

VI.—The Pycnogonida of the Scottish National Antarctic Expedition. By Mr T. V. Hodgson, F.L.S. Communicated by Dr R. H. TRAQUAIR, F.R.S. (With Three Plates.)

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I am greatly indebted to Dr W. S. BRUCE, the able leader of the Scottish National Antarctic Expedition, for the opportunity to describe the *Scotia* collections as regards the Pycnogonida and the Isopoda. We are now concerned with the Pycnogonida, and I regret that there has been so much delay before the production of the report. The collection is a large one, and extremely interesting—totally different from that made by the *Discovery* in the same region, but on the opposite side of the world. If smaller in the number of species brought home, in number of individuals it far exceeds that collection. Its principal interest lies in problems of distribution.

First and foremost, there is the exceptionally interesting and important species *Decolopoda australis*, Eights (8), a species discovered and accurately described some seventy years ago, but forgotten, and, when first noticed, despised as a monstrosity or as a sample of defective work. For the present its relations must remain more or less conjectural. It is unquestionably a very close ally of the genus *Colossendeis* (12). Though it is early yet to make a positive assertion on the subject, it appears to share with that genus the capacity for depositing its eggs in some unknown hiding-place. The ova of both genera are unknown, and it is certain that in *Colossendeis* at least they are not carried by the male, or in fact by either sex. *Decolopoda* would appear to be abundant in the South Shetland and South Orkney Islands, and a second very closely allied species has been taken from the west coast of Graham's Land (Carthage Bay) by the French Antarctic Expedition.

The second announcement of the discovery of a Pycnogonid with five pairs of legs, *Pentanymphe antarcticum*, was made by myself as one of the results of the *Discovery* Expedition (10). In the present collection there is only a single individual of this species, and that an adult female; but it has also been captured by the French and German Expeditions. It may be said to have a circumpolar distribution, and lives at a depth of from 10 fathoms to just over 200.

For the rest of the collection, there are several new species, none of which, however, can be placed in new genera.

Pallenopsis has a new species very closely allied to the *P. pilosa* of HOEK, but distinguished by spurs on the lateral processes and legs. Dr HOEK's species is, moreover, a deep-water form, while this one comes from inside the 10-fathom line.

Nymphon contains three species from the Antarctic, and another, a new species, from

the African coast. Of the Antarctic species, two are identical with species taken by H.M.S. *Challenger* off New Zealand in 1100 fathoms (Station 168). *N. longicoxa* was taken in 1410 fathoms, lat. $71^{\circ} 22' S.$, long. $16^{\circ} 34' W.$; and *N. compactum* was taken in 1775 fathoms, lat. $62^{\circ} 10' 5'' S.$, long. $41^{\circ} 20' W.$ The great distance from the point of their original discovery is well worthy of note, as well as the increase of depth.

Chætonymphon contains four species with some interesting facts in distribution. *C. orcadense* is described as a new species, and was taken in Scotia Bay in immense numbers, and a single specimen from the Burdwood Bank, off the Falkland Islands. At first sight it is like *C. australe*, Hodgson, but is readily distinguished by the distinct auxiliary claws. *C. assimile* is a new species of which there are many specimens in the collection. This one and *C. australe* and *C. altiocolatum*, Möbius, are all very closely allied. In my report on the *Discovery* collection I stated that I was unable to regard *C. altiocolatum* as distinct from *C. australe*. *C. austrinorum* I regarded as a variety of *C. australe*, though a well-marked one. These four species or varieties, whichever they may be, differ more definitely in their setose covering than in any other particular. I have no reason to modify my opinion on their specific differences; but with regard to *C. altiocolatum*, Möbius, there is most room for doubt. Examination of the type specimens reveals the fact that there is a fringe of small setæ at the posterior border of the trunk segments. This feature is not very prominent, and is not brought out by Professor MÖBIUS' description; and if this is not to be regarded as a specific character, it has a certain value when the variation and distribution of species are under consideration. All the other peculiarities of the animal agree closely with those ascribed to *C. australe*, and one does not feel justified in separating the two as distinct species. No specimens of *C. australe* or this particular variety occur in the *Scotia* collection, but a very close relation exists in *Chætonymphon assimile*, which is described as a distinct species. It is readily distinguished by the setose character of its body, which is devoid of setæ, except for a few long ones as a distal fringe on the lateral processes; other features show that it may be regarded as distinct, though closely allied.

An important bond of union between all these species is the tall ocular tubercle, which caused Professor MÖBIUS to derive the name of his species from that organ. One specimen of *C. assimile* and another of *C. orcadense* have two fairly well-developed eyes on one side of the tubercle, in addition to the four at the summit.

A purely sexual feature lies in the fact that in *C. australe*, *C. austrinorum*, *C. altiocolatum*, and *C. assimile* the ovigers of the adult male all have the fifth joint abruptly expanded to more than double its diameter for its distal half; the following joint also is considerably enlarged, but most so proximally. Another is the enormously developed distal fringe which occurs ventrally on the third coxæ of the two posterior pairs of legs in the male.

C. mendosum is not uncommon in Scotia Bay at 10 fathoms; at the other side of the hemisphere, and farther south by 16° , the *Discovery* found it equally abundant, but only below the 100-fathom line.

C. brevicaudatum, Miers, only previously known from Kerguelen, now extends its range to Scotia Bay.

Ammothea.—Two individuals of a single species of this genus were found, and are identified with Professor BOUVIER's *A. communis*, which was found in great numbers by the *Français* on the west side of Graham's Land. The members of this genus appear to be abundant in the Magellan Province, but none were seen by the *Discovery* in M'Murdo Sound.

Leionymphon is a genus instituted by Professor MÖBIUS for some immature specimens found off Bouvet Island. The collection of the *Discovery*, which was rich in these forms, necessitated a revision of the genus, which now includes no less than eight species, a key to which is given in my report on that collection (13). The two species included in the present collection were described many years ago by Dr G. PFEFFER, under the generic name of *Ammothea*. They were then recorded from South Georgia, and it is only to be expected that they should occur also in the South Orkneys. *L. grande*, however, has had its range extended considerably, and evidently has a circumpolar distribution.

Colossendeis is represented by two individuals, two very distinct species claiming them. One is a *Challenger* species, *C. leptorhynchus*, and was taken in the area where it was first found. The other is introduced as new; it is quite blind—not an unusual character of the genus, but the more surprising as it is a shallow-water species.

When considering geographical problems during our stay in the Antarctic regions, I accepted the mean annual isotherm of 45° F. for the ocean surface, as defined by Dr A. BUCHAN (4) in the concluding volume of the "*Challenger*" Reports, as the northern limit of the Sub-Antarctic region, partly perhaps as a matter of convenience, and partly because it is a natural limit which includes Kerguelen Island and its neighbours, which have, for a long time, been regarded as "Antarctic," and which have become "classical" ground by the work of that expedition. The value of this boundary is emphasised by the fact that Professor PELSENEER (23), when reporting on the Mollusca of the *Belgica* Expedition, and examining the subject exhaustively, fixed on the isotherm of 40° F. for the air in July, and a similar isotherm for the ocean surface, but a minimum and not a mean temperature; for this latter isotherm Sir JOHN MURRAY is the authority. All the three isotherms above quoted are in very close accord, and a little south of lat. 45° S. on the Pacific side, a little above it on the side of the Atlantic and Indian Oceans. As to the boundary between the Sub-Antarctic and the Antarctic regions, I suggested in my report on the Pycnogonida of the *Discovery* that lat. 60° S. might be provisionally regarded as such; it includes all the glaciated lands of the Antarctic continent and the islands connected therewith. A more satisfactory limit would be the average limit of pack ice, if a surface phenomenon is to be accepted; otherwise the centre of the trough between the Antarctic continent and the more northern lands would make a natural division, but the position of this trough will for some time at least be a matter of conjecture.

In a recent paper on the Pycnogonids of the Magellan Straits (14) it became necessary to define that area, and I suggested the division of the Antarctic and Sub-Antarctic regions into three provinces corresponding with the continents from which the attack on those regions can be made. The limits are as yet purely arbitrary, being defined by lines of longitude which may not hold good when our zoological knowledge of these regions becomes greater than at present. The division suggested was as follows:—

- (1) Magellan Province, long. 20° W. to long. 130° W.
- (2) Australasian Province, long. 130° W. to long. 100° E.
- (3) Kerguelen Province (African), long. 100° E. to long. 20° W.

The following list contains all the known species of Pycnogonida from the Antarctic and Sub-Antarctic regions—a list which contains some seventy-two species, thirty-four of which belong, as far as at present known, exclusively to the Antarctic area. Thirty of them belong to the Sub-Antarctic region, and of these, seven find their way farther northward. Those marked with an asterisk are contained in the *Scotia* collection.

