

The PODOSOMATA (=Pycnogonida) of the Temperate Atlantic and Arctic Oceans. By Canon A. M. NORMAN, M.A., D.C.L., LL.D., F.R.S., F.L.S.

(PLATES 29 & 30.)

[Read 19th March, 1908.]

PODOSOMATA is a most appropriate name which has been assigned to the class which embraces the allies of *Pycnogonum*. The name was given by Leach in 1815*, and employed by him in his subsequent papers. It is curious how it should have escaped usage and had substituted for it *Pycnogonides*, and its variations *Pycnogonoidea*, *Pycnogonidea*, and *Pycnogonida*, which are all, with the exception of the first French term, of later date, and all objectionable, for it is not desirable that the name of a class should be founded on the title of a genus which it embraces. Dr. Dohrn (9) has employed the term *Pantopoda*, an appropriate title, yet not so appropriate as *Podosomata*, which, with our present knowledge, expresses a wider signification than was known to its author. Moreover, Leach divided his *Podosomata* into two families, *Pycnogonideæ* and *Nymphonideæ*, which find their equivalents in the two orders of Sars, *Achelata* and *Euchelata*, while of that author's remaining third order, *Cryptochelata*, no example was known in the beginning of the last century.

Having a large number of *Podosomata* in my hands, obtained partly by my own dredging excursions and partly by expeditions sent out by our Government, I wrote a considerable portion of this paper some years ago; but when there were added North-East American species given me by Mr. E. B. Wilson, a nearly complete series of co-types of the Mediterranean forms described by Dr. Dohrn, others obtained by the Norwegian North Atlantic Expedition through the kindness of Professor G. O. Sars, and yet others from the dredgings of the 'Ingolf' Expedition, for which I am indebted to the authorities of the Copenhagen Museum, it appeared to me that with these advantages it might be useful if I brought together what was known of this Class in that portion of the Ocean to which my study of the marine fauna has been confined. The following synopsis embraces all species known in the Temperate Atlantic (*i. e.*, north of 35° N., including the Mediterranean) and the Arctic Oceans.

The general classification of G. O. Sars has been adopted, except that the Orders have been differently arranged.

* Trans. Linn. Soc. vol. xi. p. 308.

	1	2	3	4	5	6	7	8	9	10
	Mediterranean.	Western Europe—Spain to Denmark.	British Area.	Scandinavian—Norway, South and West.	East Arctic—Siberia to East Finmark.	High Arctic—Spitsbergen, Franz Josef Land, &c.	Faroe Channel.	West Arctic—Jan Mayen, Iceland, East Greenland.	West Greenland.	North-East America to lat. 35° N.
<i>Phoxichilidium femoratum</i> , Rathke	+	+	+	+	+	+
<i>Anaphia petiolata</i> , Krøyer	+	+	+	+						
<i>virescens</i> , Hodge	+	+							
<i>robusta</i> , Dohrn	+									
<i>angulata</i> , Dohrn	+									
<i>typhlops</i> , G. O. Sars	+	+						
<i>lenta</i> , Wilson	+
<i>oculata</i> , Carpenter	+							
<i>Pallene brevirostris</i> , Johnston	+	+	+	+	+
<i>producta</i> , G. O. Sars	+	+						
<i>spectrum</i> , D. Dohrn	+	..	+							
<i>Tiberii</i> , A. Dohrn	+									
<i>phantopa</i> , A. Dohrn	+									
<i>acus</i> , Meinert	++	
<i>hastata</i> , Meinert	++	
<i>Pallenopsis longirostris</i> , Wilson	+
<i>tritoniis</i> , Hoek	+	+	
<i>plumipes</i> , Meinert	+	..	
<i>Neopallene campanellæ</i> , Dohrn	+									
<i>Phoxichilus circularis</i> , Goodsir	+	+	+	+	+	+
<i>spinipes</i> , Fabricius	+	+	+	++	
<i>Cordylochele malleolata</i> , G. O. Sars	+	..	+	+	+	+	+	
<i>longicollis</i> , G. O. Sars	+	+		
<i>brevicollis</i> , G. O. Sars	+			
<i>Nymphon rubrum</i> , Hodge	+	+	+	..					
<i>brevirostre</i> , Hodge	+	+	+					
<i>mixtum</i> , Krøyer	+	..	+	+	+	..	+	..	+
<i>glaciale</i> , Lilljeborg	+	+	
<i>brevitarse</i> , Krøyer	+	+	..	+	+	
<i>grossipes</i> , Fabricius	+	+	+	+	+	+	+	+
<i>microrhynchum</i> , G. O. Sars	+	
<i>piliferum</i> , Carpenter	+	
<i>longitarse</i> , Krøyer	+	+	+	+	+	+
<i>Sluiteri</i> , Hoek	+	..	+	+	..	+	..	
<i>groenlandicum</i> , Meinert	+	
<i>leptocheles</i> , G. O. Sars	+	+	+	+	
<i>Strömii</i> , Krøyer	+	+	+	+
<i>giganteum</i> , Goodsir	+	+	+	+	+	+	..	
<i>elegans</i> , Hansen	+	+	+	+	+	..	
<i>macrum</i> , Wilson	+	+	+	+	+	+
<i>stenocheir</i> , Norman	+	..	
<i>Sarsii</i> , Meinert	+	..	
<i>Hoekii</i> , Meinert	+	
<i>micronyx</i> , G. O. Sars	+	+	..	
<i>longimanum</i> , G. O. Sars	+	

	1	2	3	4	5	6	7	8	9	10
	Mediterranean.	Western Europe—Spain to Denmark.	British Area.	Scandinavian—Norway, South and West.	East Arctic—Siberia to East Finnmark.	High Arctic—Spitsbergen, Franz Josef Land, &c.	Faroe Channel.	West Arctic—Jan Mayen, Iceland, East Greenland.	West Greenland.	North-East America to lat. 35° N.
<i>Nymphon gracile</i> , Leach .....	..	+	+						
<i>serratum</i> , G. O. Sars .....	..	..	..	..	+	+	..	+	+
<i>megalops</i> , G. O. Sars .....	..	..	..	..	+	+	..	+
<i>parasiticum</i> , Martens	+									
<i>Chaetonymphon hirtum</i> , Fabricius .....	..	..	+	+	..	..	..	+
<i>hirtipes</i> , T. Bell .....	..	..	+	+	+	+	+	+	+	+
<i>spinosissimum</i> , Norman .....	..	..	+	+	..	..	..	..	..	+
<i>tenellum</i> , G. O. Sars .....	..	..	..	+	..	..	+	..	+
<i>macronyx</i> , G. O. Sars .....	..	..	+	+	+	+	+	+	+
<i>Boreonymphon robustum</i> , T. Bell .....	..	..	..	..	+	+	+	+	+
<i>Paronymphon spinosum</i> , Caullery .....	..	+	+	..	..	..	..	..	+
<i>Ammothea vulgaris</i> , O. G. Costa	+									
<i>echinata</i> , Hodge .....	+	+	+	+	..	..	..	..	..	+
<i>scabra</i> , Wilson .....	..	..	..	..	..	..	..	..	..	+
<i>hispida</i> , Hodge	+	+	+	..						
<i>borealis</i> , Schimkewitsch .....	..	..	..	..	+	
<i>Langi</i> , Dohrn	+									
<i>lævis</i> , Hodge .....	..	..	+	+				
<i>appendiculata</i> , Dohrn	+									
<i>uniunguiculata</i> , Dohrn	+									
<i>biunguiculata</i> , Dohrn	+									
<i>Tanystylum orbiculare</i> , Wilson .....	+	..	+	..	?	..	..	..	..	+
<i>Tragæus communis</i> , Dohrn	+									
<i>Rhynchothorax mediterraneus</i> , O. G. Costa	+									
<i>Eurycyde hispida</i> , Krøyer .....	..	..	..	+	+	+	..	..	+
<i>Barana castelli</i> , Dohrn	+									
<i>arenicola</i> , Dohrn	+									
<i>Ascorhynchus abyssi</i> , G. O. Sars .....	..	..	..	..	..	..	..	+
<i>tridens</i> , Meinert .....	..	..	..	..	..	..	..	+
<i>Sœorhynchus armatus</i> , Wilson .....	..	..	..	..	..	..	..	..	..	+
<i>Colossendeis proboscidea</i> , Sabine .....	..	..	..	+	+	+	+	+	+
<i>angusta</i> , G. O. Sars .....	..	..	..	+	..	..	+	+	+
<i>colossea</i> , Wilson .....	..	..	..	..	..	..	..	+	..	+
<i>clavata</i> , Meinert .....	..	..	..	..	..	..	..	+	..	+
<i>macerrima</i> , Wilson .....	..	..	..	..	..	..	..	+	..	+
<i>minuta</i> , Hoek .....	..	..	..	..	..	..	..	..	..	+
<i>leptorhynchus</i> , Hoek .....	..	+	..	..	..	..	..	..	..	+
<i>gigas</i> , Hoek .....	..	..	..	..	..	..	..	..	..	+
<i>Pycnogonum littorale</i> , Ström .....	..	+	+	+	+	..	..	+	+	+
<i>crassirostre</i> , G. O. Sars .....	..	..	..	+	..	..	..	+
<i>pusillum</i> , Dohrn	+									
<i>nodulosum</i> , Dohrn	+									
<i>Endeis spinosus</i> , Montagu	+	+	+	+						
<i>charabdæus</i> , Dohrn	+									
89	25	13	32	31	26	17	13	30	22	21

As regards the table of distribution (pp. 199, 200) it may be stated that:—

1. The term "British Area" will be found defined in my paper "The British Area in Marine Zoology" (Ann. & Mag. Nat. Hist. ser. 6, vol. v. 1890, p. 345).

2. A separate column has been assigned to the Faroe Channel, because several British Government vessels have dredged there. The Faroe Channel really geographically should fall under column 8. It is separated from the British Area by the "Wyville Thomson Ridge," south of which the water is entirely influenced by the Gulf-Stream, with a bottom temperature at 500 fathoms of 46° Fahr., while in the Faroe Channel the water belongs to the Arctic Ocean, and has a temperature at 500 fathoms at and below freezing-point; for the Gulf-Stream meeting and passing over the Wyville Thomson Ridge affects the upper waters, but has no influence on those at greater depths.

There are some described forms which I am unable to identify, and a list of these is given after the account of the known forms. At the end I give a catalogue of the chief works and papers which relate to the nomenclature of the class.

Order I. EUCHELATA, *G. O. Sars.*

Family 1. PHOXICHILIDIIDÆ, *G. O. Sars.*

Genus 1. PHOXICHILIDIUM, *H. M.-Edwards*, 1846.

PHOXICHILIDIUM FEMORATUM (*J. Rathke*).

Nymphon femoratum, Rathke (*J.*), (46) p. 201, pl. v. fig. H 1-3.

? *Phalangeum aculeatum*, Montagu, (41) p. 101, pl. v. fig. 8.

Orithya coccinea, Johnston, (31) p. 378, pl. xiii. figs. 4-6.

Phoxichilidium globosum, Goodsir, (11) p. 136, pl. iii. fig. 1.

„ *maxillare*, Stimpson, Marine Invert. Grand Manan, p. 37.

„ *coccineum*, Hodge, (21) p. 124, pls. iv. & v. (development).

„ *maxillare*, Wilson, (58) p. 12, pl. iv. figs. 1 a-c; and (57) p. 480, pl. iii. figs. 12-15.

„ *minor*, Wilson, (58) p. 13, pl. iv. figs. 2 a-f.

„ *femoratum*, Hoek, (25) p. 240, pl. x. figs. 8-10; and (28) p. 512, pl. xxvi. figs. 18-21 & pl. xxvii. fig. 1.

„ *femoratum*, Adlerz (*G.*), Bihang till K. Vet.-Akad. Handl. vol. xiii. (1888) p. 17 (separate copy), pl. i. figs. 4, 5, pl. ii. figs. 6-12 (development).

„ *femoratum*, Sars, (51) p. 21, pl. iii. figs. 1 a-g.

The number of spines at the base of the propodos is subject to considerable variation, ranging from two to six; the former number (as figured by Hoek)

may be on adult individuals, though perhaps not fully grown. Full-grown individuals from Seaham (*Hodge*) have four such spines on all the legs, except one specimen, which has only three.

Falmouth; Starcross, Devon; Isle of Cumbrae; Lerwick, Shetland (*A. M. N.*); adult, young, and cysts of *Coryne* with embryo. Seaham, Co. Durham (*G. Hodge*); tide-marks, Vadsö, East Finmark (*A. M. N.*). Casco Bay, N.E. America, as "*P. maxillare*" and also as "*P. minor*" (*Wilson*). *Mus. Nor.*

Other localities are Irish Sea (*Halhed*); both East and West coasts of Ireland (*Carpenter*); whole coast of Norway, and at Florö dredged in 100 fathoms (*Sars*); Denmark (*Hansen*); Greenland (*Kröyer*); Holland and Northern France (*Hoek*); Murman Coast (*Jarzynsky*).

Genus 2. ANAPHIA, *Say*, 1821 = *Anoplodactylus*, *Wilson*, 1878.

1. ANAPHIA PETIOLATA (*Kröyer*).

Phoxichilidium petiolatum, *Kröyer*, (32) p. 123, & (33) pl. xxxviii. figs. 3 a-f.

Pallene attenuata, *Hodge*, (22) p. 281, pl. xv. figs. 1-5, & (22*) p. 463.

„ *pygmæa*, *Hodge*, (23 a) p. 116, pl. xiii. figs. 16, 17, and (23 b) p. 198, pl. v. figs. 16, 17.

Phoxichilidium mutilatum, *Semper*, Arb. aus der Zool.-zoot. Instit. Würzburg, vol. i. p. 271, pl. xvii. figs. 12-16.

„ *longicolle*, *Dohrn*, (9) p. 177, pl. xiii. figs. 1-8.

„ *exiguum*, *Dohrn*, (9) p. 181, pl. xii. figs. 19-22.

„ *pygmæum*, *Hoek*, (28) p. 514, pls. xxvi., xxvii. figs. 22-25.

Anoplodactylus petiolatus, *Sars*, (51) p. 26, pl. ii. figs. 2 a-l.

Phoxichilidium longicolle, *Schimkewitsch*, (52) p. 18.

Anoplodactylus petiolatus, *Norman*, (45) p. 152.

In my paper, "A Month on the Trondhjem Fiord," referred to above, I have given my reason for the opinion that the several forms in the foregoing list should be regarded as synonyms of *A. petiolata*.

a. Typical. Fowey, Cornwall; Plymouth; Isle of Cumbrae; Trondhjem Fiord (*A. M. N.*). Naples as *P. longicolle* (*Dohrn*).

b. As *P. pygmæa* from *Hodge*; Spain (*Pedro Antiga*), Naples (*A. M. N.*, and *Dohrn* as *P. exiguum*). *Mus. Nor.*

Firth of Forth (*D'Arcy Thompson*); exceedingly common round the coast of Ireland (*Carpenter*), Irish Sea (*Halhed*), Northern France and Holland (*Hoek*), Denmark (*Hansen*), Heligoland (*Semper*), Southern Norway and as far north as Tjötö in Nordland (*Sars*); Porto Lagunas (*Schimkewitsch* [52]); Alaska (*Cole*).

2. ANAPHIA VIRESCENS (*Hodge*).

Phoxichilidium virescens, Hodge, (23 a) p. 115, pl. xiii. figs. 13-15; (23 b) p. 197, pl. v. figs. 13-15.

Polperro, Cornwall (cotypes *Hodge*); Starcross, Devon (*C. Parker*); Plymouth (*A. M. N.*). *Mus. Nor.*

St. Malo (*Grube*).

My specimens from Hodge are now pale in colour, but those from Starcross are of a brilliant green. The very smooth joints of all the limbs readily distinguish this species from the following.

3. ANAPHIA ROBUSTA (*Dohrn*).

Phoxichilidium robustum, Dohrn, (9) p. 158, pl. xii. figs. 13-18.

Naples (*Dohrn*). *Mus. Nor.*

This species is distinguished from its allies by its very massive limbs, by the form of the proboscis which has projected angles (*Dohrn*, fig. 15), and by the nodulous processes at the end of the third coxal and of the femoral joints, and the spine-bearing nodule near the extremity of the second tibial joint (*Dohrn*, fig. 13).

4. ANAPHIA ANGULATA (*Dohrn*). (Plate 29. fig. 8.)

Phoxichilidium angulatum, Dohrn, (9) p. 154, pl. xii. figs. 1-12.

