite satisfied now that this determination was correct. Waters says that "the Antarctic specimens are thicker than most of the Mediterranean ones" and when comparing the specimens examined by me with the figure given by Milne Edwards (l. c.), though it seems obvious that they belong to one and the same group of species within the genus I have the impression that in Milne Edwards' specimens there are more zoids abreast, that their free distal portions with the apertures are closer together and that these portions do not form so distinct an angle to the rest of the cystid as is the case in the specimens before me. On the other hand the coincidence is very close between my specimens and those described and figured by Waters. I think it best, therefore, to consider the specimens in question, since they seem not to be identical with the Mediterranean ones, as belonging to a separate variety. This may well turn out, by direct comparison of specimens from the different localities, to represent a separate species, but it is impossible at present to settle that matter.

I am doubtful whether the specimens referred by Harmer (l. c.) to *E. proboscidea* are really identical with this species or whether they are instead identical with the Antarctic variety or even with both, for it seems possible to me that Harmer has had more than one species before him (cf. Harmer, op. cit., p. 110). Or they may possibly represent a separate species, nearly related to the two other ones.

The "*Mecynoecia*" *proboscidea* of Canu & Bassler (l. c.) I should think is probably identical with Harmer's species or with part of it. If this is correct, it speaks in favour of the supposition that this species is another than that of Milne Edwards (cf. Milne Edwards, op. cit., Pl. 12, fig. 2, and Canu & Bassler, op. cit., Pl. 80, fig. 8).

Occurrence: Swedish Antarctic Expedition. — St. 6.

Distribution: Off Heard Island, 75 fathoms; off Prince Edward Island, 80—150 fathoms (Busk 1886, p. 19); Lat. 70° 23′ S, Long. 82° 47′ W, 480 m, + 0,8° C;

Lat. 70° 00′ S, Long. 80° 48′ W, 500? m, + 0,9° C (Belgian Antarctic Expedition, WATERS 1904, p. 92); off Cape Horn (WATERS 1905, p. 247).

2. **Entalophora buskii** nom. nov.

Pl. 10, fig. 5.

Syn.: *Entalophora proboscidioides* BUSK 1886, pp. 19 f., Pl. 4, figs 4, 4 a, 4 b; nec *Entalophora proboscideoides* SMITT 1872, p. 11, Pl. 4, figs 26 and 27 (= *E. smittii* PERGENS 1887, p. 7).

Zoarium composed of long cylindrical branches, dividing rather frequently dichotomously, each branch constituted of 6—10, usually 8 zoids. Autocystids long and large, their free distal portions softly curving outwards and, at the same time, forwards; apertures arranged in quincunx or, rather frequently, two or three abreast; frontal side of autozoids forming part of surface of zoarium for a considerable distance, more or less distinctly arched, particularly in younger portions of zoarium, with thickly scattered pseudopores; gonozoid unknown.

Measurements in μ.

(1) Diameter of stem 880—1 000, of branches 630—760.
(2) Breadth of autozoids forming part of surface of stem 250—350.
(3) Diameter of apertures of autozoids 220—250, average 230.

The material I have had an opportunity of examining consists of several fragments, some of them presumably from one and the same zoarium. The largest of the fragments measures 16,5 mm in length and is forked four subsequent times, while the others, of which no one is more than 15 mm, are forked one single time or unforked. The basal portion of the zoarium is lacking and in none of the fragments there is a gonozoid. Nevertheless, I have felt obliged to give the species a new name, for I think it clear that the specimens described by BUSK (l. c.) as *E. proboscidioides* cannot be considered identical with those so named by SMITT (l. c.).

So far as can be judged from the material examined by me it is obvious that it comes near to *E. proboscidea* (var. *watersi*), though it does not seem to be identical with it. HARMER, who has seen part of the Challenger material of *E. proboscidioides* BUSK, says (1915, p. 110) that the specimens in question "have some resemblance to the 'Siboga' specimens", but he does not think they are identical. In this I presume he is right.

Even with the naked eye it is easy to see that the branches are coarser in the present species than in *E. proboscidea* var. *watersi* (cf. Pl. 10, figs 4 and 5). In sufficient magnification it is further ascertained that the stems are composed generally of a larger number of zoids than in the species just named, amounting to eight as a rule, while in *E. proboscidea* var. *watersi* four or six is the number in most cases.

The branching seems to be more frequent in *E. buskii*, and in the largest of my fragments the stem is zigzaging from one bifurcation to the other (Pl. 10, fig. 5, to the left). Sometimes the two branches originating through a bifurcation are of equal strength, but often one is stronger than the other (Pl. 10, fig. 5).

The soft curving of the free distal portion of the autocystids is also characteristic of the present species. Another feature that was noticed by BUSK (op. cit.) is that the apertures of two or three zoids are at about the same height or form an oblique series across the stem, thus reminding somewhat of the condition prevailing in *Spiropora,* if that genus ought to be maintained. The cystids are about as large as in *E. proboscidea* or even a little larger.

The limits between the different cystids are yet more distinct than in the species just mentioned which should be explained by the fact that the calcified walls separating the cystids are thicker than in this. The pseudopores whose ducts can be seen piercing the thick, semitransparent, calcareous, frontal wall stand therefore close together in the median zone of the frontal wall. The pore-ducts are small and circular in cross-section, except near the distal ends of the branches, where they are a little larger and slightly oval.

As HARMER (l. c.) has pointed out, the branches in *E. buskii* look more cylindrical than in *E. proboscidea.* This is due to the fact that the frontal areas of the individual cystids are usually arched, though there is a certain variation as to this character. Where it is well developed it strengthens the impression that the pseudopores are close together in the median zone of the cystids' frontal areas.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 17.

Distribution: off Marion Island, 50—75 fathoms (Challenger Exp., BUSK 1886, p. 20).

3. Entalophora australis (BUSK) 1852.

Pl. 11, figs 1—2; Text-fig. 11.

Syn.: *Pustulopora australis* BUSK 1852, p. 350; *Pustulopora australis* BUSK 1875, p. 21, Pl. 17 A, left fig.; *Entalophora australis* MACGILLIVRAY 1887, p. 219.

Zoarium somewhat irregular in shape, composed of a rather narrow stem and several branches proceeding dichotomously or in an irregular way; stem formed of usually 7—9 zoids abreast; number of zoids composing branches increasing distally and attaining 14—18 at end of well-developed branches; shape of branches therefore incrassate, with truncate ends or split up into numerous zoids diverging in different directions. Autocystids large and long, for the greater part of their length partaking in forming surface of stem and branches, but free distal portions long, forming about a third as a rule of the length of visible portion of autocystids, though sometimes nearly half of it. Frontal surface of autocystids flattened or more or less arched, with thickly scattered pseudopores and separated from neighbours by distinct lines. Gonozoids in distal half of branches, often at a bifurcation or, most often, at or near end of branches, wedged in between autozoids diverging in different directions; its middle portion strongly dilated though moderately inflated, with small lobes proceeding in between neighbouring autozoids but as a rule not wholly surrounding them; tube of gonozoid rather long, for the greater part of its length adnate to an autozoid or situated between two autozoids, slightly trumpet-shaped towards its end; aperture transversely oval.

Measurements in μ.

(1) Diameter of stem 940—1 010.
(2) Diameter of branch near top 1 160—1 430.

(3) Breadth of part of autozoids partaking in forming surface of stem 380—440.
(4) Length of free distal portions of autozoids 650—1 150, average 900.
(5) Diameter of apertures of autozoids 240—310, average 270.
(6) Length of tube of gonozoid 410.
(7) Diameter of aperture of gonozoid 260.

There are three fragments, probably from one and the same zoarium. The basal portion of the zoarium has not been preserved, but there are four gonozoids, two in the largest of the fragments and one in each of the other two.

The smallest of the three fragments, about 7 mm in height, begins with a narrow stem, that soon divides into two. One of these remains relatively small, while the other becomes distally considerably broader, bifurcating anew near its distal end, a fully developed gonozoid occupying the centre of the incipient branches (Pl. 11, fig. 2).

The other fragment is a little shorter (5 mm), the narrow stem being quite short, but it is strongly broadening distally, bifurcating here into two broad branches, one of which gives rise in its turn to two and the other to three smaller branches that have only just started their development. A little proximally of the first fission is a gonozoid which extends into the two branches formed.

The third fragment (Pl. 11, fig. 1) is 11 mm in height. Its basal portion is formed by a narrow stem that later on divides into two. One of these gives rise almost immediately to two branches, while the other splits up at the same time into no less than five. The three medial of these are quite small, but the lateral ones have grown out some distance. All these branches are diverging at all sides from the centre. Just where the splitting up into five branches takes place, in one of the two stems, is a gonozoid, and one of the lateral branches is provided with another, while in another branch (of the other stem) there is an incipient gonozoid.

From the description given we arrive at the conclusion that the fragments characterized here represent parts of the distal portion of a zoarium or possibly of two or three. The rest of the stem, proximally of the portions preserved, must be assumed to have been rather narrow. The branching, as demonstrated by the fragments described, is remarkably irregular, contrary to what is the case in species preceding.

The arrangement of the autozoids just as that of the branches is somewhat irregular. Sometimes two or more of the apertures are at about the same height, thus reminding of the arrangement in *Spiropora*, but usually they are placed in quincunx or scattered irregularly. At the end of the branches the distal portions of the cystids are often more or less detached from one another, protruding in different directions. This is particularly true where several branches arise about simultaneously, which seems to be a common occurrence in the present species.

Owing to the arrangement of the zoids it is only natural that the free distal portions of the cystids are of very varying length. They may be short, but this is unusual. At the ends of the branches, on the other hand, they may be sometimes very long, especially when surrounding a gonozoid (Pl. 11, fig. 1). The arrangement in the latter case reminds, to a certain extent, of that known to occur in *Crisiella producta* (SMITT) (cf. BORG 1924, pp. 14 ff.), though there is no torsion of the stem in *E. australis*.

The autocystids are the largest I ever saw in any species of *Entalophora* (cf. Measurement, 5, 7). The limits between them are free from pseudopores and are, therefore, very distinct. Otherwise the pseudopores are very numerous though nearer the apertures they become gradually more sparse. In shape they are oval. In the free distal portions of the autocystids they are sometimes arranged, partly at least, in somewhat indistinct transverse rows, while in the rest of the cystids they are irregularly scattered.

A description of the gonozoids has been given in an earlier paper of mine (1926 b, p. 368, and Text-fig. 73) to which I may refer here. The figure quoted, showing the distal half of a gonozoid, is completed here by Text-fig. 11, in which a whole gonozoid is drawn. As for the pseudopores, these are as usual more numerous in the walls of the gonozoids than in those of the autozoids.

Busk, when describing his *Pustulopora australis* (1852, p. 350), says that the surface is "minutely papillose, summits of papillae of a dark brown or black colour". It is difficult to say what is intended by this description; but we may remember that another Stenolaematous species (*Hornera foliacea* MacGillivray) is described by the same author (1875, p. 19) as having "numerous delicate spines projecting into the fenestrae"; later on (1886, p. 17) he states, that these spines were spicules of some sponge encrusting the zoarium. I think the case is probably a similar one here, though I am unable to say what kind of foreign matter the "dark papillae" may represent (Diatoms?). In the zoaria examined by me there is no trace of any structure like that alluded to by Busk, but in an old and worn fragment of *Idmidronea obtecta* the pseudopores are marked out by small brown spots formed by minute unicellular Algae encrusting the zoarium.

It is interesting to note that two of the three fragments of the present species examined by me are infested by a boring Ctenostome, reminding of *Harmeriella terebrans* that I have recently described (1940, pp. 424 gff.). There are several round holes through the calcareous walls, and here and there the small Ctenostome is seen to extend through the aperture of a cystid.

As the gonozoid of *E. australis* was unknown until described by me and as the diagnosis given by Busk (l. c.) for *E. australis* was rather incomplete, it is of course impossible to say for certain that the material described here is really referable to Busk's species. I think, however, that this is the case because the mode of branching and the arrangement of the zoids noted by Busk are characteristic of the specimens before me as well. If by direct comparison the Australian and the Subantarctic specimens should turn out to be distinct, on the other hand, then my material represents in all probability a new species.

Locality: Swedish Antarctic Expedition 1901—03. — St. 94.

Distribution: "Bass Strait, 45 fathoms; and elsewhere in the Australian seas" (Busk 1852, p. 350); Victoria (MacGillivray).

4. ? **Entalophora intricaria** (Busk) 1875.

Syn.: ? *Pustulopora intricaria* Busk 1875, p. 22, Pl. 10, figs 1, part., and 4.

There are some small fragments from St. 60, one of which is rather similar to that reproduced by Busk (op. cit., Pl. 10, fig. 4). This is the only reason for the identification ventured here.

Measurements in μ.

(1) Diameter of stem 1 300.
(2) Diameter of branch 1 500.
(3) Diameter of autozoid forming surface of stem 330—410.
(4) Diameter of aperture of autozoid (probably damaged) 170—220.

The material does not contain the basal portion of any zoarium nor is there any gonozoid. The fragments look like *E. buskii*, though the number of cystids in a cross-section is a little larger, being usually 12. Several apertures may be found at about the same height all round the stem, but in other cases the apertures are but two or three abreast, or they may form a spiral around the stem, as in typical *Spiroporae;* sometimes, finally, they are simply arranged in quincunx.

The cystids are deeply immersed but they are not ventricose, as stated by BUSK (l. c.). As for the free distal portions I can say nothing with certainty, because the material is too much damaged for that. There are no kenozoids, and the specimens represent in this respect as in others typical individuals of *Entalophora.*

Whether the specimens here described are identical with *E. intricaria* (BUSK) must be considered uncertain on account of both the fragmentary condition of my material and the incompleteness of the diagnosis given by BUSK. On the other hand I do not think this to be the same species as that termed *E. intricaria* by WATERS (1904, p. 842) and by HARMER (1915, pp. 112 f.) and well described by the latter author.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 60.

Distribution: ? South Australia (BUSK 1875, p. 22).

Bientalophora n. gen.

Pl. 11, figs 3 and 4.

? *Claviclausa* + *Clausa* D'ORBIGNY 1853, pp. 889, 893.
Syn.: *Pustulopora*, part., MACGILLIVRAY 1883, p. 292; BUSK 1886, p. 21; *Entalophora*, part., MACGILLIVRAY 1887, p. 219; WATERS 1905, p. 247.

Zoarium erect, branching repeatedly, branches originating through forking of stem; zoarium composed of autozoids, kenozoids, and gonozoids. Kenozoids smaller and shorter than autozoids, always closed, numerous, forming greatest part of surface of zoarium. Autozoids protruding through layer of kenozoids, distal portions of their cystids arranged in quincunx or spirally, opening all around stem. Gonozoids with middle portion large, strongly dilated, traversed by numerous autocystids; distal portion seemingly not terminal.

The zoarial structure of *Entalophora regularis* MACGILLIVRAY is so different from that of the species described above as belonging to *Entalophora* that I think it necessary to refer it to a special genus. It is hardly possible to use any of the genera placed by D'ORBIGNY in his family Tubigeridae, as these were founded upon quite other characteristics, nor have I found any other suitable genus existing.

As for D'ORBIGNY'S two genera *Claviclausa* and *Clausa* (l. c.) it seems to me evident that they should be united into one. As they are both characterized by the occurrence, between the distal portions of the autocystids, of "des cellules avortées, fermées", it is possible that one of them ought to have been used instead of *Bientalophora.* PERGENS

(1889, p. 357) says, however, that *Claviclausa* (and *Clavisparsa*) represent merely the young stage of *Clausa* (and *Cavea*) and seems inclined to consider them as related to the Heteroporidae. Therefore, until this question has been settled through a renewed investigation, it seems to me best, in order to avoid confusion, to use a new generic name for the recent species here described.

Bientalophora is separated from *Entalophora*, above all, through the regular existence, in the former genus, of kenozoids forming the greatest part of the surface, through which layer the autocystids protrude at all sides. This gives a very different aspect to the surface of the zoarium, when compared with species where kenozoids do not exist. Another character worth noticing is the shape of the gonozoid and the position of its tube and aperture.

1. **Bientalophora regularis** (MacGillivray) 1883.

Pl. 11, figs 3—4; Text-fig. 00.

Syn.: *Pustulopera regularis* MacGillivray 1883, p. 292, Pl. 1, figs 3, 3 a *Pustulopora regularis* Busk 1886, p. 21; Pl. 4, figs 2, 2 a; *Entalophora regularis* MacGillivray 1887, p. 219; *Entalophora regularis* Waters 1905, pp. 247 f., Pl. 29, figs 10—14; *Entalophora regularis* Borg 1926 b, pp. 184, 293 ff., 368 ff., Text-fig. 74.

Zoarium large, dividing repeatedly dichotomously; branches cylindrical or, sometimes, more or less flattened, the latter being the case particularly, as a rule, where a gonozoid is developed. Autozoids moderately large, distal portions of their cystids passing through layer of kenozoids, terminal ends rather short but protruding freely all around stem. Kenozoids numerous, forming elongated network on surface of zoarium. Gonozoids in distal portion of flattened branches, their middle portion very much dilated, gently convex, covering a considerable portion of surface of fertile branch, pierced by numerous autozoids but not by kenozoids; distal portion an extremely short tube situated at a rather long distance from distal rim of gonozoid, adnate to a neighbouring autocystid or wedged in between two autocystids. Aperture looking obliquely upwards, transversely oval in shape, its rim somewhat outflared.

Measurements in μ.

(1) Diameter of stem 1 140—1 350.
(2) Breadth of flattened fertile branch 1 680—2 120.
(3) Diameter of visible portion of autozoid at base of free distal portion 220—260.
(4) Length of free distal portion of autozoids 270—350.
(5) Diameter of apertures of autozoids 140—170, average 150.
(6) Diameter of kenozoids 90—140.
(7) Greatest breadth of middle dilated portion of gonozoid 2 150.
(8) Diameter of aperture of gonozoid, outer 280 × 190, inner 220 × 140.

There was a rather large amount of zoaria in somewhat different stages brought home by the Swedish Antarctic Expedition. Some of them are incrusted by Sponges or overgrown by Hydroids, Foraminiferans, zoaria of *Stomatopora eburnea*, some Cheilostomes and several other organisms, while others are relatively free from epibionts and, therefore, easier to examine.

In one of my colonies the greatest part of the basal, adnate portion, fixing the zoarium to the substratum, is preserved. It begins with some zoids arranged in the same way as those forming the proximal portion of a creeping *Tubulipora* but rises suddenly so as to form an erect stem. From the other side of this a number of zoids are growing downwards and, having attained the substratum, spread out into a semicircular disc. In all probability the zoids constituting the disc are to be regarded as kenozoids.

The branching is frequent but, at the same time, regular, the stem forking into two branches of equal strength, which soon divide again in precisely the same way (Pl. 11, fig. 3). The stems and branches are usually cylindrical, with rounded or slightly pointed ends, but sometimes the distal portions of the branches are flattened (Pl. 11, fig. 4), and it is in branches of the latter kind that gonozoids are found. It is probable that the broadening of a branch is a sign that it is on the verge of dividing into two. Most gonozoids I have seen are situated, as a matter of fact, just proximally of a bifurcation. As a rule, the gonozoid does not bifurcate with the stem, but in one case this has happened, the lobe following one of the branches that is larger than the other.

The surface of the zoarium is characterized by the layer of kenozoids making it much more even than in the species preceding. While in *Entalophora* the larger portions of the autocystids are visible on the surface of the stem composed by them, this is not the case in the present species, the autocystids being covered here by the kenocystids. The only part of the autocystids that remains visible, in *Bientalophora regularis*, is the distal portion ("peristome") that protrude right through the layer of kenozoids by which the aspect of the zoarium becomes very different from that in *Entalophora*. Both autozoids and kenozoids are well seen in the budding region at the top of the branches as is shown in fig. 4, Pl. 11, though in 1926 (BORG 1926 b, p. 293) I failed to reveal the real significance of the small incipient zoids seen near the edge of the budding zone. The "lamina" spoken of by WATERS (1914, p. 842) as covering the surface of the zoarium in the present species and seen in sections I think may possibly represent the outer wall of the ensemble of kenozoids.

The autozoids are not so large as in the species of *Entalophora* treated above and the distal portions that protrude freely at an almost right angle to the stem are uniformly rather short (cf. Measurements, 4). Here and there the free distal tube of an autocystid is broken down and the cystid is closed by means of a calcareous diaphragm pierced by pseudopores.

The kenocystids are varying in size but they are always much smaller than the autocystids (cf. Measurements, 6). The vertical walls separating them are remarkably thick, which contributes to make the cavities of the kenocystids smaller than otherwise.

The pseudopores are quite small, circular in shape. They are numerous and thickly scattered. The vertical walls are free from them and therefore the limits both of the kenocystids and of the distal portions of the autocystids protruding from between them are well marked. In some cases the pseudopores form a single or double row along the vertical wall limiting the protruding part of an autocystid, but this seems not to be a common arrangement.

The gonozoid, which is very characteristic, has been described and figured in a former paper of mine (1926 b, pp. 368 f., Text-fig. 74) to which I may refer here. As usual the pseudopores are yet more thickly placed in the walls of the gonozoids than in those of the autocystids and kenocystids. It may be noticed that autozoids only but not kenozoids traverse the dilated portion of the gonozoid.

The gonozoid is similar to that in *Entalophora intricaria* (BUSK) as described by HARMER (1915, p. 113; Pl. 10, fig. 14). So far as I can see from the description and the figure given by that author there do not exist any kenozoids in this species and the same becomes evident when studying BUSK's figure of one of his type-specimens (1875, Pl. 10, fig. 4); otherwise it ought to have been referred to *Bientalophora* as well. The gonozoid figured by HARMER (l. c.) is, moreover, so similar to that of the present species that one could think the two species were identical, which is decidedly contradicted, however, by the description given by BUSK (op. cit., p. 22). On the other hand WATERS says that there is a lamina in *E. intricaria* (1914, p. 842) and if this represents, as has been supposed above, the outer wall of a layer of kenozoids, the species should perhaps belong to Bientalophora after all. The explanation may probably be, that HARMER's species is not identical with that of BUSK (cf. BUSK, op. cit., Pl. 10, fig. 4, and HARMER, op. cit., Pl. 10, fig. 14); further, HARMER himself points out the possibility that there are two different species enclosed among his material and represented by the figures 13 and 14 of his Pl. 10 (op. cit., p. 113, note). The principal justification for the determination of the "Siboga" specimens in question was, according to HARMER (l. c.), the statement of WATERS (l. c.) that "the ovicells are wide with the zooecial tubes passing through" in *E. intricaria*. It is far from certain, however, that WATERS' species is identical with that of BUSK. The "Siboga" specimens are "more delicate than those described by BUSK and may belong to a distinct species" (HARMER, l. c.) or, possibly, to two. I suppose that the specimens of WATERS and HARMER (or, at least, part of the latter ones) are identical but that BUSK's *E. intricaria* represents another species.

As for the species of *Bientalophora* described here and identified with *Entalophora regularis* (MACGILLIVRAY) I am not sure that the identification is correct, as the gonozoid was not described either by MACGILLIVRAY nor by BUSK (1886). The main cause for the identification was the obvious resemblance, to judge from the description and figures by BUSK (l. c.), between the specimens before him and those examined by me though BUSK has not seen any kenozoids. The branches are said to end "in a short fork", which of course only refers to the actual condition of some specimens, the branches of which have just begun to bifurcate. Both MACGILLIVRAY and BUSK state that the species in question is probably closely allied to *Entalophora subregularis* D'ORBIGNY 1850, p. 267; 1853, p. 790, Pl. 621, figs 16—18; Pl. 622, figs 15—17), a Cretaceous fossil from France, or perhaps even identical with it. I see no obvious reason for that supposition.

Localities: Swedish Antarctic Expedition 1901—03. — St. 59. — St. 60.

Distribution: (?) Port Phillip Heads S E. Australia (MACGILLIVRAY 1883, p. 292); (?) "off East Moncoeur Island, Bass Strait, 38 fathoms, sand and shells (BUSK 1886, p. 21).

Fam. **Corymboporidae** SMITT.

Syn.: *Corymboporidae* SMITT 1867, p. 407; *Frondiporidae*, part. + *Corymboporidae* BASSLER 1935, pp. 12, 15.

Zoarium wart-like or erect; cup-shaped, branched or cylindrical; zoids radiating from centre in fascicles or connate throughout; gonozoid between two fascicles, if any.

The family Corymboporide, as understood by SMITT, is somewhat heterogenous and this is probably augmented, I think, by my referring of the genus *Dartevellia* to it.

Future studies will, in all probability, result in its being split up into two or more families. On the other hand, the relations to the Cytisidae are not clear and it is possible that these two families should, partly at least, be merged in one another. The material that I have been able to examine has, however, been too poor to enable me to come to any definite conclusion as to the position and limits of the family.

Genus **Domopora** D'ORBIGNY.

Syn.: *Millepora*, part., JAMESON 1811, p. 560; *Ceriopora*, part., GOLDFUSS 1827, pp. 32 ff.; *Tubulipora*, part., FLEMING 1828, p. 529; JOHNSTON 1847, p. 266; *Coronopora* GRAY 1848, p. 140; BUSK 1859, p. 146; SMITT 1867, pp. 407, 491; *Defrancia*, part., REUSS 1848, p. 36; BUSK 1855, p. 6; 1856, p. 35; M. SARS 1863, p. 20; NORMAN 1868, p. 310; *Domopora* D'ORBIGNY 1850, p. 502; 1854, p. 986; BUSK 1875, p. 35; HINCKS 1880, p. 481; BORG 1926 b, pp. 295, 375.

Zoarium developing from a *Tubulipora*-like base; in younger stages simple and semiglobular, zoids arranged in radiating simple or, usually, complex series or fascicles on upper side of zoarium, an annular zone of developing zoids surrounding its base; gonozoid lateral, situated above budding zone but below the series or in their periphery. In older stages upper portion of zoarium with series of zoids often divided into two or more discs, zoarium finally consisting of a number of superimposed sub-colonies or rather successive generations having coalesced more or less completely with each other, the whole constituting an errect, cylindrical, branched formation.

Genotype: *Ceriopora diadema* GOLDFUSS 1827, p. 39, Pl. 11, Figs 12 a—c.

Domopora was founded by D'ORBIGNY (1850, p. 502) who says that the species belonging here are "des *Defrancia* qui, par le grand nombre de couches qui se succèdent, forment un dôme ou même une massue". This diagnosis is completed, in the "Paléontologie Française" (1854, p. 987) in this way: "La première sous-colonie est fixe, rampante, comme la colonie unique des Unicavea". "Chaque sous-colonie a un centre couvert de pores opposés, autour duquel partent en rayonnant, des lignées simples, composées d'une seule rangée de cellules". "Entre les lignées sont des pores intermediaires nombreux". The latter part of the diagnosis seems important to me, but it is not mentioned by GREGORY (1909, pp. 268 ff.) when discussing the characters of the genus and which form should be regarded the type-species. It is unfortunate that GREGORY was not aware of D'ORBIGNY's additional diagnosis in 1854, otherwise he would probably not have found D'ORBIGNY's selection of *Ceriopora diadema* (GOLDFUSS 1827, p. 39, Pl. 11, fig. 12) as inappropriate as he did. D'ORBIGNY's first diagnosis referred to an old and complex zoarium; but this must of course be assumed — as evidently D'ORBIGNY did — to have developed from a simple, discoid one. Contrary to GREGORY I think it inevitable therefore that D'ORBIGNY's selection of a genotype for *Domopora* should stand.

GREGORY was right, however, in pointing out that *Ceriopora diadema* GOLDFUSS includes two species, one represented by Pl. 11, fig. 12 a—c, in GOLDFUSS' work, and the other by fig. 12 d—f, of the same Plate. This is unfortunate; but it is not put right by GREGORY's selection of *Ceriopora clavata* GOLDFUSS instead as genotype, as this includes two species too, one represented by fig. 15 a—b, and the other by the same fig., c—f, of Pl. 10 (GOLDFUSS, op. cit.), as is fully admitted by GREGORY.

The only possibility, so far as I can see, is, to accept D'ORBIGNY's own selection of a genotype, that is, to accept the figures of GOLDFUSS quoted by D'ORBIGNY so far as they represent one and the same species. This is true of the first two figures, fig. 12 a and b (a magnified representation of 12 a) and of fig. 12 c as well of GOLDFUSS' work but not of the following figures which, therefore, must be excluded.

Following the course he had adopted, GREGORY (l. c.) was forced to consider *Domopora* as a synonym of *Lichenopora* and to form a new genus, *Tholopora*, with *Ceriopora diadema* GOLDFUSS (op. cit., p. 36, Pl. 10, figs 15 a—b, non c—f) as genotype, for complex colonies exclusively, i. e. for an advanced stage in the life of the zoaria with exclusion of the younger ones. In this he was followed by BASSLER (1935, p. 217). I am, however, unable to agree with them in this.

Perhaps it would be best to create a separate genus for the recent species and to use GREGORY'S genus merely in paleontological works, though it seems that *Domopora*, in the sense D'ORBIGNY used it at least in 1854, should be applicable to some recent species as well. In any case, on grounds set forth above, I am not prepared to drop *Domopora* until other reasons in favour of this procedure than those forwarded by GREGORY are presented.

1. **Domopora antarctica** n. sp.

Text-figs 12 and 13.

Zoarium circular, somewhat wart-like, adnate. Autozoids arranged in half a dozen complex fascicles, radiating from centre in all directions, dividing distally into two or more secondary complex fascicles. Budding region forming an annular honeycomb-like zone around zoarium from its basal edge upwards, passing gradually into the fascicles whose zoids open at end of each fascicle. Frontal side of zoarium free from apertures, depressed in the centre. Gonozoid situated between the fascicles, on one side, and the annular budding region, on the other, on vertical lateral wall of zoarium; its middle portion strongly inflated and traversed by numerous autozoids or, in most cases, groups of such.

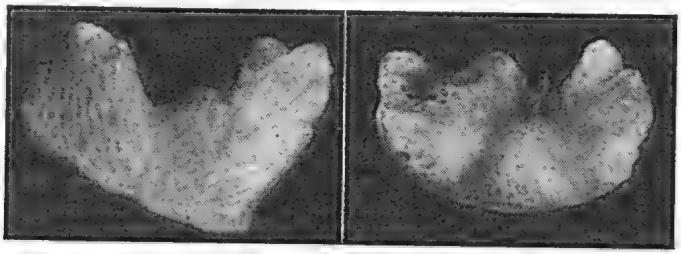
Measurements in μ.

(1) Diameter of zoarium, as measured on basal surface, 3 200—4 100.
(2, a) Height of zoarium from base to between rays 1 800—1 900.
(2, b) Height of zoarium from base to top of rays 2 300—2 800.
(3) Transverse diameter of primary fascicle 500—900.
(4) Diameter of aperture of autozoids 120—150.

There are only two zoaria one of which is for the most part decalcified. This zoarium is provided with two gonozoids while the other is not fertile. The latter one is a little smaller than the former, measuring 3,1 mm in diameter, and is probably young.

An inspection of the basal side of one of the zoaria makes it evident that the zoarium originates in a similar way as in *Tubulipora* or perhaps rather as in *Diastopora*. The primary zoid is followed by numerous other zoids, the result being that the zoarium becomes very suddenly broader until it has assumed an almost circular shape. In neither of the two zoaria is this process finished. Even in the larger one there is a deep incision just proximally of the pro-ancestrula, the two lateral lobes having not yet coalesced here. As the zoarium in question is fertile one may be inclined to think that it will never form a complete circle. As there is not much doubt, however, that it would have continued its growth, had it not been dredged, I think it probable that the two lobes would have coalesced at a somewhat later stage.

The budding region surrounds the zoarium forming a zone that is practically annular, though it is interrupted where the incision just mentioned occurs. If we think this incision broader the coincidence with the budding region in *Tubulipora* and other Stenolaemata will be evident. As in these forms the smallest buds are at the basal edge of the region and they become more advanced gradually as they are forced away from the edge. Finally they develop into full grown zoids composing the fascicles. The fascicles are thus not constricted off from the budding region though they protrude some distance above it. The apertures of the autozoids are at the end of the fascicles exclusively. It follows that, while the whole of the frontal side of the zoarium (except the fascicles) is free from apertures, the zoarium is encircled by a honeycomb-like zone consisting of the apertures of incipient autozoids and passing gradually into the fascicles.



Text-fig. 12. *Domopora antarctica.* Zoarium seen from one side to show arrangement of zoids and of developing zoids. × 10.
» » 13. *Domopora antarctica.* Zoarium seen obliquely from above. × 10.

I have not seen any closed zoids or kenozoids on the frontal side of the zoarium, neither in the centre nor between the fascicles. This may be due to the fact that no such zoids occur; but it seems to me equally possible that the absence of closed zoids depends upon the zoaria being too young. On the whole I think it must be assumed that the zoaria with increasing age become transformed in several ways, just as in the case of, for instance, *Domopora stellata* (GOLDFUSS) (cf. BORG 1926 b, pp. 296 f.).

The gonozoid is lateral, being situated between the budding region and the fascicles. This is a position characteristic of *Domopora.* The proximal portion is not visible, being wedged in between the autozoids, but the middle, dilated one occupies part of the annular zone, its surface being rather distinctly arched. Contrary to what is the case in the European *D. stellata* the gonozoid does not push the fascicles aside but is traversed, instead, by several groups of zoids and by one or two single autozoids as well. The groups consist of from two to six zoids. An oval opening, which I think to be probably the aperture, is adnate to one of the groups.

The pseudopores in the wall of the autozoids are quite small but rather numerous. In the roof of the gonozoid they are as usual much more thickly scattered and much larger too.

I should like to state that I am not sure that the species is placed correctly in *Domopora.* The structure of the zoarium and the position of the gonozoid seem to show that it ought to be referred to that genus; but the autozoids forming fascicles instead of radiating series and the gonozoid being traversed by numerous groups of autozoids perhaps may be taken as indicating that it would be better to create a separate genus for it. I think, however, that the material examined is too poor and in too bad a state to make possible at present a definite conclusion in this respect.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 4. — St. 94.

Genus **Defrancia** Bronn.

Syn.: *Pelagia* Lamouroux 1821, p. 78 (preoccupied); *Defrancia* Bronn 1825, pp. 12, 42, Pl. 4, figs 7 a—c; *Apsendesia*, part., Pergens 1889, p. 379; Gregory 1896, p. 168; 1909, p. 247; *Tubulipora*, part., M. Sars 1851; p. 145; *Defranceia* d'Orbigny 1853, p. 680; Busk 1875, p. 17; *Defrancea* Manzoni 1877, p. 91; Pergens 1889, p. 369; *Defrancia* Smitt 1867, p. 408; Borg 1926 b, p. 184, p. 376; auctt.

Genotype (by monotypy): *Pelagia clypeata* Lamaouroux 1821, p. 78; Pl. 79, figs 5—7.

Zoarium erect, stalked, consisting of a peduncle and a disc which latter is more or less cup-shaped. Zoids disposed in radiating series on frontal surface of disc. Gonozoid with its middle portion distinctly inflated, situated between two radiating rays or wedged in where a ray bifurcates.

Pergens (l. c.) and, after him, Gregory (1896, l. c.) and Bassler (1935, p. 89) state that *Defrancia* is synonymous with *Apsendesia*, *Pelagia clypeata* being, in their opinion, the young stage of *Apsendesia cristata*. This statement is founded upon the researches of Haime (1853, p. 201) who has shown, according to Pergens, that "le jeune âge [of *Aspendesia cristata*] est nettement caractérisé par une forme rayonnante". I am very far from convinced that this is correct. At any rate it is not sufficient in order to demonstrate the identity of *Pelagia clypeata* and *Apsendesia cristata*. Haime has come to the conclusion, it is true, that the latter species in its young stage is characterized by having rays of zoids radiating from a centre, but this occurs in several species and in some genera and it cannot, thus, be taken as evidence for the identity of the named species with *P. clypeata*. Moreover, the investigations made by M. Sars (1863, pp. 164 ff.), Smitt (1867, p. 495) and myself (1926 b, pp. 298 f.) upon the recent *Defrancia lucernaria* (M. Sars) speak decidedly against the opinion advanced by Pergens and Gregory, at least as far as recent forms are concerned, there being no indication that the characteristic zoaria of *D. lucernaria* ever transform into something similar to *Apsendesia cristata* (cf. Lamouroux 1821, Pl. 80, figs 12—14; Gregory 1896, Pl. 9, figs 4, 6). The *Pelagia clypeata* of Lamouroux (Pl. 79, figs 5—7), on the other hand, is obviously very similar to the recent *Defrancia lucernaria*. I accept, therefore, *Defrancia* Bronn to substitute *Pelagia*, preoccupied, and consider *P. clypeata* Lamx, the only species mentioned, as the genotype.

As for the spelling of the name *Defrancia* I prefer to use the original spelling of Bronn instead of those of d'Orbigny (l. c.) or Manzoni (l. c.).

I am somewhat doubtful if the species described below is correctly referred to *Defrancia* or not. Its zoids are connate in radiating fascicles instead of series and the gonozoid is wedged in at a bifurcation near the edge of the disc, covering part of the lateral surface of the disc. The position of the inflated portion of the gonozoid seems to exclude *Supercytis*. As my material of the species described below is poor, however, I think it best to place it in *Defrancia*, provisionally at least, rather than to form a separate genus for it.

1. **Defrancia sarsi** n. sp.

Pl. 11, figs 5—8.

Zoarium erect, consisting of a short peduncle expanding distally into a saucer-shaped or cup-shaped disc. Peduncle fixed to the substratum by means of a well-developed supporting disc. Surface of peduncle with longitudinal interzoidal lines or covered by an open network with narrow, polygonal meshes, representing a secondary thickening layer. Disc borne by peduncle produced into 6—12 rays, consisting each of a number of connate autozoids forming a fascicle. In periphery of disc the primary rays or fascicles bifurcate, as a rule, into secondary ones. Autocystids opening at end of each fascicle but visible on whole of frontal surface of disc, meeting in centre of disc or between rays; basal surface of disc in well-developed zoaria covered by secondary thickening network continuing from peduncle. No closed cystids or formations of a similar kind existing on frontal surface of disc. Gonozoid wedged in between two rays in periphery of disc, its middle, dilated portion occupying part of vertical slope of disc, traversed by fascicles of autocystids; aperture of gonozoid (probably) adnate to an autozoid belonging to one of the fascicles.

Measurements in μ.

(1) Diameter of supporting disc 1 900.
(2) Height of peduncle 1 500.
(3) Diameter of peduncle 800.
(4) Diameter of disc with rays 3 700.
(5) Diameter of apertures of autozoids 100—110.

The present species is represented by four zoaria and fragments of some others. Unfortunately, they are all in a rather bad state and partly decalcified, having been preserved for a long time in formaline. Two of the zoaria are fertile, being provided each with a gonozoid, but the others are not, being probably too young for that. I have named the species in honour of the Norwegian zoologist M. Sars, who has given an excellent description of the Northern *D. lucernaria.*

Investigating a longitudinal section through the zoarium one may observe that the autozoids of different rays are connate thoughout the peduncle but when attaining the frontal side of the disc make a sharp curve, radiating in different directions. When inspecting the disc from above (Pl. 11, fig. 6), one is able to see the radiating portions only of the zoids which, therefore, seem to meet in the centre of the disc or between the rays.

The autozoids seem to pass right through the peduncle from the base of the zoarium to the saucer and very few — if any — zoids are intercalated in the centre of the peduncle. This seems to indicate that the initial stages are not erect but creeping, *Tubulipora*-like, then suddenly rising and becoming erect, as in many other Acamptostegous families.

There is no distinct limit between the supporting disc and the peduncle, the disc being thicker towards its centre, where the peduncle rises. The supporting disc consists of one or more layers of kenozoids, and the secondary thickening layer that covers its surface is also formed, in all probability, of kenozoids.

The number of autozoids constituting a ray or fascicle is varying. It is greater in the primary fascicles than in the secondary ones formed by splitting up of the former. Both primary and secondary fascicles are complex, that is, they are constituted of more than one series of zoids (Pl. 11, fig. 6). The number of the series of zoids composing a fascicle diminishes gradually from the basal towards the frontal side of a fascicle, where it is often only one or two. It follows that a typical fascicle, when seen from the side towards which the zoid-apertures are facing, is more or less wedge-shaped with the broad side of the wedge looking basally (cf. Pl. 11, fig. 5).

The fascicles radiating from the centre of the disc seem in most cases to be directed nearly horizontally, the disc being saucer-shaped (Pl. 11, figs 5, 6). In a specimen collected by the Swedish Antarctic Expedition (St. 17), however, the fascicles are more upright and there is no distinct limit between the peduncle and the disc (Pl. 11, figs 7, 8). I suppose that the difference is due merely to the fact that the specimen alluded to is, in all probability, a young one, its disc having presumably not yet had time to widen into the saucer-shaped formation characteristic for the other specimens; but it may well happen that owing to this and some other characters the specimen discussed ought to be considered specifically distinct. As this is the only specimen of its kind and as it is not fertile, I am at present unable to decide the question.

The zoids constituting a fascicle are usually connate throughout but this is possibly due to the fact that they are more or less damaged. In the specimen just mentioned, however, the fascicles are split up at their ends so that the terminal portions of the autozoids are free, as a rule, diverging more or less from one another.

As in other species of the same genus there is in the present one a budding region forming an annular zone around the disc just below the fascicles of zoids that extend, as a rule, some distance outside the budding zone (Pl. 11, fig. 5). In the specimen from St. 17, however, no such zone can be distinguished which I think is a noticeable fact and may indicate, perhaps, that the latter of the two suppositions set forth above is the correct one (cf. Pl. 11, fig. 8).

I have seen only two gonozoids. In both the proximal portion is wedged in between two primary or secondary rows, extending inwards towards the centre of the disc. The proximal portion of the gonozoid passes gradually into the middle one which is strongly dilated and extends peripherally until just above the budding zone. Where the gonozoid occurs the fascicles are split up into smaller groups of zoids and even into single zoids traversing the gonozoid's dilated portion. The gonozoid is thus to be found in the periphery of the disc and its greatest part is situated on the outer, more or less vertical wall of the disc. I have not seen the tube and I am not sure that any such exists. What I think to be the aperture is a round opening somewhat smaller than that of an autozoid and situated quite near to one of the groups of autozoids traversing the dilated portion of the gonozoid; but as this part is damaged, in both gonozoids I have seen, I am not sure of this.

The pseudopores piercing the walls of the autozoids both on the peduncle and on the disc are small and unusually sparse. The same is the case in *D. lucernaria* too (cf. BORG 1926 b, p. 199) and it may probably be common for all species within the genus. The pores in the roof of the gonozoid, on the other hand, are distinctly larger and much more numerous.

The so-called *Defrancia striatula* WATERS (1889, p. 71, Pl. III, fig. 45) seems to come rather close to the present species, though it is probably not identical with it. I do not know why WATERS identifies his species with a Cretaceous fossil originally described and figured by BUSK (1859, p. 117; Pl. 17, fig. 5). To me it seems to be well distinguishable from BUSK's species, though the two may probably belong to one and the same genus.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 17. On a Sponge. — St. 22. On a simple, stalked Ascidian. — St. 32. On a simple Ascidian.

Genus **Dartevellia** n. gen.

Zoarium erect, consisting of a cylindrical peduncle rising from a *Tubulipora*-like initial growth and surrounded at its base by a well-developed supporting disc. All autozoids connate with one another and opening at top only of peduncle, which is slightly expanding into a sort of disc. Zoids radiating from centre of disc though remaining into one or a few fascicles incompletely separated from one another; one or a few free zoids may occur occasionally at top of peduncle. Brood-chamber unknown.

Though the broad-chamber — a gonozoid? — has not yet been described, *Dartevellia cylindrica*, the only species at present referable to this genus, is so remarkable in appearance and structure that I have felt it best to separate it generically from other Stenolaematous forms since I was unable to find any existing genus in which it might conveniently have been placed.

The relationships of *Dartevellia* seem rather obscure, and I suppose they must remain so until the brood-chamber has been discovered. One fact I have been able to establish beyond doubt, however, viz. that it must belong to the Acamptostega. The initial stages are Tubuliporidan, and the zoarium develops according to the rules governing the astogeny in that sub-order. Otherwise it seems to show no obvious relations to any of the families hitherto existing within the Division just mentioned. With the Corymboporidae, the Cytisidae and the Fascigeridae it may perhaps be said to show some similarity. The arrangement of the zoids in one single fascicle that forms the stem conforms to what occurs in the Fascigeridae but in that family the zoarium is branched, the zoids are relatively very large and there is no indication at all of any sort of disc at the top of the stem, nor do the zoids radiate from centre here. The conformity as to the arrangement of the zoids in the stem in *Dartevellia* and *Fasciculipora* is, therefore, probably due to convergence. I should like to point out, on the other hand, that when I place *Dartevellia* in the Corymboporidae, on account of the rudimentary disc at top and the arrangement of the zoids in it, this is only provisionally. When the astogeny of the genus has been investigated and the brood-chamber has been detected, it will perhaps turn out that *Dartevellia* should have been placed instead in the Cytisidae or that a separate family ought to be formed for it. Indeed, the latter possibility is rather probable, I think.

I have named the genus in honour of the Belgian bryo-paleontologist Dr. E. DARTEVELLE.

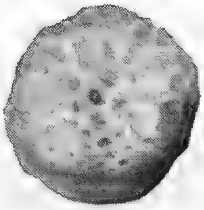
Dartevellia cylindrica n. sp.

Pl. 11, figs 9—12; Text-fig. 13 a.

Zoarium erect, consisting of a cylindrical peduncle slightly expanding at the top. Peduncle long, as a rule with some elevated, annular ridges, rising from a *Tubulipora*-like base, a circular supporting disc surrounding its origin. At top of peduncle a sort of disc is formed by the zoids composing the peduncle — about ten to thirty in number — slightly diverging. Most zoids remain connate at top in one or a few fascicles but one or two zoids sometimes have their distal ends free. In well-developed zoaria there is a distinct limit between the peduncle proper and its top region, the limit being marked by an annular zone of developing zoids. Surface of peduncle marked by numerous longitudinal septal lines, its proximal portion covered by a secondary thickening layer consisting, in all probability, of kenozoids in the shape of a calcareous network the meshes of which are closed by a semitransparent calcareous wall. Brood-chamber unknown.

Measurements in μ.

(1, a) Length of peduncle of smallest zoarium 1 000.
(1, b) Diameter of peduncle 500.
(2, a) Length of peduncle of "normal" zoarium 3 700.
(2, b) Diameter of peduncle at base 825, at top 1 150.
(3, a) Length of peduncle of largest zoarium 4 200.
(3, b) Diameter of peduncle at base 850, at top 1 360.
(4) Diameter of free aperture of autozoids 100.



Text-fig. 13 a. *Dartevellia cylindrica.* Zoarium seen from above. × 18.

I have examined half a dozen zoaria of different sizes together with some quite young ones showing the initial stages.

One might think that the zoaria here described have not yet acquired their characteristic shape and, particularly, that the disc is so far incomplete. This view seems strengthened by the lack of a brood-chamber in all zoaria examined. But on the other hand, as we see from the Measurements (1—3) the zoaria represent, obviously, rather different astogenic stages, the smallest one measuring only 1 mm in height by 0,5 mm in diameter, while the largest one is 4,2 mm in height by a top diameter of 1,36 mm. One has ground to think, therefore, that if a real disc were ever developed, it certainly ought to exist in the largest of the zoaria examined if not in all of them. The conclusion is, thus, that the zoaria described probably represent the normal condition of the species and that the peduncle never expands so as to form a well-developed disc. The existence, in one or two of the zoaria, of fully developed zoids the top portions of which are free, may be taken as speaking in favour of this suggestion which, however, is set forth with a certain amount of doubt as the material is small and does not allow a definite conclusion.

The zoarium originates in the same way as is the case in most other Acamptostegous species. From the pro-ancestrula there develops a primary zoid that becomes, already where it grows out from the pro-ancestrula, underlayered by new developing zoids, by means of which it acquires a half erect position (cf. Pl. 11, fig. 9). When some zoids have come into existence the supporting disc takes its origin through a layer of kenozoids developing to the right and left and, specially, on the distal side of the young zoarium. Growing out the two lateral portions of the future disc fix the zoarium to the substratum and expand along it, soon coalescing with the distal portion so that a single disc is formed which during its continued growth soon becomes circular. Simultaneously the zoarium, now attached steadily to the substratum by means of the disc, attains a fully erect growth (cf. Pl. 11, fig. 9). At a somewhat later stage a secondary thickening layer consisting of kenozoids of the same appearance as those composing the disc may be seen to have developed around the proximal portion of the peduncle, growing continually in a distal direction. In the larger zoaria, it covers a large portion of the peduncle but does not, in any of my zoaria, reach its top.

Most of my zoaria show very obvious signs of having gone through degenerative and regenerative processes (cf. Pl. 11, figs 10, 11). The annular elevations visible on the surface of the peduncle have come into existence, in my opinion, by the zoarium having degenerated, when this portion formed the top of the peduncle, and then having regenerated from its central portion, a little proximal of the edge of the top. The extension of the annular elevations indicates, therefore, in my opinion, the extension of the "disc" when this was the top portion. In the largest of my zoaria (Pl. 11, fig. 11) there seem at least three such periods of degeneration and regeneration to have taken place.

When observing the top of a large zoarium one cannot fail to ascertain that an outer, peripheral layer of small rudimentary cystids surrounds the central region containing the autozoids. The edge of the peripheral layer is sharply marked and the incipient zoids composing it are very numerous. It is further easy to see that there are all stages of zoids from small buds quite near the edge to almost complete cystids of about the same size as the fully developed autocystids, which latter are found nearest to the central portion. The whole region thus has the same appearance as the common bud of any other Acamptostegous species and should be regarded as representing this formation. Owing to the structure of the zoarium it is evident, however, that the numerous zoids that are about to develop in the peripheral region of the top cannot all of them develop into autozoids, as these are relatively few. The conclusion is, therefore, that many — probably most — of the incipient zoids alluded to do not form autozoids but become stunted and give origin, thus, to the layer of kenozoids forming the surface of the greater part of the peduncle.

There is no real difference, as it will seem, between these zoids, on the one hand, and the autozoids, on the other, the position of a bud determining, obviously, whether it will develop into an autozoid or a kenozoid. As in the Idmoneidae and in *Nevianipora* I am in doubt, therefore, if the small, stunted zoids should be considered kenozoids or not; but, provisionally at least, it is perhaps best to designate them as such.

I think we may suggest that it is from this layer of kenozoids that the supporting disc grows out when the zoarium is as yet quite young. Then becoming erect the zoarium is surrounded by a layer of small kenozoids. It is in complete accordance with this view that near the base of young zoaria, as the one reproduced in Pl. 11, fig. 9, one can see, right through the semitransparent surface wall, the septal limits of the autozoids composing their central part, while in the top portion the limits are much nearer to one another, thus indicating that a layer of smaller zoids, probably kenozoids, has come to surround the stem here, as soon as it has become fully erect.

It should be clearly understood that the kenozoidal layer here described is not the same as that originated, later on, from the supporting disc. The former reaches the top, which the latter does not. Thus the proximal portion of the peduncle is surrounded by at least two layers of kenozoids, one outside the other (cf. Pl. 11, figs 9 and 11).

The autozoids are arranged at the top of the peduncle in a rather characteristic way. In one of the smaller of my zoaria all autozoids except one are connate throughout and radiate like the radii of an expanded fan. In the space left the single, free autozoid stands bold upright. In another zoarium which is slightly larger than the former the arrangement is similar but there is no single autozoid, so the fan-like arrangement of the autozoids is, therefore, particularly distinct. The deep incision on one side of the peduncle where this passes into the "disc" (Pl. 11, fig. 12) seems to be characteristic for zoaria at this stage. As to its signification I am doubtful.

In larger zoaria I have not seen any such incision. The top area is circular here and the autozoids that are surrounded by an annular budding zone radiate in different directions which does not prevent them from being connate throughout. Two or three zoids in the centre are almost wholly straight.

I have seen no trace of a brood-chamber and I have no suggestions as to its position and structure.

The pseudopores in the wall of the peduncle are rather few and quite small. In the walls of the autozoids at the top or "disc" they are larger and more numerous.

The shape of the zoarium of the present species reminds somewhat of *Corymbopora fungiformis* Smitt (1867, pp. 407, 490; Pl. XI, figs 13, 14), but this is merely superficially, for in *C. fungiformis* the zoids open laterally, all around the stem, which, as we know, is never the case in *Dartevellia cylindrica*.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 13. On the shell of a Gastropod.

Fam. **Fascigeridae** d'Orbigny, char. emend.

Syn.: *Fascigeridae*, part., d'Orbigny 1853, p. 665; *Frondiporidae*, part., Busk 1886, p. 26; Canu & Bassler 1920, p. 807.

Zoarium erect, branching richly and densely in a dichotomous way; autozoids connate throughout, forming fascicles each of which constitutes a stem or branch, opening at top of stems or branches only; brood-chamber a moderately dilated zoid; or the fertile zoid is undilated and the brood-chamber is a zoarial one.

The Family Fascigeridae as defined by d'Orbigny (l. c.) comprised some genera that belong instead to Corymboporidae, and others that should be referred to Frondiporidae. I have, therefore, restricted it here so as to include only the peculiar type represented by the genus *Fasciculipora* and its species. These should probably be distributed among two or more genera, since I have stated the occurrence of a zoarial brood-chamber in *F. americana* d'Orb., while in *F. ramosa* it is of the ordinary type.

Genus **Fasciculipora** D'ORBIGNY.

Syn.: *Fasciculipora* D'ORBIGNY 1839, p. 20; BUSK 1875, p. 37; 1886, p. 27; *Fasciculipora*, part., MACGILLIVRAY 1884, p. 127, and elsewhere. The only genus.
Genotype (by monotypy): *Fasciculipora ramosa* D'ORBIGNY 1839, p. 21.

BUSK (1875, 1886), CANU & BASSLER (1920), and others, have included *Fasciculipora* in *Frondipora*; but I have been able to show (1926 b, pp. 300 ff.) that the structure and development of the zoarium are widely different in the two genera and that "the gonozoids of *Frondipora* and *Fasciculipora* differ to an exceptional degree" (p. 384). Hence it is quite evident, I think, that *Fasciculipora* ought to be placed in a separate family.

MACGILLIVRAY (1884, and elsewhere) takes *Fasciculipora* in a much wider sense than defined by D'ORBIGNY, including in it, as a matter of fact, what I have called *Hastingsia*.

1. **Fasciculipora ramosa** D'ORBIGNY.

Pl. 10, figs 6 and 7.

Syn.: *Fasciculipora ramosa* D'ORBIGNY 1839, p. 21, Pl. 9, figs 22—24; D'ORBIGNY 1853, p. 668; BUSK 1875 p. 37, Pl. 33, fig. 2; 1886; p. 27; BORG 1926 b, pp. 303 f., 382 ff., Text-figs 83—85; ?? MACGILLIVRAY 1884, p. 127; 1887, p. 220; 1888, p. 215, Pl. 157, figs 4, 4 b.; nec *Fasciculipora ramosa* MARCUS 1921, p. 119, Text-figs 19 a, b.

Zoarium erect, large, consisting of a cylindrical stem frequently forking, particularly in distal portion of zoarium. Autozoids disposed in one bundle, that forms the stem, connate throughout, opening only at top of stem that is cut off transversely. Gonozoids situated at a bifurcation, of a singular and very simple type. They are very long and only very moderately dilated and are thus similar, in most respects, to the autozoids, their width being, for the greater part of their length, about one and a half that of an autozoid. There is no definite limit neither between proximal and middle nor between middle and distal portion of gonozoid. The gonozoid follows the branches of the bifurcation and is, therefore, divided in its distal half into two or three lobes, but there is only one aperture. The tube is lacking. The aperture, which is transversely oval, is slightly larger than the aperture of an autozoid.

Measurements in μ.

(1) Height and breadth of a well developed zoarium (cf. Pl. 10, fig. 6) 30 600 × 40 650.
(2) Diameter of stem 1 600—2 800.
(3) Diameter of aperture of autozoid 330.
(4) Diameter of aperture of gonozoid 240 × 380.

Of the present species, I have had a rich material consisting of about eighty zoaria or parts of such. Unfortunately, however, the initial stages are not preserved in any of them, so it is not possible to state with certainty the way in which the zoarium develops during its earliest stages.

In one case, however, the basal portion of an old zoarium remains, though it is not easy to observe the arrangement of the autozoids here. This depends, in the first place, upon the fact that the base of the stem is overgrown by some layers of kenozoids stretching some distance up the stem but finishing before reaching the first axil. It is interesting to find that the axil is, nevertheless, partly filled up by a secondary thickening layer. The closed zoids composing it have no connection with the layer of kenozoids growing upwards from the base, though the proximal rim of the former is less than one mm from the distal rim of the latter. The conditions in this respect thus remind of those in *Idmidronea.* The kenozoids of the secondary thickening layer are very similar to those in that genus, being permanently closed and much shorter than any of the autozoids. The ensemble of the walls constituting the surface of this portion of the zoarium being semitransparent, the interkenozoidal walls are visible right through it as an oblong network of white bars.

The under side of the base of the zoarium is surrounded by several layers of kenozoids. In the base itself no pro-ancestrula can be ascertained. It seems probable to me, therefore, that the ancestrula was formed outside the base, *i. e.,* that the initial stages of the zoarium were similar to those of a *Tubulipora,* as is the case in many other Acamptostegous species. One might suppose, then, that in order to make an erect growth possible a layer of kenozoids has grown out from the young zoarium thus forming a supporting disc in a similar way as in *Idmidronea* and some other genera. The cystids are arranged on the under side of the base, so far as I have been able to ascertain, in such a way as if they were going to form a supporting disc, — which is I suppose exactly what has happened. There is a very distinct difference between this mode of disposition of the cystids, on the one hand, and that found in the Pachystega, the Heteroporina, and the Calyptrostega, on the other (cf. BORG 1941, pp. 22 ff.; 1933, pp. 271 ff.; 1926 b, pp. 312 ff.).

We thus arrive at the conclusion that the zoarium of the present species passes through, in all probability, a *Tubulipora*-stage when quite young, whereafter it requires the erect mode of growth. Otherwise it is extremely characteristic and will not easily be confounded with any other Stenolaematous species. The erect primary stem of the zoarium divides simultaneously into three branches, each of which soon bifurcates. The continued branching, in this as in other zoaria, is a very typical dichotomous one, not being restricted to one plane (cf. Pl. 10, fig. 6). The fission is frequently repeated in the distal portions of the zoarium, especially where it occurs that three or even four branches are formed almost simultaneously. To speak of branches here is, moreover, inappropriate, for what takes place is always a forking of the stem into two or more stems of a 2nd, 3rd etc. order, no branches, in the real sense of this word, ever occurring here. The zoarium does not consist, thus, of a main stem and a number of branches, but of one stem subdividing repeatedly (cf. Pl. 10, fig. 6).

The stems are about cylindrical, as a rule, but the part of a stem situated just proximally of a bifurcation is broader than elsewhere, obviously preparing to divide. Stems of this kind have not been enclosed in the measurements above.

The zoarium as compared with those of other Stenolaemes is unusually large and so are both the autozoids and the gonozoids (cf. the Measurements). As I have described its structure to some extent in an earlier memoir (1926 b, pp. 303 f.), I can restrict myself to adding a few words here.

The autozoids that have been forced away from the surface of the top through the development of new incipient zoids in the central part of the top are left behind and closed each by a calcareous diaphragm. These zoids form the greater part of the surface of the stem. Where there is no secondary thickening layer they are easily seen and their course can be followed without any difficulty. As their walls are semitransparent the interzoidal walls which are almost white are well seen (cf. Pl. 10, fig. 6); the distinctness of the latter is augmented by the fact that where they reach the surface walls the pseudopores are absent.

The somewhat wavy appearance of the surface of the stem, sometimes very distinct but at other places less pronounced, is caused by the fact that many zoids are closed at one and the same height, the closed apertures forming a ring around the stem. Just distally of such a place the stem is constricted but it swiftly retains its former width. I suppose this is a sign that there has been a pause in the growth at this place, renewed growth having then started from the restricted zone.

In the axils there are a few zoids that owing to their position are stunted in their growth and without an aperture. These, in my opinion, are not to be regarded as kenozoids but as autozoids prematurely closed.

As for the real kenozoids forming a secondary thickening layer surrounding the primary stem, it is noticeable that this layer does not seem to reach distally the primary stem, nor do other layers of a similar kind, formed secondarily, seem to be common. In all fragments examined it is only in two cases that I have observed such layers. I think we may conclude, therefore, that they are restricted, as a rule, to the proximal portion of the zoarium, strengthening it and making the existence of a large, erect zoarium possible.

The gonozoid of the present species must be said, I think, to be very remarkable (Pl. 10, fig. 7). So far as I know there do not exist any other Stenolaematous species where the difference between an ordinary autozoid and a gonozoid is so slight. One may ask if this is a primitive character or not. This I am unable to decide; but so far as I can see, there is nothing speaking against the assumption that it may be primitive, just as the whole structure of the zoarium seems, in my opinion, to represent probably a more primitive condition than in many other Stenolaemes. Thus I take the following characters of the gonozoid as primitive: (i) that the gonozoid occupies exactly the same position as an autozoid just below a bifurcation; (ii) that there does not exist any limit between the proximal, middle, and distal portions of the gonozoid; (iii)that the gonozoid is only slightly enlarged, and, therefore, is not much wider than an autozoid, (iv) that it is not at all lobed except that it is forked, as a rule, in its distal portion simultaneously with the branch, each half of the gonozoid following one of the stems originated through the bifurcation and, finally, (v) that there is no tube at all, not even the slightest trace of it and that the aperture of the gonozoid is, on the whole, very similar to that of an autozoid (Pl. 10, fig. 7).

The pseudopores in the outer walls of the autozoids are very numerous and rather large, of circular shape when seen from the surface. In the wall of the gonozoid the pseudopores are of about the same shape and size though they are yet more numerous.

There is no doubt as to the correctness of the identification here made, for I have seen D'ORBIGNY's material in the Museum d'Histoire Naturelle, Paris (nr. 13 735), and the identity between it and the present species is complete. The specimens described by BUSK (1875, l. c.; 1886, l. c.) under the name of *Fasciculipora ramosa* belong in all probability to the same species. When BUSK says that there are "a few smaller tubes" scattered among the tubular cells of large calibre [= the autozoids] constituting the stem, I suppose he means the incipient zoids in the central part of the budding region at top; these are, anyhow, the only "smaller tubes" existing here. BUSK points out the similarity between the present form and certain Cretaceous species of the genus *Fungella* HAGENOW (1851, p. 37). According to GREGORY (1909, p. 31), however, the type-species of *Fungella* (which is *F. dujardini* HAGENOW, op. cit., p. 38, Pl. 3, figs 8 a—g; cf. BASSLER 1935, p. 117) "is a capitate Heteropora". The coincidence in shape which seems to exist is, therefore, probably superficial only and due to convergence.

As to the specimens referred by MACGILLIVRAY (l. c.) to *F. ramosa* I am very doubtful if they really belong here.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 6. — St. 7. — St. 88.

Distribution: off Falkland Islands, in rather deep water (D'ORBIGNY 1839, p. 21); South Patagonia, 48 fathoms (BUSK 1875, p. 37); off Inaccessible and (?) Nightingale Islands, Tristan da Cunha, 60—150 fathoms (BUSK 1886, p. 27)[1]; ?? Portland, Victoria, Australia (MACGILLIVRAY 1884, p. 127).

2. **Fasciculipora maeandrina** n. sp.

Pl. 10, figs 8 and 9.

Zoarium erect, bouquet-shaped, rising from a narrow peduncle or stem, richly and irregularly branched. Distal ends of stems widening, anastomosing. Stems formed each by a single bundle of autozoids opening at top only; bundles of autozoids coalescing at or near top in a maeander-like way, but groups of autozoids nevertheless separated from one another at top by autozoids of other (intercalated) groups having their apertures closed each by a calcareous diaphragm pierced by a number of pseudopores; as a rule, these autocystids are broken down to a somewhat lower level than that occupied by the clusters of zoids the apertures of which remain open. Gonozoid unknown.

Measurements in μ.

(1) Height and breadth of zoarium (Pl. 10, fig. 8) 10 320 × 11 600.
(2) Diameter of proximal stem just before bifurcation 950.
(3) Diameter of secondary stem 700—1 200.
(4) Diameter of stem at top 860 × 1 300.
(5) Width of autozoid 260—300.
(6) Diameter of aperture of autozoid 250—290.

My material has consisted of but two zoaria, one of which was severely damaged, most of the branches having been broken off. The other zoarium (Pl. 10, fig. 8) I think is almost complete, though the proximal portion of the main stem is broken off, probably a short distance above its point of attachment. The stem continues undivided for a short distance, then breaks up simultaneously into half a dozen secondary stems which, in their turn, divides anew into 3—5 stems each. These may divide very soon again and in that way a great many secondary, tertiary, etc., stems come into existence, making the zoarium bouquet-shaped (cf. Pl. 10, fig. 8).

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[1] Cf. below, p. 133.

As is natural, then, the stems are very close to one another and, in most cases, anastomose frequently near the top. An anastomose is formed through the latero-distal edge of a stem growing out, within a distinct area, so as to form a horizontal lamina, upon which numerous zoid-Anlagen develop. Through the increase in length of the lamina it soon attains the edge of another top or nearly so. At the edge of this top or a little below it a similar outgrowth is formed, growing in the direction towards the one just mentioned, until the two meet and coalesce. Thus a bridge uniting the tops of two neighbouring stems is formed. It will be evident that the zoids standing on the bridge (except those nearest to the abutment on both sides) must be very much shorter than the other ones. As a matter of fact, these zoids are usually closed which probably happens shortly after the bridge is complete. Thus the result is that two neighbouring stems are united by means of a bridge-like anastomose but that the group of zoids, forming the top of each stem, remains distinct, being separated from its neighbour by a group of zoids closed each by a calcareous diaphragm.

When the stems continue growing, one of two things may happen. Either the anastomose uniting them is left behind, so to say, as the closed zoids cannot be lengthened, in which case it functions, obviously, as a kind of arch-buttress strengthening the zoarium; or else the zoids on the bridge are not closed or cease to be so, remaining continually level with the tops of the two united stems. In this way two top portions may gradually merge into one.

The anastomosing of the tops is a process that is so frequently repeated that I think it must be taken as very characteristic of the present species. The mode of branching otherwise is, moreover, similar to that of the preceding species though it is much more frequent. The anastomosing, however, is a distinguishing character that I have not found in *F. ramosa*, even if two stems are very close to one another. I do not think, therefore, that it ever occurs in that species.

The arrangement of the zoids is otherwise the same here as in *F. ramosa*. Each stem is formed by one single bundle of very long zoids the outer walls of which form the surface of the zoarium. The zoids open at the top of the stems only and become closed as soon as they are forced away from the top area by new zoids developing there. In the axils rather numerous closed zoids are often observed.

It is interesting to see that within the honeycomb-like top area, where two or more interzoidal walls meet, there are often small conical processes reminding of the apertural processes that may occur in members of the Heteroporina (cf. Borg 1933, p. 264). Through the occurrence of these processes the existence of a common terminal membrane is demonstrated. It covers the whole of the top area, as otherwise there could not have existed any such processes. On the other hand it is evident from the structure of the zoarium that the terminal membrane covers the top area only, but not the lateral walls of the zoarium.

I have sought in vain for gonozoïds. There are cavities in the axils covered by the ensemble of the closed zoids, but I have seen no signs that these might represent the brood-chambers and I do not think it likely. As the present species is, clearly, nearly related to the preceding one, it seems to me most probable that the gonozoid, too, is of the same type. Or are we possibly to meet here the simplest form of gonozoid existing, *i. e.* the one in all essentials similar to an autozoid, and is perhaps this the reason why I have been unable to find it?

The pseudopores piercing the lateral walls of the autozoids (the wall of the zoarium) are numerous and most similar to those in *F. ramosa.* In the proximal portion of the zoarium the wall may be thicker, so the limits between the individual zoids become invisible, and the pseudopores are smaller. I suppose this is what authors when describing fossil forms have called an "epitheca". The term is quite unnecessary.

Though the present species comes close to the preceding one, I think there is no doubt as to its distinctness. The generous branching and the frequent anastomosing are characteristic and the whole zoarium, the autozoids inclusive, is of smaller dimensions than in *F. ramosa.*

Fasciculipora americana d'Orbigny, of which I have seen a fragment preserved in the State Museum, Stockholm, is of much the same shape as *F. maeandrina*, but the autozoids are distinctly smaller and there are other differences too. So I do not think the two can be considered identical.

Waters, in his Supplementary Report of the Challenger Expedition (1888, p. 40) described a species which he referred to *Frondipora verrucosa*, from St. 135 c, off Nightingale Island, Tristan da Cunha. It had been labelled *Fasciculipora ramosa* by Busk. From the description given by Waters it is evident that he considers young colonies of *Frondipora verrucosa* to be in some stages "much like the *Fasciculipora ramosa* of Busk". The specimens are said to be "frequently dichotomising, and often anastomosing, but also sometimes throwing out thin connecting bars from neighbouring branches". This description seems more applicable to *F. maeandrina* than to any other species and a re-examination of the Challenger specimens discussed is, therefore, highly desirable.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 60.

Distribution: ?? off Nightingale Island, Tristan da Cunha (Challenger Expedition, Waters 1888, p. 40).

2. Divisio **Camptostega**.

Syn.: *Centrifuginés Radicellés*, part. d'Orbigny 1851—54, p. 591; *Articulatae s. Radicatae* Busk 1859, p. 92; *Camptostega* Borg 1926 b, p. 474.

Char.: Primary zoid erect, separated by a chitinous joint from the pro-ancestrula; zoarium jointed; rhizoids present. Body-wall a gymnocyst; vestibular sphincter present; broodchamber a gonozoid, moderately dilated in its middle part; polypide of gonozoid degenerating before having been fullgrown.

As in all Stenolaemata the pro-ancestrula is a semispherical formation, from which the primary zoid rises. The pro-ancestrula and the primary zoid together are homologous to the ancestrula of Gymnolaematous Bryozoa.

The incipient primary zoid grows out from the upper side of the pro-ancestrula as a cylindrical, slightly trumpet-shaped formation. It is thus from the first beginning erect, free from the substratum, its aperture facing upwards. This is very characteristic of all Camptostega.

New zoids arise from the primary zoid by means of budding. As a result of repeated budding-processes an erect, branched, bush-like zoarium comes into existence. In spite of the calcareous walls of the individuals composing it, the whole colony is rather flexible, because of numerous chitinous joints being inserted in its stems (axes) and branches.

The number of zoids in an internode (between two joints) varies from one (*Crisidia*) to more than thirty (certain species of *Crisia*). In the proximal portion of a colony this number is always low but it may increase distally until the zoarium is fullgrown. One or sometimes even more of the zoids of an internode may be transformed into a gonozoid. Fertile internodes show a higher number of zoids as a rule than any other.

From what has been said it should be evident that a zoarium is not fully developed until gonozoids have been formed. Young colonies — not to speak of small fragments — as a rule cannot be determined with certainty. Unfortunately a good many determinations of that kind have been made, even in later years. Further early authors often had dry material before them as is often evident from the descriptions given. One should be careful in comparing such descriptions with those of material fixed in alcohol.

Kenozoids occur in all Camptostega. They are of two kinds, viz. the processus spiniformes ("spines") and the rhizoids ("rootlets").

The former are developed in certain species but are lacking in others. Where they occur, they either are placed laterally, at the side of an autozoid, or terminally, at the top of an internode. Sometimes they may exist in a few colonies of a species while most other specimens lack them; or the reverse may be the case.

Rhizoids are to be found in all species of this Division but in different species they are developed to a very varying degree. They may take their origin from the pro-ancestrula only, or from this and the primary zoid, or from some of the lower zoids in addition, or from some or even many of the more distally placed zoids as well. In some cases a rhizoid may originate from the top of an internode. From the distal end of a rhizoid a new colony may develop, forming a secondary pro-ancestrula, and as this is very often the case, the species of the Camptostega as a rule form dense tufts, composed of several zoaria, that have all taken their origin from one pro-ancestrula, *i. e.* from one larva only.

Fam. **Crisiidae** JOHNSTON.

Syn.: *Crisiadae* JOHNSTON 1838, p. 260 (part.); 1847, p. 282; *Crisidae* D'ORBIGNY 1851—54, p. 596; *Crisiidae* BUSK 1859, p. 92; 1875, p. 3; *Crisiadae* BUSK 1886, p. 1; *Crisiidae* auctt.

The only family.