	Ant- arctic.	Sub- Ant- arctic.		Ant- arctic.	Sub- Ant- arctic.
<i>Pycnogonum magellanicum</i> , Hoek		x	* <i>Chætonymphon orcadense</i>	x	
" <i>magnirostre</i> , Möbius		x	* " <i>assimile</i>	x	
<i>Phoxichilus australis</i> , Hodgson	x		* <i>Pentanymphe antarcticum</i> , Hodgson	x	
<i>Pallene dimorpha</i> , Hoek		x	<i>Leionymphon striatum</i> , Möbius		x
<i>Pseudopallene cornigera</i> , Möbius	x	x	* " <i>grande</i> , Pfeffer	x	x
" <i>australis</i> , Hodgson	x		" <i>gibbosum</i> , Möbius		x
<i>Pallenopsis patagonica</i> , Hoek		x	" <i>minum</i> , Hodgson	x	
" <i>pilosa</i> , Hoek	x	x	* " <i>Clausi</i> , Pfeffer	x	x
" <i>fluminensis</i> , Kröyer		x	" <i>australe</i> , Hodgson	x	
" <i>glabra</i> , Möbius	x	x	" <i>glaciale</i> , Hodgson	x	
" <i>villosa</i> , Hodgson	x		" <i>spinosum</i> , Hodgson	x	
" <i>hiemalis</i> , Hodgson	x		<i>Ammonothea Hoeki</i> , Pfeffer		x
* " <i>lanata</i>	x		" <i>Wilsoni</i> , Schimkewitsch		x
<i>Anoplodactylus neglectus</i> , Hoek		x	* " <i>communis</i> , Bouvier	x	
" <i>petiolatus</i> , Kröyer		x	" <i>curculio</i> , Bouvier	x	
<i>Nymphon gracile</i> , Leach		x	<i>Tanystylum styliigerum</i> , Miers		x
" <i>gracilipes</i> , Miers		x	" <i>Dohrnii</i> , Pfeffer		x
" <i>brachyrhynchum</i> , Hoek		x	" <i>Chierchii</i> , Schimkewitsch		x
" <i>hamatum</i> , Hoek		x	" <i>longicaudatum</i> , Hodgson		x
" <i>fuscum</i> , Hoek		x	<i>Austrodecus glaciale</i> , Hodgson	x	x
" <i>meridionale</i> , Hoek	x		<i>Austroraptus polaris</i> , Hodgson	x	
" <i>antarcticum</i> , Pfeffer		x	<i>Ascorhynchus glaber</i> , Hoek		x
" <i>hiemale</i> , Hodgson	x		<i>Rhyncothorax australis</i> , Hodgson	x	
" <i>lanare</i> , Hodgson	x		<i>Colossendeis gigas</i> , Hoek		x
" <i>adareanum</i> , Hodgson	x		* " <i>leptorhynchus</i> , Hoek		x
" <i>frigidum</i> , Hodgson	x		" <i>gigas leptorhynchus</i> , Hoek		x
" <i>tridentatum</i> , Hodgson		x	" <i>megalonyx</i> , Hoek		x
* " <i>longicoxa</i> , Hoek	x	x	" <i>robusta</i> , Hoek		x
* " <i>compactum</i> , Hoek	x	x	" <i>gracilis</i> , Hoek		x
* " <i>articulare</i>	x		" <i>australis</i> , Hodgson	x	
* <i>Chætonymphon brevicaudatum</i> , Miers	x	x	" <i>glacialis</i> , Hodgson	x	
" <i>villosum</i> , Hodgson	x		" <i>frigida</i> , Hodgson	x	
" <i>biarticulatum</i> , Hodgson	x		" <i>rugosa</i> , Hodgson	x	
* " <i>mendosum</i> , Hodgson	x		" <i>magellanica</i> , Hodgson		x
" <i>australe</i> , Hodgson	x		* " <i>orcadensis</i>	x	
" " var. <i>austrin-</i> <i>orum</i> , Hodgson	x		* <i>Decolopoda australis</i> , Eights	x	
			" <i>antarctica</i> , Bouvier	x	

Other species taken on the voyage, but from the African coast only :—

Nymphon capense.

Discoarachne brevipes, Hoek.

Pallenopsis lanata (Plate II., figs. 4, 4a).

Specific Characters.—Body well built, with lateral processes widely separated, each with a prominent spur distally and dorsally ; body and appendages richly setose.

Ocular tubercle conical, placed in front of cephalon ; with anterior eyes large, posterior ones much smaller and above them.

Oviger ten-jointed, with simple setæ only ; no terminal claw, differing in the two sexes. Legs with long terminal claw and small auxiliaries. Spurs on the femora and first tibiæ distally and dorsally.

The Body is fairly robust, with widely separated lateral processes ; these are not very long, slightly dilating, with a strongly developed spur distally, as well as a fringe of long setæ. The segmentation is distinct ; each segment carries a fringe of long setæ along its posterior border.

The Cephalon is long, cylindrical, and carries the ocular tubercle at its anterior extremity. This rather peculiar structure, seen from behind, is stout, conical, and of some considerable elevation ; seen laterally, it is still conical, but the front upper part of the cone is incurved above the anterior pair of eyes, which are very large ; the posterior pair are scarcely half the size, behind and above them.

The Abdomen is long, almost cylindrical, being slightly dilated just beyond the middle. It is directed upwards to some extent, not articulated to the trunk, and provided with a number of fine long setæ.

The length of the body is 10 mm., the trunk only 7 mm., and its extreme width 5 mm.

The Proboscis is nearly as long as the scape of the chelifori, and rises ventrally behind the position of the ocular tubercle. It is cylindrical and completely covered with stiff setæ, which are largest and most conspicuous ventrally and distally.

The Chelifori are well developed, and rise from the anterior border of the cephalon just underneath the ocular tubercle. The scape is long and two-jointed, the joints being subequal in size and covered with rather short stiff setæ, which are more conspicuous as distal fringes. The chela has small fingers turned inwards almost at a right angle to the palm ; the movable one is much the larger, and is without a setose pad at its base. Neither bear teeth. The palm itself is not quite so long as a joint of the scape, and is covered with shorter and stiff setæ.

The Palps are reduced to stout, rounded, setose buttons ; they rise laterally close to the proboscis.

The Ovigera are ten-jointed, and differ very considerably in the two sexes. In the male, the first joint is very small, the second is very much longer and considerably dilated distally ; the third is not half as long as the second, and is articulated at an angle to it, and not in direct continuation ; its outer border is rounded, the inner one

being straight; these two joints bear setæ of varying length on their outer margins. The fourth and fifth are long and slender, slightly curved, the fifth being a little the longer and dilated distally; both are rather scantily covered with short stiff setæ, and the fourth has a large glandular (?) opening near its base.

The fifth joint is quite short and very stout, bent rather than curved, with a thick covering of long setæ on its outer margin. Of the remaining four, which curve in the opposite direction to the preceding joints, the first two are subequal in length, the two last taper, the terminal one being a little the shortest; all these are richly clothed with long setæ of quite a simple character.

In the female this appendage is shorter and quite different in structure. The first joint is very short; the second is about twice as long and dilated distally; the third is about as long as the first, and articulated to the second in a normal manner. The fourth and fifth are longer, the fourth being much stouter and a little longer than the fifth, and about two-thirds the length of similar joints in the male. All these joints are setose, the setæ being small at first, increasing in size and number to the extremity of the fifth. The sixth is scarcely half the length of the fifth; the seventh, again, much smaller; the eighth is longer, and the terminals taper, but differ little in length. All these are plentifully clothed with rather long simple setæ, and chiefly on the ventral side.

The Leg extends to about 40 mm. Of the three coxæ, the first is the shortest, the second as long as the other two together; the proportions of the three following joints are as 9, 8.5, 10. The tarsus is very small, the propodus slightly curved, with a slender terminal claw nearly as long, and two small auxiliaries. The entire appendage is thickly covered with setæ; these, on the dorsal surface more especially, are long and slender; those on the ventral surface are much shorter. In addition to these there are short and fine setæ distributed uniformly over the whole limb. As usual, the setæ on the second tibiæ become more spinous distally, and the distal fringe of this joint is distinctly spinous ventrally. The ventral surface of the tarsus bears spinous setæ which become very prominent distally. The propodus bears three stout spines proximally and ventrally, the remainder of the surface being occupied by a band of spinous setæ. There is no projecting heel, but a well-developed distal fringe projects over the base of the claw. The femora and first tibiæ of both sexes bear a prominent spur distally and dorsally. The lateral line is distinct.

The Genital apertures of the male occur on conspicuous swellings of the second coxæ of the two posterior pairs of legs. About the middle of the femur, ventrally, there is a slight enlargement extending for some distance along the joint; from the middle of this projects the tubular process so characteristic of the males of this genus. In this case its length is .7 mm.

The female is larger, and the conspicuous genital apertures open on the second coxæ of all the legs, and the distal extremities of these joints are much dilated in consequence.

The females appear to be larger than the males.

Eleven specimens of this species were taken in Scotia Bay at a depth of 14 fathoms.

March 1903. One of the males is carrying a large number of young. Some of these, recently hatched, have a very stout, massive body bearing no resemblance to the structure of the adult. The proboscis and chelifori are very distinct; two pairs of small appendages lie behind these. They show a segmentation into joints. Half way between these and the posterior extremity of the body-mass is another pair of appendages, stout stumps with two segments indicated. The majority of the young, however, are much larger. The proboscis and chelifori are well developed; the two following pairs of limbs are quite small, showing few segments and terminating in a long spine or claw. These are obviously the palps and ovigers. Behind these are three pairs of well-developed legs, and the body terminates in a rounded sac. The legs bear a few spinous setæ and more numerous finer ones.

This species is unquestionably a very close relation of *Pallenopsis pilosa*, Hoek. The spurs on the lateral processes and legs serve to separate it pretty sharply. Dr HOEK's species is a deep-water form.

Nymphon longicoxa (Plate I., figs. 3, 3a).

Nymphon longicoxa, Hoek, (15), pp. 38-39.

Specific Characters.—Body and limbs very slender, lateral processes widely separated. Palps five-jointed. Proportion of three terminal joints as 4·5, 2, 3. Oviger ten-jointed. Denticulate spines numerous, each with three or four lateral teeth. Legs long, slender, and setose; second coxa much longer than the other two together; no auxiliary claws.

Body very slender, and limbs long; lateral processes very widely separated. Segmentation distinct.

The Cephalon is long, its segment just longer than the proboscis. Just behind its centre it is enlarged to form the ventral support of the ovigers; anteriorly to this it forms a very slender neck, and is comparatively little expanded to form the lobes which support the proboscis, chelifori, and palps.

The Ocular tubercle is very short and stout; it lies just between the first pair of lateral processes and the enlargement that carries the ovigers. It bears four distinct eyes.

The Abdomen is of moderate size, cylindrical, directed upwards, but not articulated to the trunk.

The length of the body is 8·5 mm.; of the trunk only, 7 mm.; and its width is 3·5 mm. It is entirely devoid of setæ.

The Proboscis is long, slender, scarcely as long as the cephalic segment; it is cylindrical, slightly swollen in the middle, and rather abruptly rounded distally.

The Chelifori are long and slender; the scape is single-jointed, longer than and over-reaching the proboscis; a few small setæ are distributed along it, and there is a small

distal fringe. The chelæ are much longer than the scape, and the fingers are longer than the palm, which is minutely setose throughout. The dactyli are much curved at the tips, and provided with very numerous slender and close-set teeth.

The Palps arise immediately outside the chelifori. They are long and slender, the second joint not quite reaching to the extremity of the proboscis. As usual, the first joint is very small, and the second is the longest of the appendage, the proportions of the four joints being 7, 4·5, 2, 3. The second joint bears only a very few setæ, and these distally; the third is also scantily setose; the fourth joint is well provided with setæ along its ventral margin, and the terminal one is similarly provided, but these are smaller and extend to the dorsal surface.

