XV.—REPORT ON THE PYCNOGONIDA OF NEW ENGLAND AND ADJACENT WATERS.

By Edmund B. Wilson.

It is intended to give in this report an account of our present knowledge of the species of Pycnogonida known to occur upon the coasts of New England and Nova Scotia, comprising descriptions and figures of all the forms, and an account of their geographical and bathymetrical distribution. Although the work is mainly systematic, and has been done with special reference to supplying a basis for satisfactory determinations of the genera and species, and their distribution, it has been thought best to give also a brief general account of the structural peculiarities and general natural history of the group. In so doing I have drawn largely from the works of several other writers; and especially from those of Dr. Anton Dohrn, who has made a careful study of the anatomy and embryology of these animals. It should be borne in mind that the structure of the Pycnogonida is, as yet, not well understood, and that further research is needed to fully explain the anatomy and systematic relations of this peculiar and perplexing group. To make the report as complete as possible, it has been made to include not only the collections of the Fish Commission, but also those made by various other parties since the year 1864. The parties referred to were as follows: Expedition of 1864, Professors A. E. Verrill and S. I. Smith; Expedition of 1868, the same with the addition of Professor H. E. Webster and Mr. Geo. A. Jackson; Expedition of 1870, Professor Verrill with Mr. Oscar Harger and Mr. C. H. Dwinelle. The Pycnogonida from these sources, with those of the Fish Commission collections, are at present preserved in the Peabody Museum of Yale College, where they have been studied. I take pleasure in here expressing my great obligations to Professors Verrill and Smith; I am also indebted to Professor Carl Semper for specimens of several European species.

The Pycnogonida form a small and very natural group of articulated animals, which are all marine, have a very wide geographical distribution, and are found at all depths from low-water mark down to many hundred fathoms. Although forming a small and inconspicuous group, they possess a special interest from peculiarities in their structure and development; and though some of the species have been carefully studied by competent observers, opinion is yet divided as to the exact position they should occupy in the zoological system. By some writers

they are referred to the Crustacea, by some to the Arachnida, while others place them in a group distinct from both. In some respects they must be regarded as intermediate between these groups; and hence to trace their homologies, especially those of the appendages, is a matter of considerable difficulty. Some of the hairy species bear a close general resemblance to spiders, which has given rise to their common name of *sea-spiders*. Their anatomical structure is, however, very different from that of the spiders, and in their sluggish movements and parasitic habits they are still more unlike those active and predacious animals. Most of the species cling to other animals, such as sponges, sea-anemones, and particularly tubularian and other hydroids; upon these animals they probably in part feed, sucking their juices by means of the large proboscis or rostrum, though their food apparently consists also of more solid matters. They are remarkable, as a whole, for the reduction of the abdomen, and the great development of the legs, which sometimes have an extent equal to nine or ten times the length of the body; the abdomen is always aborted, so as to often appear like a mere tubercle, and, with the exception of one or two forms where it is bi-articulate, it is not divided into segments. The body shows exteriorly four segments, exclusive of the rostrum and abdomen; these segments expand laterally into prominent processes, which may readily be mistaken for the basal joints of the legs, to which they give attachment. The abdomen arises from the posterior segment, from which it is not, as a rule, separated by segmentation. It is usually directed more or less upwards; at its extremity is the anus, usually in a deep cleft.

The most anterior pair of appendages, which are wholly wanting in a few forms (*Pycnogonum*, etc.), are here regarded as antennæ, a view which seems to me to be justified by their position and the origin of their nerves; by many writers they are, however, considered to be post-oral, and as probably representing mandibles. In the higher forms they are three-jointed and usually forceps-like or 'chelate,' in other genera two-jointed, and a recently described genus (*Tanystylum*), with the antennæ composed of a single joint, completes the transition to those forms in which antennæ have quite disappeared. It may be here mentioned that antennæ are invariably present in the larva, so far as known; and that they are then always three-jointed and chelate, their subsequent disappearance in certain forms being apparently a case of "retrograde development." Below the antennæ is the large proboscis or rostrum, at the extremity of which is the mouth; this is triangular in shape, and is sometimes furnished with three denticulated organs not very unlike the jaws of a leech. Within this rostrum is a large cavity, continuous posteriorly with the œsophagus, and containing a complicated apparatus for masticating food; this consists of a great number of chitinous bars lying transversely in the walls of the cavity and giving attachment to numerous setæ, usually bifid at their tips, which extend forward toward the mouth. Posterior to these are found in some spe-