Naples (*Dohrn*). *Mus. Nor.*

This species comes very near to *P. virescens*, Hodge, but the examination of a specimen from Naples shows a distinctive character which is not figured by *Dohrn*. On the inner side of base of the claws there is a nodulous process (fig. 8) which is altogether absent in Hodge's species. This nodule has its counterpart in that of the dactylus of the gnathopod of the genus *Amphilochoides* among the amphipodous Crustacea (see Sars, *Crust. Norway*, Amphipoda, pl. lxxv. figs. 2 p 1 and 2 p 2). As *Dohrn's* pl. xii. fig. 7 does not represent the dactylus fully extended this nodulous process is not seen, and it must not be confounded with *Dohrn's* "rudimentaren Nebenkrallen," which is also present.

5. ANAPHIA TYPHLOPS (*G. O. Sars*).

Anoplodactylus typhlops, Sars, (50) no. 6.

„ *typhlops*, Sars, (51) p. 29, pl. ii. figs. 3 a-e.

„ *typhlops*, Carpenter, (6*) p. 5, pl. iii. figs. 12-19.

The type specimen was taken by Sars at Magero, south of the Trondhjem Fiord, Norway, in about 100 fathoms; 77 miles W.N.W. of Achill Head, West Ireland, in 352 fathoms (*Carpenter*).

6. ANAPHIA LENTA (*E. B. Wilson*). (Plate 29. figs. 1-3.)

? *Anaphia pallida*, Say, Journ. Acad. Sci. Phil. vol. ii. 1821, p. 59, pl. v. figs. 7 & 7 a.

Phoxichilidium maxillare, S. I. Smith (*nec* Stimpson), Report Invert. Vineyard Sound in Rep. Commiss. Fish and Fisheries, 1874, p. 544, pl. vii. fig. 35.

Anoplodactylus lentus, Wilson, Amer. Journ. Sci. & Art, vol. xv. 1878, p. 200; (58) p. 14, pl. iv. figs. 3 a-e; (57) p. 482, pl. iii. figs. 16-18.

N.E. America (cotypes *Wilson*). *Mus. Nor.*

Möbius has united this, which is the type species of the genus, with *A. petiolata*. Had he seen the two species it is impossible that he could have done this. *A. lenta* looks to the eye like a large *Nymphon*. One of my specimens has the body and proboscis 6.5 mm. long, and the stretch of the first pair of legs is 60 mm., while Sars gives as measurement of *A. petiolata* "length of body 2 mm., extent 10 mm.," and this may be taken as usual size of the adult. In *A. lenta* the neck is short (fig. 1) and the oculiferous tubercle situated only very little in advance of the base of the proboscis; the tubercle itself is low, the height scarcely exceeding the breadth, and terminates in a little point. The propodal joint of the legs (fig. 3) has at the base four spines, of which the third is the most developed; beyond these the margin is beset with 10-12 curved spines.

7. ANAPHIA OCULATA (*G. H. Carpenter*).

Anoplodactylus oculatus, Carpenter, (6*) p. 4, pl. D, figs. 7-11.

One male taken in 306 fathoms 50 miles off Tearaght, West of Ireland, August 7th, 1903 (*Carpenter*).

Family 2. PALLENIDÆ.

Genus 1. PALLENE, *Johnston*, 1837.1. PALLENE BREVIROSTRIS, *Johnston*.

Pallene brevirostris, Johnston, (31) p. 380, pl. xii. figs. 7-8.

" " Grube, (14) p. 28, pl. i. figs. 5 a-c.

" " Hoek, (25) p. 237, pl. xv. figs. 4-7; and (28) p. 511, pl. xxvi. fig. 17.

" *empusa*, Wilson, (57) p. 476, pl. ii. figs. 5-7; (58) p. 9, pl. iii. figs. 2 a-g.

" *brevirostris*, Hansen, (17*) p. 649.

" *emaciata*, Dohrn, (9) p. 193, pl. xiv. figs. 10-21.

" *brevirostris*, Sars, (51) p. 32, pl. iii. figs. 1 a-h.

Seaham, Co. Durham (*G. Hodge*); Cullercoats, Northumberland, and Plymouth (*A. M. N.*); Noank, Connecticut (cotypes of *P. empusa*, Wilson); Naples (cotype of *P. emaciata*, Dohrn). *Mus. Nor.*

St. Vaast de la Hougue (*Grube*).

I think that there can be no doubt that the three species of Johnston, Wilson, and Dohrn should be united. The number of larger spines at the base of the propodos vary from 3 to 5, and this extent of variation I have found to occur on the different legs of the same specimen, and the length of the neck is also subject to variation.

Other localities are Jersey (*D'Arcy Thompson*); Ballynakill Harbour, West Ireland, 6-8 fathoms, and off Dublin Bay (*Carpenter*); Irish Sea (*Halhed*); Isle of Cumbrae, Scotland (*D. Robertson*); Holland (*Hoek*); Denmark (*Hansen*); south-west of Norway, Stavanger and Tjötö in Nordland (*Sars*).

2. PALLENE PRODUCTA, *G. O. Sars*.

Pallene producta, *G. O. Sars*, (50) no. 3; (51) p. 36, pl. iii. figs. 2 a-d.

„ „ *Carpenter* in Ninth Annual Rep. Liverpool Biol. Comm. 1896, p. 15.

Norway (cotype from *G. O. Sars*). *Mus. Nor.*

Sars procured this species in 60-100 fathoms at Apelvær in the Trondhjem district. *Stebbing* has found it at Millport in the Firth of Clyde, and *Carpenter* has determined a specimen which came from the Isle of Man. This form comes suspiciously near to *P. brevirostris*, but as I have seen only a single specimen I follow *Sars* in keeping it distinct.

3. PALLENE SPECTRUM, *D. Dohrn*.

Pallene spectrum, *Dohrn*, (9) p. 197, pl. xv. figs. 1, 2.

Plymouth (*A. M. N.*); Naples (cotype *Dohrn*). *Mus. Nor.*

I am glad to be able to add this species to the British fauna.

4. PALLENE TIBERII, *A. Dohrn*.

Pallene Tiberii, *Dohrn*, (9) p. 198, pl. xvii. figs. 10, 11.

Naples (cotype *Dohrn*). *Mus. Nor.*

5. PALLENE PHANTOPA, *A. Dohrn*.

Pallene phantopa, *Dohrn*, (9) p. 196, pl. xiv. figs. 1-9.

Naples (cotype *Dohrn*). *Mus. Nor.*

6. PALLENE ACUS, *Meinert*.

Pallene acus, *Meinert*, (37) p. 48, pl. iv. figs. 8-13.

Taken by the 'Ingolf' Expedition in Davis Strait, lat. 63° 06' N., long. 56° W., in 1099 fathoms.

Davis Strait (cotype *Meinert*). *Mus. Nor.*

7. *PALLENE HASTATA*, *Meinert*.

Pallene hastata, Meinert, (37) p. 49, pl. iv. figs. 14-19.

Taken by the 'Ingolf' Expedition in the southern part of Davis Strait, lat. 61° 50' N., long. 56° 21' W., 1435 fathoms.

Davis Strait (cotype *Meinert*). *Mus. Nor.*

The two preceding species approach very closely to each other, and may prove to be one species.

Genus 2. *PALLENOPSIS*, *E. B. Wilson*, 1880.1. *PALLENOPSIS LONGIROSTRIS*, *Wilson*.

Pallenopsis longirostris, Wilson, (59) p. 252, pl. iv. figs. 19-22; pl. v. figs. 24, 25.

One male and one female taken by the 'Blake' Expedition at 39° 40' N., long. 71° 10' W., in 500 fathoms.

2. *PALLENOPSIS TRITONIS*, *Hoek*.

Pallenopsis tritonis, Hoek, (29) p. 7, pl. i. figs. 1-6.

„ *Holti*, Carpenter, (6*) p. 4, pl. i. figs. 1-6.

Taken by the 'Triton,' 1882, in the same dredge with *Cordylochele mal-leolata*, *Nymphon macrum*, and *Chaetonymphon macronyx*, lat. 59° 40' N., long. 7° 21' W., in 516 fathoms, that is within the British warm area just south of the Faroe Channel. The specimen described by Professor Carpenter was dredged 77 miles W.N.W. of Achill Head, north-west of Ireland, in 382 fathoms, in company with *Anaphia typhlops* and *Nymphon leptocheles*. It can scarcely be doubted that these are one species, the former an adult male 8 $\frac{5}{7}$ mm. long and a hind leg 26 mm., the latter a half-grown female 5 mm. long and a leg 15 mm.

3. *PALLENOPSIS PLUMIPES*, *Meinert*.

Pallenopsis plumipes, Meinert, (37) p. 51, pl. iv. figs. 1-7.

The type and only specimen taken by the 'Ingolf' at lat. 61° 32' N., long. 13° 40' W., in 950 fathoms.

Genus 3. *NEOPALLENE*, *A. Dohrn*, 1881.*NEOPALLENE CAMPANELLÆ*, *Dohrn*.

Neopallene campanellæ, Dohrn, (9) p. 200, pl. xv. figs. 11-15.

Naples (cotype *Dohrn*). *Mus. Nor.*

Genus 4. PHOXICHILUS, *Latreille*, 1804, as corrected 1818 = *Pseudopallene*,
Wilson, 1878 ; *nec Phoxichilus auct. plur.*

1. PHOXICHILUS CIRCULARIS (*Goodsir*).

Pallene circularis, *Goodsir*, (11) p. 137, pl. ii. fig. 2, & (13) figs. 9, 10.

„ *intermedia*, *Kröyer*, (32) p. 119 ; (33) pl. xxxvii. figs. 2 a-d.

„ *discoidea*, *Kröyer*, (32) p. 120, and (33) pl. xxxvii. figs. 3 a-g (*juvenis*).

„ *hispidata*, *Stimpson*, *Invert. Grand Manan*, p. 37.

„ *discoidea*, *Wilson*, (58) p. 12, pl. iii. figs. 3 a-c ; and (57) p. 479, pl. ii. fig. 10 (*juvenis*).

„ *hispidata*, *Wilson*, (58) p. 10, pl. iii. figs. 1 a-c (*adultus*), and (57) p. 478, pl. ii. fig. 9.

Pseudopallene intermedia, *Hansen* (18) p. 175, pl. xix. figs. 2, 2 a.

„ *circularis*, *Sars*, (51) p. 38, pl. iii. figs. 3 a, b.

Florö, Norway (*A. M. N.*) ; Greenland, 175 fathoms, ‘*Valorous*’ Expedition. *Mus. Nor.*

Firth of Forth (*Goodsir*) ; West Norway and as far north as Vadsö (*Sars*) ; near Novaya Zemlia (*Hansen*) ; Murman Coast (*Jarzynsky*) ; north of Iceland and Denmark Strait (*Meinert*) ; Greenland (*Kröyer*) ; N.E. America (*Wilson*).

2. PHOXICHILUS SPINIPES (*Fabricius*).

Pycnogonum spinipes, *Fabricius*, *Fauna Grœnlandica*, p. 232.

Pallene spinipes, *Kröyer*, (32) p. 118 ; (33) pl. xxxvii. figs. 1 a-g.

„ „ *Sars*, (51) p. 42, pl. iii. figs. 4 a-g.

Tromsö (*J. S. Schneider*) ; Greenland, lat. 67° 56' N., long. 55° 27' W., in 20 fathoms, ‘*Valorous*,’ 1875. *Mus. Nor.*

Norwegian west coast, at Lofoten, and as far as Vadsö, but rare (*Sars*) ; Murman Coast (*Jarzynsky*) ; Kara Sea (*Sars*) ; Greenland (*Kröyer*) ; Franz Josef Land (*Carpenter*).

Genus 5. CORDYLOCHELE, *G. O. Sars*, 1888.

1. CORDYLOCHELE MALLEOLATA, *G. O. Sars*.

Cordylochele malleolata, *Sars*, (49) no. 48, and (50) no. 11.

Pallene malleolata, *Hoek*, (29) p. 6, pl. i. fig. 7.

Cordylochele malleolata, *G. O. Sars*, (51), p. 45, pl. iv. figs. 1 a-k.

„ „ *Meinert*, (37) p. 50.

Twice taken by the ‘*Porcupine*’ Expedition in 1869, at Station 64, lat. 61° 21' N., long. 3° 44' W., in 640 fathoms, and Station 74, lat. 60° 39' N., long. 3° 9' W., in 203 fathoms; the first of these stations is in the Faroe Channel, the second just within the British Area (*Mus. Nor.*).

Hoek states that four specimens of this species were dredged by H.M.S. LINN. JOURN.—ZOOLOGY, VOL. XXX. 17

'Triton' in 1882 at Station 10, lat. 59° 40' N., long. 7° 21' W., in 516 fathoms; bottom temperature 46°–49° Fahr.; the station is within our area.

Between Finmark and Beeren Island, and on the north-west coast of Spitsbergen in 191–459 fathoms, also in the Kara Sea in 40–50 fathoms (*Sars*); the Greenland Sea, the Denmark Strait, and far up Davis Strait (*Meinert*).

2. *CORDYLOCHELE LONGICOLLIS*, *G. O. Sars*.

Cordylochele longicollis, *Sars*, (50) no. 12, and (51) p. 49, pl. iv. figs. 2 *a-g*.
 „ „ *Meinert*, (37) p. 50.

Lofoten Island (cotype *Sars*). *Mus. Nor.*

Sars only procured it during the North Atlantic Expedition at Lofoten and Selsövig in Nordland, depth 100–120 fathoms; and *Meinert* records it as taken by the 'Ingolf' in the Atlantic south-west of Iceland and in Davis Strait in between 400 and 500 fathoms.

3. *CORDYLOCHELE BREVICOLLIS*, *G. O. Sars*.

Cordylochele brevicollis, *Sars*, (50) no. 13, and (51) p. 51, pl. iv. figs. 1 *a-g*.

Sars has procured this species at Vadsö, and it was brought back by *Nordenskjöld* from the Kara Sea, where it was dredged in 50 fathoms.

Family 3. NYMPHONIDÆ.

Genus 1. NYMPHON, *Fabricius*, 1794.

1. NYMPHON RUBRUM, *Hodge*. (Pl. 29. figs. 4–7.)

Nymphon gracile, *Johnston*, (31) p. 380, pl. xii. figs. 9–12 (nec *Nymphon gracile*, *Leach*).
 „ *rubrum*, *Hodge*, (21) p. 41, pl. x. fig. 1.
 „ *gracile*, *Hoek*, (25) p. 243, pl. xv. figs. 11–13, and (28) p. 498, pl. xxiii. figs. 1–5.
 ? *Nymphon rubrum*, var. *intermedium*, *Schimkewitsch*, (53) p. 40, pl. ii. figs. 1 *a-f*.
Nymphon gracile, *Hansen*, (17*) p. 127, pl. vii. fig. 18.
 „ *rubrum*, *G. O. Sars*, (51) p. 58, pl. v. figs. 2 *a-k*.

This is the species which most recent authors have called *N. gracile*. The figures by *Hoek* of "*N. gracile*" and those of *Sars* of *N. rubrum* fully illustrate this species. The peculiar armature of the propodos is usually, if not always, a most distinctive character. At the base are some spines (commonly four but they range from two to four); these spines (figs. 4, 5) gradually increase in size from the first to the last, beyond the last and at some little distance there is another and smaller spine. This peculiar armature is shown in *Sars*'s figure 2, *i*; and still better in *Hoek*'s (28) pl. xxiii. fig. 5. There is very considerable variation in the proportionate lengths of the tibial, tarsal, and propodal joints.

Var. PERPLEXA (fig. 6). Among normal specimens of *N. rubrum* from St. Andrews given me by Prof. McIntosh, I have found other examples which show great divergence with respect to the tarsus and propodos, yet agree closely among themselves. The tarsus is remarkably short, not exceeding one third the length of the propodos. The propodos (fig. 6) is considerably curved, and has the four basal spines placed as usual but of small size, while the distal separated spine is entirely absent. The association of the very short tarsus with the disappearance of the usual characteristic distal spine of the propodos is very curious; but I do not find other characters to justify a specific separation of the form.

Plymouth, Starcross, Devon; Cullercoats, Northumberland; Isle of Cumbrae; St. Andrews, var. *perplexa*; Oban (*A. M. N.*). Cork (*G. H. Carpenter*). *Mus. Nor.*

Firth of Forth (*D'Arcy Thompson*); Dublin Bay and Dalkey Sound, also off Rockahill, Irish Sea, and Ballynakill Harbour, Galway (*Carpenter*). Holland (*Hoek*). Rare south of Norway (*Sars*).