The Oviger is ten-jointed, the first three joints being short and stout; the second and third are subequal in length. The fourth is long and rather stout; the fifth is more than half as long again, and quite the longest of the appendage. It is greatly curved, proximally very slender, but gradually becoming much enlarged distally. It bears fine setæ along the inner side of the curve, and a row of spinous papillæ on the opposite side of the enlarged extremity. The sixth joint is curved in the opposite direction, and rather more than one-third the length of the preceding. It is covered with fine setæ on the outer part of the curve. Both these joints are measured across the curve. Of the four terminal joints, the first is longest, the other three being subequal. The terminal one bears a claw nearly as long as itself; this is armed with a dozen slender teeth with fairly wide intervals between them. All the four joints are setose dorsally. The denticulate spines are numerous—15, 9, 8, 9—and consist of a slender tapering and flattened shaft with three rather long lateral teeth on each side, and these only rarely arise opposite to one another. The spines are rather worn, especially on the two distal joints.

The Legs are of great tenuity, and attain a length of about 55 mm. Of the three coxæ, the second is much longer than the other two together, measuring but little less than 5 mm. in length. The proportions of the three following are 10, 12·5, 19. The tarsus and propodus together measure rather more than 4 mm., the latter being the longer joint and carrying a very long slender claw without auxiliaries. The limb is setose throughout, the setæ being arranged for the most part in rows. A lateral line is readily distinguishable. On the first coxæ setæ are rather scanty; on the second they are not plentiful, except ventrally and distally, where they form a fringe; on the third they are fairly uniformly distributed, and a distal fringe is present. On the femur they are sparsely distributed and form a dorsal distal fringe. On the ventral surface of this joint there is a row of very small tubercles. On the tibiæ the setæ become much more numerous and longer, especially towards the distal extremity of the second, where they approximate to those found on the succeeding joints. On the tarsus and propodus they are short and very close set, particularly the ventral row; the dorsal setæ are somewhat more spinous.

The Genital apertures of the male occur on the second coxæ of the three posterior

pairs of legs; those of the female on all the legs. One male is carrying ova; these are large, and few in number.

I cannot find any reasonable ground for regarding this species as distinct from *N. longicoxa*, Hoek. The principal differences seem to be the setose nature of the legs, and the denticulate spines on the ovigers, which in Dr HOEK's specimens bear seven lateral teeth.

Several specimens were taken in lat. 71° 22' S., long. 16° 34' W., in 1410 fathoms, 18th March 1904.

Nymphon compactum (Plate I., figs. 5, 5a).

Nymphon compactum, Hoek, (15), pp. 41-43.

Specific Characters.—Body stout, sparsely hairy; eyes obsolete.

Palps five-jointed; proportions of last three, 5, 2·5, 2·5.

Oviger ten-jointed; denticulate spines numerous, with four to six lateral teeth.

Legs long; auxiliary claws absent.

Body stout, with the lateral processes short and not widely though very distinctly separated. The cephalon is short, much widened anteriorly to form two well-marked and divergent lobes for the support of the chelifori. The neck is very distinct, narrowest just behind the cephalic lobes; the space between these and the first pair of lateral processes is completely filled by the body-process from which the ovigers arise. This body-process is conspicuous from the dorsal aspect.

The Ocular tubercle lies immediately in front of the first pair of lateral processes; it is stout, of very small elevation, and bears no trace of eyes.

The Abdomen is pyriform, a little longer than the cephalon; it is not articulated to the trunk.

The segmentation is not at all prominent, the articulations being immediately behind the lateral processes.

The length of the body is 9·5 mm., of the trunk, 7 mm.; and its width is 5 mm.

The Proboscis is directed downwards, cylindrical, and measured ventrally it just exceeds 4 mm.

The Chelifori are well developed. The scape is single-jointed and extends just beyond the end of the proboscis. It bears a number of fine long setæ arranged in an irregular linear manner, and also forming a fairly well-defined distal fringe. The chela is long and narrow, the palm being shorter than the slender fingers; the palm is covered with fine setæ nearly half way along the immovable finger, and there is a fringe of stout setæ at the base of the movable one. The fingers are, as usual, much incurved at the tips, and provided with very numerous, close-set, slender teeth, not very irregular in length. Those of the movable finger are the larger.

The Palps arise close to the chelifori and are of the normal five joints. The first

is very short and stout, the proportions of the remainder being 6, 5, 2.5, 2.5. The second bears a few scattered setæ and a well-marked distal fringe; the third is rather thinly covered with smaller setæ, especially distally. On the ventral margin of the two terminal joints the setæ are stouter than elsewhere and very abundant; dorsally they are rather scanty but much longer. The last joint but one has a well-developed distal fringe dorsally.

The Ovigera are ten-jointed, and arise from stout processes on the ventral surface of the neck. The first three joints are very small, and while progressively increasing in length diminish in diameter. The three together are a little longer than the fourth; the proportions of this and the remaining joints are 8, 10, 7, 3, 2.5, 2, 2.2. The fourth joint is curved and stout; it bears a row of small setæ along the greater part of its outer margin, and a small distal fringe. The fifth joint is slender proximally, but considerably enlarged distally, the transition being gradual and not abrupt; it is covered, but not very thickly, with long slender setæ. The following (sixth) joint has its inner border curved and is thinly covered with setæ finer and shorter than those of the preceding joint. Of the four terminal joints, the first two bear a distal fringe only, and the distal pair bear a few long setæ dorsally in addition. The terminal claw is very nearly as long as the joint that bears it, and carries about eleven teeth. Most of them are long, curved, and have a considerable interval between them. The denticulate spines are numerous—11, 11, 8, 9—and consist of a tapering flattened shaft with four or five well-developed broad teeth on each side; traces of a sixth may sometimes be detected. The second from the base is usually the largest. The spines on the terminal joint are on the whole shorter and broader than elsewhere.

The legs are long, attaining a length of nearly 42 mm. Of the three coxæ, the second is the longest, but scarcely as long as the other two together; the proportions of the remainder being 9, 11, 10, 3.5, 2, and 1 for the terminal claw, which is without auxiliaries. The limb is setose throughout, but not in any conspicuous manner, the setæ being slender and rather long for the most part; they are arranged in four rows, dorsal, ventral, and lateral, and as usual are most conspicuous on the tibiæ; towards the end of the second they tend to become spinous. They are small and numerous on the tarsus, smaller still on the propodus, where the lateral rows are indistinguishable. A lateral line is conspicuous throughout. The distal fringes do not offer any special peculiarities, except that of the third coxa, which is very conspicuous ventrally.

The Genital apertures of the male are on the second coxæ of the two posterior pairs of legs; those of the female are found on all the legs.

The subject of this description is a fine male, which carries two small spherical packets of rather large eggs slung over the proximal part of the fifth joint of each oviger by stout threads.

Three specimens were taken in 1775 fathoms, lat. 62° 10' 5" S., long 41° 20' W.

There can be no doubt that these specimens are identical with *N. compactum*, Hoek.

I have redescribed it on account of small defects in matters of detail in Dr HOEK's original description.

Nymphon capense (Plate 1., figs. 2, 2a).

Specific Characters.—Body stout, with lateral processes distinctly but not widely separated. Cephalon with enlarged base.

Palps five-jointed. Four joints progressively decreasing in size.

Ovigers ten-jointed; denticulate spines numerous, each having eight lateral teeth.

Legs slender; claw large, without auxiliaries.

This is a rather small species, with slender limbs. The body is stoutly built, with the lateral processes very distinctly but not widely separated. The segmentation is very distinct, and the body is perfectly smooth and transparent.

The Cephalon is slightly longer than segments two and three together, enlarged at its base, dorsal to the origin of the ovigers, and having a well-developed neck, and is then widely expanded; the cephalic lobes are divided nearly to the base by a distinct groove.

The Ocular tubercle is stout, of little elevation, rounded, and carries four well-developed eyes; it lies in front of the first pair of lateral processes.

The Abdomen is short, not articulated to the trunk, directed upwards, scarcely projecting beyond the last pair of lateral processes.

The length of the body is very nearly 3 mm.; its width is 1.6 mm.

The Proboscis is about 1.6 mm. long, measured ventrally. It is rather bottle-shaped, stout at the base; near the middle it is enlarged; beyond this its diameter is only very slightly reduced; the distal extremity is rounded, and the mouth fairly large.

The Chelifori are well developed. The single-jointed scape is a little longer than the proboscis, and bears a few very small setæ and a small distal fringe. The chela is longer than the scape, and the fingers longer than the palm and much incurved at the tip. The teeth are very closely set, and of three regularly alternating sizes, the space between the longest teeth being occupied by two small ones and an intermediate one between them.

The Palps are five-jointed as usual. The first is very small; the second is the longest, and devoid of setæ; the others progressively decrease in length, the proportions of the four being 5.5, 5, 3.5, 2.8. The third carries a few small setæ, but the fourth is most conspicuously setose and has a prominent distal fringe. The setæ on the terminal joint are short, except distally, and not very abundant.

The Ovigers are ten-jointed, and rise on a conspicuous body-process just in front of the first pair of lateral processes, and very distinct from the dorsum. The first three joints are very small, but progressively increase in size, forming a small but distinct curve; the next three form a slight curve in the opposite direction; these three progressively decrease in length, but not by much, the fourth joint of the appendage

being the longest. All these joints are devoid of setæ, except for a distal fringe on the sixth. Of the four terminal joints, the difference in size is very small; the first is the longest, and the next two progressively decrease in length, the terminal one being as long as the preceding one, and carrying a claw three-quarters of its length. The claw bears about fifteen slender teeth rather closely set. The denticulate spines form a single row, and are rather long, more gently tapering than usual, especially near the apex. They are numerous, the numbers being 15, 12, 11, 12. In uninjured specimens there are eight lateral teeth, of which the four basal ones are prominent, the third being distinctly the largest; the others are small and delicate, but the terminal one is a rather large blade. All these four joints bear small setæ dorsally and a small distal fringe.

The Legs extend to about 17 mm. They are slender, and only bear a few very small setæ arranged in rows; on the ventral surface of the propodus they are most distinct. The lateral line is distinct throughout. Of the three coxæ, the second is as long as the other two together, the proportions of the remaining joints being 7, 8, 10·7, 3, 3. The terminal claw is long and slender, about two-thirds or rather more than the length of the propodus. There are no auxiliaries.