In a paper on some species of *Crisia* WATERS (1916, pp. 470 ff.) has given his opinion as to the characters available in taxonomy. It is very useful that these matters be discussed, though I think WATERS may have overrated the significance of some of the characters noted. The width of the base of the internodes and the position of the basis rami, for instance, must be used with much caution. The former depends upon two facts, viz. (i) if one or more zoids take part in the formation of the joint, and (ii) if the zoids are placed close together or not; but so far as I have found, these characters are not, or in any case not always combined with one another. The latter one, viz. the position of the basis rami on the zoid at which it is attached, must be taken in connection with the position of this zoid in its internode. If the zoid is the 1st or 2nd one, then the basis rami cannot be wedged in, but if it is the 3rd or holds a yet higher position in its internode, it is very probable that the basis rami is inserted between it and the next zoid on the same side.

I think it necessary to consider such matters as these before using a character in taxonomy in the hope that it will turn out to be useful.

Synopsis of the Genera.

1 (4) Sterile internodes consisting of 1—3 zoids; fertile internodes composed of 3—5 zoids; membranous sac of gonozoid constricted off into two parts 2

2 (3) Most internodes consisting of one zoid each; no processus spiniformes occurring: *Filicrisia.*

3 (2) Most internodes consisting of two zoids each; processus spiniformes abundant: *Bicrisia.*

4 (1) Sterile and fertile internodes mostly, except in proximal portion of zoarium, composed of a much greater number of zoids than three; membranous sac of gonozoid not constricted off into two parts .... *Crisia.*

Genus **Filicrisia** D'ORBIGNY.

Syn.: *Filicrisia* D'ORBIGNY 1852, p. 603; *Crisia*, part., MILNE EDWARDS 1838, p. 197; *Crisia* auctt.; *Filicrisia* BORG 1924, p. 29; 1926 b, p. 183.

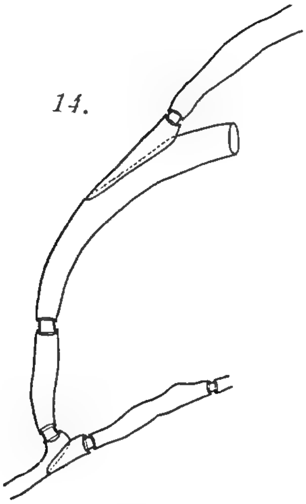
Genotype (by monotypy): *Filicrisia geniculata* MILNE EDWARDS 1838, p. 197.

Sterile internodes consisting of 1—3 zoids; fertile internodes composed of 3—5 zoids. Gonozoid adnate for the greatest part of its length, its tube terminal, the membranous sac of the gonozoid constricted off into two parts; number of tentacles 8.

Filicrisia may well be regarded as a genus transitional between *Crisidia* and *Bicrisia* on one hand and *Crisia* on the other. Or perhaps it is more correct to say that it forms a kind of transitional stage between *Crisidia* and *Crisia*, as *Bicrisia* has in my opinion begun to specialize and is about to develop along another line of evolution than the other genera, it being characterized by the zoids forming pairs.

Filicrisia comes near to *Crisidia* by the fact that most of the internodes have only one zoid each. The constriction of the membranous sac into a small proximal portion and a much larger distal one is another character which it shares with both *Crisidia* and *Bicrisia*. On the other hand, some of the sterile internodes are composed of 3 zoids, which is never the case in *Crisidia*, and in the fertile internodes the number of zoids amounts to 3—5, which is another complication compared with the condition invariably found in *Crisidia* but is more in accordance with what occurs in *Crisia*, though the zoids of the fertile internode in most species of that genus reach much higher numbers.

The structure of the fertile internodes is principally the same, however, in *Filicrisia* and *Crisia*, and the gonozoid is adnate for the greatest part of its length as in that genus; which is not the case, as we know, either in *Crisidia* or *Bicrisia*. The occurrence of numerous processus spiniformes is very characteristic of *Crisidia* and *Bicrisia* but not of *Filicrisia* which in this instance too comes nearer *Crisia*, where processus spiniformes are not necessarily lacking altogether but they are never as numerous as in the two genera just mentioned. I have not observed any processus spiniformis in the species of *Filicrisia* examined, but this forms no reason for presuming that they are lacking completely.



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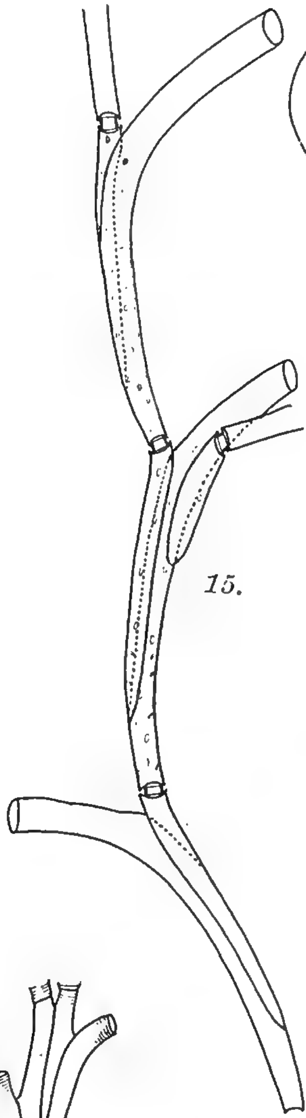

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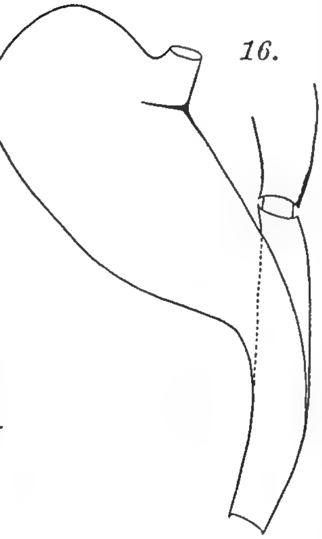

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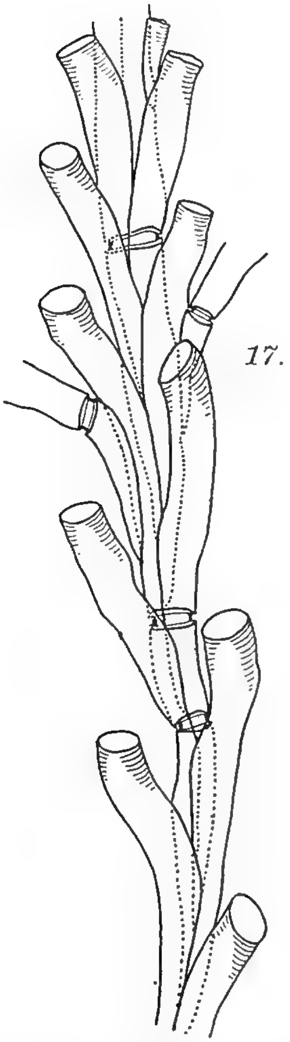

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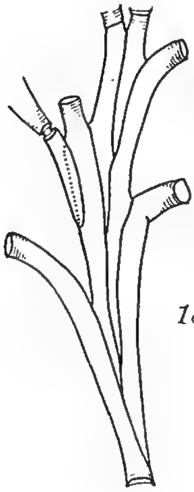

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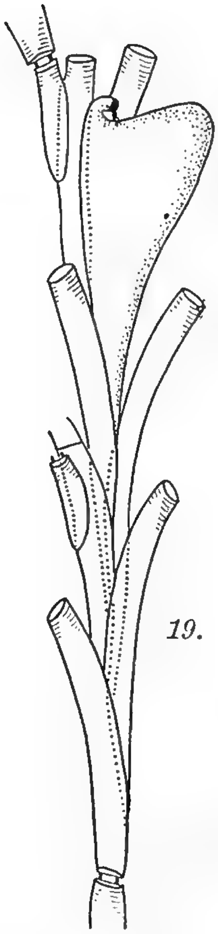


19.

Text-fig. 14. *Filicrisia* sp. Basal portion of erect zoarium rising from a rhizoid. × 52.
» » 15. *Filicrisia* sp. Some internodes to show their structure and shape of autozoids. × 52.
» » 16. *Bicrisia edwardsiana.* Gonozoid in optical longitudinal section to show its shape and valve between dilated portion and tube of gonozoid. × 63.
» » 17. *Crisia kerguelensis.* Sterile portion of zoarium as seen from frontal side, three internodes or parts of such being visible. × 53.
» » 18. *Crisia irregularis.* Sterile internode as seen from frontal side (cf. text, formula 7). × 36.
» » 19. *Crisia irregularis.* Fertile internode with gonozoid as seen obliquely from frontal side (cf. text, formula 10). × 50.

Filicrisia sp.

Text-figs 14 and 15.

Among the material of Acamptostegous Bryozoa examined by me there are a number of fragments of a species clearly belonging to the Crisiidae, which I think should be referred to this genus. As the fragments are small and in a rather poor condition and as there is no gonozoid represented, I am unable to say if they might belong to *F. geniculata* (cf. Borg 1924, p. 29; 1926 b, pp. 263, 351 f.), which so far as is known is a Boreal species, or to *F. fransiscana* (cf. Robertson 1910, p. 233), which is a West Pacific one, or if they should be referred to some other species within the genus. I think it rather probable that it may represent a new species. Describing it here will, I hope, make it possible for future writers to identify the species, when more extensive material is available.

Measurements in μ.

(1) Length of internode (with 1 zoid) from joint to joint 790—930, average 860.
(2) Breadth of internode (= breadth of zoid) 70.
(3) Transverse diameter of joint 50.
(4) — — —
(5) Length of zoid (from joint to rim of aperture) 830—1 400, average 1 150.
(6) — — —
(7) Diameter of aperture of autozoid 85—105, average 100.
(8) — — —
(9) — — —
(10) — — —
(11 a) Length of basis rami, when one occurs only, 340—860, average 610.
(11 b) Length of 2nd basis rami when existing, 270—450, average 350.

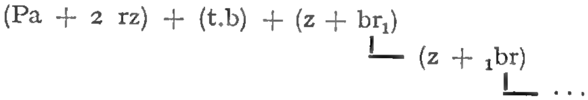
The zoarium is, so far as can be made out, very slender and gracile, bush-like, semi-transparent white, with sparse branches. It develops partly from the pro-ancestrula, but erect stems are formed here and there from the rhizoids too.

Nearest to the pro-ancestrula there is a basal tubulus, and it is far from uncommon that formations of this kind are intercalated between some of the internodes more distally in the zoarium as well, by which it assumes a rather high degree of flexibility (cf. Text-fig. 14).

Distally of the basal tubulus follow the internodes. So far as I have been able to make out they all consist of one zoid only. Consequently a main stem does not exist and each internode (or zoid) has a branch, which represents the basis rami of the next internode (Text-fig. 15). A main stem is foreshadowed, however, by the mode in which the internodes place themselves in a row, each forming the continuation as it were of the longitudinal axis of the next preceding one. This false main stem becomes divided dichotomously here and there, namely where an internode has two branches instead of one, both branches deviating, forming an obtuse angle with one another.

This mode of branching is much in accordance with what is found in *Crisidia* but differs from that prevailing in *Crisia*. The formulae below (1—5) may give some idea of it. We see that where there is a row of internodes each with a single branch (as just described), the branches may proceed alternately to the right and to the left but that this is not always the case. Often it is scarcely possible to ascertain, moreover, in what direction the branch proceeds, because the basis rami, from which it originates, has been displaced from the lateral to the dorsal side of the zoid in question. It is, partly as least, through a dislocation of this kind of the basis rami that one receives the impression of a main stem as it were and not that of a number of internodes forming a zigzag line.

(1)[1]



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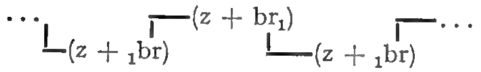

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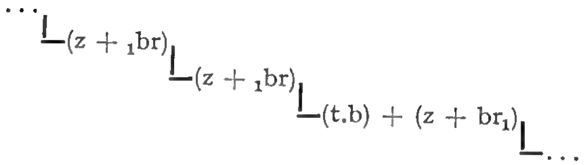

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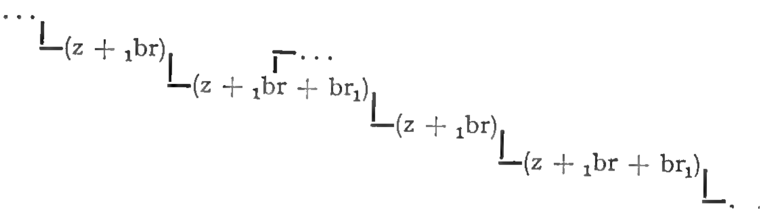

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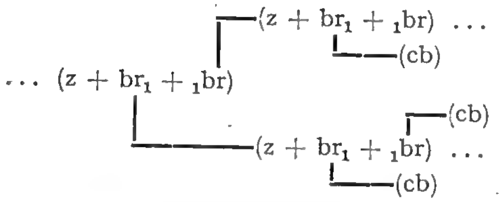

The autozoids are long and slender. They may be said to be cylindrical, this being the impression they give, though they are more correctly described as somewhat cornet-shaped, gradually widening from the joint whose diameter is about 50 μ to the aperture which measures 100 μ on an average (cf. the Measurements). Thus there is no constriction in their distal part and no "tube", just as there is not a broader portion connate to any neighbouring cystid. Each cystid protrudes a considerable distance above the point of attachment of the basis rami, its distal half being curved in a frontal direction, by which the circular aperture faces upwards and a little forwards (cf. Text-fig. 15).

In one or two cases the distal portion of an autozoid has separated itself from the rest of the zoid by means of a joint and continues its growth as a common bud, thus giving rise to a new internode.

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[1] As to the meaning of the abbreviations, cf. a former paper of mine (1924, p. 7). *Pa* is the proancestrula and cb is a common bud at the top of a branch.

Here and there chitinous hook-like processes protrude from the cuticle inwards through the calcareous layer into the cavity of the zoids. They have about the same shape as those occurring in *Crisia sinclarensis*, previously described and figured by me (1926 b, p. 192, textfig. 3).

Rhizoids are sparse. Those I have seen have originated from the pro-ancestrula, not from any other part of the zoarium. They are sparsely jointed and the calcified walls are relatively thin. Where an erect stem is produced from a rhizoid there is a small swelling, but a secondary pro-ancestrula such as is found in species of *Crisia* can hardly be said to exist here.

In the material available no processus spiniformes have been observed. It may be assumed, therefore, that these are either lacking altogether or at any rate that they are only few and occasional.

If one branch only is produced from a zoid, its basis rami is long and is attached at the zoid in such a way, that it covers about the middle third of its outer lateral (or dorsal, cf. above) wall. If on the other hand the branches are two, one of the basis rami is long but the other is much shorter. The former one is in such a case attached more proximally, the latter one more distally to the zoid in question. The joints are yellow.

The pseudopores are sparse, sometimes very sparse. This is especially true for the rhizoids and the distal portion of the autozoids, which latter parts often lack pores altogether. Where existing the pseudopores are rather narrow oval in shape, the longitudinal axis of the oval being parallel to that of the zoid as is always the case in the Crisiidae.

Assuming that the fragments examined are correctly referred to *Filicrisia*, some differences are discernible when compared with *F. geniculata* and *fransiscana*. As for *F. geniculata*, the shape of the autozoids is another, they being straight or very nearly so, and the same is true for *F. fransiscana;* in the latter species, moreover, the autozoids seem to be much shorter than in the Antarctic material here described. The probability of the specimens discussed representing a new species is thus augmented.

Occurrence: Swedish Antarctic Expedition 1901—03. — St. 94. On Hydroids and Algae.

Genus **Bicrisia** D'ORBIGNY.

Syn.: *Bicrisia* D'ORBIGNY 1853, p. 601; *Crisidia* D'ORBIGNY 1839, p. 7; nec MILNE EWDARDS 1838, p. 203; *Crisia* auctt.; *Bicrisia* BORG 1924, p. 28; 1926 b, p. 183.

Genotype (by monotypy): *Bicrisia edwardsiana* D'ORBIGNY 1839.

Sterile internodes when branchless consisting of two zoids, but when a branch occurs, of three; fertile internodes composed of 3—5 zoids; gonozoid free for the greatest part of its length, the tube on its basal ("dorsal") side. Membranous sac of gonozoid divided into two parts; number of tentacles nine.

This genus is well characterized by the strongly fixed number of zoids in the different internodes. Most internodes, being branchless, consist of two zoids only which form a pair. In those internodes from which a branch has developed, there are always three zoids if the internode is sterile, *i. e.* if none of its zoids is transformed into a gonozoid. But if this be the case and the internode thus is a fertile one, the number of the zoids constituting it may increase to five, which is the maximum number occurring. The fertile internodes always have one or sometimes even two branches.

The narrow, proximal portion of the gonozoid is wedged in between the neighbouring zoids but the whole of the middle, dilated part as well as the distal one (the tube) are free. Through this feature the genus is well distinguished.

The membranous sac of the gonozoid consists of two parts: a distal one, filling up the middle, dilated part and the tube of the gonozoid, and a proximal, very much smaller portion, which is found in the narrow proximal part of the gonozoid. It is attached here to the wall of the gonozoid by means of numerous ligaments (cf. my memoir 1926 b, pp. 431 f.). The limit between the two portions of the sac runs approximately where the gonozoid begins to widen, *i. e.* where the narrow proximal portion is gradually passing over into the dilated one.

The structure just described is common for *Bicrisia*, *Crisidia* and *Filicrisia*, whereas the membranous sac of *Crisia* and *Crisiella* is undivided. I think it may be worth while to discuss, on account of this character which seems to me a rather important one (and of several others as well), whether the three genera mentioned first should not be separated from the other two, in which case a new family ought to be instituted for them. However, as the significance of the structure in question is not clear, I think it best to wait until we know more about it.

The number of tentacles is not a character of any great value in taxonomy, but it may be used in addition. In the Crisiidae this number always is low. It is nine in *Bicrisia* and *Crisidia* and probably in *Filicrisia*, whereas in *Crisia* and *Crisiella* it is always eight.

In addition to the species described below, two other ones, viz. *"Crisia" inflata* Waters (1914, p. 839; Pl. 1, figs 1, 2) and *"Crisia" crisoides* Ortmann (1890, p. 75; Pl. 4, fig. 16) on account of the characters distinguishing them must be referred to *Bicrisia*.

1. **Bicrisia edwardsiana** (d'Orbigny) 1839.

Pl. 12, figs 1—3; Text-fig. 16.

Syn.: *Crisidia Edwardsiana* d'Orbigny 1839, p. 8, Pl. I, figs 4—8; *Bicrisia Edwarsiana* (lapsus calami for *Edwardsiana*) d'Orbigny 1853, p. 602; *Crisia Edwardsiana* (part. ?) Busk 1875, p. 5; *Crisia Edwardsiana* Busk 1879, p. 197; *Crisia Edwardsiana* Mac Gillivray 1869, pp. 142 148; 1879, p. 37; 1887 p. 217; *Crisia Edwardsiana* Hutton 1880, p. 195; *Crisia Edwardsiana* Waters 1887, p. 254; 1916, p. 470 f.; *Crisia Edwardsiana* Jullien 1888, p. 81; *Crisia Edwardsiana* Hamilton 1898, p. 198; *Crisia Edwardsiana* Marcus 1922, p. 31; *Crisia edwardsiana* Borg 1924, pp. 27 f.; *Crisia edwardsiana* Borg 1926 b, p. 183 and elsewhere; nec *Crisia edwardsiana* Robertson 1910, pp. 237 f.

Zoarium rather stout, richly branched, branches curved in a frontal direction. Sterile internodes when branchless consisting of two zoids only but where a branch has developed usually of three. Where a branch exists it proceeds invariably from the lowest zoid of an internode. Autocystids of varying length, rather large, curved more or less frontally. Most cystids with a processus spiniformis. Fertile internodes composed of three or, exceptionally, of five zoids, a branch proceeding from the 1st one. Gonozoid the 2nd member of its internode, for the most part free, proceeding in opposite direction to the branch, club-like in shape. Tube proceeding from the basal side of the gonozoids dilated portion, flattened transversely, aperture a narrow oval.

Measurements in μ.

(1 a) Length of internode with 2 zoids (measured from joint to joint) 370—500, average 440.

(1 b) Length of internode with 3 zoids (measured from joint to joint) 505—670, average 610.
(2) Breadth of internode 150—240, average 190.
(3) Transverse diameter of joint 60—80, average 72.
(4) Distance from rim of aperture to rim of the next aperture, on the same side, in uninjured zoids, 200 on an average.
(5) Length of 1st zoid of an internode (measured from joint to rim of aperture) 370—500, average 440.
(6) Length of 2nd zoid of an internode (total length) 470—670, average 580.
(7) Diameter of aperture of autozoid, 90—125, average 100.
(8) Length of gonozoid, from proximal end to top, 870—1 070, average 970.
(9) Width of gonozoid, 360—430 mm, average 390 mm.
(10) Diameter of aperture of gonozoid 135 × 65 on an average.
(11) Length of basis rami, 180—270, average 230.
(12) Length of basis of processus spiniformis, 80—210 mm, average 160 mm.
(13) Breadth of processus spiniformis at base 35—70, average 48.

The zoarium is rather stout with relatively broad and strongly calcified internodes. It is very richly branched (Pl. 12, fig. 1). The branches are curved in such a way that their concave, frontal side faces the main axis, from which they spring (Pl. 12, fig. 2). This as a rule is a little curved too, its frontal side being the concave one (Pl. 12, fig. 3). As for the branches, some of them are only slightly curved while most are rather strongly bent towards the axis. In this way the dense and bushy appearance of the zoarium characteristic for this species comes about.

The pro-ancestrula is provided with numerous, rounded pseudopores not only on its free (upper) surface but also on the basal one. The pores pierce the calcareous wall, ending under the outermost layer of the body-wall, the cuticle.

The rhizoids are strongly developed and very numerous. They originate not only from the pro-ancestrula and the primary zoid but from many of the zoids in the proximal portion of the zoarium as well. It is common that rhizoids give rise to new, erect colonies.

A basal tubulus is inserted, as a rule, between the primary zoid (s. str.) and the pro-ancestrula from which it has grown out.

The lowest internode is that of the primary zoid, consisting consequently of one zoid only. This sometimes gives rise to a processus spiniformis but often such a formation is lacking here.

The other internodes are composed of two or more zoids, the number, however, never exceeding five. The internode next to the primary zoid is sometimes, however, formed of one zoid only.

Sterile internodes, when branchless, always consist of two zoids (Pl. 12, fig. 1) but when a branch has developed, the number of the zoids in the internode in most cases is found to be three, though in one or two cases I have found a branch originating from an internode with two zoids only. As the branches are very numerous in this species, there are about as many internodes with three as with two zoids. In the proximal portion of large colonies the branches often have been broken away and the tubes of the cystids have degenerated, by which shorter or longer series of branchless, strongly calcified internodes composed of very short cystids are found, forming a zone transitory from the basis of the colony to its distal portion. Rhizoids are richly developed in this zone.

The branches proceed alternately to the right and to the left (Pl. 12, fig. 1). Only very seldom have I seen two subsequent branches proceeding at one and the same side and, when this was the case, one of them has protruded from an internode consisting of two zoids only. The branch of an internode always develops from the first (lowest) of the zoids (Pl. 12, fig. 1). I have never found an internode carrying more than one branch.

A branch in its turn may give off one or more new (secondary) branches, these may develop tertiary ones, and so on. The first (lowest) secondary, tertiary, etc. branch takes its origin as a rule at the same side, whether right or left, of its mother-branch as that, at which this in its turn runs from the internode that has given rise to it.

The conditions here described may be illustrated by the following formulae:

(1) $(Pa + 4rz) + (tb + rz) + (z + {}_{1}br + s_1)$
└$(2z) + (3z + {}_{1}br + s_2) + (2z + s_1 + {}_{2}s) + (3z + br_1 + {}_{2}s) + \dots$
└$(2z) + (3z + {}_{1}br + s_2) + \dots$

(2) $(Pa + 4rz) + (z + rz + br_1)$
└$(z + 2rz + br_1)$
└$(3z + 2\ rz + br_1 + {}_{2}s) + \dots$
└$(3z + {}_{1}br + s_2) + (2z + s_1 + {}_{2}s) + (3z + br_1 + {}_{2}s) + \dots$

(3) $\dots + (2z + s_1) + (2z + {}_{1}s + s_2) + (2z + {}_{1}s + s_2) + (2z + {}_{1}s + s_2) + (2z + {}_{1}s + s_2) + (3z + {}_{1}br + s_2) + \dots$

The autozoids are relatively large. Just as the stems and branches they are more or less curved, above all in their distal portions, their frontal sides being concave, the aperture which is rounded or a little oval facing obliquely forwards and upwards (Pl. 12, fig. 2). The rim of the aperture is in its outer portion sometimes prolonged into a blunt edge, by which the aperture assumes an oval shape, the transverse diameter of the oval gradually diminishing distally.

The distal portions of uninjured and not degenerated cystids project freely, the tube thus formed constituting about $^1/_4$ or $^1/_5$ of the cystid's total length.

A fertile internode always consists of at least three zoids. There is no exception to this rule; on the other hand only very seldom does the number of zoids in such an internode exceed three, in fact, I have found only one single fertile internode consisting of five zoids so this may perhaps be regarded as a somewhat abnormal case.

The gonozoid always represents the 2nd zoid of its internode. As in all internodes in this species consisting of 3 zoids, a branch is given off from the 1st zoid. It follows that the free portion of the gonozoid projects from its internode on the side opposite to that, from which the branch runs (Pl. 12, fig. 2). This arrangement — the gonozoid situated on one side of the stem, the branch on the other — is very characteristic of the present species and makes it easy to distinguish it from *B. biciliata*, the only species with which it could reasonably be confounded.

The formulae of some internodes one of which is fertile is as follows:

(4) $\dots + (3z + {}_{1}br + s_2) + (z + br_1 + Gz + z) + (3z + {}_{1}br + s_2) + \dots$

The gonozoids are free with the exception of their narrow, proximal portion which is attached to the other zoids of the internode. Comparing the gonozoid with an autozoid it follows, that the middle, dilated portion and the tube of the gonozoid, which are free, should be homologized with the projecting distal portion (the tube) of the autozoid.

The gonozoid apart from its tube is club-shaped, its middle portion being rather strongly dilated and, as the gonozoid is much longer than an autozoid, rather voluminous. The tube is on its basal side, at about $^1/_3$ of the distance from the top of the gonozoid to the beginning of the narrow proximal portion (Pl. 12, fig. 3; Text-fig. 16). It is sharply set off from the dilated part of the gonozoid, a calcified valve marking the limit between them. The tube faces obliquely upwards. It is broad — a little broader at its base than at its aperture — and strongly flattened so that the aperture forms a transverse, rather narrow oval.

The processus spiniformes (the "spines") are very characteristic of this species just as of the next following one. As a rule each zoid originally is provided with a processus spiniformis though they are often broken off. There are however some exceptions to this rule, as the gonozoids, the zoids from which a branch proceeds, and the 3rd zoid of an internode are always without a processus spiniformis. It is, however, by no means unusual that other zoids scattered here and there in the zoarium lack them too. I have not seen more than one processus spiniformis on each zoid. It is rather common that an internode terminates in a proc. spiniformis.

The processus spiniformes are strongly calcified. They are curved in over the internode from the zoids of which they spring (Pl. 12, figs 1—3). They are composed of 3 or sometimes 4 portions, separated by joints.

The basis rami, originating from the lowest zoid of an internode, are consequently not wedged in between the zoids, as is the case with the basis of an axial internode. They are formed in such a way that their distal ends are situated just at the base of the free distal portions of the cystids whereas the proximal ends are a little distance from the joint separating a mother-zoid from its basis. When the free distal portion of the zoid carrying a basis rami has been broken down, the basis rami has the appearance of being attached to the zoid just below its aperture (cf. Pl. 12, fig. 2).

The basis rami of the processus spiniformes are shorter and, as is natural, considerably narrower than the normal basis rami. Their place at the wall of the zoids corresponds to that of the normal basis rami, but as they are not so long as these, they give the impression of being attached to the zoids a little more distally.

The joints in the proximal parts of the zoarium are dark brown, in dry colonies almost black. Proceeding distally their colour gradually becomes a brighter brown, and in young internodes they are yellowish.

The pseudopores are numerous, rounded, scattered. They are often distributed irregularly in the wall of the zoids in such a way that areas which are more densely porous alternate with those where the pores are more sparse. The frontal side of the zoids is usually much more rich in pores than the basal (dorsal) one. In the wall of the processus spiniformis the pores are distinctly fewer and more oval in shape than in those of the zoids.

The pseudopores in the walls of the gonozoids are about as numerous as in the ordinary zoids, which is in marked contrast to what is found in most Stenolaemata where the pores of the gonozoid are mostly much more densely distributed than in the autozoids.

The species here recorded is the same as that found and named by D'ORBIGNY (1839, p. 8). I have examined the type-specimens in the Museum d'Histoire Naturelle, Paris (N:o 13732). They had earlier been examined and re-described by WATERS (1905, p. 13).

The specimens catalogued by BUSK (1875, p. 5) under the name of *Crisia edwardsiana* may belong to this species and there is nothing in the description to contradict this assumption; further the figures (Pl. II, figs 5—8) seem to represent *B. edwardsiana.* This is especially true of fig. 7, in which a fertile internode is seen, whereas fig. 8 is more doubtful. BUSK (l. c.) says, on the other hand, that "M. D'ORBIGNY's figure (1839, Pl. 1, fig. 4) represents the zooecia (zoids) as much longer and slenderer than they are in any specimen that has come under my notice", which may, however, be explained by the fact (shown by his figures) that BUSK's colonies are old ones with the zoid's distal portions mostly degenerated, while the internodes figured by D'ORBIGNY consist of zoids that have retained their full length. From WATER's (l. c.) revision of the D'ORBIGNY Collection we know, moreover, that zoids of the type BUSK had before him exist among D'ORBIGNY's material too, though D'ORBIGNY did not mention or figure them.

It might be possible, however, that BUSK had included in his *C. edwardsiana* specimens from more than one species. This is the opinion of MACGILLIVRAY (1879, p. 38) who says: "I am doubtful to which species BUSK's description and figures of *C. Edwardsiana* refer. The figures have the proportions of the cells [zoids] of *C. biciliata* [this statement is hardly correct; cf. below], and may have been taken from an imperfect specimen of the single-spined form of *B. biciliata.* The ovicell [gonozoid], however, is differently shaped".

The words quoted obviously made BUSK feel uncertain as to the correctness of his determination, for in his report on the Challenger Bryozoa (1886, p. 3) he doubts the identity of the form from Tierra del Fuego and that from New Zealand, both of which he had described in 1875 (p. 5) as *B. edwardsiana;* it is highly probable, he says, that "the latter is distinct from the Patagonian *Crisia edwardsiana,* in which the zóoecia, as represented by M. d'Orbigny, are very long and erect, whilst in the New Zealand species they are short and curved forwards".

As I have shown above the different length and shape of the zoids depend simply on their age and position in the zoarium. Since MACGILLIVRAY (l. c.) admits that the gonozoid figured by BUSK is different from that of *B. biciliata,* the question to which species the specimens belong that were described and figured by BUSK in 1875, seems settled.

BUSK further states (1886, p. 3), however, that among his material "there is also another form or variety closely approaching the New Zealand species but in some measure intermediate between that and the South American one". This form may possibly represent a separate species though I do not think it very likely. BUSK says that it is "characterized by a tendency to have two or more pairs of cells in some of the internodes, and less exactly opposite". On account of this very poor description it is impossible to say now what was meant (*B. biciliata?*).

The specimens determined by MARCUS (1922, p. 31) have no gonozoids so the determination cannot be considered certain. I have re-examined the material that has laid before this author, however, and I have found that his determination in this case was correct. The opinion forwarded by him as to the BUSK material, on the other hand, I cannot share.

Habitat: on algae and Hydroids or on other Bryozoa, in the littoral zone.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 51; St. 53; St. 55; "On kelp at the shore of Grytviken [Pot Bay], 22. 5 1902".

Distribution: Coast of Patagonia (D'ORBIGNY 1839); Tierra del Fuego (BUSK 1875); Kerguelen (BUSK 1879); Coasts of New Zealand and of Victoria, New South Wales and Tasmania, S. and SW. Australia (MACGILLIVRAY 1869, 1879, 1887; WATERS 1887); Orange Bay and S. Sebastian Bay (E. from Cap Agulhas); S. Africa (JULLIEN 1888, MARCUS 1922).

2. **Bicrisia biciliata** (MACGILLIVRAY) 1868.

Pl. 12, fig. 4.

Syn.: *Crisia Biciliata* MAC GILLIVRAY 1868, pp. 141, 148; *Crisia Biciliata* BUSK 1875, p. 9; *Crisia Biciliata* MACGILLIVRAY 1879 p. 38; Pl. 39, figs 2, 2 a—c; *Crisia Biciliata* BUSK 1886, p. 3; Pl. I, figs 1, 2; *Crisia Biciliata* MACGILLIVRAY 1887, p. 217; *Bicrisia biciliata* BORG 1926 b, p. 183 and elsewhere; *Bicrisia warrnamboolensis* STACH 1935, p. 143.

Zoarium slender, not very richly branching, branches in most cases slightly curved frontally. Sterile internodes when branchless consisting of two zoids only, sometimes even of one, but where a branch has developed usually of three. Where a branch exists this always proceeds from the first zoid of an internode. Autocystids rather short and narrow, in most cases curved distinctly frontally, particularly in their distal portions. Autocystids with one or two processus spiniformes. Fertile internodes composed of three zoids. Gonozoid the 3rd member of its internode by which it becomes situated between main stem and branch. Its shape club-like, narrow. Tube proceeding from basal side of dilated portion, near its top, strongly flattened, aperture almost slit-like.

Measurements in μ.

(1 a) Length of internode with 2 zoids (measured from joint to joint) 350—500, average 420.
(1 b) Length of internode with 3 zoids (measured from joint to joint) 430—630, average 520.
(2) Breadth of internode 130—230, average 180.
(3) Transverse diameter of joint 60.
(4) Distance from rim of aperture to rim of next aperture, on the same side, in uninjured zoids, 170—200.
(5) Length of 1st zoid of an internode, measured from joint to rim of aperture, 380—530, average 450.
(6) Length of 2nd zoid of an internode, 450—630, average 550.
(7) Diameter of aperture of autozoid, 65—85, average 76.
(8) Length of gonozoid, from proximal end to top, 550—1 100, average 820.
(9) Width of gonozoid, 240—390, average 300.
(10) Aperture of gonozoid, 90 × 35 on an average.
(11) Length of basis rami, 120—220, average 190.
(12) Length of basis of processus spiniformis, 60—140, average 110.
(13) Breadth of processus spiniformis at its base 20—50, average 34.

The zoarium is much more slender than that of *B. edwardsiana* and not so richly branched. The internodes are narrower, the cystids smaller and the calcification less strong. The walls of the cystids are therefore semitransparent by which the zoarium looks much more brittle and fragile than that of the species next preceding. The branches are curved in the same way as in *B. edwardsiana* but to a very varying extent. Sometimes a branch is sharply bent forwards but mostly its curvature is rather slight.

The pro-ancestrula on its basal side has some pseudopores and there are as a rule a few such pores in its frontal wall too.

Three or four rhizoids usually have grown out from the pro-ancestrula. It frequently happens that one or two rhizoids proceed from some of the lower internodes too but in most cases the rhizoids run exclusively or almost exclusively from the pro-ancestrula. Thus the rhizoids seem on the whole to be more sparse than in *B. edwardsiana*. The rhizoids are branched as a rule.

A basal tubulus is sometimes inserted between the primary zoid and the pro-ancestrula or the rhizoid from which it grows but often there is none. On the other hand, a tubulus may be found inserted in other places of the zoarium, at the basis of one or more internodes. This is in contrast to what is seen in *B. edwardsiana*.

The lowest internodes, 1—4 in number, each consist of one zoid only. This usually is provided with a processus spiniformis or sometimes, but not very often, with two processus on each side. In some cases there is a processus spiniformis only on one side or the zoid may lack spines altogether.

The internodes in the rest of the zoarium are composed of two or three zoids each. The rule is the same here as in *B. edwardsiana*, viz. that those internodes from which a branch has developed have three zoids while the other ones have two. But as branches are less frequent in this species than in the preceding one, the number of internodes with two zoids is decidedly larger. This difference is easily distinguishable above all in the distal half of the colonies. I have not observed any internode with more than three zoids in this species, but it is not uncommon to find, even in the distal portion of a zoarium, one or more internodes with only one zoid, inserted between the internodes with two or three zoids. I have never met with a similar condition in *B. edwardsiana*.

When two or more internodes consisting each of two zoids follow one another, a consequence which may deserve to be mentioned is that the lowest zoid in all these internodes is on one and the same side, either on the right or on the left. This is also the case with the lowest zoid of an internode consisting of three zoids which is sooner or later intercalated; whereas in the new series of internodes with two zoids now eventually beginning, the first zoid in each such internode is as a matter of course on the opposite side, and so on.

The branchless internodes are much more numerous than those carrying a branch. Just as in the preceding species I have never seen an internode with more than one branch. In *B. biciliata* I have never observed a branch proceeding from an internode with two zoids; on the other hand all internodes with three zoids have a branch. The branch is always developed from the first zoid of the internode. It follows from what has been said above that the branches run, as a rule, alternately to the right and to the left.

As in *B. edwardsiana*, the first, secondary, tertiary etc. branch is usually on the same side as that on which the branch carrying it springs from its mother-internode. One may observe, however, here and there an exception to this rule.

The following formulae may serve to illustrate what has been said:

$$\begin{array}{l}
(1)\ (Pa + 4rz) + (tb + rz) + (z + br_1 + s_1 + {}_1s) \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad \llcorner(z + br_1 + s_1 + {}_1s) \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad \llcorner(z + br_1 + s_1 + {}_2s) \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \llcorner(z + br_1 + s_1 + {}_1s) \\
\qquad\qquad\qquad\qquad\qquad\qquad \llcorner(2z + s_1 + {}_2s) + (2z + {}_12s + {}_2s) + (3z + br_1 + {}_22s) + \ldots
\end{array}$$

$$\begin{array}{l}
(2)\ (Pa + 4rz) + (z + {}_1br) \\
\qquad\qquad\qquad\qquad\quad \llcorner(2z + {}_1s + 2s_2) + (2z + {}_1s + s_2) + (3z + br_1 + 2s_2) + \ldots
\end{array}$$

$$\begin{array}{l}
(3)\ \ldots + (2z + s_1) + (3z + br_1 + {}_2s) + (2z + {}_1s + s_2) + (2z + {}_12s + 2s_2) + . \\
\quad\ \ + (3z + br_1 + s_2) + (3z + br_1 + {}_2s) + (2z + {}_1s + s_2) + (2z + {}_1s + s_2) + \ldots \\
\qquad\qquad\quad \llcorner(2z + 2s_1 + {}_2s) + \ldots \\
\quad \llcorner(2z + s_1) + (2z + s_1 + {}_2s) + (2z + 2s_1 + {}_2s) + (3z + br_1 + {}_2s) + \ldots
\end{array}$$

The autozoids are free from one another to a rather considerable part, mostly for about one third of their length. The cystids are curved and as a rule more strongly so than those of the preceding species. The greater part of the curvature is in the free distal portion of the zoids.

The length of the cystids is very varying. In the proximal portions of a colony and especially in internodes composed of only one zoid, the cystids when uninjured may be very long; but in most cases, above all in the distal half of the zoaria, the cystids are not so long as those in *B. edwardsiana.* The aperture is rounded. As for its breadth, this in all zoids is considerably smaller than in the preceding species.

I have spoken here of uninjured zoids only. If the distal part is degenerated, which may often be the case, particularly in the proximal part of a zoarium, the zoids become much shorter. Such zoids should therefore never be taken as typical of this (nor of any other) species. It is evident, however, I think, that MACGILLIVRAY (1868, p. 141; 1879, p. 38, Pl. 39, fig. 2), when describing and figuring the present species has had before him specimens in which the distal portions of the cystids were not well developed; or he might have been misled by the fact, that the free distal parts of the cystids are strongly curved, by which they easily may seem a little shorter than they really are. BUSK (1886, p. 3; Pl. I, figs. 2 and 2 a), on the other hand, had among his material specimens, the cystids of which, in the proximal portions of the zoaria, were surely unusually long.

The gonozoids are free for the greatest part of their length (Pl. 12, fig. 4). A fertile internode always consists of three zoids. So far this species is in accordance with what was found in the preceding one; but it differs from *B. edwardsiana* by the gonozoid replacing not the 2nd zoid but invariably the 3rd one (Pl. 12, fig. 4). This results in the fact that the gonozoid is situated in the edge between the branch running from the 1st zoid, on one hand, and the continuation of the stem, viz. the internode following next, on the other. The structure of the fertile internode and the position of the gonozoid thus is different in the two species.

The formulae of a number of internodes including the fertile one may be, for instance, the following:

$$(4)\quad \ldots + (2z + {}_{1}2s + 2s_{2}) + (2z + {}_{1}s + 2s_{2}) + (z + {}_{1}br + z + s_{2} + Gz) + (2z + s_{1} + {}_{2}s) + \ldots$$

The gonozoid is club-shaped as in *B. edwardsiana* but it is narrower than in that species, and its tube, springing from the basal (dorsal) side of the gonozoid, is situated much nearer the top of the dilated portion (cf. Pl. 12, fig. 4). It is strongly flattened and very sharply constricted off from the middle, dilated part, there being an arched valve between the two. As it is directed obliquely upwards and backwards, the aperture of the gonozoid which is about slit-like is facing the same direction.

The processus spiniformes are very conspicuous and more numerous than in any other species known. In internodes that consists of one zoid each, this has as a rule two processus spiniformes, one on each side. This has caused the name of the species (cf. MAC-GILLIVRAY 1868, p. 142). Sometimes there are even four processus spiniformes, two on each side, or there may be two on one side and one on the other. In not a few cases, however, the zoid in question has no processus spiniformis at all or only one on either the right or the left side, so there is much variation as to this character.

In the internodes composed of two zoids — that is, in the majority of the internodes — both zoids may have one or two processus spiniformes each, or one of the zoids may have two and the other one processus. Seldom does a zoid of such an internode lack the spiniform processes altogether.

When an internode consists of three zoids, the lowest of the zoids carrying a branch has no processus spiniformis. The 2nd zoid has one or two processus spiniformes whereas the 3rd one, whether transformed into a gonozoid or not, has none.

As in *B. edwardsiana* the processus spiniformes consist of three or four portions, with joints intercalated between them. They are long and narrow — considerably more so than in the species mentioned — and are bent over the internodes. In this species I have seen no processus spiniformis forming the termination of an internode, as is sometimes the case in *B. edwardsiana.*

The basis rami are shorter than those of the preceding species (cf. Measurements, 11), covering about the middle third of the zoid in question.

The basis of the processus spiniformes are shorter than those of the branches and are not so long as the corresponding formations in *B. edwardsiana* either (cf. Measurements, 12). The upper edge is at about the same distance from the rim of the aperture of the zoid as that of the basis rami; it follows that the distance from its proximal end to that of its zoid is relatively longer so the basis of the processus is placed seemingly more distally than is that of a basis rami.

The joints are lighter than those of the preceding species. In the younger portions of a zoarium they are of a bright yellow while in the older ones they are brownish or of a yellowish brown.

The pseudopores are rather sparse. They are oval except in the processus spiniformes where they are almost slit-like.

In the autozoids the number of the pores is larger in the frontal than in the basal wall. The pores of the gonozoid are a little wider than those of the autozoids but just as in the preceding species they are scarcely more numerous than in the wall of the autozoids. This may perhaps depend upon the fact that the gonozoid is free for the greatest part of its length, by which the aëration is, obviously, facilitated.

I have examined zoaria referred to *B. biciliata* from the South American Region as well as from the South Australian (Tasmania). So far as I can see they belong to one and the same species. The differences are very slight. The measurements taken of the South American colonies are on the whole a little larger than those of the Tasmanian one; on the other hand, the processus spiniformes are more numerous in the Tasmanian than in the South American specimens, one and the same zoid carrying more frequently two processus spiniformes. But as the position and shape of the gonozoid as well as the other characters are the same, I consider these differences as unimportant. It is a wellknown fact that Arctic and Antarctic specimens are often larger than those from more temperate regions; and the number of the processus spiniformes is a very varying character in different species of the family. For instance, in *Crisia eburnea* (L.), zoaria from the Boreal region of Europe nearly always lack processus spiniformes but in colonies from the Arctic (Spitzbergen) that I have examined, such formations are rather numerous.

The specimens of *B. biciliata* recorded by MacGillivray (1879, p. 38) were from Warrnambool, at the coast of Victoria (S. Australia). Another species of the same genus thought to be new has lately been described by Stach (1935, pp. 143 f.) from the same locality (Warrnambool) under the name of *B. warrnamboolensis.* So far as I can see from the description and the figures given it must, however, be identical with *B. biciliata.* Stach says that "the brood-chambers arise between two zooecia of an internode" which means that the gonozoid is the 3rd member of its internode. The correctness of this view is demonstrated by a look at his Text-fig. 2 which shows that the structure of the fertile internode is identical with what is found in *B. biciliata,* and Stach says himself that "the brood chamber in both species is almost identical". The differences left should be that *B. warrnamboolensis* has "a less salient peristome [free distal portion of cystid), relatively shorter internodes and a single segmented filament (processus spiniformis) in place of two filaments to each upper angle". The last character is without importance as has just been shown, and the two others are quite insufficient as foundation for a new species; in fact, the "less salient peristomes" are easily explained, for both the description and the figures make it clear that the distal portions of most if not all of the autocystids in the colonies examined by Stach had degenerated or had been broken off (cf. particularly Text-figs. 1 and 2 of Stach).

Habitat: On algae and Hydroids or on other Bryozoa, in the littoral zone.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 39; — St. 51; — St. 53; — St. 55. — Swedish State Museum, Stockholm: Coast of Tasmania, on *Bicellariella tuba.*

Distribution: Tristan du Cunha (Busk 1886, p. 3); Coast of Victoria, S. Australia (MacGillivray 1868, 1879, 1887; Stach 1935).

Genus **Crisia** LAMOUROUX.

Syn.: *Crisia*, part., LAMOUROUX 1812, p. 183; *Crisia*, part., SMITT 1866, p. 115; BUSK 1875, p. 4; HINCKS 1880, p. 418; HARMER 1915, p. 96; WATERS 1916, p. 469, auctt.; *Crisia* BORG 1924, p. 29; 1926 b, p. 183 and elsewhere.

Genotype: *Sertularia eburnea* LINNÉ 1758, p. 810.

Sterile internodes, except in the basal portions of the colonies consisting of 3 to many zoids; fertile internodes composed of at least 5, often of many zoids; the membranous sac in the gonozoid not constricted off into two parts; number of tentacles 8.

The texture of the zoarium is firmer than in any other genus within the family. While the species of *Crisidia* and *Filicrisia* are small and gracile and those of *Bicrisia* though not so slender yet form minute tufts, the members of *Crisia* are more robust, each internode consisting of a higher number of zoids. There is considerable differences, however, as to this character between different species. As two extremes might be mentioned, on the one hand *Crisia kerguelensis* BUSK, in which the number of zoids in the narrow and slender internodes is comparatively low (up to 11), and, on the other, *C. patagonica* D'ORBIGNY, where it may amount to more than 20.

The number of the zoids in the internodes always increases from the basal parts of a colony in the direction distally, reaching its upper limit in the fertile internodes which, as HARMER says (1915, p. 99) "may be regarded as the parts of the colony in which the definitive characters of the species find their fullest expression". In this statement he is quite right. The proximal parts of a zoarium, on the other hand, shows frequently characters which are nearly uniform in several species otherwise distinct. It would be a good thing if these facts were fully appreciated by authors trying to determine species within the genus. Further the position and shape of the gonozoid and the mode of branching, particularly that of the fertile internodes, give good specific characters.

The membranous sac in the gonozoid shows no trace of being constricted off into two parts as is the case in *Crisidia*, *Filicrisia* and *Bicrisia*. This no doubt has a bearing upon the mode in which degeneration and regeneration of the gonozoid takes place.As it is one of the very few characters of an anatomical kind we know of in this family to distinguish between the genera I think some stress should be laid upon it.

The number of the tentacles, though in other families often varying, is in the *Crisiidae* constant. In *Crisia* it is always eight.

Even though *Crisia* is taken here in a more restricted sense than by most earlier authors — as I have excluded both *Crisidia*, *Filicrisia* and *Bicrisia* from it — yet it comprises a great many species. It should, therefore, perhaps be worth while to discuss whether it can be divided in two or more genera or sub-genera. It seems to me that this may well happen. The species with long and slender internodes and with a comparatively low number of zoids even in the fertile internodes, such as *C. kerguelensis*, could be placed in one subgenus, while those with very short and strongly curved zoids, as, for instance, *C. cuneata* MAPLESTONE, could be referred to another; and species with a firm texture, the zoids being well wedged in among their neighbours, and with the number of zoids in an internode being high, such as *C. patagonica*, *sigmoidea*, and others, should belong to a third group. But there will always remain some uncertainty, I think, as to which group such species as for instance *C. eburnea*, the type-species of *Crisia*, should conveniently be referred, or if species of this kind, intermediate in some respects between the other ones, should form a fourth genus or subgenus.

Another fact, that must be born in mind when discussing the value of taxonomic characters in Stenolaemata, is the considerable variability of the zoaria derived from different marine areas. For instance, *C. eburnea* and *denticulata* from the Arctic differ rather considerably from such derived from Boreal waters. I think, therefore, it will be best for the present not to split up the genus. Further researches will be required to establish if this is desirable and, if so, in which way it should conveniently be performed.

1. **Crisia kerguelensis** Busk 1876.

Text-fig. 17.

Syn.: *Crisia kerguelensis* Busk 1876, p. 117; 1879, p. 197; *Crisia kerguelensis* part. (?) Studer 1879, pp. 124, 133; 1889, pp. 140, 145, 148; ? *Crisia kerguelensis* Harmer 1915, p. 105.

Zoarium of a slender growth, branches rather sparse, more or less curved frontally Sterile internodes (except in the proximal portion of the zoarium) with 4—12 zoids, 5, 7 and 11 being common numbers. Short internodes with one branch (if any), longer ones sometimes with two that proceed frequently from two successive zoids in about the middle portion of the internode. Joints either simple or double, in the latter case formed by two adnate zoids abreast. Autozoids long and narrow, free for a considerable part of their distal portion. Fertile internode consisting of 8 or more zoids, the gonozoid substituting one of the members of the middle portion of the internode, a branch proceeding from the autozoid next preceding the gonozoid and one or sometimes two from the distal part of the internode. Gonozoid about pear-shaped, acuminate at top, its distal half free and distinctly projecting above surface of internode. Tube of gonozoid cylindrical, aperture facing in a distal-frontal direction.

Measurements in μ.

(1 a) Length of internode with 5 zoids (measured from joint to joint) average 1 420.
(1 b) Length of internode with 8 zoids average 1 980.
(2) Breadth of internode 100—190, average 140.
(3 a) Transverse diameter of simple joint 70—90, average 80.
(3 b) Transverse diameter of double joint 100—180, average 120.
(4) Distance from rim of aperture to rim of next aperture on the same side (in uninjured zoids) 470—770, average 600.
(5) Length of 1st zoid of an internode (from joint to rim of aperture) average 690.
(6) Length of 2nd zoid of an internode (total length), average 970.
(7) Diameter of aperture of autozoid 65—100, average 85.
(8) Length of gonozoid, from proximal end to top, 1 030.
(9) Width of gonozoid 400.
(10) Diameter of aperture of gonozoid 110.
(11) Length of basis rami 250—400, average 320.

The material I have had an opportunity of examining is rather poor, consisting only of one incomplete zoarium with one gonozoid and of several small fragments of zoaria. The description here given must be, therefore, in some respects incomplete.

The zoarium is of a lax growth and composed of slender internodes (cf. Text-fig. 17). The branches are not numerous. They radiate in different directions and are more or less curved, their frontal side being the concave one. The calcification is rather feeble, so the walls of the cystids are relatively thin.

The only rhizoids I have observed are those proceeding from the proximal part of the lowest zoids of an internode. Such rhizoids are not uncommon.

In the basal portion of the zoarium the number of the zoids in the internodes is low, as a rule 1 or 3. Distally it becomes gradually larger. In the middle portion of the zoarium internodes with 4, 5, 7 or 8 zoids are common, and yet more distally their number may be augmented to 11 or even to 12 zoids, which is the largest number I have found. Internodes composed of 1 or 2 zoids only are sometimes intercalated between the longer ones.

Sterile internodes with a small number of zoids have only one branch (if any), which in this case proceeds from the first (lowest) zoid.

If the number of zoids in an internode is larger, there is always one branch and sometimes, but not very often, there are two. In the first case the branch may proceed from one of the three lowest zoids of the internode, but often it is instead an offshot from one of the zoids in the distal half of the internode. In case of two branches in an internode the branches often take their origin from two successive zoids in about the middle portion of the internode and of course in opposite directions. The branches as a rule alternate. I have not found more than two branches in one and the same internode, and the material is too poor to enable me to give any more detailed rules as to the mode of branching. The following 5 formulae may illustrate what has been said:

(1) ... $(3z + {}_{1}br)$ ...
(2) ... $(5z + br_{2})$ ...
(3) ... $(7z + {}_{4}br + br_{5})$ ...
$\quad\quad\quad\quad$ └──(6z)
(4) ... $(8z + {}_{3}br + br_{6})$ ...
(5) ... $(11z + {}_{7}br)$ ...
(6) ... $(12z + {}_{5}br + br_{6})$ ...

The internodes and branches usually are separated by joints, but in one case I have observed that an internode had been divided dichotomously in its distal half without any joints having been formed.

It may further occur that a zoid becomes elongated and that its distal and proximal parts are separated from one another by means of a joint, whereafter the distal portion develops into a common bud giving rise to a new internode.

The autozoids are long and narrow in shape. The distal part of an autozoid is not attached to the neighbouring zoids but projects freely, this portion forming about $^1/_3$ or $^1/_4$ of the total length of an uninjured zoid. It is abruptly curved frontally so as to form an angle of about 45° with the rest of the zoid and at the same time curves a little to one side too, the aperture thus facing in the frontal-distal direction and, at the same time, slightly outwards. The aperture is circular or very nearly so. Busk (1879, p. 197) says that the aperture is slightly expanded, which is correct. He further states that the "peristome", *i. e.* the free distal portion of the zoid, is thin and membranous. As a matter of fact the calcified layer of the bodywall, which is always thin in this species, becomes distally gradually thinner and more vitreous. On the other hand it is easy to see, in such cases where it has been damaged, that the calcareous layer exists up to the very rim of the aperture.

The only fertile internode I have seen consists of eight zoids, the gonozoid being the 5th member, but as it is not complete, the number of zoids would probably have been a little higher. Its formula is as follows:

$$\begin{array}{l} (7)\ \ldots\ (4\mathrm{z} + \mathrm{br}_1 + {}_4\mathrm{br} + \mathrm{Gz} + 3\mathrm{z} + \mathrm{cb}) \\ \qquad\qquad\qquad\quad\ \llcorner\!\!\!\longrightarrow (5\mathrm{z} + \mathrm{cb}) \end{array}$$

The description of the gonozoid given by BUSK (l. c.) is not good but the figure (op. cit., Pl. X, fig. 18) is better, at least regarding two of the three gonozoids shown there, and enables us to form a conception of its real shape. From the fertile internode just described as well as from BUSK's figure it seems that the gonozoid is situated at about the middle height of its internode, often replacing the 5th or 6th zoid, and that a branch is given off just below it, *i. e.* from its nearest predecessor; it is further evident, I think, that the fertile internode has as a rule two branches, sometimes perhaps even three.

The gonozoid as seen from the frontal side is elongated, pear-shaped, distinctly acuminate at the top. In my memoir 1926 b (p. 354. Text-fig. 65), it is drawn in lateral view, in which its characteristics are most obviously shown. The distal part of its dilated (middle) portion is free from the neighbouring zoids, as we see, and this is the case with its distal portion (the tube) too. The tube is cylindrical, the circular aperture facing in the distal direction and, at the same time, slightly frontally. The valve between the widened portion and the tube is well developed.

The joints are yellow. They are remarkable, because there are two kinds of them, viz. the usual ones, formed between the distal and proximal portions of one zoid, and other ones formed between the distal and proximal portions of two zoids or of a zoid and a basis rami. In the latter case one of the two zoids form the main part of the joint; but the other zoid (or its basis rami) attached to it has its basal portion proximally of the joint but its distal one distally of it, the wall, separating the two formations in question, passing through the joint. This other zoid (or basis rami) may form part of the joint, the chitinous ring being formed by the outer wall of both formations; but this is not always the case for the chitinous ring is sometimes formed by the outer wall of the "main" zoid together with the wall separating it from its neighbour. The outer wall of the neighbouring zoid then remains calcareous and passes just laterally of the joint. I think this is probably the more primitive condition which may have been later on transformed in the other one. It may have developed from the simple joints found in all other species of the family known so far.

Processus spiniformes seem to be absent in this species.

The basis rami are not wedged in between the neighbouring zoids. Distally a basis rami ends at about the point where the zoid, at which it is attached, becomes free, while proximally it does not quite reach the preceding zoid at the same side. This of course contributes to the lax aspect of the zoarium. When attached to the 1st zoid of an internode, the basis rami ends some distance from the joint, if this is a simple one.

The pseudopores are rounded oval in shape, their longer axis being parallel with the longitudinal axis of the zoids. In the autozoids they are relatively small and sparse while in the gonozoids they are a little larger and about two times as numerous as in these.

Some of the fragments I have examined had the polypides very well preserved; they were similar to those of other species of *Crisia.*

I have no doubt that the species described by BUSK (l. c.) under the name *C. kerguelensis* and the one dealt with here are identical. They correspond closely, so far as I can see, in all essential parts. STUDER (1879, 1889) stated anew the occurrence of *C. kerguelensis* at Kerguelen and there is of course no need to doubt this; but as he gave no description nor any figure it may well happen that he has included two or more species in what he calls *C. kerguelensis.*

As for the specimens from the Siboga Expedition determined by HARMER (1915, l. c.) as *C. kerguelensis* I doubt if they really belong to this species. The swollen part of the gonozoid seems to be more erect than in *C. kerguelensis* and the shape of the tube and its aperture is another. HARMER's determination is made with some hesitation; and it is certainly not common that species from Antarctic or Subantarctic seas (nor from Arctic or Boreal ones either) occur in the Littoral of Tropical waters.

HARMER thinks that the *Crisia eburnea* var. *laxa* of BUSK (1886, p. 4), reported by the Challenger Expedition from Kerguelen, may belong to the species here treated. With this I cannot agree. From the figure given by BUSK (1886, Pl. II, fig. 1) it will seem that the zoids are considerably shorter than in *C. kerguelensis.* The gonozoid, though unfortunately not figured by BUSK, so far as can be concluded from his description is certainly not of the same shape as in this species.

Habitat: on algae, Sponges etc. in the littoral zone.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 5. — St. 17, on a Sponge. — St. 95, on an Alga.

Distribution: Kerguelen Island (BUSK 1876, 1879; STUDER 1879, 1889).

2. **Crisia irregularis** n. sp.

Text-figs 18 and 19.

Zoarium small, gracile, richly branching, internodes slender; stem and branches showing distinct sigmoid flexures. Sterile internodes in proximal part of zoarium consisting of one zoid or sometimes of two, in middle portion of 3—5 zoids. In odd-numbered internodes there is one branch, as a rule, proceeding from the 1st zoid, while in even-numbered ones there are usually two branches, proceeding alternately to the right and to the left. Fertile internodes with 6—8 zoids, gonozoid replacing the 3rd—6th one; branches 2—3, one proximal of the gonozoid and one or two distally of it; the normal alternation of the branches sometimes reverted. Autozoids narrow and slender, with a rather long free distal portion slightly curved forwards. Gonozoid adnate, its middle portion widening rather suddenly, reaching its greatest breadth as well as height near the top, which slopes very suddenly to the tube. Tube quite short but distinct, strongly curved frontally. Aperture transversely oval.

Measurements in μ.

(1 a) Length of internode with 3 zoids (measured from joint to joint) 900.
(1 b) Length of internode with 4 zoids 1 080.
(1 c) Length of internode with 5 zoids 1 220.
(2) Breadth of internode 110—120.
(3) Transverse diameter of joint 50—52.
(4) Distance from rim of aperture to rim of next aperture on the same side (in uninjured zoids) 320—390.
(5) Length of 1st zoid of an internode (from joint to rim of aperture) 530—650.
(6) Length of 2nd zoid of an internode (total length) 730—760.
(7) Diameter of aperture of autozoid 65—75.
(8) Length of gonozoid (from proximal end to top) 1 050.
(9) Transverse diameter of gonozoid 240—260.
(10) Diameter of aperture of gonozoid 60 × 40.
(11 a) Length of basis rami (cf. text) 400—440.
(11 b) Length of basis rami (cf. text) 230.

Among the material from the Swedish Antarctic Expedition examined by me there are some fragments of a species which I cannot identify with any hitherto described. As there is among these fragments a fertile internode with a fully developed gonozoid and another slightly damaged one, I think it best to range them under a special name so as to avoid confusion. The mode of growth seems to be somewhat irregular in this species; hence the name I have chosen for it. The description here given is incomplete to a certain extent, which depends upon the condition of the material available.

The zoarium is small and gracile, of delicate growth. It is richly branched. The calcification is not strong.

The pro-ancestrula gives rise to the zoarium, but erect stems often develop from rhizoids. I have seen but one pro-ancestrula. Between it and the lowest internode a basal tubulus is intercalated, and this is usually the case when a zoarium originates from a rhizoid as well.

The stem shows in most fragments investigated sigmoid flexures very distinctly pronounced. The branches protrude at the convexities of the curves. These are independent of the limits of the individual internodes.

The 1st internode always consists of one zoid only (formula 1). But there are many such internodes among my material, so I presume that in most cases a series of internodes of this kind follows upon the 1st one (formula 2). This is, however, not always the case, for I have seen a fragment, where the lowest internode (with one zoid) gives rise to another with three zoids, after which follows the 3rd one with five (formula 3). It should be added that internodes with two zoids are not uncommon. They always seem to be branchless and probably are intercalated between the other internodes. In one case two successive internodes of this kind were found (formula 4).

(1) $(Pa + 3rz) + (tb + rz) + (z + br_1)$ — — —

$$\begin{array}{lllll}
(2)\ \text{— — —}\ (z + br_1) & & \ulcorner(z + br_1) & & \\
 & \llcorner(z + {}_1br) & & \llcorner(z + {}_1br)\ \text{— — —} &
\end{array}$$

$$(3)\ \text{— — —}\ \mathrm{rz} + (\mathrm{tb} + \mathrm{rz}) + (\mathrm{z} + \mathrm{br}_1)$$

$$\llcorner\!\!\text{—}(3\mathrm{z} + {}_1\mathrm{br}) + (5\mathrm{z} + \mathrm{br}_1) + \text{— — —}$$

$$(4)\ \text{— — —}\ (2\mathrm{z}) + (2\mathrm{z})\ \text{— — —}$$

$$(5)\ \text{— — —}\ (3\mathrm{z} + \mathrm{br}_1)\ \text{— — — or — — —}\ (3\mathrm{z} + {}_1\mathrm{br})\ \text{— — —}$$

$$(6)\ \text{— — —}\ (5\mathrm{z} + \mathrm{br}_1)\ \text{— — — or — — —}\ (5\mathrm{z} + {}_1\mathrm{br})\ \text{— — —}$$

$$(7)\ \text{— — —}\ (5\mathrm{z} + {}_3\mathrm{br})\ \text{— — —}$$

$$\ulcorner\!\!\text{—}(5\mathrm{z} + {}_1\mathrm{br}) + \text{— — —}$$

$$(8)\ \text{— — —} + (5\mathrm{z} + {}_1\mathrm{br}) + \text{— — —}$$

$$\ulcorner\!\!\text{—}(3\mathrm{z}).$$

$$(9)\ \text{— — —}\ (4\mathrm{z} + \mathrm{br}_1 + {}_2\mathrm{br}) + (4\mathrm{z}).$$

$$\vdots$$

$$\ulcorner\!\!\text{—}(5\mathrm{z} + {}_3\mathrm{br} + \mathrm{Gz} + 2\mathrm{z} + {}_7\mathrm{br}).$$

$$(10)\ \text{— — —}\ (4\mathrm{z} + \mathrm{br}_1 + {}_4\mathrm{br})$$

$$\vdots$$

$$\ulcorner\!\!\text{—}(\mathrm{z} + \mathrm{br}_1)$$

$$(11)\ \text{— — —}\ (\mathrm{z} + {}_1\mathrm{br} + \mathrm{rz})\ \ \llcorner\!\!\text{———}(4\mathrm{z} + {}_1\mathrm{br} + \mathrm{br}_2) + (2\mathrm{z} + \mathrm{br}_1 + \mathrm{Gz} + 3\mathrm{z} + {}_4\mathrm{br} + \mathrm{br}_6).$$

Most of the other internodes are composed either of three or of five zoids (formulae 5, 6, and 7). Each such internode seems to have one branch and this is mostly produced from the 1st (lowest) zoid of the internode, as shown in the formulae 5 and 6. But this rule is not without exception for we see in the formula 7 a branch proceeding from the 3rd member of an internode containing 5 zoids. I have seen three internodes with four zoids each (cf. formulae 9, 10, 11) and in all of these the internode in question has two branches, one proceeding from the 1st zoid and the other from one of the zoids on the other side of the internode, *i. e.* from the 2nd (formulae 9 and 11) or from the 4th, topmost zoid (formula 10). It will seem then that internodes with 4 zoids and with two branches are a common arrangement here.

As usual the branches proceed alternately to the right and to the left. Secondary branches, on the other hand, are, as a rule, produced at the same side as the primary one from which they take their origin (cf. formula 8).

From what has been said it is obvious I think that the number of zoids in the internodes in this species is low as a rule. This is further confirmed when examining the two fertile internodes included. One of these (cf. formula 10) consists of 8 zoids in all, the gonozoid being the 6th member of its internode, whereas the other (cf. formula 11) has 6 zoids, the gonozoid being the 3rd. In both internodes examined the growth seems to have come to an end soon after the formation of the gonozoid, the common bud being wholly consumed in producing a few autozoids distally of the gonozoid.

The branching of the fertile internodes seems rather characteristic. One of the internodes investigated has two branches, one proximally of the gonozoid and the other distally of it (cf. formula 10). In this case the normal alternation of the branches has been disturbed, both branches proceeding at one and the same side, namely, that opposite to the one where the gonozoid protrudes. The other fertile internode has three branches (cf. formula 11). One of these originates from the 1st zoid, and consequently it is at the same side of the internode as the gonozoid, while the next one, proceeding from the 4th zoid, is at the side opposite to that of the gonozoid. The third, finally, has a very unusual position, for it is attached to the topmost zoid though not at its outer, abaxial side (which would have been a normal condition as the zoid faces that direction) but at the other, axial one; thus it protrudes at the same side as the 1st branch and the gonozoid.

Summarizing I think we may state, (i) that the fertile internode consists of a relatively low number of zoids, (ii) that the gonozoid is placed rather high in its internode, and (iii) that the fertile internode has at least two branches, as a rule, one proximally of the gonozoid and the other distally of it.

The autozoids are narrow and slender, of cylindrical shape. The free distal portion, the tube, in many cases among my material has degenerated and is broken down, the cavity of the zoid being closed by a diaphragm. Where the terminal portion exists, however, it is relatively long, about $^1/_7$—$^1/_9$ of the total length of the zoid. It is slightly curved frontally ,though not quite as much as 45°, the aperture thus showing in the distal-frontal direction. Between the tube and the connate portion of the zoid there is no constriction or only a very slight one, the tube being of about the same width as the connate portion. The average distance between the apertures of the zoids on one and the same side is relatively large (cf. Measurements, 4).

An arrangement that seems to be rather common, as I have noted three cases of it in my very scarce material, is that the tube of an autozoid lengthens and is constricted off from the rest of the zoid by means of a joint. The portion thus set apart then develops as a common bud, giving rise to a new internode or to a rhizoid.

The gonozoid is wholly adnate. Its narrow, proximal portion rather suddenly widens into the middle swollen one (Text-fig. 19). This reaches its greatest height and width near its distal end. From the prominent top of the inflated portion it falls away very suddenly to the tube, its wall even running obliquely downwards and backwards. The tube is very short but distinct and is curved frontally, the aperture facing in that direction.

The rhizoids are densely jointed and often branched. They proceed from the proancestrula, from the basal tubulus and sometimes from one or two of the lowest internodes as well. It may further occur that a rhizoid develops instead of an internode from a common bud formed just distally of an axial joint. A case of this kind is shown in the following formula:

$$(12) \quad — \; — \; — \; (3z + br_1) + (rz).$$

Processus spiniformes are not represented in the material examined by me.

The basis rami are of two kinds. The lower internodes, with only one zoid in each, have long basis rami, as a rule, reaching proximally nearly to the joint and measuring about 400—440 μ, while in other internodes they measure only about 230 μ and are thus much shorter. A basis rami of the latter kind is attached to the distal half of the wall of its zoid. The basis therefore is not at all wedged in between the zoids, and if it is attached to the 1st zoid of an internode, there is a considerable distance between its proximal end and the joint.

The joints show nothing remarkable. They are yellow, and as usual they are lighter in the young portions of the zoarium but darker in the old ones.

The pseudopores are uncommonly large, oval in shape. In the walls of the autozoids they are sparsely distributed and in those of the rhizoids even more so. The narrow proximal portion of the gonozoid has few pores but in the widened, middle portion they are much more numerous and unusually large.

The present species seems to me to be nearly related to the Boreal *Crisia aculeata* HASSALL, though I do not think the two are identical. The shape of the gonozoid is similar in both, but the number of zoids in the internodes, the mode of branching and the structure of the fertile internode are not the same. The processus spiniformes found in most zoaria of *C. aculeata* do not seem to occur in *C. irregularis,* while on the other hand the sigmoid flexures characteristic of the stems in the latter species are not generally found in the former. Moreover, to judge from the measurements given by HARMER (1891, p. 177) for *C. aculeata* and by myself for *C. irregularis,* it will seem that *C. aculeata* is a stouter species than *C. irregularis.*

Habitat: on Algae and Hydroids.

Occurrence: Swedish Antarctic Expedition 1901—03, locality unknown.

3. **Crisia eburnea** (L.)

Text-fig. 20.

Syn.: *Sertularia eburnea* LINNÉ 1758, p. 810; *Crisia eburnea* auctt.; ? *Crisia eburnea* var. *laxa* BUSK 1886 p. 4, Pl. 2, figs 1, 1 a.

Zoarium forming dense tufts, richly branching, branches curved in a frontal direction. Sterile internodes in middle portion of zoarium either composed of an odd number of zoids, usually 5 or 7, in which case a branch is present, as a rule, proceeding most often from the 1st zoid of the internode; or the number may be even, usually 4 or 6, the internode being in these cases branchless. In distal portion of zoaria the number of zoids composing an internode may increase to 11. Fertile internodes forming part of branches, in distal portion of zoarium, composed usually of 7 or 10 zoids, gonozoid replacing mostly the 2nd or 3rd autozoid. Fertile internode with one branch, proceeding almost invariably from 1st zoid of the internode. Autozoids connate for the greatest part of their length, their short free distal portion curving frontally forming an angle of about 45° with rest of zoid. Aperture facing upwards and, at the same time, forwards, in shape circular or nearly so. Gonozoid adnate, about pear-shaped. Tube short but distinct, narrowing from base to top, curved frontally; aperture transversely oval.

Measurements in μ.

		Subantarctic zoaria	Boreal zoaria
(1, a)	Length of internode with 5 zoids (measured from joint to joint), average	1 200	1 220
(1, b)	Length of internode with 7 zoids	1 450	1 480
(2)	Breadth of internode	150—190	180—190
(3)	Transverse diameter of joint	80	85
(4)	Distance from rim of aperture to rim of next aperture on the same side (in uninjured zoids)	300—380	290—360
(5)	Length of 1st zoid of an internode (from joint to rim of aperture)	600	560—570

		Subantarctic zoaria	Boreal zoaria
(6)	Length of 2nd zoid of an internode (total length)	720	730
(7)	Diameter of aperture of autozoid	74	75
(8)	Length of gonozoid	1 150	1 240
(9)	Transverse diameter of gonozoid	360	390
(10)	Diameter of aperture of gonozoid	85 × 50	90 × 60
(11)	Length of basis rami	240—280	310

The zoarium is richly branched and the branches are curved towards the main stem in a very characteristic way, reminding of what occurs in *Bicrisia edwardsiana* and *biciliata.* On account of this shape and position of the branches, the zoarium has not at all the straggling habit characteristic of *C. patagonica* and *nordenskjöldi,* as described below, but forms dense tufts, the branches often more or less entangled among one another.