2. NYMPHON BREVIROSTRE, *Hodge*. (Pl. 29. figs. 9-12.)

Nymphon brevirostre, Hodge, (22) p. 282, pl. xv. figs. 6-11, and *Ann. & Mag. Nat. Hist.* ser. 3, vol. xi. 1863, p. 464.

Nymphon gracile, Sars, (51) p. 55, pl. v. figs. 1 *a-h* (exclusive of all synonyms).

This is the smallest *Nymphon* known to me; length of body scarcely 3 mm.; span of fully outstretched legs 17 mm. The form is very robust for its size both as regards the body and legs, and these are unusually short. The lateral processes of the trunk are equal in length to the breadth of the trunk itself, the intervals between the processes are moderately broad. The cephalic segment (fig. 8) is subequal in length to the united hinder segments, the neck is very short; the frontal portion is much widened at the extremity to receive the chelifori. The caudal segment, when directed backwards, reaches to a little more than half the length of the lateral body-lobes. The oculiferous tubercle is conical and, viewed from the front, has two small points near the summit (just as in Sars, pl. v. fig. 1 *c*). The proboscis is often no longer than its breadth as viewed from above, but in other specimens half as long again, its extremity widely rounded. The chelifori (fig. 10) are robust, the scape three times as long as broad, and the hand of nearly equal length; hand generally carried bent inwards (fig. 9), so that the proboscis reaches beyond it; the finger and thumb are strong and margined with short teeth, the thumb at about half its length is usually suddenly contracted in breadth so as to form a notch, over which hangs a bundle of short setæ. The palpi have the second joint slightly longer than the third, which latter is equal in length to combined length of the two terminal joints, the last of which is longer than the somewhat clavate-shaped

penultimate, and is stout, obtusely rounded at the extremity, and covered with short setæ*.

The false feet have the fourth joint somewhat longer than the fifth, which equals in length the first three joints of the terminal portion; each of the five joints of the terminal portion is shorter than the preceding; the last four of these are furnished with flattened knife-shaped spines with serrated margins, consisting of a pair of larger serræ at the base, followed by six or seven pairs of smaller but distinct serræ; the number of these serrated spines ranges from about ten on the fifth joint to seven on the last joint; the nail is rather more than half the length of the last joint and is beset on the margin with nodular teeth.

The ambulatory legs (fig. 11) have the second coxal joint contracted at the base and widened distally, and it is one and a third times as long as its greatest breadth; the femoral joint (in ♀ greatly swollen) is slightly longer than the preceding portion of the limb; first tibial equal to the femoral; second tibial only slightly longer; tarsus very short, length and breadth usually subequal, bearing a distal strong spine; propodos (fig. 12) three to four times as long as tarsus, very broad and strongly built, arcuate, armed with three to five strong spines of considerable size on the first two-thirds of its length, and spinules on the more distal portion; dactylus strong, scarcely more than one-third the length of the propodos; supplementary claws hardly half its length; the legs bear a few scattered spine-like setæ.

There can, I think, be scarcely a doubt that Sars's *N. gracile* is this species. It is like it in almost every particular; the only points in which there is not absolute agreement with my specimens are that the neck looks rather longer in fig. 1 (but not so in fig. 1 b), and that the propodos is shorter in proportion to the length of the tarsus on the one hand and of the claw on the other.

Starcross and Plymouth, Devon; Oban; St. Andrews (*A. M. N.*); Shetland (*Pearcey*). *Mus. Nor.*

Hodge's type-specimen was taken near the Dogger Bank in 25-30 fathoms. Firth of Clyde (*D. Robertson*). A few specimens have been taken in Norway (*Sars*).

3. NYMPHON MIXTUM, *Kröyer*.

Nymphon mixtum, Kröyer, (32) p. 110, and (33) pl. xxxv. figs. 2 a-f.

„ „ Hansen, (17) p. 128, pl. vii. fig. 19.

„ *grossipes* (*armatum* on plate), Hoek, (26) p. 44, pl. iii. figs. 9-12, and pl. iv. fig. 1.

„ *mixtum*, G. O. Sars, (51) p. 68, pl. vi. figs. 3 a-i.

* It is obvious that Hodge's description and figure of the palpi are erroneous, they do not agree with each other and are both wrong.

Shetland (43); Hardanger and Trondhjem Fiords, Norway (*A. M. N.*); Tromsö (*J. S. Schneider*). *Mus. Nor.*

Denmark (*Hansen*); whole coast of Norway; North of Finmark; south of Jan Mayen; Kara Sea (*Sars*); Spitsbergen and East Greenland (*Bucholz*); coasts of North America and East Greenland (*Lönnberg*).

4. NYMPHON GLACIALE, *Lilljeborg*.

Nymphon glaciale, Lilljeborg, "Bidrag till Norra Rysslands och Norriges fauna," Kongl. Vet.-Akad. Handl. 1850, vol. ii. p. 311.

Nymphon glaciale, G. O. Sars, (50) no. 17, (51) p. 63, pl. vi. figs. 1 *a-g*.

'Valorous,' 1875, Greenland, lat. 67° 56' N., long. 55° 27' W., in 20 fathoms (*Mus. Nor.*).

Russian Lapland (*Lilljeborg*); Kara Sea, 3-12 fathoms (*Sars*).

5. NYMPHON BREVITARSE, *Kröyer*.

Nymphon brevitarse, Kröyer, (32) p. 155, (33) pl. xxxvi. figs. 4 *a-f*.

" " G. O. Sars, (51) p. 61, pl. vi. figs. 3 *a-g*.

" " Meinert, (37) p. 37.

Wilson synonymized this *Nymphon* of Kröyer with *N. grossipes*, regarding it as the young of that species; but Sars and Meinert both regard it as a distinct form.

Greenland (*Kröyer*); Matotschkin Skarr in 10-15 fathoms (*Sars*); between Greenland and Iceland, 752 fathoms (*Meinert*); Spitsbergen (*Möbius*); Franz Josef Land (*Carpenter*).

6. NYMPHON GROSSIPES (*Fabricius*).

Nymphon grossipes, Fabricius, Fauna Grœnlandica, p. 229.

" *Johnstoni*, Goodsir, (11) p. 138, pl. iii.* fig. 5, and (13) p. 3, pl. i. figs. 14, 15.

" *grossipes*, Kröyer, (32) p. 108, and (33) pl. xxxvi. figs. 1 *a-h*.

" " Wilson, (58) p. 20, pl. vii. figs. 1 *a-q*, and (57) p. 491, pl. vi. figs. 32-37, pl. vii. fig. 42.

" " Hoek, (27) p. 12, pl. i. figs. 17-21.

" " Hansen, (18) p. 170, pl. xviii. figs. 8, 8 *a*.

" " G. O. Sars, (51) p. 65, pl. vi. figs. 2 *a-i*.

It cannot be considered certain that Fabricius's description was drawn up from this species rather than *C. mixtum*. Johnston described the species two years before Kröyer, and his type preserved in the British Museum is unquestionably the present species. Meinert unites *P. mixtum* with this species; and in examining a large number of specimens I find that *N. grossipes* is subject to very considerable variation, so much so as to make me doubt whether *N. mixtum* and *N. glaciale* are really specifically distinct

* The figures in the description of Plate iii. are wrongly numbered, and are corrected (at any rate partially) by Goodsir in his subsequent paper (13).

from it. Hansen and Meinert regard *N. mixtum* as a form of this species, and Möbius (40) not only synonymizes these two Nymphons with *N. grossipes*, but also *N. gracile*, Leach, *N. rubrum*, Hodge, and *N. piliferum*, Carpenter!

Off Northumberland (*A. M. N.*); off Durham coast (*G. Hodge*); Firth of Forth (*Dr. Henderson*); Faroe Channel in several dredges down to 632 fathoms ('*Porcupine*,' 1869); Greenland (*A. Hancock*); Eastport, N.E. America (*Wilson*). *Mus. Nor.*

Hoek records the species as having been taken by the 'Knight Errant' in the cold area of the Faroe Channel; and by the 'Triton' in both the Faroe Channel and the warm area south of the Wyville Thomson Ridge. This has generally been regarded as an Arctic form, and Sars has not found it south of the Arctic Circle on the Norwegian coast; its not unfrequent occurrence therefore on our eastern coast from the Firth of Forth to the coast of Durham is of considerable interest. Orkney and Moray Firth (*D'Arcy Thompson*). Off Lofoten and Tromsö; north-west coast of Spitsbergen; Matotschkin Skarr in 2-743 fathoms (*Sars*). Greenland (*Kröyer*); Barents Sea (*Hoek*); Kara Sea (*Hansen*); Denmark Strait and between Iceland and Greenland (*Meinert*). N.E. coast of America, and reaching as far south as lat. 41° 32' N., long. 65° 55' W., where it was taken in 524 fathoms by the 'Blake' Expedition (*Wilson*).

7. NYMPHON MICRORHYNCHUM, *G. O. Sars*.

Nymphon longitarse, Hansen, (18) p. 169, pl. xviii. figs. 7 a-c (*nec Kröyer*).

„ *microrhynchum*, Sars, (50) no. 20.

„ „ Sars, (51) p. 73, pl. vii. figs. 1 a-g.

Kara Sea (*Hansen and Sars*).

8. NYMPHON PILIFERUM, *G. H. Carpenter*.

Nymphon piliferum, Carpenter, (4) p. 628, pl. xlvi. figs. 1-13.

Franz Josef Land, brought home by Mr. W. S. Bruce (*G. H. Carpenter*).

9. NYMPHON LONGITARSE, *Kröyer*.

Nymphon longitarse, Kröyer, (32) p. 112, (33) pl. xxxvi. figs. 2 a-f.

„ „ Wilson, (58) p. 19, pl. vii. figs. 2 a-h, and (57) p. 489, pl. vi. figs. 30, 31.

„ „ Hoek, (27) p. 15, pl. i. figs. 22, 23.

„ „ G. O. Sars, (51) p. 75, pl. viii. figs. 3 a-h.

Vadsö, East Finmark (*A. M. N.*); off Salem, Massachusetts Bay (*Wilson*). *Mus. Nor.*

Coast of Durham (*Hodge*). N.E. America, Greenland, Spitsbergen, Kara Sea, Barents Sea, whole coast of Norway (*Wilson, Kröyer, Hoek, Sars*);

south of Faroe Channel, *i. e.* in British area (*Hoek*) ; Franz Josef Land (*Carpenter*) ; Baffins Bay and Frederikshaab (*Meinert*).

10. NYMPHON SLUITERI, *Hoek*.

Nymphon sluiteri, *Hoek*, (27) p. 18, pl. ii. figs. 30-34.

„ „ Hansen, (18) p. 166, pl. xviii. figs. 5 *a, b*.

„ „ G. O. Sars, (51) p. 78, pl. vii. figs. 2 *a-g*.

Kara Sea (*Copenhagen Museum*). *Mus. Nor.*

This species has been added to the British fauna by H.M.S. 'Triton' in 1882, under Sir John Murray (lat. 59° 13' N., long. 7° 13' W.), at a depth of 555 fathoms (*Hoek*). Between Finmark and Beeren Island, 191 fathoms ; Kara Sea, 20-60 fathoms (*Sars*) ; Barents Sea, 292 fathoms (*Hoek*) ; Franz Josef Land, 237 fathoms (*Carpenter*) ; between Faroe Islands and Jan Mayen, 700-1444 met. (*Meinert*) ; König Karls Land (*Möbius*).

11. NYMPHON GRÆNLANDICUM, *Meinert*.

Nymphon grænlandicum, *Meinert*, (37) p. 41, pl. iii. figs. 14-22.

Davis Strait, lat. 60° 54' N., long. 55° 10' W., in 393 fathoms. Co-type taken by 'Ingolf' Exped. (*Copenhagen Museum*). *Mus. Nor.*

Nymphon grænlandicum is scarcely distinguishable from *N. leptocheles*. Indeed, Herr Meinert's description and figures in all ways seem to accord with that species except the following sentence respecting the ambulatory legs : "tarsal joints together distinctly longer than half the second tibial joint ; the second tarsal joint much longer than the first one." As regards the first part of this sentence, in the two specimens examined by me I find the author's words to apply to some of the legs but not to others, and in *N. leptocheles* there is also considerable variation in the proportionate length of the two ultimate joints to the second tibial. As regards the second part of the sentence it is obviously a *lapsus pennæ*, since it is at variance with the illustration given (fig. 22) and with the specimens ; and for "longer" should be read "shorter."

The specimens of *N. grænlandicum* differ from the usual *N. leptocheles* in the much more setose ambulatory legs, more especially the tibial joints, on which the setæ are numerous and longer than the breadth of the joint itself.

12. NYMPHON LEPTOCHELES, *G. O. Sars*.

Nymphon leptocheles, *G. O. Sars*, (50) p. 348, and (51) p. 78, pl. viii. figs. 1 *a-i*.

„ „ Norman, (45) p. 153.

„ „ Meinert, (37) p. 48.

I have dredged this species in the following places off the Norwegian coast :—Kors Fiord, near Bergen, 1878 ; Hardanger Fiord, off the southern portion of Huglin Island, in 100 fathoms, 1879 ; Christiania Fiord, 30-100

fathoms; Florö, 1882, in 45–70 fathoms; Rödberg, Trondhjem Fiord, 150–250 fathoms, 1893. It was also procured by the 'Porcupine,' 1869, lat. 59° 34' W., long. 70° 18' W., in 542 fathoms, a station within the British Area. *Mus. Nor.*

Off Achill Head, Co. Mayo, Ireland, in 382 fathoms (*Carpenter*); Davis Strait and near Iceland, in 362–600 fathoms (*Meinert*); entire west coast of Norway, in 50–191 fathoms (*Sars*).

13. NYMPHON STRÖMII, *Kröyer*.

Nymphon Strömii, Kröyer, (32) p. 111, and (33) pl. xxxv. figs. 3 a–f.

„ „ Wilson, (58) p. 17, pl. i. figs. 2 a, b, and pl. vi. figs. 1 a–h; and (57) p. 485, pl. v. and pl. vi. fig. 29.

„ „ Adlerz (G.), Bihang till K. Vet.-Akad. Handl. vol. xiii. (1888) p. 1 (separate copy), pl. i. figs. 1–3.

„ „ G. O. Sars, (51) p. 80, pl. viii. figs. 2 a–k.

Near Holy Island, Northumberland (*G. Hodge*); Shetland* (*A. M. N.*); N.N.E. of Shetland, in 267 fathoms ('*Porcupine*,' 1869); Bergen, Hardanger and Trondhjem Fiords, Norway (*A. M. N.*); off Salem, Massachusetts (*Wilson*). *Mus. Nor.*

Phalangium marinum, Ström, and *Nymphon grossipes*, Abildgaard ('*Fauna Norvegica*,' pl. cxix., but not *Pycnogonum grossipes*, Fabricius) would seem to be this species.

I find *Nymphon Strömii* to vary so greatly in the proportionate lengths of its several parts that I cannot but think that Hoek and others who would unite the following species with the present have much to justify the view which they take.

N.E. America (*Wilson*); south and west coasts of Norway as far as Lofoten Islands in 10–50 fathoms (*Sars*); Faroe Channel (*Hoek*); Sumburgh Head (*D'Arcy Thompson*).

14. NYMPHON GIGANTEUM, *Goodsir*.

Nymphon giganteum, Goodsir, "Description of a New Species of *Nymphon*," Hist. Berwickshire Naturalists' Club, 1844, p. 114, pl. iii., and Ann. & Mag. Nat. Hist. vol. xv. p. 293.

Nymphon gracilipes, Heller, (20) p. 16, pl. iv. fig. 15, pl. v. figs. 1, 2.

„ *Strömii*, Hoek, (27) p. 9, pl. i. figs. 7–16 (partim).

„ „ Hansen, (18) p. 163, pl. xviii. fig. 3.

„ *gracilipes*, G. O. Sars, (51) p. 83, pl. viii. figs. 3 a–g.

Nymphon giganteum of Goodsir is, I think, clearly the *N. gracilipes* of Heller. Goodsir's type-specimen was obtained off Embleton, on the Northumberland coast, and G. Hodge recorded it in 1863 and 1865 from

* I took it and recorded it from Shetland (43) in 1861 in 80 fathoms; but the specimen has been destroyed.

the same coast, and one of these specimens was given to me by him. In the British Museum is a very fine specimen dredged by Mr. George Barlee off Lerwick, Shetland, and it has been subsequently procured by myself (43) and by the 'Porcupine' Expedition in the Shetland Sea.