Two males bear eggs. These are large, few in number, and carried in very irregular masses. The oviger is but little modified in the male; the fifth joint is more curved and rather dilated distally.

The Genital apertures of the male are on the second coxæ of the two posterior pairs of legs; of the female, on all the legs.

The body of this species is sufficiently transparent to show some details of its anatomy. The "sieve apparatus" is distinctly seen in the proximal half of the proboscis. The nerve chain is readily seen as a chain of five ganglia connected by a double cord. The ganglia are double and partially fused. The first lies just behind the origin of the ovigers and gives off three nerves on each side, the most posterior of which goes to the oviger. The other two cannot be traced into any of the appendages. The posterior ganglion lies on the line of segmentation of the last segment of the body; all of them give a strong nerve to its appendage.

In the female from one to four ova can be seen on the second and third coxæ and the femora. The alimentary canal is distinct in the trunk, but it is not easy to determine its limit in the legs.

A score of specimens, principally females, and some of them in rather a dilapidated condition, were taken 8 miles north of Dassen Island, Cape Colony, 18th May 1904, in 35 fathoms.

Nymphon articulare (Plate I., figs. 4, 4α).

Specific Characters.—Body well built, with rather long lateral processes, and these well separated.

Palp five-jointed; proportions of the last three 2·5, 1·5, 1·75.

Oviger ten-jointed; denticulate spines not numerous, with six (?) lateral teeth.

Legs: principal joints subequal, tarsus and propodus subequal, terminal claw with two well-developed auxiliaries.

Body stout, with lateral processes long—the second pair longer than the width of the body, and rather widely separated.

Cephalon not long, constricted to form a well-defined neck, and then expanded to form the stout cephalic lobes.

Ocular tubercle rises between the first pair of lateral processes, abreast of their anterior border. It is tall, tapering, and ends in a blunt point where the four eyes occur.

The segmentation of the trunk is distinct but not very prominent, and the abdomen is not separated by an articulation. This part of the body is rather long and slightly pyriform. It carries a few very small setæ, which also occur as distal fringes of the lateral processes.

The length of body is 3 mm., of the trunk only, 2.25 mm.; its width is 1.8 mm.

The Proboscis is almost cylindrical, with a truncated extremity, and its base is reduced a little in diameter. Measured ventrally, it is 1.4 mm. long.

The Chelifori are well developed. The scape is long, 1.3 mm., sparsely covered with setæ. The chela is strong, the palm being setose; the fingers are scarcely as long, much curved, and beset with numerous closely set teeth of variable length.

The Palp arises at the side of the proboscis, and comprises the normal five joints; the first is very small and stout; the second is the longest, and its proportionate length with the remainder is 4, 2.5, 1.5, 1.75. The second joint is sparsely covered with rather long setæ; on the following joint they are much more numerous, and on the two terminals they are more thickly distributed, and chiefly on the ventral surface.

The Oviger arises ventrally between the first pair of lateral processes. The first three joints are very small, the first two being stout and having a very oblique joint between them; the third has the normal oblique joint; the fourth and fifth are subequal in length, the former being much the stouter, the sixth being a little more than half their length. Very few small setæ are to be found on this part of the appendage; they are, however, rather more numerous on the sixth joint. The four terminal joints are very nearly subequal, setose dorsally, and each has a row of a few denticulate spines, 6, 6, 5, 7. The terminal claw is rather long, with about nine teeth not very closely set. These and the denticulate spines are rather worn. The spines are curved forwards, probably due to pressure. There are four well-developed teeth on each side, and probably two more delicate ones.

The Legs attain a length of about 9 mm. Of the three coxæ, the second is the longest, but scarcely as long as the other two together; the proportions of the other joints are 4, 4, 4, 2, 2. The terminal claw is about half the length of the propodus, and has two well-developed auxiliaries. The entire limb is covered with rather fine setæ;

they are not very abundant, and the linear arrangement is not distinct; a distal fringe is conspicuous ventrally on the third coxa, more so dorsally on the femur; on the second tibia it is ventral, and the setæ are distinctly spinous but few in number. Setæ are scarce and very small on the tarsus and propodus, and on these joints it is usual to find a ventral row which is to some extent at least characteristic. In this species this row consists of very inconspicuous setæ, and placed at comparatively large intervals.

Three specimens were found among a large number of *Chætonymphon orcadense*. They are all adult females, and attention was attracted to them by the peculiar enlargement of the femora. These joints are not enlarged throughout, as in most species, but considerably bellied for about two-thirds of their length.

Chætonymphon brevicaudatum.

Nymphon brevicaudatum, Miers, (20), pp. 200-214.

Nymphon horridum, Böhm, (1), p. 172.

Nymphon brevicaudatum, Hoek, (15), pp. 49-52.

Three specimens of this species were taken in Scotia Bay, South Orkneys. They were found amongst an immense number of *Chætonymphon orcadense* captured during the autumn and winter of 1903 inside the 15-fathom line. The specimens are: an adult female, an ovigerous male, and a small one of which the sex is uncertain. All of them show the setæ of the body arranged in the stellate manner described and figured by Dr HOEK; but that author distinctly states that the setæ are not placed in regular rows on the legs. In these specimens this is a striking feature; the setæ are long and coarse, arranged in five rows, two dorsal, two lateral (and these are the longest), and a single ventral row, where they are shortest but most numerous. This arrangement is most noticeable on the tibiæ. Smaller and finer setæ are also irregularly distributed over the appendage, but more particularly on the ventral surface of the coxæ, especially the third, and the femora. The tarsus and propodus are much more slender than the rest of the appendage, the latter being a little the longer, and here the setæ are small and there is a well-developed ventral row; dorsally and laterally the linear arrangement is indistinct. The terminal claw is accompanied by two well-developed auxiliaries.

The ova carried by the male are not very numerous, but large.

Chætonymphon mendosum.

Chætonymphon mendosum, Hodgson, (13), pp. 30-32.

Specific Characters.—Body robust and tapering; articulation imperfect; lateral processes not widely separated, and with stout spines distally and dorsally; no fine setæ whatever.

Ocular tubercle short and stout.

Palp five-jointed; proportions of last three 5·5, 1·5, 1·6.

Oviger ten-jointed; denticulate spines few, with four teeth on each side, two of them prominent.

Legs with five rows of spinous setæ, without enlarged bases; terminal claw with two small auxiliaries.

I have fully described this species in the Report quoted above. Its occurrence on the opposite side of the Polar area is a matter of great interest. No less than thirteen specimens of both sexes were found among an immense number of *Chætonymphon orcadense* from Scotia Bay, taken in depths of less than 15 fathoms. As in the case of those taken by the *Discovery*, the body is quite smooth, and while there is a fair amount of variation in the setose covering of the appendages, its arrangement is characteristic. The lateral processes carry two stout spines dorsally and distally; but the number is not confined to two. Two other smaller ones may be found outside the principal ones. The spinous armature of the coxæ varies more, and while the setæ on the femur are not so regular in their distribution, the characteristic five rows of strong setæ are conspicuous on the tibiæ, the two dorsal rows having the smaller setæ. One specimen—the largest, and an adult female—has its setose covering the least well developed.

The Ocular tubercle of all these specimens is rather flattened and tapering from a broad base.

The Denticulate spines, which in the type specimens were rather worn, are here well preserved. The large female already alluded to has the same number as the type; the males may have fewer.

The shaft tapers, and may have as many as five lateral teeth, the fifth being little more than a trace.

Chætonymphon orcadense (Plate II., figs. 2, 2a).

Specific Characters.—Body robust, with lateral processes close together, setose.

Palps five-jointed; proportions of three terminal joints 4, 2·5, 2·5.

Oviger ten-jointed; denticulate spines rather numerous, with 5–7 lateral teeth.

Legs coarsely setose, with terminal claw and well-developed auxiliaries.

Body robust, with lateral processes of unequal length, giving it an ovoid form; they are distinctly though not widely separated, variable, apparently depending on age. Segmentation is very distinct.

The Cephalon is not long, constricted near the middle to form a distinct neck, and then widely expanded, forming two prominent divergent lobes. In length it is about two-thirds of the first trunk segment.

The Ocular tubercle is rather stout, not quite clear of the first pair of lateral processes. It is tall, rounded at the extremity, where there are four well-developed eyes.

The Abdomen is not articulated to the trunk, very distinctly pyriform in shape, and not quite so long as the cephalon.

The entire animal is covered with setæ; on the body they are quite small. The length of the body is 8 mm., its width 5.5 mm.

The Proboscis is not half the length of the body, cylindrical, with a constricted base, and truncate at the extremity. It is finely setose throughout.

The Chelifori are strongly developed. The scape is a single joint longer than the proboscis, richly supplied with setæ, which are most conspicuous on the inner side, some of the dorsal ones being very powerful; the distal fringe is strongly developed, the setæ being of varied size. The chelæ are as long as the scape, the palm fairly stout and covered completely with short setæ, which extend well on to the immovable finger. The two fingers are slender, much curved at the tips, and furnished with a large number of closely set teeth, which are fairly regular in size.

The Palps are five-jointed, and rise below the chelifori, at the side of the proboscis. The first joint is very small; the second is the longest; the proportion of that to the remainder is 5, 4, 2.5, 2.5. The entire limb is setose, setæ being fairly plentiful on the second joint and becoming more numerous to the distal extremity of the appendage. They are thickest on the ventral surface of the two terminal joints; the third and fourth have well-developed distal fringes.

The Oviger is ten-jointed, and rises ventro-laterally just in front of the first pair of lateral processes. The first three joints are very small and stout, the second and third being subequal, the latter having, as usual, a very oblique termination; the fourth is slightly curved, about as long as the first three together, and stouter distally than proximally; the fifth is fully half as long again, more strongly curved, enlarged distally, and having a curious constriction about a quarter of its length; the sixth is about one-third the length of the fifth, and has a well-developed setose tubercle at its extremity; the seventh joint is articulated at the outer angle of the sixth, but this is not always easy to observe. The four terminal joints differ but little in size; the first three progressively decrease in length, and the fourth is as long as the second. The terminal claw carries upwards of a dozen slender teeth. The denticulate spines are in a single row of 12, 8, 7, 10 on the four joints. Each spine is a stout blade with from five to seven lateral teeth; the middle ones are the largest, and the distal ones only exist as a mere trace. The entire appendage is setose; the setæ are small; the fourth joint carries them on the outer side of its curve, the fifth also, but distally they are much more evenly distributed; the sixth is completely covered, and the four terminal joints are provided dorsally with numerous setæ, longer than elsewhere. The oviger of the female presents considerable differences from the above. The limb is much more slender; the fourth and fifth joints are large, slightly curved, stoutest distally, and subequal in length. The setose tubercle at the extremity of the sixth joint is not noticeable. The number of denticulate spines on the various joints is not quite constant, nor are the teeth on the terminal claw. The setose covering is not so well developed.