The pro-ancestrula gives rise to the erect stem but other such stems frequently take their origin from one or more of the rhizoids.

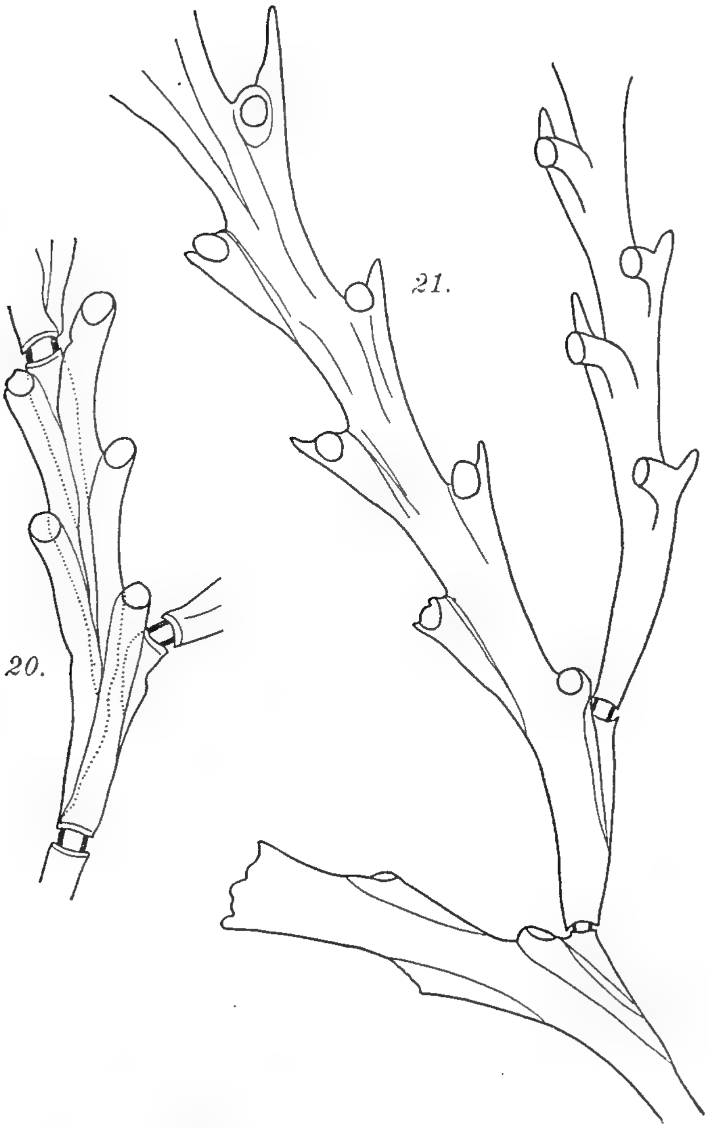
Sometimes but not very often a basal tubulus occurs between the pro-ancestrula and the 1st internode.

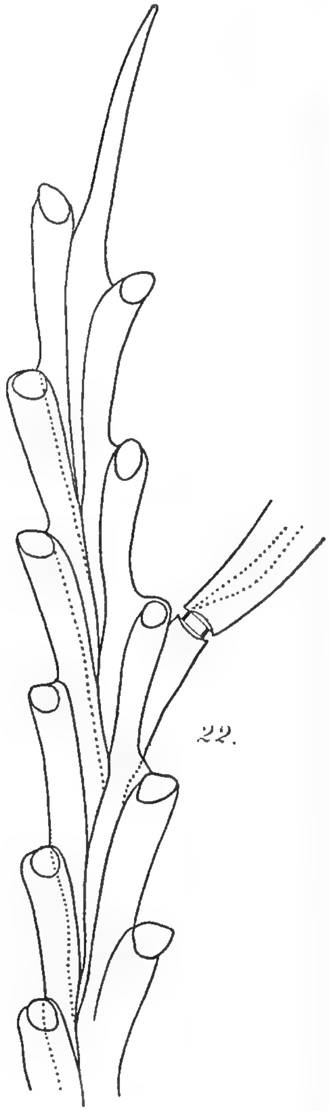
The 1st internode consists of only one zoid (the primary zoid) together with a basis ramus; from this latter one the rest of the zoarium develops. One or two internodes following consist of 3 zoids each. The other internodes have a somewhat varying but rather low number of zoids. This number is most often 5 or 7, but it is not uncommon to find internodes with a higher number of zoids, above all in the distal portion of the zoarium, 11 being the highest number I have noticed here.

Most internodes are composed of an odd number of zoids, and each of these internodes has as a rule one branch though it is fairly common to find branchless internodes with 3 zoids. Internodes with an even number of zoids are on the other hand far from uncommon, being intercalated here and there between the other ones. Mostly the number of zoids in these internodes is 4 or 6, and they are then practically always branchless; if, however, the number of zoids is higher, a branch may occur, as I have seen in an internode with 10 zoids.

The branches generally arise from the lowest zoid of an internode but sometimes higher up. Thus it is not uncommon to find a branch proceeding from the 2nd or even from the 3rd zoid of an internode, but branches are very seldom found arising from zoids of a higher number. In one case, however, I have seen, in an internode with 11 zoids, a branch attached to z_5 and another proceeding from z_6, but this is to be regarded as a very rare exception both with reference to the position and to the number of the branches.

The branches arising from the main stem are produced as usual alternately to the right and to the left. This may be the case with the secondary branches too. This condition is often observed in the proximal half of larger zoaria while in the distal one another rule prevails, viz. the formation of a secondary, tertiary, etc. branch at the same side as that, at which the primary branch proceeds from the main stem. Thus a kind of helicoid cyme is formed. The same mode of branching is found in several other species of *Crisia* as well. It was first observed in the present species by HARMER (1891, pp. 131, 156).

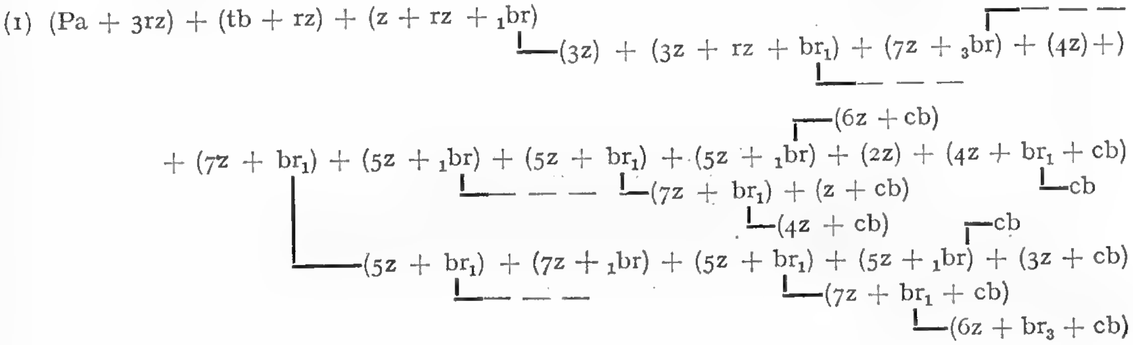


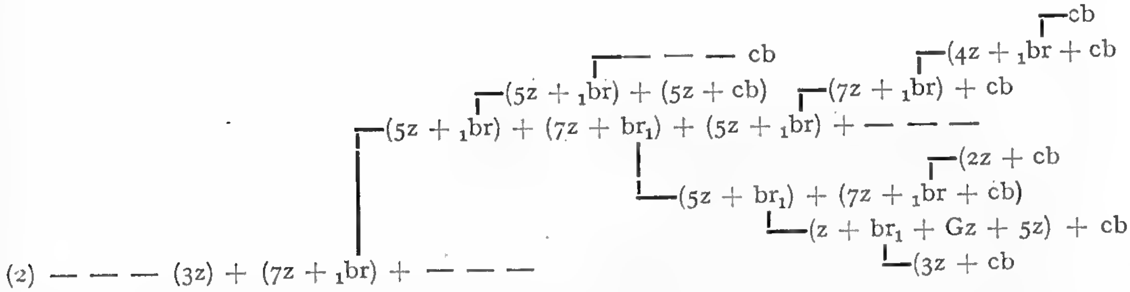


Text-fig. 20. *Crisia eburnea.* Sterile internode from frontal, to show shape and arrangement of autozoids, joints, and branch. × 50.
» » 21. *Crisia sinclarensis.* Part of sterile zoarium from frontal and, partly, from one side. × 50.
» » 22. *Crisia patagonica.* Part of zoarium (top of sterile internode) from frontal. × 50.

The fertile internodes do not form part of the main stem but of branches in the distal half of the zoarium. They do not differ much from the sterile ones. The number of the zoids in a fertile internode is as a rule 7 or 10, though other numbers may occasionally occur. The gonozoid mostly replaces z_2 or z_3, rarely z_7 or some of the zoids higher up in the internode. Examining 16 fertile internodes, I found the gonozoid in 1 of these replacing z_1, in 8 z_2, in 5 z_3, in 1 z_4 and in 1 z_5. In the last case but one the 2nd zoid was, however, a little widened and should probably be regarded as a gonozoid stunted in its growth, which may explain the position of the other and fully developed gonozoid in this internode. The fertile internode has one branch only, and this is developed proximally of the gonozoid, almost invariably from z_1. The only exception I have found to this rule is the one diagrammatized in formula 5 (below), which is in no way typical for the species. On the other hand the fertile internode very seldom lacks a branch, the only exception found being that where the gonozoid replaces z_1 mentioned above, but this is surely an abnormal case, both the gonozoid and its internode being stunted in their growth here.

The formulae given below may illustrate what has been said regarding the mode of branching and the structure of the sterile and fertile internodes in the present species. In the formulae 1 and 2 the formation, in the distal parts of the zoaria, of the compound helicoid cyme so characteristic for this species is clearly shown. Near the top of a zoarium there is often some irregularity in the mode of branching; or branches that otherwise ought to have been formed might be suppressed here, as we see in formula 1; but this is probably to be regarded as an indication of ceasing growth owing to the season. The formulae 3 and 4 are typical for the majority of the fertile internodes that I have seen while 5 is atypical.





(3) — — — + $(z + {}_1br + Gz + 5z)$ + — — —

(4) — — — + $(2z + br_1 + Gz + 7z)$ + — — —

(5) — — — + $(4z + br_1 + Gz + 2z + {}_6br)$ + — — — [broken].

The internodes are flattened and slightly curved in a frontal direction, and this condition is more strongly marked in the branches than in the main stem, especially in the distal portion of the zoarium.

The sigmoid flexures of the internodes characteristic of some other species of *Crisia*, especially perhaps of those with very long internodes, cannot be observed in *C. eburnea* though there may be some indication of it.

The autozoids are connate along the greatest part of their length. The free distal portion is very short forming only about $^1/_{15}$—$^1/_{20}$ of the zoid's total length. Curving frontally it forms an angle of a little more than 45° with the connate portion. As a consequence of this the aperture faces frontally and a little distally. It is circular or very nearly so; sometimes however the latero-distal portion of its rim is a little thickened so as to form a small protuberance. The connate portion of the zoid is wider than the tube so there is a constriction though not a very marked one at the beginning of the tube.

The gonozoid is approximately pear-shaped. Its proximal portion gradually widens into the middle, swollen one, the outline of which forms a soft curve. The transition from this portion to the tube is a gradual one. The tube therefore is broad at its base, narrowing towards the aperture. It is short but distinct and is curved frontally in such a way that the aperture, which is transversely oval, faces in a frontal-distal direction. The whole of the gonozoid, the tube inclusive with the exception of its uppermost part, is adnate to the neighbouring zoids.

The rhizoids take their origin from the pro-ancestrula, the basal tubulus, and some of the internodes. The lowest internode often gives rise to a rhizoid, and such rhizoids may be produced from 1—3 of the internodes immediately following, in which case the rhizoid or rhizoids arise as a rule from the 1st zoid of the internode. The rest of the internodes lack rhizoids though in exceptional cases a rhizoid may be found developing at the top of an internode, thus replacing the new internode that had otherwise taken its origin here. On the whole the rhizoids must be said to be rather few though they are not as sparse as in the (British) colonies described by HARMER (1891, o. 131).

The rhizoids are sparsely jointed but frequently branching, the branches giving rise to new rhizoids or to erect stems.

Processus spiniformes are lacking in my material though they are well known to occur in other zoaria of this species, especially, perhaps, in colonies from the Arctic.

The basis rami are relatively short, their distal ends being situated at or quite near the base of the tubes while the proximal one is about halfway down along its wall. They are thus not wedged in between two cystids; most of them, moreover, are attached as we know to the 1st zoid of an internode.

The joints are light yellow in the younger parts of a zoarium, while in the older ones they are yellow with a brownish tinge.

The pseudopores are rather densely scattered, both in the walls of the autozoids and those of the rhizoids. In young zoids they are oval while in old zoids with thickly calcified walls they are smaller and more rounded in shape. In the wall of a gonozoid they are as usual both larger and more numerous than in the other parts of the zoarium.

Crisia eburnea was hitherto known mainly to occur in Arctic and Boreal zones reaching southwards to Madeira and the Azores (BORG 1933 a, p. 139). I was astonished, then, to find it among the material brought home by the Swedish Antarctic Expedition from the Subantarctic Region, and at first I was not much inclined to identify these colonies with the well known European *C. eburnea.* Having specimens from both Boreal and Arctic areas abundantly at hand for comparison, however, I have made an examination of them as thorough as possible, comparing them with the Subantarctic colonies; but I was unable to find differences of any importance. The mode of branching, the number of zoids in the internodes, the structure of the fertile internode, the shape of the autozoids and the gonozoids, etc., are all similar. The zoaria from the Arctic are larger and of a coarser growth than both the Boreal and Subantarctic ones, but this is a rule that holds true for most species at least when specimens from the Arctic are compared with those of Boreal origin; otherwise there are no differences worth noting. The table of Measurements above enables us to make a detailed comparison as to the size of different parts of the zoarium. The result is as we see that the specimens come very close to one another. In some cases, as, for instance, in (4) and (5), the figures are a little larger for the Subantarctic zoaria, while in others, as in (2) and (11), the Boreal ones have the overweight; but, on the whole, the agreement is very close. I see no reason, therefore, to create even a separate variety for the Subantarctic form.

As *C. eburnea* is not known to occur in the Tropical nor in the Subtropical areas it will seem, then, that we have before us here a case of bipolarity, very seldom among Bryozoa.

In his Challenger Report, Busk (1886, p. 4) describes and figures (Pl. 2, figs 1, 1 a) a species of *Crisia*, which he names *C. eburnea* var. *laxa*. The specimens were found off Kerguelens Land. There is nothing in the short description given that speaks against the assumption that this could be identical with *C. eburnea;* but, though the branches are stated to arise as a rule from the 1st zoid of an internode, the figure (Pl. 2, fig. 1 a) shows one such case only but three where the branch is produced instead from the 3rd zoid, so the latter seems to be the common rule. Moreover the basis rami are, to judge from the figure just quoted, certainly not very similar to those of *C. eburnea.* Thus it must remain doubtful whether or not the *C. eburnea* var. *laxa* of Busk should not simply be referred to *C. eburnea.*

Habitat: On algae and Hydroids.

Occurrence: Swedish Antarctic Expedition. St. 60.

Distribution: Widely distributed in the Arctic and Boreal Regions; Madeira; Azores.

4. **Crisia sinclarensis** Busk 1875.

Text-fig. 21.

Syn.: *Crisia sinclarensis* Busk 1875, p. 6, Pl. 4, figs. 7—11; *Crisia sinclarensis* Borg 1926 b, p. 183.

Zoarium rather stout, sparsely branching, stems and branches slightly curved frontally. Sterile internodes composed of 7—13 zoids, in middle portion most often of 9, in distal one of 11 zoids; each internode as a rule with one branch, proceeding from 1st zoid of internode. Autozoids very long, connate for the greatest part of their length, distal portion forming a short, free tube, sharply curving off from the connate one; breadth of connate portion about double that of free, distal one. At latero-distal edge of connate portion a hollow denticle. Aperture about circular. Gonozoids unknown.

Measurements in μ.

(1 a) Length of internode with 7 zoids (measured from joint to joint), average 1 940.
(1 b) » » » » 9 » » » » » » » 2 520.
(1 c) » » » » 10 » » » » » » » 2 700.
(1 d) » » » » 11 » » » » » » » 2 990.

(2) Breadth of internode 160—240, average 190.
(3) Transverse diameter of joint 90—140, average 110.
(4) Distance from rim of aperture to rim of next aperture on the same side (in uninjured zoids) 440—550, average 490.
(5) Length of 1st zoid of an internode (from joint to rim of aperture).
(6) Length of 2nd zoid of an internode (total length) 800—1 200, average 1 100.
(7) Diameter of aperture of autozoid 60—75, average 67.
(8) — — —
(9) — — —
(10) — — —
(11) Length of basis rami 300—550, average 410.

The material that I have been able to examine is rather poor, consisting of a small number of zoaria, the proximal portions of which were lacking, and of numerous fragments. Unfortunately there were no gonozoids.

The zoarium is rather stout. The main stem is very well marked, especially in the older, proximal portions of the zoaria. The branches are relatively sparse.

The internodes do not show any sigmoid flexures but are slightly curved frontally, by which the stem and the branches become more or less bent towards each other though this character is subject to considerable variation in different zoaria. The internodes I have seen consist of from 7 to 13 zoids, the number by far most common being 9. In the distal portions of the zoarium 11 is a common number. The number of zoids is unusually constant, never amounting to such high numbers as in the species following next and several others as well (cf. formula 1 below).

I have not seen any internodes with more than one branch. Most internodes are of this kind but branchless internodes are sometimes met with though they are not common. So far as I have found the branch when present proceeds from the 1st zoid of an internode. As usually the branches of a stem are produced alternately to the right and to the left, but a branch (a "primary" branch) may give rise to a "secondary" branch on the same side as that where it was developed from its mother-zoid. The result must be branches that are sparsely scattered, with secondary, tertiary etc. ones, like the shanks of a unilateral cyme. To illustrate the arrangement the following formula may be given:

(1) . . . $(9z + br_1) + (10z + {}_1br) + (9z + br_1) + (9z + {}_1br) + (9z + br_1 + rz) + (7z + {}_1br + rz) + \dots$
└$(9z + br_1) + (5z + {}_1br + cb$ └$(9z + br_1) + (7z + {}_1br + cb$
└$(11z + {}_1br + cb$ └$(3z + br_1 + cb$
└$(9z)$ └$(4z + br_1 + cb$
└. . .

The autozoids are unusually long and the distance from aperture to aperture (on the same side) is relatively large. The zoids are connate throughout their whole length with the exception of the distal end with the aperture forming a short tube. This tube, which is only $^1/_{12}$—$^1/_{15}$ of the zoid's total length, is facing upwards and a little forwards, thus forming a sharp curve with the connate portion of the cystid. As usual the free distal portion of the uppermost zoid of an internode is longer than those of the other zoids. The aperture is circular or slightly oval. The connate portion of the cystid, which is flattened, is distinctly broader than the tube. Where this takes its origin, the cavity of the cystid narrows suddenly, the diameter of the tube and aperture being scarcely half the width of the cavity of the cystid proximally of the tube. In fact, the aperture is unusually narrow. A similar condition may be indicated in some species of *Crisia* as well but it is never so strongly pronounced here as in the present species (cf. Text-fig. 21).

It is very characteristic of *C. sinclarensis* that the latero-distal edge of the connate portion of the cystid is more or less prolonged into a hollow "denticle". A similar structure exists in *C. patagonica*, but the denticle is much longer in the present species and there is a very distinct difference as to its position in the two cases. In *C. patagonica* the free distal portion of the cystid is keeled and the denticle is situated quite near the rim of the aperture; but in *C. sinclarensis* the tube with the aperture is unaffected, and the denticle is instead a prolongation of the connate portion of the cystid projecting behind the aperture. The length of the denticle may vary. Most often it is very well marked. When the 1st zoid of an internode is provided with a branch, the denticle of this zoid is small as a rule (cf. Text-fig. 21).

I have only seen rhizoids grown out from the zoids of an internode. They are produced either from the 1st zoid of the internode or from its top. They are straight, not branching, densely jointed and with strongly calcified walls. Those originated from the lowest zoid of the internode may or may not separate themselves by means of a calcified wall from the cavity of the zoid. When a rhizoid is formed at the top of an internode, it is separated from the internode by means of a joint. Sometimes the topmost zoid of such an internode becomes prolonged, forming a support as it were for the rhizoid.

The basis rami are relatively long but rather variable in length. As a basis rami develops regularly from the 1st zoid of an internode, it is of course not wedged in between the neighbouring zoids. It is attached to the distal half of the connate portion of its zoid, the distance from the proximal end of a basis rami to the joint being about $^2/_3$ of the length of the basis rami.

A noticeable feature observed not only in this but also in several other Stenolaematous species is that the outer, non-calcified (chitinous) layer of the cuticle forms here and there hook-like structures piercing the calcareous layer and protruding into the cavities of the zoids, rhizoids, or basis rami, respectively. I have described and figured them before (1926 b, p. 192, Text-fig. 3). They are more numerous in *C. sinclarensis* than in any other species of *Crisia* that I have examined. As to their function — if any — this is so far completely unknown.

Processus spiniformes are lacking at the zoids but, as Busk (1875, p. 7) has pointed out, an internode ceasing its growth frequently finishes by forming a "hollow conical process" (Busk, l. c.), *i. e.* an axial processus spiniformis. This, however, is by no means characteristic of *C. sinclarensis* only, for it occurs in other species of *Crisia* as well, for instance in *C. eburnea*, especially in zoaria from Arctic waters.

The joints in the distal portions of the zoarium are yellow with a brownish tinge more or les pronounced while in older internodes they are brown or dark brown, sometimes even almost black.

The pseudopores are densely scattered in the walls both of the autozoids and the rhizoids. In shape they are circular or rounded oval.

I have often emphasized that species of Stenolaemata could with rare exceptions not be determined reliably, unless the gonozoids were examined. The determination here made should perhaps be counted among those exceptional cases but I prefer to regard it myself as uncertain. Among the characteristics common for the *C. sinclarensis* of BUSK (op. cit.) and the specimens here described under that name, the number of zoids in the internodes and the existence of the curious denticle "behind the aperture" deserve to be especially mentioned. The branching is similar too, though BUSK has found the basis rami attached to the 1st or the 2nd zoid of an internode and he figures 5 instances of the former and 3 of the latter mode of branching; but that I have not noticed any branch proceeding from the 2nd zoid of an internode cannot be ascribed much value on account of the scarcity of material before me. The drawings of BUSK are evidently made from dry material, which may explain some of the differences between his figures and mine; moreover, it is not very probable, that two species of *Crisia* from one and the same area should both have a prolonged denticle, placed in a characteristic position, near the aperture.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 89.

Distribution: Coast of Patagonia (BUSK 1886, p. 6).

5. **Crisia patagonica** D'ORBIGNY 1839.

Text-fig. 22.

Syn.: *Crisia patagonica* D'ORBIGNY 1839, p. 7; D'ORBIGNY 1853, p. 599; *Crisia patagonica* BUSK 1875, p. 8; ?? *Crisia denticulata* var. *patagonica* BUSK 1886, p. 5; *Crisia patagonica* BORG 1926 b, p. 183 and elsewhere.

Zoarium stout, branches rather sparse, straight or almost so. Most internodes composed of a relatively high number of zoids, 7—11 being a common number in middle portion of zoarium, 11—15 in distal one, 23 being the highest number observed. Sterile internodes branchless when consisting of an even number of zoids but when odd-numbered usually with one branch; thus proceeding in the majority of cases from 1st or 3rd zoid of the internode. Fertile internodes consisting usually of 15—22 zoids, being often provided with one branch and not infrequently with two. Gonozoid replacing, in most cases, 3rd—9th autozoid, in the majority of cases 5th one. Gonozoid adnate, club-shaped, its middle portion strongly dilated; tube extremely short, strongly curved frontally; aperture transversely oval.

Measurements in μ.

(1 a) Length of internode with 5 zoids (measured from joint to joint) 1 100—1 300, average 1 200.
(1 b) » » » » 7 » » 1 630.
(1 c) » » » » 8 » » 1 820.
(1 d) » » » » 9 » » 2 060.
(1 e) » » » » 11 » » 2 490.
(1 f) » » » » 13 » » 2 900.
(1 g) » » » » 15 » » 3 350.
(2 a) Breadth of normal internode 220—320, average 280.
(2 b) » » narrow » , average 180.
(3) Transverse diameter of joint 100—190, average 140.

(4) Distance from rim of aperture to rim of next aperture on same side (in uninjured zoids) 270—390, average 350.
(5) Length of 1st zoid of an internode (from joint to rim of aperture) 500—700, average 610.
(6) Length of 2nd zoid of an internode (total length) 700—870, average 800.
(7) Diameter of aperture of autozoid 70—90, average 80.
(8) Length of gonozoid from proximal end to top 1 470—1 100, average 1 290.
(9) Transverse diameter of gonozoid 700—530, average 560.
(10) Diameter of aperture of gonozoid 120—60, average 90.
(11) Length of basis rami 510—530, average 420.

My material of the present species has been very rich consisting of numerous zoaria and fragments of such.

The zoarium is rather strongly calcified. It is composed of internodes that are straight or almost so. The branches are not numerous but those existing are well developed, straight or only slightly bent forwards.

The pro-ancestrula is provided with pseudopores on its basal side; as a rule one or two such pores exist in its frontal wall as well.

Rhizoids, mostly 4 in number, proceed from the pro-ancestrula in different directions, thus anchoring it at the substratum. Other rhizoids take their origin from the basal tubuli and from some of the internodes, in which latter case they grow out from one or two of the lowest zoids. In a few cases I have found a rhizoid developing at the top of an internode, distally of the axial joint, thus replacing a new axial internode. The rhizoids are densely jointed and sometimes branched. They are very strongly calcified.

From the pro-ancestrula and often from some of the rhizoids as well the erect stems, *i. e.* the zoarium proper, develop. Between the pro-ancestrula and the primary zoid a basal tubulus is inserted. Sometimes there are two successive tubuli.

The 1st internode contains only the primary zoid. In many cases there follow one or two branchless internodes consisting of an even and rather low number of zoids, 2, 4 or 6 as a rule. Sometimes, however, the internode following the 1st one is composed of an odd number of zoids, mostly of 5, 7 or 9, in which case a branch usually proceeds from it.

In the middle portion of a zoarium most internodes contain 7, 9 or 11 zoids, a branch proceeding as a rule from each such internode, while others with 6 or 8 zoids each are often though not always branchless. On the other hand I have never seen a complete internode with an odd number of zoids being branchless.

More distally the internodes become gradually longer, most of them being composed of 11, 13 or 15 zoids or even of more, the longest internode I have seen containing 23 zoids. Even these long internodes as a rule give rise each to one branch only, provided they are not fertile, in which case two branches are common. Examining 152 sterile internodes carrying branches I found only 6 of them having 2 branches each, none of these internodes being unusually long. In the remaining 146 internodes the one branch existing was attached in 30 cases to the 1st zoid, in 89 to the 3rd, in 22 to the 5th one. Only in 5 cases was the branch formed from a zoid with a higher number.

In the 6 cases of two branches proceeding from one and the same internode these were attached at the 1st and 6th zoids (2 cases), to the 3rd and 10th (2 cases), to the 3rd and 11th (1 case) or to the 5th and 13th zoids (1 case).

The following formulae may give some examples to illustrate the mode of growth and the branching in this species:

(1) $(Pa + 4rz) + (tb) + (z + br_1)$
└—$(4z) + (6z) + (7z + br_3) + (7z + {}_{3}br + cb \ldots$

(2) $(Rz) + (tb) + (tb) + (z + br_1)$
└—$(4z) + (2z + cb \ldots$

(3) $(Pa + 3rz) + (tb + rz) + (z + 2rz + {}_{1}br)$
└—$(9z + {}_{1}rz + {}_{5}br) + (9z + rz_1 + br_3) + (11z + {}_{7}br) + \ldots$

(4) $\ldots (7z + br_5) + (15z + {}_{3}br) + (7z + br_1) + (9z + {}_{1}br) + (9z + br_3) + \ldots$
└—$(11z + br_3) + (10z) + (11z + {}_{1}br) + (7z + br_1) + (9z + {}_{1}br) + (7z + br_1) +$
$+ (11z + {}_{3}br) + (19z + br_3) + \ldots$
└—$(13z + {}_{3}br) + (11z + br_3) + \ldots$
└—$(13z + br_3) + (13z + {}_{3}br) + \ldots$
└—$(5z + {}_{3}br + cb \ldots$
└—$(10z) + (11z + {}_{3}br) + (9z + br_3) + (11z + {}_{1}br) + \ldots$
└—$(9z + {}_{3}br) + \ldots$
└—$(13z + {}_{3}br) + (15z + br_5) + (13z + {}_{3}br) + \ldots$

As we see from the formulae, the branches proceed alternately to the right and to the left, but this rule holds true in the first place for the main stem. If we term the branches carried by the internodes of the main stem or axis branches of the 1st order and those proceeding from these, branches of the 2nd order, etc., we find many instances showing that a branch of the 2nd order often proceeds at the same side as the branch (of the 1st order) from which it is itself an offshot (cf. formula 4); and this may be repeated with the branches of the 3rd order, and so on. Thus a mode of branching is brought about reminding somewhat of the formation of a compound helicoid cyme of some flower. This is characteristic not only of the species here dealt with but of many other species of the present genus as well.

The internodes are nearly straight, *i. e.* they are not much bent in the frontal direction; but where a branch proceeds from an internode, this is slightly curved, the branch taking its origin from the convex side of the flexure.

As seen from the measurements the normal internodes are relatively broad. A few branches, however, are composed of internodes that are considerably narrower; and here the distance from the aperture of one autozoid to that of another is longer at the same time. Branches of this kind take their origin, here and there in the zoarium, from normal, broad internodes, but often an internode with a single zoid only is intercalated between the two, thus forming the base of the narrow branch. Branches of the kind described are probably to be looked upon as stunted in their growth. As they are only few, they do not much affect the shape of the zoarium.

The autozoids are not very long. They are relatively narrow in shape and well wedged in between one another, the free distal portion being short. In uninjured zoids this is seen to form a sharp curve at a nearly right angle to the rest of the zoid, then proceeding almost straight towards the aperture which is directed frontally and, at the same time, a little forwards. Along the lateral wall of the free distal portion runs, in its upper part, a keel which reaches the rim of the aperture. This has, therefore, the shape of a somewhat acute oval, the apex of which is formed by the edge of the keel pointing outwards and forwards. The keel may vary: sometimes it is strong, but in other cases it is only slightly developed or may even be lacking altogether. In this case the aperture is circular.

In the proximal portions of a zoarium the zoids often have undergone a process of degeneration by which the free distal portions have been lost and the cavity of the zoid is closed by means of a calcareous diaphragm. This condition of the zoids may be easily overlooked, particularly so as the rim of the new aperture is often quite smooth. In internodes where most zoids have been thus deprived of their free distal parts, one may find some, however, that have regenerated, the tube with the aperture being fully developed in a way typical for the species. Thus, in this as in other species of *Crisia* to avoid mistakes it is necessary before describing the autozoids to convince oneself that these are not stunted or deformed by degeneration. Unfortunately among earlier authors this has very seldom been done.

The gonozoids have their place in the internodes of many of the branches in the distal half of the zoarium. As a rule there is only one gonozoid in such an internode, and the condition figured by D'ORBIGNY (1839, Pl. I, fig. 1) with 2 gonozoids immediately following one another is certainly very rare. The fertile internodes I have seen consist of from 9 to 22 zoids (cf. the formulae 5—8 below). The gonozoid may be found to replace the 3rd—11th zoid, though in the majority of cases it replaces the 4th—7th zoid and most commonly the 5th one as shown by the table below.

Crisia patagonica. 75 fertile internodes.

The gonozoid was found to replace z_3 in 3 cases
» » » » » » z_4 » 8 »
» » » » » » z_5 » 31 »
» » » » » » z_6 » 13 »
» » » » » » z_7 » 12 »
» » » » » » z_8 » 1 »
» » » » » » z_9 » 3 »
» » » » » » z_{10} » 1 »
» » » » » » z_{11} » 1 »

The fertile internode often has a branch and frequently — more so than in sterile internodes — there are two branches. When the gonozoid is situated relatively low in an internode a branch often proceeds from one of the zoids just below it (5) and another higher up in the internode (6). If on the other hand the gonozoid has its place rather high in the internode a branch often develops from one of the lowest zoids, mostly the 3rd, and, sometimes, another from the internode's highest zoid (7). Finally, the fertile internode may be branchless (8).

(5) $\ldots + (3z + Gz + 7z + br_3) + \ldots$
(6) $\ldots + (5z + Gz + 16z + br_3 + br_{11} + psp)$
(7) $\ldots + (6z + Gz + 3z + {}_3br + br_{10}) + \ldots$
(8) $\ldots + (4z + Gz + 8z + psp).$

The gonozoid is adnate along its whole length to the neighbouring zoids, only the distal end of its tube being free. In its middle portion it is greatly widened, sloping abruptly to the tube which is extremely short and curved frontally so that the aperture, which is transversely oval, faces that direction.

The basis rami are relatively long. They are attached to the zoids in such a way that their distal end nearly reaches the place where the zoid's free distal portion takes its origin. If the basis rami is at the first zoid of an internode, it does not reach the joint. In other cases, *i. e.* when attached at the 2nd zoid or someone of the following ones, the basis rami reaches, as a rule, the proceeding zoid on the same side or nearly so. Sometimes it is wedged in between this and the zoid from which it proceeds.

Processus spiniformes are only few and those existing are not jointed. It is not uncommon that at the top of an internode a spinous process (cf. formulae 6 and 8, psp) develops instead of an axial joint and a new internode (cf. Text-fig. 22). In other cases a rhizoid may take its origin at this place as mentioned above. Very seldom have I seen a spinous process proceeding from a basis rami. The processus spiniformes, whether axial or lateral, are short, narrowing at the end and with strongly calcified walls.

The joints are yellow, when old, *i. e.* in the basal portions of well developed zoaria, with a tinge of brown. In dry material they seem frequently black. The cuticle of the joints is, just as the calcified cuticle of the cystids, very thick.

The pseudopores are longitudinal, rounded ovals, rather large in the walls of the zoids, basis rami etc. but smaller in the rhizoids. In the gonozoids they are much more densely scattered than in the autozoids. The free distal portions of the zoids have only very few pores or they may be altogether absent here.

The species here described is, so far as I can judge, identical with that found and figured by D'ORBIGNY (1839). As the material brought home from the Swedish Antarctic Expedition is abundant, it may be concluded that this is a common species within the Subantarctic region. It seems not to have been refound by any other Expedition so far, though it may well be possible that the *"Crisia ? denticulata"* of CALVET (1904, p. 33) might belong in reality to this species. As for the *"Crisia denticulata* var. *patagonica* (?)" described by BUSK (1886, p. 5), on the other hand, there is nothing to indicate that it has anything to do with the present species. The assumption of JOHNSTON (1847, p. 285) and, after him, of BUSK (1859, p. 93) as to the identity of *C. patagonica* with *C. denticulata* is of no weight, for a comparison of zoaria of both species that I have made shows clearly the differences, for instance, in the shape and position of the gonozoid (cf. BORG 1926 b, pp. 352 f.). Both species being of a dense and stout texture, they may be said to belong to the same group within the large genus including them both. Other species belonging here are *Crisia acropora* BUSK 1854, p. 351, *Crisia holdsworthii* BUSK 1875, p. 7, and *C. acuminata* BUSK 1886, p. 6. The so-called *Crisia elongata* of BUSK, HARMER, WATERS, etc. (nec MILNE EDWARDS) consists in all probability of two or more species mingled together.

Habitat: On other Bryozoa, on Hydroids, Sponges, tubes of Terebellids and Serpulids, and on stones.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 22. — St. 34. — S. 94. — St. 95.

Distribution: Ensenada de Ros, South of Rio Negro, on the coast of Patagonia (D'ORBIGNY 1839).

6. **Crisia nordenskjöldi** n. sp.

Pl. 12, figs 5 and 6.

Syn.: *Crisia denticulata* Busk 1886, p. 4, Pl. II, figs 3, 3 a, b; ?? *Crisia denticulata* var. *gracilis* Busk 1886, p. 5, Pl. I, figs 4, 4 a—c; nec *Crisia denticulata* Lamarck.

Zoarium of a rather slender habit, stem and branches straight or almost so. Branches numerous. Sterile internodes consisting, in middle portion of zoarium, of 10—12 zoids, in distal portion of 11—21 as a rule. Many of these internodes with one branch, others with two. When there is one branch, this proceeds from the 1st—5th internode, most often from the 3rd one. Short, branchless internodes with an even number of zoids, usually 4—8, sometimes intercalated between the other ones. Fertile internodes composed of 12 to more than 20 zoids; frequently with two or three branches. Autozoids lacking a keel, their free distal portion curving softly frontally, aperture circular. Gonozoids replacing the 3rd—9th zoid, in the majority of cases the 4th—6th, elongated, about pear-shaped, narrower than in the species next preceding. Tube short but distinct, aperture of gonozoid transversely oval.

Measurements in μ.

(1 a) Length of internode with 5 zoids (measured from joint to joint), average 1 170.

(1 b) » » » » 6 » average 1 430.

(1 c) » » » » 8 » » 1 840.

(1 d) » » » » 9 » » 2 030.

(1 e) » » » » 10 » » 2 250.

(1 f) » » » » 12 » » 2 690.

(1 g) » » » » 13 » » 2 740.

(1 h) » » » » 16 » » 3 470.

(2) Breadth of internode 150—220, average 190.

(3) Transverse diameter of joint 65—110, average 80.

(4) Distance from rim of aperture to rim of next aperture on same side (in uninjured zoids) 290—430, average 340.

(5) Length of 1st zoid of an internode (from joint to rim of aperture) 470—630, average 560.

(6) Length of 2nd zoid of an internode (total length) 630—800, average 740.

(7) Diameter of aperture of autozoid 55—70, average 65.

(8) Length of gonozoid from proximal end to top 870—1 130, average 1 030.

(9) Transverse diameter of gonozoid 290—470, average 390.

(10) Diameter of aperture of gonozoid, average 40 × 100.

(11) Length of basis rami 240—360, average 290.

I have examined a rather rich material of this species, consisting of several fertile zoaria and fragments of some others.

The zoarium, the internodes and branches of which are nearly straight, resembles to a certain extent that of the species next preceding but it is slenderer and of a more delicate growth and the shape of the gonozoids is somewhat different.

The zoarium develops from the pro-ancestrula proper or from rhizoids forming secondary pro-ancestrulae. Between the pro-ancestrula and the first internode a basal tubulus is usually intercalated. In some cases there are two successive basal tubuli.

The first internode consists of one zoid only. This is sometimes the case with the next internode as well. Then one or more internodes follow that are composed of 3 zoids but often of 4 or 5; each of these internodes as a rule has a branch. In the following internodes the number of zoids has increased to 5 or 7, as a rule, though one may find it to be from 3 to 9 in this transitional zone. The rest of the zoarium is composed of internodes in which the number of zoids is mostly 10—12 or in the distal parts often higher, up to 20 or even a little more. The highest number of zoids that I have found in an internode is 21, but this internode, that was at the end of a branch, had not yet finished its growth. Between the long internodes in the distal portions of the zoarium short ones, composed of an even number of zoids — 4, 6, or 8 as a rule — and then branchless, are sometimes intercalated.

The internodes are straight or very slightly curved in the frontal direction. Where a branch proceeds from an internode, this forms a very slight curve, from the convex side of which the branch develops.

Short internodes have as a rule one branch or sometimes none. When an internode includes a higher number of zoids, there is often one branch but in many cases two. Internodes with an even number of zoids are as a rule branchless, when this number is low (4, 6, 8), but when it is higher (10, 12, 14), branches exist just as in internodes with an odd number of zoids. As usual the branches normally take their origin alternately to the right and to the left. The exception is as in *C. patagonica* and other species that a "secondary" branch mostly develops at the same side as the "primary" one from which it is produced, and so on.

When one branch only is developed from an internode, it proceeds as a rule from the 3rd zoid, though sometimes from the 1st or the 5th. Where two branches exist, they take their origin mostly from the 3rd and 7th zoid, or the 3rd and 8th one.

In one case I have observed an internode near the base of a zoarium consisting of one zoid only but carrying two branches (cf. formula 4, where this case is diagrammatized). Thus a dichotomous ramification of the zoarium is brought about, which is otherwise a very rare occurrence in this species.

The structure and mode of branching of this species may be further illustrated by the following formulae:

(1) $(Pa + 4rz) + (tb + 2\ rz) + (z + 2rz + {}_1br)$
└─$(3z + {}_1br) + (7z + br_3) + \dots$

(2) $(Pa + 3rz) + (tb + 2rz) + (z + rz + br_1)$
└─$(z + br_1)$
└─$(4z + {}_1br) + \dots$

(3) $(Pa + 4rz) + (tb + rz) + (z + br_1)$
└─$(5z + br_3) + (5z + {}_3br) + (7z + br_3 + cb$

(4) $(Pa + 3rz) + (tb + 2rz) + (z + rz + br_1)$
┌─$(5z + br_3) + \dots$
└─$(z + rz + br_1 + {}_1br)$
└─$(5z + {}_3br) + \dots$

The number of zoids in the fertile internodes is from 12 to about 20. These internodes have at least two branches as a rule but not infrequently there are three. Always one branch only is found proximally of the gonozoid, but one or two distally of it. I have found fertile internodes where branches had been produced from the 1st, 6th and 9th zoid, or from the 3rd, 7th, and 10th, or, in another case, from the 3rd, 9th and 12th zoid (cf. the formula 5 below). In the fertile internodes, especially when there are three branches, the regular alternation of the branches may often be disturbed in such a way that the two branches proceeding proximally and distally of the gonozoid are produced on one and the same side (cf. formula 5). The reason for this seems to be the existence of the gonozoid since it is not found in sterile internodes (cf. Pl. 12, fig. 6).

The gonozoid replaces the 3rd—9th zoid, most often the 4th—6th, and each of these three cases is about equally common. The table below shows the position of the gonozoid in 56 cases studied by me.

Crisia nordenskjöldi. In 56 fertile internodes
the gonozoid was found to replace z_3 in 3 cases
» » » » » » z_4 » 12 »
» » » » » » z_5 » 15 »
» » » » » » z_6 » 12 »
» » » » » » z_7 » 8 »
» » » » » » z_8 » 3 »
» » » » » » z_9 » 1 »

As the formula (5) shows, gonozoids occur in internodes of the main stem as well as in such composing the branches, in the distal half of the zoarium.

$$\begin{array}{l}
(5)\ \ldots + (5z + {}_{3}br) + (5z + br_{3}) + (5z + Gz + 7z + {}_{3}br + {}_{7}br + br_{10}) + (8z) + \ldots \\
\qquad\qquad\qquad\qquad\qquad\quad \llcorner\!-(7z + Gz + 10z + br_{3} + br_{9} + {}_{12}br) + (2z + psp) \\
\qquad\qquad \llcorner\!-(7z + {}_{3}br) + (4z + Gz + 8z + br_{1} + {}_{6}br + br_{9}) + (4z + psp) \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad \llcorner\!-(9z + {}_{3}br) + \ldots \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad \llcorner\!-(13z + br_{3} + {}_{8}br) + \ldots
\end{array}$$

The autozoids are attached to one another in the greater part of their length but the distal portion is free, forming a tube. This has no keel, as is usually the case in *C. patagonica*, and the aperture is therefore circular. The aperture faces obliquely forwards-upwards and a little outwards, from which follows that the curve between the free distal portion of the autozoid and the rest of it is not so sharp as in the species preceding. The length of the tube is about $^{1}/_{7}$—$^{1}/_{9}$ of the zoid's total length but this is subject to some variation. In the highest zoid of an internode, especially, the free distal portion may be well developed and much projecting, provided that no process of degeneration has occurred. As usual this is often the case in the proximal half of many zoaria, where the zoids often lack the distal portions, their cavities being closed by one or more calcareous diaphragms. The tube, when existing, is a little narrower, as a rule, than the rest of the cystid (cf. Pl. 12, fig. 5) but this condition can be observed in many other species of *Crisia* too.

The gonozoids (Pl. 12, fig. 6) are somewhat variable in shape though always elongated and attached to the neighbouring autozoids with the whole of their basal side. Most often they are pear-shaped or almost so, the proximal portion gradually widening into the middle, inflated one, the top of which is rounded. The inflated portion may sometimes be wider, sometimes more narrow, and its distal end may be abruptly cut off instead of rounded. In some gonozoids the distal end of the swollen portion protrudes a little, thus concealing the aperture when seen from the frontal side and ending, in one or two cases that I have seen, in a point, though this is not very pronounced. The tube of the gonozoid is quite short but distinct. It is curved in such a way that the aperture faces obliquely forwards and upwards. This is transversely oval, sometimes a little narrower in its median part. Its transverse diameter is a little more than twice the longitudinal one.

The rhizoids are rather numerous, 3 or 4 of them often proceeding from the pro-ancestrula (cf. Pl. 12, fig. 5), while others run from the secondary pro-ancestrulae, from the basal tubulus or tubuli and from the lower internodes. In the latter case the rhizoids take their origin from the lowest zoid of an internode. They may or may not be separated from their cavity by means of a calcareous wall. As the zoarium grows older, the number of rhizoids gradually increases and one may find them developing from other internodes than the proximal ones as well. The rhizoids are densely jointed; they are rarely branched. Their walls are strongly calcified.

The basis rami are relatively short. They are attached to the cystids in such a way that their distal end is at or a little proximally of the place, where the tube of the cystids begins, while the proximal end does not reach down to the preceding cystid at this side. If the basis rami is at the first cystid of an internode, there is a good bit of distance between its proximal end and the joint.

Processus spiniformes attached at the zoids or protruding from the basis rami are absent here. But it may frequently happen that the end of an internode is formed by a short, unjointed processus spiniformis, narrowing towards its blunt end (cf. above, formula 5, psp). They are, however, not so numerous here as in the preceding species.

The joints are yellow, in the older parts with a brownish tinge, in the younger ones light yellow.

On the basal side of the pro-ancestrula there are some pseudopores and often one or two on its frontal side as well. The pores piercing the walls of the rhizoids are small and sparse, and the same is the case with the pores in the basal tubuli. In the walls of the autozoids the pseudopores are more numerous but of varying size: quite small in the proximal internodes with their degenerated, strongly calcified zoids, but larger and rounded oval in shape in the portion of the zoarium with active zoids; in the zoids' free, distal portions, however, the pores are but few and very small, which is explained I think by the poor calcification of this part of the wall. The pores in the wall of the gonozoid, viz. in its middle, dilated portion, are similar in shape to those of the ordinary zoids but much more densely scattered.

When I have created a new species for the zoaria here described, I am well aware of the fact that further investigations may prove this to be identical with some species already described. It may happen, for instance, that it can be identified with the "*Crisia denticulata* var. *gracilis*" of BUSK (1886, p. 5, Pl. I, figs 4, 4 a, b, c), though I do not think this very probable. To judge from the figures just referred to, there is a certain degree of similarity between the two, but the structure of the fertile internode shown by BUSK in his fig. 4 b is rather remarkable. Anything of that kind is certainly not to be found in *C. nordenskjöldi*. Moreover, I do not think it very probable that a species from the Philippine region occurs in the Subantarctic area. More probably the present species could be the same as that named *C. denticulata* by BUSK (op. cit., p. 4, Pl. II, figs 3, 3 a, b) and occurring at St. Paul and Tristan da Cunha, but the gonozoid shown in BUSK's Pl. II, fig. 3 b, does not give much help, as it seems to have undergone a process of degeneration and, possibly, regeneration, by which its shape may have been altered. It may be stated here in passing that certainly neither the "*C. denticulata* var. *gracilis*" nor the "*C. denticulata*" of BUSK (l. c.) have anything whatever to do with the northern *Crisia denticulata* LAMARCK and I do not see any reason for classifying them under that heading.

Crisia nordenskjöldi certainly comes rather near *C. patagonica*. A comparison of the measurements, the structure of the fertile internodes and the shape of the gonozoid prove, however, in my opinion, the distinctness of the two forms. On account of the shape of the gonozoid as well as other characteristics it is evident, however, that they both belong to the same group of species within the genus.

Habitat: On algae and on Hydroids.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 67.

Distribution: ?? Off St. Paul's Rocks, shallow water: — Lat. 10° 30′ S, Long. 142° 18′ E, 8 fathoms, coral mud. — ? Off Inaccessible Island, Tristan da Cunha, 60 to 90 fathoms (Challenger Exp., BUSK 1886, p. 4, under the name of *C. denticulata*).

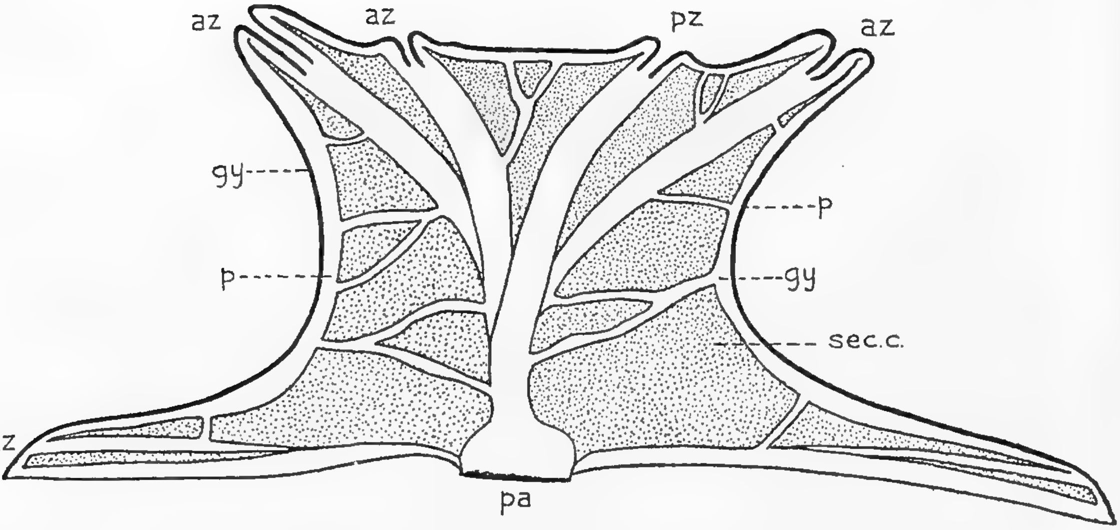
3. Divisio **Pachystega**.

Syn: Pachystega BORG 1926 b, p. 475.

Char: Primary zoid erect, never separated by any joint from the pro-ancestrula; zoarium not jointed, erect, branching like a tree; wall of zoarium double, consisting of a gymnocyst and a cryptocyst, the latter undergoing a process of secondary calcification, by which the zoarium in its older parts becomes very strongly calcified; brood-chamber a gonozoid dilated in its middle portion; this situated either on frontal or basal side of zoarium or in an axil between two branches.

It was not until the structure of the body-wall of the Horneridae was known (cf. BORG 1926 a, pp. 589 ff.; 1926 b, pp. 195 ff.) that it became evident that the members of this family were by no means nearly related to "*Idmonea*" or *Entalophora*, as had hitherto been supposed on account of a superficial resemblance in the appearance of their zoaria, but that they must be regarded as very well separated not only from the genera just named but from most other Stenolaemata as well. The conclusion thus arrived at made it necessary to form a separate Division, the Pachystega, for the Horneridae and some other families three of which are proposed here. In another paper (1941) I have demonstrated that the fam. Crisinidae must be included in that Division. The name of the Division was derived from the fact that the cryptocyst of the body-wall was growing gradually thicker, reaching in the older portions of a zoarium a quite excessive thickness.

The development of the zoarium in the Pachystega from the 1st zoid is unlike that of any other Division within the Stenolaemata, for the primary zoid is erect from its very



Text-fig. 23. Diagram showing sagittal section through young zoarium of *Hornera* to demonstrate its structure. — *az* autozoid, *gy* gymnocyst, *kz* kenozoids (composing supporting disc.). *p* pore-duct (simple or branched) *pa* pro-ancestrula, *pz* primary zoid, *sec. c.* secondary calcification layer (cryptocyst).

beginning and never becomes adnate. The tubular portion of the primary zoid is tolerably well separated from the pro-ancestrula, though not so sharply as in the Camptostega, where there is a joint between these two formations. The zoids following are likewise erect, by which a primary stem is formed, that soon divides into two or more secondary stems; these in their turn give rise to tertiary stems, and so on. In this way the erect and branching, often tree-like zoarium distinguishing the Pachystega comes into existence.

The zoarium of all Pachystega is fixed to the substratum by means of a "supporting disc" that is composed of a number of tubes representing a kind of kenozoid. They may be of about the same width as the autozoids (*Stegohornera*) but in most species they are much narrower. Sections through young zoaria parallel to the longitudinal axis of the autozoids show that the tubes or kenozoids take their origin from quite near the place, where the primary zoid originates from the pro-ancestrula. From here they radiate at all sides along the substratum. At the edge of the disc thus formed new tubes come into existence in the same way as in a common bud, *i. e.* by the fission of the partition-walls or septa between those already existing. The origin of the kenozoids composing the "disc" in *Crisina* has been described more in detail in another paper of mine (1941).

The mode of formation of the said kenozoids implies I think the explanation of the structure of the zoarial wall characteristic of all Pachystega. A young developing zoarium probably should be regarded as a greatly widened common bud, the basal wall of which is in contact with the substratum all around the pro-ancestrula, while just inside this wall and parallel to it the kenozoids forming the disc grow out radially and the autozoids, close together in the central portion of the bud, are gradually lengthening upwards, new ones being formed occasionally by fission of the interzoidal walls. If this assumption is correct, as I think it to be, the terminal membrane of the bud obviously would cover like a transparent veil the upper side of all the tubes forming the disc as well as the ensemble of the outer walls of the autozoids; and, as we know, this is exactly what happens in the zoarium of a Pachystegous form. Text-fig. 23, which is a diagrammatic representation of a sagittal section through a quite young zoarium of *Hornera antarctica* WATERS, will further illustrate the conclusion arrived at.

Thus the zoarial wall, *i. e.* the ensemble of the outer walls of the autozoids, is formed by the following strata: (i) a gymnocyst, consisting of cuticle, ectoderm and mesoderm, and (ii) a cryptocyst, viz. a calcareous layer surrounded on both sides by ectoderm and mesoderm; between the gymnocyst and the cryptocyst is a slit-like (hypostegal) coelomic cavity (cf. BORG 1926 b, p. 198).

As has just been mentioned the gymnocyst does not belong to each of the individual zoids but is rather to be regarded as of zoarial origin, being derived from the terminal membrane of the original common bud. In most genera within the group there is no calcareous matter deposited in the cuticle of the gymnocyst but in *Stegohornera* this is the case to some extent.[1]

The calcareous layer of the cryptocyst is produced from the ectoderm surrounding it. The ectodermal cells secrete one chitinous stratum after the other; and in these layers calcareous matter, mainly carbonate of lime, is deposited simultaneously. Now as there are living tissues, capable of secreting chalky matter, not only inside the calcareous cryptocyst but outside it as well, a secondary thickening of the zoarial wall can be effected from both sides. A thickening of the inside of the walls of the cystids is met with in all Stenolaemata; but owing to the space necessary for the polypide and for its movements within the cavity of the cystid this is rather inconsiderable. For a thickening from the outside, on the other hand, there is no such limit; and thus we see in the Pachystega that the wall of the zoarium gradually assumes a really enormous thickness.

The number of the zoids abreast in a branch is always small, most often amounting to 3—8 only. The top of a stem, where the process of secondary thickening has not yet begun, is therefore quite narrow, while gradually as we proceed from the top downwards it becomes thicker until it has assumed several times its original width. This is practically solely due to the secretory function of the ectodermal cells outside the cryptocyst. The secretion obviously goes on in periods which is the reason why the calcareous cryptocyst becomes composed of several strata.

The secondary thickening is a process extremely characteristic of the Pachystega, and more so than in any other Division of the Stenoloemata. As a result of it, the distal portions of the cystids, protruding originally more or less above the level of the stem, are deeper and deeper immersed in the calcareous layer, finally in many cases up to the very rim of the aperture. Other changes of the surface of the zoarium may take place too, such as the formation of ridges and of furrows separating them on one or both sides of the zoarium or all around the stem. It follows that a species within this group cannot be characterized merely by describing the appearance of the surface of the zoarium, as has often been done, but that it is necessary to take into consideration the changes caused by the gradual progress of the secondary calcification.

In the Pachystega, as is natural from the structure of the bodywall, there do not exist any pseudopores but only real pores piercing the cryptocyst. As this grows gradually thicker, the pore-ducts become lengthened and small cavities or pits are formed in the surface of the cryptocyst, in the bottom of which the pores open. Where the second-

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[1] To this genus *Hornera violacea* SARS is referred on account of the structure of its body-wall and the location of its gonozoid. The fam. Stegohorneridae is instituted for it.

ary calcification proceeds swiftly, as in many species of *Hornera,* two or more pore-ducts may meet and fuse, by which thus ramified pore-duets arise.

Paleontologists have used very various names for these pores and for the pits, in which they usually open. Thus GREGORY (1896, p. 360) speaks of "cancellate walls", meaning the cryptocyst pieced by pores, and says that "the cancellate character of the walls (in, for instance, *Hornera*) is due to the presence in them of a series of maculae", meaning the pores (cf. GREGORY 1893, p. 221). GREGORY obviously regards the "cancelli" as of two main types (1909, p. XXI). CANU & BASSLER (1920, pp. 641 ff.; 655) use "tergopores" and "vacuoles" though not quite in the same meaning as GREGORY; but it must be admitted, I think, that all these terms are applied simply to designate the pores and pits in different Pachystegous forms, and that they are hardly necessary.

In most species within the Pachystega the autozoids open on one side of the zoarium only, which is then conveniently termed the frontal side, while on the other, the basal side, there are no apertures. This rule is however not without exception for in one genus, *Calvetia,* described here for the first time and referred, because of its structure, to a separate family, the Calvetiidae, the zoids open all around the cylindrical stem.

The apertures most often are rounded but their rim may be exserted or sometimes lengthened into a number of spine-like processes, as in *Hornera spinigera* KIRKPATRICK and some other species. The existence of such formations, unknown in the Camptostega and the Acamptostega, is of course easily explained by the existence of living tissues outside the calcareous layer. They may occasionally occur at other places of the surface both of the basal and especially of the frontal side of the zoarium, though this is unusual.

The polypide and other inner organs show some characteristics when compared with the corresponding formations in other Stenolaemata, but as these do not seem to have any special bearing upon taxonomy I shall not go further into this matter here.

The brood-chamber is a gonozoid as in the Divisions hitherto dealt with, but it is of another type and of a rather peculiar one. The proximal portion is situated among the other zoids from which it does not differ. The middle dilated portion on the other hand is situated either on the frontal side of the stem (Crisinidae) or it may occupy the space available in the bifurcation between two branches (Stegohorneridae, Calvetiidae) or it is placed at the back side of the stem (which arrangement is found in the Pseudidmoneidae and Horneridae). In this latter case the undilated portion before passing into the dilated one makes usually an abrupt curve of about 90°, so the axis of the gonozoid thus becomes about transverse to the longitudinal axis of the stem. Owing to the shape of the zoarium this makes the middle portion of the gonozoid capable of being more strongly widened, for its lateral lobes can now grow upwards and downwards along the back of the stem. The distal portion of the gonozoid, viz. the tube with the aperture, is situated in these cases just above the proximal one (cf. BORG 1926 b, pp. 341 ff., Text-figs 93, 95).

The wall of the gonozoid is in all Pachystega of principally the same structure as that of the rest of the zoarium, but there are often a number of more or less prominent ridges on the surface of the gonozoid, forming a network the meshes of which are separated by deep pits.

With the exception of the tubes of the supporting disc kenozoids do not seem to occur in the Pachystega, though in Stegohorneridae among the ordinary zoids formations exist that ought probably to be interpreted as kenozoids.

Synopsis of the Families of Pachystega.

1 (8) Autozoids opening on frontal side of stem only .... 2.
2 (3) Gonozoids on frontal side of stem; zoids arranged in very distinct transverse or oblique series across stem .... Fam. Crisinidae.
3 (2) Gonozoids in axils or with middle (inflated) and distal portions on basal side of stem 4.
4 (5) Gonozoids in axils; gymnocyst partly calcified .... Fam. Stegohorneridae.
5 (4) Gonozoids with middle (inflated) and distal portions on basal side of stem .... 6.
6 (7) Distal portions and apertures of autozoids not forming transverse series across stem, usually arranged in quincunx .... Fam. Horneridae.
7 (6) Distal portions and apertures of autozoids forming transverse or oblique series across stem .... Fam. Pseudidmoneidae.
8 (1) Autozoids opening all round cylindrical stem; gonozoids in axils ... Fam. Calvetiidae.

The families Crisinidae and Stegohorneridae are not represented in the present collections.

Fam. **Pseudidmoneidae** n. fam.

Zoarium erect, branching dichotomously; branches narrow; autozoids opening on frontal side of stem only, arranged in oblique series parted in the middle, connate throughout; outermost cystids the longest; median ones level with surface of zoarium. Gonozoid simple, unlobed, moderately dilated; its middle and distal portions situated on basal side of stem. Secondary calcification conspicuous, forming ridges and pits.

In my opinion a separate family should conveniently be erected in order to enclose *Pseudidmonea* ("*Idmonea*") *fissurata* Busk and, perhaps, some other species as well. The disposition of the autozoids is quite another here than in the rest of the families. In the Crisinidae, to which the Pseudidmoneidae comes nearest as to this character, the autozoids are in transverse rows but it is the innermost zoid of each series that is the most prominent one, not the outermost zoid, as in the Pseudidmoneidae. The gonozoid is simpler in shape than in any other of the families, though it is principally of the same type as in the Horneridae.

The secondary calcification with its ridges and pits is very characteristic and is not similar to that in any other family within the Division.

On the whole I think the members of the Pseudidmoneidae represent a more primitive stage in phylogenetic development than the rest of the families.

The coincidence with the Idmoneidae that is caused by the disposition of the autozoids in transverse rows is of course only a superficial one since the structure of the body-wall and, consequently, the astogeny are quite different. The name of the family is chosen in order to lay stress upon this fact.

Genus **Pseudidmonea** n. gen.

Zoarium from a central, primary stem branching dichotomously; branches rounded triangular in cross section. Autozoids disposed in oblique rows, each separated in the middle line into two halves forming about right angles with each other; the outer 2—3 zoids of each series connate throughout, strongly protruding, the outermost the longest; median zoids about level with surface of zoarium. Gonozoid with its middle portion inflated, almost globular, the tube long, protruding laterally. Secondary calcification forming longitudinal or somewhat oblique ridges, separated by furrows that with increasing age are bridged over by numerous transverse or oblique ridges with the result that the surface of the zoarium both on frontal and basal side is covered by a layer of polygonal spaces, each with a depression in its centre.

Pseudidmonea fissurata (BUSK) 1886.

Pl. 13, figs 1—4.

Syn.: *Idmonea fissurata* BUSK 1886, p. 14, Pl. 3, figs 5, 5 a—c; *Hornera fissurata* WATERS 1889 b, pp. 275 ff., Pl. 14, figs 1, 3, 4, 7.

Zoarium erect, saucer-shaped. Primary stem quite short, dividing simultaneously into several branches, radiating irregularly from their common point of origin and, in their turn, dividing dichotomously one or more times. Branches rounded triangular in transverse section, more obviously so in young stems than in older ones. Oblique series of autozoids on each side of median line consisting of 3—6 zoids, most commonly of five. Outer cystids of a series 2—4 in number, strongly protruding, connate throughout, the outermost the longest; more centrally placed cystids much shorter, apertures some distance apart from each other and about level with surface of zoarium. Apertures both of marginal and median cystids, when uninjured, with their distal-basal rim exserted into a pointed process of varying length. Gonozoid with its proximal portion wedged in between the autozoids of a series on frontal surface of zoarium, middle portion situated on basal side, inflated, almost globular, distal portion a well-developed tube, protruding laterally, curved distally, adnate during its whole length to the outermost zoid of that series of which the gonozoid is a transformed member; aperture of gonozoid circular, larger than that of an autozoid. Secondary calcification in the shape of longitudinal or oblique ridges separated by furrows; later on ridges connected by transverse bars, by which a layer of polygonal spaces comes into existence, each enclosing a central depression.

Measurements in μ.

(1, a) Transverse diameter of primary stem (one case) 1 130.
(2, a) Transverse diameter of branch 1 mm from top 550—660.
(2, b) Transverse diameter of moderately old branch 800—860.
(2, c) Transverse diameter of old branch 1 060—1 400.
(3, a) Diameter of aperture of medial autozoids 100—110 × 140—150.
(3, b) Diameter of aperture of outermost autozoids 110—112 × 130—140.
(4) Length × breadth of middle, dilated portion of gonozoid 980 × 1 400.
(5) Diameter of aperture of gonozoid 280.

My material has consisted of a complete zoarium and of fragments of some others. As there was no gonozoid represented among these, Miss ANNA B. HASTINGS, at the British Museum, was so kind as to send me on my request a fertile (though incomplete) zoarium from the Challenger Collection for examination. I was thus able to state the identity between my specimens and those of BUSK.

The primary stem arises in the centre of a supporting disc consisting as usual of a number of small tubes radiating at all sides from the centre. The disc is one-layered but there is a secondary calcareous layer spreading upon its surface. The primary stem is quite short. It divides, in the zoarium seen in Pl. 13, fig. 1, into four radiating branches of about equal strength, each very soon dividing again dichotomously. Of the eight branches thus arising one has been broken off and the other one, proceeding from the same main branch, has not yet had time to divide. The two secondary branches originating from another main branch are so far undivided too; while the two remaining branches have divided again dichotomously. Other fragments show that the dichotomous mode of branching is continued throughout the whole zoarium, though the branches resulting are not always quite equally strong.

The branches are narrow, as we see (Pl. 13, figs 2—4), and superficially reminding of those of an *Idmonea* or *Crisina*. Their shape is in transverse section somewhat triangular with the apex of the triangle in the middle line of the branch (Pl. 13, fig. 3). This depends upon the arrangement of the zoids which is very characteristic indeed. They are clustered together in simple obliquely arranged series, diverging from the middle line. In most cases there are 5 zoids in a series, 2 median and three lateral, protruding ones; but it may happen that there are only two lateral and one or two median; or there may be 4 lateral and 3 median, though, so far as I have been able to observe, not in one and the same series. Thus, 5 (2 + 3) may be said to be the normal number, while 4 (2 + 2) or 6 (3 + 3) is not quite unusual but 3 is a rare exception. A lower number (4) than the normal one is often found at the bifurcations while a number a little higher than the normal one can sometimes be found in the distal portions of a well-grown zoarium.

At first one may be inclined to think that only the two or three (lateral) zoids protruding strongly at either side of the branch and connate throughout form the series; but on closer inspection it becomes evident that the 2—3 median ones belong to the same series as the lateral ones, and are continuous with them. But as the apertures of the median zoids are all level with the surface of the zoarium and as the whole series is decidedly obliquely arranged, the aperture of each median zoid is situated distally and a little more laterally (counted from the median line) to the one next preceding. As for the lateral, protruding zoids, the first, *i. e.* the most medially placed of these, does not protrude much, thus forming a transition between the median and lateral ones. The next one protrudes a bit more, but the longest distal portion is the one belonging to the outermost zoid. Thus the "fissured" appearance characteristic of the species and mentioned already by BUSK (*op. cit.*, p. 14) comes about.

The outer border of the aperture is exserted to a varying degree. The exsertion is most strongly perceivable, naturally, on the outermost zoid. The apertures of the other zoids are more or less elliptical.

The apertures of the median zoids which are level with the surface of the zoarium, have the appearance of large holes leading into the interior of the branch or stem (Pl. 13, fig. 3). One could think they were pits (as occurring in other Pachystega) which, however, on account of their arrangement and the way in which they have come into existence is certainly not the case. Or they could be thought of as kenozoids; but as sections show that they may contain normal polypides this assumption obviously is not correct. BUSK (l. c.) considered them as autozoids ("zooecia") and WATERS (l. c.) had no objection to that. I have convinced myself that this view is correct.

The calcareous walls of the zoids, both the outer one and the interzoidal walls, are more easily seen here than in Horneridae, particularly in young portions of a zoarium. This is due to the fact that the zoids' distal portions form a much larger part of the frontal side of the stem than in that family; which in its turn depends partly upon the mode of arrangement of the zoids as just described and partly upon the secondary calcification not being very pronounced here. The walls are thin, therefore, especially the interzoidal ones. They are pierced by quite small, circular, sparsely scattered pores. In the interzoidal walls, so far as I have been able to ascertain, these pores form a single row along the wall. WATERS (op. cit., p. 278) has called our attention to the position of the pores as a factor of importance in taxonomy; but as was often his habit, he speaks only in general terms, giving few definite facts. In the Pseudidmoneidae I cannot see how the disposition of the pores could be used for classificatory purposes; for there are many Stenolaemata belonging to different groups in which the same arrangement is seen; and the position of the pores is subject to too much variation to be used with advantage as a systematic character of importance, which of course might not prevent it from being useful in some cases.

The number of the tentacles of the polypides is invariably 10, while in the Horneridae it is always 9.

I have seen but one gonozoid (in a zoarium from the Challenger Collection) but this gonozoid is complete and, in all probability, quite typical for the species (Pl. 13, fig. 2, gz). From the description given by WATERS (op. cit., pp. 275 and 277, Pl. 14, fig. 4) the gonozoid is of principally the same type as that occurring in Horneridae, the inflated portion being placed on the basal surface of the zoarium (Pl. 13, fig. 2). KIRKPATRICK, who has examined the gonozoids of the present species at the request of WATERS, says (cf. WATERS, l. c.) that he "found in each instance that the last one or two zooecia of a series in proximity to an ovicell are not only enlarged but considerably altered in direction". There is of course never more than one zoid transformed into a gonozoid, but otherwise my results conform with those of KIRKPATRICK. We may presume, thus, that it is either the outermost zoid of a series that becomes a gonozoid — which seems the case in the gonozoid examined by me — or it may sometimes be the outermost but one that becomes transformed in this way. The dilated portion is almost globular (cf. Pl. 13, fig. 2) and much smaller than I have seen in any species of *Hornera*.

KIRKPATRICK has further observed that "in every case the wide tube is to some extent connate to a zooecial series"; in the gonozoid examined by me the tube is wholly adnate to the outermost zoid of the series to which the gonozoid belongs. The tube seems always to be lateral (Pl. 13, fig. 2). It is long and distinctly curved forwards. As stated by KIRKPATRICK it is unusually wide; and the aperture, which is circular, is much larger than that of an autozoid (cf. Measurements 3 b, and 5).

The process of secondary calcification is to a certain extent another here than in the other families of Pachystega. At the frontal side it begins a little distance from the top of the branches. Here the frontal surface is formed by the distal portions of the zoids. Now, where the series of zoids meet in the middle line of the stem a ridge is formed, running thus on top of the interzoidal wall in question. At first quite thin, this ridge proximally becomes gradually thicker and higher (cf. Pl. 13, fig. 3). Other ridges are formed more proximally on both sides of the median ridge. These ridges either may run so as to form acute angles with the median one, in which case they soon meet and coalesce with it; or they may run about parallel to it. In this latter case crossbars are formed here and there between the ridges, enclosing pits, at the bottom of which are one or more pores. Thus on the frontal side there are formed a small number of ridges joined by crossbars and separated by furrows or by rows of pits. These ridges often separate the apertures of the median zoids from each other, as in the Crisinidae and Horneridae. One of these ridges, the median one, is as a rule a little larger than the other ones — though it is never very prominent — and can easily be followed to near the distal end of the branch (cf. Pl. 13, fig. 3).

Another system of ridges comes into existence at the fronto-lateral surface of the branches, between the series of cystids constituting the surface here. Just where a new series protrudes distally of an older one a number of ridges are formed on top of the interzoidal walls including cavities (pits) between them. These ridges, which are parallel, are quite short at first, but as growth proceeds they become gradually longer, running along the fronto-lateral surface of the series. Between the ridges there are then rows of pits, separated by crossbars. In the older portions of a zoarium these ridges, now thick, prominent and glossy in appearance, become contiguous at last with the ridges on the fronto-median surface of the zoarium.