Off Holy Isle, Northumberland (*G. Hodge*); N.E. of Shetland, lat. $61^{\circ} 15'$ N., long. $1^{\circ} 44'$ W., 267 fathoms ('*Porcupine*,' 1869, Stat. 66); Hardanger Fiord, Norway, 150–180 fathoms (*A. M. N.*). *Mus. Nor.*

East Finmark, Spitsbergen, Jan Mayen, Kara Sea, 10–459 fathoms (*Sars*); Grinnell Land (*Miers*); Franz Josef Land (*Heller*); Barents Sea and Faroe Channel (*Hoek*); East Greenland (*Lönnberg*).

I am inclined to agree with those writers who would unite the last species and this. If that is done the name given by Goodsir has precedence over *N. Strömii*, Kröyer, see *Hoek* (27) p. 9, *Meinert*, &c.

15. NYMPHON ELEGANS, *Hansen*.

Nymphon gracilipes, G. O. Sars, (48) p. 365 (*fide* Sars's name only).

„ *elegans*, Hansen, (18) p. 165, pl. xviii. figs. 4 *a-d*.

„ „ G. O. Sars, (51) p. 86, pl. ix. figs. 1 *a-g*.

„ „ Carpenter, (4) p. 631.

„ „ Meinert, (39) p. 42.

'*Porcupine*,' 1869, Stat. 57, lat. $60^{\circ} 5'$ N., long. $6^{\circ} 17'$ W., in 632 fathoms; '*Triton*,' 1882, Stat. 9, lat. $6^{\circ} 5'$ N., long. $6^{\circ} 21'$ W., 608 fathoms; these stations are both in the cold area of the Faroe Channel, and therefore not British (*Mus. Nor.*).

Greenland Sea, 118 fathoms (*Hansen*); near Iceland, off Nordland and Lofoten in Norway, Bear Island, Spitsbergen, and Kara Sea, in 40–743 fathoms (*Sars*); East Greenland (*Lönnberg*); Franz Josef Land (*Carpenter*); Denmark Strait (*Meinert*).

16. NYMPHON MACRUM, *Wilson*.

Nymphon macrum, Wilson, (57) p. 487, pl. iv. figs. 21–23.

„ *brevicollum*, Hoek, (26) p. 45, pl. iii. figs. 13–15, pl. xv. figs. 12, 13.

„ *macrum*, Hoek, (29) p. 4.

„ „ G. O. Sars, (51) p. 89, pl. ix. figs. 2 *a-g*.

„ „ Norman, (45) p. 154.

„ „ Meinert, (37) p. 43.

Gulf of Maine, N.E. America, 110 fathoms (*Wilson*); among Alcyonarians and Corals on the precipices at Rödberg in the Trondhjem Fiord, in 150–250 fathoms (*A. M. N.*); '*Triton*,' 1882, Stat. 11, lat. $59^{\circ} 39'$ N., long. $7^{\circ} 13'$ W., in 555 fathoms. *Mus. Nor.*

The '*Triton*' dredging referred to is within the British Area, and *Hoek* (29) p. 4, records four specimens from another '*Triton*' Station, no. 10, which is also in the warm area and within the boundary of our fauna.

N.E. America, as above, in 85–115 fathoms (*Wilson* and *Hoek*); off west coast of Norway and eastwards as far as Vardö, in 40–191 fathoms (*Sars*); Davis Strait and Denmark Strait, in 315–582 fathoms (*Meinert*); Newfoundland (*Topsent*).

17. NYMPHON STENOCHAIR, sp. n. (Pl. 30. figs. 1–9.)

Body slender (fig. 1), smooth, lateral processes widely separated, longer than the trunk is broad. Cephalic segment subequal in length to the three posterior segments, neck not slender, widening in front, where the segment is moderately broad; caudal segment scarcely as long as the lateral processes. Oculiferous tubercle (fig. 2) low, truncate above, the angles slightly projecting. Proboscis long, narrow, distally rounded, nearly equal in length to the cephalic segment. Chelifori (figs. 4, 5) slender, with a remarkably slender hand; hand not much shorter than the scape; palm of nearly the same breadth throughout, more than twice as long as the very small and delicate fingers, which are gently bent. Palpi (fig. 3) slender, second and third joints subequal, and the terminal rather longer than the penultimate. False legs (fig. 8) greatly produced, much longer than the body; spines (fig. 9) somewhat elongated, with marginal teeth small and subequal. Ambulatory legs extremely slender, very smooth, with only scattered minute spinules, except at termination of tarsus; length of fore leg 21.5 mm., made up as follows: three coxal joints combined 2.5 mm.; femoral and first tibial each 5 mm., second tibial 7 mm.; tarsal and propodal (fig. 6) each 1 mm.; propodos (fig. 7) six times as long as broad, bearing on basal half four or five spines, each of which is larger than the preceding, beyond this the palm bears numerous spines of small size; the claw is slender, but more than half as long as the palm, the secondary claws are quite rudimentary, not larger in size than the spines at the end of the propodos. Length of body 4.75 mm., of proboscis 1.5 mm.

This is a strongly characterized species, and taking jointly into consideration the characters of chelifori, spines of false legs, and the propodos of ambulatory legs, with the very minute auxiliary claws, it is difficult to say what described form is its nearest ally.

A single specimen was taken by the 'Porcupine,' 1869, in the Faroe Channel, Stat. 64, lat. 61° 21' N., long. 3° 44' W., in 640 fathoms.

18. NYMPHON SARSII, *Meinert*.

Nymphon Sarsii, *Meinert*, (57) p. 38, pl. iii. figs. 1–6.

A single specimen only known, taken by the 'Ingolf' Expedition between the Faroe Isles and Iceland, lat. 63° 4' N., long. 9° 22' W., in 262 fathoms (*Meinert*).

19. NYMPHON HOEKII, *Meinert*.

Nymphon Hoekii, Meinert, (57) p. 39, pl. iii. figs. 7-13.

Two specimens taken in the middle of the Denmark Strait, lat. 65° 14' W., long. 30° 39' W., in 752 fathoms (*Meinert*).

20. NYMPHON MICRONYX, *G. O. Sars*.

Nymphon micronyx, Sars, (51) p. 91, pl. xi. figs. 3 a-g.

The types, and as yet only known specimens of this species, were taken by Nordenskjöld's Expedition of 1875-6 in the Matotschin-Skarr Strait, in 2-15 fathoms (*Sars*).

21. NYMPHON LONGIMANUM, *G. O. Sars*.

Nymphon longimanum, Sars, (50) no. 29.

„ „ Sars, (51) p. 93, pl. x. figs. 1 a-f.

„ „ Lönnberg, (34*) p. 356.

Kara Sea, 60 fathoms (*Sars*) ; East Greenland, 1-10 metres (*Lönnberg*).

22. NYMPHON GRACILE, *Leach*.

Nymphon gracile, Leach, (35) p. 45, pl. xix. fig. 1, ♂.

„ *femoratum*, Leach, (35) p. 45, pl. xix. fig. 2, ♀.

? *Nymphon gracile*, H. Milne-Edwards, Hist. Nat. Crust. vol. iii. p. 533, pl. xli. fig. 7.

Nymphon gallicum, Hoek, (28) p. 501, pl. xxiii. figs. 6-9, and pl. xxx. fig. 41.

I have examined the type-specimens of the two species of Leach in the British Museum. They are the male and female of the same species which was subsequently named by Hoek *N. gallicum*. The figures of the latter author are very good. It is a shore and shallow-water form, and is a much larger species than *N. rubrum*, and belongs to an entirely different section of the genus, characterized by the longer and more slender chelæ of the *N. Strömii* allies. This is the species which was understood by Mr. Hodge and myself to be *N. gracile* forty years ago, at the time when Mr. Hodge described his *Nymphon rubrum*.

Herm (as *N. gracile*, 1861, *Hodge*) ; St. Clement's Bay, Jersey, 1865, Plymouth and Starcross, Devon (*A. M. N.*) ; Co. Kerry and Bantry, Ireland (*G. H. Carpenter*). *Mus. Nor.*

It will be seen that I have now in my collection a specimen from Herm, given me by Mr. Hodge forty-one years ago under the name *Nymphon gracile*. It was in 1865 that he described his *Nymphon rubrum*. Hoek mistook the species, and subsequent writers have generally adopted his mistaken views.

Irish Sea (*Halhed*). Professor G. H. Carpenter (2 & 6*) records it from many places on the West Coast of Ireland ; Hoek from Roscoff and Ile Verte, Brittany, and Schimkewitsck (52) from Cap de las Vergines, 'Vettor Pisani' ; Hansen from Denmark.

23. NYMPHON SERRATUM, *G. O. Sars.*

- Nymphon serratum*, Sars, (49) p. 471, (51) p. 95, pl. x. figs. 2 *a-h*.
 „ „ Hoek, (27) p. 16, pl. i. figs. 24-28, pl. ii. fig. 29.
 „ „ Hansen, (18) p. 161, pl. xviii. figs. 2 *a-c*.
 „ „ Meinert, (37) p. 37.

‘Valorous,’ Expedition off Disco, Greenland, 175 fathoms (*Mus. Nor.*).

Barents Sea (*Hoek*); Kara Sea and Davis Strait (*Hansen*); between Beeren Island and Spitsbergen in 146-180 fathoms (*Sars*); Spitsbergen (*Möbius*); Denmark Strait, 204-267 fathoms (*Meinert*).

24. NYMPHON MEGALOPS, *G. O. Sars.*

- Nymphon megalops*, Sars, (48) p. 366, (51) p. 98, pl. x. figs. 3 *a-g*.
 „ „ Meinert, (37) p. 37.

A cotype from the Norwegian North Atlantic Expedition received from Professor Sars (*Mus. Nor.*).

N.W. of Finmark and S.W. of Spitsbergen, 299-743 fathoms, near Iceland; Greenland Sea (*Sars*); Denmark Strait (*Meinert*).

25. NYMPHON PARASITICUM, *Martens.*

- Nymphon parasiticum*, Martens (Hugo), Mitt. Zool. Stat. Neapel, vol. xviii. 1906, p. 136, pl. vii. figs. 1-6.

This is merely the parasitic stage of a species in *Tethys leporina*; the adult is not yet known.

Genus 2. CHÆTONYMPHON, *G. O. Sars*, 1888.1. CHÆTONYMPHON HIRTUM (*Fab.?*) (*Kröyer*).

- ? *Nymphon hirtum*, O. Fabricius, Entom. systemat. vol. iv. p. 417.
Nymphon spinosum, Goodsir, (11) p. 139, pl. iii. fig. 3, and (13) p. 3, pl. i. figs. 17, 18.
 „ *hirtum*, Kröyer, (33) pl. xxxvi. figs. 3 *a-g*.
 „ *pallenoides*, Sars, (49) p. 470.
 „ „ Wilson, (59) p. 254, pl. iii. fig. 14.
 „ *hirtum*, Hansen, (18) p. 161 note.
Chætonymphon hirtum, Sars, (51) p. 101, pl. xi. figs. 1 *a-g*.
 „ „ Norman, (45) p. 154.
 „ „ Hoek, (29*) p. 297, pl. iii. figs. 14-19.

In the paper just mentioned Hoek in 1898 records the occurrence of *C. hirtum* off Margate, and regards the fact of its living there as something wholly unexpected; but although the species had not been observed so far south as this, yet the eastern coast of England would appear to be the district in which it occurs most frequently. In 1894 in my paper on the fauna of the Trondhjem Fiord (45. p. 154) there will be found a list of the localities in which *C. hirtum* had been met with on the British coast, and I

expressed the opinion that *Nymphon spinosum* of Goodsir was this species, and not that to which Sars had referred it, inasmuch as the only *Chætonymphon* of which there is any record of occurrence on our east coast is *C. hirtum*, and that in my collection I had this species from the Firth of Forth, whence Goodsir procured the species which he named. *C. hirtum* was recorded as living on the British coasts between thirty and forty years ago both by the late Mr. George Hodge (22. p. 28 & 24. p. 41) and by myself (43. p. 301), on the east coast of England and at Shetland.

Specimens are at the present time in my possession from Shetland (43) and Cullercoats, Northumberland (*A. M. N.*), off Ryhope, Co. Durham (*G. Hodge*), Firth of Forth (*Dr. Henderson*), Aberdeenshire (*R. Dawson*). *Mus. Nor.*

Montrose, East Haven (*D'Arcy Thompson*) ; Irish Sea (*Carpenter*) ; Norway in 80–90 fathoms (*Sars*) ; Iceland (*Kröyer*).

2. CHÆTONYMPHON HIRTIPES (*T. Bell*).

Nymphon hirtipes, Bell, Last of the Arctic Voyages—Crustacea, p. 403, pl. xxxv. fig. 3.

„ „ Wilson, (58) p. 22, pl. v. figs. 2, 3 ; pl. vi. figs. 2 a–b.

„ *hirtum*, Wilson, (57) p. 495, pl. vii. figs. 38–41.

„ *hirtipes*, Hansen, (18) p. 159.

„ „ Hoek, (27) p. 6, pl. i. figs. 1–8.

Chætonymphon hirtipes, Sars, (51) p. 103, pl. xi. figs. 2 a–k.

Nymphon spinosum, Meinert (nec Goodsir), (37) p. 44.

Off Halifax, Nova Scotia, (*Wilson*) ; Bog Fiord, 100–120 fathoms, and Varanger Fiord, 125 fathoms, both in East Finmark (*A. M. N.*) ; off Disco, Greenland, 175 fathoms ('*Valorous*' Expedition, 1875). '*Porcupine*' Exped. 1869, Stats. 64, 65, 78, 88, in from 290 to 705 fathoms : of these the first station was in the Faroe Channel, the second and third were just on the border of the British Area, while the last in lat. 59° 26' N., long 8° 23' W., makes the species a member of our fauna. *Mus. Nor.*

Arctic Norway, Jan Mayen, Kara Sea, 50–100 fathoms, Spitsbergen, Iceland (*Sars*) ; Siberian and Polar Sea (*Stuxberg*) ; Novaya Zemlia (*Hansen*) ; Franz Josef Land (*Carpenter*) ; White Sea, Murman Coast, and Karl Konigs Land (*Möbius*) ; East Greenland (*Lönnberg*) ; Greenland (*Miers & Rodger*) ; N.E. America (*Bell & Wilson*).

3. CHÆTONYMPHON SPINOSISSIMUM, *Norman*.

Chætonymphon spinosum, Sars (nec Goodsir), (51) p. 107, pl. xi. figs. 3 a–i.

„ *spinosissimum*, Norman, (45) p. 154.

Meinert (37) and Möbius have united this species with the foregoing. I cannot acquiesce in that view ; and indeed Meinert's own statement hardly agrees with his conclusion. He says that he has had the opportunity of examining a very large number of specimens, and he writes respecting them :

"The species is somewhat variable; but I find no sufficient reason to divide the forms belonging hither into two species, as has been done by Sars, even if I have to acknowledge that most of the specimens found and examined can tolerably well or decidedly be said to belong either to the *N. spinosum* of Sars or to his *N. hirtipes*, as these species are diagnosticated and described in his last large and excellent work."

Hardanger and Trondhjem Fiords, Norway, in 120–190 fathoms (*A. M. N.*). N.E. America, lat. $44^{\circ} 35'$ N., long. $57^{\circ} 13'$ W., 150 fathoms (*U.S. Nat. Mus.*). 'Porcupine,' 1869, Stat. 78°, lat. $60^{\circ} 14'$ N., long. $4^{\circ} 30'$ N., 290 fathoms, and Stat. 88, lat. $59^{\circ} 26'$ N., long. $8^{\circ} 23'$ W., in 705 fathoms. It is therefore to be added to the British fauna. *Mus. Nor.*

Norwegian coast from Stavanger to Tjötö in Nordland (*Sars*).

4. CHÆTONYMPHON TENELLUM, *G. O. Sars*.

Chætonymphon tenellum, Sars, (50) p. 353; and (51) p. 169, pl. xii. figs. 1 *a-h*.
Nymphon tenellum, Meinert, (37) p. 45.

'Porcupine' 1869, Stat. 51, lat. $60^{\circ} 5'$ N., long. $80^{\circ} 14'$ W., in 440 fathoms. *Mus. Nor.*

The station referred to is only $0^{\circ} 5'$ northward of the British Area, and as, moreover, it is situated in the warm water south of the Faroe Channel, there can be little doubt that the species may be added to our fauna*.

Two specimens dredged in the sea west of Finmark in 620 fathoms (*Sars*); south of Davis Strait in 420–600 fathoms (*Meinert*).