cies, according to Zenker, horny denticles by which food may be still further comminuted. The homologies of the rostrum are not well understood. It is regarded by Huxley as representing the coalesced cheliceræ and pedipalpi, like that of the Acarina; and Latreille states that in a large species of *Phoxichilus* from the Cape of Good Hope he found longitudinal sutures in the rostrum, so that it appeared as if consisting of the "Labrum, lingua and two jaws united together." Other writers have regarded it as the head, etc. It seems to me that a study of the embryology does not confirm these views, for the rostrum in its early stages presents no trace of sutures or other evidence of its composite nature, but arises as a simple protuberance between the bases of the antennæ. Posterior to the antennæ, and at the sides of the rostrum, are, in many genera, a pair of so-called 'palpi,' which are composed of five to nine joints, and are sometimes furnished with plumose hairs that undoubtedly have a tactile function. The third pair of appendages, which are wanting in the females of certain species, have been termed 'ovigerous legs,' from their office, in the male, of bearing the egg-masses, it having been formerly supposed that the females never possessed them. This term is, however, inappropriate when applied to the female appendages, and it seems preferable to term them *accessory legs*, as certain writers have done, at least until their homologies are better understood. The legs proper are eight in number, and are, as already mentioned, remarkable in many species for their great length. They are composed of nine joints, of which the last, or dactylus, is claw-like and forms, in some species, a sub-cheliform hand with the preceding joint or propodus. In certain genera the dactylus is armed with two movable auxiliary claws, articulated to its upper side near the base; their presence or absence forms a valuable generic character.

The stomach always sends out long prolongations into the legs and antennæ, and sometimes, also, rudimentary ones to the palpi and accessory legs. These diverticula exhibit active peristaltic movements, which drive the food rapidly back and forth and thoroughly distribute it. The movement is plainly visible in some species of *Nymphon*, and is an interesting sight. The stomach-walls contain numerous muscular fibres and are somewhat glandular, but no liver or other special secretory organ is known to exist. The circulatory system is very simple and has been detected in only a few species. It consists of a tubular dorsal vessel, with lateral paired openings for the ingress of the blood. Claparède figures in "*Phoxichilidium*" *cheliferum* a distinct aorta, which divides anteriorly into two trunks, emptying into the body-cavity. I have observed in *Nymphon grossipes* a dorsal pulsating organ, which I believe to be the heart. In the same specimen the perivisceral circulation was also seen. No special respiratory organs have been observed with certainty, though *Phanodemus* and *Oomerus* were described as possessing tracheal (?) openings; it seems improbable that this is their true nature, more especially since the tracheæ which should communicate with them have

not been detected. The nervous system is well developed, consisting of a supra-œsophageal ganglion connected by commissures with a series of four large ventral ganglions. The former lies immediately beneath the oculiferous tubercle, to which it sends large nerves; and from it are also derived the nerves of the antennæ, palpi, rostrum, and accessory legs (Zenker). It seems probable, in view of the different origin of their nerves, that the accessory legs are not, as often supposed, branches of the first pair of ambulatory legs, but that they represent a pair of distinct appendages. Moreover, they are sometimes distinctly separated from the first pair, which is notably the case in a peculiar genus from Japan, apparently belonging to the genus *Ascorhynchus* Sars.

The sexes are separate, and the reproductive organs extend far out into the legs; their orifices are upon the lower side of the second joints in all the legs. Reference has already been made to the habit of carrying the egg-masses, followed by the male. These egg-bearing forms were long supposed to be females, but it has been conclusively shown by Cavanna, and subsequently by Dohrn, that they are males. The same fact was also noted in one or two species by Semper and Hoek. I have been able to confirm this in nearly all of our species by examination of the contents of the reproductive organs. In the fourth joint of each leg, in the male, is a large glandular organ, discharging by a number of openings arranged in an irregular row along the inferior side of the joint. Dohrn surmises that the secretion of this organ serves as a cement by which the eggs, when discharged by the female, are glued into a ball and attached to the accessory legs of the male.