The Legs attain a length of 32 mm. Of the three coxæ, the second is about as long

as the other two together; all are fairly uniformly covered with short setæ; the distal fringe of the third is, however, ventral and composed of numerous long slender setæ, and these are most conspicuously developed on the two posterior pairs of legs of the male—obviously a sexual character. The three following joints differ but little, their proportions being 6·5, 7, 7·25; the tarsus and propodus being as 3 to 2·5. The terminal claw is rather slender, and is accompanied by two auxiliaries less than half its size. The limb is thickly covered with setæ of no great size, but variable in length; they are longer and stronger laterally than elsewhere. This is not so conspicuous on the femur as on the tibiæ; they are largest on the second tibia, though the general covering of this joint is much finer than on the preceding joints. On the tarsus and propodus the setæ are small, uniform in size, and thickly set. The distal fringe of the femur is dorsal and composed of long stiff setæ; that of the first tibia is ventral and rather more spinous; that of the second tibia is also ventral and composed of strong spines.

The Genital apertures of the male are only to be found on the second coxæ of the two posterior pairs of legs; those of the female occur on every leg.

Of the enormous number of specimens taken in Scotia Bay, but a few males carry eggs. These are rather large, 0·7 mm., and between thirty and forty in a packet. This is slung over the fifth joint of the oviger by a stout thread near its proximal end. Another specimen carries a very large mass of young. These show the chelæ well developed, as are also the first two pairs of legs; the third pair are conspicuous rudiments, and the fourth pair can be seen as a swelling on either side of the abdomen. Rudiments of the palps are visible, and the ocular tubercle is present. Scotia Bay, about 10 fathoms. Burdwood Bank, south of the Falkland Islands, one specimen, immature, 56 fathoms.

Chætonymphon assimile (Plate I., figs. 1, 1a).

Specific Characters.—Body robust, with lateral processes very distinctly separated; devoid of setæ but for the distal fringes.

Palps five-jointed; proportions of last three 7·3, 4, 4.

Ovigers ten-jointed; denticulate spines not numerous, with five (?) lateral teeth.

Legs with long terminal claw and very minute auxiliaries.

The Body is stoutly built, with the lateral processes distinctly but not widely separated, and they carry a few stout setæ as a distal fringe; otherwise the body is quite smooth. Segmentation is distinct but not prominent, and the abdomen, which is pyriform and directed upwards to clear the posterior lateral processes, is not articulated to the trunk; it only bears two small setæ near its extremity, sometimes more.

The Cephalon is short, constricted to form a distinct neck, and then expanded to form two divergent lobes.

The Ocular tubercle lies between the neck and the first pair of lateral processes as a tall cylindrical structure, having at its rounded summit four well-developed eyes.

The length of the body is very nearly 6 mm., and its width 3 mm.; the abdomen takes up 1.2 mm.

The Proboscis is cylindrical, and is thinly covered with small setæ; the extremity is truncated.

The Cheliferi are strongly developed. The scape is single-jointed and 2.3 mm. long; it is covered with small setæ and a row of three or four spinous ones along the mid-dorsal surface, and a distal fringe of the same kind. The chelæ are about as long as the scape, the dactyli being longer than the palm, which is covered with very short setæ well on to the base of the immovable finger. Both fingers are much curved at the tips and bent on their inner margins, with numerous closely-set, slender teeth not of uniform size.

The Palps arise at the side of the proboscis, and comprise the normal five joints. The first is small and stout; the second is the longest, but only by a very little, the proportions between it and the remaining joints being 8, 7.3, 4, 4. The second joint bears a few setæ scattered along it, and two or three distinctly spinous ones, and a distal fringe of stout setæ. The third joint is more plentifully supplied with setæ, more uniformly distributed; the distal fringe is well developed ventrally. The two following joints are still more richly supplied on the ventral surface, but not to the same extent dorsally.

The Ovigera arise in the angle between the first lateral process and the cephalon, the body-process being distinctly visible dorsally. Of the ten joints, the first two are very small and stout; the third is as long as the two together. The fourth and fifth are almost subequal, the fifth being a very little the longer; the former is stout, the latter more slender and covered on its outer margin with short stiff setæ; the sixth is comparatively long, just exceeding two-thirds the length of the fifth, and is similarly setose. The four terminal joints differ but little in size; the third is perhaps the smallest; the dorsal surface of all is well provided with rather long setæ, and the terminal claw carries about a dozen teeth. The denticulate spines are not numerous (9, 8, 6, 9). They are much worn, as are also the teeth on the terminal claw, but exhibit a tapering shaft with three strongly developed lateral teeth and probably two more delicate ones.

The Legs attain a length of 20 mm. Of the three coxæ, the second is not so long as the other two together; the proportions of the remaining joints are as 8, 11, 10, 4.5, 3. The terminal claw is long and slender, and the auxiliaries are extremely minute. The entire limb is setose. The setæ on the coxæ are scanty dorsally, being limited to a poorly developed fringe on the first, and a lateral row on the second; but the ventral surface of the second and more particularly the third are covered with short stiff setæ and distinct distal fringes. The femur is irregularly clothed with rather long setæ dorsally, and a prominent distal fringe; ventrally the setæ are quite small. A similar arrangement holds good on the two tibiæ, but there is in addition a lateral row of stout spinous setæ situated at rather long intervals. The distal fringe of the first tibia is inconspicuous but for one stout spine ventro-laterally, and on the second tibia it is

composed ventrally of stout spines. On the tarsus and propodus the setæ are small and inconspicuous; there is a row ventrally along the two joints in which the setæ are more regular than elsewhere, but there is nothing very distinctive about them.

The specimen described above is an adult female, and the genital apertures occur, as usual, on all the legs. Those of the male occur only on the two posterior pairs of legs. The male differs further in being more coarsely setose, though the arrangement of the setæ is identical. The fifth joint of the oviger is abruptly expanded to more than twice its normal diameter, and the sixth joint is also expanded considerably, but is reduced to something like normal diameter distally. The denticulate spines are a little more numerous than in the female, being 11, 7, 6, 8.

A number of specimens were taken in Scotia Bay, in less than 10 fathoms, during the stay of the *Scotia*.

Pentanympyon antarcticum.

Pentanympyon antarcticum, Hodgson, (10), pp. 458-462; (11), p. 35; (13), pp. 36-39.

„ „ Cole, (6), p. 105; Bouvier, (3), p. 4.

Only a single specimen, an adult female, was taken by the expedition, and was found among a large number of *Chætonymphon orcadense* from Scotia Bay, in 10 fathoms. It is more robust than the average specimens from M'Murdo Sound; the scabrous nature of the body is more distinct, but this is not readily noticeable. Its neck, though a little shorter in proportion to the type specimens, does not appear to be more than an individual peculiarity. The joints of the legs have the same proportions as the types, but the tarsus and propodus vary on the different limbs more than usual for a single individual. The denticulate spines of the ovigers are much worn, and quite useless for specific discrimination. The genital apertures occur on the second coxa of all the legs.

Scotia Bay, 10 fathoms.

Ammonothea communis (Plate II., figs. 1, 1a).

Ammonothea communis, Bouvier, (3), p. 6.

Specific Characters.—Body discoid, with lateral processes close together; they and the first coxæ armed dorsally with two stout spurs.

Palps eight-jointed, last three progressively increasing in length.

Oviger ten-jointed, small; few denticulate spines, no claw.

Legs stout, uniformly setose; terminal claw stout, with two well-developed auxiliaries.

Four strong spines on propodus.

Body discoid, the lateral processes being close together; these are armed with two stout spurs dorsally and distally, and similar but stouter ones occur on the first coxæ. Of these the posterior one is always the largest.

The Cephalon is stout, and also provided anteriorly with a short but stout spur on each side, and between these is the stout Ocular tubercle. This is short, blunt, and rounded, but bears a small pointed tubercle at the apex. Of the four well-developed eyes, the anterior pair are the larger.

The Abdomen is rather long and cylindrical, directed upwards, but not so much so as in Professor BOUVIER's specimens. Very small setæ occur on the abdomen and all the spurs of the cephalon and lateral processes.

The length of the body is 1.7 mm., and its breadth 1.3.

The Proboscis is large, pyriform, rather more than half the length of the body.

The Chelifori are as is usual with the members of this genus; the scape is short, slightly curved, with but few minute setæ, and those distally. The chela is reduced to a mere knob, with but traces of the dactyli.

The Palps are eight-jointed and rise laterally to the proboscis. The first joint is short and stout; the second and fourth are subequal and about three times as long, the latter bearing a few setæ ventrally. The third joint is quite small, with two or three setæ dorsally. The four terminal joints are all small, and differ but little in size; however, the last three progressively increase in length, the terminal one being distinctly the longest and rather irregular in shape; it is richly supplied with short stiff setæ ventrally and distally, to a less extent dorsally. The other joints are enlarged a little ventrally, and carry a tuft of short stiff setæ.

The Ovipiger is ten-jointed, short, with all the joints small. The first is short and stout; the second is much longer and more slender; the third, shorter than the preceding one; the fourth and fifth are subequal, slightly curved, and the longest of the appendage, the proportions of the third to these being 3, 4, 4. The sixth is small, the seventh a little longer and more slender; the remainder graduate to a very small terminal joint. Very few setæ are to be found on the entire appendage, and the denticulate spines are also in very small numbers (1, 2, 1, 2). They consist of a slightly curved shaft with the flattened blade cut into nine very closely set teeth. On the sixth joint there are two spines, and another on the seventh, which look as if they were much-worn specimens of the denticulate spines. This would increase the formula to 2, 2, 2, 1, 2.