5. CHÆTONYMPHON MACRONYX, *G. O. Sars*.

Nymphon macronyx, Sars, (48) p. 365.
" " Hoek, (26) p. 95, pl. xv. figs. 1–7.
" " Hansen, (18) p. 167, pl. xviii. figs. 6 *a-c*.
Chætonymphon macronyx, Sars, (51) p. 111, pl. xii. figs. 2 *a-k*.
Nymphon macronyx, Meinert, (37) p. 43.

'Triton' Expedition 1882, lat. $60^{\circ} 5'$ N., long. $6^{\circ} 21'$ W., 608 fathoms, and $59^{\circ} 30'$ N., long. $7^{\circ} 13'$ W., in 555 fathoms (*Mus. Nor.*).

This last locality is in the warm area, bottom temperature $45^{\circ} \cdot 5$ Fahr.; and within the limits of our seas. I have five specimens received from Sir John Murray as from this locality, and they have a different aspect from those taken at Stat. 9, being paler in colour and much more transparent. This is worthy of notice because Hoek, having seen only a single specimen of each of the two species *Chætonymphon macronyx* and *Boreonymphon robustum* from the warm area, with wise caution thought the evidence insufficient to prove

* In a 'Catalogue of Crustacea and Pycnogonida of University College, Dundee,' by Professor D'Arcy Thompson, C.B., after *Chætonymphon tenellum* is given as a locality "Ireland." On enquiry, Prof. Thompson informs me that "Ireland" is a misprint for "Iceland."

that they really lived south of the cold depths of the Faroe Channel. He wrote (29. p. 1) :—“*Nymphon macronyx*, G. O. Sars is represented by hundreds of specimens from the cold area and by one specimen only from the warm area; and this is also the case with *Nymphon robustum*, Bell. Of both species the number of specimens collected at stations in the cold area was so large, that the occurrence of one specimen at a station in the warm area seems rather unimportant—it must be considered as a specimen which has got astray; but whether this happened before or after its being dredged I cannot say with certainty. As in both cases the station in the warm area from which the single specimen was obtained follows one in the cold area from which several hundred specimens of the one and upwards of fifty of the other species were collected, it is even probable that the same fishing apparatus (trawl) being used—one specimen was overlooked, either remaining between the meshes of the trawl, or clinging to the rope. The nature of the animals with their long and numerous legs, each furnished with a claw, favours this suggestion.”

Hoek's caution is greatly to be commended; and I should not have had much hesitation in applying it to even the four examples from the warm area in my collection, if it had not been that they were distinctly different from those in the cold area in their paler colour and much greater transparency.

A male from the cold area is curiously abnormal, the ocular tubercle is altogether absent, not a vestige of it can be seen.

Off the northern portion of the Norwegian coast, off Spitsbergen and in the Kara Sea (*Sars*); Faroe Channel (*Hoek*); Jan Mayen (*Meinert*); East Greenland (*Lönnberg*); Davis Strait (*Rodger*); Franz Josef Land (*Carpenter*).

Genus 3. BOREONYMPHON, *G. O. Sars*, 1888.

BOREONYMPHON ROBUSTUM (*T. Bell*).

Nymphon robustum, T. Bell, Belcher's 'Last of the Arctic Voyages,' vol. ii. p. 409, pl. xxxv. fig. 4.

Nymphon abyssorum, Norman, (44) p. 129, woodcut.

„ *hians*, Heller, (20) p. 17, pl. v. figs. 3-6 (separate copy).

„ *robustum*, G. O. Sars, (48) p. 365.

„ „ Hoek, (27) p. 20, pl. ii. figs. 35-40.

„ „ Hansen, (18) p. 158, pl. xviii. fig. 1.

„ „ Hoek, (29) p. 3.

Boreonymphon robustum, Sars, (51) p. 115, pl. xii. figs. 3 a-d.

„ „ Norman, (45 *) p. 167.

'Porcupine,' taken at Stations 52, 55, 57, 59, 61, 64, 65, the whole of which were in the Faroe Channel; and as it was not taken by the 'Porcupine' anywhere south of the Wyville-Thomson Ridge, additional weight is given to the suggestion of Hoek (see under *Chaetonymphon macronyx*) that the single specimen said to have been procured by the 'Triton' in the warm area was by error assigned to that locality. I may say that Stat. 65 is exactly on the

border-line of the British area as regarded by myself, but the bottom temperature being only 30° Fahr. at a depth of 345 fathoms, it more properly belongs to the cold area. 'Triton,' Stat. 9, Faroe Channel, 608 fathoms; Varanger Fiord, East Finmark, in 125 fathoms (*A. M. N.*). *Mus. Nor.*

Wellington Channel (*Bell*); Kara Sea; N.W. of Spitsbergen; near Iceland, 260-649 fathoms (*Sars*); Barents Sea (*Hoek*); Franz Josef Land (*Heller*); König Karls Land (*Möbius*); Denmark Strait (*Meinert*); East Greenland (*Lönnerberg*); West Greenland (*Rodger*).

Genus 4. PARANYMPHON, *Caullery*, 1896.

Caullery, (7) p. 363, and *Meinert*, (37) p. 46.

The only character which *Caullery* gave for his new genus was that the palpi were composed of six joints. *Meinert* has already shown that the statement was not correct, for they are really composed of seven joints. Other characters were added by this latter author, namely, that the processes of the trunk are very long; the chelæ bent backwards, with few and weak teeth; the ovigerous legs eight-jointed and furnished with claws: and the ambulatory legs without auxiliary claws.

PARANYMPHON SPINOSUM, *Caullery*. (Pl. 30. figs. 10-14.)

Paranymphton spinosum, *Caullery*, (7) p. 361, pl. xii. figs. 1-6.

„ „ *Meinert*, (37) p. 46, pl. iv. figs. 20-28.

The description of *Caullery* was very brief. *Meinert* has extended it. The following note will add some particulars.

The body is moderately robust, with unusually long lateral processes; these processes are distally furnished with a remarkable long fleshy lobe, which is beset with minute tubercles; these lobes are so long that if extended along the limb they reach the middle of the second coxal joint (fig. 10). The oculiferous tubercle is in the form of a greatly produced cone, the height of which is equal to the length from its own base to the end of the proboscis; no vestige of eyes is to be seen. The abdomen, like the oculiferous tubercles, is pyramidal in form and carried directly upwards; it is of remarkable length, equalling in fact that of the rest of the body exclusive of the proboscis (fig. 10). The proboscis is short and broad, the width at the base being sub-equal to its length, it does not reach the end of the scape of the chelifori. The chelifori (fig. 13) have the hand much shorter than the scape; the palm not longer than broad, the chela is gaping; the movable finger longer than the thumb, the former with some teeth mostly at the base, the latter with teeth most developed in the middle portion; the extremities of both acute. The palpi are seven-jointed, the distal joints are represented in *Meinert's* fig. 24. The false legs consist of nine joints (counting the terminal nail as one); and *Meinert's* fig. 26 fairly represents the distal portion; there is an entire

absence of the serrated flattened spines so characteristic of most genera. The ambulatory legs have the second coxal joint, as usual, about twice as long as the first and third; the femoral and tibial joints are subequal in length, the second tibial slightly the longer; the tarsus does not quite equal the propodos in length; these joints are very slender, and gradually attenuated until they terminate with the long, slender sharp nail (fig. 14); the propodos is not armed with any conspicuous spines, and the nail is entirely destitute of supplementary claws.

Caullery described and figured some objects which he regarded as clavate-formed spinules. Meinert came to the conclusion that what Caullery saw were simply spines with mud attached to their summits. He is most likely right. They may have been a condition of the objects which I am about to describe, but as far as my example shows these latter are not present on the palpi, the position which Caullery's club-shaped spines held; and Meinert's fig. 24 correctly represents the last five joints of the palpi.

The specimen of this species which was dredged by the 'Porcupine' was mounted in gelatine shortly afterwards. The whole body in this specimen, including the lateral processes, is covered with remarkable stalked stellate bodies (fig. 11 represents portions of two lateral processes). They do not appear to be spines, and if they were they might be compared with the extraordinary covering of stellate spines which Dr. Calman has recently made known to exist on the carapace of a new Cumacean, *Pseudodiastylis ferox**. But the bodies on *Paranymphon* have a very different appearance from spines; fig. 12 represents one of them greatly magnified: they appear as though directly connected with the dermis of the *Paranymphon*, to be flexible, and to be in different degrees of expansion or contraction. Whether they really are parts of the animal itself, or whether they are parasites upon it, is a question which I am quite unable to decide, and which the future must be left to determine. In my perplexity I sent this mounted specimen to Copenhagen and asked Dr. Hansen to compare it with the numerous specimens collected by the 'Ingolf' Expedition. The Copenhagen specimens did not show similar conditions, but the naturalists there were equally unable with myself to determine what these peculiar organs or organisms are. Three of the 'Ingolf' specimens were kindly given me by the authorities of the Copenhagen Museum; on them I can find no stellate bodies, but just in the same positions I find the body and its lateral processes covered with minute punctures, which it is possible are the stellate bodies in a closely contracted state.

'Porcupine,' 1869, Stat. 17, lat. 54° 28' N., long. 11° 44' W., in 1230 fathoms. This locality lies S.S.E. of Rockall, and in the British Area.

The three specimens procured by the 'Caudan' were from as many stations in the Bay of Biscay. By the 'Ingolf' Expedition it was dredged in Davis

* Calman, The Cumacea of the 'Siboga' Expedition, 1905.

Strait, lat. $63^{\circ} 30'$ N., long. $54^{\circ} 25'$ W., in 582 fathoms, and also off the south-eastern side of Greenland, lat. $64^{\circ} 56'$ N., long. $36^{\circ} 19'$ W., in 204 fathoms.

Order II. CRYPTOCHLATA, *Sars*.

Family 1. AMMOTHEIDÆ.

Genus 1. AMMOTHEA, *Leach*, 1815.

= *Alcinous*, *O. G. Costa* = *Achelia*, *Hodge*.

1. AMMOTHEA VULGARIS (*O. G. Costa*).

Alcinous vulgaris, *O. G. Costa*, (8) p. 11, pl. ii A. fig. 1.

Ammothea franciscana, *A. Dohrn*, (9) p. 135, pl. iii. figs. 1-7.

Naples (cotypes *Dohrn*). *Mus. Nor.*

2. AMMOTHEA ECHINATA (*Hodge*).

? *Parabæa spinipalpis*, *Philippi*, *Archiv f. Naturgesch.* lx. Jahrg. 1843, p. 178, pl. ix. fig. 3, ♀.

? *Zetes spinosa*, *Stimpson*, *Invert. Grand Manan*, p. 37.

? *Ammothea pycnogonoides*, *Quatrefages*, *Mémoire sur l'Organisation des Pycnogonides*, *Ann. des Sci. Nat.* ser. 3, vol. iv. 1845, p. 71, pl. i. figs. 1, 2, pl. ii. figs. 2, 3.

Achelia echinata, *Hodge*, (23) p. 197, pl. iv. figs. 7-10.

Ammothea brevipes, *Hodge*, (23) p. 196, pl. iv. figs. 1-4 (*juvenis*).

Achelia echinata, *Grube*, (14) p. 27.

Ammothea achelioides, *Wilson*, (58) p. 16, pl. v. figs. 1 a-e; and (57) p. 484, pl. iv. figs. 19, 20 (*juvenis*).

Achelia spinosa, *Wilson*, (58) p. 7, pl. ii. figs. 1 a-h; and (57) p. 473, pl. i. fig. 4, pl. ii. fig. 8.

Ammothea echinata, *Hoek*, (28) p. 568, pl. xxv. figs. 14-16 (*adult et juv.*).

„ *fibulifera*, *Dohrn*, (9) p. 141, pl. iv. figs. 1-22.

„ *echinata*, *G. O. Sars*, (51) p. 120, pl. xiii. figs. 1 a-m.

„ „ *Meisonheimer* (*J.*), *Beit. z. Entwickl. d. Pantopoden*, *Zeits. f. Wiss. Zool.* vol. lxxii. (1902) pp. 193-248, pls. xiii.-xvii.

Jersey; Isle of Wight; Starcross, Salcombe and Plymouth, Ilfracombe; Isle of Cumbrae; Roundstone, Ireland; Naples (*A. M. N.*). Channel Islands and Seaham (cotypes of "*Achelia echinata*" from *Hodge*). Naples (cotypes of "*A. fibulifera*," *Dohrn*). *Mus. Nor.*

Other localities are Irish Sea (*Halhed*), Ballynakill and other parts of Ireland (*Carpenter*), west coasts of France and Holland (*Hoek*), west coast of Norway in many places (*Sars*), St. Vaast de la Hougue (*Grube*).

3. AMMOTHEA SCABRA (*Wilson*).

Achelia scabra, *Wilson*, (57) p. 475.

One male dredged fifteen miles off Cape Ann, N.E. America, in 23 fathoms, and one female on St. George's Bank in 45 fathoms (*Wilson*).

4. AMMOTHEA HISPIDA (*Hodge*).

Achelia hispida, Hodge, (23) p. 197, pl. v. fig. 11.

Ammothea longipes, Hodge, (23) p. 196, pl. iv. figs. 5, 6 (*juvenis*).

„ „ Grube, (14) p. 25, pl. i. figs. 4 a-c.

„ *magnirostris*, Dohrn, (9) p. 147, pl. vi. figs. 1-11.

Gouliot Caves, Sark, 1865 (*A. M. N.*); Starcross, Devon, 1883 (*C. Parker*).
Mus. Nor.

Naples (*Dohrn*); St. Vaast de la Hougue (*Grube*).

There can I think be little doubt that *Ammothea magnirostris* of Dohrn is the *Achelia hispida* of Hodge. The most marked characteristic of the species consists in the large fleshy tubercles, one of which is situated on each lobe of the body, but these are not easily seen in unmounted and dirty specimens, and were overlooked by Hodge. The substitution of hairs for spines on the legs distinguishes the present from the preceding species and from *A. Langi*.

The front margin of the cephalic segment is abruptly truncate, but the corners are produced forwards into lobes (see Dohrn, pl. vi. figs. 1 & 3); the ocular tubercle is less elevated than in its allies; the rostrum is wide centrally as well as at its termination, and somewhat contracted at the base. The palpi are very long, and when extended forwards surpass the length of the rostrum by three and a half or four joints; the five terminal joints are subequal in length to each other. In immature specimens the chelifori are remarkably long for the genus, and the chela itself is widely gaping, and the inner margin of the finger quite simple. What appears to be a peculiarity in the species is that the rostrum is often bent downwards, and the palpi turned completely backwards underneath the body, so as to be quite invisible from the dorsal view.

5. AMMOTHEA BOREALIS, *Schimkewitsch*.

Ammothea borealis, Schimkewitsch, C. R. Soc. St. Pétersb. 1895, 'On some forms of Pantopoda' (in Russian), p. 36, pl. ii. figs. 2, a, b.

The White Sea (*Schimkewitsch*).

Apparently this is closely allied to *A. hispida*, if it be not the same.

6. AMMOTHEA LANGI, *Dohrn*.

Ammothea Langi, Dohrn, (9) p. 146, pl. v. figs. 1-8.

Naples (cotypes *Dohrn*). *Mus. Nor.*

7. AMMOTHEA LÆVIS (*Hodge*).

Achelia lævis, Hodge, (23) p. 197, pl. v. fig. 12.

Ammothea lævis, G. O. Sars, (51) p. 124, pl. xiii. figs. 2 a-m.

Polperro, Cornwall (cotypes as "*Achelia lævis*," G. Hodge). Jersey (*A. M. N.*). Starcross, Devon (*C. Parker*). *Mus. Nor.*

Christiansund, West Norway, in 20–30 fathoms (*Sars*). Böhm (1) has recorded this species from Kerguelen. Irish Sea (*Halhed*).

8. *AMMOTHEA APPENDICULATA*, *Dohrn*.

Ammothoa appendiculata, *Dohrn*, (9) p. 152, pl. vii. figs. 1–5.

Naples (cotypes *Dohrn*). *Mus. Nor.*

9. *AMMOTHEA UNIUNGUICULATA*, *Dohrn*.

Ammothoa uniunguiculata, *Dohrn*, (9) p. 155, pl. vii. figs. 1–5.

Naples (*Dohrn*).

10. *AMMOTHEA BIUNGUICULATA*, *Dohrn*.

Ammothoa biunguiculata, *Dohrn*, (9) p. 158, pl. viii. figs. 1–3.

Naples (*Dohrn*).

Genus 2. *TANYSTYLUM*, *Miers*, 1879 = *Clotenia*, *Dohrn*, 1881.