On the basal side of the branches, a system of ridges covering the original surface of the cystids is likewise formed. These ridges begin at the very top of the branches. Here they appear as narrow but rather conspicuous formations, some of them running upon the interzoidal walls and others in the median line of the back side of each cystid. It may be noted, especially, that the outermost cystid of a series is always provided with such a ridge, running up to the rim of the aperture and thus contributing to its exsertion. These ridges become gradually very prominent. They can be easily seen in Pl. 13, fig. 4.

Near the top of a branch there are no crossbars or pits between the ridges, and the back sides of the cystids where they run are so far easily seen (cf. Pl. 13, fig. 4, near the distal end of the right stem). Sooner or later some of the ridges coalesce with neighbouring ridges, but there is always a number of ridges, amounting in the cross-section of a branch to something from 6 to 16, that run almost parallel. A little distance below the top numerous crossbars, with pits between them, are formed rather suddenly, connecting the longitudinal ridges with each other. The crossbars soon become stronger, and the interspaces between the ridges are thus divided into small, elongated spaces, including one or often more of the original pits. These spaces then as the zoarium grows older become subdivided through new crossbars. Finally most of the crossbars attain the same strength as the longitudinal ridges, the basal side now being entirely covered by a layer of polygonal spaces (cf. Pl. 13, fig. 4), each enclosing one or sometimes two of the original pits, which in their turn are pierced each by a single circular pore at the bottom.

This is a rather remarkable species, being separated from all other members of the Pachystega through a lot of characters.

When first describing it Busk (op. cit., p. 14) referred it to *Idmonea*. This was obviously a mistake due to the fact that he had not observed the gonozoid, and it was corrected by WATERS (op. cit., op. 275) who transferred it to *Hornera.*

WATERS (op. cit., p. 278) states correctly that "the zooecia are arranged in very distinct series, suggesting at first *Idmonea*"; but in his opinion "the serial arrangement is not uncommon in *Hornera;* for in *H. lichenoides* it occurs decidedly in some specimens" and "it is found in some fossil species too". To this may be answered that connate series of zoids with the distal portions protruding far beyond the level of the surface of the zoarium never occur, in my experience, either in *H. lichenoides* nor in any other species of *Hornera;* and, further, that if it really does exist in any fossil species, this certainly is a sign that such a species should be removed from Hornera.

On the other hand the so-called *Idmonea hochstetteriana* MACGILLIVRAY (1895, p. 120, Pl. 16, figs 12—16) seems probably to belong to the same genus as the present species; but it does by no means follow that it is, therefore, to be considered identical with *P. fissurata,* as WATERS thinks (1914, p. 846). The median zoids of "*Idmonea*" *hochstetteriana* protrude according to MACGILLIVRAY's figure (Pl. 16, fig. 16 a) above the level of the surface of the zoarium, not to mention other characters indicating that the two forms are at least specifically distinct.

HARMER (1915, pp. 138 f.) thinks that the species of MACGILLIVRAY just alluded to is probably not "*Hornera*" *fissurata* but instead *Crisina radians* LAMARCK. This I think may be a mistake, since MACGILLIVRAY has described in one and the same work (op. cit.) two species one of which (Pl. 16, figs 12—16) is discussed above and should belong, in my opinion, to *Pseudidmonea;* and another (Pl. 16, figs 18—18 c) which is referred by MACGILLIVRAY himself to "*Idmonea*" (*Crisina*) *radians* (op. cit., p. 121) and which in my opinion is either this species or a rather nearly related one.

It is unfortunate that WATERS so often has been inclined to identify different species with each other on account of rather superficial resemblances, especially when one of the species is a recent and the other a fossil one. On the same grounds he considers certain species as nearly related on account of characters that are not always important. Thus he says (1889, p. 278) that "*Hornera*" *fissurata* and *H. lichenoides* are "no doubt closely allied" which certainly is not the case; and the reason for this supposition seems mainly to be that "in *H. lichenoides* the amount to which the zooecial tubes are exserted is variable".

A really interesting fact is that the serial arrangement of the zoids in *Pseudidmonea fissurata* suggests "*Idmonea*". As the astogeny in these two genera is entirely different from the formation of the first zoid — on account of which they are referred to different Divisions among Stenolaemata — it follows that the serial arrangement of the zoids must have arisen quite independently in the two genera. Thus we have here before us a case of convergence, and a rather typical one I should say, the shape of the members of the two genera being much the same.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 58. On a large Hydroid. — St. 59. On an encrusting Chilostome.

Distribution: Challenger Expedition: St. 320, 37°17 S, 53°52 W, [= near off Montevideo] 600 fathoms, green sand.

Fam. **Horneridae** SMITT.

Syn: Horneridae SMITT 1867, p. 404; Idmoneidae (pars) BUSK 1875, p. 10; Horneridae HARMER 1915, p. 147.

Zoarium erect, tree-like, branching frequently; stem and branches about cylindrical in transverse section, secondary calcification making them gradually much thicker; zoids taking their origin at basal edge of top but curving gradually frontally and opening on frontal side of zoarium only; distal portions of autozoids arranged so that the apertures are in quincunx or, sometimes, irregularly placed; number of tentacles of polypide nine; gonozoid with middle (inflated) and distal portion placed on basal side of zoarium.

It was the sharp eye of SMITT (op. cit.) that first distinguished the characters separating the species of *Hornera* from most other Stenolaemata with which they had hitherto been considered nearly related. As a consequence of the results at which he had arrived, especially in regard to the formation and arrangement of the zoids, SMITT created a separate family, the Horneridae, for the species in question. In this he was unfortunately not followed by BUSK (1875, 1886) who continued to place *Hornera* with *Tubulipora, Idmonea,* etc. in the large and heterogeneous fam. Idmoneidae of his. By later authors, however, SMITT's views were generally accepted; and now, since studies of the anatomy and the astogeny of some of its members have led to the creation of a separate Division for the Horneridae and some other families, it is firmly established.

There are a good many species belonging to Horneridae, but most of them are extinct, only a minor part living nowadays. The fossil species of the family have been scattered among several genera and are I think in great need of a revision; but I shall not touch upon that matter here. The recent ones have all so far been brought together in *Hornera,* though KIRCHENPAUER (1869) introduced *Retihornera* for "fenestrate" species, in which the branches show anastomoses in the shape of calcareous bars between them, obviously in order to get the zoarium more solid and firm. Unfortunately the named author included in the same genus some Chilostomatous species that ought to have been referred to *Retepora.* I shall not discuss here the question if *Retihornera* should be maintained or not, as I have not had an opportunity to study any of its species; though I should like to mention that the existence of transverse bars between the stems of an erect zoarium is not an uncommon character in Stenolaemata (cf. for instance, *Tubulipora pulcherrima* KIRKPATRICK, *T. cassiformis* HARMER, and other species). Where it occurs it has not hitherto been considered of generic value and I am doubtful if it should be in Horneridae. Further researches seem necessary in order to decide that question.

Hornera is the only genus represented in the present collections.

Genus **Hornera** LAMOUROUX.

Syn: *Millepora* (part.) LINNÉ 1758, p. 790; *Retepora* (part.) LAMARCK 1816, p. 180; *Hornera* LAMOUROUX 1821, p. 41; *Hornera* MILNE EDWARDS 1838, p. 209 (this author places the genus for the first time among its true relatives, viz. among other Stenolaematous Bryozoa); *Hornera* D'ORBIGNY 1853, p. 916; auctt.

Genotype: *Hornera frondiculata* LAMOUROUX 1821, p. 41 (recent, Mediterranean).

1. **Hornera antarctica** WATERS.

Pl. 14, figs 1—4.

Syn: *Hornera antarctica* WATERS 1904, p. 93; WATERS 1905 b, p. 249; (Miss) THORNELY 1924, p. 19; BORG 1926 b, p. 184; (?) LIVINGSTONE 1928, p. 78.

Zoarium relatively slender, spreading out horizontally from a short primary stem or forming a flattened funnel, the primary stem representing the spout of the funnel; branches occurring more frequently in proximal than in distal portion of zoarium, sometimes stunted in their growth and proceeding at about right angles to the branch from which they originate, with projecting tubular portions of autozoids at their ends; transverse section of branch about oval, with the frontal side appreciably flattened; secondary calcification not very strong, but forming distinct ridges and sulci on both sides of stems; zoids in quincunx or irregularly placed, those nearest the lateral side of the stem the longest, with the rim of the aperture exserted but without any spine-like processes; gonozoids with middle, dilated portion of variable shape, often very large and lobed, occupying space between two or even more bifurcations, with a distinct carina, simple or forked, on top of it; tube short but distinct, either lateral or terminal, slightly curved so that the aperture, which is transversely oval in shape, faces the fronto-lateral direction.

Measurements in μ

(1) Diameter of branch 1 mm from top 430—620.
(2) » » branch at about the middle height of well developed zoarium 880—1 020.
(3) » » primary stem 1 060—1 220.
(4) » » aperture of autozoids 140 × 170.
(5) » » » » gonozoids 180 × 260.

When well developed the zoarium of the present species is rather characteristic, being funnel-shaped or even saucer-shaped, the ensemble of the branches representing the funnel while the primary stem represents its spout (cf. Pl. 14, fig. 1). Young zoaria, on the other hand, are often more irregular in shape.

The stem and branches are not so strongly calcified as in most other species of *Hornera* (cf. Pl. 14, fig. 2). In cross-section they are oval, with the frontal and basal sides somewhat flattened, which is especially true of the former one.

The primary stem that arises from the middle of the supporting disc soon divides. In this way usually three but sometimes two or four secondary stems come into existence. These stems bifurcate repeatedly giving rise in their turn to tertiary, etc., stems or branches. It is not in all cases, however, that the two branches that have originated by means of a bifurcation, develop into "twin" stems of equal strength; often one of them grows more slowly, while the other becomes rapidly vigourous and soon divides anew (cf. Pl. 14, fig. 2).

The secondary stems often bifurcate almost immediately after having been formed from the primary one; and on the whole the dichotomous branching of the stems is more often repeated in the proximal than in the distal portion of the zoarium. In the latter the stems therefore give the impression of being straighter and more parallel than in the former.

On one occasion only have I seen a stem (other than the primary one) divide into three instead of two branches at one and the same time. This irregularity in the mode of branching probably was influenced by the fact that a gonozoid had developed just where the branching occurred.

As pointed out by WATERS (l. c.) it is a feature characteristic of the species now in question that often small lateral branches are formed in such a way that a few zoids forming a cluster grow out at about right angles from some of the stems (cf. Pl. 14, fig. 3). They swiftly become stunted in their growth, no new zoids being formed at the top of the branch, where therefore the tubular ends of the zoids project freely. These small offshoots at right angles to the stems may occur both in the distal and proximal portions of a zoarium though they seem to be a little more frequent in the older parts. They are rather common but may be lacking in small zoaria.

It should be noted that branches sometimes are found to anastomose with one another, though this does not seem to be very common. It is interesting, however, for it shows that anastomoses occurring regularly in certain species as, for instance, *Hornera* (*Retihornera*) *foliacea* MACGILLIVRAY, may be occasionally met with in other species as well.

When studying a young stem it is easy to see that it is constituted of rather few zoids, viz. 4—6, mostly 5, abreast (cf. Pl. 14, fig. 2). Their apertures are arranged in a somewhat varying manner. Sometimes, and especially where the stem is relatively broad while just about to bifurcate, they are in a fairly regular quincunx, but at other places, e. g. in the younger portions of the zoarium, they can sometimes be observed to form transverse or obliquely transverse rows though they are never connate. On the other hand they are often scattered rather irregularly as it would seem.

The free distal portions of the medial cystids are quite short while when situated at the lateral edges of the stems they are considerably longer, projecting freely at both sides (Pl. 14, fig. 1), as is the case in most species of *Hornera*. In the older portions of a zoarium where the thickening of the cryptocyst has proceeded well, the medial apertures are immersed in the calcareous mass up to their margin, while the lateral ones when not damaged continue to project freely (cf. Pl. 14, fig. 2). As the cystids are softly curved frontally, most apertures look in that direction; the lateral ones however face a little more laterally.

The medial apertures are somewhat excised, but those of the lateral ones are exserted, their proximal margin being much less developed than the distal one, as pointed out by WATERS (l. c.). The shape of the apertures of the autocystids therefore in both cases becomes oval with the longer axis parallel to that of the stem. There are no spine-like processes or other ornamentations at the rim of the apertures in this species.

The gonozoids have been described at some length in a former paper of mine (1926 b) to which I have only a few words to add here. The tubular, proximal portion of the gonozoid is concealed among the ordinary zoids, while the strongly dilated middle portion together with the tube is to be found on the basal side of the stem. Its place and shape are variable as can be seen in Pl. 14, fig. 4; the middle one of the three gonozoids shown in this figure is very typical for this species. In the paper just quoted some other gonozoids of various shape are drawn (cf. BORG 1926 b, p. 387, Text-figs 86—89). The tube of the gonozoid is short but distinct, either lateral — which is more common — or terminal. It is slightly curved so that its aperture faces the frontal-lateral direction, the same as the lateral autozoids. The aperture is transversely oval in shape. It is wider than the apertures of the autozoids (cf. Measurements, 4 and 5).

Along the middle line of the dilated gonozoid there runs a ridge or carina, continuing up to the very rim of the aperture (Pl. 14, fig. 4). Usually the carina is forked, one branch running at the top of each of the two main lobes. Where there are more lobes, the carina may split up in yet more branches. The carina is, however, not very prominent on the whole and it may sometimes even be difficult to discern it in some parts of the gonozoid, its most prominent part being as a rule that running at the tube's dorsal side.

For some reason or other the carina is not mentioned by WATERS (l. c.) nor is it indicated in his figure (Pl. 9, fig. 1 d) representing a small and not very typical gonozoid of the present species.

The wall of the dilated portion of the gonozoid in which the embryos are lodged consists, so far as the calcareous parts merely are concerned, of a reticulated network of higher and lower ridges including depressions or pits of various dimensions (Pl. 14, fig. 4). Sometimes and, I should think, mainly in older gonozoids a network is no longer discernible but the wall of the gonozoid consists instead of a granular calcareous layer in which there are numerous rounded pits of varying size. The bottom of the pits is always formed by a thin calcareous lamina pierced by small rounded pores. As a rule there are in this species several pores in each depression.

The secondary thickening of the stems and branches in *H. antarctica* is a very characteristic process. As I have described it thoroughly before (1926 b, pp. 307 ff; Text-figs 52—54) I will only give a brief summary here of what happens.

At the top of each stem the individual cystids are easily discernible, being separated both on the frontal and the basal side by distinct furrows (cf. Pl. 14, fig. 2). Some little distance below the top, however, the calcareous layer (of the cryptocyst) which is strongly granulated here begins to alter its appearance. At the frontal side the grooves between the cystids are bridged over by short transverse ridges, including pits between them. Longitudinal ridges are formed too, which anastomose by means of transverse bars, likewise including pits between them. This whole system of bars and ridges, at the beginning quite low, becomes gradually higher and thicker, the pits consequently at the same time becoming narrower and more oval longitudinally. This is the appearance of the frontal surface of a moderately aged zoarium. Growing older the ridges merge more and more into one another, the pits being gradually smaller and the cystids becoming deeply immersed in the thick calcareous mass. Numerous longitudinal striations on the surface of the calcareous layer indicate however the location of the former main ridges, but as WATERS (l. c.) has pointed out there are never any "rhomboidal spaces" (as, for instance, in *H. frondiculata*) in which are situated the apertures of the zoids surrounded by numerous pores (cf. BUSK 1875, p. 17).

Corresponding changes occur on the basal side of the zoarium. Near the top numerous calcareous granules are discernible, arranged in several almost parallel longitudinal rows. They soon fuse into low ridges, which then grow gradually higher and broader, including narrow sulci between them. Here and there ridges may branch and join with their neighbours, or cross-bars may originate connecting the ridges, by which the sulci thus become transformed into a number of longitudinal, narrow pits. Further two or more ridges may coalesce. In old portions of the zoaria the basal surface therefore is characterized by numerous longitudinal, anastomosing ridges, constituting the outermost parts of the thick calcareous layer and separated by deep pits, the bottom of which is pierced by one or more pores.

When compared with other species of the same genus *H. antarctica* cannot be said to go through a very strong process of secondary calcification. A definite appreciation of this can be obtained by measuring the diameter of a branch near its top on one hand and that of the primary stem on the other, the difference being solely due to secretion of chalky matter from the outside (cf. Measurements, 1—3). Nevertheless the processes just described naturally cause a considerable change in the appearance of the surface of the zoarium. The boundaries between the individual cystids becoming soon wholly indiscernible contribute much to this.

The description of this species given by WATERS (l. c.) is brief and somewhat incomplete and his figures are diagrammatized to a certain extent. On account of this the correctness of the identification made here could perhaps be doubted; but as I have seen part of the material that WATERS had before him (and which is now in the Manchester Museum) this point is settled.

Miss THORNELY (1924, p. 19) gives neither a description nor any figure of the specimens she has referred to the present species, so the identification is open for criticism: LIVINGSTONE (1928, p. 78) however has confirmed it and in any case the locality (Commonwealth Bay) is within the region inhabited by the present species.

Hornera antarctica seems to be a species not uncommon in the Subantarctic region having been found at several places. I have had a large material before me consisting of some 30—40 colonies and fragments of such.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 5 (on a large *Thalamoporella*). — St. 6 — St. 60 — St. 89 — St. 94.

Distribution: Lat. 70° 23′ S, Long 82° 74′ W, 480 m; Lat. 70° 00′ S, Long 80° 48′ W ?500 m; Lat. 70° 15′ S, Long 84° 06′ W, 569 m (WATERS 1904 (Belgica); — "Near Cap Horn" (Romanche Exp., no loc. given, WATERS 1905 b). — Commonwealth Bay, Antarctica, 25 fathoms, 354 fathoms; Lat. 66° 55′ S, Long 145° 21′ E, 318 fathoms, ooze with diatoms; Lat. 66° 08′ S, Long 94° 17′ E, 120 fathoms (LIVINGSTONE 1928).

2. **Hornera americana** D'ORBIGNY 1839.

Pl. 14, figs 5—7.

Syn: *Hornera americana* D'ORBIGNY 1839, p. 22, Pl. 10, figs 7—9; 1853, p. 920; (?) JULLIEN 1888, p. 82; ?? STUDER 1889, p. 54; ?? *Hornera caespitosa* (part) BUSK 1875, pp. 17 f.; ? (part?) CALVET 1904, p. 37; ?? THORNELY 1924, p. 19; nec CALVET 1907, p. 478; nec HARMER 1915, pp. 149 f., Pl. 11, fig. 13; nec MARCUS 1922, pp. 35 f., Text-figs 21 a—c.

Zoarium erect, branching mainly in one plane, not funnel-shaped or saucer-shaped. Branches dichotomous, alternating or irregularly placed, sometimes slightly arched, always strongly calcified, in transverse section nearly circular. Apertures of autozoids arranged in quincunx or in more or less distinct transverse, not connate rows across the frontal side of the stem and branches, 5—6 abreast as a rule. In young zoaria the distal end of the zoids protrudes a short distance above the level of the surface, the lateral tubes being a little longer than the median ones but yet quite short, while in old ones they are imbedded in the common calcareous mass up to their margins. Apertures circular or slightly oval, proximal margin not excised; distal margin of lateral autozoids sometimes a little lengthened in the latero-distal direction. Gonozoids at the base of a bifurcation or between two bifurcations, irregular in shape with a rather strong carina, which is often forked, and an irregularly reticulated wall consisting of higher and lower calcareous bars including pits of various size between them. There is no tube. The aperture which is on one side has approximately the shape of a transverse oval, its lower lip being about semicircular but the upper one almost straight with a small projecting process — the end of the carina — in the middle. Secondary calcification much pronounced, through which a system of longitudinal ridges develop both on frontal and basal side. Frontal ridges strong, undulating between the apertures and inclosing them in spaces longitudinally oval in shape, with a small pit just distally of the aperture and another proximally of it; sometimes there is more than one pit. Basal ridges straight and narrow, less distinct, including between them rows of small pits.

Measurements in μ.

(1) Diameter of branch 2 mm from top 468—634, average 563.
(2) » » » at about the middle height of a well developed zoarium 1 140.
(3) » » primary stem 1 245 (one case only).
(4) » » aperture of autozoids 120 × 122.
(5) » » » » gonozoids 122—132 × 184—265.

This is a characteristic species and a very typical *Hornera*. From *H. antarctica* it is easily distinguished by the mode of branching which is quite different and by the secondary calcification being much stronger, beginning just below the top and giving rise at the frontal side to undulating ridges inclosing fusiform spaces with the apertures of the autozoids within them (Pl. 14, figs 5, 7).

The zoarium begins with a supporting disc in the centre of which the primary stem arises. In large colonies the supporting disc consists of several strata. The lowest of these is formed by small, radiating tubes, probably kenozoids, as in *H. antarctica;* but as growth proceeds new layers little by little come to cover the first one. Finally the disc becomes so thickened that it is impossible to discern the tubes or even the limits between them, merely indistinct ridges being visible on its surface, forming an irregular network in the meshes of which are numerous pits.

The cylindrical primary stem is most strongly calcified. Its length is varying for it is not splitting up after a short distance in 2—4 branches as in *H. antarctica* but usually gives off one or perhaps two branches and then continues until more branches develop. One of D'ORBIGNY's figures (cf. his Pl. 10, fig. 7), gives a rather good idea of this condition. The dichotomous mode of branching thus occurs, in the present species, mainly in the distal portions of the zoaria, while more proximally the mode of branching is as a rule alternating or irregular; but even distally it is by no means so regular as in *H. antarctica.* Small branches growing out at about right angles from the stem are rare here, though one or two may sometimes occur in a large zoarium.

On account of the strong secondary calcification the zoids protrude but very little. In moderately aged branches they are wholly immersed, only the lateral zoids protruding a little, though even this is not always the case. The apertures, being circular or nearly so, are not excised at their proximal margin. They are easily distinguished from those of the preceding species, as becomes evident when comparing the figs 2 and 5 (Pl. 14).

The gonozoids have hitherto remained undescribed. I have seen four gonozoids and as they all coincide closely with one another I think they may be considered typical. The dilated portion of one of them is seen in Pl. 14, fig. 6, which shows part of a zoarium from its basal side. Another gonozoid I have met with is similar to the one just described though it is a little shorter than this, while the third gonozoid has its dilated portion a little longer than the first one but is otherwise similar to it. The fourth one, finally, is yet a little longer, with two tolerably well developed lobes in the proximal part of the dilated portion, where the two other gonozoids are strongly dilated. The carina is perhaps a little more pronounced, too, in the fourth gonozoid, and the part of it running from the median portion to the rim of the aperture forms an obvious crest. The aperture of this gonozoid is shown in a somewhat oblique frontal view in Pl. 14, fig. 7, where the tip of the crest is visible projecting from the middle line of the aperture's upper lip (*gzap*). The shape of the aperture, as shown in Pl. 14, fig. 7, is the same in all four gonozoids.

The gonozoids are not much inflated and the transition from the basal side of the stem proper with its narrow and almost parallel ridges to the roof of the gonozoid is not very sharp, as can be seen in Pl. 14, fig. 6. The roof itself is very characteristic, for the network of ridges forms two strata as it were, a higher and a lower one, and the largest of the meshes of the network are elongated and arranged on both sides of the carina in such a way that their longitudinal axis forms an almost right angle to it (cf. Pl. 14, fig. 6). The arrangement is of course not quite regular and there are many small, rounded pits and others that are polygonal as well, but on the whole it is very characteristic.

The dusky colour of the gonozoid in Pl. 14, fig. 6, is due to the soft tissues — ectoderm, mesoderm, mesenchymatous strings and amoebocytes — that are amply present outside the calcareous layer of its cryptocyst, covering the ridges and completely filling up the pits, for the wall of the gonozoid has of course the structure described above in the survey of the group. The tissues mentioned are thus by no means characteristic of the present species only, though because of the shape and arrangement of the pits and ridges they are unusually distinct here. I suppose one of the first steps of early authors treating a gonozoid of this kind would have been to remove this awkward tissues so the specimens "can be directly compared with fossils" (WATERS 1889 a, p. 277). Unfortunately there are authors using this method even nowadays.

The gonozoid referred to above as the fourth one has lost part of its roof and some embryos can be seen, embedded in a thick mass of nutritive tissue, in the interior of the gonozoid. They are but few, however, so it looks as if most of the larvae had left their shelter, the gonozoid being probably near the end of its reproductive period. It is possible, therefore, that the loss of part of the roof was not caused by an accident after the zoarium had been dredged, but that it represents an initial stage in the degeneration of the gonozoid. Another fact possibly indicating the same line is that the soft tissues otherwise coating the calcareous wall of the gonozoid are much more sparse here. That the gonozoids actually degenerate after having fulfilled their purpose I think may be taken as an established fact since I have found in another zoarium of the present species the remnants of a gonozoid, merely parts of the foundation walls, if I may say so, of the dilated part being left; but exactly where it should have been expected (cf. BORG 1926 b, pp. 392 f.) the proximal tubular portion was seen, its end protruding a little beyond the level of the stem and closed by means of a calcareous diaphragm. The observation mentioned may be taken as indicating that degeneration is a regular process in the life-cycle of a gonozoid. In all probability this is true not only of the species in question but of the whole family and, perhaps, of the whole group. Though I have but few observations of regenerative processes in this and other species of *Hornera* I venture to suggest that such processes occur alternating with degenerative ones during the life of both the autozoids and the gonozoids.

The processes of secondary calcification begin just below the top of the branches (cf. Pl. 14, fig. 5). At the frontal side of each branch there swiftly develop a number of ridges running longitudinally. These are further strengthened by cross-bars. In the meshwork of ridges and bars thus coming into existence elongated pits are enclosed. A little more proximally the ridges have become much stronger and many of them have coalesced forming the prominent undulating ridges mentioned above. The pits on the other hand are much smaller now and not a few of them have disappeared. In old portions of the zoaria the pits persist as a rule only just proximally and distally of the apertures where one or two of them are found (Pl. 14, figs 5, 7). Functionally they are to be considered as lengthened pore-ducts.

The basal surface of the zoarium becomes thickened by the formation, just below the basal edge of the tops of a similar system of ridges and of cross-bars uniting them. Here the ridges are quite thin, running in a number of 3—5 parallel on the back of each cystid. At this stage the cystids and incipient cystids, 5—7 abreast, are easily distinguishable from one another. But this condition very soon becomes altered just as on the frontal side, for the ridges almost at once become much broader and higher, neighbouring ridges often fusing and the furrows separating them being bridged over by cross-bars (cf. Pl. 14, fig. 6). Already a few millimetres below the top a thick secondary calcareous layer is formed, covering the one originally existing. As the zoarium grows older this secondary calcareous layer gradually augments in thickness, the ridges becoming at last indistinct by partly coalescing, and the pits between them becoming quite small and few in number, until finally in old stems most of them have disappeared (cf. Pl. 14, fig. 6). It may be assumed that in stems having reached this stage the zoids are no longer functional.

Both on the frontal and basal side the surface of the calcareous cryptocyst is strongly granular, a large number of small conical chalk granules protruding from it. This is true of the wall of the gonozoids too, both of the meshwork of ridges and of the walls of the pits. The existence of these granules — which, moreover, are seen in other species within this group as well, though they are uncommonly distinct in *H. americana* — is of course easily explained by the secretion of chalk outside the calcareous cryptocyst through the ectoderm covering it. The granules are nothing else than the tops of the chalky layer so to say and thus simply demonstrate the continuation of the secretion of chalk. In Stenolaemata where no living tissues exist outside the calcareous layer (Acamptostega

Camptostega) of course nothing of this kind ever occurs. The granules mentioned have by earlier authors often been mistaken for pores (cf., for instance, D'ORBIGNY 1839, Pl. 10, figs 8, 9; MARCUS 1922, Text-fig. 21 c[1]), which may be explainable on account of their special distinctness in calcined specimens.

The material before me, about a dozen larger and smaller fragments belonging to perhaps half a dozen zoaria, corresponds closely to the description and figures given by D'ORBIGNY (op. cit.) so I think there cannot be much doubt of the identification. The figs 7, 8 and 9 of the Plate 10 in D'ORBIGNY's work I feel sure are of this species and this may be the case with the figs 10—12 too, of the same Plate; though it is possible that these latter figures are taken from another species. In the text only the figs 7—9 are referred to. Moreover, I have examined zoaria of *H. americana*, probably determined by D'ORBIGNY, in the Coll. Michelin, Lab. Malacologique, Paris.

When creating his *Hornera caespitosa*, BUSK (1875, p. 17) referred to it (i) a form dredged at Lat. 53° S, near Tierra del Fuego, by CH. DARWIN, and (ii) some material from Cape Capricorn (Queensland, Australia), brought home by the "Rattlesnake". BUSK says, however, that "the Australian form is rather more robust than the Fuegian", so one is inclined to think that probably two species are included in his *H. caespitosa*. This view I think is further strengthened by looking at the figures in BUSK's work (op. cit., Pl. XV) which so far as I can judge do not give any illustrations (or bad ones!) of the true *H. americana*.

When MARCUS (1922, p. 35) thinks that *H. caespitosa* is identical with *H. americana*, this may possibly be true for the colonies from Tierra del Fuego, therefore, but probably not for the Australian ones.

It follows that BUSK's name should stand for the "Rattlesnake" material, but not for the Fuegian one.

The zoarium referred by HARMER (1915, p. 149) to *H. caespitosa* may belong to this species (though I do not think it very probable); but to judge both from the description and the figure it is certainly not identical with *H. americana*.

JULLIEN (1888, p. 82) has referred a fragment of a *Hornera* to *H. americana*, but as there is no description and no figure it is quite impossible to say whether the identification is correct or not. The specimen was dredged between the Falkland Islands and the Strait of Magellan.

There is the same uncertainty regarding the material brought home by the "Gazelle" Expedition from near Cape Town (Lat. 33° 59′ S, Long. 17° 52′ O) and determined by STUDER as belonging to *H. americana*. There is no description and no figures. When dredged the colonies were alive; and STUDER says their colour was pale rose. MARCUS (1922, p. 35) has studied the Gazelle material and states that it is identical ("durchaus übereinstimmend") with the colonies from St. Sebastian (E. of Cape Agulhas, S. Africa) described by him in the paper quoted; but he states at the same time that it agrees completely with D'ORBIGNY's material, which seems a little odd as he says (p. 36) that in the colonies before him the apertures are bifid ("zweispaltig"), while D'ORBIGNY mentioned that the zoaria described by him had "cellulis rotundatis"; and this is true for the colonies of *H. americana* investigated by me as well.

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[1] In *H.* »*caespitosa*»; cf. below.

I have therefore re-examined the material described by MARCUS (l. c.) and now preserved in the Gothenburg Museum (two fragments, one the proximal portion of a stem, the other a larger portion of the distal half of a zoarium) and I have come to the conclusion that it certainly does not belong to *H. americana*. There are several differences; the most pregnant one I think is that the distal ends of the cystids project a longer distance above the surface of the zoarium and that the apertures, when uninjured, are very distinctly bilabiate, as mentioned by MARCUS (l. c.). The process of secondary calcification is different too. The consequence thus would be that the "Gazelle" material in all probability does not belong to *H. americana* either.

CALVET (1904, p. 37), determining the material collected by the Hamburger Magalhaensische Sammelreise, states the occurrence of *H. caespitosa* in Smyth Channel and in the South Atlantic off East Patagonia. There is no description and no figures. On account of the localities given, *i. a.*, I do not think this is *H. caespitosa*, and it is very dubious whether it is *H. americana* either. As CALVET says that he places all the specimens in one and the same species, "obgleich diejenigen von Ost-Patagonien tatsächlich etwas von denen aus Smyth Channel abweichen", it may be suggested that he had in reality two species before him; but whether one of them was *H. americana* it is impossible to say for certain.

The *H. caespitosa* of Miss THORNELY (1924, p. 19) is likewise doubtful, being neither described nor figured. The specimens are from Commonwealth Bay, Antarctica, so I do not think they belong to *H. caespitosa* but probably to *H. americana* or to some species related to it. The material having since then been lost (cf. LIVINGSTONE 1928, p. 7), it must remain *incertae sedis*.

Occurrence: Swedish Antarctic Expedition 1901—03, St. 60. On an encrusting Chilostome.

Distribution: "dans le sable de fond des îles Malouines" (D'ORBIGNY, l. c.); — ? Between the Falkland Islands and the Strait of Magellan JULLIEN, l. c.).

Other localities mentioned in the literature are either highly uncertain or probably referable to other species of *Hornera*.

3. **Hornera falklandica** n. sp.

Pl. 14, figs 8—9; Pl. 15, fig. 1; Text-fig. 24.

Zoarium stout, richly and densely branched; branching mainly in one plane. Primary stem very strong, not divided simultaneously in several branches but discernible rather high up in the zoarium until gradually split up into branches. Branching irregular, alternating, or dichotomous; small, stunted branches proceeding at about right angles from the normal ones not uncommon. Some of the branches gradually narrowing in a characteristic way towards their end, others broad and flattened distally, dividing dichotomously near their distal end. Frontal side of stem and branches flattened and rather strongly so; dorsal side arched; transverse section decidedly oval. Zoids 4—8, mostly 5—7 abreast, their apertures arranged in transverse or obliquely transverse, non-connate series but often giving the impression of being scattered irregularly. Cystids deeply immersed, only in young, distal portions of zoaria protruding a little over the surface of the branches, but in moderately old and old portions embedded in the common calcareous mass nearly up to the rim of their aperture. Lateral cystids as usual forming an exception to this rule, protruding in a fronto-lateral direction at both sides of the branches even in old portions of the zoaria. Apertures of medially placed autozoids rounded or slightly oval, proximal lip sometimes with a slight excision; apertures of lateral autozoids often with this excision more strongly marked and regularly with the latero-distal edge exserted into a prolongation of varying length. Gonozoids typical with the middle portion very much dilated, extending into two or more long lobes on the basal side of the zoarium; young ones smaller with oval dilated portion. Wall of gonozoids reticulated with rounded pits enclosed by calcareous bars; in old gonozoids pits much smaller and surface therefore of a smoother appearance than in young ones. Carina sometimes well pronounced, sometimes lacking. Tube extremely short, lateral or sometimes terminal, its aperture large, regularly oval. Secondary calcification strong both on frontal and basal side. In moderately old portions of zoaria frontal ridges usually rather distinct, undulating, enclosing between them fusiform depressions, each with the aperture of an autozoid and, distally and proximally of this, one or more pits. In older portions most ridges have coalesced and the depressions have disappeared, an even or nearly even surface thus having been formed. Basal ridges straight, rather close together, with numerous small, elongated pits between them. The ridges soon coalescing and the pits gradually disappearing, the basal surface likewise becomes fairly even.

Measurements in μ.

(1 a) Diameter of branch 1 mm from top (narrow branch) 600.
(1 b) » » » » » » » broad, flattened branch 800.
(2) » » » at about middle height of well developed zoarium 1 150—1 500.
(3) » » primary stem 2 200.
(4) » » apertures of autozoids 100 × 110—120.
(5) » » » » gonozoid 180—160 × 260—240.

My material has been rather poor, consisting only of two zoaria, both incomplete, and of some small fragments.

The species comes rather near to the one next preceding, though it is more robust. This is especially true of the primary stem (cf. Measurements, 3), which, in contrast to that of *H. antarctica*, is not short, splitting up simultaneously in several stout branches in different directions, but continues rather high up in the zoarium until it gradually disappears after having formed one branch after the other alternately to the right and to the left, as may be observed in Pl. 14, fig. 8.

I have seen but one supporting disc, viz. the one visible in the figure just mentioned, and though this is somewhat damaged it is easy to ascertain that it consists of several layers.

The branches are much more densely placed than in *H. americana*. Their arrangement can be studied in Pl. 14, figs 8 and 9, the former being a frontal view and the latter a basal one. We may observe here that while in the proximal portion of the zoarium the branches seem to originate rather irregularly, the top branches are commonly formed through a dichotomous division of their mother-branches. This rule is not without exceptions, however, for we find, even distally, other branches proceeding alternately to the right and to the left from the stem giving rise to them.

In several places, in the figures just referred to, we may observe branches that are narrow and acuminate at the top (cf., also, Pl. 15, fig. 1), while the other, "normal" ones are broader, with blunt ends. The acuminate branches, which are always undivided, are obviously about to finish their growth and may therefore be considered as more or less stunted; they are formed, obviously, where sufficient space is not left for the other kind of branches (cf. Pl. 14, fig. 9). The broader branches often subdivided. In the fig. just quoted some striking examples of this are also seen.

Text-fig. 24. *Hornera falklandica.* Part of zoarium from basal side to show shape of dilated portion of a gonozoid. × 26.

Another difference from the preceding species is that the frontal side of the branches is decidedly flattened and the transverse section of a branch is therefore not circular but oval. A comparison between Pl. 14, fig. 5 (*Hornera americana*), and Pl. 15, fig. 1 (*H. falklandica*) will further elucidate this point.

The frequently repeated branching and the flattened frontal surface of most branches both contribute, in the present species, to the impression that the stem is relatively broad, the acuminate branches of course forming an exception to this. As a matter of fact, in normal branches the zoids are a little more numerous than in the preceding species, being as a rule 5—7 but sometimes 8 abreast. Where a branch divides, the number of zoids abreast is naturally augmented. The top of a (normal) branch, on the other hand, has as a rule only 4—5 zoids abreast as in most other species of *Hornera.*

The arrangement of the autozoids is much the same as in *H. americana*, though the apertures are more densely placed. The transverse rows formed by the apertures may sometimes be seen rather distinctly, as in Pl. 15, fig. 1 (just below the centre of the figure) but in most cases they cannot be discerned without some difficulty, the apertures usually having the appearance of being arranged quincunxially or even irregularly. The lateral cystids protrude as we see (Pl. 15, fig. 1) in a rather characteristic way while the protruding portions of the others are quite short and with the increasing secondary calcification become gradually wholly immersed which is never the case with those of the lateral cystids until in the oldest portions of the zoarium (cf. Pl. 15, fig. 1). In these portions the apertures of the more centrally placed cystids are often closed by a calcareous diaphragm.

In shape the medial apertures correspond closely to those of the preceding species.

As for the lateral apertures, most of them are well exserted latero-distally (cf. Pl. 15, fig. 1). This is not the case in the species next preceding (cf. Pl. 14, fig. 5, and Pl. 15, fig. 1).

The gonozoids are rather interesting. I have seen four of them and the remnants of three more, all of them in one and the same portion of a colony, viz. the one reproduced in Pl. 14, fig. 9. In this fig., which represents a basal view of the zoarium in question, all the gonozoids mentioned are seen. Their structure is essentially the same as in other species of *Hornera.*

The smallest of the gonozoids which is marked "gz_1" is in my opinion the youngest one. It is situated near the top of its branch. The shape of its middle portion, which has been but moderately dilated, is simply oval. Its wall consists of an irregular network of calcareous bars, which have developed upon a calcareous lamina (= the original calcareous cryptocyst) and which enclose between them spaces or pits of varying size. A carina is present only in the part most distant from the top but cannot be distinguished in the rest of the gonozoid. The aperture, borne by an extremely short tube, is lateral but is placed near the extreme end of the dilated portion. In shape it is nearly circular, and there is no carina, not even a trace of one, running along the tube .

Two of the three gonozoids of which the remnants only are present have had almost the same shape as the one just described, and the apertures were lateral too. What remains of these gonozoids are the foundations of their middle, dilated portions and, in one of them, the lower portion of the tube and aperture, the whole "roof" of the gonozoid having disappeared.

The gonozoid marked "gz_2" is reproduced at a higher scale of magnification in Text-fig. 24. It is very different in shape from those just mentioned, its middle portion being very strongly dilated and drawn out into no less than four lobes. There are indications that this gonozoid has regenerated and, especially, that the extreme half of its left distal lobe as well as the left proximal lobe (cf. Text-fig. 24) have been formed at a later occasion than the rest of the inflated portion of the gonozoid. At an earlier stage this would thus have had three lobes, one proximal and two distal, which may be accounted for by its being situated at a bifurcation of the branch to which it belongs. The wall of this gonozoid is of the same structure as in that described above; this is especially true of the two lobes just discussed, while in the rest of the inflated portion the calcareous bars are considerably thicker and, therefore, the pits smaller and more rounded, which gives a smoother appearance to its surface. Carinae are running along the middle line of parts of the lobes, as seen in Text-fig. 24, which is a diagram of the gonozoid "gz_2" reproduced in Pl. 14, fig. 9; but they are not prominent, and no carina exists on top of the tube which is very short. The aperture opens on the right side of the right distal lobe. It is of the same shape as in the gonozoid described above, though it is perhaps a little more oval.

One of the two gonozoids remaining (gz_3) is rather similar to the one just described though the lobes are but slightly developed. The appearance of the wall is much the same and the aperture is lateral and oval in shape. On the other hand there is a distinct carina running along the inflated portion, at about its middle line, and another only just indicated meets the former one at a right angle and passes on to the rim of the aperture.

The fourth gonozoid (gz_4) is remarkable because of the extraordinary length of its inflated portion. This is narrow and has but one quite small lobe (the two main lobes, one distal and the other proximal, uncounted), but it measures not less than 7.8 mm in length. Proximally it is well set apart from the basal wall of the branch to which it belongs, but distally the transition is more gradual, the gonozoid being much depressed here. In this part of the gonozoid degenerative and regenerative processes have no doubt taken place. The position of the gonozoid suggests that it is an old one, and evidence for this is further given by the structure of its wall. The calcareous bars are no longer distinguishable, having completely coalesced, and the pits have disappeared to a large extent, the remaining ones being quite small, with minute, circular entrances. Thus the surface of the inflated portion has changed its appearance considerably, being no longer reticulated but for the most part smooth and even, thus similar to the rest of the basal side of the stem. There are several separate carinae, running on different portions of the long inflation; but they are not much pronounced and there is no indication of a carina on top of the tube and aperture which as usual is placed laterally and is oval in shape.

The process of secondary calcification takes its origin, in the present species, already at the top of the branches. At the frontal side ridges are formed on both sides of each aperture, thus covering the interzoidal walls between them. Proximally these ridges become gradually thicker, filling up the space between the apertures more and more completely. On account of the arrangement of the apertures now a ridge may branch, now two ridges coalesce, by which the ridges acquire a more or less undulating course; further, cross-bars arise here and there between the ridges (cf. Pl. 15, fig. 1). As a result of these processes the apertures of the autozoids become enclosed in fusiform depressions, limited by strong, calcareous ridges; distally as well as proximally of each aperture there are two or more crossbars separated by pits. The summit of the ridges is often more or less glossy, which depends simply upon the fact that the cuticle of the gymnocyst is arched over them. As the zoarium grows older, the depressions become gradually filled up by the crossbars growing stronger and most of the pits vanishing; at the same time the ridges become gradually higher and broader, until they all have colaesced and thus a monotonous thick (secondary) calcareous layer has been formed, pierced here and there near the apertures by single, quite small, circular pits (Pl. 15, fig. 1); at this stage the glossy texture of the ridges of course has disappeared.

On the basal side the secondary calcification likewise begins at the very top of the branches. On the back of each of the centrally placed cystids 1—3 longitudinal, almost parallel ridges are formed, each crowned by a row of conspicuous calcareous granules. The protruding portions of the lateral cystids, on the other hand, are provided with only one ridge each, running along its middle line up to the edge of the exserted portion of the aperture, which is thus strengthened. The ridges are separated by furrows which are soon bridged over by crossbars and thus transformed into series of oblong pits. The crossbars becoming gradually broader and at the same time more numerous, the pits are reduced to a corresponding degree. What follows has already been described in the preceding species: the ridges, growing broader and broader, coalesce, the pits disappear or become reduced, minute perforations of the thick secondary calcareous layer thus remaining.

Both on the frontal and basal side the surface of the calcareous layer is thickly granulated. This granulation does not exist from the beginning but comes into existence gradually as the process of secondary calcification goes on. It persists even in the oldest portions of the zoarium.

From the description given it is evident I think that the present species is very well separated from *Hornera antarctica* but comes rather near to *H. americana*. The differences, however, are not few and, in my opinion, unmistakable (cf. Pl. 15, fig. 1, and Pl. 14, fig. 5). The branches are much more numerous and closer to one another; they are broader on the whole and their frontal surface is flattened; the lateral zoids that are more strongly protruding form an acute angle to the stem, and the latero-distal edge of the apertures is much more exserted; the gonozoid is different and its aperture though reminding of that of *H. americana* is not similar to it; and the secondary calcification, finally, does not develop along the same lines altogether. This I think is sufficient to justify the formation of two different species here.

Occurrence: Swedish Antarctic Expedition 1901—03, St. 59. — Tube without a label (locality unknown).

4. **Hornera smitti** n. sp.

Pl. 15, figs 2—8.

Zoarium erect, stout and strong, branching mainly in one plane, branches numerous and often curved in different directions. Primary stem not dividing simultaneously in several branches but continuing and gradually being consumed in the formation of branches. Branching in proximal portion of well-developed zoaria alternating but rather irregular, distally often dichotomous. Both frontal and basal side of zoarium well arched; transverse section of branches about circular. Zoids 4—6 abreast, their apertures scattered or arranged, though indistinctly, in oblique or transverse non-connate series, deeply immersed, except in quite young branches; even the lateral cystids but very slightly projecting. Apertures of medially placed autozoids almost perfectly circular, lateral margin of lateral ones sometimes, though not always, a little exserted; median margin mostly even though sometimes exserted, whereby the aperture becomes bifid. Middle dilated portion of the gonozoids oblong or very slightly lobed, their wall irregularly pitted and reticulated. Carina indistinct or lacking. Tube lateral, usually well developed, curved so that the aperture, which is oval, faces frontally and at the same time towards the lateral wall round which the tube is bent. Secondary calcification strong and characteristic, ridges very distinct both on frontal and basal side, with rows of pits separating them. Frontal ridges unusually straight, often cut off by intercalation of the autozoids' apertures; these therefore not situated in depressions between ridges. Even in old portions of zoaria ridges often distinct.

Measurements in μ.

(1) Diameter of branch, 1 mm from top 600—800, average 690—700.
(2) » » branch at about middle height of zoarium 1 230—1 800, average 1 600.
(3 a) » » primary stem of small zoarium 1 467.
(3 b) » » » » » large zoarium 2 767.
(4) » » aperture of medial autozoids 112—132, average 122.
(5) » » » » gonozoid 164 × 200—267.

The material before me consists of three complete zoaria and of a large number of fragments of others. One of the zoaria is young, measuring only 13 mm in height, while another that reaches the height of 44 mm is obviously old; the third one, measuring 26 mm, holds the middle between these two.

The supporting disc of the large zoarium (Pl. 15, fig. 2) is completely overgrown by ridges and furrows formed during the processes of secondary calcification occurring in that zoarium. The vigourous primary stem gives off a number of stout branches — seven in all — projecting alternately and rather irregularly to the right and to the left, until at a height of 15.2 mm from the substratum it divides into two branches of about equal strength which then continue branching alternately and irregularly until they both bifurcate, whereafter the alternate branching again continues. The right one of the two main branches when bifurcating gives rise on the right hand to a branch which is soon strongly curved inwards over the rest of the zoarium (Pl. 15, fig. 2). This is not an isolated instance. It is rather common, instead, that branches are curved in different directions in this or in a similar way. Furthermore it is common in this species that some of the branches have undergone a torsion, amounting to 90° or even more, around their own axis. I have never seen anything like that in any other species of *Hornera*. Near the top of the large zoarium there are several instances of dichotomous branching (Pl. 15, figs 2—4), which is thus commonly occurring in the topmost portion of the present species just as in the one next preceding.

The third zoarium, which is seen in Pl. 15, fig. 4, shows a mode of branching similar to that just described. The bifurcations are repeatedly interrupted as we see by cases of alternative and irregular branching but at the top the dichotomous mode of branching is frequent.

The rest of the material shows the same mode of branching. The fragment reproduced in Pl. 15, fig. 3, thus represents a typical case: a fragment from the distal portion of a large zoarium frequently branching now dichotomously now alternately.

Stunted branches are frequent (cf., for instance, Pl. 15, fig. 4); they are quite short, stout and rounded at the top. Small branches deviating at right angles from their mother-branch, so frequent in some species of *Hornera* (as, for instance, in *H. antarctica*), seem to be very rare here. I have observed but one single case of it. The narrow, acuminate branches characteristic of the *H. falklandica* are so far as I have found totally lacking in the present species.

The stems and branches have the appearance of being round in cross-section, partly because both the frontal and basal sides are well arched and partly because the lateral zoids are not much projecting (cf. Pl. 15, figs 5, 6). To this impression may contribute the fact that the number of zoids abreast is low (Pl. 15, fig. 5). Further the stem does not bifurcate so frequently, in the distal parts of the zoaria, that it becomes flattened by that cause (as in the two species next preceding).

The apertures of the autozoids are not so densely placed by far as in *H. falklandica* (cf. the figs 1 and 5, of Pl. 15). Usually they give the impression of being scattered and it is rather seldom that one is able to ascertain their arrangement in oblique or transverse non-connate series. The number of zoids abreast, usually 4 or 5, is less than in the preceding species.

In quite young zoaria the distal portions of the cystids may protrude above the surface of the zoarium, especially near the ends of the branches, but in other zoaria this is hardly the case or only the lateral cystids protrude and even those quite inconsiderably (Pl. 15, figs 5 and 6).

The apertures both of the median and lateral zoids are circular as a rule, though the lateral ones in young branches may have their margin a little exserted. In these cases it is not the distal or latero-distal margin but as a rule the lateral one that is a little exserted. In one or two cases I have observed that the rim of the aperture though undamaged was slightly bifid, the margin facing medially being slightly exserted too; but this is far from common.

In the proximal portion of large zoaria the apertures of most if not all zoids are closed by calcareous diaphragms (cf. Pl. 15, figs 2, 4).

I have seen half a dozen gonozoids and the remnants of one or two. They all have a characteristic appearance, being very well distinguished from those in the species described above. Their position is significant, because they seem always to be situated just proximally of a bifurcation; nevertheless the tube with the aperture in all cases I have seen is lateral. Further is the middle, dilated portion unusually simple in shape, both young gonozoids and older ones being but very slightly lobed. The gonozoid shown in Pl. 15, fig. 7, is a moderately old one and quite typical. Young gonozoids are a little smaller and the shape of the dilated portion is more oblong without even the indication of any lobes. It is further characteristic of the gonozoid of *H. smitti* that the inflated portion is not very sharply set apart from the basal surface of the branch upon which it rests but that the transition is performed gradually; owing to the progress of the secondary calcification it may be impossible, therefore, to say exactly where the inflation begins (cf. Pl. 15, fig. 7). It follows that the gonozoid is not so strongly inflated in its peripheral portions than is the rule otherwise.

The wall of young gonozoids is strongly and irregularly reticulated. In older ones the surface has become smoothened because of a calcareous lamina having developed between the ridges, bridging over the spaces occupied by the pits and reducing them to small, circular or oval openings. In old gonozoids the few remaining pits are quite small and circular, the ridges are only just indicated and the whole surface of the inflation is therefore unusually smooth.

In young gonozoids a carina, running along their middle line, is well distinguishable, as a rule, though it is in no way prominent and does not run along the tube to the rim of the aperture. But gradually as the lamina just described is formed the carina just as most of the other ridges becomes invisible. Thus in the gonozoid reproduced in Pl. 15, fig. 7, a carina is seen only indistinctly while in older gonozoids it has disappeared completely. Thus the wall of the gonozoid in *H. smitti* goes through a series of changes that lead to the same result — the smoothening of the wall of the inflated portion — as in other species, but that is brought about in another way than in these.

Another characteristic of the present species is the occurrence in the gonozoid of a well-developed tube. This is shown in Pl. 15, fig. 8. It is the tube of the gonozoid visible from the basal side in fig. 7, of the same Plate. The curving of the tube around the side of the branch to which the gonozoid belongs seems to be very characteristic. The remnants of another (young) gonozoid show a tube that is short but very distinct and is not so strongly curved as that seen in fig. 8 (Pl. 15), facing laterally and proximally. It may be possible, therefore, that the tube has this shape in young gonozoids but that after degeneration and regeneration it becomes longer and assumes a stronger curvature. The tube of an old gonozoid that I have seen has been imbedded, through the secondary calcification, in a calcareous mass up to its rim, but it faces in the same direction as the young one just described. There is never any carina nor any trace of one running along the tube to the rim of the aperture.

The process of secondary calcification is characteristic (cf. Pl. 15, figs 5—6). On the frontal side, the system of ridges begins even in young zoaria quite near the top, where the depressions separating the protruding distal ends of the cystids become divided into smaller spaces through longitudinal ridges. These often run along the frontal side of a cystid to the distal border of another more proximally placed. The ridges very swiftly grow thicker, and the depressions separating them are bridged over by short transverse ridges, thus being transformed into a series of pits. These later on become covered by a thin calcareous lamina extending from the ridges over the pits which, similar to what takes place in the wall of the gonozoids, are thereby reduced to small, narrow, elongated openings. The ridges become soon very strongly marked (Pl. 15, fig. 5) but on account of their mode of formation they have not the undulating course as in *H. americana* and *falklandica*, for instance, but are much straighter. Of course it may happen that a ridge curves around the aperture of an autozoid but much more commonly the ridge is interrupted where an aperture occurs. Therefore the apertures are not located in fusiform depressions, with one or more pits distally as well as proximally of each aperture; no such depressions exist here. On account of these facts the appearance of the frontal surface is another here than in the species just mentioned. Further the ridges as a rule do not coalesce but remain distinct even in old portions of large zoaria, though they are broad here, their summit having been flattened out. It ought to be noticed that the pits are never completely closed — most of them are not, anyhow — but persist as series of perforations of the thick calcareous layer, separating the ridges and rendering them distinct even in old portions of large zoaria.

On the basal side of a zoarium (Pl. 15, fig. 6) the ridges do not begin, as in the preceding species, in rows of granules running on the back sides of the median cystids, and there are never any ridges running up the back sides of the lateral cystids as in *H. falklandica*. Instead they begin as consistent ridges partly on the back of the cystids but especially between the cystids, in the depressions separating them. These ridges are from the very beginning broader and more vigorous than in the former species. Very swiftly they become strong and prominent (cf. Pl. 15, fig. 6) running almost parallel in the proximal direction. The largest ridges are in the axils. The ridges in this species do not often coalesce though this occurs here and there. The depressions between the ridges are transformed, through the same processes as those just described for the frontal side, into a series of pits, gradually diminishing in width but persisting as quite narrow, oblong cavities even in the basal portions of large zoaria. These cavities are more frequently occurring and much longer here than on the frontal side, by which the ridges remain very well separated (cf. Pl. 15, fig. 6).

It is worth mentioning, finally, that the surface of the zoaria either is not granulated at all or that the granules are but feebly developed. This is a marked contrast to what is found in most species of *Hornera*.

I think the species here described must be considered well separated from the preceding ones as well as from all other species of *Hornera*. The mode of branching, the arrangement and appearance of the autozoids, the position and shape of the gonozoid and of its tube and, finally, the mode through which the secondary calcification starts and proceeds are all distinctive. I have named it in honour of the celebrated Swedish Bryozoologist F. A. SMITT, who created the family Horneridae.

On the other hand the mode of branching of the (primary) stem and many other characteristics place *H. smitti* side by side with *H. americana* and *H. falklandica.* These three species — and some others, not represented in the collections dealt with here — seem to form a natural group of species nearly related to each other, while *H. antarctica* is representative for another group.

Occurrence: Swedish Antarctic Expedition 1901—13. St. 6. — St. 7. — St. 88.

Fam. **Calvetiidae** n. fam.

Zoarium erect, sparsely branched dichotomously; zoids with their apertures opening all around surface of zoarium. Gonozoids situated in axils between the two branches of a bifurcation, visible from both sides. Calcareous ridges, separated by rows of pits, undulating between apertures of autozoids and forming surface of the zoarium.

In the Stegohorneridae and the Horneridae the zoids always take their origin at the basal side of the zoarium, as we know, curving gradually until they reach the frontal surface, where the apertures are found. Principally the same arrangement is found in the Pseudidmoneidae and the Crisinidae, though most or all of the zoids are connate here, forming transverse series.

In the Calvetiidae, on the other hand, the arrangement is quite different, the apertures of the zoids being scattered in groups on all sides of the stem and branches. Between the groups there are areas where no apertures occur. Thus it is impossible to speak of a frontal or basal side of the branches as no such difference exists here. This remarkable fact, to which may be added the shape and position of the gonozoid, makes inevitable I think the creation of a separate family for the species in question. In the axial position of its gonozoid it coincides with the Stegohorneridae but otherwise it seems to be very well separated from the rest of the families within the Pachystega.

CALVET thought on two occasions (1903, pp. 161 and 162; 1911, p. 7) that he had found *Hornerae* whose zoids all opened around the stem. He referred them to 3 species (*Hornera verrucosa*, *eburnea*, and *gravieri*) which he described as new. Later on he came to the conclusion that he had made a mistake and that the specimens in question were not Bryozoa but Hydrocorallinae, belonging to the fam. Stylasteridae. He was himself the first to correct the statements erroneously made (1931, pp. 45 f.), though he died, unfortunately, before that memoir was published. It is only proper, therefore, that when a form is now described with much the same characteristics as those attributed to the species mentioned, but which is really a Bryozoan of Horneridan relationships, the family (and genus) created for it should be named after the late Professor L. CALVET in memory of his important contributions in the field of Bryozoology.

It may be mentioned here in passing that CALVET was not the only author to misunderstand a Hydrocoralline for a Bryozoan, viz. for a *"Hornera"*. The same happened to SMITT when describing the Pourtalès' Collection of Floridan Bryozoa, for his *Hornera* *galeata* (1872, p. 10; Pl. IV, figs. 23—25) is no *Hornera* at all but a Stylasterid, as became clear from an inspection I made of the type specimens preserved in the Swedish State Museum, Stockholm; moreover, it is rather well seen from the figures given by SMITT himself.

Genus **Calvetia**[1] n. gen.

Zoarium erect, stout, strongly calcified, branching sparse and dichotomously, branches often directed at about right angles as compared with the stem giving rise to them; both stem and branches circular in transverse section. Apertures of autocystids scattered within certain areas of the surface of the zoarium on all sides of the cylindrical stems and branches while other areas are free from apertures. Gonozoids in bifurcations, not much inflated, visible from both sides, their wall reticulated. Secondary calcification strong, well marked ridges, separated by rows of pits, covering the whole surface of the zoarium, the space between the apertures inclusive.

This genus seems to be quite isolated among the recent Pachystega. Its mode of branching reminds of that in certain species of *Heteropora* (cf. BORG 1933 b, pp. 283 ff.) and in fossil Bryozoa such as, for instance, the Trepostomatous family Halloporidae.

Calvetia dissimilis n. sp.

Pl. 13, figs 5—8.

Zoarium erect, stout, strongly calcified, consisting of a short, central stem with sparse branches occurring dichotomously, branches proceeding either in the same plane as that of other branches or in a plane at about right angles to that. Stem and branches about cylindrical, tapering slightly towards the top, which is occupied by a budding region. Autocystids wholly immersed, with circular apertures, scattered in areas and opening on all sides of stem and branches, while other areas have no apertures; these latter areas occur especially at bifurcations. Distal ends of cystids not protruding or but very slightly so, rim of apertures being, in most cases, level with surface of zoarium or very nearly so; apertures circular. Gonozoids situated here and there in axils, middle portion dilated, occupying an area without apertures but surrounded by areas with apertures, extending at both sides of bifurcation proper, very little inflated and, therefore, not extending much above level of surface of stem; wall of dilated portion irregularly reticulated and pitted; carinae present on parts of it. Tube extremely short, representing as it were merely an outgrowth of roof of gonozoid concealing partly the aperture proper which faces at right angle to longitudinal axis of middle, dilated portion of gonozoid. Shape of aperture of gonozoid oval. Secondary calcification strongly developed, discernible even at top of branches up to edge of budding region, giving rise to numerous ridges situated close to one another and separated by rows of small pits. Ridges winding between apertures, on areas occupied by them, but on areas deprived of apertures running almost parallel.

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[1] Not to be confounded with *Calvertia* BOURGUIGNAT 1880, Étude Foss. Tert. Quat. Vallée Cettina, 44, nor with *Calveria* CARPENTER, JEFFREYS & THOMSON 1870, Proc. Roy. Soc. 18, 154.

Measurements in μ.

(1) Diameter of branch 1 mm from top 800—900.
(2) » » moderately old branch 930—1 130.
(2 a) » » another branch 1 530.
(3) » » primary stem 1 200.
(3 a) » » another primary stem 1 940.
(4) » » aperture of autozoid 100.
(5) » » » » gonozoid 145 × 112.

The material before me consists of two complete zoaria and of a small fragment of a third zoarium. One of the complete zoaria is smaller than the other. It is fixed on a stone and seems to have not been fertile; its height is about 4 mm. This zoarium is reproduced in Pl. 13, fig. 5. The other zoarium, which is seen in fig. 6, of the same Plate, has become detached from its substratum, but the supporting disc still exists. This zoarium is larger, measuring about 7.0 mm in height, and is fertile, being provided with two gonozoids. These are seen, at a somewhat higher magnification, in Pl. 13, figs 7 and 8.

The primary stem arises in the centre of a circular supporting disc composed originally of one stratum of small, radiating tubes or kenozoids. New kenozoids arise between the old ones through fission of the septa at the actual edge of the disc. In the smaller one of my colonies the disc is overgrown by a system of radiating ridges formed by the process of secondary thickening and forming a single layer (cf. Pl. 13, fig. 5), while in the larger one the disc has been covered by several superimposed strata (cf. Pl. 13, fig. 6), the formation of which may be due not only to a continuation of the process of secondary calcification, but obviously to degeneration and regeneration of the zoarium taking place periodically.

The primary stem is quite short, reaching hardly one mm or even less in height (cf. Pl. 13, fig. 5). It divides into two branches or secondary stems of about equal strength. As this is the case in both of the zoaria I have examined (Pl. 13, figs 5 and 6), I think we may conclude that it is typical for the species. The secondary stems in their turn bifurcate anew, and this process is then repeated throughout the zoarium (cf. Pl. 13, figs 5 and 6). The branches thus formed are about equal in strength and develop at about the same pace, though it may occur that one of them grows out a little faster than the other one. Thus we see in Pl. 13, fig. 6, that the two branches on both sides of the upper (right) gonozoid are not quite equally developed, the one to the right having just bifurcated while the one to the left has not. It should further be observed that the bifurcations take place in two planes, at about right angles to one another (cf. Pl. 13, figs 5 and 6). In most cases the bifurcations occur alternately in one direction and the other but the process is not always quite as regular as that.

The mode of branching here described results in the formation of a zoarium which is very different from that occurring in the Horneridae. The branches are much more sparse, those occurring being, on the other hand, much stouter than in that family (cf., for instance, Pl. 13, figs 5, 6 and Pl. 14, figs 1,, 8). From the rich branching in the Horneridae, with larger and smaller branches, stunted or acuminate ones, etc., no trace is to be seen here. In fact, the shape of the zoarium and its mode of ramification are more similar to those of certain species within the Heteroporidae (cf. Borg 1933, Pl. 5, fig. 1; Pl. 9, fig. 2) than to those of the Horneridae, though this resemblance is merely superficial.

Perhaps the most conspicuous of the characters distinguishing the present species and one noticed at first sight is that the zoids open not only on one side but all around the stem and branches. Thus a "frontal" and a "basal" side as in all other Pachystega do not exist here. It is a remarkable fact, too, that the apertures are found not only on the branches or secondary, etc., stems but likewise on the surface of the primary stem, as can be seen in Pl. 13, figs 5 and 6. We observe in these figures that apertures are scattered all around the primary stem, that they are all open — not closed by any kind of calcareous diaphragm — even in the larger one of the two zoaria (Pl. 13, fig. 6) and, further, that apertures exist even quite near the supporting disc. This is contrary to what is met with in the Stegohorneridae and the Horneridae; and it demonstrates that the astogeny and the arrangement of the zoids must be different in the present species from early developmental stages already as compared with those in the said families.

The axils between two branches are free from apertures (cf. Pl. 13, figs 5—7). This I think must be considered as a result of the mode of growth of the zoarium in the same way as, for instance, in *Fasciculipora ramosa* (cf. above, p. 130), where there are no apertures in the bifurcations either. It follows that the apertures are found, on the other hand, to occupy distinct areas on the surface of the branches. Better than through any detailed description the position of these areas can be ascertained by a look at Pl. 13, figs 5—7 (cf., especially, fig. 6!). Within each area the apertures are scattered as we see, neither an arrangement in series of any kind nor in clusters occurring. On the other hand it is easy to observe, in the figures just referred to, that the apertures are very regularly distributed over the whole of each area.

Many of the apertures of the smaller — and no doubt younger — of the two zoaria protrude slightly above the surface though others do not. In the larger zoarium, on the other hand, there are hardly any protruding apertures at all, most of the apertures here being level with the surface, while others are even a little more deeply immersed. The differences are explained by the different degree of development of the secondary calcareous layer.

The apertures are circular in shape, though the youngest ones are in most cases slightly oval. It is not uncommon, both in the older and the younger one of my two zoaria, that the border of the apertures is a little exserted into one side, the exsertion forming, when well developed, a short pointed process (cf. Pl. 13, figs 5 and 8). It is the apertures situated in the periphery of an area that are sometimes exserted in this way; and the border produced is the lateral or rather latero-distal one, the border nearest to the centre of the area taken as the median one (Pl. 13, figs 5 and 8).

The two gonozoids that I have seen are both of the same shape and position, so they should certainly be considered as characteristic of the species. The type represented by these gonozoids shows an obvious resemblance to that of *Stegohornera* but deviates from it in some rather important respects. As to their position the gonozoids correspond closely to those of *Stegohornera violacea* (cf. Borg 1926 b, p. 395, Text-figs 96 and 97) which are likewise placed in a bifurcation, parts of the dilated portion being visible on both sides of the stem as in that species (cf. Pl. 13, figs 7, 8). The gonozoid thus takes up the space otherwise occupied by an area without apertures. This is well seen in Pl. 13, figs 6—8.

It should be observed, too, in these figures that there is no special border limiting the inflated portion, as in *St. violacea*. Instead, the apertures of the zoids surrounding the gonozoid are sometimes situated within the verge of the dilated portion of the latter. The roof of the gonozoid is not much elevated; and the limit between it and the normal surface of the zoarium is indistinct along the greatest part of its circumference.

In both gonozoids the tube and aperture may be said to be "lateral" in relation to the longitudinal axis of the inflated portion (cf. Pl. 13, fig. 7). While in the gonozoid reproduced in Pl. 13, figs 8, there is one, oval aperture, in the other one, which is seen in Pl. 6, fig. 6 (to the right), two apertures seem to exist side by side (at x). One of these, viz. the more lateral one, is similar to that of the first gonozoid just described, while the other one, which is obliquely oval, faces more upwards. I suppose that the former one is the true aperture of the gonozoid and the latter the aperture of an autozoid in a somewhat unusual situation.

The structure of the roof of the gonozoid is principally the same as in *Hornera*. It shows an irregular network of ridges separated by larger or smaller pits, many of which are transversely oval in relation to the axis of the inflated portion, while others are round or irregular in shape (Pl. 13, figs 6—8; cf., especially, figs 7 and 8). The calcareous lamina constituting the bottom of each pit is pierced by one or a few pores. Many of the ridges are continuous with those running on the surface of the zoarium nearest surrounding the gonozoid. In the figures just quoted a carina can be ascertained running along the median line of the inflated portion; it disappears near the summit of the bifurcation (in the axil proper) but comes into existence on the other side again. Another carina meets it at almost right angles; but neither of them is very prominent nor have they any relation to the tube and aperture.

The secondary calcification is very strong. When inspecting the budding region occupying the top of each branch it is easy to observe that the ridges begin at the very border of the aperture of those zoids that are about to detach themselves from the budding region all round its edge. These ridges are very well marked, stout and strong. They do not seem to have any definite relation to the cystids upon which they develop, for a ridge may be found running along the median line of a cystid as well as upon the interzoidal wall separating two cystids. The ridges are thus close together (cf. Pl. 13, figs 5, 8), separated by rather deep furrows, which soon become overbridged by crossbars, dividing each furrow into a series of elongated pits pierced at the bottom by one or a few pores. In the angles between two branches the ridges are especially prominent, as can be seen in Pl. 13, fig. 6 (in the middle) and fig. 7 (to the left); here, as in other portions of the zoarium, where there are no apertures, the ridges run almost parallel, while within the areas with apertures scattered over the surface they wind between them (cf. Pl. 13, figs 6 and 8). As they grow older, the ridges gradually become broader, their surface becomes flattened and the pits between them are reduced both in size and number, some of them being diminished into quite small perforations of the thick calcareous layer, while others disappear altogether. In advanced stages most of the ridges therefore have fused more or less completely. It should be observed, especially, that in many cases the ridges surrounding an aperture fuse, wholly or partially, with its border which thus acquires an unusual thickness.

As mentioned above the supporting disc of an old zoarium may consist of several layers. This may be the case with other parts of the secondary calcareous layer as well, especially with those constituting the surface of the primary stem and the lower (proximal) portion of the zoarium, and perhaps with other portions as well. We may assume, therefore, that a process of periodical degeneration and renewal of the surface of the zoarium takes place in this species, as in the Heteroporidae (cf. BORG 1933 b).

The species here described is very distinctly separated from those of the other families within the Pachystega, as we have seen, through numerous characters. The most important of these are, I think, the singular arrangement of the zoids, the mode of development of the zoarium and the process of branching. This makes it inevitable in my opinion not only to create a new genus for it but also to place it in a separate family. On the other hand there is nothing to show that this family should be referred to any other division than the Pachystega. The structure of the wall of the zoarium, consisting of a gymnocyst and a cryptocyst, and the nature of the gonozoid give evidence of this. In the mode of branching and in the degenerative and regenerative processes affecting the surface of the zoarium there is a similarity to what occurs in species within the Heteroporina, it is true; but as there are no kenozoids between the autozoids and as the arrangement of the autozoids in relation to the surface of the zoarium as well as the type of brood-chamber are those characterising the Pachystega, not those of the Heteroporina, the coincidence alluded to may, I suppose, be due to convergence.

Locality: The Swedish Antarctic Expedition 1901—03: St. 3. Two zoaria, one of which is growing upon a small stone.

4. Divisio **Heteroporina.**

Syn: Heteroporina BORG 1933, p. 375.

Char: Primary zoid adnate or partially erect; zoarium varying in shape, adnate, suberect or erect, composed of zoids of two kinds, autozoids and kenozoids, the latter at least as numerous as the former, both autozoids and kenozoids opening at about right angles to the surface of the zoarium; wall of zoarium double, consisting of gymnocyst and cryptocyst; brood-chamber a coelomic space, formed by the absorption of the subdistal portions of some autozoids and numerous kenozoids outside the fertile, ovigerous zoid (zoarial brood-chamber).

In a paper dealing with the recent Heteroporidae (1933) I came to the conclusion that these should form a separate Division within the Stenolaemata and proposed the name Heteroporina provisionally for the group.

For a discussion of the characters used I may refer to my memoir just quoted (op. cit., pp. 353 ff.). In this paper I have referred 4 genera to the Heteroporina, viz. *Neofungella, Heteropora, Canuella* (*Borgiola*[1]), and *Densipora*. These were all placed in one

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[1] When proposing the genus *Canuella* (op. cit., p. 331) I was not aware, unfortunately, that it was preoccupied by *Canuella* T. & A. SCOTT 1893, Ann. Scott. Nat. Hist., p. 91. This opportunity was made use of by EMBRIK STRAND (1933, p. 122, Fol. Zool. et Hydrobiol. Vol. 5/1, Riga 1933), who, against the Codex Æticus of the International Rules, for the name I have given the genus in honour of the late Dr F. CANU, the well-known Bryozoologist, invented a quite new one, viz. "*Borgiola*". Mr STRAND is known for many such deeds and has therefore gained a reputation of the herostratic kind. I cannot but protest in the strongest possible way against his insidious action and hope as we probably all do that the International Commission will soon decide all names furnished by him in such a way as invalid. Until then we are forced so far as I can see to use "*Borgiola*" for *Canuella*.

and the same family, though I pointed out that this was only provisionally, as there were very obvious differences between *Neofungella* and *Heteropora*, on one hand, and *Canuella* and *Densipora* on the other; as for *Densipora*, which is in many respects different from the other genera mentioned, it seemed to me that it should conveniently be referred to a separate family.