The Legs attain a length of 6 mm. The first coxa is stout, with two dorsal spines, as before stated; the second is longer, slender, but enlarged distally, not as long as the other two together. The proportions of the three following joints are as 6, 6, 5. The tarsus is very short; the propodus is curved and bears a stout terminal claw and two very well-developed auxiliaries. The entire limb is covered with short and rather stiff setæ. The tarsus sometimes bears a stout spine ventrally. The propodus has four stout spines ventrally and proximally, the remainder of the ventral surface being occupied by a band of stout setæ. The difference between these and the four proximal spines is not so sharply marked as in some species. The femora bear a stout tubercle dorsally and distally.

The Genital apertures are on a prominent outgrowth at the distal extremity of the second coxæ of the two posterior pairs of legs. The eggs are numerous, and two roughly spherical packets may be found on each oviger.

Two specimens, both ovigerous males, were taken in Scotia Bay, at a depth of 10 fathoms.

Leionymphon grande.

Ammothea granulis, Pfeffer, (24), pp. 43-45.

Colossendeis (?) *Charcoti*, Bouvier, (2), pp. 295-296.

Leionymphon grande, Hodgson, (13), pp. 41-43.

This species was first described by Dr PFEFFER as coming from South Georgia. Professor BOUVIER has recorded it more recently from Carthage Bay, where it was taken by the French Antarctic Expedition. A single adult female and several immature specimens were captured by the *Discovery* off Coulman Island in the Ross Sea. In the Report on the *Discovery* Pycnogonida I have described the species at some length, and transferred it to a genus founded by Professor MÖBIUS (22) for an immature species taken off Bouvet Island.

A single specimen only was taken by the Scotch Expedition in Scotia Bay, South Orkneys, 14 fathoms, 26th March 1903. It is a male, not quite adult, retaining the chelate condition of the chelifori; and the genital apertures are not yet developed. In point of size it is a good deal smaller than the adults, but otherwise does not exhibit any important differences. The length of the body is 11 mm., its width 9.5 mm. The proboscis, which tapers very slightly towards the extremity, is 12 mm. long. The legs have a length of only 42 mm., the proportions of the three principal joints being 9.5, 9, 12. There are only three stout spines proximally on the ventral side of the propodus, and the distribution of the short stiff setæ over the legs is quite uniform. The ocular tubercle ends in a cone above the eyes.

These are the only differences to be found between this specimen and the adult taken by the *Discovery*.

The oviger, however, presents important sexual features, and though this specimen is not mature the appendage may be described in detail. The first joint is very small; the second is longer and stout; the third is more slender, and has, as usual, a very oblique termination; if measured to the extremity of this it is about as long as the preceding. Their outer margins are rather thickly covered with short setæ. The three following joints form a curvature in the opposite direction to the first three. Their proportions are about as 5, 6, 3.5, and they are covered with short setæ, but more particularly so on the outer side. The precise proportions of the remaining joints cannot be given, owing to their relations one to the other. The seventh joint is shorter than the preceding, and articulated to it at something like a right angle. Near its distal extremity it bears a tuft of setæ. The eighth joint is richly setose, and also articulated to the seventh at a considerable angle; the two terminals

taper to a blunt point, are devoid of setæ, and do not appear to have attained their full development.

Leionymphon Clausi (Plate II., figs. 1, 1α).

Ammonothea Clausii, Pfeffer, (24), pp. 43-44.

Leionymphon Clausi, Hodgson, (13), p. 40.

Specific Characters.—Body with lateral processes not widely separated but divergent.

Abdomen tall, erect, immediately behind posterior trunk segment.

Palps nine-jointed, the last five differing but little in size.

Ovigers ten-jointed, without terminal claw, and differing in the two sexes.

Legs with strong terminal claw and auxiliaries; about five stout spines ventrally and proximally on the propodus.

The Body is robust, with the lateral processes rather long, distinctly but not widely separated, divergent. Segmentation rendered conspicuous by three prominent transverse ridges, which are rounded and not produced into a median point.

The Cephalon is but very little expanded. Its anterior margin is straight, and it is about two-thirds the length of the anterior segment. At its antero-lateral angle it bears a distinct tubercle, and there are two more similar ones on each side of the lateral processes. Here the posterior one of each pair is the largest.

The Ocular tubercle lies slightly in advance of the middle line of the cephalon; it is tall and cylindrical, bearing four well-developed eyes, above which it terminates in an elongated cone.

The Abdomen is directed straight upwards, and lies so close to the posterior segment that the line passes over its base. It is cylindrical, tapering distally to a blunt point. The length of the body, measured to the extremity of the posterior lateral processes, is barely 6 mm.; its width is 4 mm.

The Proboscis is pyriform, quite smooth, and fully 5 mm. in length. Movably articulated to the body, it is carried directly downwards at a considerable angle.

The Chelifori are rudimentary; they arise from the anterior margin of the cephalon above the proboscis, and are curved, having a few setæ distally. The chelæ are irregularly shaped knobs inclined downwards, with small tubercles to represent the dactyli.

The Palps arise just below the chelifori at the sides of the proboscis, and are nine-jointed. The first joint is short and stout; the proportions of the three following are as 6, 1, 4·5; the remaining five differ but little in size, and, retaining the proper numbers of each joint, their sequence in point of length is as follows: 5, 7, 9, 6, 8. The entire appendage is covered with very small setæ, and these are specially numerous on the ventral surface of the five terminal joints.

The Ovigers are ten-jointed and arise ventro-laterally from a small body-process on the neck, and therefore immediately in front of the first pair of lateral processes.

Between the two sexes they exhibit considerable differences. The type specimens are males, and the specimen now under examination is an adult female.

All the joints are small; the first is short and stout; the second, fourth, and fifth are subequal, and, by a little, the longest joints of the appendage; the third is about two-thirds the size of these; the sixth is a little shorter than the preceding; the seventh and eighth are a little shorter still and subequal; the ninth is the shortest of all, except the first; and the tenth is slender, rather tapering, and half as long again as the ninth. Setæ are very scarce throughout, except on the sixth joint, where they are fairly numerous though minute. The last four joints bear numerous denticulate spines, which are not, however, arranged in a single row. These are unfortunately much worn, but show a stout, usually curved shaft, bent, with some eight or nine very closely set teeth on each side. There is no terminal claw.

The Legs extend to a length of about 27 mm. Of the three coxæ, the first is the shortest, the second is rather more than twice as long, and the third is intermediate between the two. The proportions of the three following joints are as 6, 5, 7, but they are not strictly preserved on all the legs. The tarsus is very small, covered with stiff setæ, which become distinctly spinous as a ventral distal fringe. The propodus is rather curved; ventrally and proximally there is a row of very stout spines, five in number. The rest of the joint is thickly covered with short stiff setæ, especially ventrally; dorsally there are a few longer ones. The heel does not project much and is fringed with stiff setæ. The terminal claw is long and stout, with two large auxiliaries more than half as long; the three rise from a common membranous investment.

The limb is covered fairly plentifully with short stiff setæ, and there are rows on the principal joints of stout spinous setæ dorsally and laterally; these are, however, not closely set. The distal fringes are not conspicuous.

The Genital apertures are found on the second coxæ of all the legs.

A single specimen was found among an enormous number of *Chaetonymphon orcadense* taken in Scotia Bay, at 9 fathoms.

Through the courtesy of Dr PFEFFER of Hamburg, I have been able to compare this specimen with the types of his *Ammonothea Clausi*. Though Dr PFEFFER's specimens are both ovigerous males, there cannot be any question as to the identity of this specimen with that species. The ova are small and numerous, massed together in two spherical packets on each oviger.

Decolopoda australis (Plate III., figs. 2, 2a, 2b, 2c).

Decolopoda australis, Eights, (8), pp. 203-206; Stebbing, (29), pp. 185-189; Cole, (6), pp. 405-415; Loman, (19), p. 722.

Decolopoda australis, Hodgson, (11), pp. 36-42; (12), pp. 254-256; Bouvier, (3), pp. 1-5.

This fine species was discovered in some numbers along the shores of the South Shetland Islands, and a very full description was published by Dr EIGHTS in the first

volume of the *Boston Journal of Natural History* in 1837. The description is clear and accurate; if the plate which accompanies the paper is not as good as it might be, it is readily recognisable, and quite as good as many produced at the present day. It is more than probable that the title of the paper has contributed largely to its having been overlooked for so long; but that does not justify the reception allotted to it when discovered. It would appear that a Pycnogonid with five pairs of legs was not to be tolerated, and two well-known zoologists have failed to recognise such a possibility. However, the species has been rediscovered, and another totally distinct and not closely related species, also with five pairs of legs, has been discovered in the distant south. The modern discovery which has led to a proper appreciation of EIGHTS' species has been achieved by the recent Antarctic expeditions, three of which secured a number of EIGHTS' species from the South Orkneys, in latitude 61° S. The discovery of such an interesting form was deemed of sufficient importance to warrant its prompt publication, and it was not till that was undertaken that the significance of EIGHTS' work came to light. In a communication made to the Royal Physical Society of Edinburgh (11), EIGHTS' original description has been republished verbatim, together with a more modern one. It is a matter of opinion which is the better of the two; the plates, however, are much superior, and give a very accurate idea of the animal.

The more recent description is republished here, with some verbal alterations, and some further information is added in a final paragraph.

• *Decolopoda australis*, EIGHTS.

Specific Characters.—Body stout, discoid, with only occasional traces of segmentation, with a group of three or four very small spines on the dorsal surface of the lateral processes, which are quite close together.

Proboscis large, bent downwards just beyond the middle of its length, with minute spines dorsally.

Palps: third joint considerably the longest; the three terminal joints subequal, and shorter than the seventh.

Legs smooth; setæ restricted to spinous distal fringes.

In comparing the South Orkney specimens with EIGHTS' description, one is struck by the accuracy of that naturalist; but according to modern requirements some small points have been overlooked.

EIGHTS describes his specimens as being a bright scarlet, and the body and coxæ of the figure have been so coloured. The South Orkney specimens, after being in spirit for more than a year, do not show any trace of such a colour. Some of the specimens are of a very light straw colour, without any trace of pigment, except in one or two cases where a little is distributed at the extremity of the proboscis. Other specimens are of a rich olive-brown colour, which is considerably darker, almost black, on the proboscis, mandibles, and palps. In one specimen the legs are equally darkly pigmented. The

colour notes taken at the time, and which have been forwarded to me, show that some of the specimens were bright scarlet, as EIGHTS described them; others are a very dark red, and in the latter case the proboscis is almost black. The scarlet colour appears to be uniformly distributed over the body and limbs, the proboscis and adjacent parts being darker than the rest. One specimen shows a distinct segmentation, two others show it very indistinctly, and the remainder not at all.