TANYSTYLUM ORBICULARE, *E. B. Wilson*.

?? *Pasithoe umbonata*, *Gould*, *Proc. Boston Soc. Nat. Hist.* vol. i. p. 92.

Tanystylum orbiculare, *Wilson*, (58) p. 5, pl. ii. figs. 2 *a-f*; (57) p. 471, pl. iii. figs. 11 *a-f*.

Clotenia conirostris, *Dohrn*, (9) p. 164, pl. viii. figs. 4–11, pl. ix. figs. 1–5.

Tanystylum conirostre, *Carpenter*, (3) p. 297, pl. vi. figs. 1–5.

? *Tanystylum Hoekianum*, *Schimkewitsch*, (53) p. 44, pl. ii. figs. 5 *a-c*.

Wood's Hole, Massachusetts (from U.S. Nat. Mus.). Naples (cotype "*Clotenia conirostris*," *Dohrn*). *Mus. Nor.*

Wilson says that on the American coast *Tanystylum orbiculare* extends from Martha's Vineyard to Virginia, and that it is almost invariably found on Hydroids or Ascidians growing on piles of wharves, etc., down to 14 fathoms. At Naples I took it near Castell dell' Uovo. It was added to our fauna by Mr. J. E. Duerden, who found two specimens at Bundoran, in Donegal Bay, and sent them to Mr. G. H. Carpenter.

Genus 3. *TRAGÆUS*, *A. Dohrn*, 1881.

TRAGÆUS COMMUNIS, *Dohrn*.

Tragæus communis, *Dohrn*, (9) p. 164, pl. ix. figs. 6–14, pl. x. figs. 1–5.

Naples (cotypes from *Dohrn*, and *A. M. N.*). *Mus. Nor.*

Genus 4. *RHYNCHOTHORAX*, *O. G. Costa*, 1861.

RHYNCHOTHORAX MEDITERRANEUS, *O. G. Costa*.

Rhynchothorax mediterraneus, *Costa*, (8) p. 7, pl. i. figs. 1, 2.

„ „ *Dohrn*, (9) pl. xvii. figs. 1–9.

Naples (*Dohrn*). *Mus. Nor.*

Family 2. EURYCIDIDÆ.

Genus 1. EURYCYDE, *Schiödte*, 1857 = *Zetes*, *Kröyer*, 1844 (preoccupied).

EURYCYDE HISPIDA (*Kröyer*).

Zetes hispidus, *Kröyer*, (32) p. 108, (33) pl. xxxviii. figs. 1 a-h.

Eurycyde hispida, *Schiödte*, *Nat. Bidrag till en Beskrivelse af Grönland*, 1857, p. 71.

„ „ *Hansen*, (18) p. 171, pl. xix. figs. 1 a-h.

„ „ *Sars*, (51) p. 128, pl. xiv. figs. 1 a-g.

Kara Sea (*Copenhagen Museum*). *Mus. Nor.*

Greenland (*Kröyer*); Christiansund and two localities further north on the coast of Norway, Kara Sea (*Sars*); Murman Coast (*Jarzynsky*); König Karls Land (*Möbius*); Davis Strait (*Rodger*).

Genus 2. BARANA, *A. Dohrn*, 1881.

1. BARANA CASTELLI, *Dohrn*.

Barana castelli, *Dohrn*, (9) p. 125, pl. i. figs. 1-16, pl. ii. fig. 1.

Naples (cotypes *Dohrn*). *Mus. Nor.*

Found at two or three places in the Bay of Naples (*Dohrn*).

2. BARANA ARENICOLA, *Dohrn*.

Barana arenicola, *Dohrn*, (9) p. 129, pl. ii. figs. 2-8.

Naples (cotype *Dohrn*). *Mus. Nor.*

Genus 3. ASCORHYNCHUS, *G. O. Sars*, 1876.

1. ASCORHYNCHUS ABYSSI, *Sars*.

Ascorhynchus abyssii, *Sars*, (48) No. 8; (50) No. 41; and (51) p. 133, pl. xiv. figs. 2 a-t.

Numerous specimens taken by the Norwegian North Atlantic Expedition in from 1081 to 1539 fathoms, between Norway and Faroe and Iceland, and further north between Spitsbergen and Beeren Island on the east and Jan Mayen and Greenland on the west (*Sars*).

2. ASCORHYNCHUS TRIDENS, *Meinert*.

Ascorhynchus tridens, *Meinert*, (37) p. 55, pl. v. figs. 7-18.

‘Ingolf’ Exped. (cotypes *Meinert*). *Mus. Nor.*

This was taken by the ‘Ingolf’ in the same area in which *Sars* found *A. abyssii*, and also in the south-eastern part of the Greenland Sea. It seems very doubtful if it is a distinct species.

Genus 4. SCÆORHYNCHUS, *E. B. Wilson*, 1881.SCÆORHYNCHUS ARMATUS, *E. B. Wilson*.

Scæorhynchus armatus, Wilson, (59) p. 245, pl. ii. figs. 3, 4, pl. v. figs. 26-31.

Four males and five females from lat. 41° 24' N., long. 60° 35' W., in 1242 fathoms.

This genus appears to be closely related to the preceding, but differs in having well-developed chelæ to the chelifori of the male.

Family 3. COLOSSENDEIDÆ.

Genus COLOSSENDEIS, *Jarzynsky*, 1870.1. COLOSSENDEIS PROBOSCIDEA (*Sabine*).

Phoxichilus proboscideus, Sabine, Suppl. to Appendix Capt. Parry's Voyage, p. 226.

Colossendeis borealis, Jarzynsky, (30*) (*vide* Sars).

„ *proboscidea*, Sars, (48) p. 368; and (50) no. 42.

Anomorphynchus Smithii, Miers, (39) p. 50, pl. vii. figs. 6-8, and p. 264.

Colossendeis proboscidea, Hoek, (26) p. 98.

„ „ Hoek, (27) p. 22, pl. ii. figs. 41, 42.

„ „ Hansen, (18) p. 174.

„ „ Sars, (51) p. 138, pl. xv. figs. 1 a-d.

„ „ Carpenter, (4) p. 633.

„ „ Meinert, (37) p. 59, pl. v. figs. 21, 22.

Kara Sea (*Copenhagen Museum*). *Mus. Nor.*

Its known distribution is as follows: To the south of Greenland (*Parry*); off Storeggen Bank, W. Norway, 412 fathoms (*Sars*); Murman Coast (*Jarzynsky*); Siberian Polar Sea (*Stuxberg*); Franz Josef Land (*Miers & Carpenter*); Barents Sea and Faroe Channel (*Hoek*); Kara Sea and North Greenland (*Hansen*); near Jan Mayen (*Meinert*); near Beeren Island (*Möbius*).

2. COLOSSENDEIS ANGUSTA, *G. O. Sars*.

Colossendeis angusta, G. O. Sars, (48) p. 368.

„ „ Wilson, (59) p. 243, pl. iii. figs. 8 & 13.

„ „ Hoek, (29) p. 5, pl. i. fig. 8.

„ „ Hansen, (18) p. 175.

„ „ Sars, (51) p. 140, pl. xv. figs. 2 a-f.

„ „ Meinert, (37) p. 59.

'Porcupine,' 1869, locality lost. 'Triton,' 1882, Faroe Channel, lat. 60° 18' N., long. 6° 15' W., 640 fathoms (*Mus. Nor.*).

'Hirondelle,' lat. 46° 4' N., lat. 49° 2' W., near Newfoundland (*Topsent*). Atlantic, off W. Norway, and N.W. of Beeren Island, 417-658 fathoms (*Sars*). Kara Sea (*Hansen*). Off N.E. America down to as far south as lat. 38° 15' N., long. 73° 18' W., and in depths from 810 to 1242 fathoms (*Wilson*). Near Jan Mayen and south of Iceland (*Meinert*).

3. COLOSSENDEIS COLOSSEA, *E. B. Wilson*.

Colossendeis colossea, Wilson, (59) p. 244, pl. i. fig. 1, pl. iii. figs. 5-8.

„ „ Meinert, (37) p. 58.

'Blake' Expedition at five stations from lat. $41^{\circ} 33' N.$, long. $65^{\circ} 51' W.$, in 810 fathoms, southwards to lat. $39^{\circ} 43' N.$, lat. $70^{\circ} 55' W.$, in 1002 fathoms (*Wilson*); and by the 'Ingolf' it was dredged in 1300 fathoms in the Denmark Strait, and at lat. $61^{\circ} 44' N.$, long. $30^{\circ} 29' W.$, 1135 fathoms (*Meinert*). Newfoundland (*Topsent*).

4. COLOSSENDEIS CLAVATA, *Meinert*.

Colossendeis clavata, Meinert, (37) p. 57, pl. v. figs. 19, 20.

'Ingolf' Expedition, lat. $62^{\circ} 6' N.$, long. $19^{\circ} W.$, that is in the Atlantic to the south of Iceland, 1041 fathoms (*Meinert*).

5. COLOSSENDEIS MACERRIMA, *E. B. Wilson*.

Colossendeis macerrima, Wilson, (59) p. 246, pl. i. fig. 2, pl. iii. figs. 9-12, pl. v. fig. 32.

„ „ Meinert, (37) p. 60.

A single specimen taken by the 'Blake' in 922 fathoms at lat. $38^{\circ} 18' N.$, long. $73^{\circ} 18' W.$ (*Wilson*). Between Iceland and Greenland in the Denmark Strait, and in the mouth of Bredebugt, Iceland, in the former case in 1300 fathoms and in the latter in 76 fathoms (*Meinert*).

6. COLOSSENDEIS MINUTA, *Hoek*.

Colossendeis minuta, Hoek, (26) p. 73, pl. x. figs. 12-14.

Dredged by the 'Challenger,' lat. $42^{\circ} 8' N.$, long. $63^{\circ} 39' W.$, *i. e.*, about two degrees south of Halifax, Nova Scotia, in 1250 fathoms (*Hoek*).

7. COLOSSENDEIS LEPTORHYNCHUS, *Hoek*, var. SEPTENTRIONALIS, *Caullery*.

Colossendeis leptorhynchus, var. *septentrionalis*, Caullery, (7) p. 362, pl. xii. fig. 7.

Dredged by the 'Caudan' in 1710 metres in the Bay of Biscay. It seems impossible to make anything out of this. *C. leptorhynchus* is only as yet known from specimens taken by the 'Challenger' at many stations ranging from 33 to 51 degrees south of the equator. It is possible that the 'Caudan' species may be *C. macerrima* of Wilson.

8. COLOSSENDEIS GIGAS, *Hoek*.

Colossendeis gigas, Hoek, (26) p. 61, pl. viii. figs. 1, 2, pl. x. figs. 1-5.

„ „ Topsent, (56) p. 177.

Dredged by the 'Hirondelle,' lat. $40^{\circ} 8' N.$, long. $29^{\circ} 48' W.$, in 1850 metres (*Topsent*).

Order III. ACHELATA, *G. O. Sars.*Family 1. PYCNOGONIDÆ, *G. O. Sars.*Genus 1. PYCNOGONUM, *Brünnich, 1764.*1. PYCNOGONUM LITTORALE, *Ström.*

Pycnogonum littorale, Ström, Physisk og økonomisk Beskrivelse over Fögderiet Söndmör, 1762, p. 209, pl. i. fig. 17.

„ *balænarum*, Linné, Syst. Nat. ed. xii. i. p. 1028.

„ *pelagicum*, Stimpson, Marine Invert. Grand Manan, p. 37 (*immature form*).

„ *littorale*, *G. O. Sars*, (51) p. 7, pl. i. figs. 1 *a-i*.

Sars's figures are excellent and there is no need of extending references for this well-known form.

Specimens in my collection are from Guernsey; Essex Coast; Cullercoats, Northumberland; Isle of Cumbrae; Shetland, very large; Valentia, Ireland (*A. M. N.*). Lat. 59° 23' N., long. 7° 4' W., in 374 fathoms (*'Porcupine,'* 1869). Eastport, N.E. America (*Wilson*). *Mus. Nor.*

It is usually a shore or shallow-water species, but sometimes reaches great depths, and it ranges from the west coast of France northwards right round the coasts to the White Sea; found again at Iceland, Greenland, and down the American coast to lat. 41° 30'. Off St. George's Banks it is recorded by Smith and Hargar (*U.S. Fish. Comm.*, 1872) from 406 fathoms. *Wilson* gives the measurements of a large female as: body (without rostrum) 10 mm., rostrum 5 mm., legs 15 mm. One of my Shetland specimens is slightly larger—body 11 mm., rostrum 6 mm., front leg 15 mm.

2. PYCNOGONUM CRASSIROSTRE, *G. O. Sars.*

Pycnogonum crassirostre, *G. O. Sars*, (50) No. 2; (51) p. 12, pl. i. figs. 2 *a-h*.

„ „ *Norman*, (45) p. 151.

„ „ *Meinert*, (37) p. 61.

Kors Fiord, near Bergen, 180 fathoms, 1878; in the Hardanger Fiord, in Stoksund, 80–100 fathoms, and off Midso Lighthouse, 50–100 fathoms, 1879; Rodberg, in Trondhjem Fiord, in about 70 fathoms, 1893 (*A. M. N.*). *Mus. Nor.*

The types described by Sars were found mixed with some *P. littorale*, which he had collected from different parts of the coast.

Meinert records a specimen as taken by the 'Ingolf' Expedition in Denmark Strait, in the mouth of Bredebugt in Iceland, in 70 fathoms.

3. PYCNOGONUM PUSILLUM, *Dohrn.*

Pycnogonum pusillum, *Dohrn*, (9) p. 207, pl. xvi. figs. 4 8.

Naples (cotype *Dohrn*). *Mus. Nor.*

4. PYCNOGONUM NODULOSUM, *Dohrn*.

Pycnogonum nodulosum, Dohrn, (9) p. 203, pl. xvi. figs. 1-3.

Bay of Naples (*Dohrn*).

Family 2. ENDEIDÆ.

Genus 2. ENDEIS, *Philippi*, 1843.

= *Phoxichilus*, *auct. nec Latreille*, and *Chilophoxus*, *Stebbing*, 1902.

The Rev. T. R. R. Stebbing has in 'Knowledge' (54*, August 1902, p. 157) introduced certain changes in nomenclature which it is necessary to notice; and as the publication in which these changes are made is not likely to be seen by naturalists, in justice to him I give here his full statement:—

“Not without some fear of evoking those electric flashes which are ever ready to smite the rash disturbers of long accepted terminology, I must here invite the special attention of naturalists to the new names *Chilophoxus* and *Chilophoxidæ* and to the cancelling the names *Pallenidæ* and *Pseudopallene* in favour respectively of *Phoxichilidæ* and *Phoxichilus*. The last-named genus was instituted by Latreille in the 'Nouveau Dictionnaire d'Histoire Naturelle,' tom. 24. p. 137, as far back as 1804, not as had been stated in 1816. The only species assigned to it was *Pycnogonum spinipes* of O. Fabricius. It is impossible, therefore, to retain *Phoxichilus* apart from that species. Consequently *Pseudopallene*, Wilson, 1878, to which both Sars and Meinert refer the above-named *P. spinipes* of the 'Fauna Grœnlandica,' becomes a synonym of Latreille's far earlier genus, and the family hitherto known as *Pallenidæ* must be henceforward known as *Phoxichilidæ*. All species which have been assigned to *Phoxichilus* on the ground of a real generic agreement with Montagu's *Phalangium spinosum*, must now be transferred along with this species to *Chilophorus*, while *Pseudopallene circularis*, Goodsir, will find its place in the true *Phoxichilus* as now reinstated.”

Before entering upon Mr. Stebbing's argument let me state that if that argument be considered just, as I believe it to be, *Chilophorus* is at once a synonym, since there is the genus *Endeis* of Philippi, the first species given for which is congeneric at least, if not identical, with *P. spinosum*, Montagu; the only error in Philippi's description is that he mistook the seven-jointed false feet for palpi (Philippi, Archiv f. Naturg. Jahrg. ix. p. 195).

It is now desirable to examine into the history of the genus *Phoxichilus*—

LATREILLE (Nouv. Dict. d'Hist. Nat. vol. xxiv. 1804, p. 137):—

“43. Genus *Phoxichile*, *Phoxichilus*. Dix pattes, les antérieures beaucoup plus petites et repliers dans le ventre; mandibules coudées, terminées par une pièce en crochet; point de palpes”; with a reference to *Pycnogonum spinipes*, O. Fabr.