The opinion thus advanced can be fully maintained, I think; as a matter of fact, the researches I have performed since it was set forth have further strengthened it. I should like, therefore, to propose, in addition to the fam. Heteroporidae WATERS, which ought to be maintained for Neofungella and Heteropora, the formation of two new families, viz. Canuellidae for *Borgiola*, and Densiporidae for *Densipora*. Only the first one of the three families is represented in the present collection.

Fam. **Heteroporidae** WATERS.

Syn: *Heteroporidae* WATERS 1880, p. 157; PERGENS & MEUNIER 1886, p. 41.

Zoarium erect, pedunculate and capitate, or arborescent; autozoids and kenozoids about equally numerous or the former less in number; apertures of both kinds of zoids scattered over surface of zoarium, not forming clusters, circular or polygonal in shape; brood-chamber zoarial, not visible from surface of zoarium except in form of a slight swelling of that part of the zoarium.

Most of the members of this family are fossils but there are at least 6 living species, one belonging to the genus *Neofungella* and the other 5 to *Heteropora*.

BASSLER says (1935, p. 125) that *Heteropora* as used by me (1933) comprises in part *Tretocycloecia* (CANU 1919, p. 346). This is correct; but it should be borne in mind that *Tretocycloecia* and the family Tretocycloeciidae were instituted by CANU (l. c.) and by CANU & BASSLER (1920, p. 826) for a species of *Heteropora*, in which CANU described what he thought to be an "ovicell", while Heteroporidae was maintained for species with "no ovicell" (CANU & BASSLER, op. cit., p. 675). Since then I have demonstrated the existence of zoarial brood-chambers in recent species of the Heteroporidae (op. cit.), and therefore I see no reason whatever to accept either *Tretocycloecia* or Tretocycloeciidae; just as I think the most remarkable of the contributions to modern taxonomy by Messrs CANU & BASSLER, viz. the dividing of most of the Stenolaematous families each into two, one for those species in which the brood-chambers have not yet been described (these are placed under the old, correct family name) and the other one for species in which brood-chambers are known (for these a new family name is usually introduced), to be quite inadmissible (cf. BORG 1926 b, pp. 468 ff.). In later works of CANU & BASSLER this classification is nevertheless maintained. Describing the Bryozoa of the Philippine Region (1929), for instance, the authors create three new species of "*Tretocycloecia*" for specimens which, so far as I can see, ought rather to be referred to Frondiporidae. Even in 1935, BASSLER, having corrected some of the most serious mistakes made by him and the late Mr. CANU, still catalogues *Heteropora* and "*Tretocycloecia*" in two separate families! The sooner the family Tretocycloeciidae is dropped and its species are placed back in Heteroporidae, the better.

Genus **Heteropora** DE BLAINVILLE.

Syn.: *Heteropora* DE BLAINVILLE 1830, p. 382.

Genotype: *Heteropora cryptopora* (GOLDFUSS) 1826, p. 33.

Zoarium erect, arborescent; its surface smooth or slightly rugose, honeycomb-like when the cystids are open; the kenozoids much more numerous than the autozoids, located between them and thus separating them, *e. g.* their distal portions, from each other; apertures circular or polygonal.

In my revision of the Heteroporidae (1933) I described 4 recent species as belonging to the genus *Heteropora* (op. cit., pp. 306 ff.). Two of these were *H. pelliculata* WATERS and *H. neozelanica* BUSK; as for the so-called *H. pelliculata* O'DONOGHUE (1924, pp. 25 f.), this was regarded as being, in all probability, not identical with *H. pelliculata* WATERS but possibly representing specimens of *H. neozelanica.* An inspection of the material in question in the British Museum (Nat. Hist.), where it was sent from Edinburgh at my request, has enabled me to state, however, that O'DONOGHUE's specimens are identical neither with *H. pelliculata* nor with *H. neozelanica* but that they represent a separate species; by which the number of recent species of *Heteropora* thus amounts to 5.

As far as the recent species are concerned, *Heteropora* is a homogeneous genus, the different species being separated generally by comparatively slight differences referring to the position and arrangement of the autozoids and kenozoids.

Heteropora neozelanica BUSK 1879.

Pl. 16, fig. 1.

Syn: *Heteropora neozelanica* BUSK 1879, pp. 724 ff., Pl. 15, figs 1—4; NICHOLSON 1880, pp. 329 ff., Text-figs 1 and 2; *Heteropora pelliculata* BORG 1932, pp. 2 ff., Text-figs 1 and 2; *Heteropora neozelanica* BORG 1933, pp. 306 ff.

Zoarium branching dichotomously; branches strong, straight, not anastomosing, circular or oval in diameter; surface slightly rugose, wavy owing to apertures of autozoids being arranged indistinctly in transverse zones and their distal ends eventually protruding a little; apertures of both autozoids and kenozoids always open, giving surface of whole zoarium a decidedly honeycomb-like appearance.

Measurements in μ.

(1) Diameter of stem 5 600.
(2) Diameter of branch grown out from stem near its base 4 300—5 400.
(3) Longest diameter of branch just below the top 3 300—3 700.
(4) Diameter of aperture of normal autozoids 180.
(5) Diameter of aperture of larger, protruding autozoids (aperture of brood-chamber ??) 220.

I have only had one incomplete zoarium before me, viz. that photographed and reproduced in Pl. 16, fig. 1. This is an unusually stout species, the zoarium being much more vigorous than, for instance, in *Heteropora pelliculata.*

As a matter of fact, there are not many Stenolaematous species known of which the zoarium as well as the individuals are of such large dimensions as in this (cf. Measurements!). As I have described it at some length in a former paper (op. cit., pp. 306 ff.) it may be sufficient to refer to that description here.

Brood-chambers are not known with certainty, but there exist, at some places, apertures the diameters of which are slightly larger than those of other zoids and that, moreover, protrude sometimes above the level of the zoarium a little more than the ends of normal autocystids do. It may be possible that these apertures function, during a certain period, as the openings of brood-chambers situated in the interior of a branch; but this is so far merely a supposition.

Occurrence: The material was collected by Dr. S. VALLIN during an Antarctic whaling expedition in 1924. There is some uncertainty as to the exact locality, but, as Dr. VALLIN tells me, the colony was taken S. of New Zealand, either at Stewart Island or at the Campbell Islands (Perseverance Harbour, at a depth of 40 m.). — Mus. Lund, n:o 325.

Distribution: "from the seas around New Zealand" (BUSK 1879, p. 724; NICHOLSON 1880, p. 329): New Zealand (colonies sent to me from Professor W. R. B. OLIVER, Dominion Museum, Wellington.)

5. Divisio **Calyptrostega.**

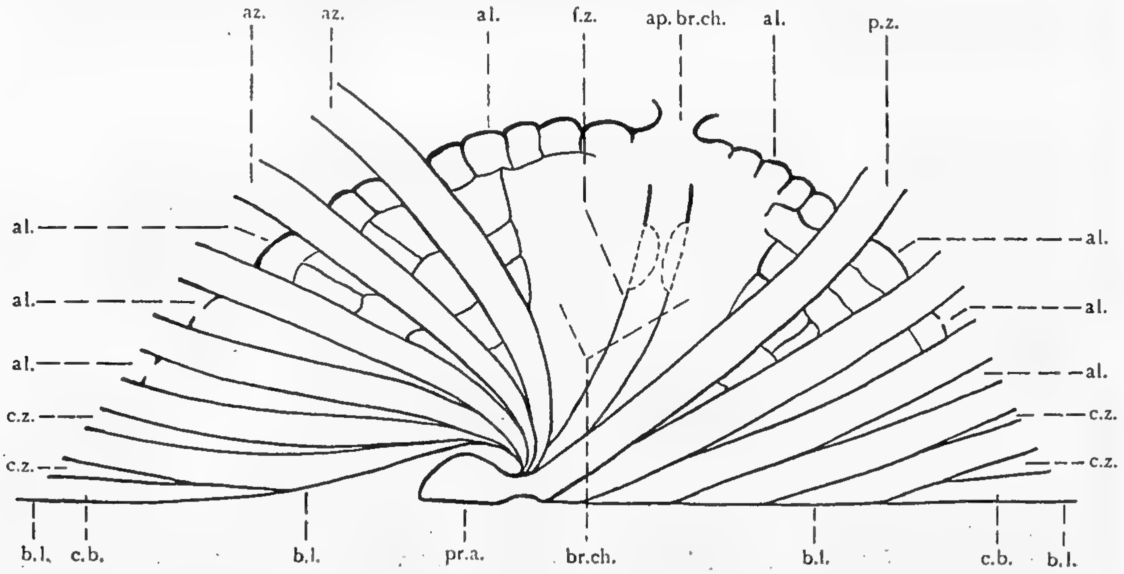
Syn.: *Rectangulata*, part., WATERS 1887, p. 337; *Calyptrostega* BORG 1926 b, p. 475.

Char: Primary zoid adherent to the substratum, never separated by any joint from the pro-ancestrula; zoarium wart-like, its basal wall adnate, simple; frontal wall double, consisting of gymnocyst and cryptocyst; between the zoids special coelomic cavities (alveoli) limited by calcareous, extrazoidal walls; no vestibular sphincter; brood-chamber zoarial: a coelomic space, corresponding to numerous alveoli, outside the fertile (ovigerous) zoid; polypide of fertile zoid degenerating first after having been functional for some time.

Through the researches of SMITT (1867, pp. 474 ff.), HARMER (1896), and BORG (1926 b, pp. 312 ff.) the structure and development of the zoarium in this Division has been explained. It has been made clear that the whole of the more or less circular, wart-like zoarium characteristic of this group comes into existence through the funnel-shaped common bud of the quite young colony widening gradually as new zoids are formed within its circumference, until finally the wall of the funnel is in contact with the substratum at all sides of the pro-ancestrula. From now on this flat wall forms the basis upon which the colony grows; it is known as the "basal lamina". As a result of this mode of development of the zoarium the zoids or series of zoids obviously must come to deviate more or less from each other, leaving a space free from zoids in the centre of the zoarium. Here as well as between the zoids or series of zoids calcareous bars are developed, connecting the zoids with one another. In this way the so-called cancelli or alveoli come into existence. Their function or rather that of their walls may be assumed to be, in the first place, to bring about a strengthening of the zoarium, which according to its mode of formation is obviously very necessary, should it not be broken through the influence of the waves. Further through the confluence of a number of alveoli the brood-chamber in this group is formed.

It follows from what has been said that the entire zoarium is to be regarded, in the Calyptrostega, as a greatly widened common bud, the terminal membrane of which covers the ensemble of zoids and alveoli. With the exception of the outer side of the basal lamina all the calcareous parts are covered by soft tissues, ectoderm and mesoderm. A cryptocyst is thus formed, which is in its turn covered by the terminal membrane of the complicated common bud, i. e. by a gymnocyst. A glance at Text-fig. 25 which is a diagram of a sagittal section through a zoarium of this kind will further elucidate the points alluded to.

As a consequence of the structure of the zoarium in the Calyptrostega, calcareous matter obviously can be deposited here, as in the Pachystega and the Heteroporina, on the outside of the cystids in the shape of ridges, spines or other formations, and new alveoli can be developed on top of those already existing. In this way often considerable changes of the surface of the zoarium are brought about either accidentally or in most cases regularly as the colony grows older. Thus also the fact is easily explained that the apertures of the zoids are not round as a rule but of quite another shape (cf. for instance Harmer 1896, pp. 84) and that their border is drawn out into a varying number of spinous processes. The Calyptrostega, like the Pachystega and Heteroporina, are indeed no "Cyclostomata" at all in the real sense of the word.



Text-fig. 25. Diagrammatic sagittal section through fertile zoarium of a species of *Lichenopora* to show its structure. The calcareous parts only are drawn. — *al.*, alveoli (The alveoli nearest to the budding region are not or only incompletely roofed in while those more centrally placed have each acquired a complete roof. The medio-lateral alveoli are developed in several superimposed layers so that primary, secondary, tertiary, etc., alveoli can be ascertained here. Most of the central alveoli have had their walls absorbed and their cavities have consequently coalesced so as to form a single, large cavity [the brood-chamber] while the walls of some other alveoli within the same region have been absorbed only in part); *ap.br.ch.*, aperture of brood-chamber (transformed alveolus); *az.*, zoids (autozoids; kenozoids do not occur in the Calyptrostega); *b.l.*, basal lamina; *br.ch.*, brood-chamber (portion of zoarial coelomic cavity and formed, in this case, through coalescence of a number of alveoli; cf. my paper 1926 b, pp. 398 ff.); *c.b.*, budding region (common bud); *c.z.*, part of zoarial coelomic cavity near budding edge of zoarium and not yet divided into separate alveoli; *f.z.*, fertile zoid (the parts of its walls indicated by the dotted lines have been absorbed); *pr.a.*, pro-ancestrula; *p.z.*, primary zoid.

The conditions here dealt with have hitherto been seldom understood. Species have been said to be distinguished by the centre of the colonies examined being either depressed or filled up by a number of alveoli, which character depends upon the actual state of the brood-chamber; or the peripheral cystids, e. g. the budding ones, are characterized as being level with the surface of the colony while those more centrally placed are said to be erect and long, protruding over the surface, which is true for most if not all Calyptrostega; and the surface of the zoarium has been described as being provided with a network of calcareous ridges indicating the formation of secondary or perhaps tertiary alveoli upon those already existing or such formations have been said to be absent, which again is mostly not a character available for the distinction of species but one that varies greatly according to the stage of development attained by the colony in question; or it has been pointed out that the lamina surrounding the zoarium of a certain species is broad, or narrow, or provided with radiating ridges (cf., for instance, ORTMANN 1890, p. 64); or the existence or absence of spines, etc., on the surface of the zoarium or at the border of the apertures are ascribed an importance in the distinction of a species that they may very seldom have.

As a matter of fact, the diagnoses of many — perhaps of most — species belonging to the Calyptrostega hitherto described contain to a large extent either characters that are common to all or at least to many species within this Division, or they deal with characters that are seasonal, which means, in this case, that they are discernible during certain stages only in the development of the zoarium, as, for instance, the formation of secondary or tertiary alveoli. On account of these it certainly has occurred more than one time that young and old stages of one and the same species have acquired different specific names. Perhaps the most striking example of this is the "*Discoporella infundibuliformis*" of BUSK (1876, p. 118; 1879, p. 199, Pl. 10, fig. 19), a developmental stage with a funnel-shaped common bud probably of *Lichenopora canaliculata*. On the other hand, authors that have not wished to run the risk of starting a new species upon some developmental stage of an already known one or else upon insufficient grounds, have instead ventured to identify the material before them with some old and well-known species. Thus it happens that *Lichenopora verrucaria* and *hispida* as well as certain other species are said to occur under very different conditions in the most various parts of the world. Of course it may be possible that some of these species may turn out to be cosmopolitan; but it is not likely that many of them are.

It is generally admitted that the determination of the species within the Calyptrostega is a very difficult task. The matters just alluded to have by no means contributed to make it easier. Indeed there is hardly any other group of Stenolaematous Bryozoa that gives such a strong impression of a nearly hopeless confusion as that of the Calyptrostega. Going nearer into it one soon finds that there are a few well-defined species only and, in addition to these, a vast mass of incompletely known and badly described ones. All these are heaped together in one family, the Lichenoporidae, and attributed, within this, to one single genus, *Lichenopora*, though it is clear enough that there are very obvious and rather important differences between many of these species.

Studying the diagnoses one cannot but observe that these comprise for the most part characters of generic much more than of specific value.[1] In fact, the discrimination of the

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[1] I should like to note, however, that the descriptions given by HARMER (1915, pp. 155 ff.) form an exception to this sad rule.

species in the Calyptrostega has scarcely but begun. WATERS' statement (1889, p. 282) that "one cannot help feeling despair when trying to determine the *Lichenoporae*" was, indeed, correct; and the conditions are not much altered from the time when they were written down (cf., for instance, HARMER 1915, p. 160).

When I am trying now to arrange the species within the Calyptrostega in some groups that might probably be considered natural, this must be considered as a modest attempt only. I think it may be worth while doing; but I am very well aware that much more study is required, should we hope to eliminate the confusion now existing and to bring about a better state of matters among the Calyptrostega. I have no claim that the list of species reviewed here should be considered complete. It contains the majority of the recent species hitherto described; but very little regard has been taken to fossil species, and there are not a few recent ones that are omitted as well. I should think, however, that no special difficulties will arise when trying later on to find the proper place for them.

In the first place we may ask: which characters are applicable for dividing the species of Calyptrostega into groups? In my opinion these are above all the following:

(i) The mode of development of the zoarium. This presents obvious differences in different species; and so far as I have found two groups may be discerned: one in which the alveoli soon become "roofed in" and, at a later stage, secondary, tertiary, etc. alveoli being formed on top of those already existing; and another one in which the alveoli are not closed until at a relatively late stage, it then taking place in an iris-like way, a round hole gradually diminishing in size being left in the centre of each alveolus. In this case secondary or tertiary alveoli do not seem to be formed, but the walls of the alveoli soon become very thick, so that the walls separating them from one another are not discernible from the outside. For the former group *Lichenopora verrucaria* (FABR.) is a representative, for the latter one *Lichenopora* (*Disporella*) *hispida* (FLEM.).

(ii) The mode of formation of the brood-chamber. This proceeds in principally the same way in all Calyptrostega it is true, the brood-chamber being a part of the zoarial coelomic cavity; but there is nevertheless a very distinct difference between at least two groups of species. In one of these a zoid becomes fertile already at a very early stage during the development of the zoarium and the formation of a brood-chamber through the fusion of a number of alveoli takes place accordingly at a comparatively early stage too. The roof of the alveoli which is always rather thin and pierced by numerous small pores does not show any noticeable changes by the formation of the brood-chamber.

There exists only one brood-chamber here, occupying the central area and part of the space between the zoids neighbouring it. This brood-chamber may degenerate, in which case the central area of the zoarium becomes depressed. It may regenerate again and then the central area is filled up by newly formed alveoli. It may further be enlarged by the development of secondary alveoli, etc.; and it may contain successive sets of embryos derived from different zoids having become fertile. The number of zoids that have, during the life of a zoarium, given off their embryos to the common (zoarial) brood-chamber is shown by the number of apertures of the brood-chamber present at the surface of the colony.

In the other group the conditions are different. A brood-chamber is not formed here until at a considerably later stage in the development of the zoarium. It does not, therefore, occupy the central area of the zoarium but is placed between the zoids or rays of zoids. The consequence is that a single brood-chamber is not formed here but there occurs a separate chamber for each brood of embryos or at least for each fertile zoid giving off embryos. It follows that the older (or larger) the zoarium, the more numerous are the (separate) brood-chambers; while in the former group only the increasing number of apertures of the (single) brood-chamber indicates the embryogenic processes that have occurred. When in the group of species now dealt with a brood-chamber is formed, the changes of the part of the surface of the colony destined to be the roof of the brood-chamber are considerable and much more conspicuous than in the former group. The hole in the centre of the cryptocyst of each alveolus gradually becomes closed and the alveolus finally requires an entire calcareous covering, pierced by numerous pores, while at the same time calcareous matter is absorbed so that the roof of the brood-chamber becomes thinner than was that of the alveoli. Representatives for the two groups discussed are again, for the former one, *Lichenopora verrucaria,* and for the latter, *L. hispida.*

(iii) The mode of zoarial regeneration. In the Calyptrostega as in other Stenolaemata processes of degeneration and regeneration occur periodically. By these either the individual zoids or else the entire zoarium may be affected. It is with the events of the last-named kind that we are dealing here. Unfortunately, the processes in question and their effect upon the shape and appearance of the zoarium in the Stenolaemata are very incompletely known, except in the Heteroporina, where I have described (1933, pp. 276 ff.) to some extent the changes brought about through periodic degeneration and regeneration of the zoarium. As for the Calyptrostega, the same processes are discernible; though they proceed along different lines in different species. Again two groups can be discerned. Both are characterized by the formation, through regenerative processes, of one or more daughter-zoaria through which the simple colony developed from the pro-ancestrula becomes transformed into a complex one; but while in the one group of species this is effected by one or more daughter-zoaria being superimposed upon the original, simple colony, in the other the daughter-zoaria originate instead from the budding region of the mother-zoarium in such a way that they become fixed to the substratum side by side with the mother-colony. Thus in one of the groups the regenerative processes proceed in a vertical direction, in the other in a horizontal one. The result is very different in the two cases; in the latter one as a result of it a highly complicated colony may finally come into existence. I may add in passing that certain genera of fossil Calyptrostega seem to be founded upon characters of this kind, thus representing developmental stages only in the life of a zoarium. As for the recent species, the group with "vertical" regeneration is again represented by *Lichenopora verrucaria,* that with a horizontal one by *L. hispida.*

It is certainly not a mere chance that in all of the three characters dealt with above the two species *Lichenopora verrucaria* and *hispida* deviate from one another. It has been noted before that these two species are well separated from one another and this view seems to be much strengthened by the above review. There are other characters as well separating them, but I shall not enter into further details here. This much is clear, in my opinion, that the characters reviewed are fully sufficient to justify a generic separation of the two species discussed. In this case *Lich. verrucaria* should remain in the genus

Lichenopora (Defrance 1823, p. 256) while *L. hispida* should be removed from this genus and instead be placed in *Disporella* (Gray 1848, p. 138) which, as Harmer has pointed out (1915, p. 154), was founded for it (as a subgenus of *Tubulipora*) and of which it is consequently the type.

I am inclined, however, to go a step farther and to place *Lichenopora* and *Disporella* in two separate families, reserving for the former the fam. Lichenoporidae (s. str.) and creating for the latter the fam. Disporellidae. I am of the opinion that the characters reviewed are sufficiently important as to justify such a separation. I am well aware that our knowledge of the species here dealt with is still incomplete; but my suggestion is that the more we become acquainted with the structure and development of the species within both groups, the more we shall find their separation in two families justified. On the other hand it may well happen that other characters will turn out to be equally distinctive for the separation of the families as those dealt with here; yet I find it worth while to try this separation for the purpose of making at least a first step to substitute a more satisfactory arrangement for the confusion now existing.

There is an inconvenience connected with the using of two separate families for the species hitherto heaped together in the Lichenoporidae, viz. that it is not always possible to decide with certainty to which of the two families some of these species ought to be referred. This is especially true of certain forms described by early authors; but a few species created in later years come in under the same heading as well. This, however, as far as I can see, cannot be helped. The endeavour to bring about a more natural and, thus, a more satisfactory arrangement of the species within the Calyptrostega will result I think in better and more sufficient diagnoses in the future and must not conveniently be stopped because of certain very incomplete diagnoses given in the years that have passed.

When investigating the species remaining in the fam. Lichenoporidae in its new and more restricted sense it soon becomes evident that they can be placed in some different groups for which the mode of arrangement of the zoids is in the first place the distinguishing character. The same is probably true of the Disporellidae too. There are not a few species the zoids of which are arranged quincunxially. In earlier descriptions the zoids of these species were often described as being arranged in radiating though not connate series, but this was obviously because the author held the opinion that the zoids "ought" to be arranged in that way in the Calyptrostega and is therefore not to be taken too seriously.

Another group, including numerous species, is characterized by the zoids being arranged in radiating series, the zoids of each series being connate with one another up to the rim of their aperture. These series may be simple, consisting of one single row of zoids only, or the zoids may be united into biserial, triserial or multiserial rays, or they may be clustered together into bundles. The origin of these series of zoids may occur earlier or later during the development of the zoarium, so it is not always sure that the character distinctive for the fullgrown colony is clearly shown already in the quite young zoarium; but this of course is true of other characters too.

There are some characters in addition that could be used for separating the groups, such as the shape of the zoids and of their apertures and the size and shape of the alveoli as well as their mode of development. On the whole the mode of arrangement of the zoids within the zoarium seems to be a fairly constant character that could possibly be used for generic purposes, provided that the colony has reached a stage of development sufficiently advanced. This is strongly opposed by WATERS (1918, p. 36) but I think it nevertheless correct as my experience points decidedly in that direction. Some species do probably exist that are transitory between those with non-connate series and those with connate ones or with those with uniserial and biserial ones, for instance. Nevertheless I think this character will turn out to be sufficiently constant to enable the establishing of some genera based upon it. I have not the intention, however, to propose any new genera here, for I think it better to wait until a greater number of species have been thoroughly studied.

The review of 55 species following here will further illustrate the mode of arrangement commented upon above and the characters applied. I have tried to contribute, too, to the elucidation of the somewhat involved synonymy of some of the species.

Review of Species of Calyptrostega.

1. **Lichenoporidae** (s. str.).

A. Species the zoids of which are arranged in quincunx, not in connate, radiating series.

1. *Lichenopora canaliculata* (BUSK 1876, p. 118; 1879, p. 199, Pl. 10, figs 12—14); KIRKPATRICK (1902, p. 289). — Occurrence: Kerguelen; Cape Adare; Victoria Land; Antarctica.

Lich. grignonensis RIDLEY (1881, p. 57; Pl. 6, fig. 2) from Sandy Point, in the eastern part of the Straits of Magellan, is probably identical with this species or is, at any rate, very nearly related to it. On the other hand it is in all probability neither identical with *Tubulipora* (*Lichenopora*) *grignonensis* MILNE EDWARDS (1837, p. 333, Pl. 13, fig. 2) nor with *Discoporella* (*Lichenopora*) *grignonensis* BUSK (1859, p. 116, Pl. 20, figs 4 a—c); RIDLEY himself has pointed out some of the differences separating his species from the two other ones which are both fossils. So far as I can see the *Lich. grignonensis* of WATERS (1887 b, p. 262, Pl. 7, fig. 4) from Port Jackson and Bondi Bay, N. S. Wales, Australia, can hardly be considered identical with the species here discussed (cf. below under the heading Species incertae sedis). WATERS says there is no doubt as to the identity between his species and that of RIDLEY. In fact, there are similarities, but, to judge from the figure given, the apertures of the brood-chambers (as well as other characteristics) are different. In 1926 b (pp. 312 ff., 397 ff.) I termed this species erroneously *L. fimbriata*.

2. *Lichenopora complicata* (HASWELL, 1879, p. 354). — Occurrence: Port Jackson, N. S. Wales, Australia. — RIDLEY (l. c.) states that this species is the nearest recent ally to his *L. canaliculata* and in this I think he is right. It is possible that the two species are in reality identical, but the discriptions and figures published are too incomplete to enable a positive statement. It seems to me not unprobable that *L. grignonensis* WATERS (1887, p. 262, Pl. 7, fig. 4) may be identical with this species instead of the preceding one.

3. *Lichenopora picoensis* JULLIEN 1903, p. 119, Pl. 15, fig. 5. — Occurrence: E of Pico, Azores (Lat. 38° 24′ N, Long. 30° 21′ 40″ W). — The zoarium described is obviously

a young one, but a brood-chamber is developed already at this stage. So far as can be ascertained from the short description and the figure it belongs to this group.

4. *Lichenopora quincuncialis* CANU & BASSLER (1929, p. 560; Pl. 89, figs 1—4). — Occurrence: Sea of Japan; 41° 36′ 12″ N, 140° 36′ E. — The figures which obviously were made from zoaria artificially fossilized are not very elucidative; but it is clear from the description given that the zoids are arranged quincunxially and that secondary alveoli exist upon the primary ones in the central area of the zoarium.

5. *Lichenopora tridentata* (HASWELL 1879, p. 355). — Occurrence: Port Jackson, N. S. Wales, Australia. — The short and incomplete description gives no clear idea of the structure of this species, but the conclusions that can be drawn from it seem to indicate that the species ought to be referred to this group.

6. *Lichenopora venabulum* (JULLIEN 1888, p. 84). — This name was proposed by JULLIEN (*l. c.*) for *Discoporella grignonensis* BUSK (1859, p. 116, Pl. 20, figs 4 a—c) as it was clear that this is not identical with *Tubulipora grignonensis* MILNE EDWARDS (1837, p. 333, Pl. 13, figs 2 a—d).[1] *L. venabulum* is a Cretaceous fossil. To judge from the arrangement of the zoids (BUSK, op. cit., fig. 4 a) and the appearance of the aveoli (fig. 4 b) it should be referred to this group.

7. *Lichenopora verrucaria* (FABR.). — This well-known species may be taken as type for the group here dealt with. It is widely distributed in Arctic and Boreal waters from the boreal west coast of Europe (SMITT 1867, p. 405; HINCKS 1880, p. 478; LEVINSEN 1891, p. 293; 1894, p. 78; ORTMANN 1894, p. 359; NORDGAARD 1906, p. 101; BORG 1930, p. 52, and others) along the north coast of Europe and Asia (NORDGAARD 1918, p. 21; 1923, p. 8; KLUGE 1929, p. 31; BORG 1933 c, p. 520, and others) to the Japanese coast (OKADA 1918, p. 383; 1928, p. 495; SAKAKURA 1935, p. 117), further along the coasts of Iceland (NORDGAARD 1924, p. 5) and Greenland (LEVINSEN 1914, p. 622; 1916, p. 471; OSBURN 1919, p. 607), the east coast of N. America to Woods Hole (OSBURN 1912, p. 219) and the north coast of Canada (OSBURN 1923, p. 5) to Queen Charlotte Islands at the Pacific coast of America (HINCKS 1884, p. 207; ROBERTSON 1900, p. 329; 1910, p. 263). It may, therefore, be considered as circumpolar (BORG 1933 c, p. 138). The localities at the Japanese coast and at the Pacific coast of America are, however, somewhat uncertain I think; and it is not unprobable that a thorough examination of the material would reveal some differences between the zoaria from areas far away from each other; no such researches have, however, so far been made.

Lichenopora verrucaria is said to occur in the Mediterranean as well, *viz.* at Cette (CALVET 1902, p. 86), in the bay of Naples (WATERS 1879, p. 276) and, especially, in the Adriatic (FRIEDL 1918, p. 278; 1925, p. 30; NEVIANI 1939, p. 92), though these determinations seem to me rather doubtful. If *L. verrucaria* really occurs in the Mediterranean, which I think is far from certain, it ought to be considered as a relict form as pointed out by NORDGAARD (1932, p. 8).

Discopora ciliata BUSK (1855, p. 256) is in all probability identical with *L. verrucaria* (cf. HARMER 1915, p. 164), while *Discoporella ciliata* BUSK (1875, p. 31, Pl. 30, fig. 6, Pl. 33, fig. 4) is clearly another species. It was renamed by HARMER (1915, p. 161) who called it *Lichenopora buski*. It is dealt with below under *Disporella* (n:o 4).

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[1] MILNE EDWARDS's species is from Tertiary beds. From the description and figures I am not sure whether it ought to be referred to Lichenoporidae or to Disporellidae. Probably it belongs to the latter family. As it no longer exists, I think it best to refer it to Species inc. sed.

B. Species the zoids of which are arranged in connate, uniserial, radiating series.

1. *Lichenopora algoensis* (BUSK 1875, p. 31; Pl. 28, figs 1 and 4). — Occurrence: Algoa bay, S. Africa. — BUSK points out that the lower border of the aperture — not, as usual, the upper one — is exserted into an acuminate point. If this is correct, the species would be very easily recognisable; it seems not, however, to have been refound since BUSK described it. OKADA (1917, p. 353), it is true, has reported it from Japanese waters, though with some doubt; and I am far from convinced that his specimens and those of BUSK are identical.

2. *Lichenopora californica* D'ORBIGNY 1853, p. 972. — Occurrence: Madelaine, Lower California. — The species is referred by its author to *Unicavea*, which proves that the zoids are in connate, uniserial rays. It is further described as having "de pores intermédiaires énormes".

Discoporella californica BUSK (1875, p. 32, Pl. 30, fig. 5), on the other hand, is said to have its zoids not in uniserial rays but in biserial to triserial radii; and other details in the description given do not seem to agree with that of D'ORBIGNY either, though BUSK's material was from the same area (coast of California). It seems probable to me, therefore, that we have to do here with two different species. This is confirmed by a statement of WATERS (1905, p. 15) who after having re-examined the specimen described by D'ORBIGNY says that "this does not seem the *Discoporella californica*, BUSK". CANU & BASSLER (1923, p. 203) accept WATERS's statement as correct, just as I do. But on account of it they "believe it necessary to substitute the name [*californica*] of CONRAD (1855, p. 441) for that of D'ORBIGNY". In their opinion "it is useless to change the specific name, as the specimen of D'ORBIGNY has not been figured" (!). This is against the law of priority, since D'ORBIGNY's name is not a nomen nudum; further in my opinion the two species in question are not identical. In a later work (1928, p. 164) they propose to term BUSK's species *L. buskiana* which we are obliged to accept.

Further, Miss ROBERTSON (1910, p. 261; Pl. 25, figs 48, 49) has described a species of *Lichenopora*, which she termed *L. californica*, from San Diego Bay, California. The determination was based upon the description and figures by BUSK (l. c.), so I think it may be regarded as tolerably certain that the material of BUSK and of Miss ROBERTSON belong to one and the same species. From the description and figures given, particularly by the latter author, is is evident that the species is a typical multiserial one, the zoids being connate in clusters or rays, 2—3 abreast as a rule, but that it may occasionally happen that a newly formed cluster or part of such is at first uniserial. This, however, does not affect the distinctness of the species. CANU & BASSLER (1928, p. 164) think that the *L. californica* of Miss ROBERTSON (and CONRAD, op. cit.) is another species than that of BUSK (*L. buskiana C. & B.*), which seems to me improbable.

Another species of *Lichenopora* from the coast of Japan (Sagami Bay) has likewise been described, by ORTMANN (1890, p. 65, Pl. 1, fig. 29), under the name of *L. californica*. From the figures given by Miss ROBERTSON (l. c.), on the one hand, and by ORTMANN, on the other, it seems evident that we are concerned with two different species here, and that ORTMANN's species is not identical with *L. californica* of D'ORBIGNY either. If this is correct, the species termed by ORTMANN *L. californica* would require a new name. I propose to call it *Lich. japonica.*

Finally, WATERS (1889 b, p. 282, Pl. 15, fig. 1) described and figured a species from Port Western, Victoria, Australia — thus from quite another part of the world — that he referred to *L. californica,* giving both D'ORBIGNY's and BUSK's species as synonyms, though he seems to have had some doubt as to its identity with the former one. WATERS thinks the species should be ascribed to BUSK instead of D'ORBIGNY, because "D'ORBIGNY's description might apply equally well to three or four species" (!). In a later work (1918, pp. 35 f.) WATERS doubts that the species within the Lichenoporidae can be distinguished according to the mode of arrangements of the zoids; this is, obviously, to justify his identification of D'ORBIGNY's, BUSK's and his own specimens of *L. "californica"* with one another.

Assuming that BUSK's and Miss ROBERTSON's (l. c.) species are one and the same and comparing WATERS's description and figure of the brood-chamber with that of Miss ROBERTSON it becomes evident that these two must be considered distinct. The correctness of this view is further strengthened by the enormous distance separating the localities where these species have been obtained. So far as I can see there is further no indication whatever that what WATERS called *L. californica* is identical with D'ORBIGNY's species so named. HARMER (1915, p. 161) has pointed out that the brood-chamber described by WATERS in his *"L. californica"* closely resembles that of *L. novae-zelandiae* as figured by the same author (cf. HARMER, op. cit., Pl. 12, fig. 11). I do not think, however, that these two species are identical, as *L. novae-zelandiae* has typically uniserial rays but the so-called *L. californica* of WATERS has usually biserial or triserial ones. As there is no other species so far as I am aware, to which the *"L. californica"* of WATERS could be referred with certainty, a new name is consequently required for it. It is appropriate, then, to term it *L. watersi.* Possibly it will turn out to be identical with what I have proposed to term *L. japonica* (cf. above). The figures given (ORTMANN 1889, Pl. 1, fig. 29; WATERS 1889 b, Pl. 15, fig. 1) indicate, as a matter of fact, some resemblance between them.

In the absence of both description and figures I may assume that the *L. californica* of Miss PHILIPPS (1900, p. 449), from Lifu, Loyalty Islands, is identical with WATERS's species just named.

3. *Lichenopora discoplanata* NEVIANI 1939, pp. 84 ff. — Occurrence: The Adriatic. — So far as I can see from the description (there are, unfortunately, no figures) this species must be placed here.

4. *Lichenopora holdsworthii* (BUSK 1875, p. 33; Pl. 30, fig. 4). — Occurrence: off Ceylon. — This species is reported from Port Phillip Heads, Australia, by MACGILLIVRAY (1887, p. 219), from Port Western (Victoria), Watson's Bay and Port Jackson, Australia, by WATERS (1887 a, p. 347; 1887 b, p. 261), from S. of Cape of Good Hope, S. Africa, by WATERS (1888, p. 41; 1889 b, p. 285, Pl. 15, figs 7, 8), and from Cargados and Saya de Malha, Indian Ocean, by Miss THORNELY (1912, p. 157); but as there is no description nor — except in one case (WATERS 1889 b, l. c.) — any figure either, it is consequently impossible to decide whether these determinations are correct or not and, likewise, whether one, two, or eventually even more species are brought together here under the name of *Lich. holdsworthii.*

HARMER (1915, pp. 155, 161) is of the opinion that *Lich. novae-zelandiae* and *holds-*

worthii should be considered as one and the same species and that "the differences between the two types are due to variation in the extent to which the cancelli [alveoli] cover the ovicell" [brood-chamber]. The character named is certainly a very variable one, as mentioned above, and it is possible that HARMER is right, though I am not sure as to this. BUSK, who was admittedly an efficiant observer, diagnosed, in one and the same work (1875, pp. 32, 33), *Lich. novae-zelandiae* and *holdsworthii* as two distinct species. The apertures of the zoids were described, in the former species, as "bifid", but in the latter one as "elliptical" and "pointed on the lower side"; and the central alveoli in *Lich. novae-zelandiae* are said to be "comparatively very large" while in *Lich. holdsworthii* they are expressively characterized as "numerous large stellate pores". Further, the brood-chamber described and figured by WATERS (1887 b, p. 261, Pl. 7, fig. 8) in a specimen that he considers as belonging to *L. novae-zelandiae*, is, indeed, very different from the brood-chamber of another specimen (WATERS 1889 b, p. 285; Pl. 15, fig. 8) designated by the same author as belonging to *L. holdsworthii*. The conclusion I arrive at is, therefore, that *L. novae-zelandiae* and *L. holdsworthii* ought probably to be maintained as two separate species. This is in accordance with the opinion expressed by WATERS (1918, p. 36) but it is contrary to that of CANU & BASSLER (1929, p. 559).

The brood-chamber of the specimen alluded to above and referred by WATERS (1887 b, l. c.) to *L. novae-zelandiae* has instead, according to HARMER (op. cit., p. 160) "some resemblance to the ovicells of specimens from Ceylon described by BUSK as *Discoporella holdsworthii*" while the other specimen, referred by WATERS (1889 b, l. c.) to *L. holdsworthii*, belongs, in the opinion of HARMER (op. cit., p. 155) to *L. novae-zelandiae*. Thus what HARMER terms *L. novae-zelandiae* is named by WATERS *L. holdsworthii*, and the reverse; indeed, the latter author decidedly states, in a later work (1918, p. 36) that "HARMER's 'Siboga' specimens must be called *L. Holdsworthii*, BUSK". Nevertheless I think it may be considered tolerably certain that HARMER (op. cit.) was right, at least regarding the majority of his 'Siboga' specimens, when referring them to *L. novae-zelandiae* (cf., however, below, under this species, n:o 8).

The stellate pores mentioned by BUSK (l. c.) and visible in his figure (1875, Pl. 30, fig. 4) of the species under discussion as well as the type of brood-chamber presented by it (cf. WATERS 1887; Pl. 7, fig. 8), have made me think that *L. holdsworthii* ought perhaps to be referred to *Disporella* (and, consequently, to the fam. Disporellidae) instead of to *Lichenopora* and the Lichenoporidae. Until more is known of the structure and development of the zoarium and, particularly, of the brood-chamber, I do not wish, however, to express any definite opinion as to the taxonomy and relationships of this species.

5. *Lichenopora imperialis* ORTMANN (1890, p. 64; Pl. 4, fig. 25); OKADA (1917, p. 354; 1923, p. 220). — Occurrence: Coast of Japan; Straits of Korea. — This seems to be a typical member of the group now dealt with.

6. *Lichenopora lamellosa* CANU & BASSLER (1929, p. 561; Pl. 89, figs 5, 6). — Occurrence: Darvel Bay, Borneo.

7. *Lichenopora mellevillensis* D'ORBIGNY 1853, p. 959; BUSK 1875, p. 34. — Occurrence: Port Melleville (Melville?), Riu-kiu Islands, Japan. — D'ORBIGNY refers this species to the genus *Discocavea* of his, which is characterized, among others, by each series being composed "d'une seule rangée de cellules saillantes". Otherwise it is very incompletely known and would perhaps have been catalogued better as a species *incertae sedis*.

8. *Lichenopora novae-hollandiae* D'ORBIGNY 1853, p. 971 [*novae-hollaniae* is obviously a printer's error]; BUSK 1875, p. 33. — Occurrence: "Baie des Chiens Marins, Nouvelle-Hollande" (? Seal Bay, King Island, Tasmania). — The diagnosis is very incomplete, and there is probably not much hope that the species will be recognised again.

9. *Lichenopora novae-zelandiae* BUSK 1875, p. 32, Pl. 30, fig. 2. — Occurrence: New Zealand. — This typically uniserial species has been reported from the Australian and Indo-West-Pacific area by HASWELL (1879, p. 353) [Port Jackson and Botany Bay, Australia], HINCKS (1884, p. 362) [Mergui Archipelago, Burma] and Miss THORNELY (1905, p. 127) [Gulf of Manaar, Ceylon]. HARMER (1915, pp. 155 ff., Pl. 12, figs 6—11) records it from several places in the Malayan Archipelago, further from Ceylon, Torres Straits and New Zealand and from two localities at the coast of Japan (Tosa, Shikoku Isl., and Okinose, off Tokyo), but I wonder whether the specimens referred by HARMER (l. c.) to *L. novae-zelandiae*, all belong to one and the same species (cf. WATERS 1918, p. 36, foot-note). LIVINGSTONE (1927, p. 69) reports if from Queensland, Australia. ORTMANN (1890, p. 65, Pl. 2, fig. 10), OKADA (1917, p. 355) and SAKAKURA (1935, p. 117) have obtained it in Japan (Sagami Bay) and OKADA (1923, p. 220) reports it, though with some doubt, from the Straits of Korea. I am not quite sure whether these determinations, especially those of specimens from the seas round Japan, are all correct. The *Lichenopora novae-zelandiae* of WATERS (1887 b, s. 261, Pl. 7, fig. 8) is certainly not this species. As HARMER (1915, p. 160) has pointed out, the brood-chamber differs widely from that of the true *Lich. novae-zelandiae*, and there seem to be other differences as well. HARMER (l. c.) suggests that this species might possibly be identical with *L. holdsworthii* BUSK which seems to be provided with a brood-chamber of similar appearance.

In describing his *Discoporella reticulata* (1884, p. 126; Pl. figs 1, 1 a), MACGILLIVRAY was unaware of the fact that the specific name used was preoccupied (by HAGENOW 1851, p. 43, Pl. 4, fig. 3). WATERS (1889 b, p. 284, Pl. 15, fig. 4), therefore, replaced it by *L. victoriensis*. This is considered by HARMER (l. c.), so far as I can see on good grounds, to be synonymous with *L. novae-zelandiae*. The localities are Victoria and N. S. Wales, Australia.

Though it is evident, thus, that *L. novae-zelandiae* is very widely distributed over a great part of the Pacific Ocean it does not follow that it occurs in the Atlantic too, nor is this very probable. CALVET (1903, p. 164) has recorded a species which he terms *Lich. novae-zelandiae* from the Azores but in the absence of both figures and description HARMER (1915, p. 160) doubts the correctness of the reference; and so do I. Nor am I sure as to the correctness of the determination of some small colonies of a *Lichenopora* from St. Helena, referred by MARCUS (1938, p. 198, Text-fig. 6) to *L. novae-zelandiae.*

10. *Lichenopora radiata* (AUDOUIN 1826, p. 235; SAVIGNY 1809, Pt. 2, Polypes, Pl. 6, figs 31—34). — Occurrence: Probably Mediterranean. From this area the species was further reported by LAMARCK (1816, p. 16) and MILNE EDWARDS (1837, pp. 329 f.; Pl. 13, figs 1, 1 a, 1 b) under the name of *Tubulipora patina*, and, later on, by other authors, as, for instance, by BUSK (1875, p. 32; Pl. 34, fig. 3), who gave it again its correct name, and by WATERS (1879, p. 276) who found it occurring abundantly at Naples on seaweeds from shallow water. It was found in the Adriatic by HELLER (1867, p. 46), who called it *Discosparsa patina*, by FRIEDL (1918, p. 277; 1925, p. 30), MARCUS (1920, p. 99), NEVIANI (1939, pp. 87 ff.), and others.

L. radiata was further reported from the Bay of Biscay by JULLIEN (1903, p. 119) and by CALVET (1906, p. 467), at a depth of 135 and 392 m. respectively (cf. WATERS, l. c.) and from the coast of S. England by HINCKS (1880, pp. 476 ff.; Pl. 68, figs 9 and 10). Though I am not convinced of the correctness of these determinations, it is not unlikely that the species in question may be distributed as here indicated. By NORMAN it is reported from off Madeira, by BARROSO from Santander and by WATERS (1910, p. 237) from Suez. Another and somewhat dubious locality is the Atlantic coast of Marocco (CANU & BASSLER 1925, p. 71); there is no description nor any figure given.

After the issue of the well-known works of BUSK (1875) and HINCKS (1880), however, uniserial specimens of *Lichenopora* were soon identified with *L. radiata* in very different parts of the world, where it was really very improbable that this species would occur. Thus, Miss ROBERTSON (1910, p. 262, Pl. 24, figs. 46, 47) records this species from the coast of S. California, although it is very evident by comparing her figures and description with those of SAVIGNY and AUDOUIN (l. c.) that two different species are dealt with here. I think it much more probable that the *L. radiata* of Miss ROBERTSON is instead identical with *L. californica* D'ORBIGNY (l. c.), which is a typically uniserial species. The same is true of the so-called *L. radiata* of O'DONOGHUE & O'DONOGHUE (1923, p. 15; 1926, p. 28) from the Vancouver Island Region.

CANU & BASSLER report the species in question from north of Cuba (1928, p. 163; Pl. 29, figs 1, 2) and from the Galapagos Islands (1929, pp. 56 f.). Only in the former case are there any figures, and these, which are photographs, show in my opinion beyond doubt that the specimens dealt with must be referred to *Disporella* instead of *Lichenopora*. As I believe the true *radiata* to belong to the latter genus, CANU's & BASSLER's species from the Gulf of Mexico is probably not identical with it. The same is probably true of their Galapagos specimen, too, of which there is no description nor any figures.

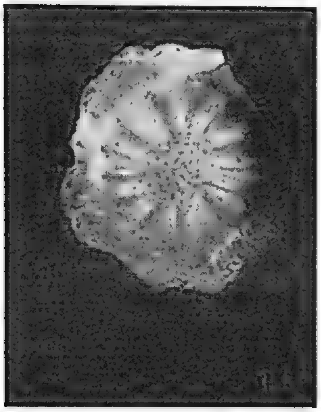
L. radiata has also been said to occur at the coasts of S. Africa (O'DONOGHUE 1924, p. 26), and of Victoria (MACGILLIVRAY 1887, p. 219) and Queensland, Australia (LIVINGSTONE 1927, p. 69) as well as in Torres Strait (KIRKPATRICK 1890, p. 612), but there is no description nor any figures of any of these specimens. Until such have been produced I see no reason whatever to accept the statements made (*a priori* not very probable), as to the occurrence of this species in Australian seas. Whether it is *L. novae-zelandiae, wilsoni*, or perhaps some other species that has instead lain before the authors just quoted it is impossible to say now.

According to ORTMANN (1890, p. 64), OKADA (1917, p. 355; 1928, pp. 494 f.; Text-fig. 11) and OKADA & MAWATARI (1935, p. 147), *L. radiata* occur at the coasts of Japan too. The only figure existing of a Japanese specimen of the supposed *L. radiata* is, so far as I am aware, the Text-fig. 11 of OKADA (1928), a very good one. This makes it clear at once that the species here dealt with is quite another than *L. radiata*, nay, that it probably belongs to *Disporella* instead of *Lichenopora*.

CANU & BASSLER (1929, pp. 557 ff.; Text-fig. 223; Pl. 88, figs 1—6) think they have found *L. radiata* off Borneo and at some other places in the Malayan Archipelago, further in the vicinity of Hong Kong, in the China Sea, and at Cape Tsiuka in the Sea of Japan. They have been beaten by this astonishing wide distribution and ask, — "How can this species cover the enormous distance which separates Japan from California?" The answer they give is that "its larva, like that of all *Lichenoporas*, must be very mobile and swim about a long time before it fixes itself." This, however, is by no means the case, for all the Stenolaematous larvae I have seen, and those of some Calyptrostega among them, are very little mobile and fix themselves after a few hours free swimming life. What about another explanation, viz. that the so-called *L. radiata* from California and the so-called *L. radiata* from Japan belong to two different species; — neither of which, moreover, is identical with *L. radiata* (AUDOUIN)? These, in my opinion, are the true facts.

11. *Lichenopora simplex* (BUSK 1875, p. 35; Pl. 34, fig. 2.) — Occurrence: Mazatlan, Mexico. — The species is uniserial and from BUSK's figure which is the only existing one, it will seem that it belongs to *Lichenopora*. As it is scarcely probable that the species will be recognised again, founded upon a single, much worn specimen as it is, it might perhaps better be placed among the species *incertae sedis*.

12. *Lichenopora smitti* CALVET (1906 b, pp. 466 f.). — In his "Floridan Bryozoa", SMITT (1872, pp. 12 f., Pl. 4, fig. 12) described and figured a species of *Lichenopora*, which he referred erroneously to *Tubulipora* (*Disporella*) *clypeiformis* D'ORBIGNY. JULLIEN (1882, p. 503) thought that he had found SMITT's species in the collections from the "Travailleur"; and CALVET (l. c.), reporting it from the Bay of Biscay, N. of Spain, appropriately gave it a new name. As no description nor figures are given and as both JULLIEN's and CALVET's specimens are from the European side of the Atlantic I am somewhat doubtful as to the correctness of the determination. SMITT's species, at any rate, is a typically uniserial *Lichenopora* (Swedish State Museum, Bryoz. n:o 254); cf. Text-fig. 26.



Text-fig. 26. *Lichenopora smitti* (CALVET). Zoarium (type-specimen) photographed from above.

13. *Lichenopora spinata* J. Y. JOHNSON (1897, pp. 62 f.). — Occurrence: off Madeira. — It is with considerable hesitation that I place the present species in this group. No figures are published and the diagnosis is incomplete. The zoids are said to be placed in uniserial, though "somewhat irregular" radiating rows. It is not clear whether the series are connate but it seems to be indicated that this is the case. The alveoli are described in such a way that one, unfortunately, cannot be sure whether the species ought to be referred to *Lichenopora* or to *Disporella*.

14. *Lichenopora wilsoni* MACGILLIVRAY (1887, pp. 182; Pl. 1, fig. 5, 5 a). — Occurrence: Port Phillip, Victoria, Australia. — The description and one of the figures (fig. 5 a) seem to indicate that the uniserially arranged zoids are in connate rows though this is not clearly stated. Otherwise so far as I can make out from what is said about it, the species is a typical *Lichenopora*.

C. Species the zoids of which are arranged in connate, bi- or multiserial, radiating rows or bundles.

1. *Lichenopora buskiana* CANU & BASSLER 1928, p. 164 (= *Lich. californica* BUSK 1875, p. 32, Pl. 30, fig. 5; ROBERTSON 1910, pp. 261 f.; Pl. 25, figs 48 and 49). Cf. above, under B, n:o 2. — Occurrence: Coast of California (San Pedro; San Diego Bay). — To judge from the description given by Miss ROBERTSON (op. cit., p. 261, the Key) and from one of her figures (Pl. 25, fig. 48), the zoids are not arranged in series, in the true sense

of the word, but in connate, irregularly radiating bundles with 1—3 zoids abreast. The difference between this species and *L. japonica* is, therefore, rather sharp as it will seem (cf., for comparison, *L. harmeri* (n:o 2) and *L. nevianii* (n:o 4, below). Perhaps species of this kind should conveniently be placed in a separate group, in order to distinguish them better from those with zoids arranged in multiserial rays.

2. *Lichenopora harmeri* NEVIANI 1939, pp. 97 f.; Pl. 4, fig. 9. — Cf. below, under *L. mediterranea.*

3. *Lichenopora japonica* nom. nov. (= *Lich. californica* ORTMANN 1890, p. 65; Pl. 1, fig. 29). — Occurrence: Coast of Japan (Sagami Bay). — Cf. above, under B, n:o 2. — The zoids are arranged in biserial or triserial rays and the mode of regeneration as shown in ORTMANN's figure seems to be that typical for species of *Lichenopora.*

4. *Lichenopora mediterranea* MICHELIN 1840—47, p. 68, Pl. 14, figs 5 a, 5 b. — Occurrence: Mediterranean. — The *L. mediterranea* of DE BLAINVILLE (1834, p. 407) is a *nomen nudum* and must be dropped, as stated correctly by HARMER (1915, pp. 164, 165). NEVIANI (1939, pp. 94 ff.) has come to the conclusion that two recent species, both occurring in the Mediterranean, have been designated by different authors as *L. mediterranea;* for one of these, which is characterised by its multiserial radiating rows of zoids, he retains that name, while the other one, the zoids of which are arranged in radiating bundles or fascicles, is termed *L. harmeri.* To judge from the description by WATERS (1879, p. 277) of two specimens from the Bay of Naples, referred by him to *L. mediterranea,* I think they do not belong to that species but instead to *L. harmeri* NEV. (if they belong to *Lichenopora* at all).

Now if we examine the figures drawn by MICHELIN (l. c.), we will find that they show a uniserial species, two zoids abreast occurring only, so far as I can see, where a series divides into two. Secondary series originate here and there at the edge of the zoarium, between the primary ones. D'ORBIGNY (1853, p. 971), moreover, refers the species in question to his genus *Unicavea* — thus to the same genus as, for instance, *L. radiata* (AUDOUIN) — which shows that he considers it as being uniserial. In the diagnosis given by BUSK (1875, p. 33; Pl. 34, fig. 4), however, it has acquired characters quite different from those originally attributed to it. The zoids are now said to be arranged "in short multiserial rays, most of which do not reach the border of the disc" and the entire surface is described as "reticulate". These characters are all in marked contrast to those really occurring in MICHELIN's species; and the conclusion that BUSK (l. c.) had quite another species before him is, therefore, I think, inevitable. Later authors, then, on account of BUSK's diagnosis have been led to consider the species as multiserial, which it is not. The uncertainty as to most if not all the characters of this species of which NEVIANI (l. c.) as well as other authors complain is, then, no wonder indeed.

The name *mediterranea* must obviously be retained for MICHELIN's species but not for that of BUSK. Assuming the *L. mediterranea* of NEVIANI (l. c.) to be identical with that of BUSK — both being multiserial, and no other multiserial species, in the true sense of the word, that is, with series (not fascicles) of zoids two or more abreast, existing, so far as I am aware, in the Mediterranean — a new name is required for it. I propose to term it *L. nevianii* in honour of the distinguished Italian Bryozoologist. If the "*L. mediterranea*" of BUSK and NEVIANI should turn out to be distinct from one another, the name here proposed is to stand with the specimens of the latter author.

As for MICHELIN's species, the whole of its appearance seems to me to indicate that it does not belong to Lichenoporidae but to Disporellidae in which family I have therefore catalogued it (cf. under Disporellidae, n:o 12).

In his 'Siboga' Report, HARMER (1915, pp. 164 f.; Pl. 12, figs 2 and 3) has described and figured a species which he referred, though with considerable hesitation, to *L. mediterranea* MICHELIN. The species described by HARMER being biserial (possibly another, uniserial species is included too), the reference made to MICHELIN's species cannot be correct. On the other hand, from the description and figures given the alveoli (cancelli) are clearly different from those existing in the *L. mediterranea* of BUSK (= *L. nevianii*), and there seem to be other differences too. Besides, HARMER's species is from the Malayan Archipelago but that of MICHELIN from the Mediterranean. On account of what has been said I think it most probable, therefore, that HARMER's species is another than that of BUSK. So far as I can find from the description of the alveoli (cancelli) it ought not to be referred to *Lichenopora* but to *Disporella*, where I therefore catalogue it. As the conclusions arrived at here make a new name necessary for it, it will be termed *Disporella sibogae*.

HARMER (1915, p. 164) further gives, with some hesitation, *Discoporella porosa* HASWELL (1879, p. 354) as a synonym of the species he calls *L. mediterranea* (= *D. sibogae* nom. nov.). I admit the possibility that the two may be identical. HASWELL's species, at any rate, is multiserial with rounded "cancelli" and from the description given by that author it seems evident that it ought, too, to be referred to Disporellidae. If *D. sibogae* and *D. porosa* should turn out to be identical, then the latter name of course must stand.

OKADA (1917, p. 354) has, though not without doubt, recorded the present species from the coast of Japan (off Jôgashima). The specimens are identified, in the first place, with those of HARMER (l. c.) mentioned above. On account of the very brief description and the lack of figures we remain uncertain as to the correctness of the reference; but I do not think it improbable that OKADA's specimens are correctly identified with what is termed here *D. sibogae*. SAKAKURA (1935, p. 39) reports the species as a fossil from the Plio-Pleistocene strata in Japan.

CANU & BASSLER (1929, pp. 561 ff.; Pl. 90, figs 1—3), finally, have described and figured specimens from the Philippine region, which they identify with those of HARMER (l. c.). This identification I am inclined to believe is correct. From the figures (which are photographs) and from the note (p. 562) that "the colonies increase in size and become superimposed rather easily" ("early" is probably meant) it is clear that the species must be referred to *Disporella*.

To sum up: under the name of *Lich. mediterranea* in my opinion at least four species have been mingled together: 1) The true, uniserial *Lich. mediterranea* of MICHELIN, referred by me to *Disporella;* 2) *Lich. harmeri* NEVIANI (with zoids arranged in radiating fascicles); 3) *Lich. nevianii* nom. nov. (= *L. mediterranea* BUSK 1875 and, probably, NEVIANI 1939), with zoids arranged in multiserial rays); 4) *Disporella sibogae* nom. nov. (= *L. mediterranea* of HARMER 1915, OKADA 1917, and CANU & BASSLER 1929).

5. *Lichenopora watersi* nom. nov. (= *L. californica* WATERS 1889 b, p. 282; Pl. 15, fig. 1). — Occurrence: Port Western, Victoria, Australia. — Cf. above, under *L. californica*, B, n:o 2.

2. Fam. **Disporellidae.**

For the present I am unable to distribute the species belonging to this family into groups according to the arrangement of the zoids, as was the case in the Lichenoporidae. This is partly due to the incompleteness of the diagnoses, little regard often having been taken to the named character; but there is another cause also, viz. that the mode of formation of daughter-colonies and, thus, the superposition of zoaria of different ages brings about a certain amount of variation and, here and there, some irregularity, too. Further study, I think, will make us understand better the arrangement of the zoids and the developmental changes that it undergoes during the life of the colony; as a result of which it will be possible, no doubt, to use this character with greater advantage for classificatory purposes.

There follows a list of species which I think — though in some cases with considerable doubt — should be referred to this family. Provisionally I place them all in *Disporella.*

1. *Disporella aculeata* (D'ORBIGNY 1853, p. 958; Pl. 776, figs 5—8). — Occurrence: off Calvados and Ile de Ré (recent). — I can see no distinct difference between this species and *D. hispida* and I wonder whether the two are not identical.

2. *Disporella brusinae* (NEVIANI 1939, pp. 90 ff.). — Occurrence: Adriatic. — NEVIANI says that his species comes near to *L. violacea* CANU & BASSLER (cf. below), which is undoubtedly a *Disporella;* and from his description it will seem that it should be referred to the same genus. The zoids are arranged in uniserial rays.

3. *Disporella bullata* (MACGILLIVRAY 1887, p. 70; Pl. 3, figs 2, 2 a, b, c.). — Occurrence: Port Phillip Heads, Victoria, Australia. — Both from the description and from the figures it is evident that MACGILLIVRAY has had a complex zoarium before him, composed of several simple colonies or "discs", many of them with a brood-chamber. Thus there is no doubt, I think, as to this species belonging to *Disporella.* The zoids seem to be arranged in uniserial rays (cf. MACGILLIVRAY, op. cit., fig. 2 b).

4. *Disporella buski* (HARMER 1915, pp. 161 ff.; Pl. 12, figs 4, 5). — Occurrence: Cape of Good Hope; coasts of New Zealand and Australia; Torres Straits; Malayan Archipelago; Loyalty Isls; Japan. — HARMER (1915, p. 164) has pointed out that *Discoporella ciliata* BUSK 1875, pp. 31 f., was preoccupied by *Discopora ciliata* BUSK 1855, p. 256, and has, therefore, proposed *Lichenopora buski* as a new name for the former species. As for the present one, cf. above under *L. verrucaria* (Lichenoporidae, A, n:o 7).

In BUSK's diagnosis of the present species (op. cit., p. 31; Pl. 30, fig. 6; Pl. 33, fig. 4 [the latter fig. is not cited in the text]) there are some rather remarkable inadvertences. The author says: "diameter of mouth [= aperture of zoids] less than that of the interstitial cancelli" [= alveoli]; but in his fig. 6, Pl. 30, both the central alveoli and those that are located between the rays are distinctly smaller in diameter than the apertures of the zoids, while in his fig. 4, Pl. 33, the alveoli near the margin of the colony are of about equal diameter as the apertures — a feature common for many species of Calyptrostega — but those more centrally placed are obviously much smaller. BUSK further says that "the figure of *Discocavea aculeata,* D'ORB. Pal. Franc. p. 958, Pl. 776, figs 5—8, strongly resembles this species"; but when looking at D'ORBIGNY's figures and, especially, at his fig. 6, which represents an enlarged zoarium of the species in question, one finds that the openings of the alveoli are, all of them, distinctly smaller than the apertures of the zoids. D'ORBIGNY's species belongs in my opinion undoubtedly to *Disporella* (cf. above, n:o 1). On account of the statements of BUSK just alluded to, it is perhaps admissible to think that he might have had more than one species before him (one from the Cape of Good Hope and another from New Zealand?). The type-specimen is from the Cape of Good Hope (cf. HARMER 1915, p. 164).

Like HARMER (l. c.) I suppose that the *Discoporella ciliata* of HASWELL (1879, p. 354), from Port Jackson, N. S. Wales, Australia is identical with BUSK's species, or, at least, with one of them, viz. probably with that from New Zealand. The same is perhaps true of the *L. ciliata* of WATERS (1887, p. 263, Pl. 7, fig. 5), too, though WATERS himself says, at a later occasion (1904, p. 97), that "it is doubtful whether it should be placed under *L. ciliata* BUSK"; and I am at least as doubtful as he in regard to this point. In the work just cited (1887, l. c.) he asks further, "ought not *L. ciliata* to be considered a variety of *L. verrucaria?*" which is certainly not the case. HUTTON in his 'Catalogue' (1880, p. 199) mentions *D. ciliata*, only citing the diagnosis and locality given by BUSK (1875, l. c.).

Miss PHILIPPS (1900, p. 441), according to HARMER (l. c.), has distributed her specimens of *D. ciliata* (from Lifu, Loyalty Isls) among three species, not only her *L. ciliata* but also what she terms *L. hispida* and *L. verrucaria* being, in reality, *D. buski* HARMER.

HARMER's (l. c.) clear and valuable description of this species seems to me to show, beyond doubt, that it should be referred to *Disporella*. The disposition of the zoids is something between a quincunxial arrangement and uniserial rays, the marginal zoids being quincunxially arranged, while the more centrally placed ones form short, uniserial rays. HARMER records the species under discussion from the coast of Japan, among other localities, and I think we may therefore consider the specimens of *D. buski* reported by OKADA (1917, p. 354) from the same area as correctly determined. CANU and BASSLER (1929, pp. 558 ff.; Pl. 88, figs 7—10) describe the species from the Sulu Archipelago and the Sea of Japan; the figures (photographs) show very clearly, so far as I can judge, that *D. buski* belongs to *Disporella*.

Since CANU & BASSLER (l. c.) mention, when describing this and several other species, that the zoarium is "free" or "incrusting" or both, it may be expressly stated here that of course the zoaria of all Calyptrostega (and, indeed, of all Stenolaematous Bryozoa!) are always growing on a substratum; if accidentally a zoarium has been broken off from it, this does not matter anyway. I could have better understood the statement of CANU & BASSLER, had it referred to fossils; as regards recent forms it is evidently quite superfluous or perhaps, sometimes, misleading.

5. *Disporella clypeiformis* (D'ORBIGNY 1839, p. 19; Pl. 9, figs 4—6). — Occurrence: off the Falkland Islands, from great depths. This is quite another species than that described by SMITT (1872, p. 12) under that name. WATERS (1905, p. 15), who has studied the type-specimen, says that it "is of the *Lichenopora hispida*, FLEM., group"; and this is evident from D'ORBIGNY's figures too.

6. *Disporella cristata* (BUSK 1875, p. 35; Pl. 34, fig. 1). — Occurrence: South Atlantic (John Adams's Bank). — BUSK referred this species to *Radiopora* D'ORBIGNY (1854, p. 992), which genus is characterised by the zoarium being composed "de sous-colonies confluentes, superposées par couches et représentant un ensemble encroutant fixe". This indicates, evidently, that *Radiopora* must be placed in the Disporellidae; but in the two

recent forms considered by BUSK as belonging to that genus "there is no superposition at all; but as the mode of growth is in other respects — — — in accord with M. D'ORBIGNY's — — — description, I have not thought it expedient to institute another genus — — — merely on that account" (BUSK, l. c.). Thus it will seem that the (astogenic!) characters upon which the genus *Radiopora* was founded are missing here. Yet I think there is hardly any doubt but that the present species should be referred to Disporellidae. BUSK's figure shows two confluent colonies, one of which has probably developed from the other. The openings of the alveoli are described (and figured) as "orbicular", which certainly reminds one of *Disporella* more than of *Lichenopora*.

CALVET (1902, p. 45; 1931, p. 47) reports *D. cristata* from the Mediterranean (coast of Corsica; off Monaco) and in the neighbourhood of the Azores and the Cape Verde Islands. There are no figures and not much to indicate, if the determinations are correct or not; the localities, however, are within the area where this species might probably be assumed to occur.

The statement of Miss PHILIPPS (1900, pp. 441, 450), on the other hand, recording *D. cristata* from the Loyalty Islands and the Pacific, seems to me very doubtful. I should think it much more probable that the specimens found by her belong, for instance, to *D. bullata* or *D. magnifica* MACGILL. (cf. n:o 3 and 11, respectively).

7. *Disporella echinata* (MACGILLIVRAY 1884, p. 127; Pl. 1, fig. 4; 1887, p. 219). — Occurrence: Port Phillip Heads, Victoria, Australia. — MACGILLIVRAY (1884, l. c.) is doubtful as to whether this species "may not prove to be a variety of BUSK's *D. fimbriata*"; the difference is said to consist chiefly "in the numerous spines springing from all parts of the cells [cystids], which give it a very distinctive appearance". The zoids are "arranged in irregular rows or confused". In his 'Catalogue' (1887, l. c.), however, MACGILLIVRAY enumerates both *D. echinata* and *fimbriata* as two independent species but is doubtful whether or not *D. fimbriata* and *hispida* should be considered identical. WATERS (1889 b, p. 282 f.; Pl. 15, fig. 6) states that the zoids in *D. echinata* are irregularly arranged. His description seems to me to make it probable that the species before him was really *D. echinata*, but in that case the figure must be considered bad. This author, obviously, is of the opinion that *D. echinata* and *fimbriata* are identical (p. 282); in another work (1904, p. 96) he points out that the latter species is closely allied to *D. hispida*.

In his report upon the Bryozoa from the 'Travailleur & Talisman', CALVET (1906 b, p. 46) states the occurrence of the present species, which he designates as *Lich. fimbriata* var. *echinata*, at the Azores and off Cap Spartel (at the entrance to the Strait of Gibraltar). I have seen some of the specimens, and I am not convinced that they belong either to *echinata* or to *fimbriata*.

MACGILLIVRAY's description of this species, though brief, indicates that it should be referred to Disporellidae. This view is much strengthened by the statements of both MACGILLIVRAY and WATERS as to the close relationship between *D. echinata* and *fimbriata*, on the one hand; and *D. hispida* on the other.

8. *Disporella fimbriata* (part.) BUSK 1875, p. 32; Pl. 27, figs 1—4). — The typical specimens are from the Chonos Archipelago, Tierra del Fuego, Cape Horn, and Chiloe, thus all from S. America (BUSK, figs 2—4), while a specimen from Tasmania (fig. 1)

seems to me to belong, in all probability, to another species. BUSK himself seems to have been doubtful as to this point (cf. BUSK 1879, p. 199).

In BUSK's Report of the Bryozoa from Kerguelen (1879, l. c.) as well as in this 'Challenger' Report (1886, p. 26) *D. fimbriata* is recorded from Tristan da Cuñha. WATERS (1889 b, p. 282) states that "this is *L. echinata* with an ovicell, so that the name *fimbriata* must be dropped", which is of course by no means the case, *fimbriata* being the older of the two names. Moreover, WATERS mentions *D. fimbriata* from Antarctica (1904, pp. 96 f., Pl. 8, fig. 20) and from near Cape Horn (1905, p. 250); in both works he states that the *Disporella spinulosa* of JULLIEN (1888, p. 83) is in reality *D. fimbriata*. This opinion, which is based upon a study of some of JULLIEN's specimens, I think is correct. The specimens in question were taken between the Falkland Islands and the Strait of Magellan.

CALVET (1904, p. 37; 1909, p. 42) reports the present species from several localities within the Subantarctic area (Tierra del Fuego, Smyth Channel, off Graham Land); like WATERS he has come to the conclusion that *D. fimbriata* and *echinata* "müssen verschmolzen werden. Die Stücke — — — zeigen alle Zwischenstufen zwischen den typischen Formen der einen und der anderen jener beiden Arten" (1904, l. c.). The two species are closely allied, at any rate, and the assumption that they are identical is perhaps correct; but as I still think that it needs confirmation, I find it best, for the present at least, to treat them separately. They obviously come rather near to the northern *D. hispida;* and there does not seem to be much doubt as to their being correctly referred to the Disporellidae. — In 1926 b (pp. 312 ff., 397 ff.), when speaking of *L. fimbriata,* I intended instead *L. canaliculata.*

D. fimbriata has been repeatedly reported from the Australian region, thus by MAC GILLIVRAY (1887, p. 219), Miss THORNELY (1924, p. 20; under the name of *Lichenopora hispida*) and LIVINGSTONE (1928, p. 7). It is somewhat uncertain whether these determinations refer to BUSK's South American specimens or, as seems more probable to me, to that from New Zealand; and because of this we are in doubt as to what species was in reality meant. O'DONOGHUE & O'DONOGHUE (1923, p. 15) record this species from the East coast of the North Pacific (the Vancouver Island Region) though I am doubtful as to the correctness of this determination. The species is omitted, however, from the later one of the two lists given by the named authors (1926, p. 28).

The occurrence of *D. fimbriata* at the Azores and the Cape Verde Islands and in the middle Atlantic is stated by CALVET (1927, p. 42; 1928, p. 4; 1931, p. 47); but I am very doubtful as to the correctness of this determination.

9. *Disporella hispida* (FLEMING 1828, p. 530). — This is one of the commonest and most wellknown species, reported by numerous authors as occurring in Boreal and Arctic areas at the European coast: from Greenland (LEVINSEN 1914, p. 622; 1916, p. 472; OSBURN (1919, p. 606), Spitzbergen (BIDENKAP 1900, p. 529), Franz-Joseph-Land (WATERS 1904, p. 177); Finmark, Coast of Norway and Sweden (M. SARS 1851, p. 145; SMITT 1867, p. 406; NORMAN 1905, p. 575; NORDGAARD 1896, p. 6; 1911, p. 4; 1918, p. 21; 1927, p. 2), Skagerrak and Cattegat (LEVINSEN 1891, p. 293; 1894, p. 78; BORG 1930, p. 51), the North Sea and the Channel to the coast of S. England and SW France (NORMAN 1869, p. 308; HINCKS 1880, p. 476; JOLIET 1877, p. 286; FISCHER 1870, p. 10; and others). It is further distributed along the Atlantic coast of northern America to the coast of Labrador (VERRILL 1875, p. 414; WHITEAVES 1901, p. 112; OSBURN 1923, p. 5; 1933, p. 18)

and, possibly, off Florida (OSBURN 1914, p. 186). The records from the Pacific coast of North America (HINCKS 1884, p. 207; O'DONOGHUE & D'DONOGHUE 1923, p. 15; 1926, p. 28), according to which *D. hispida* occurs to the Juan da Fuca Straits, I consider as doubtful, especially as the last-named authors declare that "in some respects this [species] is like *L. verrucaria*".