The Cephalon is short; a distinct neck separates it from the rest of the trunk. It is expanded to completely fill the interval between the first pair of lateral processes.

The Ocular tubercle lies in the middle of the cephalon, and is short and stout; it bears four well-developed eyes below the terminal cone.

The Proboscis is not so long as the body, but longer than the trunk. It is much swollen just beyond the middle, where it bends downwards at a considerable angle. The mouth is small. Along the middle line of the proboscis is a narrow band of small spines, which can hardly be said to have a regular arrangement. More laterally are two or three rows of spines, not always well defined; the inner one comprises several spines, but the outer one only a very few. On the whole, the lateral spines are larger than those of the median band. One or two spines may occur ventrally just behind the bend.

The Chelifori are well developed and the scape is two-jointed. They arise from the wide extremity of the cephalon laterally to the proboscis. The first joint is long, reaching almost to the beginning of the median enlargement of that organ. The second joint is very small, and constitutes the angle in the direction of the appendage; seen laterally, it is practically triangular in shape, the apex downwards and its dorsal margin sinuous. The chela is articulated to the ventral angle, and lies close underneath the first joint. The palm is very small; both fingers are slender and much curved, like a pair of callipers; the tips overlap, and there is no trace of teeth. There are no setæ on the appendage.

The ten-jointed Palps rise ventrally close against the proboscis. It is open to question if the first is a true joint or merely a body-process; it is, however, constricted at the base. The first two joints are very short and wide—annular, in fact; the third is the longest in the appendage, and in proportion to the three following is as 6, 1, 4, 2. The following joints are all small and differ but little in length. The seventh is perhaps the longest, the eighth the shortest; the two terminals are subequal and longer, but the difference is scarcely noticeable. The fifth joint is the stoutest of them all, and slightly constricted about two-thirds of its length. In none of the specimens are the palps setaceous, and this is the only discrepancy between EIGHTS' description and the South Orkney examples.

The Ovigera rise from a body-process immediately behind the palps, close to the middle line of the ventral surface. This body-process is quite as large ventrally as any of the first three joints, which are small, and might easily be mistaken for one. The proportions of the three following joints are as 9.5, 5, 10. The four terminal joints

are subequal in length, and bent on each other to form a loop which is so characteristic of the genus *Colossendeis*. Each joint is furnished with four rows of non-denticulate spines, though on the terminal joint these spines are less regularly arranged, and a fifth row may be distinguished. The spines vary a good deal in form and size; the larger ones are trenchant blades, bent rather close against the surface from which they spring. The terminal claw is long and slender. These spines, as well as the terminal claw, are much worn in all the specimens available, though of course to a varying extent, and I would not assert that I had seen a perfect specimen. It does not appear to me improbable that they should prove to terminate in a flattened blade with a denticulate margin.

The Leg extends to a length of about 83 mm. They differ in length, but without measurement the difference is hardly noticeable. The fifth leg is the smallest, the first comes next, and the fourth is intermediate between the third and fifth; the second and third are the largest and subequal. Of the three coxæ, which are short, the first is the shortest, and the second the longest, the differences being small. The first is marked dorsally and ventrally by a faint groove passing along the greater part of the joint, and rendered more conspicuous by a change of colour. Its distal extremity is marked by a minute spine. The other coxæ exhibit distinctly the "lateral line," which is continued to the extremity of the limb. The proportions of the other joints and claw are as 18, 19, 20·5, 8·5, 7, 5·5. There is a certain amount of variation, but it is confined to narrow limits. Except for the spinous distal fringes, the limbs are perfectly smooth. The distal fringe of the femur consists of one mid-dorsal spine and two lateral; these are quite small and inconspicuous; that of the first tibia is generally deficient; those of the second tibia and tarsus comprise four long spines, each pair being situated ventro-laterally; a mid-ventral spine occurs occasionally. A pair of long spines occurs ventrally on the propodus, one on each side of the claw.

The Genital apertures occur on the second coxa of all the legs; those of the male are small and distal, those of the female are larger and median.

Several specimens of this fine species were taken on various dates in Scotia Bay, South Orkneys, in 9 or 10 fathoms. Two are quite immature, but show no traces of segmentation, and in all particulars, except the non-development of the genital apertures, resemble the mature specimens. Two specimens in the collection were marked as bearing ova, but examination shows that these "ova" were bunches of contracted hydroid polyps, and were held by the mandibles, but close against the ovigers.

Colossendeis orcadense (Plate II., fig. 3).

Specific Characters.—Body well built, with lateral processes widely separated. Proboscis considerably longer than the trunk, and enlarged from near the middle onwards.

Palps ten-jointed; proportions of last three joints 1·8, 2·5, 2·5.

Ovigers ten-jointed, the last four joints with five rows of denticulate spines.

Ocular tubercle stout, conical, without eyes.

Legs slender, covered with rows of very minute setæ; terminal claw long.

The Body is fairly robust, without any trace of segmentation, and the lateral processes are widely separated. The cephalon is small, and at its posterior border, not quite clear of the first pair of lateral processes, lies the ocular tubercle. This is a very short but stout and pointed process, without any trace of eyes. The abdomen is slender and articulated to the trunk.

The Proboscis is considerably longer than the body, and is bottle-shaped—that is, it is narrow at the base and for about a third of its length, when it becomes considerably enlarged. At about its distal third it again becomes slightly constricted, and terminates in three lobes corresponding to the sides of the mouth. It is irregularly covered with minute setæ, and movably articulated to the trunk.

The length of the proboscis is 20 mm.; trunk, 13 mm.; abdomen, 2 mm.; width of trunk, 7 mm.

The Palps arise ventro-laterally at the extreme end of the trunk. The first joint, though small, is unusually large, and twice the size of the second, which is annular. The proportions of the other joints are 11, 1·3, 7, 4, 5·75, 1·8, 2·5, 2·5.

With the exception of the first two joints, the entire appendage is setose throughout. On the third joint they are scarce and hardly noticeable, but become more numerous on succeeding joints. From the sixth they are most abundant, always small, and thickest on the ventral aspect of the appendage. On the fifth joint, at about three-quarters of its length, there is a distinct swelling externally and a faint constriction, a peculiarity which seems to prevail throughout the genus.

The Ovigera lie immediately behind the palps, and the processes on which they arise are quite close to the middle line and seem to have pushed the palps off the body. Each might quite justifiably be taken for an eleventh joint; the first three, properly so called, are quite small and approximately subequal. The proportions of the next three are 17, 7·5, 15·2. The four terminal joints present no exceptional peculiarities in general appearance, but the denticulate spines are arranged in five rows altogether—a single row of large spines separated by an interval from a second which contains nearly double the number of smaller spines, another interval, and then three more rows not so regular as the other two. In the ninth joint these latter rows are very irregular. The spines themselves are of the characteristic type—a more or less cylindrical base bearing a flattened blade, the two being subequal in length. In the present specimen they are so much worn that no details as to their margins can be observed.

The Legs are slender and are 110 mm. in length. The three coxæ are small and subequal, the first being very closely articulated to its lateral process, the proportions of the remaining joints being 32, 27, 22, 11, 7, and the terminal claw about 5. The limb is rather liberally covered with very minute setæ, which are arranged in rows. The lateral line is distinguishable throughout. The left femur of the first pair of legs and the

right femur of the last pair bear peculiar excrescences, obviously the result of some injury. In both cases, however, the injured joint is longer than its fellow on the opposite side.

A single specimen, which carries a few individuals of *Scalpellum*, was taken at the South Orkneys in June 1903.

Colossendeis leptorhynchus.

Colossendeis leptorhynchus, Hoek, (15), pp. 64-65.

A specimen referable to this species was taken in lat. 48° 6' S., long. 10° 5' W., in 1742 fathoms. It differs slightly from the type specimens taken by H.M.S. *Challenger*, and is much larger than any from that expedition. With its legs straightened out it covers an area of very nearly 14 inches. Its length is as follows:—Proboscis, 39.5 mm.; trunk, 13.5 mm.; abdomen, 5 mm.; total, 58 mm.

The Body is perfectly smooth, but traces of segmentation may be seen under a good lens. It is not stoutly built, and the small lateral processes are separated by an interval equal to about half their thickness.

The Cephalon is marked off from the rest of the trunk by a V-shaped groove which cuts into the space between the first pair of lateral processes. The ocular tubercle is immediately in front of this groove, and occupies rather a large area; it is of very small elevation and bears two poorly developed eyes.

The Proboscis is very long and slender, slightly enlarged in the middle, exactly as described by Dr HOEK; but it is movably articulated to the trunk as in the type and all other species of the genus that I have seen, twenty-three in number.

The Palps arise ventro-laterally as close as possible to the proboscis, beyond which they do not extend far, the sixth joint not reaching the extremity. The first two joints are very small, the proportions of the remainder being 14, 2, 20, 2.5, 2.3. The three terminals are together not as long as the preceding joint; the first two are subequal, and the last a little longer, but not as long as the two together. The entire organ is very finely setose throughout.

The Ovigera rise ventrally close together, each on a small body-process which is close behind the proboscis. They are very long; the first three joints are as usual very small, the middle one of these being much more slender than the other two. The proportions of the three following are as 23, 4, 26. The four terminal joints are small and form the characteristic loop, and are provided with groups of denticulate spines, the last joint bearing a strong claw. A lateral line is readily seen along the entire appendage. There are not less than seven rows of these denticulate spines; those of the first and principal row are the longest and best suited for observation. Here they are less numerous than in the other rows. They are roughly cylindrical shafts, becoming, at about half their length, flattened ovoid blades. The margin of the flattened blade is, near the base, provided with very small and rather curved teeth. These become longer and closer set, and before the extremity of the blade is reached they

have become fine setæ. I believe that this appearance is entirely due to wear and tear; these spines and the terminal claw are more or less worn, some of course very much more than others. If in really good condition, I believe these spines would be finely dentate all round the blade.