LATREILLE again, four years later (Gen. Crust. et Insect. 1806, p. 143) has :—

“Fam. Pycnogonides : I. Mandibulæ (biarticulatæ); pedes decem, antici duo spurii ; inflexi, oviferi. Genus *Nymphon* : Mandibulæ didactylæ. Palpi duo. Genus *Phoxichilus* : Mandibulæ monodactylæ, palpi nullæ” ; with reference again to *Pycnogonum spinipes*, O. Fabr.

In both these quotations the characters given are directly the opposite to those of *P. spinipes*, which has strongly developed “Mandibulæ didactylæ.” There is one genus which if we substitute the name palpi for mandibulæ will answer to the generic descriptions of the original *Phoxichilus*, and Sabine was so far quite justified in calling the first discovered Colossendeis, *Phoxichilus proboscideus*.

But we must pursue *Phoxichilus* further :—

LEACH (Trans. Linn. Soc. vol. xi. 1815, p. 306) describes the genus as having “Mandibulæ nullæ.” Nothing is said of any palpi. The characters here then are not those of Latreille and are still further away from those of *P. spinipes*.

LATREILLE (Dict. d’Hist. Nat., Nouvelle Edition, 1818, vol. xxvi. p. 14). Here we have a full account of *Phoxichilus*, and Latreille tells us of the blunder he made, and that the mandibles really “finissoient en pince didactyle, de même que celles des *Nymphons*,” but that *Phoxichilus* is distinguished from *Nymphon* by the absence of palpi. He concludes : “Le *Nymphon femoratum*, Rathke, et le *Phalangium spinosum*, Montagu, paraissent appartenir au genre des Phoxichiles.” After the accurate description of the genus follows the first unfortunate intimation that *Phalangium spinosum* may belong to the genus.

JOHNSTON, in 1837 (31), was, I believe, the first writer who actually used the joint names *Phoxichilus spinosus*, which have since that date been employed.

LAMARCK (Hist. Nat. Anim. sans Vert. vol. v. 1838, p. 103) only increased the confusion by giving among his characters “mandibulis duabus vel uniungulatis, vel chelatis,” including in his genus both the *spinipes* Fabr. and the *spinosus* Montagu, the latter of which, however, he re-named *Phoxichilus monodactylus*.

MILNE-EDWARDS (Hist. Nat. des Crust. vol. iii. 1840, p. 535) consummated the confusion, giving to *Phoxichilus* only one species *P. spinosus*, removing *P. spinipes*, Fabr., and giving it as a doubtful synonym under *Pallene brevirostris*.

The change made by Stebbing must, I fear, be of necessity adopted ; but instead of writing as Mr. Stebbing has done that *Phoxichilus* was established by Latreille “so far back as 1804, not as has been stated in 1816,” I should write “Latreille 1804 as corrected by him in 1818,” for the first description

was not only insufficient, but absolutely wrong, while in that of 1818 the error was corrected and the description is thoroughly full and clear.

1. ENDEIS SPINOSUS (*Montagu*).

Phalangium spinosum, Montagu, (41) p. 100, pl. v. fig. 7.

Phoxichilus spinosus, Johnston, (31) p. 377.

Endeis gracilis, Philippi, Arch. f. Nat., Jahrg. ix. Bd. i. 1843, p. 176, pl. ix. fig. 1.

Phoxichilus spinosus, Quatrefages, Mémoire sur l'organisation des Pycnogonides, Ann. des Sci. Nat., Zool. ser. 3, vol. iv. (1845) p. 71, pl. i. figs. 2, 2 a, pl. ii. fig. 1.

„ *spinosus*, Kröyer, (32) p. 125; (33) pl. xxxv. figs. 1 a-f.

„ *lævis*, Grube, (15) pp. 31 & 50, pl. i. figs. 1 a-c.

„ *inermis*, Hesse, Ann. des Sci. Nat. vol. vii. p. 199.

„ *vulgaris*, Dohrn, (9) p. 169, pl. x. fig. 6, pl. x a. figs. 16-20, pl. xi. figs. 1-10, 12, 13, 16-27.

„ *spinosus*, Hoek, (28) p. 58, pl. xxviii. fig. 33.

„ „ Sars, (51) p. 15, pl. i. figs. 3 a-g.

„ „ Carpenter, (2) p. 199, pl. xii. figs. 1, 3, 5, 7.

„ *lævis*, Carpenter, (2) p. 200, pl. xii. figs. 2, 4, 6, 8.

Professor Carpenter, in his paper above referred to, gives the opinion, illustrated by figures, that the *P. lævis* of Grube is distinct from *P. spinosus* of Montagu; but I agree with the view of Hoek, that they are the same species, though exhibiting considerable diversity as regards the development of the spination of the limbs. In the young the spines are scarcely developed, and the larger the examples are the stronger in proportion is the spiny growth. The largest specimens I have seen are from Birturbuy Bay, Co. Galway. They are brilliant red or almost black: a female measures, body (exclusive of proboscis) 4.25 mm., proboscis 2 mm., front leg 17 mm. Younger specimens are greenish, and still younger white in colour.

Birturbuy Bay, Co. Galway, very large; Jersey; Gouliot Caves, Sark; Plymouth, off Berry Head, and Starcross, Devon; Isle of Cumbrae; Strangford Lough, Ireland; Naples (cotypes of *P. vulgaris*, Dohrn). *Mus. Nor.*

Off Aran Island, the larger form, and several places on the coast of Galway, the smaller form (*Carpenter*). Dublin Bay (*Scharff*). Killalo Bay (*Miss Warren*). Dunmanus Bay, Irish Sea (*Halhed, A. Newburgh*). West coast of France (*Grube* and *Hoek*). On the Norwegian coast it was first found by Kröyer, and Sars records it from near Stavanger, Florö, and Manger, Norway; and Topsent records it from the Azores.

2. ENDEIS CHARABDÆUS (*Dohrn*).

Phoxichilus charabdæus, Dohrn, (9) p. 174, pl. x. figs. 7-18, pl. x a. figs. 14, 15, 21, 22, pl. xi. figs. 11, 14, 15.

„ *charabdæus*, Schimkewitsch, (52) p. 20.

Bay of Naples (cotype *Dohrn*). *Mus. Nor.*

Abrolhos Isles (*Schimkewitsch*).

DOUBTFUL SPECIES.

- COSTA (O. G.). Fauna del Regno di Napoli : Crostacei et Arachnedi. Napoli, 1836 and following years.
Foxichilus pygmæus.
Phanodemus horribus.
 „ *collaris*. Gulf of Taranto.
 „ *inermis*. Gulf of Taranto.
- PHILIPPI (A.). "Ueber die Neapolitanischen Pycnogoniden." Archiv f. Naturgesch. ix. Jahrg. i. Bd., 1842.
Paritoca spinipalpis, p. 178.
Endeis didactyla, p. 176 = ? *Ammothea Langi*, Dohrn.
- COSTA (O. G.). Microdoride Mediterranea. Napoli, 1861.
Platycheilus sardonicus, p. 11.
Alcynous megacephalus, p. 14.
- GOODSIR (H. D. S.). "Description of some new species of Pycnogonidæ." Edinburgh New Philos. Journ. vol. xxxii. 1842, p. 365, and Ann. & Mag. Nat. Hist. vol. xiv., 1844.
Pephredo hirsuta, p. 137, fig. 7 (as *P. capillata*).
Nymphon pellucidum, p. 138, fig. 5, & p. 3, figs. 19, 20.
 „ *minutum*, p. 138, fig. 6, & figs. 24, 25.
 „ *similis*, p. 3, figs. 21-23.
Pasithoe vesiculosa, p. 2, figs. 11-13.
- GOSSE (P. H.). "On some new and little known Marine Animals." Ann. & Mag. Nat. Hist. ser. 2, vol. xvi. 1855, p. 30, pl. iii. figs. 12, 13.
Phoxichilidium olivaceum; probably *Anaphia virescens*, Hodge.
- CLAPARÈDE (R. E.). Beobachtungen über Anat. und Entwickl. Wirbelloser Thiere, 1863, p. 103, pl. xviii. fig. 12.
Phoxichilidium cheliferum.
- HESSE (M.). "Observ. sur Crust. rares ou nouveaux des côtes de France." Deuxième Article. Ann. des Sci. Nat. ser. 5, vol. vii. 1867, p. 201, pl. iv. figs. 1-6.
Oiceobathys arachne; probably an *Ammothea*.
- HESSE (M.). Do. do. Vingt-quatrième Article. Ibid. vol. xx. 1874, pl. viii. figs. 1-24.
Oomerus stigmatophorus.
- SAY (T.). Journ. Acad. Nat. Sci. Philadelphia, vol. ii. 1821, p. 59, pl. v. figs. 7, 7 a.
Anaphia pallida; probably *A. lenta*, Wilson.

BIBLIOGRAPHY.

1. BÖHM (R.).—Pycnogoniden des Königl. Zool. Mus. zu Berlin, &c. Monatsber. Berlin. Akad. Wissensch. 1879, p. 170.
2. CARPENTER (GEORGE H.).—Some Pantopoda from the Irish Coast. Proc. Roy. Dubl. Soc. vol. viii. n. s. 1893, p. 195.
3. ——— New British Pantopod (*Tanystylum conirostre*, Dohrn). Irish Naturalist, vol. iv. 1895, p. 297.
4. ——— Pantopoda collected by Dr. W. S. Bruce in the neighbourhood of Franz-Josef Land, 1896-7. Journ. Linn. Soc., Zool. vol. xxvii. 1898, p. 626.
5. ——— In Herdman, Ninth Annual Report of Liverpool Marine Biol. Comm. 1896, p. 15.
6. ——— Pantopoda from the Arctic Seas, dredged by Mr. W. S. Bruce, 1897-8. Proc. Roy. Dubl. Soc. vol. ix. 1900, p. 729.
- 6*. ——— Marine Fauna of the Coast of Ireland. Pycnogonida. Fisheries Ireland Sci. Invest. iv. 1905, p. 1.
7. CAULLERY (MAURICE).—Pycnogonidés. Résultats Sci. Camp. du 'Caudan,' 1896, p. 361.
8. COSTA (O. G.).—Microdoride Mediterranea, 1861, pp. 1-16.
9. DOHRN (A.).—Pantopoden des Golfes von Neapel, 1881.
10. FREY (H.) & LEUCKART.—Beiträge zur Kenntniss Wirbelloser Thiere, 1847.
11. GOODSIR (H. D. S.).—Description of some new species of Pycnogonidæ. Edinburgh New Philos. Journ. vol. xxxii. 1842, p. 136.
12. ——— Description of some new Crustaceous Animals found in the Firth of Forth. Edinb. New Philos. Journ. vol. xxxiii. 1842, p. 365.
13. ——— Specific and Generic characters of the Araneiform Crustacea. Ann. & Mag. Nat. Hist. vol. xiv. 1844, p. 1.
14. GRUBE (E.).—Mittheilungen über St. Vaast-la-Hougue, &c. Verhandl. schlesischen Gesellsch. f. Naturwiss. u. Medicin, Breslau, 1868 (separate copy).
15. ——— Mittheilungen über St. Malo u. Roscoff u. die dortigen Meeres-besonders die Annelidenfauna. *Ib.* 1871 (separate copy).
16. HALHED.—List of the Pycnogonida in Report on Marine Zoology, Botany and Geology of the Irish Sea. Brit. Assoc. Report for 1896, p. 442. (Other papers on the localities there referred to.)
17. HANSEN (H. J.).—Fortegnelse over de hidtil i de Danske Have fundne Pycnogonider eller Sospingler. Naturhist. Tidssk. 3 R. vol. xiv. 1884, p. 647.
- 17*. ——— Zoologica Danica, 4^{de} Hefte. Copenhagen, 1885.
18. ——— Kara-Havets Pycnogonider Dijnphna-Togtets. Zoologisk-botaniske Udbytte, 1886, p. 155.
19. ——— Pycnogonider og Malakostrake Krebsdyr. Ryders Expedition til Östgrönland 1891-92, 1895, p. 124.
20. HELLER (C.).—Die Crustaceen, Pycnogoniden und Tunicaten der K.-k. Oesterr.-Ungar. Nordpol-Expedition. Math.-naturw. Kl. d. Wiss. Wien, vol. xxxv. 1875, p. 16 (separate copy).
21. HODGE (GEORGE).—Observations on a species of Pycnogon (*Phoxichilidium coccineum*, Johnston), with an attempt to explain the order of its development. Trans. Tyneside Nat. Field Club, vol. v. 1862, p. 124.
22. ——— Report on the Pycnogonoidea, with descriptions of two new species, in Report Dredging Expedition to the Dogger Bank and Coasts of Northumberland. Trans. Tyneside Nat. Field Club, vol. v. 1863, p. 281.

- 22*. HODGE (G.).—Description of two new species of Pycnogonoidea. *Ann. & Mag. Nat. Hist.* ser. 3, vol. xi. (1863) p. 463.
23. — List of British Pycnogonoidea, with descriptions of several new species. (a) *Ann. & Mag. Nat. Hist.* ser. 3, vol. xiii. 1864, p. 113; and (b) *Trans. Tyneside Nat. Field Club*, vol. vi. 1864, p. 195.
24. — Report on the Pycnogonoidea, in Reports Deep Sea Dredging on Coasts of Northumberland and Durham. *Nat. Hist. Trans. Northumb. & Durham*, vol. i. 1865, p. 41.
25. HOEK (P. P. C.).—Ueber Pycnogoniden. *Niederl. Archiv für Zool.* vol. iii. 1877, p. 235.
26. — Description of Species of Pycnogonida dredged during the Cruise of the 'Knight Errant.' 'Challenger' Report, vol. iii. 1881: Pycnogonida, Appendix I. p. 94.
27. — The Pycnogonids, 'Willem-Barents' Expedition. *Niederl. Archiv für Zoologie, Supplement-Band i.* 1881-2.
28. — Nouvelles études sur les Pycnogonides. *Archiv de Zool. Expér. et Gén.* vol. ix. 1882, p. 445.
29. — The Pycnogonida dredged in the Faroe Channel during the Cruise of H.M.S. 'Triton.' *Trans. Roy. Soc. Edinb.* vol. xxxii. 1883, p. 1.
- 29*. — Four Pycnogonids, dredged during the Cruise of the 'Challenger.' *Tijdschr. d. Ned. Dierk. Vereen.* ser. 2, vol. v., 1898.
30. †JARZYNSKY (TH.).—"Promissus Catalogus Pycnogonidarum inventarum in Mari glaciali ad oras Lapponiæ Rossicæ et Mari albo, anno 1869 et 1870. Petersburg 1870. Abgedruckt in: Nic. Wagner, *Die Wirbellosen des Weissen Meeres*, Leipzig, 1885. Anhang, pp. 108-171."
31. JOHNSTON (G.).—Miscellanea Zoologica. I. *Mag. Zool. & Bot.* vol. i. 1837, p. 368.
32. KRÖYER (H.).—Bidrag til Kundskab om Pycnogoniderne eller Söspindlerne. *Naturhist. Tidssk., Anden Rækkes*, vol. i. 1844, p. 90.
33. — In Gaimard, *Voyages en Scandinavie, &c.*, 1849, pls. xxxv.-xxxix.
34. LAURIE (M.).—Pycnogonidæ, in *Fauna, Flora, and Geology of the Clyde Area*. Glasgow, 1901 (only four common species mentioned).
- 34*. LÖNNBERG (E.).—List of Pycnogonids collected by the Swedish Zoological Expedition to Spitsbergen and East Greenland, 1900. *Öfvers. K. Vet.-Akad. Forhandl.* 1902, p. 353.
35. LEACH (W. E.).—Zoological Miscellany, 1814, pls. xiii. & xix.
36. — *Encyclopædia Britan. Suppl.* 1817 (?) p. 432.
37. MEINERT (FR.).—Pycnogonida, in The Danish 'Ingolf' Expedition, vol. iii., 1899.
38. MIERS (E. J.).—Report on Crustacea Arctic Exped. 1875-6. *Ann. & Mag. Nat. Hist.* ser. 4, vol. xx. 1877, p. 108.
39. — †Crustacea and Pycnogonoidea collected by B. Leigh Smith from Franz-Josef Land. *Ann. & Mag. Nat. Hist.* ser. 5, vol. vii. 1882, pp. 49 & 264.
40. MÖBIUS (K.).—Arktische und subarktische Pantopoden. *Fauna Arctica*, vol. ii. 1901, p. 37.
- 40*. — Pantopoden der deutschen Tiefsee-Expedition 'Valdivia,' 1898-9. 1902.
41. MONTAGU (G.).—Description of several Marine Animals found on the South Coast of Devonshire. *Trans. Linn. Soc.* vol. ix. 1808, p. 81.