D. hispida is, however, reported from many other parts of the world as well. Thus, WATERS (1879, p. 277) states that it lives in the littoral zone of the Bay of Naples and CALVET (1902 a, p. 85; 1902 b, p. 44; 1906 b, p. 466) and others that it occurs in the Mediterranean (coast of Corsica; Cette, etc.), while JULLIEN & CALVET (1903, pp. 120, 164) think they have found it in the Bay of Biscay. It is possible that these determinations or some of them at least are correct though I am not altogether sure about this. In the Adriatic the species in question has not been recorded (NEVIANI 1939).

Certain other localities are yet more improbable. BUSK (1886, p. 26), for instance, thinks he has found *D. hispida* at Tristan da Cuñha, and MACGILLIVRAY (1869, p. 148), WATERS (1887 a, p. 345) and others report it from various localities at the coast of Australia and New Zealand. I do not think this is correct but that some other *Disporella*-species has in these cases been mistaken for the well-known *D. hispida* (*D. echinata* or *fimbriata*?).

Disporella crassiuscula SMITT (1867, pp. 406, 482) represents some stages in the life of the zoaria of *D. hispida* (cf. JULLIEN 1888, p. 13; LEVINSEN 1891, p. 293; BORG 1930, p. 51).

What BUSK in his "Crag Polyzoa" (1859, p. 115; Pl. 18, figs 5 a—c) called *Discoporella hispida* does not seem to be identical with the recent species entitled to that name.

10. *Disporella irregularis* J. Y. JOHNSON 1897. — Locality: Madeira. — This is a very typical *Disporella* with numerous subcolonies. It was refound by NORMAN (1909, p. 282) and by WATERS (1918, pp. 33 ff.; Pl. 4, figs 2—3, 5—8) at Madeira and the Cape Verde Islands and by CALVET (1931, p. 48) in the sea off Monaco. The description and figures of WATERS, especially, give a very good idea of the appearance of this species and of the position of its brood-chambers.

As for the simple colony giving rise to the complex one described by the authors, however, we know little more than that its zoids are arranged in uniserial rays.

I wonder whether the specimens reported by CALVET (l. c.) but with no description nor any figures, do not instead belong to *D. neapolitana*, a species known to occur in the Mediterranean (cf. below).

11. *Disporella magnifica* (MACGILLIVRAY 1887 a, pp. 70 f.; Pl. 3, fig. 3; 1887 b, p. 219; 1889, p. 280; Pl. 176, figs 3, 3 a). — Occurrence: Port Phillips Head, Victoria, Australia. — This species, too, is described in its complex stage, the simple one being apparently unknown. From one of the figures (MACGILLIVRAY 1887 a, fig. 3 a) it will seem that the zoids are arranged in biserial or triserial rays, though from the description given it is evident that through the formation of new discs a certain irregularity in this arrangement might be caused. MACGILLIVRAY seems to be unaware of the mode in which the numerous discs or centres have originated.

12. *Disporella mediterranea* (MICHELIN). — Cf. above, under Lichenoporidae, C, n:o 4.

13. *Disporella neapolitana* (WATERS 1918, p. 36). — Occurrence: Bay of Naples. — In 1879, WATERS described and figured (1879, pp. 277 f.; Pl. 24, figs 15, 15 a, b) a

species composed of several subcolonies and obviously belonging to *Disporella*, as this genus is used here. The author identified it, obviously on insufficient grounds, with *Radiopora pustulosa* D'ORBIGNY, a Cretaceous fossil. In the work just cited, however, he thinks it better to give the recent species a new name — a very sound conclusion I should think — adopting the one here used. WATERS further points out, that the zoids in *D. neapolitana* are arranged in such a way, that "each subcolony — — — has some multiserial and some uniserial rays" —; which, as a matter of fact, implies a change of the original diagnosis, in which the rays were said to be uniserial, as they are in the fossil form alluded to.

The simple colony from which the complex one must have developed, is not known so far.

14. *Disporella octoradiata* (WATERS 1904, pp. 97 f.; Pl. 9, figs 9 a—d). — Occurrence: Antarctica (71° S). — From the description, though this is very brief and incomplete, as well as from the figures given, it seems to me that this species ought to be referred to the Disporellidae. WATERS says that the zoids are arranged in biserial rays, but I think it would be more correct to say that they are in small clusters near the central disc of the zoarium. In the specimen figured (Pl. 9, fig. 9 a) there are, as far as I can see, nine clusters, so I do not quite understand why WATERS termed his species *octoradiata*. The reference to *Defranceia* D'ORB. [BRONN] is without significance, the two forms being widely separated.

15. *Disporella pristis* (MACGILLIVRAY 1884, p. 126; Pl. figs 3, 3 a, b). — Occurrence: Port Phillip Heads, Victoria, Australia. — The zoaria upon which this species was founded were complex ones, with the zoids arranged irregularly. The simple stage is unknown so far, though WATERS (1889 b, p. 283) thinks it probable "that *L. pristis* and *echinata* are only the simple and confluent colonies of one and the same thing. It follows from what has been said above that this author considers the two species mentioned to be identical with *D. fimbriata*. This question, however, still remains open.

16. *Disporella sibogae* nom. nov. for *L. mediterranea* HARMER 1915, p. 164, *nec* MICHELIN. — Cf. under Lichenoporidae, group C, n:o 4.

17. *Disporella truncata* (PHILIPPS 1900, pp. 449 f.; Pl. 43, figs 14, 14 a). — Occurrence: Lifu, Loyalty Islands. — I have no doubt that this species belongs rather to *Disporella* than to *Lichenopora;* but both in the appearance of the zoarium, which is said to have the shape of a truncated cone, and in the disposition of the zoids, which are arranged in uniserial, radiating rays it seems to deviate so much from what is found in other species of *Disporella* that I think it probable that a separate genus ought to be formed for it. However, this may be postponed, until we know more about it. Miss PHILIPP's statement that the zoids are not raised above the surface of the zoarium is perhaps not quite correct, as the figures show that they are so, to some extent at least.

18. *Disporella violacea* (CANU & BASSLER 1927, p. 43; Pl. 9, figs 4—6). — Occurrence: Hawaiian Isles. — The figures leave not much doubt that this species should be referred to *Disporella*. It is characterised by the numerous, uniserial, elevated rays. Its authors have named it on account of the violet colour of its colonies; but this colour is common for a good many species of Bryozoa.

Species incertae sedis.

In the list given above not a few species are mentioned, the determination and position of which is more or less doubtful and often very much so. I record below some other species of this kind which I have been unable to refer to anyone of the above groups. The list is short but could easily have been made considerably longer.

1. *"Lichenopora" conica* ORTMANN (1890, p. 64; Pl. 4, fig. 24); OKADA (1923, p. 220). Occurrence: Coast of Japan. — The description and figure by ORTMANN show that this species deviates strongly both in shape and structure from other Calyptrostega, indeed, so much so that I am in doubt as to whether it should be referred to this Division at all. Possibly it may represent an early stage of something quite different from the Calyptrostega.

2. *"Unicavea" convexa* D'ORBIGNY (1853, p. 972). — Occurrence: Coast of Calvados, France. — The species is a recent one and indubitably belongs to the Calyptrostega. The zoids are arranged "par lignées irrégulières", but the diagnosis is in other respects too brief to allow a conclusion as to the position and relationships of this form, and as there is hardly any hope of it being recognised again, I think its proper place may be here. Miss JELLY (1889, p. 135) designates the species in question as a synonym of *D. hispida*. This might possibly be correct, but it is impossible to prove it.

3. *"Tubulipora" grignonensis* MILNE EDWARDS (1837, pp. 333 f.; Pl. 13, figs 2, a a—d). — The species is a fossil one; otherwise the same can be said of it as of the species next preceding. As I have pointed out above, it is not identical with what BUSK (1859, p. 116; Pl. 20, fig. 4) termed *Discoporella grignonensis*, nor with the *L. grignonensis* of RIDLEY (1881, pp. 57 f.; Pl. 6, figs 2 a, 2 b).

4. *Lichenopora grignonensis* WATERS (1887, p. 262. Pl. 7, fig. 4) is not identical with anyone of the other *grignonensis* just mentioned.

5. *"Discoporella" infundibuliformis* BUSK (1876, p. 118; 1879, p. 199, Pl. 10, fig. 19). — Occurrence: Kerguelen. — This is an initial growth of some Calyptrostegous species, possibly of *Lichenopora canaliculata* (BUSK) or *Disporella fimbriata* (BUSK), both of which occur at the same locality.

6. *Favosipora rugosa* MACGILLIVRAY (1885, p. 98; Pl. 2, figs 4, 4 a, 4 b). — Occurrence: Coast of Australia. — This is a very interesting form. Its author says that "it is evidently allied to *Densipora corrugata*, and there can be no doubt that they belong to the same family as *Discoporella*" [= *Lichenopora* + *Disporella*]. In another memoir (1933, pp. 342 ff.). I have shown that *Densipora* ought to be referred to a separate family within the Heteroporina; and I am not at all sure that *Favosipora* belongs to the Calyptrostega either, though this may be possible. The species is thus in strong need of reexamination.

Species that have been referred to Calyptrostega but that do not belong there.

1. *Discosparsa annularis* HELLER (1867, p. 46). — Occurrence: the Adriatic. — According to NEVIANI (1939, p. 77) this is no *Lichenopora*, as it has for a long time been thought to be (cf., for instance, Miss JELLY 1889, p. 133), but is instead a variety (var. *annularis*) of the well-known *Diastopora patina* (LAMARCK). BUSK (1875, p. 34) thought

it was probably identical with *Lichenopora mediterranea* MICHELIN, but this is clearly wrong.

2. *Tubulipora complanata* MENEGHINI 1844, p. 5. — Occurrence: the Adriatic. — Just as the preceding species this is a *Diastopora*, though it is uncertain to which species it belongs. I see no reason whatever to refer it to *D. latomarginata* D'ORBIGNY, a recent species from Australia, as WATERS (1879, p. 272) has done and after him Miss JELLY (1889, p. 82) and others. BUSK's supposition (1875, p. 33) that it is identical with *Lich. radiata* AUDOUIN is obviously not correct.

3. *Lichenopora fava* O'DONOGHUE & O'DONOGHUE (1923, p. 16; Pl. 1, fig. 9). — Occurrence: Vancouver Island Region, W. Coast of N. America. — The zoaria of this species represent a circular inflation consisting of honeycomb-like individuals, not raised over the surface of the zoarium. The brood-chamber is said to form "an inflation of the central region"; its aperture was not found. Any difference between zoids and alveoli is not mentioned. So far as I can see there is not much to indicate that this species should belong to the Calyptrostega, rather the contrary. It is a pity that its authors were not able to make a more thorough study of it. Perhaps it may represent an early stage of a species of *Heteropora*.

4. *Lichenopora prolifica* JULLIEN (1903, p. 119; Pl. 15, fig. 2). — Occurrence: Bay of Biscay. — Both from the description and the figure it seems to me clear that this is no Calyptrostegous species at all, but I am not prepared to say where it ought to be placed.

5. *Actinopora regularis* D'ORBIGNY (1853, p. 763; Pl. 763, figs 7—9) = *Lichenopora regularis* HINCKS (1880, pp. 479 f.; Pl. 68, fig. 11). — The species is a Cretaceous fossil, later on reported by HINCKS as occurring off the Shetland Islands, where the specimen was dredged by NORMAN. LEVINSEN (1914, p. 623; 1916, p. 471) has recorded it from Greenland and OSBURN (1912, p. 276) from Labrador (cf. BORG 1930, p. 520). WATERS (1918, p. 38), who has found fossil specimens which were fertile and was thus able to study the brood-chamber, states that "it is not *Lichenopora* but *Defrancia*". An inspection of the figures cited gives the result that the former part of this statement at least is correct, there being no alveoli; but if the latter part of it is so, too, seems to me dubious. I have no intention, however, to go further into that matter here.

Fam. **Lichenoporidae** SMITT, char. emend.

Syn: *Lichenoporidae*, part., SMITT 1867, p. 405; *Caveidae*, part. D'ORBIGNY 1853, p. 922; *Discoporellidae*, part., BUSK 1875, p. 30; *Galeidae*, part., JULLIEN 1888, pp. 8, 82; *Lichenoporidae*, part., HINCKS 1880, p. 471; PERGENS 1889, p. 378; HARMER 1915, p. 153; BASSLER 1935, p. 13; auctt.

Zoarium discoid or sometimes (according to the nature of the substratum) more irregular in shape, mostly flattened, sometimes subconical or even cylindrical, surrounded by a "lamina" of varying breadth. Zoids arranged quincunxially or in uniserial or biserial, triserial or multiserial rays radiating from centre, that is free from zoids; between the zoids or rays of zoids and filling the centre of the zoarium there are alveoli, e. g. polygonal coelomic spaces, separated by calcareous bars and often confluent so that larger cavities are formed. New alveoli are formed (i) at the growing edge of the colony, and (ii) by new bars originating upon the old ones; secondary, tertiary etc. alveoli thus coming into existence. Brood-chamber a zoarial coelomic cavity formed by the confluence of a number of alveoli and originating already at a quite early stage in the life of the zoarium, by which the brood-chamber comes to fill up the centre of the zoarium, eventually stretching out lobes in between the zoids or rays of zoids. In the brood-chamber several zoids, one after the other, lodge their sets of embryos. Alveoli either open or roofed in by a calcareous film pierced by (real) pores. Pesudopores do not exist. Daughter zoaria taking their origin from near the margin of the old, original one, superimposed upon it but for the greatest part of their basal surface free.

Genus **Lichenopora** DEFRANCE, char. emend.

Syn: *Lichenopora*, part., DEFRANCE 1823, p. 256; *Melobesia*, part., AUDOUIN 1826, p. 325 (nec *Melobesia* LAMOUROUX 1812, p. 186); *Discopora*, part., FLEMING 1828, p. 530; *Discoporella*, part., BUSK 1859, p. 115; SMITT 1867, p. 405; BUSK 1875, p. 30; *Lichenopora*, part., HINCKS 1880, p. 471; BUSK 1886, p. 25; PERGENS 1890, p. 382; WATERS 1914, p. 836; HARMER 1915, p. 153; BORG 1926 b, p. 184; auctt.

For further synonymy, cf. BASSLER 1935, p. 139.

Genotype: *Lichenopora turbinata* DEFRANCE 1823, p. 256.

The only genus.

GREGORY (1909, pp. 233, 247) has criticized the reference of recent species to *Lichenopora*, because the genotype, *D. turbinata* DEFRANCE (selected by D'ORBIGNY 1853, p. 963) has its apertures (the cystids are meant) "in elliptical radial bundles, and not in single radial lines". Species that show the latter arrangement of their cystids should, in GREGORY's opinion, not be referred to *Lichenopora* but to *Discocavea, Melobesia* or *Disporella.* GREGORY's views in this respect are opposed by PERGENS (1890, p. 379) and by HARMER (1915, p. 154). The latter author does not feel convinced that the arrangement of the zooecia in radial lines or otherwise can be adopted conveniently for the generic separation of recent species.

The review made above seems to me to show that the arrangement of the zoids is, in all probability, a useful character when trying to separate generically the species within Lichenoporidae. When I have not proposed the use of different genera for the different groups of species reviewed above, the reason is that most species are as yet too incompletely known and that, therefore, it is not possible always to decide to which genus they should conveniently belong. For this reason I think it best at present to retain *Lichenopora* for all members of the family, apart from the mode of arrangement of the zoids.

1. **Lichenopora canaliculata** BUSK 1876.

Pl. 16, figs 2, 3.

Syn: *Lichenopora canaliculata* BUSK 1876, p. 118; 1879, p. 199, Pl. 10, figs. 12—14; *Lichenopora canaliculata* KIRKPATRICK 1902, p. 289; *Lichenopora grignonensis* RIDLEY 1881, p. 57, Pl. 6, fig. 2 (nec *Tubulipora grignonensis* M. EDWARDS 1838, p. 333, Pl. 13, fig. 2; nec *Discoporella grignonensis* BUSK 1859, p. 116, Pl. 20, fig. 4 a, b, c; ? *Lichenopora grignonensis* WATERS 1887, p. 262; Pl. 7, fig. 4; *Lichenopora fimbriata* BORG 1926, p. 184, and elsewhere.

My material of this species has been very rich.

Zoarium discoid or oval, slightly convex. Zoids arranged in quincunx or irregularly placed, never forming connate series and only seldom and accidentally here and there quite short non-connate ones. Zoids protruding above the level of the zoarium to a varying degree according to the actual development of the alveoli. Usually the older zoids near the central area protrude much more than the younger ones near the edge, particularly when the central area is depressed. Frontal side of cystids, i. e. the side facing the central area, typically though not always with two or three parallel fillets — very seldom with only one — running up to the border of the aperture, where each ridge ends in a calcareous projection which is sometimes forked, the central (frontal) rim of the aperture thus being prolonged into 2—5 pointed processes. Basal half of rim in younger zoids deeply sinuated but in older and more centrally placed ones usually (though not always) entire or nearly so. In latter case aperture longitudinally oval, being somewhat compressed from both sides. Lower down on the fillets, on their way up to the aperture, there are sometimes one or more spines. These vary in length but are short in most cases. Numerous alveoli fill up whole of central area as well as interspaces between the zoids. They are of varying appearance according to the stage actually attained by the colony in question; but there are two characteristics that practically always are present. The first is that all the aveoli except the young ones near the budding edge (which are open) are roofed in by a porous cryptocyst, the other that in the central portion of the zoarium a dense network of secondary alveoli is developed on top of the primary ones. Secondary alveoli large and especially well developed around the base of the zoids projecting from out of the mass of (primary) alveoli. Here and there at the intersection of two interalveolar septa a spine may occur. Spines of this kind may be lacking altogether in many zoaria, while in others they are rather numerous. Brood-chamber occupying central portion of extrazoarial coelomic space. Number of apertures of brood-chamber corresponding to number of fertile zoids existing. There is always an aperture in immediate neighbourhood of each fertile zoid. Aperture of brood-chamber very characteristic in shape, being formed like a helmet or a funnel facing horizontally. The opening proper which is transversely oval, is slightly smaller than that of a zoid, and is surrounded by a broad rim, constituting the helmet and making it to a rather conspicuous formation easy to ascertain both in young and old colonies when existing.

Measurements in μ.

1) Diameter of fully developed circular (fertile) zoarium 1 400—6 300.
2) Diameter of aperture of autozoids 140—160 × 80—100.
3) Diameter of aperture proper of brood-chamber 100—120.
4) Diameter of aperture of brood-chamber (measured from rim to rim) 260—280.

The zoarium is somewhat varying in shape but mostly discoid and but slightly convex. Oval zoaria may occur, but so far as I have found they are the result of two neighbouring zoaria having become confluent. Young zoaria are often rather strongly convex while large ones are, on the other hand, sometimes unusually flattened or even a little depressed in the centre — which I think explains the disagreement between the statements of BUSK (1879, p. 199) and RIDLEY (1881, p. 57) as to this matter; but most colonies hold the middle between these two extremes. In this respect the zoaria shown in Pl. 16, figs 2 and 3, are typical.

The basal lamina, fixing the zoarium to the substratum, is normally flat; but when the substratum is uneven, a number of short, blunt projections are developed from its basal side, obviously in order to make a stronger attachment possible for the colony. As regards most colonies one has the impression that the part of the lamina that surrounds the budding edge is rather narrow, as stated by RIDLEY (l. c.), and that the incipient interzoidal walls, originated within the budding zone, continue as radiating lines to its border. This is, however, not exactly the case. The lamina is in its peripheral portions exceedingly thin and becomes therefore most easily broken; but where this has not occurred, the lamina is broad and the radiating lines (the incipient interzoidal walls) disappear before reaching its margin. The frontal side of the lamina is finely granulated and here and there small calcareous knobs are seen. Formations of the same kind are often observed in the interior of the developing cystids and alveoli or on the outer side of their walls.

Both the knobs and the radiating lines just mentioned are sometimes stated by different authors to be characteristic of a certain species or another; but so far as I know they are common for most if not all Calyptrostega. No one of the species within this Division that I have examined lacks them, which is, moreover, quite natural, at least regarding the radiating lines. The mode of development of the zoarium makes of course the existence of calcareous knobs, etc., both inside and outside the cystids and alveoli very easily explainable.

The arrangement of the zoids is characteristic, for no radiating series exist as in so many other species. When BUSK (l. c.) says that the zoids are "very irregularly uniserial" he obviously intends to state that they are not in connate series, as is very clearly shown by one of his figures (BUSK, op. cit. Pl. 10, fig. 13); and when RIDLEY (l. c.) points out that they are "partially arranged in radiating series (the series generally interrupted by the occurrence of intermediate cells [alveoli])", the part of the statement that is of any importance is that contained in the words in brackets. The zoids are normally in quincunx, though this arrangement may sometimes be disturbed, the zoids then becoming more irregularly placed. This is well shown in Pl. 16, fig. 2, where the zoids nearer to the margin are quincunxially arranged, while those in or near the centre are more irregularly scattered.

The zoids near the margin do not protrude above the level of the zoarium or but slightly so. Gradually as the distal portions of the cystids become forced inwards through the formation, all round the margin, of new incipient zoids, however, they complete their growth and begin, therefore, to protrude more and more above the ensemble of the alveoli. It follows that the cystids protruding most are found nearest to the centre of the zoarium. This arrangement is often stated to be characteristic of some species or other; and RIDLEY (l. c.) dwells upon it when describing the present species. It occurs, as a matter of fact, in all members of the Division, though it is more or less strongly pronounced in different species. As for *L. canaliculata*, we see in Pl. 16, fig. 2, that the centrally placed zoids, though longer than the other ones, do not protrude very much. This I think to be a typical case; but it is not unusual, especially in fertile colonies, to find even the central zoids only very slightly protruding, as in Pl. 16, fig. 3 (to the left). On the other hand, in the largest zoarium I have seen, measuring 6.3 mm in diameter and a very fine one, the distal portions of the cystids protruding above the level of the alveoli are quite unusually long. The different aspect depends, above all, on the actual state of the brood-chamber.

Ridley (l. c.) lays stress upon the fact that the entire front of the "peristome" is wanting, its "posterior" part being horseshoe-shaped. By this statement he refers to the fact that while the zoids are obliquely arranged, their apertures face horizontally outwards. The arrangement may be understood "by imagining a number of the quills of quill pens to be arranged in an obliquely vertical position" (Harmer 1896, p. 76). This is, however, again a character that is common for most if not all Calyptrostega. Jullien (1888, p. 82), observing this shape of the aperture, once proposed a new family, the Galeidae, for those species the cystids of which were "prolongées sur une partie seulement de leur orifice par une sorte de visière (*galea*), soit entière, soit decoupée"; but, as Waters (1904, p. 97) has remarked, this family is of course wholly superfluous.

In *L. canaliculata*, moreover, the conditions are not so uniform as Ridley (l. c.) supposed. In the young zoids near the margin the central (frontal) side of the aperture is more or less exserted, while the marginal (or basal) half of it is deeply incised. In the more centrally placed zoids the cystids may sometimes have a similar shape; but it is common in these zoids that the marginal (basal) rim of the aperture is entire, i. e., that it is not incised. As the cystids are somewhat compressed laterally — a character which, too, is common for several species of the genus and has been observed, for instance, by Harmer (1915, p. 157) for *L. novae-zelandiae* (Busk) — the apertures thus are longitudinally oval, while otherwise their shape is varying.

The exserted central (frontal) margin of the apertures when uninjured is produced as a rule into two pointed processes, as can be seen in Pl. 16, fig. 2, in several places. These prolongations correspond each to one of the two ridges running parallel to each other up the distal portion of the cystid. It seems to be rather seldom in the present species that there is only one single protuberance, just as the longitudinal ridges when discernible are usually two; but on the other hand the protuberances like the ridges are sometimes three. The two lateral protuberances in such a case may be forked, while the middle one remains undivided, by which the number of the pointed processes thus becomes five. Four may likewise occur, when one only of the apertural projections has divided. It may be added that, as mentioned by Ridley (l. c.) the projections alluded to may be provided, in their turn, with fine, spine-like processes, proceeding laterally on both sides of them.

The variance as to the shape of the aperture is still augmented through the fact, that the prolongations here discussed become affected in many cases by degenerative and regenerative processes, or these may affect the whole of the distal portion of one or more cystids. I quite agree with Waters (1889, p. 281) and Harmer (1915, p. 157) as to the variability of this portion of the cystids and, particularly, of the shape and armament of the apertures in different species of *Lichenopora*.

In Pl. 16, figs. 2 and 3, we see that though a central area from which the zoids radiate in all directions is well discernible, this is not wholly deprived of zoids and there is not, as seems to be the case in several other species, a sharp limit between a central area free from zoids, on the one hand, and a marginal zone where the zoids occur, on the other. This becomes yet more evident, when zoaria representing different stages of development are studied. In quite young colonies, where the lamina has obviously only just been widened so as to cover and conceal the pro-ancestrula, the central area is quite small, while in large ones it has reached, as a rule, a considerable extension. The explanation of this fact can be but one, viz. that a number of centrally placed zoids have disappeared, the distal portions of their cystids having become absorbed and the rest having presumably been overgrown and covered by fresh developed alveoli. The zoids visible in the central area of fig. 3, Pl. 16, for instance, are such that have not yet been overgrown but are sooner or later to be so. As a matter of fact one can frequently observe one or two of the centrally placed zoids, the apertures of which are almost level with the surface of the central area. It would probably soon have become altogether invisible by the continued growth of the alveoli.

The alveoli, that surround the zoids on all sides and fill up the central area, form three zones, which are easy to ascertain both in fig. 2 and fig. 3 (Pl. 16). Near the margin all alveoli are widely open. Then follows an intermediate zone, where the alveoli have been closed by means of a calcareous roof (a cryptocyst) pierced by pores. There is no sharp limit between this and the third zone, occupying the central portion of the colony and characterized by the development of secondary alveoli on top of the roofed primary ones.

As is natural, there is much variance as to these zones in colonies of different age. The first and outermost of them is always present though in large zoaria it forms a relatively narrow zone just inside the border of the zoarium. In quite young zoaria, on the other hand, it is the only zone existing so far. Even at this stage it may be correctly designated as marginal, for it forms an annular zone around the small central area, the coelomic space of which is not, in *L. canaliculata*, divided into separate alveoli. This seems to be contrary to what occurs in most species of *Lichenopora* (cf. Borg 1926 b, p. 315) but it is in accordance with what was found by Harmer (1915, p. 156) in *L. novae-zelandiae*. The central space soon acquires a calcareous roof and at the same time the roofing in of the innermost ones of the marginal alveoli begins, the second and intermediate zone thus originating. As the zoarium increases in width, the intermediate zone becomes gradually broader. In Pl. 16, fig. 2, it is quite conspicuous. It is characteristic that in this species (and in some others as well, as, for instance, in *L. verrucaria*) the calcareous cryptocyst forming the roof of the alveoli is never formed in an iris-like way as in many other species (cf., for instance, *L. novae-zealandiae*, Harmer 1915, p. 159) but the calcareous layer comes into existence simultaneously over the entire roof, at first as an extremely thin calcareous film which then grows rapidly thicker, though it never becomes very thick. It is pierced by numerous small circular pores (cf. Borg 1926 b, p. 401, fig. 99).

The third zone, that of the secondary alveoli, begins to develop at a rather early stage in the present species. The central area has only just acquired its calcareous roof, when a network of calcareous bars — the beginning of the secondary alveoli — becomes visible on top of it; and this may happen even before the innermost of the marginal alveoli have become roofed in. The first to occur of these bars are usually those surrounding the distal portions of the centrally placed cystids. At later stages we find accordingly the largest secondary alveoli at these places (cf. Pl. 16, figs 2 and 3).

The secondary alveoli develop rapidly and soon the whole of the central area is covered by a network of calcareous bars. At the bottom of each secondary alveolus there are, as a rule, several pores. The roofed-in alveoli of the intermediate zone become covered in due course through the continuation of the same process, and it often occurs, here and there in a zoarium, that the third zone, that of the secondary alveoli, very nearly meets the first or marginal zone, that of the open alveoli, as can be seen in Pl. 16, fig. 3 (to the left).

In old colonies the secondary alveoli become in their turn closed by a calcareous roof and new (tertiary) alveoli are formed on top of them in the same way as the secondary ones. The tertiary alveoli are smaller than the secondary ones and their walls are thicker, being more strongly calcified. It deserves further to be mentioned that the walls of the alveoli of the marginal zone become much stronger calcified gradually as the zoarium increases in width, their openings being smaller and more rounded. The appearance of the whole zoarium becomes considerably changed through these processes, it being at this stage not dissimilar to some species of *Disporella*. I am convinced that many species within the Calyptostega have been founded upon different zoarial stages of one and the same form.

In most Stenolaemata there are no special difficulties met with when studying the brood-chamber, as this has a definite shape, that is usually easy to make out. In the Heteroporina this is not so; and in the Calyptrostega the difficulties are much augmented. The brood-chamber of most *Lichenopora*-species is constituted as we know simply by the ensemble of the cavities of a number of alveoli. In *L. canaliculata* it is formed by the cavity of the central area, not divided into separate alveoli, together with the cavities of the primary alveoli (of the intermediate zone) that have later on been incorporated with it. Eventually secondary, etc., alveoli may become incorporated. The limits of the brood-chamber are therefore all but definite. When the reproductive period is at its height, numerous alveoli have coalesced with it and the whole of the central area is often distinctly swollen. But when the larvae have performed their development and fresh broods no longer are produced, the roof of the central area of the zoarium, i. e., of the brood-chamber, usually degenerates and a new one is formed at a considerably lower level, the central area assuming a depressed appearance. Though I have no direct evidence of it I think it probable that a number of alveoli come into existence again during this period at the periphery of the central area, the colony gaining strength by means of the calcareous walls formed for this purpose. The occurrence of what he calls "secondary ovicells" is stated by HARMER for *L. verrucaria* (1896, p. 132) and for *L. novae-zelandiae* (1915, pp. 156 f.) and in all probability this is a general occurrence in the Calyptrostega.

The aperture of the brood-chamber is as we know a modified alveolus formed in the immediate neighbourhood of a fertile zoid. In an earlier memoir (1926 b, pp. 398 ff.) I have described at some length the way in which it develops.

The fully developed aperture of the brood-chamber is a conspicuous formation (Pl. 16, fig. 3, gzap). So far as I am able to judge after the examination of numerous apertures, it is very constant in shape. The broad lip surrounding the real aperture proper is found in several other species of *Lichenopora* as well. Possibly it may be assumed, therefore, to fulfil some protective purpose.

L. canaliculata seems to be a common species in the littoral zone of Antarctic and Sub-antarctic waters. I have seen some hundred zoaria from several localities within the named areas. Most of the colonies were on kelp, while others were growing on the shell of a *Patella*-species, on Ascidians, and on some erect Cheilostomes.

Occurrence: Swedish Antarctic Expedition 1901—1903: Cumberland Bay, South Georgia, shallow water, 23. IV. 1902. — Grytviken (Pot Bay), S. Georgia, 22. V. 1902, on kelp at the shore. — The same, 23. V. 1902, on kelp near the shore, on compound Ascidians growing on the kelp leafs and on some specimens of a *Patella*. — St. 4: On some stalked compound Ascidians. — St. 5. On a compound Ascidian, on *Flustra* sp., and on kelp. — St. 17.—St. 26. — St. 27 On algae. — St. 28. — St. 29. On algae. — St. 55. — St. 94. On some Cheilostomes (*Cellaria* sp., *Flustra* sp.)

Distribution: Swain's Bay (Observatory Bay?), Kerguelen (Busk 1876, p. 118; 1879, p. 199); — Sandy Point [Strait of Magellan], 9—10 fathoms, on piece of a Selachian's egg (Ridley 1881, p. 57); Kap Adare (Victoria Land, Antarctica), 8 fathoms, encrusting seaweed (Kirkpatrick 1902, p. 289). — ?? off Vaucluse Point, Port Jackson, 5 fathoms, and Bondi Bay, New South Wales, Australia (Waters 1887, p. 263).

2. **Lichenopora tubicen**, n. sp.

Pl. 16, fig. 4.

Zoarium discoidal, rather strongly convex, with a well developed basal lamina surrounding it. Zoids arranged in quincunx or with an indication of a serial arrangement, their distal portions protruding moderately above the level of the surface of the zoarium, those placed centrally not or only inconsiderably longer than the more peripheral ones. Lower (marginal) half of aperture deeply incised, upper (central) lip with 1—4 spine-like projections forming the continuations of well-marked ridges at central (frontal) side of the zoids' free, distal portions. Central area not large but well discernible, specially owing to the appearance of its alveoli; one or two zoids within it, area otherwise free from zoids. Marginal alveoli polygonal, open; intermediate ones with a thin, calcareous roof pierced by pores; central alveoli likewise closed, on top of them an irregular network of calcareous bars, constituting the walls of secondary alveoli. Brood-chamber occupying cavity of central area; its aperture placed at the edge of the area, circular, trumpet-shaped with a broad lip, facing upwards.

Measurements in μ.

(1) Diameter of zoarium 2 900.
(2) Transverse diameter of aperture of zoids 85—130.
(3) Diameter of aperture proper of brood-chamber 140.
(4) » » » of brood-chamber measured from one rim of its border to the other 260.

There is but one single zoarium of this species and I have, therefore, not much to add to the above description. This zoarium is shown in Pl. 16, fig. 4. It is fixed to part of a colony of *Crisia patagonica*, and owing to this circumstance its shape is a little irregular, part of it having sunken in between two of the branches of the *Crisia*. In the photograph one sees part of its substratum, the *Crisia*, as well.

The free border of the basal lamina is normally very broad, though in the zoarium figured it has been damaged in the greater part of its circumference. On the surface of the lamina there are numerous small calcareous granules and structures of the same kind can be observed on the inner sides of the walls of the zoids and in the interior of the alveoli, when still open, as well. I have not observed any calcareous spines projecting from the surface of the zoarium so they may possibly be lacking or may occur accidentally only.

No series of connate zoids exist. The alternate arrangement of the zoids, which seems to be normal for this species, is well seen in Pl. 16, fig. 4. On the other hand we see in this figure (to the right) that some of the zoids show an indication of a serial arrangement, one zoid being contiguous with the next one. Possibly this arrangement may be more accentuated in older colonies than in the present one, which is, in all probability, rather young. As for the shape of the zoids they are not so slender as in the preceding species, the zoids being on the whole shorter and not so compressed laterally or only inconsiderably so. The excision of the marginal half of the rim of the aperture common for most if not all *Lichenoporae* is strongly marked. Only in some of the central zoids this border is about level with the central border, the aperture thus becoming almost circular. As for the central half of the border, two prolongations, one at each of the central corners of the aperture may be found; but mostly the projections are 3—4 in number. They are of about equal strength and correspond to the number of the ridges running parallel along the wall of the cystid (cf. Pl. 16, fig. 4).

The three zones of alveoli described in the preceding species are well discernible here as well. The marginal alveoli originate through calcareous bars developing between the zoids connecting them with one another and thus considerably strengthening the zoarium. The alveoli, i. e. the cavities enclosed by these bars, are widely open and, therefore, polygonal in shape. When growing older the alveoli acquire a calcareous roof, by which they rapidly become completely closed. This is true of the alveoli both of the intermediate zone and of the central one. The roof is pierced by circular pores, which are, however, rather few and occur mostly near the circumference of an alveolus. The secondary alveoli are well seen in the colony reproduced (Pl. 16, fig. 4). They are quite small here, their walls forming an irregular network. These walls surround the pores which become thus situated in the bottom of the secondary alveoli. As is natural the alveoli are very well developed around the bases of the zoids' protruding portions but they are not so large by far here as in the species preceding. We should be careful, I think, not to draw any special conclusions from the appearance of the secondary alveoli in the specimen here described, for it is very probable that it might be altered with the increasing age of the colony. I should like to call attention to the fact, however, that there is an obvious difference regarding the secondary alveoli in the zoarium discussed, on one hand, and in young fertile zoaria of about the same size in *L. canaliculata*, on the other, those of the latter species being as a rule larger and much more conspicuous.

The aperture of the brood-chamber holds about the same position as in the preceding species but is very easily distinguished from it both by its shape and by facing upwards instead of horizontally (Pl. 16, fig. 4, gzap). Moreover, the lip surrounding the aperture is not as broad as in *L. canaliculata* and its shape is different.

L. tubicen must no doubt be considered as rather closely related to *L. canaliculata*. Owing to the shape of the cystids, the somewhat different appearance of the alveoli and the different shape of the aperture of the brood-chamber I think, however, that there cannot be much doubt as to its specific distinctness, though more material is desirable in order better to establish the characters distinguishing it.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 95. On a zoarium of *Crisia patagonica*.

3. **Lichenopora lovéni**, n. sp.

Pl. 16, figs 5, 6.

Zoarium saucer-shaped, its marginal lamina curved more or less upwards, its central portion but slightly elevated. Diameter of fully developed zoarium 5—6 mm. Zoids arranged in radiating, though somewhat irregular uniserial rays all around a small central area free from zoids. The zoids of a ray may sometimes be connate in the central half of the ray but mostly they are not. The more centrally placed zoids protrude strongly, the length of the distal portion of the zoids gradually diminishing in the direction peripherally. The central (frontal) half of the border of each aperture exserted into a long, pointed process, the longer the more centrally the zoid in question is situated but quite distinct even in the marginal zoids when uninjured. The marginal (basal) half of the aperture is only slightly above the surface of the zoarium or, in zoids near the periphery, about level with it. Marginal alveoli open, with rounded openings; intermediate ones open or closed by a porous calcareous film; those filling up the central area usually closed, eventually a network of secondary, etc., alveoli on top of them. Brood-chamber occupying central area, its cavity constituted by the cavities of confluent alveoli. Aperture of brood-chamber situated at edge of central area, close to the innermost zoid of one of the rays, oval in shape, not surrounded by any lip.

Measurements in μ.

(1) Diameter of zoarium 4 900—6 000.
(2) » » excised (normal) aperture 90—110.
(3) » » entire aperture (cf. text) 100 × 120.
(4) » » aperture of brood-chamber 120—130 × 80—90.

The material before me consists of three zoaria and of some fragments of a fourth one. The largest of the zoaria measures almost exactly 6 mm in diameter, while the smallest one is 4.9 mm. The third one holds the middle between these two extremes. Both zoaria are oval in shape, though a little irregularly so owing to the nature of the environment (cf. Pl. 16, figs 5 and 6). They are fixed to the substratum — some thread-like algae — by the central portion of their basal side only, the whole of the marginal zone, the lamina inclusive, being free. Just as in *L. canaliculata* there are some blunt projections from the basal side of the lamina obviously for the purpose of a better attachment. The curving of the lamina, to the effect that the zoarium becomes more or less distinctly saucer-shaped, may occur to a very varying degree in different portions of a zoarium. Thus we may observe in Pl. 16, fig. 6, that the left side of the lamina and its lower edge (on the fig.) are very sharply curved while on the right side and along the upper border the condition of the lamina is different. As we see in Pl. 16, fig. 5 (to the right), the marginal lamina when uninjured is very broad. It is provided with a large number of very densely scattered calcareous granules that so far as I have been able to make out are to be found on the whole of the lamina, i. e. not only on its free, marginal portion but on that part as well that has been constricted by and is now the "bottom" of the different zoids. On the other hand no spines have been observed, either springing from the lamina or from the zoids or the walls of the alveoli.

The arrangement of the zoids in radiating series is very distinct and cannot fail to be observed (cf. Pl. 16, fig. 5 and, especially, fig. 6), though the zoids of a series are not, as a rule, connate with one another. I have not observed any biserial or multiserial rays. On the other hand, irregularities of growth may occur here and there in the zoarium, rendering some of the series indistinct. Further, owing to the fact that the zoids originate in quincunx, the series cease a little distance from the edge. This is well seen both in fig. 5 and fig. 6, of Pl. 16, and, perhaps, especially so in the latter one. The same condition can be observed in many other *Lichenoporae* with serially arranged zoids, possibly in all of them. New series are intercalated here and there, near the margin, between two older ones; but the zoaria at hand are not sufficiently large to render this process conspicuous, though it is quite easy to observe. The number of the primary series, i. e. those reaching the central area, amounts to 12 in the larger and to 11 in the smaller of the two zoaria examined.

The shape of the cystids may be said to be somewhat unusual even for a member of this family. They protrude very strongly above the surface of the zoarium, indeed, even more so than is revealed by an inspection of Pl. 16, figs 5 and 6. The projection is caused mainly by the central half of the wall of the cystid being enormously prolonged. I think the actual state of matters is better described by these words than by saying that the rim of the aperture is provided with a pointed process, for what occurs is that the whole of the central half of the wall of the cystid grows out so as to form a long process tapering above.

The processes are easily distinguishable even in the young zoids not yet detached from the marginal budding zone (cf. Pl. 16, fig. 6, to the left), though they are not so long here. They are sharply pointed. Along their median line there is a ridge terminating in the top of the long protuberance. A little lower down there is, on each side of the ridge, a wing, consisting of a thin, calcareous film and forming the rest of the central (frontal) half of the wall of each cystid in this region.

In the zoids intermediate between the marginal and the old centrally placed ones the said projection is considerably longer and much stouter and the ridge terminating in it has been transformed into a thick though blunt keel forming the median portion of the zoid's central (frontal) wall. The "wings" are thicker, too. They are variable in shape. Sometimes they run along both sides of the projection, the rim thus formed becoming gradually thinner and narrower, until it disappears a short distance below the top; but in other cases the wings are of about uniform breadth until they cease abruptly, being cut off transversely.

In the fully developed, centrally placed zoids the protuberance, if not damaged, is still longer. It is interesting to note however that it has not seldom been absorbed so this part of the zoids is level now with the "wings", the distal end of the cystid thus being formed by the transversely cut ends of the wings and the end of the thick, blunt ridge between them.

I have observed that the calcareous wall forming the central (or frontal) half of the cystids, protruding above the level of the surface of the zoarium, consists of two layers, an inner and an outer one covering the former. This outer layer in young zoids does not reach high up the distal portion but it grows gradually higher until in the fully developed zoids both layers are level with each other. I think this structure is well worth mentioning, as it shows a remarkable resemblance to the so-called lunarium of certain fossil Paleozoic Bryozoa commonly referred to the Trepostomata (*Crepipora*, *Ceramopora*, etc.) and possibly has some bearing upon the conception of its real significance.

The marginal or basal half of the cystids is much shorter than the central (frontal) one, the border of this half of the aperture in the young, marginal cystids being level with the surface of the zoarium and in the somewhat older, intermediate ones but slightly higher. Even in the centrally placed cystids the marginal border of the aperture is often very low down, so that the aperture has a rather peculiar form (cf. Pl. 16, fig. 6).

If some of the older cystids of a series are connate with one another as sometimes happens, the lower border of the aperture is of course a little higher. However, the cystids are never connate throughout, the long pointed process of each cystid always being separated from those of the others.

In some cases it may occur that the lower lip of the aperture is entire, that is, that it is not excised, and that the projection of the central (frontal) one has been more or less completely absorbed. In such cases the aperture is longitudinally oval, owing to the fact that the cystids are somewhat compressed from both sides.

I have observed that, in several cases, centrally of the oldest (innermost) cystid of a series the remnant of another cystid connate with the said one is left. Its condition may be varying, its protruding portion being absorbed to a different extent in different series. The existence of these rudimentary cystids indicate, I think, that the central area was quite small when the colony was young, and that it has been widened gradually as the zoarium has grown larger through the degeneration and absorbtion of the innermost cystids of the radiating series, one after the other.

The alveoli of the marginal zone are always open; but as the calcification is much stronger here than, for instance, in *L. canaliculata*, their lumen is rounded, not polygonal (cf. Pl. 16, fig. 5, below). Around the circumference of each alveolus numerous small calcareous spicules can be ascertained projecting into its cavity; this, however, is in no way remarkable, occurring, as a matter of fact, in a great many (if not in all) species of the Calyptrostega.

The intermediate zone comprises the alveoli that are situated between the rays of zoids and, particularly, those of the inner (central) half of that space (Pl. 16, figs 5, 6). The alveoli are arranged here in two rows, as a rule, between each two series of zoids, the alveoli of each row alternating with those of the other. The alveoli of this zone may still be open, though the opening is then much smaller than in the marginal alveoli. When existing, the opening is circular. Not a few alveoli within this region, however, and usually those more centrally placed, are completely closed, a calcareous film having developed so as to form a roof where formerly the circular opening was (cf. Pl. 16, figs 5, 6). The roof is pierced by a few rather large pores, rounded or oval in shape.

The majority of the alveoli of the central zone are closed in the same way as just described. Here and there, even in the central area, there is, however, an open alveolus, and this is specially true of many of those surrounding the innermost zoids of the rays (cf. Pl. 16, figs 5 and 6). The roof of the central alveoli being on the whole thicker than that of the intermediate ones, the pores piercing it are smaller and more exactly circular.

In one of my colonies (Pl. 16, fig. 5) there is a layer of smaller alveoli on top of those just described. I do not think that these are secondary in the strict sense of the word —

a broken fragment of another colony of about the same size, where an inspection of the interior of the zoarium was possible, has given me the impression that they would rather be of the 4th or 5th order — but they have the same appearance and obviously have developed in the same way as true secondary alveoli. They are smaller on the whole than those previously existing, upon which the walls separating them form an irregular network with rounded meshes. The walls of these alveoli and of those previous to them do not coincide.

The brood-chamber is, so far as I have been able to ascertain, a rather large cavity, brought into existence through the confluence of numerous alveoli within the central area and the central portions of a number of interserial alveoli. In one of the brood-chambers inspected there are three layers of small, closed alveoli one beneath the other, while in another one there are two. The floor of the brood-chamber is smooth. It is pierced by numerous pores and the same is true of the walls separating the brood-chamber from the neighbouring alveoli not consumed. In the walls of the zoids passing like pillars through the cavity of the brood-chamber the pores occurring form uniserial rows.

The aperture of the brood-chamber I have seen in only two cases. One of these is shown in Pl. 16, fig. 5. In both cases the aperture is a widely open alveolus, oval in shape and a little larger in diameter than the aperture of a zoid. It is quite near to the innermost zoid of a ray, so it is obviously one of the alveoli normally surrounding such a zoid that has been modified so as to form the aperture of the brood-chamber. The position of the aperture thus is on the verge of the central area; but it may be assumed that other alveoli can be modified in the same way and that the place of the aperture, therefore, may vary. Contrary to what is the case in many other species of *Lichenopora* it is just level with the surface formed by the ensemble of the roofs of the other alveoli and it has no lip at all, though its rim is somewhat thickened. I am not sure, therefore, that the apertures here described really were complete, though they have appeared to me to be so.

So far as I have found, this species has not been described before. I have named it in honour of the famous Swedish zoologist SVEN LOVÉN.

Occurrence: Swedish Antarctic Expedition 1901—03: St. 59. On algae. — St. 60. On an incrusting Cheilostome.

4. **Lichenopora elegantissima** n. sp.

Pl. 16, fig. 7.

Syn: ?? *Discoporella echinata* MACGILLIVRAY 1884, p. 127; ?? *Disporella spinulosa* JULLIEN 1888, p. 83.

Zoarium oval, its central portion moderately convex. Diameter of fully developed zoarium 3—4 mm. Marginal lamina, walls of zoids and walls of alveoli with numerous, erect, calcareous spines. Zoids in quincunx or sometimes more irregularly arranged, moderately protruding; those placed centrally only slightly longer than intermediate ones, on account of which the relatively small central area does not appear sharply limited, especially as the alveoli of the intermediate and the central zones are very similar to one another. Distal portion of cystids with three longitudinal ridges, in young cystids distinct but in older ones indistinct, running parallel as far as the border of the aperture. This exserted into three or, sometimes, four or five narrow pointed processes, most distinct in the marginal cystids. Most alveoli usually open, marginal with oval openings, intermediate ones with circular; central alveoli closed only when a brood-chamber is formed. Brood-chamber occupying part or the whole of central area. Aperture of brood-chamber situated at edge of central area, funnel-shaped, facing upwards.

Measurements in μ.

(1) Diameter of fully developed, fertile zoarium 3 300—5 000.
(2) Diameter of another (not fertile) zoarium 1 760 × 1 300.
(3) Transverse diameter of aperture of autozoid 80—100.
(4) Length of protruding portion of autozoid, maximum 200.
(5) Diameter of aperture proper of brood-chamber 130.
(6) » » » of brood-chamber, with rim, 180.

I have seen only three zoaria and some fragments of one or two others. It is a little curious that all of these zoaria are oval, but I suppose this is only accidental and that discoid colonies may be formed as well. The substratum was in two cases a species of *Flustra*, but in the third one and in the case of the fragments a small Hydroid, so the reason for the shape of the zoaria cannot, obviously, be sought for in the nature of the substratum.

The basal lamina even when uninjured seems to be always narrow, the radiating lines indicating the walls of incipient zoids reaching almost to its rim. From these numerous erect spines arise, their length being about twice that of the diameter of a zoid. Here and there one or more spines may occur between the rudimentary septa as well.

The cystids of the present species are usually disposed in a rather regular quincunx; and I have not seen any series nor even an indication of any such arrangement. It is easy to distinguish them from those of *L. canaliculata*, for instance, for they are relatively shorter and, at the same time, a little broader, and they can scarcely be said to be compressed laterally (cf. Pl. 16, fig. 7). Further, I have never seen the border of the aperture exserted into one single process only and very seldom into two. Typically the prolongations are three in number and these are about equally well developed, but four may commonly occur and sometimes there are as many as five. It should be added that the side of the apertural border from which these projections spring is the central (frontal) one; the other, marginal half of the border being simply non-existent even in cystids situated centrally, that is, the border is exactly level with the surface of the alveoli (Pl. 16, fig. 7). It happens only seldom indeed that one sees, in one or two of the cystids nearest to the central area or within this, that the marginal half of the apertural rim is elevated a little above the level of the alveoli. In such cases the projections of the central half of the apertural border are more or less completely absorbed or remain merely as short and blunt processes.

Spines are very common both on the young, marginal cystids and on the older ones. They spring as a rule from about the median line or from the lateral edges of the frontal (central) side of the cystids (cf. Pl. 16, fig. 7). Moreover, minute spinous processes like fine needles or small granules project in many cystids from the border of the aperture into its cavity.

The marginal alveoli are easily distinguished between the developing zoids as they lack completely a protruding portion. Otherwise they are of about equal diameter as the apertures of the young zoids (Pl. 16, fig. 7). The walls surrounding them are strongly calcified, which is probably the reason why they are not polygonal but rounded oval. Their openings soon diminish in size, assuming at the same time a circular shape (cf. Pl. 16, fig. 7). This condition is maintained not only by the intermediate alveoli but by most of the central ones as well. The appearance of the central alveoli seems, however, to be somewhat varying. In Pl. 16, fig. 7, we see that the majority of these alveoli are open; but in one of the other colonies before me, being so young that the lamina is just about to grow over the pro-ancestrula, only 14 zoids having developed so far, some of the alveoli in the centre of the colony are roofed in and this has taken place in a way similar to that described in the species preceding. Otherwise this young colony is completely like the one reproduced in Pl. 16, fig. 7, and I have no doubt, therefore, that they both belong to one and the same species. It might be possible that the latter one represents a somewhat abnormal case, but the explanation of the facts that seems to me most likely is that in the young colony alluded to a brood-chamber is about to develop, but that the larger one is not in a fertile stage and that this is the reason why the majority of the alveoli are open here. That a period of reproductive activity has occurred in the latter zoarium is demonstrated, at the edge of the central area, by the existence of the aperture of a brood-chamber (Pl. 16, fig. 7, gzap). The alveoli visible at the surface of the colony I suppose, therefore, to be secondary ones. One of the broken fragments among my material shows, beneath the actual surface of the colony, what I think to be three superimposed stories of closed alveoli, so I have no doubt as to the existence of secondary, etc., alveoli in this species. It must be admitted, however, that the material before me is too poor to permit any positive conclusions as to the behavior of the alveoli in the different stages of growth.

Like the apertures of the zoids all open alveoli are provided with small calcareous spicules all around the opening and projecting into its cavity.

The only aperture of a brood-chamber that I have seen is the one shown in the colony photographed in Pl. 16, fig. 7. It is almost funnel-shaped and surrounded by a lip that is a little broader on one side. The shape is not at all that of a helmet, the aperture facing straight upwards.

The rich equipment with spines and some other characteristics as well, viz. the arrangement of the zoids and, to a certain extent, the shape of their apertures, are similar in this species and *Discoporella echinata* MacGillivray (1884, p. 127). Both MacGillivray and Waters (1889 b, p. 283; 1904, p. 96), who have likewise studied that species, state that it is very nearly related to *Disporella hispida* and *fimbriata* and that it should eventually be regarded identical with the latter one. As this is certainly not the case with the present species the two are probably not identical in spite of the similarities existing.

Another species that is similar to the present one in some respects is *Disporella spinulosa* Jullien; but as Waters (1904, p. 96; 1905, p. 250) states, after having examined Jullien's specimens, that they belong to *D. fimbriata* and that, consequently, *D. fimbriata* and *spinulosa* should be regarded as synonymous I think it might be concluded that the colonies here described ought to be referred to a separate species, which I consider to be new. The existence of secondary alveoli and of a brood-chamber occupying the central area of the zoarium indicate decidedly that the present species should be placed in the *Lichenoporidae*.

Occurrence: Swedish Antarctic Expedition 01—03: St. 39. On a small Hydroid. — St. 60. On a species of *Flustra*.

Fam. **Disporellidae** n. fam.

Syn: Lichenoporidae, part., SMITT 1867, p. 405; auctt.
Discoporellidae, part., BUSK 1875, p. 30.

Zoarium sometimes discoidal, oval or elongated but often wholly irregular owing to the existence of secondary colonies developed from the original one; surrounded by a lamina of varying breadth. Zoids arranged quincunxially or in simple or complex series or clusters around a central area that is free from zoids.

Between the zoids or rays and filling up the central area occur the alveoli. These are widely open near the margin but become gradually closed through the development in an iris-like way of a calcareous cryptocyst. They seem never to be completely closed, however, except when a brood-chamber is developing, in which case the roof of those alveoli that are situated within the region of the brood-chamber is transformed into a relatively thin calcareous film pierced by numerous pores. The thick walls between these alveoli become likewise absorbed by which a cavity comes into existence in which the embryos of a fertile zoid are lodged.

The number of brood-chambers in a colony that is not complex is varying, being sometimes one but most often two or more. The individual brood-chambers are separate from one another. In each brood-chamber so far is known only one fertile zoid lodges its embryos. The zoarium does not develop a brood-chamber, as a rule, until at a relatively late stage. The brood-chambers are usually placed, therefore, between the zoids or rays of zoids, though they may reach the central area and occupy part of it as well. Aperture of brood-chamber likewise placed, in most cases, between the zoids or rays of zoids. It is circular, without a lip, and there is often not even a tube; it is, therefore, often very difficult to ascertain the aperture of the brood-chamber from those of such zoids the distal portions of which have degenerated or been broken off.

Genus **Disporella** GRAY.

Syn: *Disporella* GRAY 1848, p. 138; *Lichenopora*, part., auctt.

The only genus.

Genotype (by monotypy): *Disporella hispida* GRAY 1848, p. 138.

Some authors seem to think that *Disporella* was a misprint for *Discoporella*, in which form the name was used by BUSK (1875, and elsewhere). Whether it was a misprint or not it has been correctly used by GRAY (l. c.) and it should stand, therefore, in the form used by its author. GREGORY (1909, p. 234) says that GRAY "did not use this name as that of either a genus or subgenus". Consulting the work of GRAY it seems to me, however, that it can hardly be denied that *Disporella* was applied to *Tubulipora hispida* (FLEM.) as a generic or subgeneric name. Moreover, as JULLIEN (1888, p. 83) has pointed out, BUSK's name was preoccupied by *Discoporella* D'ORBIGNY (1852, p. 472) who used it for some Cheilostomes. HARMER (1915, pp. 154 f.) who has made a very valuable review of the generic names applicable to species of Calyptrostega, arrives at a similar conclusion.

Disporella is so far the only genus within its family. I do not doubt that future researches will reveal that it includes more than one generic type, but the group has hitherto been much neglected and much work remains to be done upon it.

1. **Disporella fimbriata** BUSK 1875.

Pl. 16, fig. 8.

Syn: *Discoporella fimbriata* BUSK 1875, p. 32, Pl. 27, figs 2—4 (not fig. 1); 1879, p. 199; *Lichenopora fimbriata* BUSK 1886, p. 26; WATERS 1904, pp. 96 f, Pl. 8, fig. 20; WATERS 1905, p. 259; *Disporella spinulosa* JULLIEN 1888, p. 83 (fide WATERS); *L. fimbriata*, part., MURRAY 1896, p. 448; ?? *Lichenopora fimbriata* MACGILLIVRAY 1887, p. 219; CALVET 1904, p. 37; 1906 b, p. 467; 1909, p. 32; 1927, p. 42; 1928, p. 4; 1931, p. 47; LIVINGSTONE 1928, p. 79; *Lichenopora hispida* THORNELY 1924, p. 20; nec *Lichenopora fimbriata* BORG 1926 b, pp. 184, and elsewhere.

Zoarium discoid, subconical, or, sometimes, like a truncated cone. Basal lamina narrow. Arrangement of autozoids quincunxial, their distal portions protruding though not very much so; those nearest to the central area slightly longer than the more peripheral ones. Cystids disposed obliquely all round central area, their apertures cut off obliquely and, therefore, facing horizontally. Central border of aperture exserted, marginal border excised in young cystids to or near to the level of the surface of the colony but in older ones to a slighter degree. Central half of rim of aperture when uninjured with a varying number of long, slender, spine-like processes, in most cases 2—4, forming the continuations of longitudinal, parallel ridges running along the wall of the distal portion of the cystid, the ridges being, however, not always distinct. Ridges well distinguished in young, marginal cystids but they cannot be ascertained, as a rule, in centrally placed ones. In old cystids spinous processes at margin of aperture often more or less obliterated.

Alveoli completely filling up central area as well as space between zoids, small, rounded, uniform in shape with very thick walls; their openings circular, with increasing age gradually diminishing in size. In alveoli filling up central area opening usually quite small but never completely closed (until, in all probability, when a brood-chamber is formed). Basal lamina as well as walls of cystids and intersections of alveoli with numerous erect, scattered, calcareous spines. Brood-chamber unknown.

Measurements in μ.

(1) Diameter of smallest zoarium 1 900.
(2) Diameter of largest zoarium 3 200.
(3) Diameter of aperture of autozoids 110—120 × 70—80.

I have seen but three zoaria and a fragment of a fourth. The largest of these zoaria measures 3,2 mm in diameter, while the two others are smaller. They are all very similar to one another, with the exception that in the largest colony the central area is slightly depressed, which gives the colony the appearance of being truncated (Pl. 16, fig. 8). This may suggest that a brood-chamber has existed in this part of the colony, but there is nothing to indicate, in other respects, that this might have been the case. The other, smaller colonies show no depression of the central area and no brood-chamber nor any indication of such a one.

There is but one noticeable fact about the free portion of the basal lamina, viz. that it is unusually narrow, even when uninjured. As I have seen but few colonies, I do not wish, however, to lay much stress upon this fact which may be occasional. The erect calcareous spines rising from the surface of the lamina and, particularly, from the radiating ridges indicated on it, are rather numerous and sharply pointed though short; they seldom exceed the diameter of a zoid but are often shorter.

As we see in Pl. 16, fig. 8, the zoids are arranged in a very regular quincunx and there is no indication, in the colonies examined by me, of any serial arrangement. In the marginal cystids the lower rim of the aperture is simply level with the surface of the zoarium but as the zoids grow older and acquire an intermediate position that part of the rim becomes gradually somewhat elevated above the surface until, in the cystids immediately surrounding the central area, it is some distance above that surface. In the cystids just mentioned which are of course the zoarium's eldest ones, the appearance of the aperture is, moreover, somewhat variable, for the upper, projecting lip has often become more or less reduced and is situated, in several cases, at about the same height as the lower one, or it may be that the latter one has risen over the surface of the zoarium.

In both these cases the aperture is of a more "normal" appearance than is the rule in the Calyptrostega, being oval or even about circular and facing obliquely upwards or even straightly so. Otherwise the upper lip of the aperture is prolonged into a various number of spine-like, pointed processes, One single process occurring is uncommon and probably represents an accidental case, though it may be seen here and there near the margin, thus in quite young cystids. Two processes are more often met with, both in marginal and intermediate cystids but very seldom in the central ones. Usually they are 3 or 4, sometimes even 5 in number. When uninjured — which is, of course, not always the case — they are very long and slender.

Erect, calcareous spines are found not only on the basal lamina but on the surface of the protruding distal portions of the cystids as well. They are very common here, occurring both on the marginal and intermediate cystids and, above all, on the central ones where often about 10 spines or even more may project from one single cystid. Like those on the lamina they are, in most cases, short. Small calcareous knobs or granules are often seen in addition between them. We may remember that the calcareous wall of the cystids is a cryptocyst.

It is easy to see that the interior not only of the apertures but of the larger portion of the cavities of the cystids is fringed by minute calcareous needles or granules, which give these cavities a rather peculiar aspect. The cavities of the alveoli have a similar equipment. Suggestions have been made, as, for instance, by WATERS (1887 b, p. 340; 1889 b, p. 278, and elsewhere) as to the possible function of these and similar formations. I wonder if they do not represent a normal stage in the secondary thickening of the walls of the cystids.

By a close inspection it soon becomes obvious that such an increase in thickness of the walls of the cystids takes place, in the present species, to a very marked degree. The result is that the protruding distal portions of the cystids surrounding the central area are very much thicker — several times, I should think — than those of the young, marginal ones. In suitable light a special calcareous layer can be distinctly seen, constituting the inner side of the wall in the central half of the protruding tube. It is of a pure white colour and thereby easily distinguished from the outer, semitransparent calcareous layer forming the rest of the wall. The white layer is particularly thick in the median portion of the central half of the protruding portion. It is impossible not to be struck by the remarkable similarity between these conditions and those observed in certain fossil Trepostomatous genera, as, for instance, the Paleozoic *Ceramopora.*

The alveoli are very different from those of the members of the Lichenoporidae described above. The marginal ones are quite small. They do not take their origin in the shape of cavities, enclosed by bars, between the cystids and of about the same transverse diameter as these, as in the Lichenoporidae, but they occur as small pits or pore-like ducts here and there at the edges where the developing cystids meet. The diameter of such a minute cavity is only a small part of that of a cystid's aperture. Gradually as the zoarium grows larger and new alveoli are formed, those already existing, whose position is now an intermediate one, become deeper and the walls surrounding them augment in thickness. The thickening of the interalveolar walls is, as a matter of fact, really enormous, the alveoli being gradually transformed into small, cylindrical cavities with circular opening separated by very thick calcareous walls from their neighbours as well as from the adjoining zoids. The same appearance is maintained by the alevoli of the central area, the only difference between these and the intermediate ones being that the openings of the former are narrower yet and may even be reduced to a small round hole in the centre of each alveolus. The walls of these alveoli are slightly elevated and at the intersections short erect spines or calcareous knobs may often occur.

No secondary alveoli can be detected in any of the colonies that I have examined, no trace of any such formations occurring. I should not like to state, however, that secondary alveoli do not exist here. The shape of the zoarium, being subconical and thus with the central portion much more elevated than the marginal zone, indicates, I think, that some arrangement must have been made to fill up the space below the surface of the central portion.

In the members of the Lichenoporidae this is effected as we know through a meshwork of closed alveoli occurring, one layer on top of the other. But so far as I can see from the fragments of a zoarium broken into two halves and examined, nothing of that kind is to be found here. Instead it seems as if the space available should be filled partly through the enormous thickening of the calcareous walls of both the cystids and the alveoli and, partly, through a process of enlargement of the only existing layer of alveoli immediately below the surface of the zoarium.

There is not much doubt as to the fact that periods of degeneration and regeneration of the zoarium alternating with one another occur in the present one as well as in other species of Disporellidae; and I suppose this is when the changes of the alveoli and the enlargement of their cavities, which is actually observed, comes about. It may perhaps form an explanation for the fact, too, that, in colonies of one and the same species, the central area may be found sometimes arched and sometimes depressed.

I have not seen any brood-chamber. In the few zoaria examined by me there is no indication of such a formation; but in one of the fragments a cavity is visible just below the surface of the zoarium, between some of the zoids. This cavity seems to have come into existence through the walls of a not very large number of alveoli having been absorbed, their cavities thus having become confluent. These alveoli have been roofed in so there is an entire calcareous film covering the cavity. I suppose this structure represents an incipient brood-chamber or the remnants of such a formation. If this is correct it may indicate, (i) that the brood-chamber is located in between the zoids, not exclusively within the central area, and (ii) that the alveoli constituting the brood-chamber are roofed in and thus completely closed. There is no aperture of the cavity of the supposed brood-chamber here described, nor have I seen in the other colonies investigated any formation to which that function could be reasonably ascribed.

The only description of *Disporella fimbriata* existing is that of Busk (1875, p. 32) which is very brief and extremely incomplete. It is repeated and, at the same time, completed in one or two points in Busk's Challenger Report (1886, p. 26). Later authors have often identified species before them with *D. fimbriata,* but as no description nor any figures have accompanied the identifications made, these have in no way contributed to our knowledge of this species, rather the contrary.

As for the colonies that I have referred to *D. fimbriata,* their determination cannot, of course, be considered sure. There seems, however, to be a fairly good coincidence between the characters offered by them and those mentioned by Busk (l. c.). This author states, it is true, that the zoids are "serial", but as he says, at the same time, that they are so only "very indistinctly" adding that they are "distant", I think we may conclude that they are in reality disposed in quincunx, which is, moreover, the arrangement shown in the figure given by Busk (op. cit., Pl. 27, fig. 2). I have no objection to his saying that the zoarium is "subconical or hemispherical" (1886, l. c.) nor to his statement that the alveoli are "small, circular, often more or less obsolete" (meaning their openings) and that the "peristome", which means in this case the rim of the aperture of the autocystids, is "fimbriate, with a varying number of pointed teeth", as in most other species of this group. Busk's words that the "orifice", i. e. the aperture, is "somewhat expanding" I think should be taken as an allusion to the fact that the spine-like projections of the apertural border rather often diverge a little from one another. If this is correct the coincidence in this case is complete.

The specimen drawn in the fig. 1 (Pl. 27) of Busk (1875) does not seem to belong to this species (cf. Busk 1879, p. 199). This is probably not the case with the specimens referred by Calvet (op. cit.) to *D. fimbriata* either. As for those of MacGillivray (l. c.), Miss Thornely (l. c.) and Livingstone (l. c.) the determinations seem to be doubtful.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 17. On a sponge. — St. 59: On a stone and on a Gastropod shell.

Distribution: Chonos Archipelago (Chiloe), 13 faths; Tierra del Fuego; Cape Horn, 40 faths; Chiloe, 96 faths, Darwin (Busk 1875, l. c.); Kerguelen (Busk 1879, p. 199; Murray 1896, p. 1 448); between the Falkland Island and strait of Magellan (Jullien 1888, p. 83 [under the name of *Disporella spinulosa*]); Exp. Antarct. Belge, Lat. 70° 23′ S, Long 82° 47′ W, 480 m (Waters 1904, p. 97); near Cape Horn (Waters 1905, p. 250; ? Smyth Channel, Puerto Beno, 8 fathoms, on algae; S. of Tierra del Fuego, Ushuaia, on kelp (Calvet 1904, p. 38); ?? several localities off Graham Land (Calvet 1909, p. 42); ?? Victoria, Australia (MacGillivray 1887, p. 219); ?? Auckland Islands, New Zealand, 40 fathoms (Thornely 1924, p. 20; Livingstone 1928, p. 79).

2. **Disporella crassa** n. sp.

Pl. 16, fig. 9.

Zoarium discoid or oval according to the nature of the substratum, thickly calcified, conical or truncate, consisting of a low, marginal portion and an elevated, central zone; the transition between these two portions in young and small zoaria gradual, in old and large ones sudden, the central portion forming, in the latter case, a strongly elevated, sharply limited part of the zoarium. Largest zoarium measuring 6,7 mm in diameter. Zoids arranged in the marginal zone quincunxially or, here and there, in non-connate, uniserial rays; in the central zone the arrangement is uniserial, the zoids being here contiguous so as to form very short, connate, simple rays, mostly meeting in centre of zoarium, where the zoids are arranged irregularly, no central area existing here. Central cystids longer and much larger while much more strongly calcified than peripheral ones. Apertures of cystids when uninjured with two or more pointed processes at their upper border. Alveoli smaller in diameter than the cystids, open, openings polygonal or circular, in central portion of zoarium sometimes reduced to small, round holes, like poreducts, but not completely closed. Brood-chamber a cavity situated in its larger part or exclusively in central portion of zoarium, beneath a layer of alveoli not completely closed. Aperture of brood-chamber unknown.

Measurements in μ.

(1) Diameter of smallest zoarium 2 800.
(2) Diameter of largest zoarium 6 700.
(3) Length of protruding portion of marginal cystids 180—220.
(4) Length of protruding portion of central cystids 380—410.
(5) Transverse diameter of marginal cystids 90—110.
(6) Transverse diameter of central cystids 200—240.
(7) Longitudinal diameter of marginal cystids 100—120.
(8) Longitudinal diameter of central cystids 270—340.
(9) Diameter of aperture of autocystids 100—120 × 70—90.

There are a dozen colonies at hand, representing some rather different astogenic stages. The shape is somewhat varying, most of them being discoid, while others are oval and two of them very distinctly so (cf. Pl. 16, fig. 9), which is caused, I suppose, by their being fixed on the shell of a small *Scalaria*.

All the colonies are very strongly calcified and I think this may be said to be an especially distinguishing feature of the present species. The basal lamina, which when wholly uninjured is quite thin forming a broad border around the zoarium, occurs in most cases as a thick and narrow rim, the edge of which is often elevated (cf. Pl. 16, fig. 9). This transformation of the original lamina I think we may assume to have been caused by regenerative processes, the lamina having repeatedly been damaged.

Three of my colonies, with a diameter of 2,8, 3,5 and 3,6 mm respectively, obviously represent one and the same stage. They are all discoid and the zoids are arranged in a very fine and regular quincunx. On a few places only, in the intermediate zone of the zoarium, this arrangement is substituted by short, uniserial, non-connate rays. Nearer to the centre the zoids become contiguous so as to form, in the zoaria alluded to, 8—12 short, connate, uniserial rays, each consisting of but a few (2—4) zoids. The position of these rays is far from regular, and as they, or at least most of them, are in contact with one another even in the very centre of the zoarium, several zoids are irregularly crowded together here, which should be especially noticed, as it is in marked contrast to what occurs in most other species of *Disporella* where a central area, free from zoids, is present as a rule. Further, the length of the cystids as well as the thickness of their walls increase gradually from the periphery of the zoarium towards its centre, the central cystids being much longer and, above all, very much stouter than the peripheral ones. These two circumstances, viz. the lack of a central area and the considerable size of the central cystids as compared with the peripheral ones, cause the shape of the zoarium at this stage to be that of an obtuse cone.

The other zoaria are larger and, in all probability, older. Some of them are discoid or nearly so, while others are oval. Of the former, 6 in number, the smallest zoarium measures 4,5 mm, the largest one 6,7 mm, but it should be mentioned that these measurements are not quite reliable through the fact that some of the colonies are worn, two of them being fixed on the very edge of a small stone. The oval zoaria measure 4,5 × 2,2, 4,6 × 2,1, and 6,0 × 3,7 mm respectively. In these cases the shape of the zoarium is another than in the small colonies just described, the central portion being more or less elevated. This is well seen in Pl. 16, fig. 9. It is a very characteristic feature for the present species and is strongly marked, above all, in large zoaria, in which the transition from the flattened marginal zone to the elevated central one is very sharp (Pl. 16, fig. 9) while in younger ones it is more gradual. Otherwise there are variations in these as in other characters, part of the elevated central portion being, for instance, sometimes a little depressed; but the distinctive feature of the central portion of the zoarium being elevated as compared with the marginal one is not obscured by slight modifications of that kind.

As for the arrangement of the cystids in the zoaria just described, this is much the same as in the small, conical zoaria mentioned. In the marginal zone the cystids are disposed in quincunx, while the intermediate ones, occupying the sharp slope of the elevation, form as a rule more or less distinct, uniserial, non-connate rays; at the top of the slope these in their turn transform into short, connate series (cf. Pl. 16, fig. 9), consisting in most cases of but 2—3 cystids each, the innermost of which is the largest. Cystids of this kind occupy the central swelling too, where the rays meet. Here they are arranged in the most irregular fashion.