The Legs are long, very slender, and attain a length of 180 mm. The three coxæ are small and subequal; the proportions of the remaining joints are as 54, 61, 44, 8, 4. The terminal claw is very small. The limb is supplied at long intervals with very minute setæ; these make their appearance on the femur. The relative sizes of the joints of the leg differ from Dr HOEK's specimens, in which the femur is the longest joint. There can, however, be no doubt as to the identity of this species.

In the preparation of this report I am greatly indebted to the Council of the Marine Biological Association of the United Kingdom, and especially to Dr E. J. ALLEN, the Director, for accommodation at their Plymouth Laboratory; also to my friends Mr and Mrs L. E. SEXTON and Mr J. RITCHIE, who have so generously assisted me with the drawings and the photographs from which they have been prepared.

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EXPLANATION OF PLATES.

PLATE I.

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| Fig. 1. <i>Chatonymphon assimile</i> . . . oviger × 15. | Fig. 3a. <i>Nymphon longicoxa</i> . . . ♂ palp × 10. |
| " 1a. " " . . . ♀ palp × 16. | " 4. <i>Nymphon articulare</i> . . . ♀ palp × 50. |
| " 2. <i>Nymphon capense</i> . . . palp × 20. | " 4a. " " . . . oviger × 28. |
| " 2a. " " . . . oviger × 20. | " 5. <i>Nymphon compactum</i> . . . oviger × 8. |
| " 3. <i>Nymphon longicoxa</i> . . . oviger × 9. | " 5a. " " . . . ♂ palp × 15. |

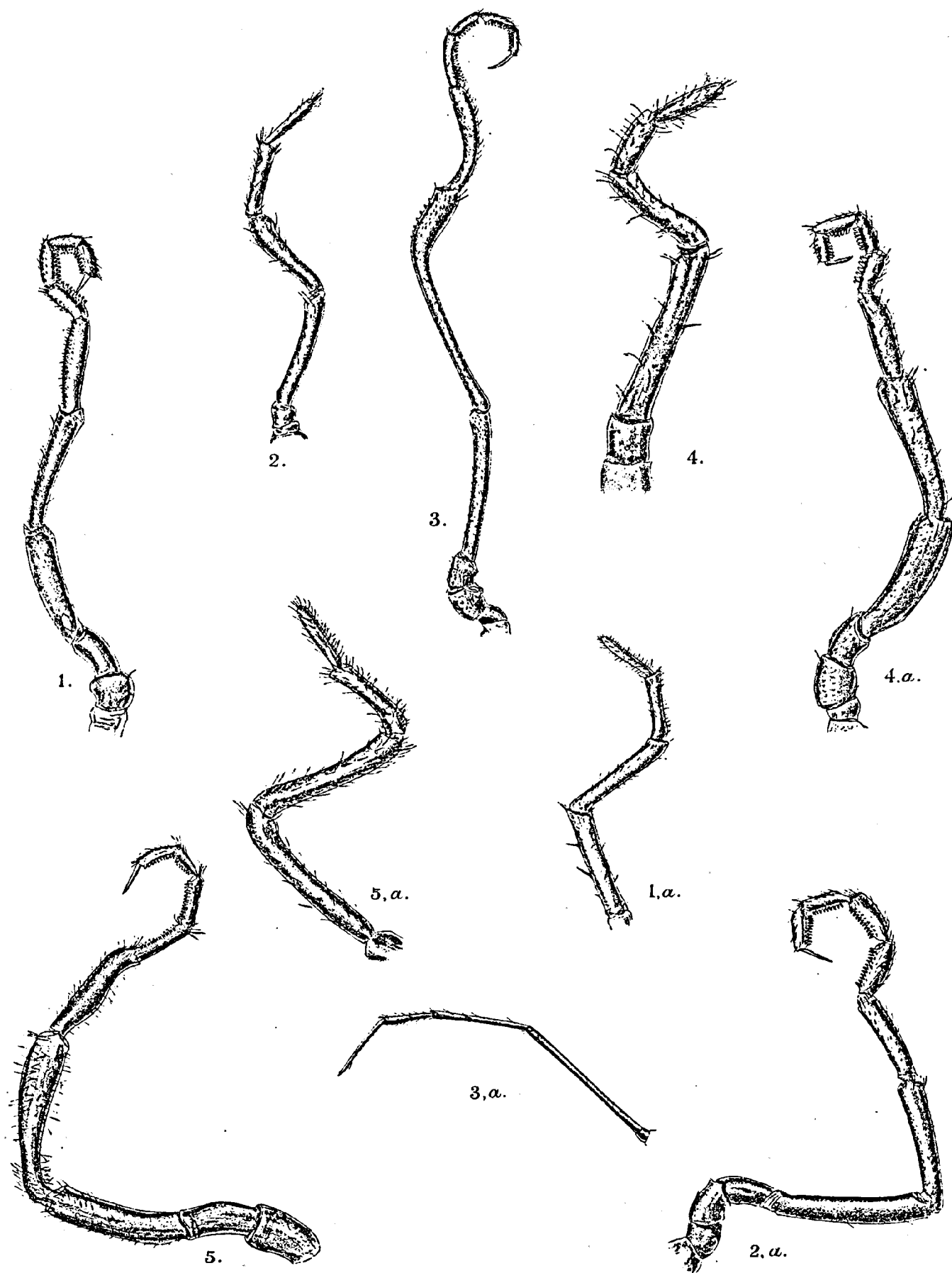
PLATE II.

- | | |
|---|--|
| Fig. 1. <i>Ammothoea communis</i> . . . ♂ palp × 35. | Fig. 3. <i>Colossendeis orcadense</i> . . . nat. size. |
| " 1a. " " . . . oviger × 40. | " 4. <i>Pallenopsis lanata</i> . . . oviger × 14. |
| " 2. <i>Chatonymphon orcadense</i> . . . ♂ palp × 13. | " 4a. " " . . . ♂ palp × 16. |
| " 2a. " " . . . oviger × 12. | |

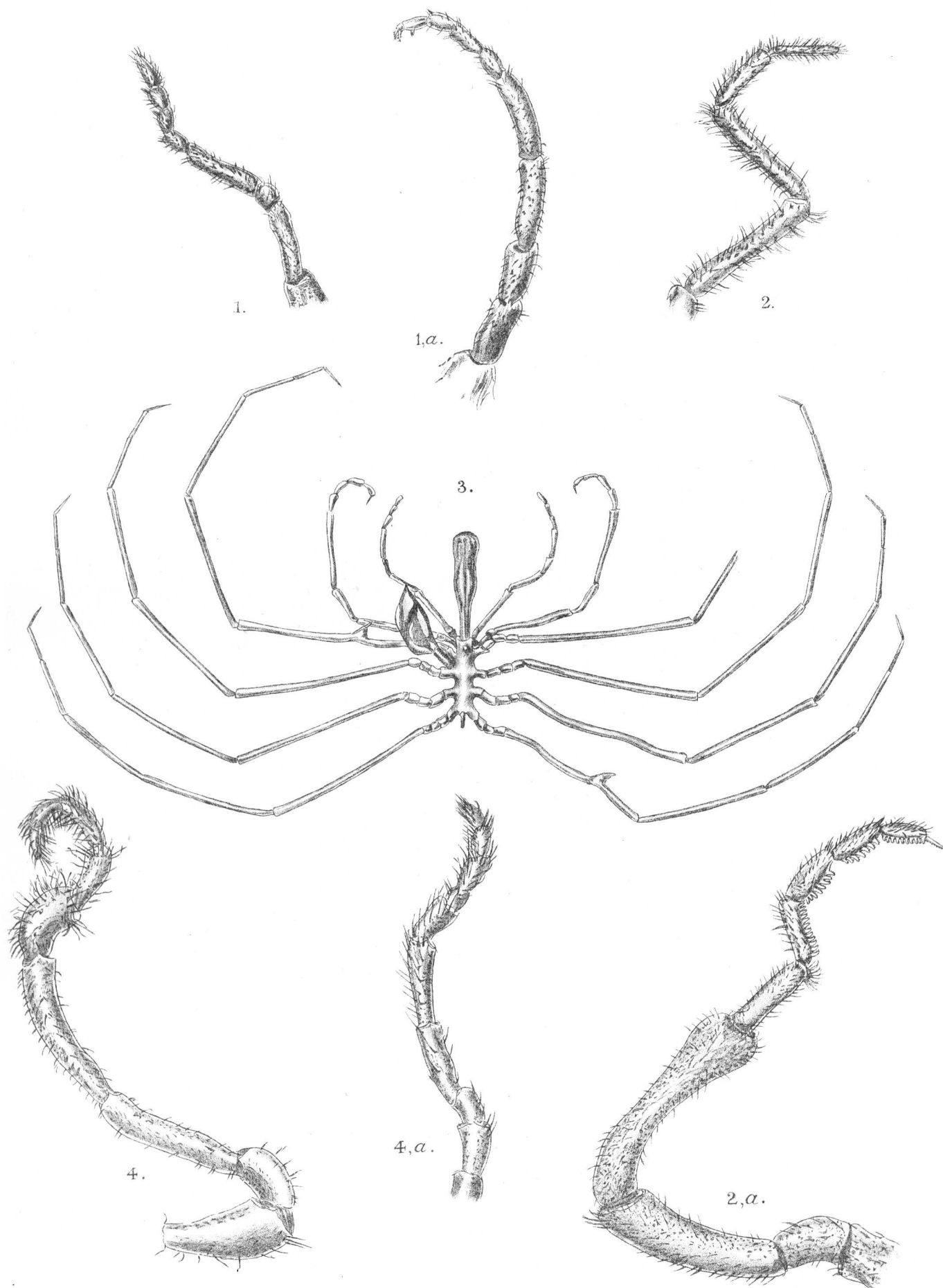
PLATE III.

- | | |
|---|---|
| Fig. 1. <i>Leionymphon Clausi</i> . . . × 2. | Fig. 2a. <i>Decalopoda australis</i> . . . proboscis from |
| " 1a. " " . . . ♀ oviger × 8. | right side × 4. |
| " 2. <i>Decalopoda australis</i> . . . ♂ nat. size. | " 2b. " " . . . oviger, terminal |
| | joints × 6. |
| | " 2c. " " . . . cheliferus × 6. |

HODGSON: PYCONOGONIDS.—PLATE I.



HODGSON: PYCONOGONIDS.—PLATE II.



HODGSON: PYCONOGONIDS.—PLATE III.