† This work not being in my library, it is quoted here as given by Möbius.

42. MORGAN (T. H.).—Contribution to the Embryology and Phylogeny of the Pycnogonids. Studies Laboratory Johns Hopkins University, Baltimore, vol. v. 1891, p. 1.
43. NORMAN (A. M.).—Final Shetland Dredging Report. Rep. Brit. Assoc. for 1868–1869, p. 301.
44. ——— *Nymphon abyssorum* in Wyville Thomson's 'The Depths of the Sea,' 1873, p. 129.
45. ——— A Month on the Trondhjem Fiord. Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. 1894, p. 151.
- 45*. ——— Notes on the Natural History of East Finmark. Ann. & Mag. Nat. Hist. ser. 7, vol. xi. 1903, p. 168.
46. RATHKE (J.).—Entomologiske Iagttagelser. Skrivt. Naturhist. Selsk. Copenhagen, vol. v. 1799, p. 201.
- 46*. RODGER (A.).—Preliminary account of Nat. Hist. Colls. made on Voyage to the Gulf of St. Lawrence and Davis Strait. Proc. Roy. Soc. Edinb. 1893, p. 154.
47. SABINE (E.).—Marine Invertebrate Animals in Suppl. to Appendix Captain Parry's Voyage in 1819–20. 1824.
48. SARS (G. O.).—Prodromus descriptionis Crustaceorum et Pycnogonidarum quæ in exped. Norveg. ann. 1876 observavit. Archiv f. Math. og Naturvid. vol. ii. 1876, p. 237.
49. ——— Crustacea et Pycnogonida nova in itinere 2^{do} et 3^{tio} expeditionis Norvegiæ anno 1877 et 1878 collecta. Archiv f. Math. og Naturvid. vol. iv. 1879, p. 427.
50. ——— Pycnogonidea borealia et arctica. Archiv f. Math. og Naturvid. vol. xii. 1888, p. 339.
51. ——— The Norwegian North Atlantic Expedition, 1876–1878: Pycnogonidea. 1891.
52. SCHIMKEWITSCH (W.).—Les Pantopodes recueillis par Lieut. C. Chierchia, Voyage 'Vettor Pisani.' Mem. Reale Accad. dei Lincei, Roma, ser. 4, vol. vi. 1889, pp. 329–347, 1 pl.
53. ——— On some forms of Pantopoda (in Russian, with characters also in French). C. R. Soc. St. Pétersb. vol. xxv. p. 35.
54. SEMPER (C.).—Pycnogoniden und ihre in Hydroider schmarotzenden Larvenformen. Arbeit. a. d. Zool.-zoot. Instit. Würzburg, vol. i. 1874, p. 264.
- 54*. STEBBING (Rev. T. R. R.).—"The Nobodies" in 'Knowledge, an Illustrated Magazine,' Feb., April, June and August, 1902, and January and July, 1903. (A popular account of the Class.)
55. THOMPSON (W.).—Order Pycnogonida in 'Natural History of Ireland,' vol. iv. 1856, p. 412.
56. TOPSENT (E.).—Pycnogonides provenant des Campagnes du Yacht 'l'Hirondelle,' 1886–88. Bull. Soc. Zool. France, vol. xvi. 1891, p. 176.
57. WILSON (E. B.).—Report of Pycnogonida of New England and adjacent Waters. Rep. U.S. States Comm. Fish and Fisheries, 1878, p. 463.
58. ——— Synopsis of the Pycnogonida of New England. Trans. Connect. Acad. Arts and Sci. vol. v. 1878, p. 1.
59. ——— Report on the Pycnogonida (of the 'Blake' Expedition). Bull. Mus. Comp. Zool. vol. viii. 1881, p. 239.

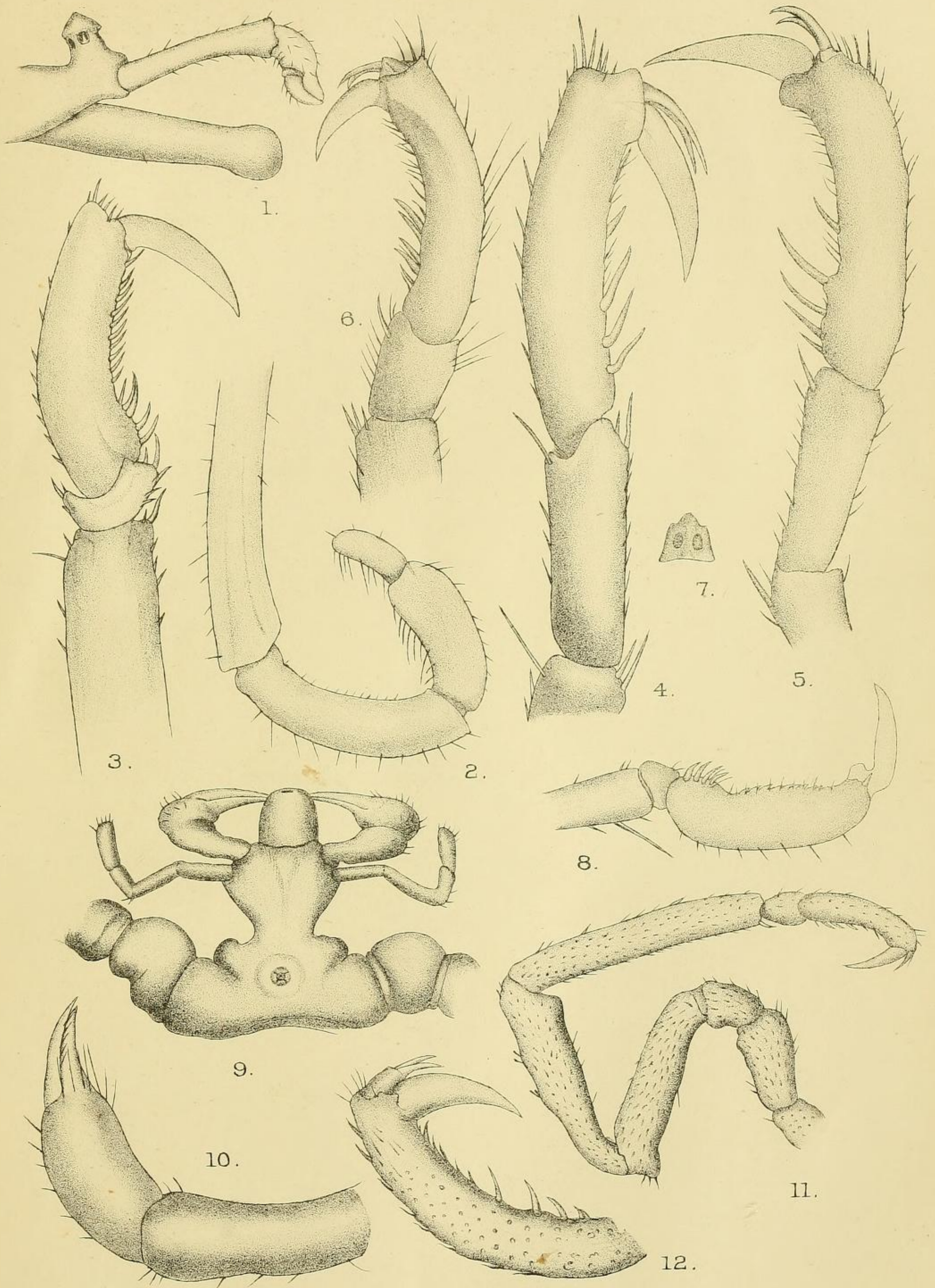
EXPLANATION OF THE PLATES.

PLATE 29.

- Fig. 1. *Anaphia lenta*, E. B. Wilson. Cephalic segment.
 2. " " False leg.
 3. " " Last joints of ambulatory leg.
 4. *Nymphon rubrum*, Hodge. Last joints of ambulatory leg from Plymouth specimen.
 5. " " do. do. do. from a Shetland specimen.
 6. " " do. do. do. var. *perplexa*, St. Andrews.
 7. " " Oculiferous tubercle.
 8. *Anaphia angulata*, Dohrn. Last joints of ambulatory leg.
 9. *Nymphon brevirostre*, Hodge. Cephalic segment.
 10. " " Cheliforus.
 11. " " Ambulatory leg.
 12. " " do. do. propodos.

PLATE 30.

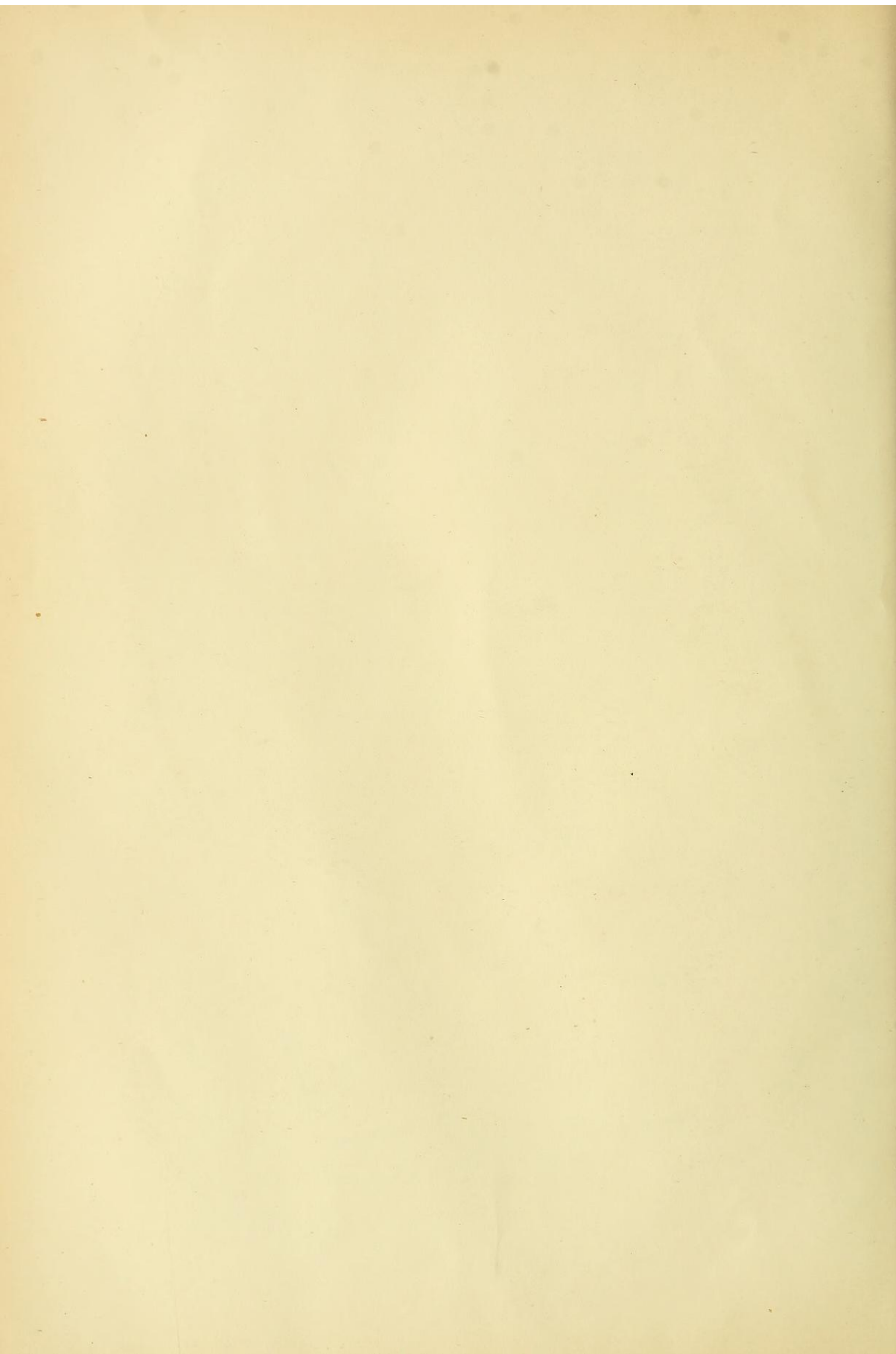
- Fig. 1. *Nymphon stenocheir*, sp. n., from above.
 2. " " Oculiferous tubercle.
 3. " " Palp.
 4. " " Cheliforus from the front.
 5. " " Chela from the side.
 6. " " Last joints of ambulatory leg.
 7. " " Propodos.
 8. " " False leg.
 9. " " Spines of false leg.
 10. *Paranymphon spinosum*, Caullery. Last segment of body, showing abdomen and remarkable processes from the lobes of the body.
 11. " " Portion of two lobes of the body covered with remarkable appendages.
 12. " " One of the appendages highly magnified.
 13. " " A cheliforus.
 14. " " Last joints of an ambulatory leg.

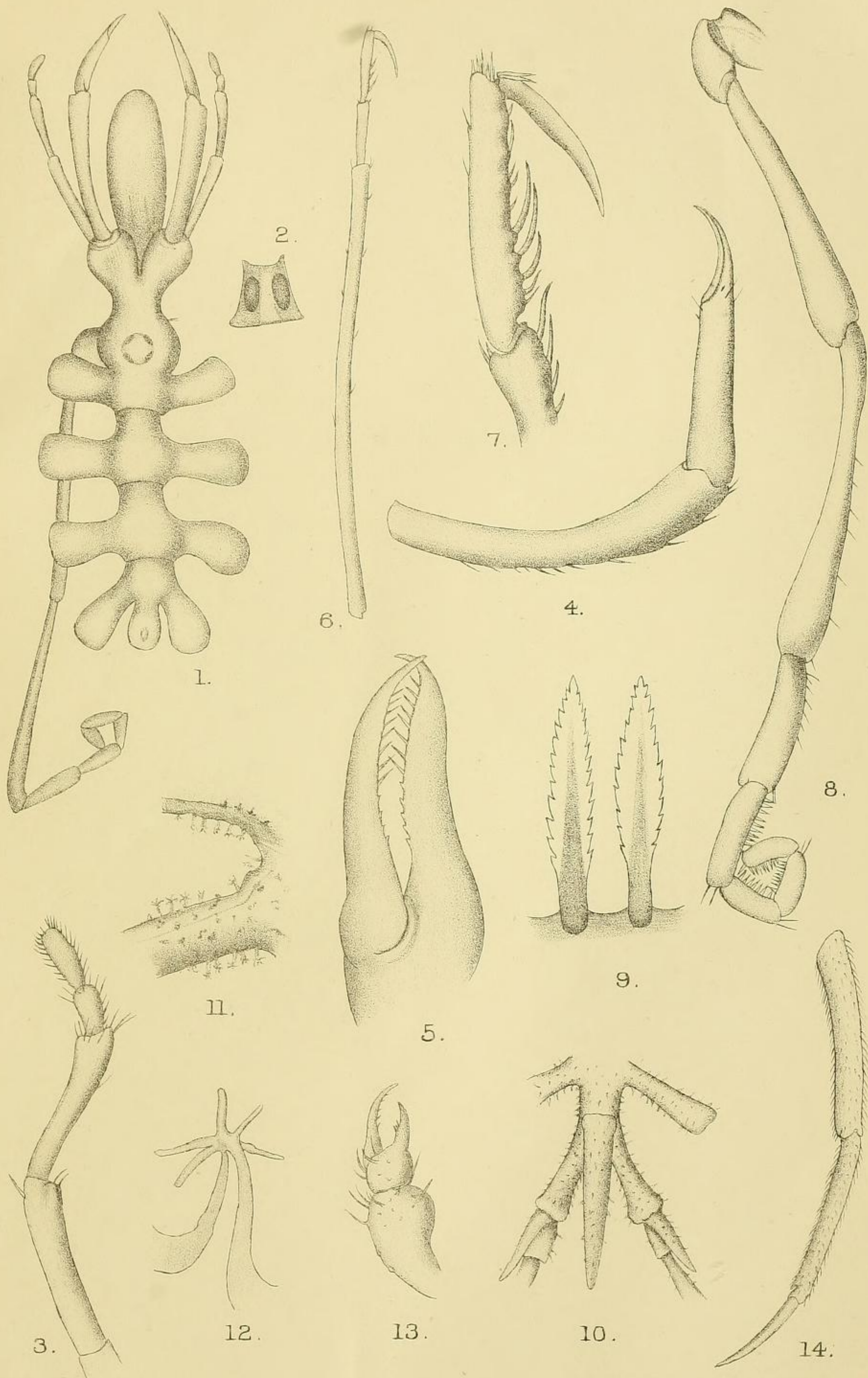


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