One of the most pregnant features in the present species is the increasing in size of the cystids from the periphery towards the centre of the zoarium. A process of this kind can be observed in most if not all Calyptrostega, as is natural in regard to the fact that the cystids, originating at the marginal edge, complete their growth and become fully developed gradually as they are separated from the budding zone by new incipient cystids and are forced inwards; and the central cystids, i. e. those placed at the edge of the central area, are different as a rule in several respects from the marginal ones: they are longer, the calcification of their walls is stronger, and the border of their aperture is not so spinous, most of the pointed projections originally present having been absorbed. This can be distintly observed, for instance, in the species next preceding; but I have not seen it so strongly pronounced by far as in the present one. The differences in size between the marginal and the central cystids is simply enormous. From the measurements I have made the following results may be alleged here: (i) The length of the distal portion of the cystids, protruding above the surface of the zoarium (the so-called "peristome" of earlier authors), is in marginal and intermediate cystids 180—220 μ, as a rule, but in the large, central ones 400 μ or often a little more; (ii) The diameter of the named portion of the cystids, measured just above the surface of the zoarium is in the radial direction 100—120 μ for the marginal and intermediate cystids and 270—340 μ for the central ones, and in the transverse one 100 μ and 240 μ, respectively. As the diameter of the aperture is in the young, marginal zoids 110—120 × 70—80 μ but in the large, central ones 100—110 × 80—90 μ, it is evident, that practically the whole of the very considerable increase in size of the central cystids demonstrated by the above facts is due to a process of strong secondary calcification from the outside. For what purpose this occurs I am not prepared to say.

The cystids near the margin of a zoarium, when wholly uninjured — which happens in some of my colonies where the cystids have been protected from damage, for instance, by part of the lamina having been worn —, are provided with at least 3 spine-like projections up to no less than 9. Most often they are 5—6, very long and slender in shape, with a long acute point. To this rich equipment of calcareous processes is to be added a number of very slender spines half a dozen or more in number, standing out radially from the central wall of the protruding portions of the cystids. It should be mentioned, finally, that the inner side of the aperture and the cavity of each cystid is fringed with innumerable numbers of minute, calcareous needles pointing inwards, much the same as in the species next preceding but yet more numerous. The same equipment of small calcareous needles is found in the interior of the alveoli as well.

On account of these facts it is somewhat curious to think of the firmness with which some authors wish to maintain the old name of Cyclostomata (Busk), which, indeed, is all but appropriate for these animals.

In the non-protected cystids most of the projections are broken off to a varying degree, though of course they can be observed here and there. The shape of the upper lip of the aperture is, therefore, mostly irregular; in the large, central cystids, where the projections seem in most cases to have been absorbed, it is usually about horseshoe-shaped. The lower lip is, as in many other species, in the marginal and intermediate cystids level with the surface of the alveoli or nearly so, while in the centrally placed cystids it is a little more elevated.

In one of the zoaria there is, just at one side of the centre where the rays meet, a kind of central area surrounded by large and very strongly calcified cystids. The elevation in the centre of the zoarium is very strongly marked; and the area mentioned occupies the greater portion of the plateau at the top of the elevation. I have not seen anything of this kind in any other species; for the area is filled by cystids, the apertures of which are about level with the alveoli separating them, and they are facing in a direction opposite to that of the cystids surrounding the area. Cystids placed quite near to one another — at the edge of the area, on one hand, and a little within that edge, on the other — can thus be seen facing in quite opposite directions. I have not gone into the astogeny of the zoarium in order to form an explanation for the fact mentioned, which is, so far as I know, unique; but I am inclined to think that it is caused by some abnormality in growth. In other respects the colony in question agrees with the other zoaria.

The alveoli are formed in the same manner as those in the species preceding, but they become swiftly increased in size. They are, however, smaller in diameter than the apertures of the cystids. In the small zoaria described above the alveoli are similar throughout, all of them being polygonal in shape and widely open. In the larger colonies with a welldeveloped central elevation, on the other hand, the marginal alveoli are more or less polygonal, while the walls of the intermediate and central ones are thicker and their openings circular. In the central portion of a colony the openings are sometimes reduced to small round holes, but I have not seen any alveoli completely closed.

At first I sought in vain for brood-chambers. As there were as many as a dozen colonies at hand, I thought it probable that a brood-chamber would occur in some of them at least and that it could be traced by the alveoli being closed and their roof being pierced by pores or else by the existence of an aperture. None of these characteristics could be discovered, however; and it was not until I had broken one of the larger colonies into two halves that I became aware of the existence of a cavity in the interior of it. The larger part of this cavity is in the elevated portion of the zoarium but with its extreme lobes it reaches peripherally of the slope leading from the flattened marginal zone to the elevated one. It is widely ramified, the cystids passing like pillars right through it, and was obviously brought into existence by a number of alveoli having coalesced. There is no doubt that this cavity represents a brood-chamber, for I found a mass of embryos and nutritive tissue within it; but on account of its shape I am unable to say whether the cavity was continuous or whether there was more than one brood-chamber present. The latter condition was, however, probably represented in another colony dissected, as the cavity was in two stories here. The roof of the cavity was represented by the upper portions of a number of alveoli, the vertical walls of which were still present. These alveoli were not completely closed, a circular hole remaining in the centre of each of them. In the small colonies mentioned before no brood-chamber was found. I am of the opinion, therefore, that the existence of an elevated central portion of the zoarium in this species should be taken as demonstrating that a brood-chamber has developed or is about to develop.

I have not been able to make out the existence of an aperture for the brood-chamber. So far as I can see, there are two possibilities: either the embryos find their way out through an alveolus remaining open but otherwise not modified in any noticeable way, or they escape through the apertures of one or more of the zoids. Could it be that the giant zoids described above have this purpose?

I do not think that this species, the distinctive features of which must be said to be strongly marked, has been described before, but *Lichenopora truncata* PHILIPPS (1900, pp. 449 f.; Pl. 43, figs 14, 14 a) shows some resemblance to it, though a central area free from zoids seems to exist here. It is possible that a separate genus ought to be formed for one or both of these species, but we ought to know a good deal more about the species described by Miss PHILIPPS before we are able to settle that question.

Occurrence: Swedish Antarctic Expedition 1901—03. St. 3. — St. 59. On stones and shells.

3. **Disporella** (?) **octoradiata** WATERS 1904.

Pl. 9, figs 1 and 2.

Syn: ?? *Tubulipora clypeiformis* D'ORBIGNY 1839, p. 19, Pl. 9, figs 4—6;? *Lichenopora octoradiata* WATERS 1904, pp. 97 ff., Pl. 9, figs 9 a—d.

Zoarium unusually large, discoid, subconical, its base narrower than the disc, the free basal lamina not spacious, its edge curving more or less sharply upwards. Marginal zone flattened, zoarium gradually though strongly rising to the flattened summit of the cone occupied by the central area. Cystids likewise unusually large, the diameter of their apertures being larger than is otherwise commonly found. Marginal zoids in regular quincunx, their distal, protruding portions very short; intermediate zoids situated on the descent from the marginal zone to the central one; their distal portions increasing in length gradually as the zoids are nearer to the central area, the disposition of the zoids being simultaneously altered first to a uniserial and then rapidly to a multiserial one; central zoids with long protruding distal portions, contiguous up to their apertures or nearly so, forming multiserial clusters arranged radially all around the small and irregular central area. Apertures of cystids with a various number of pointed processes at their borders, except as a rule in central clusters of zoids. Alveoli rounded with a circular opening in centre of roof. Usually more than one brood-chamber in each zoarium, situated in between some of the clusters or rays of zoids, its roof formed by the roofs of a number of completely closed alveoli. Aperture of brood-chamber situated in the intermediate zone, large, circular, protruding only very slightly.

Measurements in μ.

(1) Diameter of zoarium 11 200.
(2) Length of protruding portion of marginal zoids 150.
(3) Length of protruding portion of central zoids 1 500—2 000.
(4) Diameter of apertures of marginal zoids 150—180.
(5) Diameter of apertures of central zoids (in cluster) 160—200.
(6) Diameter of apertures of brood-chamber 220—310.

There is but one single zoarium; this, however, is very well developed. One of its most characteristic features is indeed its size, for the colony in question (Pl. 9, figs 1, 2), being simple, with one central area only, and showing no signs of being old and worn, nevertheless measures no less than 11,2 mm in diameter, which is more than the simple stage of any other Calyptrostegous species known to me. The diameter both of the cystids and of the aperture of the brood-chamber is quite in accordance with this. The apertures of the young cystids of the marginal and intermediate zones amount to 150—180 μ, those of the central clusters to 160—200. The aperture of one of the brood-chambers is 310 μ in diameter.

No increase in the degree of calcification of the cystids, such as in the species next preceding, can be ascertained here. The length of the protruding distal portions of the cystids composing the central clusters is certainly remarkable, amounting to about 1,5—2,0 *mm* and being many times that of the distal portions of the young, marginal cystids; but their walls are not or but very inconsiderably thicker than those of the young ones.

The colony is fixed to an encrusting Cheilostome, but it is only part of the basal side, viz. its middle portion, that is fixed to the substratum, while the peripheral zone of the lamina is free, curving upwards and surrounding the conical central portion. WATERS (l. c.) says that "this has many of the characters of *Defrancia* D'ORB. [by which he means *Defrancia* BRONN] and I admit that there is some superficial resemblance; but as the mode of development of the zoarium is wholly different in the two cases and no alveoli are present in *Defrancia,* the reference made by WATERS has no real meaning.

As we see in Pl. 9, figs 1 and 2, the free border of the lamina is very narrow all around the colony except at one place (at x in the figures quoted), where it is a little broader. This portion has the appearance of being uninjured, so I think we can conclude from it the real breadth of the lamina. Numerous calcareous granules are scattered on the surface of the lamina and here and there curious spine-like processes forked at the top can be seen.

I should think the chitinous gymnocyst covering the lamina as well as the upper side of the whole colony is uncommonly thick for it is visible as a transparent but quite distinct veil.

In the marginal cystids the lower half of the apertures is level with the surface of the zoarium, so the protruding portion is represented merely by the upper (central) half of the tubes. The lateral edges of the rim often protrude a little, which gives the part between the edges an appearance of being sinuated, thus augmenting the similarity of the whole formation with the so-called lunarium in some Palaeozoic Bryozoa.

In the intermediate zone the protruding portion of the cystids has not increased much in length, but is no longer constituted merely of the central half of the tube, for the marginal lip of the aperture is now a short distance above the surface of the zoarium; and the more centrally we proceed, the more distinctly this condition is pronounced, until in the long, central cystids (Pl. 9, fig. 2) the two halves of the aperture are level with one another, by which the apertures of the clustered cystids become an oval or rounded shape that is quite normal in, for instance, the Acamptostega, but represents, in the Calyptrostega, a very exceptional case (cf. Pl. 9, fig. 1). It seems further to be characteristic for the present species that in the outer portion of the central zone the *lower* lip of the aperture is ornamented with some — usually three or four — erect calcareous spines rather sharply pointed. The other, central half of the aperture is sometimes sinuated in the middle, sometimes prolonged into three processes of varying shape and length. It is unusual that any of the spine-like processes at the rim of the aperture remain in the cystids composing the multiserial clusters, though it may occur sometimes, especially in the cystids neighbouring the intermediate zone. Mostly, however, they have been absorbed.

Peripherally the clusters change into simple series of connate zoids which are, however, quite short, consisting of 4—6 zoids at most and being detached peripherally into single, non-connate zoids. At the central end of the clusters one or two cystids are often seen being halfway broken down. It is evident, then, that the central area becomes gradually widened by the innermost zoids degenerating, the bundles increasing at the same time radially by new zoids being added peripherally to them. The result is that, proceeding in a radial direction, the distance between the bundles becomes gradually larger. New series of zoids are then intercalated between those already existing. In the zoarium here described there are 9 bundles which I suppose to be primary — though these are not all of equal size — and between them are several secondary ones (cf. Pl. 9, fig. 1).

I do not know why Waters (l. c.) termed his species *octoradiata,* for, though he says that "in a well developed specimen there are eight main rays", in the zoarium figured by him (op. cit., Pl. 9, fig. 9 a) there are nine. In all probability the number of the rays is varying.

The alveoli are of uniform appearance throughout the colony. Even those situated in the marginal zone are rounded in shape instead of polygonal and are not widely open but have a well developed calcareous roof with a circular hole in the centre. It seems possible, however, that in smaller colonies the aspect of these alveoli may be somewhat different and that they are in these cases more widely open. The intermediate and central alveoli and especially the latter ones have (contrary to the cystids) had their walls much thickened but are otherwise similar to the marginal alveoli, the central hole in the roof being of about the same size as in these. As we see in Pl. 9, figs 1 and 2, some of the alveoli give the impression of being secondary ones, developed on top of the primary alveoli, and at first I thought they were; this, however, does not seem to be the case, for the formations mentioned come into existence simply through the walls of some of the (primary) alveoli growing a little higher, the alveoli affected nevertheless remaining open.

Here and there at the lateral surfaces of the clusters of cystids small alveoli are visible, which have originated through the grooves between the cystids having been bridged over by bars, the alveoli representing the cavities enclosed by these bars. These alveoli obviously have developed much later than the ordinary ones; they seem to me to be of the same kind as the pits in the Pachystega.

In the colony examined by me there are at least three brood-chambers, possibly more, and two of these are provided each with an aperture. The brood-chambers are all of one and the same type, consisting of an elongated cavity located between two fascicles of zoids. The cavity may be lobed, the lobes reaching in between some of the neighbouring rays. Part of the central area may be occupied as well; but the mode of branching of the brood-chambers shows that their centre is located peripherally, not centrally, in the zoarium. It is in accordance with this observation that both the apertures of a brood-chamber that I have seen are situated in the intermediate zone, indeed, not far from the marginal one (cf. Pl. 9, fig. 1, gzap). The brood-chambers come into existence as usual through a number of alveoli coalescing, their walls having disappeared. These alveoli have been completely closed (cf. Pl. 9, fig. 1) and the ensemble of their calcareous roofs constitutes the roof of the brood-chamber, having transformed into a uniform but rather thin calcareous film pierced by numerous pores.

The aperture of the brood-chamber so far as I have been able to make out is a modified alveolus. It protrudes a little distance above the surface of the colony, but it is not surrounded by any lip. Its diameter is unusually large, one of the two apertures observed measuring 220 μ, the other 310 μ.

I wonder if the *Tubulipora clypeiformis* of D'ORBIGNY (1839, p. 19) may not be identical with the present species. It clearly belongs to the Calyptrostega and D'ORBIGNY placed it later on (1853, p. 972) in *Unicavea.* Its shape and mode of growth remind one of the present species, though there is one important difference, viz. that the fascicles protruding radially from the top of the zoarium, in *D. octoradiata*, are represented, in D'ORBIGNY's specimen, merely by single zoids (cf. D'ORBIGNY 1839, Pl. 9, fig. 6). This difference is perhaps a definite one; or are we to think that D'ORBIGNY, a very skilful observer though a little inclined to diagrammatizing, may have mistaken clusters for single zoids?

The identification of the present species with *D. octoradiata* (WATERS) cannot be considered sure. The description given by that author is too brief and incomplete to enable a tolerably certain determination, and the figures he has given (*op. cit.*, Pl. 9, figs 9 a—d) are rather strongly diagrammatized. However, the species in question is according to WATERS "very solid [= strongly-calcified] and much raised" and the zoids form clusters or rays (though these are said to be biserial and composed of a few zoids), which "do not extend to the border of the zoarium, nor are the zoaria round the border of the disc elevated, while in the centre of the zoarium the openings are round". The similarities existing are thus not to be denied, and as my specimen is from the same area as those of WATERS, no other multiserial species being known from the Antarctic region so far as I am aware, I suggest, though with some hesitation, that they may be identical.

Occurrence: Swedish Antarctic Exp. 01—03, St. 88. On an encrusting Cheilostome.

Distribution: Lat. 71° 09′ S. — Long. 89° 15′ W. 460 m, + 0,3° C. Lat. 17° 18′ S. — Long. 88° 02′ W. 435 m, - 0,3 °C. Exp. Antarct. Belge (WATERS 1904, p. 98).

LITERATURE.

ALLMAN, G. J., 1856, A Monograph of the fresh-water Polyzoa. — Ray Society. London.

AUDOUIN, V., 1826, Explication sommaire des Planches de Zoophytes de l'Egypte et de la Syrie publ. par J.-C. Savigny. — Déscript. de l'Egypte. Hist. Nat. T. 1. Paris.

BASSLER, R. S., 1935, Bryozoa. (Generum et Genotyporum Index et Bibliographia). — Fossilium Catalogus. I: Animalia. Ed. a. Haag.

BIDENKAP, O., 1900, Die Bryozoen. Zool. Ergebn. einer Untersuchungsf. d. deutsch. Seefischereivereins nach d. Bäreninsel u. Westspitzbergen. III. — Wiss. Meeresuntersuch. Kiel. N. F. Bd 4. H. 2. Abt. Helgoland. Kiel u. Leipzig.

BLAINVILLE, H. M. de, 1830, Zoophytes. — Dictionnaire des Sc. Nat. T. 60. Paris et Strasbourg.

— 1834, Manuel d'Actinologie ou de Zoophytologie. — Paris.

BORG, F., 1923, On the Structure of Cyclostomatous Bryozoa. — Ark. f. Zool. Bd 15. Stockholm.

— 1924, On some remarkable Species of Cyclostomatous Bryozoa. 1. On *Crisiella producta* (SMITT 1866), together with some remarks on the Classification of the Species in the family Crisiidae. — Göteborgs Kgl. Vet. & Vitt. Samh. Handl. 4. Följd. XXVIII: 4.

— 1926 a, On the Body-wall in Bryozoa. — In: Q. J. Microsc. Sc., N. Ser., Vol. 70, Part IV, London.

— 1926 b, Studies on Recent Cyclostomatous Bryozoa. — Diss. Uppsala 1926. Zool. Bidr. fr. Uppsala, Bd. 10.

— 1930, Moostierchen oder Bryozoen (Ectoprocten). — Die Tierwelt Deutschlands und der angrenzenden Meeresteile, Teil 17, Jena.

— 1932, On the Structure and Development of Heteropora (Bryozoa). Ark. f. Zool. Bd 24 B. Stockholm.

— 1933 a, Die Bryozoen. III. Teil: Die marinen Bryozoen (Stenolaemata und Gymnolaemata) des arktischen Gebietes. — Fauna arctica, Bd. 6, Lief. 5, Jena.

— 1933 b, A Revision of the Recent Heteroporidae (Bryozoa). — Zoologiska Bidrag fr. Uppsala Bd. 14.

— 1933 c, Über die geographische Verbreitung der innerhalb des arktischen Gebietes gefundenen marinen Bryozoen. — Arch. f. Naturgeschichte. N. F. Bd. 2. Leipzig.

— 1940, On the Genus *Tubiporella* and on a New Boring Bryozoan. — Zool. Bidr. fr. Uppsala. Bd 18.

— 1941, On the Structure and Relationships of Crisina (Bryozoa Stenolaemata). Ark. f. Zoologi. Bd 33 A. N:o 11.

— 1943, On a new type of Brood-chamber in Stenolaematous Bryozoa. Ibid. Ser B.

BROCH, HJ., 1939, Bipolarity, a Problem of Zoogeography. — Norsk Geogr. Tidsskr., Bd 7, Oslo.

BRONN, H. G., 1825, System der Urweltlichen Pflanzenthiere (Vorlesungen über Petrefaktenkunde). — Heidelberg.

— 1835—37, Lethaea geognostica (oder Abbildungen und Beschreibungen der für die Gebirgs-Formationen bezeichnendsten Versteinerungen). — Bd. 7. Stuttgart.

— 1837, XLVII Tafeln mit Abbildungen zur Lethaea Geognostica. Stuttgart.

BUSK, G., 1850, A List of Polyzoa from Port Natal. — Rep. 20. Meeting Brit. Ass. Adv. Sc. London.

— 1867, Zoophytology. — Q. J. Micr. Sc. N. S. Vol. 7.

— 1852 a, An account of the Polyzoa, and Sertularian Zoophytes, collected on the Voyage of the Rattlesnake, on the Coasts of Australia and the Louisiade Archipelago. etc. — Narrative of the Voyage of H. M. S. Rattlesnake — during the years 1846—1850, By J. MACGILLIVRAY. Vol. 1., Appendix. No 4. London.

BUSK, G., 1852—75, Catalogue of Marine Polyzoa in the collection of the British Museum. — Part I. Cheilostomata. 1852. Part II. Cheilostomata 1854. Part III Cyclostomata 1875. London.

— 1855—1867, Zoophytology, I—X. — Q. J. Microsc. Sc. Vol. 3—8; N. S. Vol. 1, 7. London.

— 1859, A Monograph of the Fossil Polyzoa of the Crag. — Palaeontograph. Soc. 1857. London 1859.

— 1876, Descriptions of some new Species of Polyzoa from Kerguelen's Island. — Ann. & Mag. Nat. Hist. Ser. 4, Vol. 17.

— 1879, Polyzoa. An account of the — — — collections made in Kerguelen's Land and Rodriguez during the transit of Venus expeditions in the years 1874—75. — Phil. Trans. Roy. Soc. London. Vol. 168 (Extra Volume).

— 1884, 1886, Report on the Polyzoa collected by H. M. S. Challenger during the years 1873—1876. Part. 1, 2. — The voyage of H. M. S. Challenger. Zoology. Vol. 10 (Part 30); Vol. 17 (Part. 50). Edinburgh.

CALVET, L., 1902, Bryozoaires marins de la région de Cette. I, II. — Trav. Inst. Zool. Montpellier et Stat. zool. Cette. Sér. 2. Mém. 11, 12. Montpellier.

— 1904 a, La distribution géographique des Bryozoaires marins et la théorie de la bipolarité. — C.-R. Acad. Sc. Paris.

— 1904 b, Bryozoen. — Ergebnisse der Hamburger Magalhaensischen Sammelreise 1892/93. Bd. 3. Hamburg 1896—1907.

— 1906 a, Deuxième note préliminaire sur les Bryozoaires récoltés par les Expéditions du Travailleur (1881—1882) et du Talisman (1883). — Bull. Mus. Hist. Nat. 1906, no 4. Paris.

— 1906 b, Bryozoaires. — Expéditions scientifiques du "Travailleur" et du "Talisman" pendant les années 1880, 1882, 1883. Paris.

— 1909, Bryozoaires. — Expéditions antarctique française (1903—1905), commandée par le Dr Jean Charcot. Sc. Nat.: Doc. Sc. 18. Paris.

— 1911, Diagnoses de quelques espèces nouvelles de Bryozoaires Cyclostomes provenant des Campagnes scientifiques accomplies par S. A. S. le Prince de Monaco, à bord de la Princesse-Alice (1889—1910). — Bull. Inst. Océanograph. No. 215, Monaco.

— 1927, Bryozoaires de Monaco et environs. — Ibid. No 503.

— 1928, Documents faunistiques sur les Bryozoaires marins des côtes françaises de l'Atlantique et des côtes africaines de la Méditerranée occidentale. — Ibid. No. 530.

— 1931, Bryozoaires provenant des campagnes scientifiques du Prince Albert Ier de Monaco. — Rés. Camp. Sc. Fasc. 83.

CANU, F., 1908, Les Bryozoaires fossiles des terrains du Sud-Ouest de la France. Pt. 2. — Soc. Géol. de France. Bull. Sér. 4, T. 8. Paris.

— 1918, Les Ovicelles des Bryozoaires cyclostomes. Études sur quelques familles nouvelles et anciennes. — Ibid. Sér. 4. T. 16.

CANU, F., & BASSLER, R. S., 1920, North American Early Tertiary Bryozoa. — Smithson. Inst. U. S. Nat. Mus. Bull. 106. Washington.

— — 1922 and 1926, Studies on the Cyclostomatous Bryozoa. I and II. — U. S. Nat. Mus. Proc. Vols 61 and 67. Washington.

— — 1923, North American Later Tertiary and Quaternary Bryozoa. — Smithson. Inst. U. S. Nat. Mus. Bull. 125. Washington.

— — 1925 et 1928, Les Bryozoaires du Maroc et de Mauritanie. 1 et 2. — Mém. Soc. Sc. Nat. du Maroc. Nr 10 et 18. Rabat.

— — 1927, Bryozoaires des Îles Hawaï. — Soc. Sc. Seine-et-Oise. Fasc. suppl. 1927. Thiers.

— — 1928, Bryozoaires du Brésil. — Ibid. T. 9, Fasc. 5.

— — 1929, Bryozoa of the Philippine Region. — Smiths. Inst. U. S. Nat. Mus. Bull. 100. Vol. 9. Washington.

— — 1930, The Bryozoan Fauna of the Galapagos Islands. — U. S. Nat. Mus. Proc. Vol. 76. Art. 13. Washington.

Conrad, T. A., 1855, A Note on the Miocene and Post-pliocene deposits of California with descriptions of two new Fossil Corals. — Acad. Nat. Hist. Proc. Vol. 7, Philadelphia.

Cori, C., 1941, Bryozoa, 3. Ordnung der Tentaculata. In: Kükenthal-Krumbach, Handbuch der Zoologie Bd 3, 2. Hälfte. Berlin.

Defrance, J. L. M., 1824, Tableau des corps organisés fossiles. — Paris.

Ekman, S. P., 1935, Tiergeographie des Meeres. Leipzig.

Fischer, P., 1870, Bryozoaires etc. du Département de la Gironde et des côtes du Sud-Ouest de la France. — Acta Soc. Linn. de Bordeaux. T. 27. Paris.

Fleming, John, 1828, A History of British Animals. Edinburgh.

Friedl, P. H., 1917, Bryozoen der Adria. — Zool. Anz. Bd 49.

— 1925, Koloniebildung, Besiedelung und Wachstum bei marinen Bryozoen. — Arb. Zool. Inst. d. Univ. Innsbruck. Bd 2. H. 3. Berlin.

Gabb & Horn, 1862, A Monograph of the fossil Polyzoa of the Secondary and Tertiary Formations of North America. — J. Acad. Nat. Sc. Philadelphia, (2) 5.

Goldfuss, A., 1926—33. Petrefacta Germaniae, Th. 1. — Düsseldorf.

Goldstein, J. R. Y., 1882, Some new Species of Bryozoa from the Marion Islands, with Notes on Bicellaria grandis. — Trans. & Proc. Roy. Soc. Victoria, Vol. 18. Melbourne.

Gray, J. E., 1848, List of the Specimens of British Animals in the Collection of the British Museum. Part I. London.

Gregory, J. W., 1896, Catalogue of the fossile Bryozoa in the Department of Geology. 1. The Jurassic Bryozoa. — British Museum (Nat. Hist.) London.

— 1899, Catalogue, etc. 2. The Cretaceous Bryozoa Vol. 1. — Ibid.

— 1909, Catalogue, etc. 3. The Cretaceous Bryozoa Vol. 2. — Ibid.

Hagenow, F. v., 1851, Die Bryozoen der Maastrichter Kreidebildung. — Cassel.

Hamilton, A., 1898, A List of Recent and Fossil Bryozoa collected in various Parts of New Zealand. — Trans. & Proc. New Zealand Inst. 1897, Vol. 30. [N. S. Vol. 13.] Wellington.

Haime, J., 1853, Description des Bryozoaires Fossiles de la formation Jurassique. — Mém. Soc. Géol. de France. Sér. 2. T. 5, Pt 1. Paris.

Hamm, H., 1881, Die Bryozoen des Maastrichter Ober-Senon. I. Theil. Die Cyclostomen Bryozoen. Diss. Berlin.

Harmer, S. F., 1891, On the British Species of *Crisia*. — Q. J. Micr. Sc. N. S. Vol. 32. London.

— 1896, On the Development of Lichenopora verrucaria, Fabr. — Ibid.

— 1898, On the Development of Tubulipora, and on some British and Northern Species of this Genus. — Ibid.

— 1915, The Polyzoa of the Siboga Expedition. Pt I. Entoprocta, Ctenostomata, and Cyclostomata. — Siboga-Expeditie. 28 a. Leyden.

— 1930, Polyzoa [Presidential Adress]. Proc. Linn. Soc. London. Sess. 141.

— 1931, Recent Work on Polyzoa [Presidential Adress]. Ibid. Sess. 143.

Hasenbank, W., 1932, Bryozoa der Deutschen Tiefsee-Expedition. 1. Teil. — Wissensch. Ergebn. d. Deutschen Tiefsee-Exp. auf d. Dampfer "Valdivia" 1898—1899. Bd. 21. H. 2. Jena.

Haswell, W. A., 1879, On the Cyclostomatous Polyzoa of Port Jackson and Neighbourhood. — Proc. Linn. Soc. New South Wales Vol. 4, Part 3. Sidney.

— 1880, On some Polyzoa from the Queensland Coast. — Ibid., Vol. 5, Part 1. Sidney.

— 1881, Note on the occurrence on the coast of New South Wales of the Genus *Mesenteripora*, Bl., (Polyzoa Cyclostomata). — Ibid., Vol. 6, Part 2. Sidney.

Hincks, Th., 1880, A History of the British Marine Polyzoa. 2 Vols. London.

— 1880 b—1884, Contributions towards a General History of the Marine Polyzoa. — Ann. & Mag. Nat. Hist. Ser. 5, vols. 6—13. London.

— 1882—1884 b, Report on the Polyzoa of the Queen-Charlotte Islands. — Ibid. Ser. 5. Vols 10—13.

— 1887, 1890, Critical Notes on the Polyzoa, I, II. — Ibid. Ser. 5. Vol. 19. Ser. 6. Vols 5 & 7.

Hutton, F. W., 1873, Catalogue of the Marine Mollusca of New Zealand. — Col. Mus. & Geol. Survey Dep. Wellington.

HUTTON, F. W., 1876, Corrections and Additions to the List of Polyzoa in the Catalogue of the Marine Mollusca of New Zealand. — Trans. & Proc. New Zealand Inst. Vol. 9. Wellington.

— 1877, On some Australian Polyzoa. — Papers & Proc. Roy. Soc. Tasmania 1877. Wellington.

— 1878, On some South Australian Polyzoa. — Ibid. 1878.

— 1880, Manual of New Zealand Mollusca (A Systematic and Descriptive Catalogue etc.). — Colonial Museum and Geological Survey Department. New Zealand. Wellington.

— 1891, Revised List of the Marine Bryozoa of New Zealand. — Trans. & Proc. New Zealand Inst. 1890, Vol. 23. Wellington 1891.

— 1904, Index Faunae Novae Zealandiae. — Phil. Inst. Canterbury, New Zealand. London.

JAMESON, R., 1811, Catalogue of the Animals, of the Class Vermes, found in the Firth of Forth, and other Ports of Scotland. — Mem. Wernerian Nat. Hist. Society. Vol. 1. Edinburgh.

JELLY, E. C., 1889, A Synonymic Catalogue of the recent marine Bryozoa including Fossil Synonyms. — London.

JOHNSON, J. Y., 1858, Zoophytological Fauna of Madeira. — Q. J. Microsc. Sc. Vol. 6. London.

— 1897, New Cyclostomatous Bryozoa found at Madeira. — Ann. & Mag. Nat.Hist. Ser. 6, Vol. 20. London.

JOHNSTON, G., 1838, A History of the British Zoophytes. London.

— 1847, A History of the British Zoophytes. In 2 Vols. — Ed. 2. London.

JOLIET, L., 1877, Contributions à l'histoire naturelles des Bryozoaires des côtes de France. — Arch. zool. exp. et gén. T. 6. Paris.

JULLIEN, J., 1882, Bryozoaires. Espèces draguées dans l'océan Atlantique en 1881. Dragages du Travailleur. — Bull. Soc. Zool. France 1882. Vol. 7, Paris.

— 1888, Bryozoaires. — Mission scientifique de Cap Horn 1882—1883. [Romanche-exp.] Tom. 6. Zoologie. 3. Paris 1891.

JULLIEN, J., & CALVET, L., 1903, Bryozoaires provenant des campagnes de l'Hirondelle (1886—1888). — Rés. Camp. Sc. — par Albert I de Monaco. Fasc. 23. Monaco.

KIRCHENPAUER, G. H. 1884, A Record of Localities of some New South Wales Zoophytes. — Proc. Linn. Soc. New South Wales. Vol. 9 II. Sidney.

KIRKPATRICK, R., 1888 a, Polyzoa of Mauritius. — Ann. & Mag. Nat. Hist. Ser. 6. Vol. 1. London.

— 1888 b. Polyzoa from Port Phillip. — Ibid. Ser. 6. Vol. 2.

— 1890, Hydroida and Polyzoa. Reports on the Zoological Collections made in Torres Straits by Prof. N. C. Haddon 1888—1889. — Sc. Proc. Roy. Dublin Soc. N. Ser. Vol. 6. Dublin.

— 1902, Polyzoa. — Report on the Collections of Natural History made in the Antarctic Regions during the voyage of the "Southern Cross". London.

KLUGE, H., 1914, Die Bryozoen der Deutschen Südpolar-Expedition 1901—1903. 1. — Deutsche Südpol. Exp. Bd 15. Zool. Bd 8. Berlin.

— Die Bryozoen des Sibirischen Eismeeres. — Trav. Stat. Biol.

LAMARCK, J. B. P. A. DE, 1816, Histoire Naturelle des Animaux sans Vertèbres. 2. Tome. Paris.

— 1836, Histoire naturelle des animaux sans Vertèbres. — Deuxième Edition. Par G. P. Derhoges & A. H. Milne Edwards. T. 2. Histoire des Polypes. Paris.

LAMOUROUX, J. V. F., 1810, Mémoire sur la Classification des Polypiers coralligènes. Paris.

— 1812, Extrait d'un mémoire sur la classification des Polypiers coralligènes non entièrement pierreux. — Nouv. Bull. Sc. Soc. Philomatique. Tome III. 5e Année. Paris.

— 1816, Histoire des Polypiers Coralligènes Flexibles, vulgairement nommés Zoophytes. — Caen.

— 1821, Exposition Méthodique des Genres de l'Ordre des Polypiers (avec leur description et celle des principales espèces, figurées dans 84 Planches; les 63 premières appartenant à l'Histoire naturelle des Zoophytes d'Ellis et Solander). Paris.

— 1824 a, Corallina; or, a classical arrangement of flexible coralline polypidoms, selected from the French. London.

LAMOUROUX, J. V. F., 1824 b, Encyclopédie Méthodique. — Histoire naturelle des Zoophytes ou Animaux Rayonnés. Paris.

LANG, W. D., 1905, On Stomatopora antiqua, Haime, and its related Liassic Forms. — Geol. Mag. N. S. Dec. 5. Vol. 2. London.

— 1906, A Key to the Published Figures of the Cretaceous Forms of the Polyzoan Genus Entalophora. — Ibid. N. S. Dec. 5. Vol. 3.

— 1907 a, The Evolution of Stomatopora dichotomoides (d'Orbigny). — Ibid. N. S. Dec. 5. Vol. 4.

— 1907 b, A tabular View of the Cretaceous Polyzoa of the Family Idmoneiidae. — Ibid. N. S. Dec. 5. Vol. 4.

LEVINSEN, G. M. R., 1891, Polyzoa. — Det vid. Udbytte av Kanonbaaden »Hauchs» Togter i de danske Have indenf. Skagen Aar 1883—86. Kjøbenhavn.

— 1894, Mosdyr. — Zool. Danica. H. 9, Afd. 1. Kjøbenhavn.

— 1909, Morphological and Systematic Studies on the Cheilostomatous Bryozoa. — Copenhagen.

— Bryozoa, etc. — Meddelelser om Grønland. H. 23. Afd. 3. 5. Kjøbenhavn.

— 1916, Bryozoa. — Danmark-Exp. t. Grønlands Nordøstkyst 1906—08, Bd 3, Nr 16 (Meddelelser om Grønland. Bd 43. 1917.)

LIVINGSTONE, A. A., 1924, 1925, 1926 a, 1926 b, Studies on Australian Bryozoa. — Rec. Austral. Mus. Vol. 14, No 3 (1924); Vol. 14, No 4; (1925) Vol. 15, No 1 (1926); Vol. 15, No 2 (1926). Sidney.

— 1927, Studies on Australian Bryozoa. No 5. A Check List of the Marine Bryozoa of Queensland. — Ibid. Vol. 16, No 1. Sidney.

— 1928, The Bryozoa. Supplementary Report. — Australasian Antarctic Expedition 1911—14. Scientific Reports. Ser. C. Zoology and Botany. Vol. 9, Part 1. Sidney.

— 1929, Bryozoa Cheilostomata from New Zealand. — Vidensk. Meddel. Dansk Naturhist. Foren. 87. Copenhagen.

MCCOY, F., 1878—90, Prodromus of the Zoology of Victoria. Vol. I, II. (Bryozoa by MACGILLIVRAY). Melbourne and London.

MACGILLIVRAY, P. H., 1859 a, On some new Australian Polyzoa. — Trans. Phil. Inst. Victoria. Vol. 4. Melbourne.

— 1859 b, Notes on the Cheilostomatous Polyzoa of Victoria, etc. — Ibid.

— 1869, Descriptions of some new Genera and Species of Australian Polyzoa; to which is added a List of Species found in Victoria. — Trans. & Proc. Roy. Soc. Victoria. Part II. Vol. 9. Melbourne.

— 1881, On Two New Genera of Polyzoa. — Ibid.. Vol. 17. Melbourne.

— 1882—91, Descriptions of New, or Little Known, Polyzoa, Parts 2—12. — Ibid. Vols 18—24.

— 1887, A Catalogue of the Marine Polyzoa of Victoria. — Ibid. Vol. 23. Melbourne.

— 1895, A Monograph of the Tertiary Polyzoa of Victoria. — Roy. Soc. Victoria. Trans. Vol. 4. Melbourne.

MANZONI, A., 1877, I Briozoi fossili del Miocene d'Austria ed Ungharia. Part 2. — Denkschr. K. Akad. Wissensch. Math.-Naturw. Cl. Bd 37. Wien.

MAPLESTONE, C. M., 1882, Observations on living Polyzoa. — Trans. & Proc. Roy. Soc. Victoria. Vol. 18. Melbourne.

— 1905, Lord Howe Island Polyzoa. — Proc. Roy. Soc. Victoria. Vol. 17 (New Ser.), Part II. Melbourne.

— 1909, The Polyzoa. The Results of Deep-Sea Investigations in the Tasman Sea. I. The Expedition of H. M. S. "Miner". 5. Austral. Mus. Vol. VII. Sydney, 1908—1910.

— 1911, Polyzoa. Supplement. The Results of Deep-Sea Investigations in the Tasman Sea. 1. The Expedition of H. M. S. "Miner", No 5. — Rec. Austral. Mus. Vol. VIII. Sydney, 1910—1913.

MARCUS, E., 1920, Mittelmeer-Bryozoen aus der Sammlung des zoologischen Museums zu Berlin. — S.-B. Ges. naturforsch. Freunde Berlin. Jahrg. 1920, No 2.

MARCUS, E., 1921 a, Bryozoen. Results of Dr. E. Mjöbergs Swedish Scientific Expeditions to Australia 1910—13. 24. — Kungl. Sv. Vet. Akad:s Handl. Bd 61. No 5. Stockholm.

— 1921 b, Bryozoen von den Juan Fernandez-Inseln. — The Natural History of Juan Fernandez and Eastern Island edited by Dr. Carl Skottsberg. Vol. III. Zoology. Part I. 15. Uppsala.

— 1921 c, Über die Verbreitung der Meeresbryozoen. — Zool. Anz., Bd 53. No 9/10.

— 1921 d, Bryozoen von den Auckland- und Campbell-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16. VI. — Vidensk. Meddel. Dansk Naturhist. Foren. Köbenhavn. Bind 73. Copenhagen. 1922.

— 1922, Südafrikanische Bryozoen aus der Sammlung des Gothenburger Museums, nebst 1 Westafr. Spezies. — Meddel. Göteborgs Musei Zool. Avd. 15.

— 1937—38—39, Bryozoarias Marinhas Brasileiras I, II, III. — Zoologia no 1—2—3. Universidade de São Paulo, Boletins da Faculdade de Philosophia, Sciências e Letras. I, IV. São Paulo. Brasil.

— 1938, Bryozoen von St. Helena. Papers from Dr Th. Mortensen's Pacific Expedition 1914—16. LXIX. — Vidensk. Meddel. Dansk Naturhist. Foren. Bd 101. Copenhagen.

MEISSNER, M., 1902, Liste der von Herrn Professor Semon bei Amboina und Thursday Island gesammelten Bryozoen. — Semon, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel. Jena.

MENEGHINI, G., 1844, Polipi della famiglia dei Tubuliporiani finora osservati nell' Adriatico. — 1847, Polipi. (Nuovi Annali delle Scienze Naturali dell' Istituto di Bologna (2). III. 1845, pp. 115—133). (Nuovi Saggi dell'Accademia di Scienze di Padova, VI, 1847, pp. 59—72).

MICHELIN, H., 1840—47, Iconographie Zoophytologique, déscriptions par localités et terrains des polypiers fossiles de France et pays environnants. — Texte et Atlas. Paris.

MILNE EDWARDS, M. H., 1837, Mémoire sur les Polypes du genre des Tubulipores. — Ann. Sc. Nat. Zool. Sér. 2. Tom. 8. Paris.

— 1838, Mémoire sur les Crisies, les Hornères et plusieurs autres Polypes vivants ou fossiles dont l'organisation est analogue à celle des Tubulipores. — Ann. Sc. Nat. Zool. Sér. 2. Tom. 9. Paris.

MONOD, T. et DOLLFUS, R. P., 1932, Sur quelques animaux rapportés par E. Aubert de la Rüe des Îles australes (Kerguelen et St. Paul). — Bull. Soc. Zool. de France. Vol. 57. Paris.

MURRAY, J., 1896, On the Deep and Shallow-water Marine Fauna of the Kerguelen Region of the Great Sothern Ocean. — Trans. Roy. Soc. Edinburgh. Vol. 38. Pt 2, No 10.

NEVIANI, A., 1891, Contribuzione alla conoscenza dei Briozoi fossili italiani. Briozoi postpliocenici del sottosuolo de Livorno. — Boll. Soc. Geol. Ital. Vol. 9. Roma.

— 1900, Monografia del genere Idmonea. I, II, III. — Roma.

— 1905, Briozoi fossile de Carrubare-Calabria. — Boll. Soc. Geol. Ital. Vol. 23. Roma.

— 1939, I Briozoi Adriatici del Museo Civico di Storia Naturale de Venezia. — R. Istit. Veneto Sc. Lett. ed Art. Vol. 30: 4. Venedig.

NICHOLSON, H. A., 1880, On the Minute Structure of the Recent Heteropora neozelanica, and on the Relations of the Genus Heteropora to Monticulipora. — Ann. & Mag. Nat. Hist. Ser. 5. Vol. 6. London.

NORDGAARD, O., 1906, Systematisk fortegnelse over de i Norge hidtil observerede arter af marine polyzoa. II. Cyclostomata. — Bergens Museums Aarbog 1896, No 2. Bergen 1897.

— 1906, Bryozoa from the 2nd Fram Expedition 1898—1902. — Rep. 2nd Norweg. Arctic Exped. in the »Fram» 1898—1902, No 8. Kristiania.

— 1912 a, Revision af Universitetsmuséets Samling af Norske Bryozoer. — Kgl. Norsk Videnskabs Selsk. Skrifter 1911, No 3. Trondhjem.

— 1912 b, Bryozoaires. — Duc d'Orléans. Camp. arct. de 1907. Bruxelles.

— 1918, Bryozoa from the Arctic Regions. — Tromsö Mus. Aarsheft., Vol. 40 (1917), No 1. Trondhjem.

— 1924, Bryozoa from Iceland. — Kgl. Norsk Vidensk. Selsk. Skrifter 1924, No 2. Trondhjem.

Nordgaard, O., 1932, On some Arctic Bryozoa from West-Finmark. — Meddel. Trondheim Stat. Biol. No 44.

Norman, A. M., 1869, Shetland Final Dredging Report, Pt. III. — Brit. Ass. Adv. Sc. 38. Meeting. London.

— 1903, 1905, Notes on the Natural History of East Finmark: Polyzoa. — Ann. & Mag. Nat. Hist. Ser. 7, Vols 11, 12, and 15. London.

— 1906, Greenlandic Polyzoa. — Ibid. Ser. 7, Vol. 17. London.

— 1909, The Polyzoa of Madeira and neighbouring Islands. — J. Linn. Soc. Zoöl. Vol. 30. London.

O'Donoghue, Ch. & E., 1923, A Preliminary List of Polyzoa (Bryozoa) from the Vancouver Island Region. — Contrib. Canad. Biol. N. Ser. Vol. 1. Toronto.

— 1924, The Bryozoa (Polyzoa) collected by the S. S. "Pickle". — Union of South Africa. Fisheries and Marine Biological Survey. Report No 3. For the Year 1922. Cape Town 1924.

— 1926, A Second List of the Bryozoa (Polyzoa) from the Vancouver Island Region. — Contrib. Canad. Biol. Fisheries. N. S. Vol. 3. Toronto.

O'Donoghue, Ch. H., and de Vatteville, D., 1937, Notes on South African Bryozoa. — Zool. Anz. Bd. 117.

Okada, Y., A Report of the Cyclostomatous Bryozoa of Japan. — Ann. Zool. Jap. Vol. 9, Pt 3. Tokyo.

— 1923, On a Collection of Bryozoa from the Straits of Corea. — Ann. Zool. Jap. Vol. 10, art. 22. Tokyo.

— 1928. Cyclostomatous Bryozoa of Mutsu Bay. — Rep. Biol. Survey Mutsu Bay. Sc. Rep. Tohoku Imp. Univ. Ser. 4, Biol. Vol. 3, No 4, Fasc. 1. Sendai.

— and Matawari, Sh., 1935, Bryozoa Fauna collected by the »Misago» during the Zoological Survey around Izu Peninsula. I. — Sc. Rep. Tokyo Bunrika Daigaku. Sekt. B. No 35. Zool. Inst. Univ. Lit. and Sc. Tokyo.

Orbigny, A. d', 1839, Zoophytes. Voyage dans l'Amérique méridionale, exécuté pendant les années 1826—1833 par Alcide d'Orbigny. — Tome 5. 4^e Partie: Zoophytes. Paris et Strasbourg.

— 1850, 1852, Prodrome de Paléontologie stratigraphique universelle des Animaux Mollusques et rayonnées. — Tom. I, 1850; Tom. II, 1850; Tom. III, 1852. Paris.

— 1851—54, Paléontologie française. Terrains crétacés. — Tom. 5. Bryozoaires. Texte et Atlas. Paris.

Ortmann, A., 1890, Die Japanische Bryozoenfauna. — Arch. f. Naturgesch. Jahrg. 56. Bd 1. Berlin.

— 1894, Bryozoen. Beiträge zur Fauna der südöstlichen und östlichen Nordsee. 1. Teil. III. — Wissensch. Unters. — — — d. deutsch. Meere in Kiel u. d. Biol. Anstalt Helgoland. N. F. Bd 1. H. 1. Kiel u. Leipzig.

— 1896, Grundzüge der marinen Tiergeographie. Jena.

Osburn, R. C., 1912 a, The Bryozoa of the Woods Hole Region. — Bull. Bureau of Fisheries. Vol. 30, 1910. Washington.

— 1912 b, Bryozoa from Labrador. Newfoundland, and Nova Scotia. — Proc. U. S. Nat. Mus. Vol. 43. Washington.

— 1914, The Bryozoa of the Tortugas Islands, Florida. — Papers fr. the Tortugas Lab. Carnegie Inst. Washington. Vol. 5.

— 1919, Bryozoa of the Crocker Land Expedition. — Bull. Amer. Mus. Nat. Hist. Vol. 41. New York.

— 1923, Bryozoa. — Rep. Canadian Arctic Exp. 1913—18. Vol. 8, Pt D. Ottawa.

— 1933, Bryozoa of the Mount Desert Region. — Biol. Surv. Mount Desert Reg. Philadelphia.

Pax, A., 1930, Die Tierwelt. — In: Supan u. Obst: Grundzüge der physischen Erdkunde Vol. 2, T. 2. Berlin u. Leipzig.

Pergens, Ed., 1889, Révision des Bryozoaires du Crétacé figurés par d'Orbigny. 1. Part., Cyclostomata. — Bull. Soc. Belge de Géologie. 1889. Tome III. Bruxelles.

Pergens, Ed., et Meunier, A., 1886, La faune des Bryozoaires Garumniens de Faxe. — Ann. Soc. Roy. Malacolog. de Belgique. Tome 21. Bruxelles.

PFEFFER, G., 1890, Die niedere Tierwelt des antarktischen Ufergebietes. — Internat. Polarforsch. Deutsch. Exp. Vol. II. 1890, p. 471.

PHILIPPS, E. G., 1900, Report on the Polyzoa collected by Dr Willey from the Loyalty Isles, New Guinea and New Britain. — Zoological Results based on material from New Britain, New Guinea, Loyalty Islands and elsewhere, collected by Arthur Willey. Part 4. Cambridge.

PRATT, E. M., 1898, Contribution to our knowledge of the Marine Fauna of the Falkland Islands. — Mem. Manchester Soc. Vol. 42, no 13. Manchester.

QUOY ET GAIMARD, P., 1824, Voyage autour du monde. (Exp. sur les corvettes l'Oranie et la Physicienne). — Zoologie. Text + Planches. Paris.

REUSS, A. E., 1848, Die fossilen Polyparien des Wiener Tertiärbeckens. — Haidingers Naturw. Abhandl. Bd 2, Pt 1. Wien.

— 1867, Die fossile Fauna der Steinsalzablagerung von Wieliczka in Galizien. — S.-B. d. K. Akad. d. Wissensch. Bd. 55, Abth. 1. Wien.

— 1869, Paläontologische Studien über die älteren Tertiärschichten der Alpen. II. Abteilung: Die fossilen Anthozoen und Bryozoen der Schichtengruppe von Crosara. — Denkschriften der Kgl. Akademie der Wissenschaften in Wien. 29. Abteil I.

RIDLEY, S. O., 1881, Polyzoa. Account of the Zoological Collections made during the Survey of H. M. S. "Alert" in the Straits of Magellan and on the Coast of Patagonia. V. — Proc. Zool. Soc. London 1881.

ROBERTSON, A., 1900, The Bryozoa. — Papers from the Harriman Alaska Expedition. 6. Vol. 9. Proc. Washington Acad. Sc. Vol. 2.

— 1910, The Cyclostomatous Bryozoa of the West Coast of North America. — Univ. Calif. Publ. Zool. Vol. 6. No 12. Berkeley.

ROEMER, F. A., 1840, Die Versteinerungen des Harzgebirges. — Hannover.

SAKAKURA, K., 1935, Bryozoa from Toyama Bay, Sea of Japan. — Ann. Zool. Jap. Vol. 15: 1. Tokyo.

SARS, M., 1851, Beretning om en i Sommeren 1849 foretagen zoologisk Reise i Lofoten og Finnmarken. — Nyt Mag. f. Naturvid. Bd 6. Christiania.

— 1863 a, Beskrivelse over nogle norske Polyzoer. — Vidensk. Selskabets Forhandl. 1862. Christiania.

— 1863 b. Geologiske og Zoologiske Iakttagelser, anstillede paa en Reise i en Deel af Trondhjems Stift i Sommeren 1862. — Nyt Mag. f. Naturvid. Bd 12. Christiania.

SAVIGNY, J. C., 1809, Déscription de l'Egypte. Hist. Nat. Planches. T. Deuxième. Polypes. — Paris.

SILÉN, L., 1942, Origin and Development of the Cheilo-Ctenostomatous Stem of Bryozoa. XX — Zool. Bidr. fr. Uppsala, Bd 22.

SMITT, F. A., 1865—1872, Kritisk Förteckning över Skandinaviens Hafsbryozoer, I—V. — Öfvers. af Kgl. Sv. Vet. Akad:s Förhandl. 1865—71. Stockholm.

— 1872, Floridan Bryozoa, Pt. I. — Kgl. Sv. Vet.Akad:s Handl. Ny Följd. Bd 10. Stockholm.

STACH, LEO W., 1935, A new Cyclostomatous Bryozoan. — The Australian Zoologist. Vol. 8. P. 2. Melbourne.

— 1935 b, Notes on recent Australian Bryozoa. Pt. 1. — Ibid.

STOLICZKA, F., 1864, Fossile Bryozoen aus dem tertiären Grünsandsteine der Orakei-Bay bei Auckland. — Reise der Novara um die Erde 1857—59. Geol. Theil. I. Paläontologie von Neu-Seeland. Beiträge zur Kenntniss der fossilen Flora und Fauna der Provinzen Auckland und Nelson. Wien 1865.

STUDER, TH., 1879, Die Arten der Gattung *Serolis* von Kerguelensland. — Arch. f. Naturgesch. N. F. Vol. 45. Berlin.

— 1889, Die Forschungsreise S. M. S. "Gazelle" in den Jahren 1874—1876 hrsgegeb. v. d. Hydrographischen Amt des Reichs-Marine-Amts. — Th. 3. Zoologie und Geologie. Berlin.

THORNELY, LAURA R., 1905, On the Polyzoa. — In: HERDMAN: Rep. to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar. With suppl. Rep. upon the Marine Biol. of Ceylon. Suppl. Rep. 26, Pt 4. London.

— 1907, Report on the marine Polyzoa in the Collection of the Indian Museum. — Rec. Indian Museum. Vol. I. 1907. Part 3, No 13. Calcutta.

THORNELY, LAURA R., 1912, The Marine Polyzoa of the Indian Ocean, from H. M. S. Sealark. Reports of the Percy Sladen Trust Exp. to the Indian Ocean in 1905. Vol. 4. — Trans. Linn. Soc. London. Zoology. Ser. 2. Vol. 15.

— 1924, Polyzoa. — Australasian Antarctic Expedition 1911—14 (under the leadership of Sir Douglas Mawson). Scientific Reports. Series C. Zoology and Botany. Vol. 6. Part. 6.

VERRILL, A. E., 1875, Results of dredging Expeditions off the New England Coast in 1874. — Brief Contr. to Zool. fr. the Mus. of Yale Coll. Nos 32—33. Amer. J. of Sc. and Arts. Ser. 3, Vols 9 and 10. New Haven.

WALFORD, E. A., 1894 a, On some Bryozoa from the Inferior Oolite of Shipton Gorge. Dorset. — Q. J. Geol. Soc. Vol. 50. London.

— 1894 b, On Cheilostomatous Bryozoa from the Middle Lias. — Ibid. Vol. 50.

WATERS, A. W., 1879, On the Bryozoa of the Bay of Naples. — Ann. & Mag. Nat. Hist. Ser. 5. Vol. 3. London.

— 1880, Note on the Genus Heteropora. — Ibid. Ser. 5. Vol. 6.

— 1884, On Fossil Cyclostomatous Bryozoa from Australia. — Q. J. Geol. Soc. London. Vol. 40.

— 1887 a, On Tertiary Cyclostomatous Bryozoa from New Zealand. — Ibid. Vol. 43.

— 1887 b, Bryozoa from New South Wales, North Australia, etc. — Ann. & Mag. Nat. Hist. Ser. 5. Vol. 20.

— 1888, Supplementary Report on the Polyzoa collected by H. M. S. Challenger during the years 1873—1876. — Report of the Scientific Results of the Voyage of H. M. S. Challenger 1873—76. Zoology. Vol. 31. Part. 79. 1889.

— 1889 a, On some Ovicells of Cyclostomatous Bryozoa. — J. Linn. Soc. London. Zoology. Vol. 20. (No 121).

— 1889 b, On the Ovicells of some Lichenoporae. — Ibid. Vol. 20. (No 121).

— 1899, Bryozoa from Madeira. — J. Roy. Microsc. Soc. 1899. London.

— 1904, Bryozoa. — Expédition Antarctique Belge. Résultats du Voyage du S. Y. Belgica en 1897—1898—1899. Rapports scientifiques. Zoologie. Antwerpen.

— 1905 a, Notes on some Recent Bryozoa in d'Orbigny's Collection. — Ann. & Mag. Nat. Hist. Vol. 51. Ser. 7.

— 1905 b, Bryozoa from near Cape Horn. — J. Linn. Soc. London. Zoology. Vol. 29. 1903—1906.

— 1906, Bryozoa from Chatham Island and d'Urville Island, New Zealand. — Ann. & Mag. Nat. Hist. Ser. 7. Vol. 17.

— 1907, Tubucellaria: its Species and Ovicells. — J. Linn. Soc. London. Zoology. Vol. 30. No 196.

— 1910, The Bryozoa. Pt II. Cyclostomata. Ctenostomata, and Endoprocta. Rep. Mar. Biol. of the Sudanese Red Sea, from Coll. made by Cyril Crossland; together with Coll. made in the Red Sea by Dr. R. Hartmeyer. — J. Linn. Soc. Zool. Vol. 31, No 207. London.

— 1913—14, The Marine Fauna of British East Africa and Zanzibar, from Collections made by Cyril Crossland — — — in the years 1901—1902. Bryozoa. I Cheilostomata. II Cyclostomata, Ctenostomata, and Endoprocta. — Proc. Zool. Soc. London 1913. Part III.

— 1916, Some Species of Crisia. — Ann. & Mag. Nat. Hist. Ser. 8. Vol. 18.

— 1918, Bryozoa. Some Collections of the Littoral Marine Fauna of the Cape Verde Islands, made by Cyril Crossland in the Summer of 1904. — J. Linn. Soc. Zool. Vol. 34, No 225. London.

— 1922, On Mediterranean Tervia and Idmonea. — Ann. & Mag. Nat. Hist. Ser. 9. Vol. 10. London.

WHITEAVES, J. F., Catalogue of the Marine Invertebrata of Eastern Canada. — Geol. Survey of Canada. Ottawa.

WHITELEGGE, T., 1888, Notes on some Australian Polyzoa. — Ann. & Mag. Nat. Hist. Ser. 6. Vol. 1.

— 1890, List of the Marine and Fresh-water Invertebrate Fauna of Port Jackson and the Neighbourhood. — J. & Proc. Roy. Soc. of New South Wales. Vol. 23. Sidney.

EXPLANATION OF PLATES.

All the Figures are photomicrographs.

PLATE 1.

Fig. 1. *Stomatopora eburnea* D'ORB. — Zoarium adnate to a Gastropods shell. × 4.
Fig. 2. *Stomatopora eburnea.* — Part of fertile zoarium showing autozoids and a gonozoid, its tube and aperture (*gzap*). × 18.
Fig. 3. *Tubulipora carinata* n. sp. — Zoarium from above. *gzap* aperture of gonozoid. × 18.
Fig. 4. *Tubulipora gracillima* n. sp. — Young bilobed zoarium. There are gonozoids in both lobes though they are as yet incomplete. × 18.
Fig. 5. *Tubulipora gracillima.* — Fertile lobe of zoarium, with a gonozoid, the dilated portion, tube and aperture (*gzap*) of which are visible from above. × 18.
Fig. 6. *Tubulipora gracillima.* — Fertile lobe of zoarium in lateral view. The bilabiate shape of the tube and aperture of the gonozoid (*gzap*) is well seen. × 18.
Fig. 7. *Tubulipora bocki* n. sp. — Fully developed and fertile zoarium (the gonozoid is in the upper lobe, to the left). × 4.
Fig. 8. *Tubulipora bocki.* — Young zoarium with gonozoid, the aperture of which (*gzap*) is visible. × 18.
Fig. 9. *Tubulipora bocki.* — Part of the zoarium reproduced in figure 7, to show gonozoid and its aperture (*gzap*). × 18.

PLATE 2.

Fig. 1. *Tubulipora stellata* n. sp. — Young zoarium. × 2.
Fig. 2. *Tubulipora stellata.* — Another very well developed zoarium. × 4.
Fig. 3. *Tubulipora stellata.* — Zoarium. × 4.
Fig. 4. *Tubulipora stellata.* — Part of a large zoarium to show disposition of autozoids, gonozoid, and aperture of gonozoid (*gzap*). × 18.
Fig. 5. *Tubulipora anderssoni* BORG. — Well-developed zoarium. × 8.
Fig. 6. *Tubulipora anderssoni.* — Part of a fertile lobe to show arrangement of autozoids in transverse series and aperture of gonozoid (*gzap*). × 18.
Fig. 7. *Tubulipora spatiosa* n. sp. — Zoarium with gonozoid (*gz*) from above. × 12.

PLATE 3.

Fig. 1. *Tubulipora anderssoni.* — Sterile lobe. × 8.
Fig. 2. *Tubulipora anderssoni.* — Fertile lobe. × 8.
Fig. 3. *Tubulipora organisans* D'ORBIGNY. — Zoarium. × 8.
Fig. 4. *Tubulipora organisans.* — Part of zoarium to show gonozoid and aperture (*gzap*). × 18.

Fig. 5. *Tubulipora tubigera* BUSK. — Zoarium. Two gonozoids (*gz*) are visible. × 8.

Fig. 6. *Diastopora dichotoma* D'ORBIGNY. — Young bilobed zoarium. × 8. r_1, r_2, r_3 lines indicating periodical growth having taken place.

Fig. 7. *Diastopora dichotoma.* — Lobe of zoarium to show its irregular mode of growth. × 18.

Fig. 8. *Diastopora dichotoma.* — Part of zoarium to show disposition of autozoids, and gonozid (*gz*). × 18. *ogr* outgrowth (lobe just beginning to develop).

PLATE 4.

Fig. 1. *Tubulipora organisans.* — Part of zoarium (lateral lobe) with two gonozoids, one of which (above) is developing while the other (*gz*) is complete and its aperture (*gzap*) well visible. × 18.

Fig. 2. *Diastopora ridleyi* n. sp. — Fully developed zoarium with gonozoid (*gz*). × 18.

Fig. 3. *Diastopora reticulata* n. sp. — Fully developed circular and fertile zoarium. A gonozoid (*gz*) is visible in the upper portion of the figure. × 18.

Figs 4—7. *Diastopora reticulata.* — Four small, not fertile zoaria to show zoarial development. × 4.

Fig. 8. *Diastopora reticulata.* — Part of zoarium with gonozoid (*gz*), the aperture of which (*gzap*) is visible. × 18.

Fig. 9. *Diastopora gracilis* n. sp. — Zoarium. × 6.

Fig. 10. *Diastopora gracilis.* — Part of zoarium, to show disposition of autozoids. × 18.

Fig. 11. *Diastopora gemelligera* n. sp. — Part of zoarium to show arrangement of autozoids, and gonozoid (*gz*). × 18.

PLATE 5.

Fig. 1. *Diastopora ridleyi.* — Young zoarium not yet fertile. × 18.

Fig. 2. *Diastopora gracilis.* — Part of fertile zoarium to show gonozoid (*gz*) with its aperture (*gzap*) and arrangement of autozoids. × 18.

Fig. 3. *Idmidronea pseudocrisina* n. sp. — Zoarium, to show mode of growth. × 8.

Fig. 4. *Idmidronea pseudocrisina.* — Branch showing arrangement of autozoids the apertures of which are curiously expanded. × 18.

Fig. 5. *Idmidronea curvata* n. sp. — Zoarium. × 4. Three stems are visible one of which (to the left) is fertile. *gz* gonozoid.

Fig. 6. *Idmidronea curvata.* — Part of branch in lateral view, to show dilated portion, tube, and aperture (*gzap*) of gonozoid (*gz*). × 18.

PLATE 6.

Fig. 1. *Idmidronea hula* n. sp. — Fertile zoarium with gonozoid (*gz*). × 18.

Fig. 2. *Idmidronea hula.* — Fertile branch, with gonozoid (*gz*), the aperture of which (*gzap*) is visible in the upper left lobe of the branch. × 18.

Fig. 3. *Idmidronea hula.* — Sterile branch to show mode of arrangement of autozoids. To the right part of a fertile zoarium with gonozoid (*gz*) is visible. × 18.

Fig. 4. *Idmidronea antarctica* n. sp. — Zoarium. × 8. *gz* gonozoid, *sd* supporting disc.

PLATE 7.

Fig. 1. *Idmidronea antarctica.* — Zoarium from the basal side to show secondary thickening layer (in upper portion of colony) and the very sharp limit between it and the peduncle. × 8.

Fig. 2. *Idmidronea antarctica.* — Part of fertile lobe, with gonozoid (*gz*) between transverse series of autozoids. × 18.

Fig. 3. *Nevianipora milneana* (D'ORBIGNY). — Part of typical zoarium as seen from frontal side. × 6.

Fig. 4. *Nevianipora milneana.* — Part of basal side of zoarium to show curved lines (*r*) designating periods of growth. × 8.

Fig. 5. *Nevianipora milneana.* — Part of fertile stem with gonozoid (*gz*), as seen from frontal side. The aperture of the gonozoid (*gzap*) is well visible among autozoids at bifurcation. × 16.

Fig. 6. *Nevianipora milneana* var. *canui* n. var. — Frontal view of part of stem. × 6.

Fig. 7. *Nevianipora milneana* var. *canui.* — Part of zoarium. × 8.

Fig. 8. *Nevianipora milneana* var. *canui.* — Small portion of zoarium in frontal view, to show appearance and arrangement of autozoids. × 18.

PLATE 8.

Fig. 1. *Hastingsia irregularis* n. sp. — Zoarium from frontal side. × 6.

Fig. 2. *Hastingsia irregularis.* — Another zoarium. × 8.

Fig. 3. *Hastingsia irregularis.* — Part of the zoarium reproduced in fig. 1, to show arrangement of autozoids on frontal side. × 12.

Fig. 4. *Hastingsia irregularis.* — Part of fertile zoarium from frontal side. A gonozoid (*gz*) is visible in the branch to the left. × 12.

Fig. 5. *Hastingsia irregularis.* — Part of another, very irregular, fertile zoarium. A gonozoid (*gz*) is seen to the left. × 12.

Fig. 6. *Hastingsia irregularis.* — Part of zoarium with gonozoid (*gz*) and aperture (*gzap*). × 18.

Fig. 7. *Hastingsia irregularis.* — Part of zoarium with gonozoid (*gz*) in an axil, as seen from above. × 18.

Fig. 8. *Hastingsia irregularis.* — Part of another zoarium from frontal, to show a gonozoid (*gz*) in the axil. × 18.

Fig. 9. *Hastingsia irregularis.* — The same from the basal side. × 18.

PLATE 9.

Fig. 1. *Disporella* (?)*octoradiata* (WATERS). — Zoarium from above. The fascicles of autozoids in central portion of zoarium are well seen. In lower portion of zoarium, a little to the right, a brood-chamber with aperture (*gzap*) can be discerned. × 8.

Fig. 2. *Disporella* (?)*octoradiata.* — Zoarium from above, to show budding region encircling it. × 6.

Fig. 3. *Hastingsia pygmaea* n. sp. — Three zoaria and part of a fourth. × 4.

Fig. 4. *Hastingsia pygmaea.* — The uppermost of the zoaria reproduced in fig. 3, in lateral view, magnified 18 ×.

Fig. 5. *Hastingsia pygmaea.* — The middle zoarium of fig. 3, magnified 18 ×. In the middle portion of the zoarium is a gonozoid (*gz*) with its aperture (*gzap*).

Fig. 6. *Hastingsia pygmaea.* — Part of zoarium with gonozoid as seen from basal side. × 18. *gzap* aperture of gonozoid.

PLATE 10.

Fig. 1. *Hastingsia gracilis* n. sp. — Zoarium. × 8.

Fig. 2. *Hastingsia gracilis.* — Zoarium. Between the two main branches, low down in the figure, a gonozoid (*gz*) is visible. × 4.

Fig. 3. *Hastingsia gracilis.* — Part of zoarium showing gonozoid (*gz*) with aperture (*gzap*). × 18.

Fig. 4. *Entalophora proboscidea* var. *watersi* n. var. — Three branches of one and the same zoarium. × 6.

Fig. 5. *Entalophora buski* nom. nov. — Three branches. × 4.

Fig. 6. *Fasciculipora ramosa* D'ORBIGNY. — Part of zoarium in side view. × 2.

Fig. 7. *Fasciculipora ramosa.* — Top of zoarium some distance above a bifurcation. The block needles are put into the two branches of a gonozoid (*gz*). × 6.

Fig. 8. *Fasciculipora maeandrina* n. sp. — Zoarium (part of zoarium?) in side view. × 4.

Fig. 9. *Fasciculipora maeandrina.* — The same zoarium as in fig. 8 seen from above. × 8.

PLATE 11.

Fig. 1. *Entalophora australis* BUSK. — Zoarium. × 4.

Fig. 2. *Entalophora australis* BUSK. — Fertile zoarium with gonozoid (*gz*). × 8.

Fig. 3. *Bientalophora regularis* (MACGILLIVRAY). — Zoarium. × 4.

Fig. 4. *Bientalophora regularis.* — Branch of the zoarium reproduced in fig. 3, to show arrangements of autozoids and kenozoids. × 12.

Fig. 5. *Defrancia sarsi* n. sp. — Zoarium in lateral view. × 8.

Fig. 6. *Defrancia sarsi.* — Another zoarium (var.?) seen from above. × 8.

Fig. 7. *Defrancia sarsi.* — The same zoarium as in fig. 6 seen from one side. × 8.

Fig. 8. *Defrancia sarsi.* — The same zoarium as in fig. 7 but seen from the opposite side. × 8.

Fig. 9. *Dartevellia cylindrica* n. sp. — Quite young zoarium growing on a shell. The proancestrula is still visible. × 8.

Fig. 10. *Dartevellia cylindrica.* — Zoarium (fully developed?). × 8.

Fig. 11. *Dartevellia cylindrica.* — Old zoarium. Circular ridges indicate, in all probability, periods of growth. × 8.

Fig. 12. *Dartevellia cylindrica.* — Young zoarium seen from above. × 18.

PLATE 12.

Fig. 1. *Bicrisia edwardsiana* (D'ORBIGNY). — Zoarium, sterile portion. × 12.

Fig. 2. *Bicrisia edwardsiana.* — Part of zoarium with gonozoid to show its position, particularly relative to branch of fertile internode. × 30.

Fig. 3. *Bicrisia edwardsiana.* — Part of zoarium with gonozoid to show its shape and the situation of its aperture. × 30.
Fig. 4. *Bicrisia biciliata* (MACGILLIVRAY). — Part of zoarium with gonozoid to show its shape and position. × 20.
Fig. 5. *Crisia nordenskjöldi* n. sp. — Lower portion of zoarium to show internodes and mode of branching. × 20.
Fig. 6. *Crisia nordenskjöldi.* — Part of zoarium with two gonozoids to show their shape and position. × 20.

PLATE 13.

Fig. 1. *Pseudidmonea fissurata* (BUSK). — Young zoarium in side view. × 2.
Fig. 2. *Pseudidmonea fissurata.* — Part of fertile zoarium in basal view. A gonozoid (*gz*) with its tube is well visible. × 4.
Fig. 3. *Pseudidmonea fissurata.* — Branch from frontal. × 18. *mz* aperture of median zoid, *lz* lateral zoid.
Fig. 4. *Pseudidmonea fissurata.* — The same branch in basal view. × 18. *lz* lateral zoid.
Fig. 5. *Calvetia dissimilis* n. sp. — Zoarium in lateral view. × 4.
Fig. 6. *Calvetia dissimilis.* — Another, fertile zoarium in lateral view. × 4. *gz* brood-chamber; *x* two apertures (of a gonozoid and an autozoid?) quite near each other.
Fig. 7. *Calvetia dissimilis.* — Part of zoarium with gonozoid (*gz*) in axil; aperture of gonozid (*gzap*) well visible. × 12.
Fig. 8. *Calvetia dissimilis.* — Part of another gonozoid (*gz*), × 12.

PLATE 14.

Fig. 1. *Hornera antarctica* WATERS. — Zoarium in frontal view. × 6.
Fig. 2. *Hornera antarctica.* — Part of zoarium from frontal to show disposition of autozoids and pits. × 12.
Fig. 3. *Hornera antarctica.* — Part of zoarium with two dwarf branches. × 18.
Fig. 4. *Hornera antarctica.* — Part of zoarium in basal view showing three gonozoids. × 12.
Fig. 5. *Hornera americana* D'ORBIGNY. — Part of zoarium to show appearance of autozoids and ridges. × 12.
Fig. 6. *Hornera americana.* — Part of stem from basal side with swollen portion of gonozoid. × 18.
Fig. 7. *Hornera americana.* — Gonozoid with aperture (*gzap*) from frontal side. × 18.
Fig. 8. *Hornera falklandica* n. sp. — Zoarium from frontal. × 4.
Fig. 9. *Hornera falklandica.* — Part of zoarium from basal side to show gonozoids. × 4. gz_1, gz_2, gz_3, gz_4 the different gonozoids.

PLATE 15.

Fig. 1. *Hornera falklandica.* — Branches from frontal, to show appearance and arrangement of autozoids. × 18.

Fig. 2. *Hornera smitti* n. sp. — Large zoarium in frontal view. × 2.
Fig. 3. *Hornera smitti.* — Part of zoarium showing characteristic mode of branching. × 6.
Fig. 4. *Hornera smitti.* — Part of another zoarium in frontal view to show secondary calcification. × 8.
Fig. 5. *Hornera smitti.* — Part of zoarium in frontal view to show disposition and appearance of autozoids, and secondary calcification ridges. × 12.
Fig. 6. *Hornera smitti.* — Part of zoarium from basal side, showing well developed ridges of secondary calcification. × 12.
Fig. 7. *Hornera smitti.* — Gonozoid from basal side. × 18.
Fig. 8. *Hornera smitti.* — Gonozoid from frontal, showing tube and aperture. × 18. *gzt* tube of gonozoid.

PLATE 16.

Fig. 1. *Heteropora neozelanica* BUSK. — Part of zoarium, side view. × 2.
Fig. 2. *Lichenopora canaliculata* BUSK. — Zoarium from above. × 12.
Fig. 3. *Lichenopora canaliculata.* — Fertile zoarium from above. The aperture of the brood-chamber (*gzap*) is well visible in centre. × 12.
Fig. 4. *Lichenopora tubicen* n. sp. — Zoarium from above. The trumpet-shaped aperture of the brood-chamber (*gzap*) is visible in the lower half of the figure, a little to the left. × 12.
Fig. 5. *Lichenopora lovéni* n. sp. — Zoarium seen obliquely from above. × 12. *gzap* aperture of brood-chamber.
Fig. 6. *Lichenopora lovéni.* — Another zoarium seen from above. × 12.
Fig. 7. *Lichenopora elegantissima* n. sp. — Zoarium from above. × 12. *gzap* aperture of brood-chamber.
Fig. 8. *Disporella fimbriata* (BUSK). — Zoarium from above. × 8.
Fig. 9. *Disporella crassa* n. sp. — Zoarium seen a little obliquely from above. × 8.

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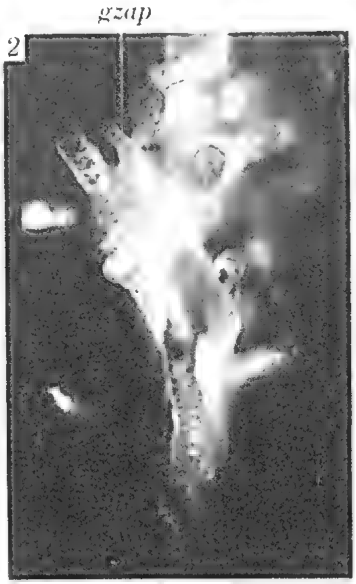
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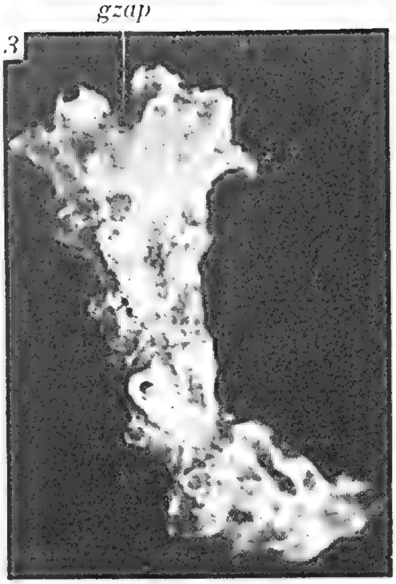
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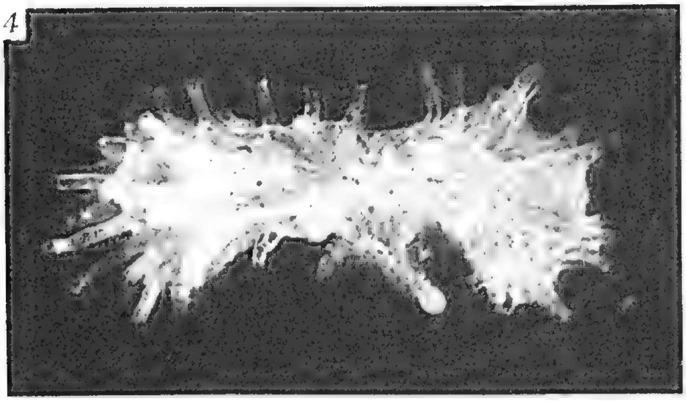
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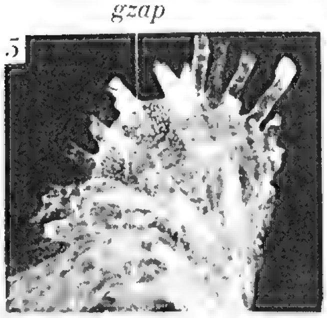
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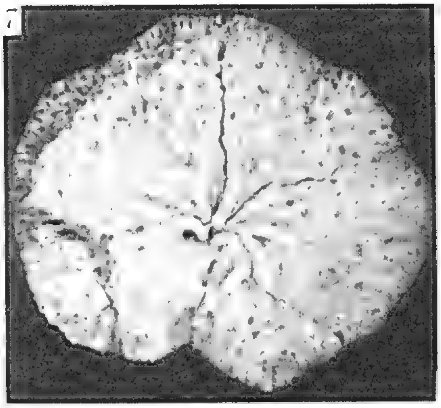
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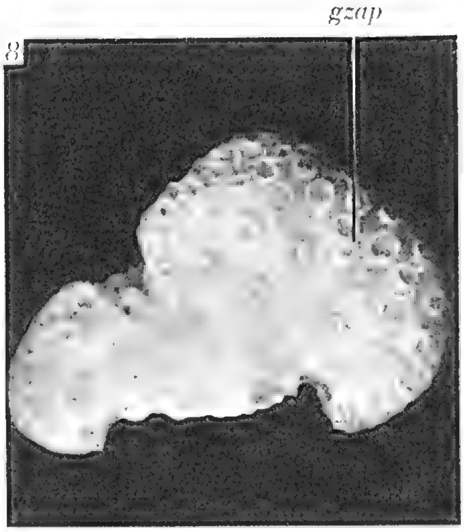
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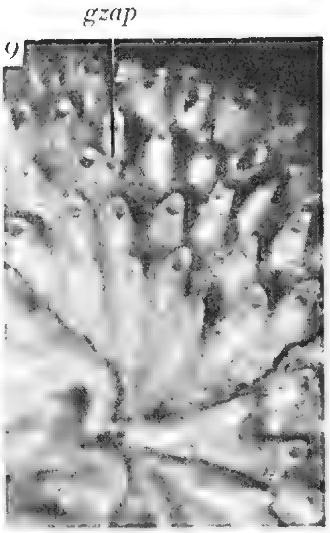
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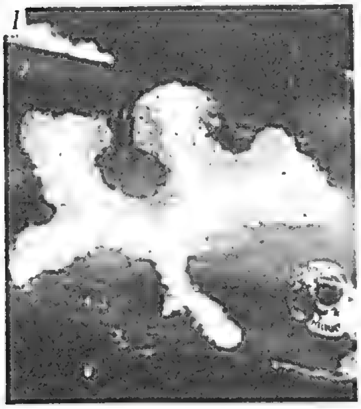
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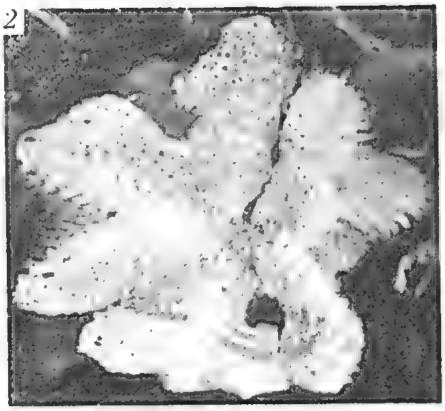
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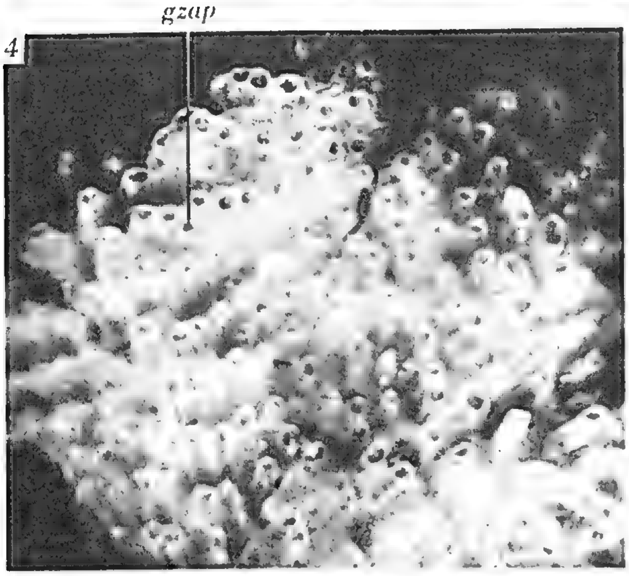
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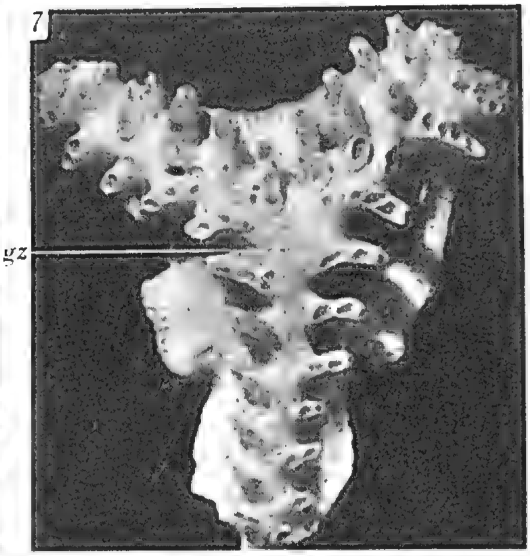
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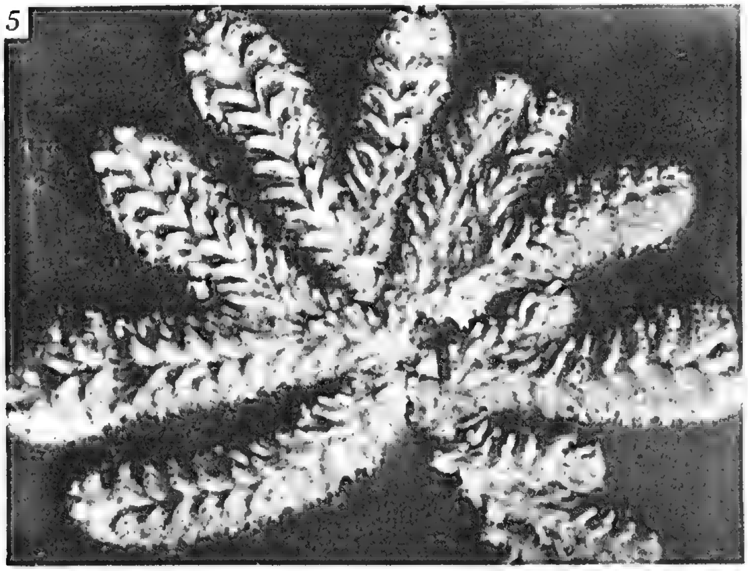
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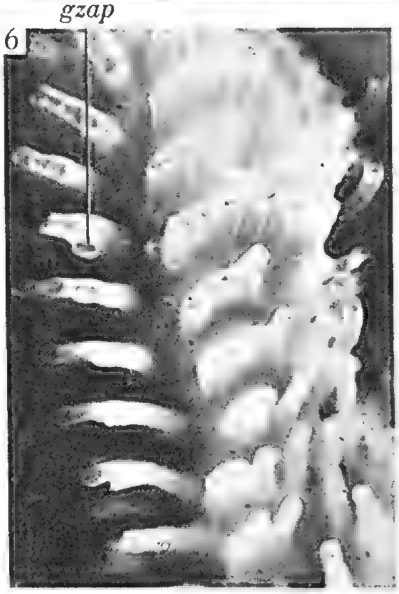
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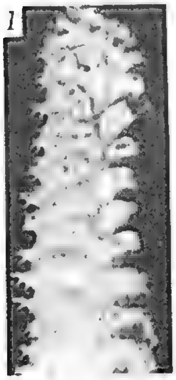

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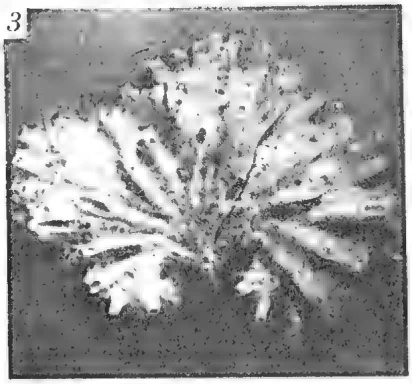

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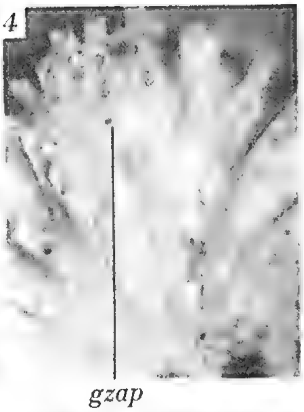

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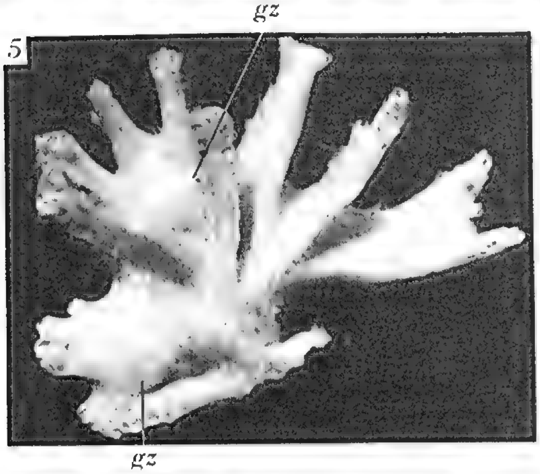

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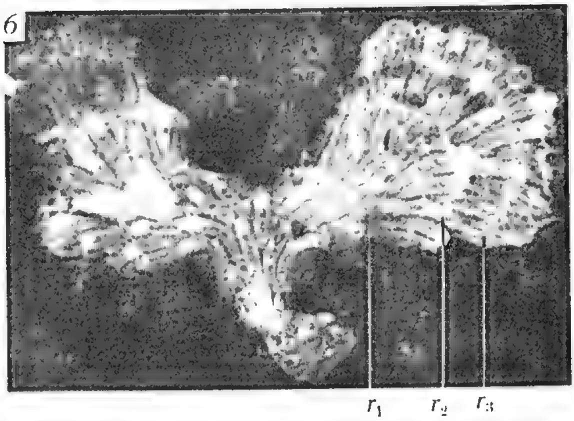

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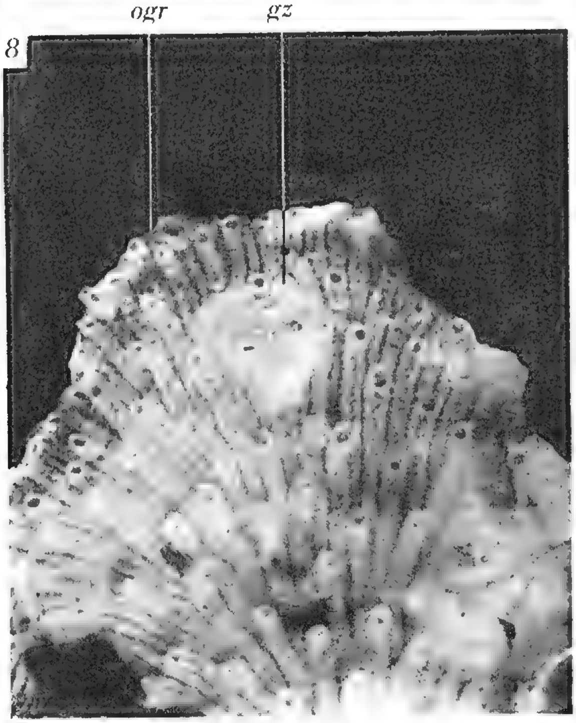

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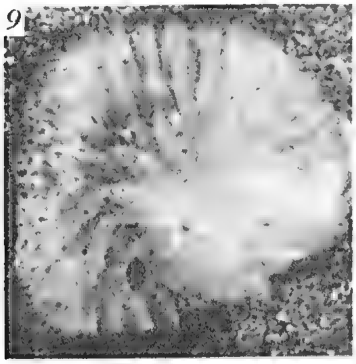

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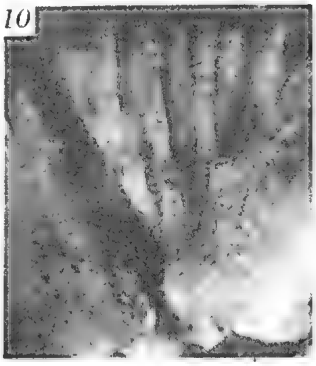

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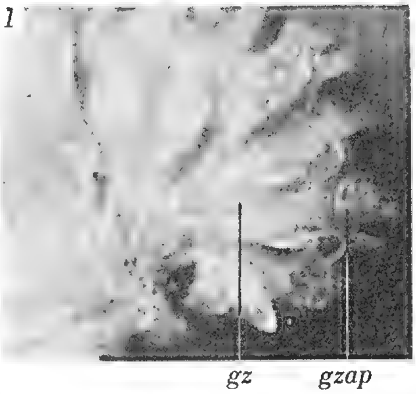

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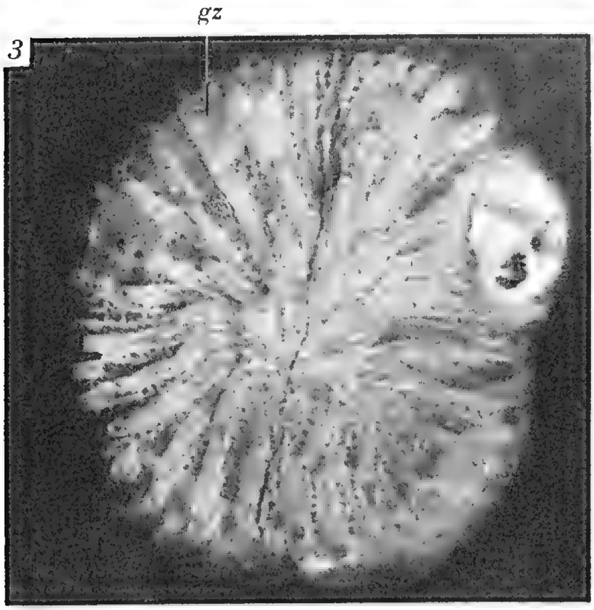

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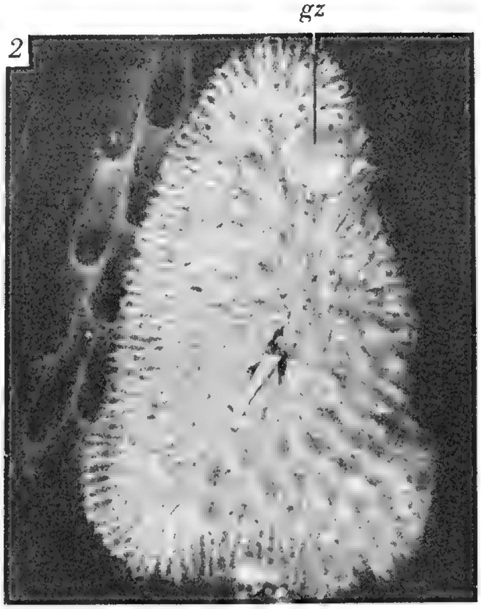

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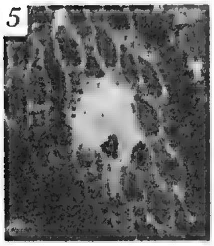

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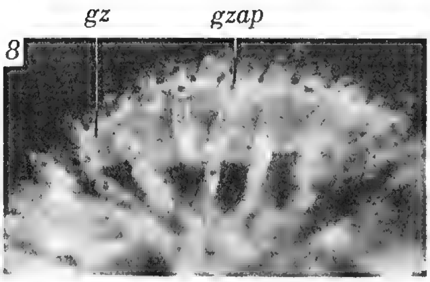

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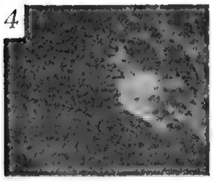

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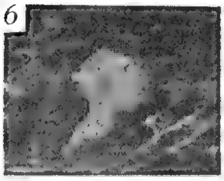

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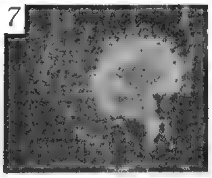

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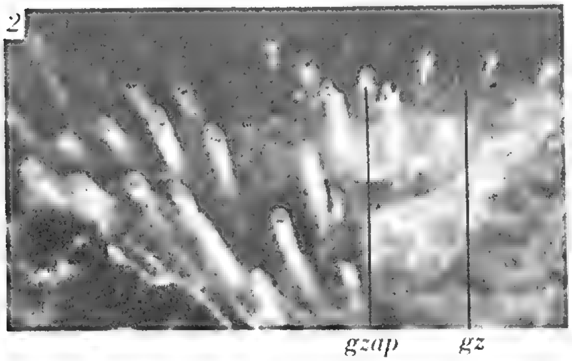

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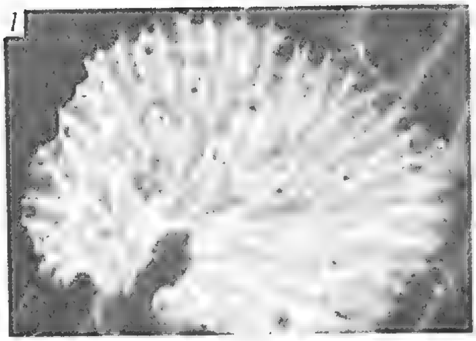

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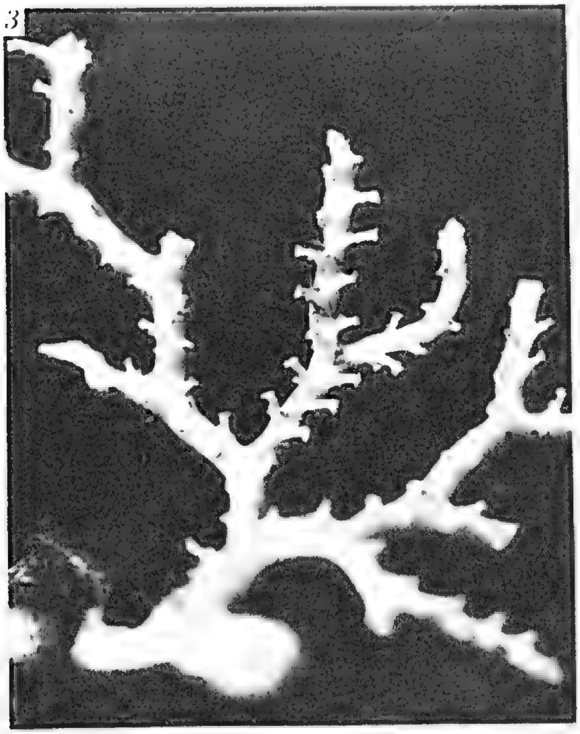

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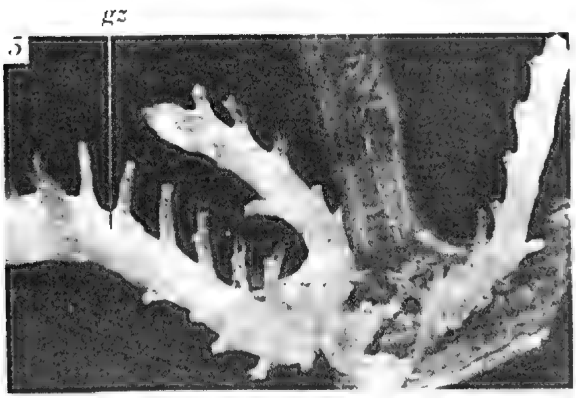

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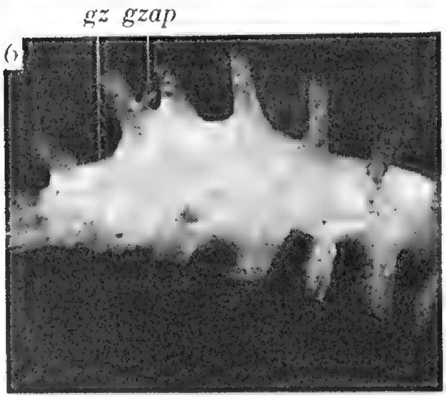
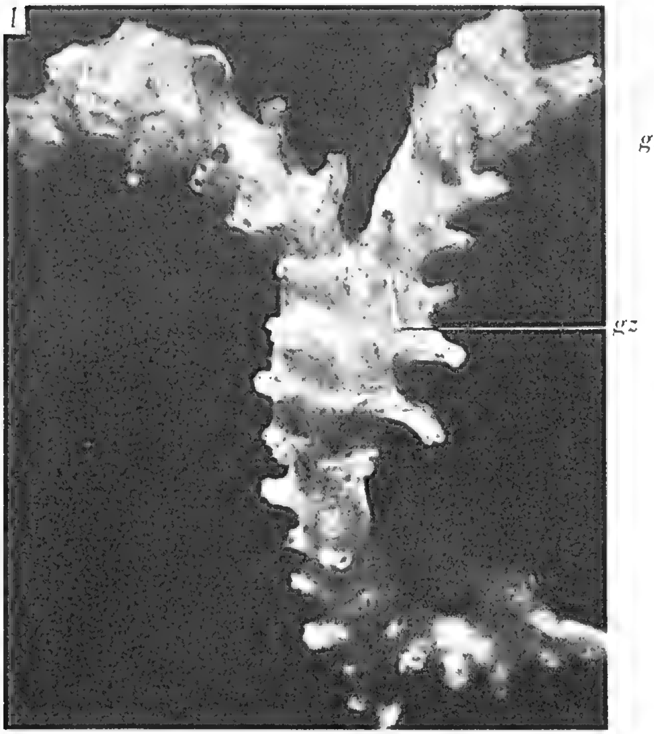
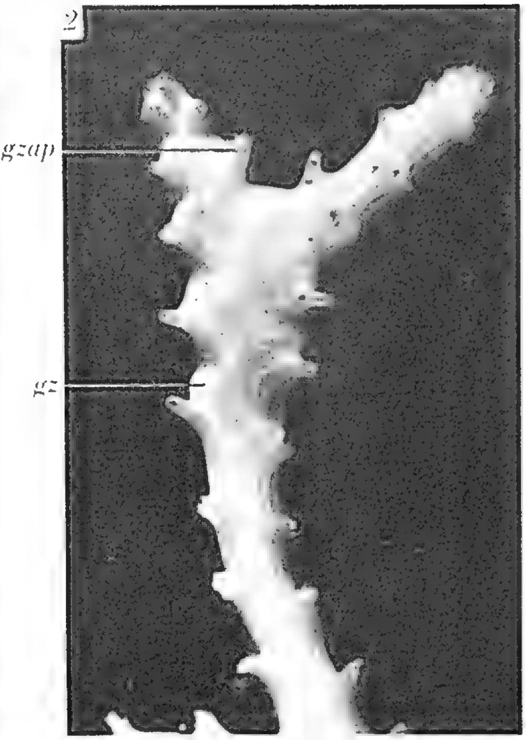
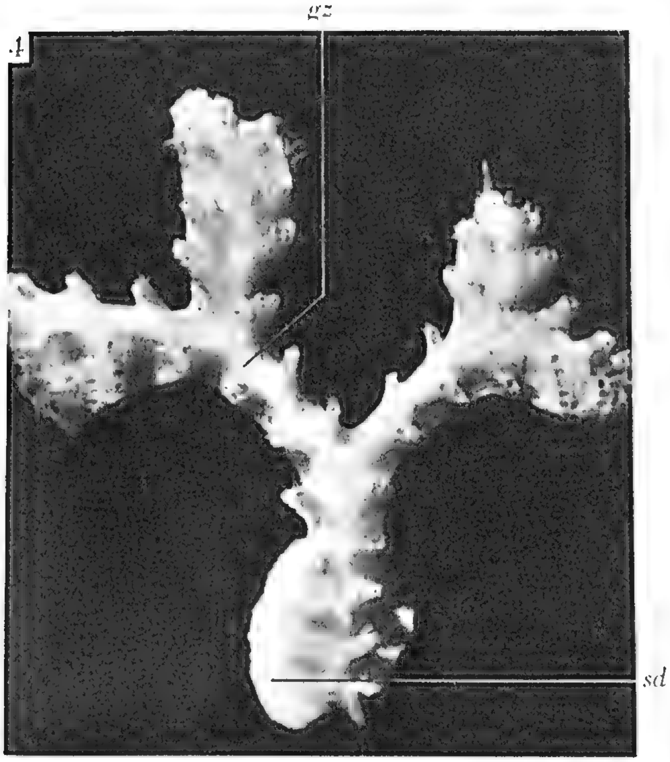
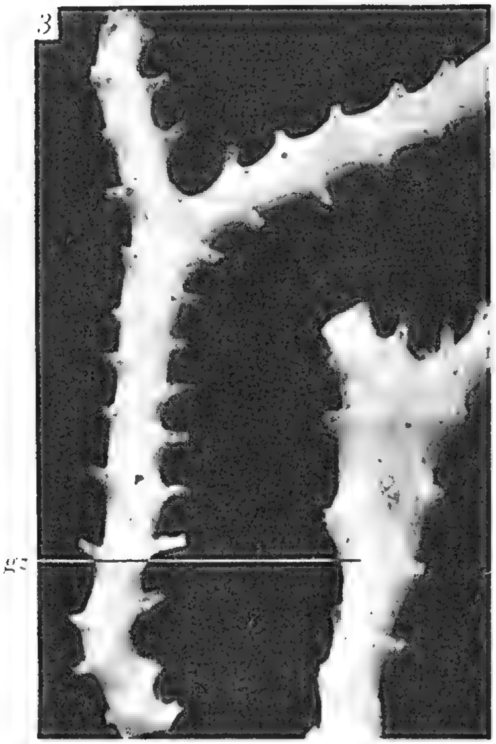


Malmö Ljustrycksanstalt









Malmö Ljustrycksanstalt

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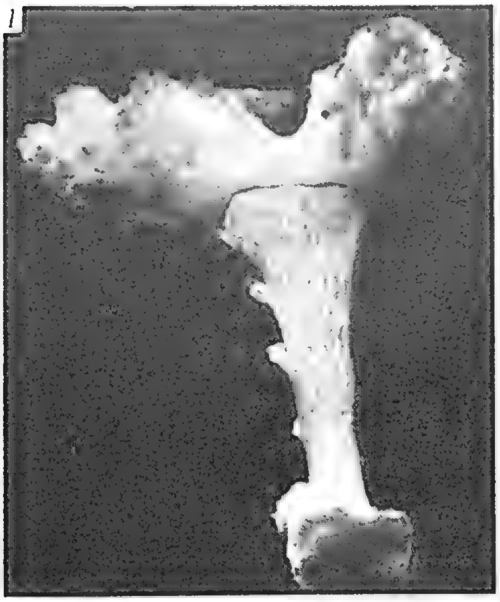

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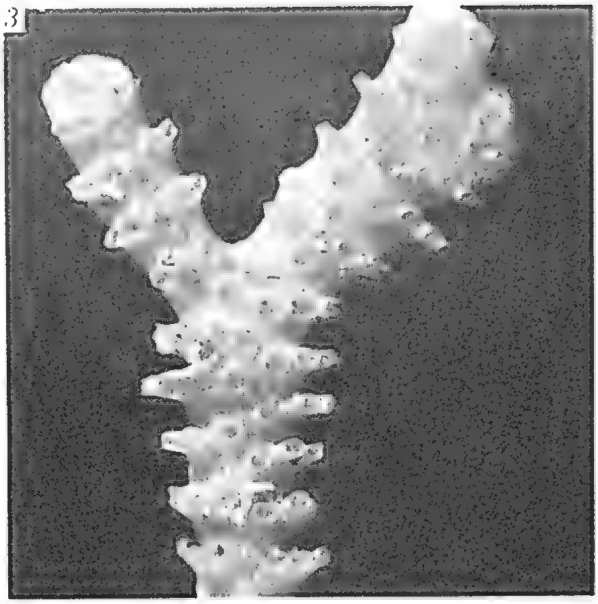

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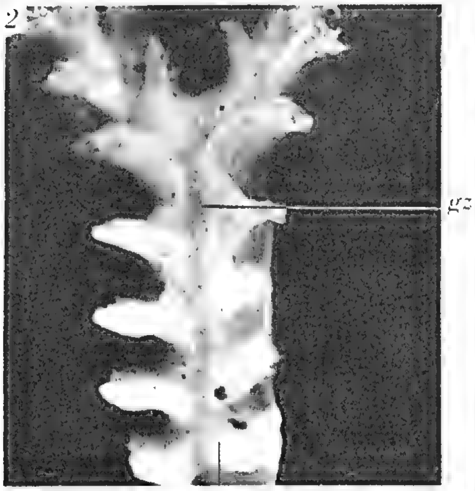

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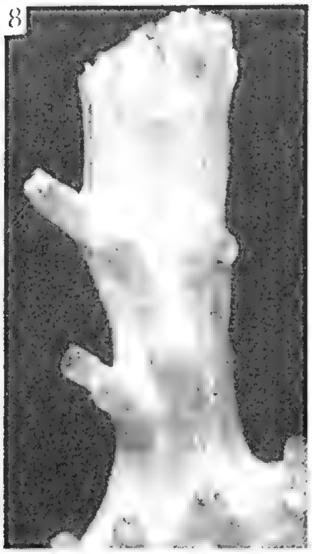

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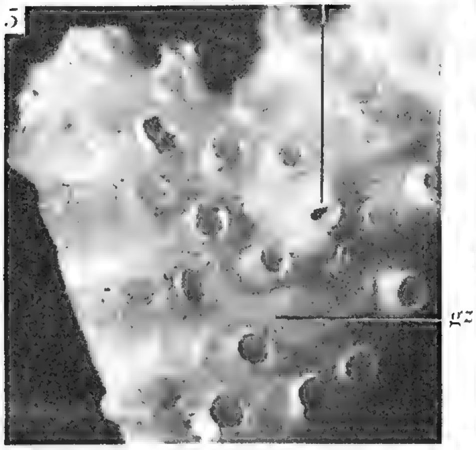

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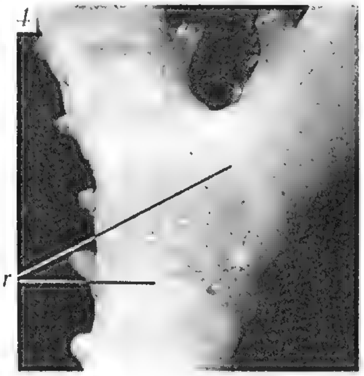

Malmö Ljustrycksanstalt

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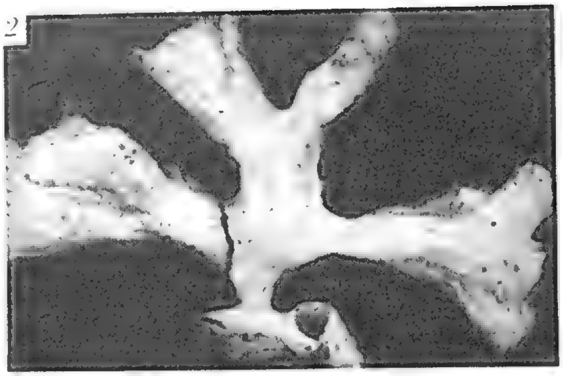

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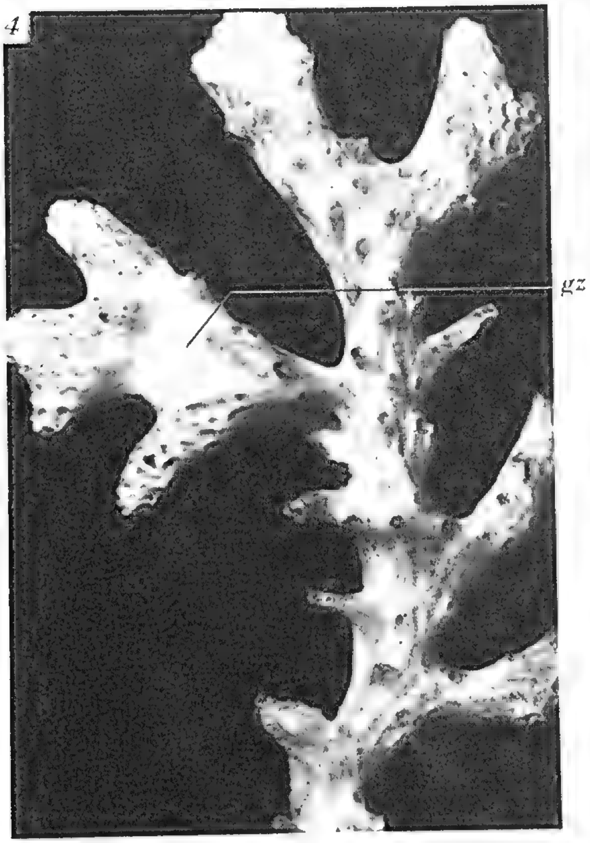

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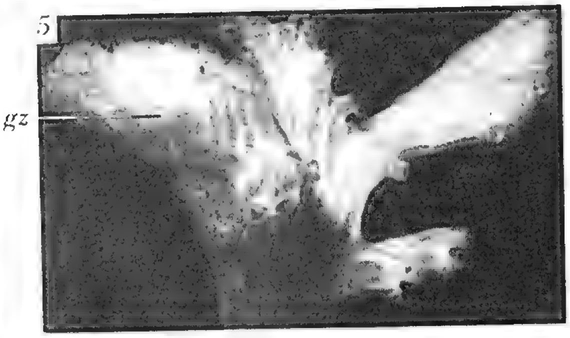

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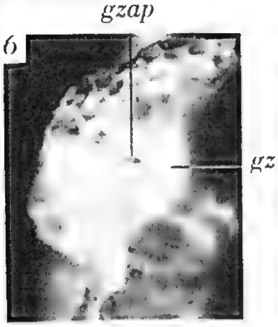

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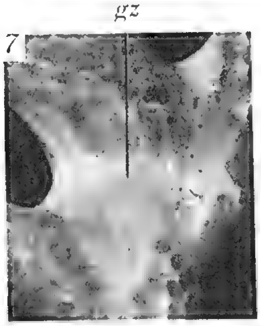

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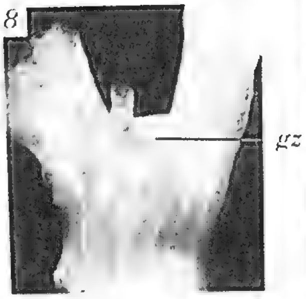

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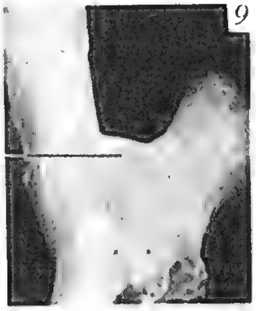

Malmö Ljustrycksanstalt

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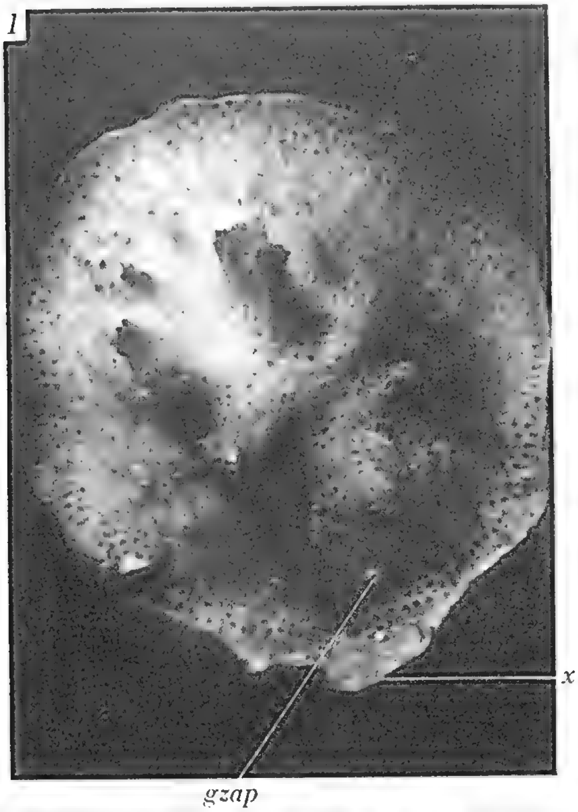

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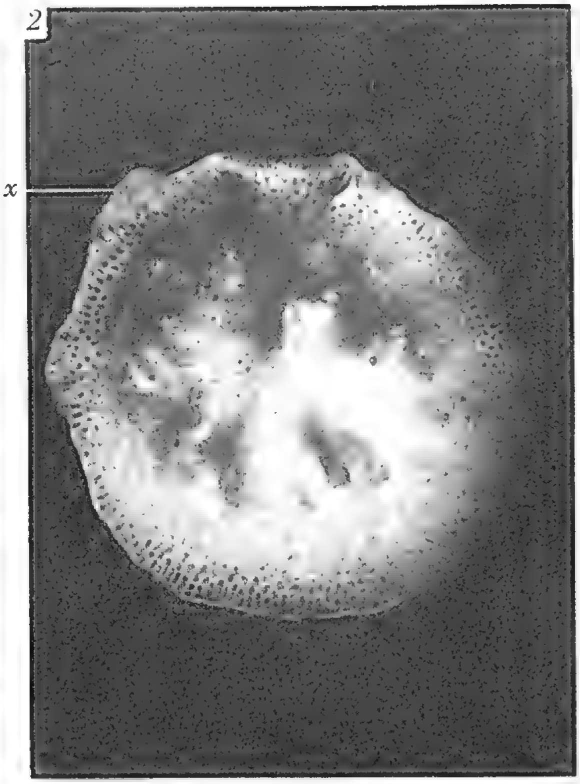

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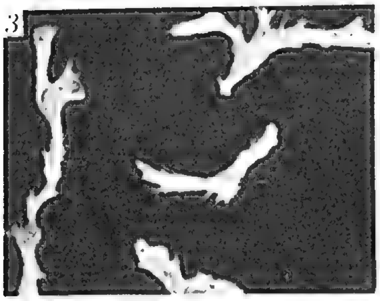

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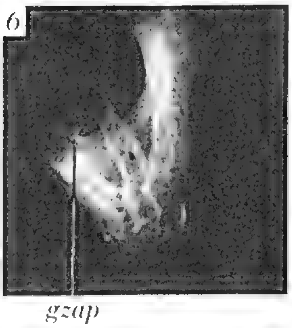

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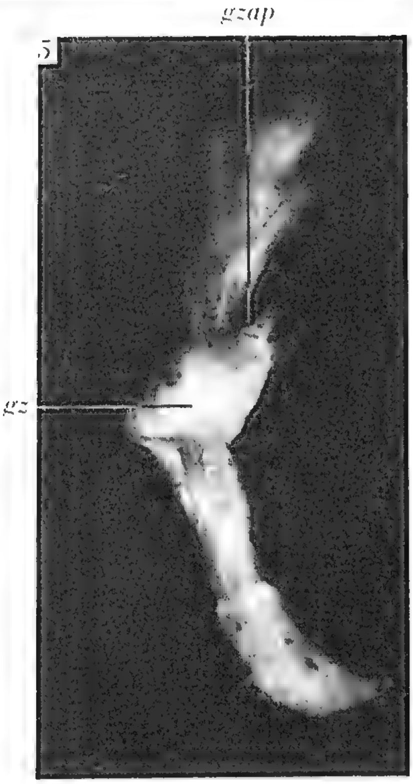

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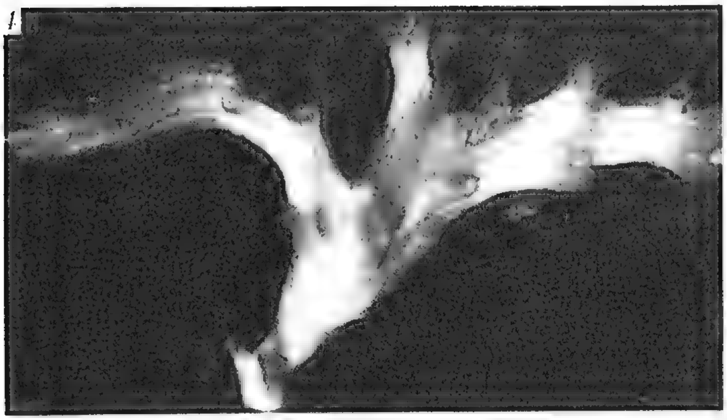

Malmö Ljustrycksanstalt

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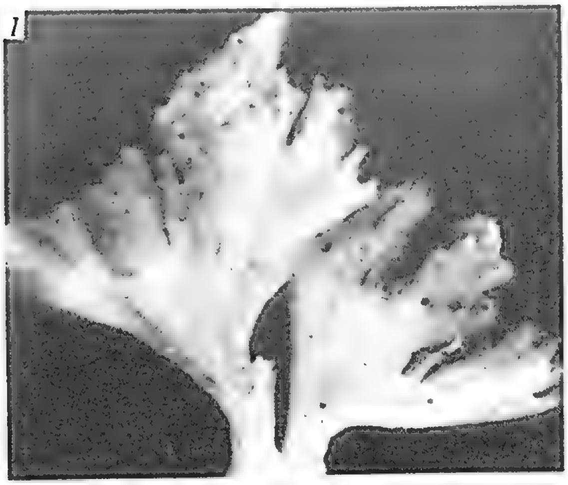

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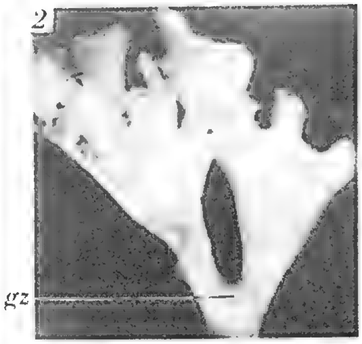

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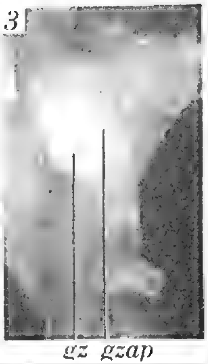

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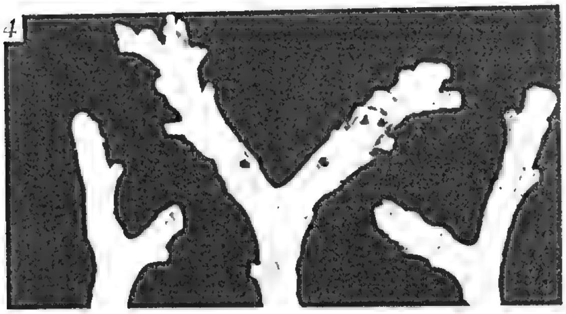

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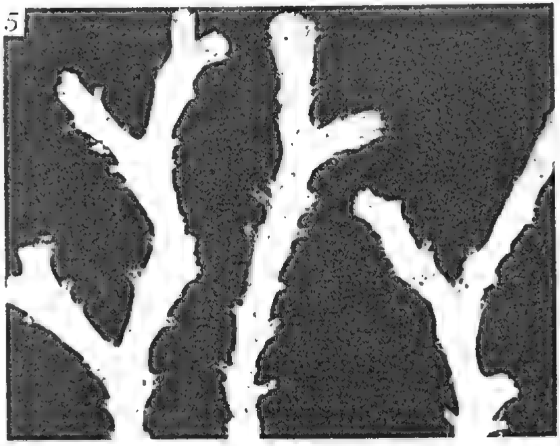

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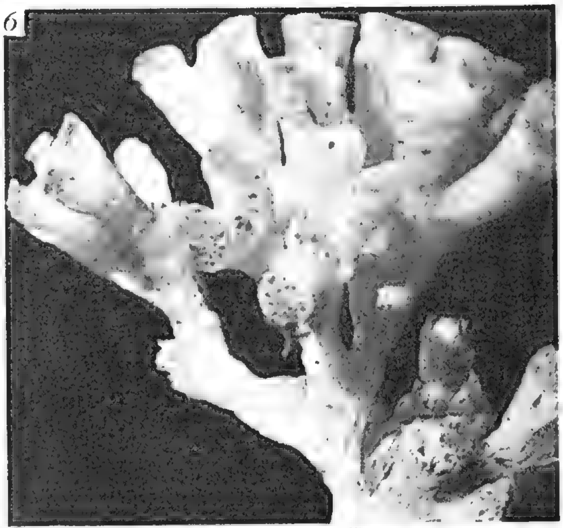

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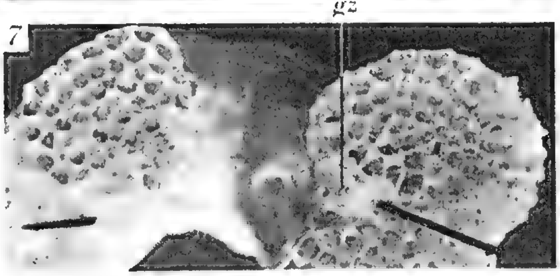

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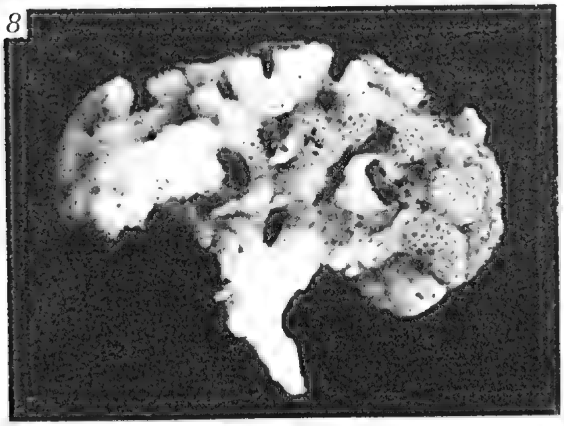

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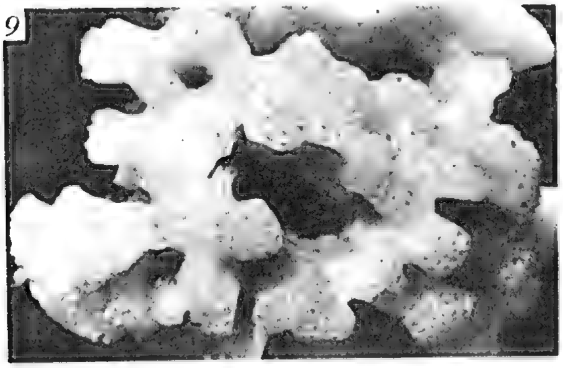

Malmö Ljustrycksanstalt

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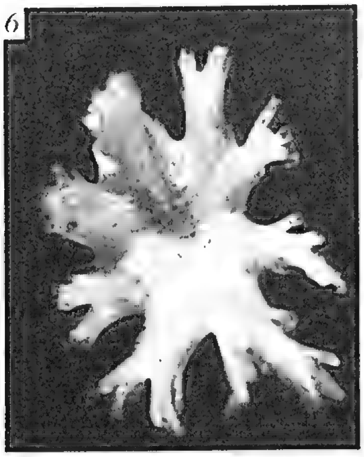

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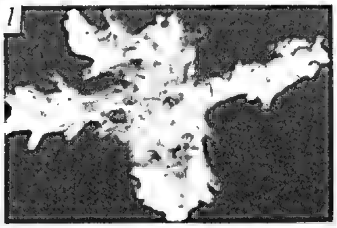

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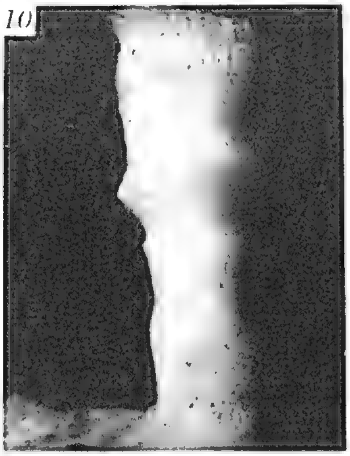

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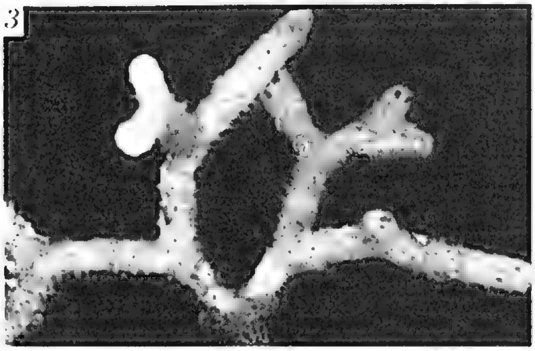

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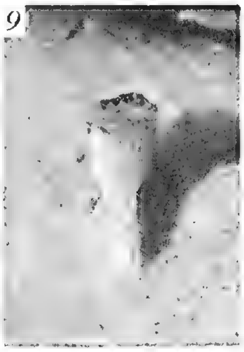

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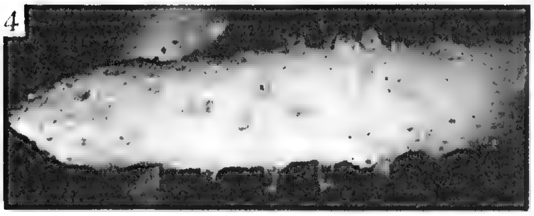

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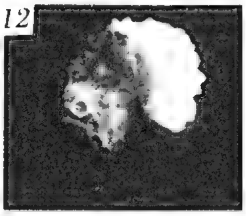

Malmö Ljustrycksanstalt

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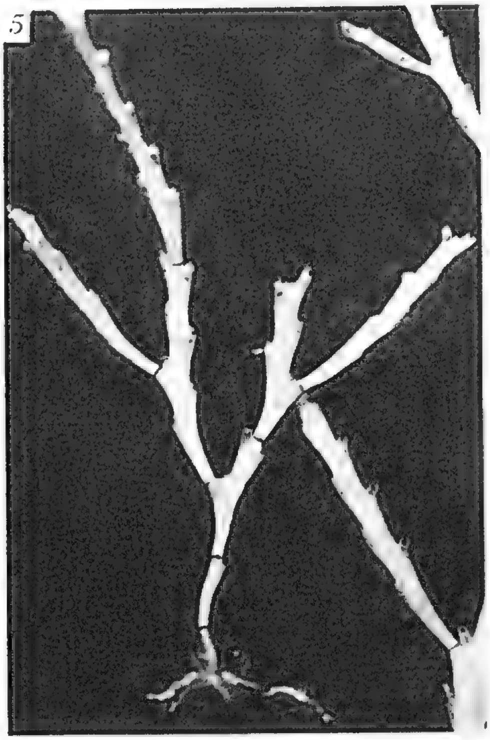

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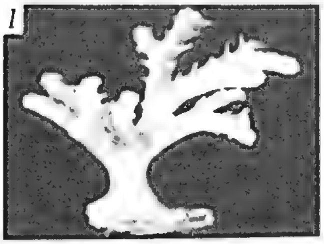
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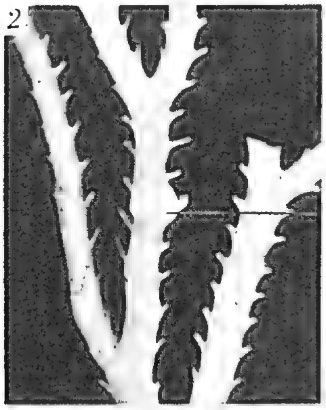
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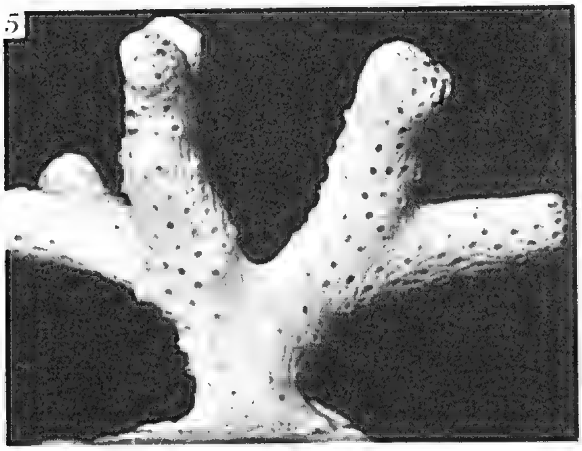
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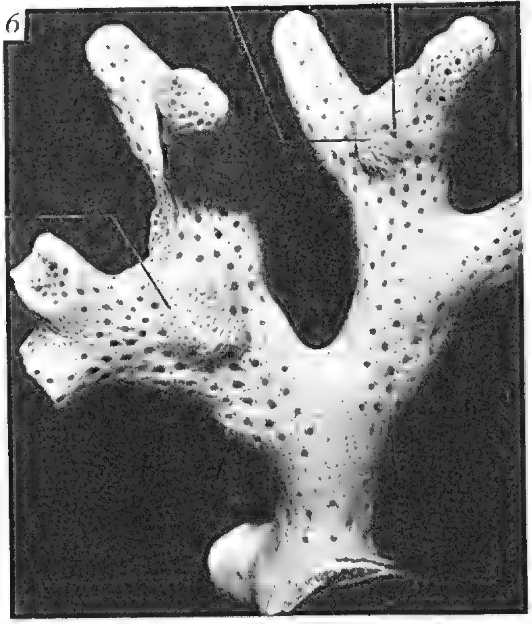
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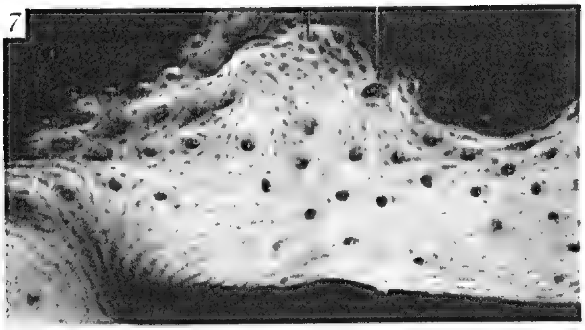
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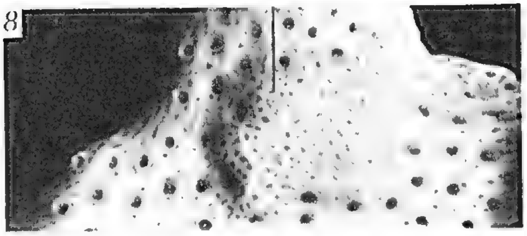
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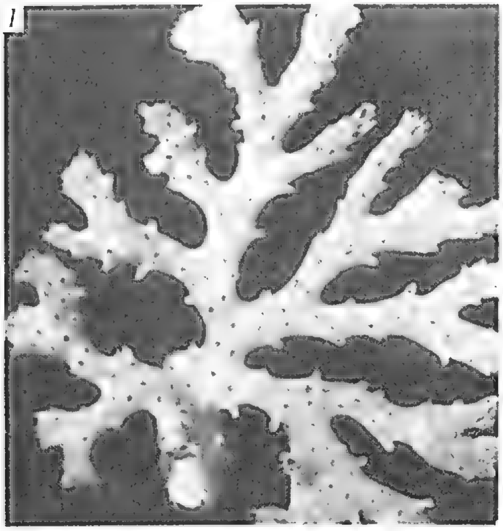
A.-B. Malmö Ljustrycksanstalt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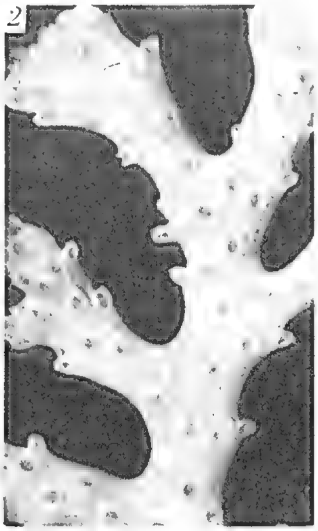
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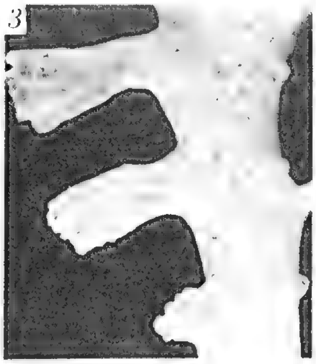
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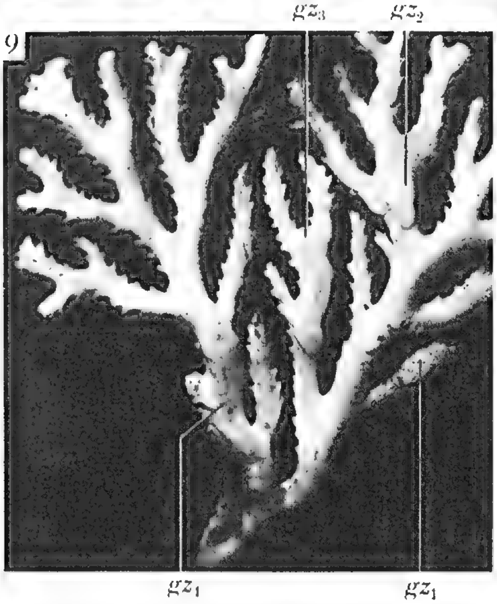
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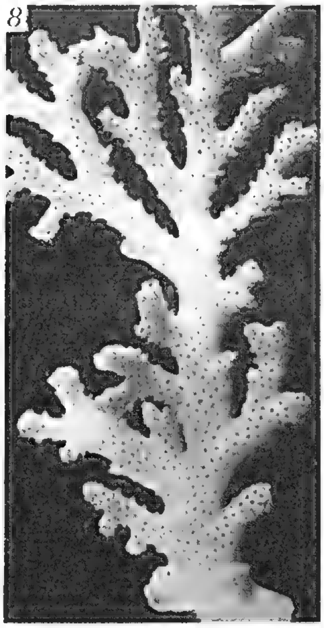
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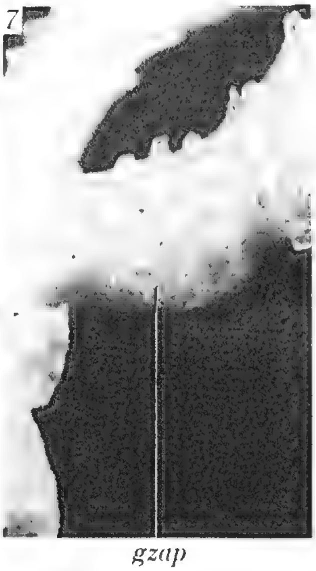
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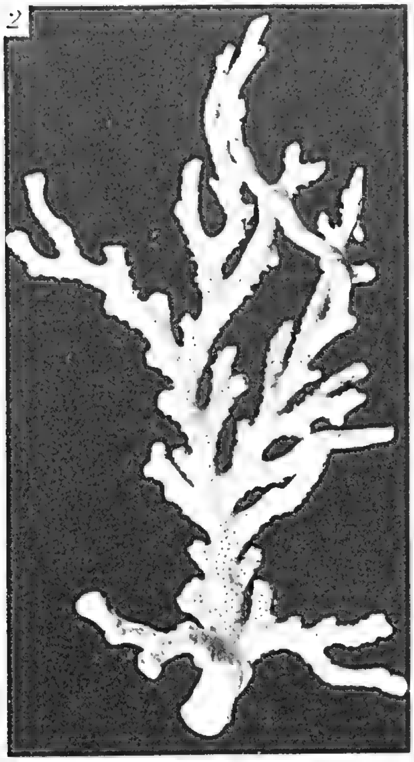

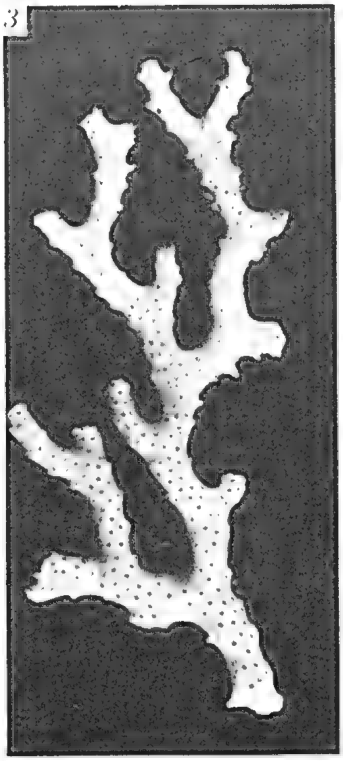

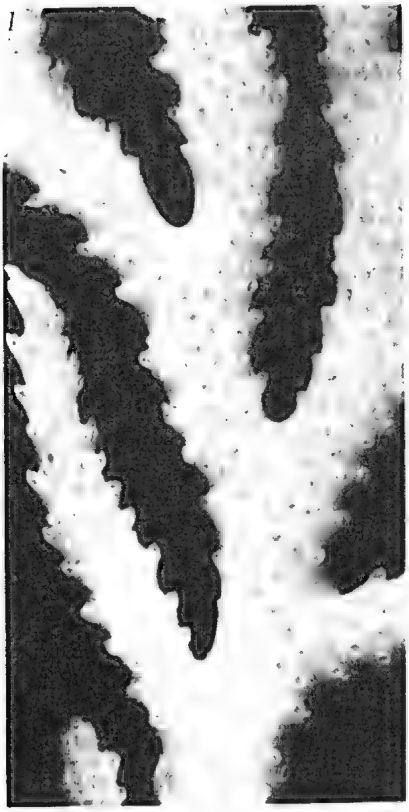

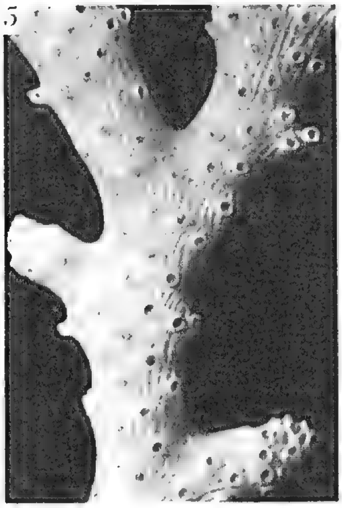

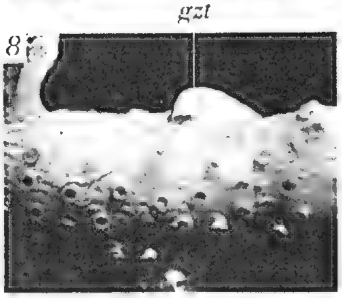

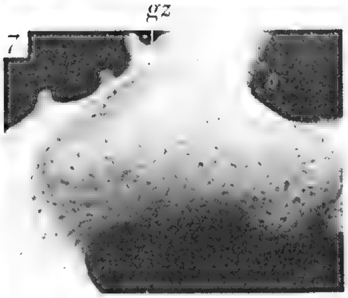

.-B. Malmö Ljustrycksanstalt

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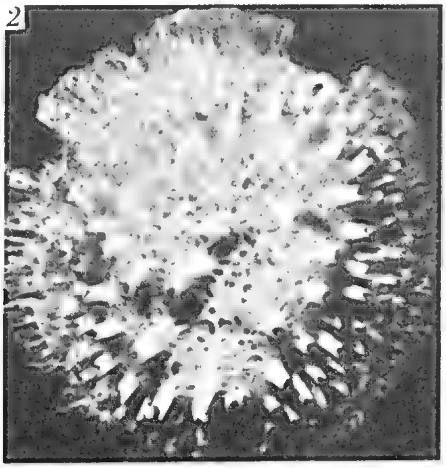

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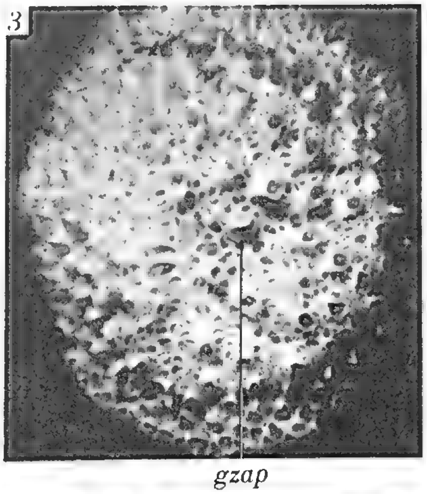

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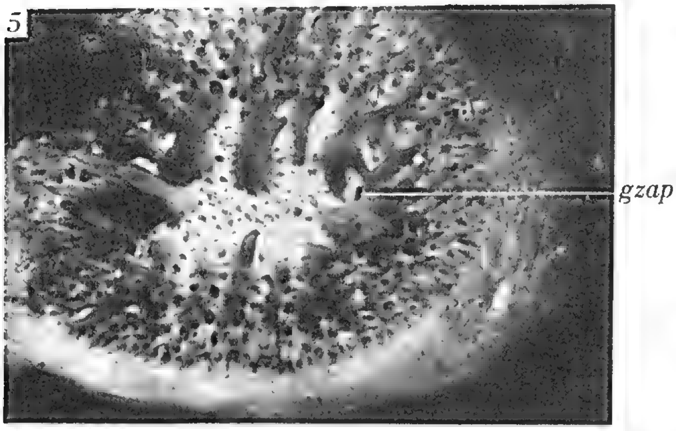

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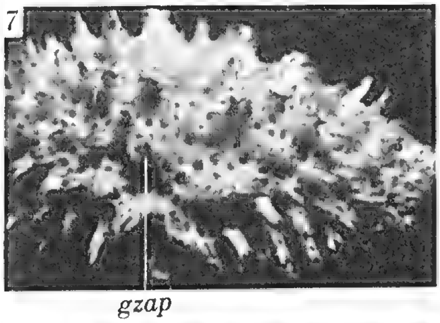

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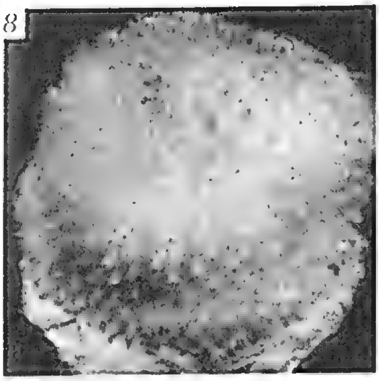

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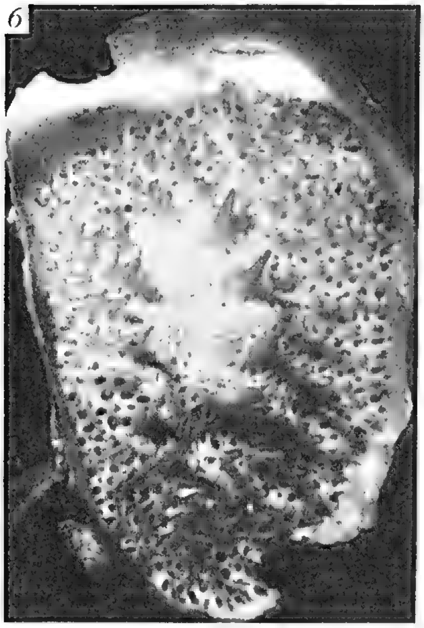

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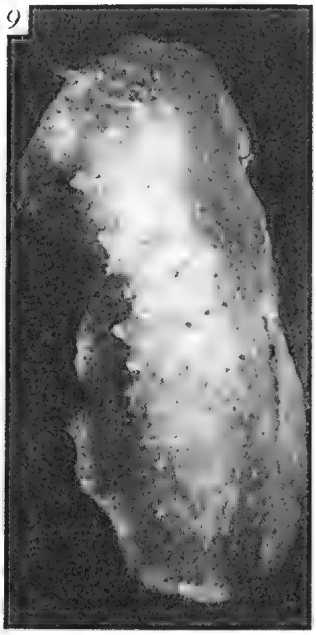

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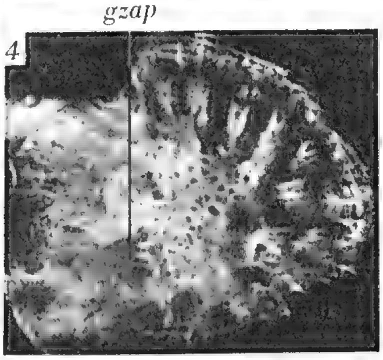

-B. Malmö Ljustrycksanstalt