Kröyer, Dohrn, and others have carefully studied the embryology. The eggs are collected into round masses upon the accessory legs and thus carried about by the male until after the escape of the embryos so that his body is often covered with the curious young. Segmentation of the yolk is complete. Prominences then appear upon the lower side of the embryo, one of which ultimately becomes the rostrum, and the others form three pairs of appendages, representing the future antennæ, palpi, and accessory legs. The condition of the larval antennæ has been already referred to. In most forms the embryo escapes from the egg with only these three pairs of appendages; but a species of *Pallene*, studied by Dohrn, passed through no metamorphosis, leaving the egg provided with the full number of appendages.

The species of the genus *Phoxichilidium* are remarkable for passing their early larval stages within the digestive cavities of certain tubularian hydroids (*Hydractinia*, etc.), six or eight of them sometimes living together within a single polypite. How they take up residence in the body of their involuntary host has not been observed, but they have been seen to escape by crawling out through the mouth.

The Pycnogonida, as a whole, have never been very carefully studied by systematic zoologists, though the observations of Dohrn, Quatrefages, Zenker, and others have given us a tolerably full knowledge of their

anatomy and, in some cases, of their embryology. The systematic work has, with few exceptions, been unsatisfactory and confusing, owing to the paucity of generic and specific characters, the great variation of some species, the difficulty of obtaining large series of specimens, and the want of detailed descriptions. Though the specific characters are well marked, the general resemblance is so close in certain genera (*e. g.*, *Nymphon*, *Phoxichilidium*) as to render close examination necessary for the proper determination of the species. For this reason it is quite impossible to determine, from the descriptions, to what species some of the older names should be applied; and hence, as a rule, only such references are given in the synonymy as refer to figures or full descriptions.

The North American species have hitherto received little attention. Leach described an *Ammothea* from Carolina, and Stimpson another species of this genus from Puget Sound. Thomas Say described, in 1821, from Charleston, S. C., the genus *Anaphia*, of which he had one species (*A. pallida*) represented by three specimens. In 1853, Stimpson enumerated five species in his "Invertebrata of Grand Manan," of which four were described as new. In addition to these, three or four species are mentioned, accompanied in some cases by brief notes, in papers by Professors Verrill, Smith, Packard, and others. The "*Pasithoe*" described by Dr. Gould (Proc. Bost. Soc. Nat. Hist., vol. i, p. 92) is indeterminable. With two exceptions, the species here described were fully figured and characterized in a preliminary paper by the author, entitled "A Synopsis of the Pycnogonida of New England" (Trans. Conn. Acad. Sci., vol. v, pp. 1–26).

The genera known to me are included in the following table, those occurring on the New England coast being indicated by an asterisk. It should be noted that the table is in part compiled from descriptions, some of which are very imperfect. In cases where I have been unable to find the exact characters, an interrogation mark is placed after the name. There is need of a revision of the present genera, which can only be effected by the study of a large collection from all parts of the world.

I have been unable to ascertain the characters of the genus *Gnamptorhynchus* recently described by Böhm, and have therefore not included it in the table.

A. Antennæ present and chelate.
  a. Palpi present. (*Nymphonidæ*).
    b. Auxiliary claws present.
      (1). Accessory legs 11-jointed. Palpi 5-jointed.....**Nymphon* Fabr.
      (2). Accessory legs 9-jointed. Palpi 8-jointed.....**Ammothea* Leach.
      (3). Stigmata present (?) Accessory legs 3-4 (?) jointed. Palpi 3-jointed. *Phanodemus* Costa.
    bb. Auxiliary claws wanting.
      (1). Accessory legs 11-jointed. Palpi 10-jointed.....*Decolopoda* Eights.

aa. Palpi wanting. (*Pallenidæ*).
b. Auxiliary claws present.
(1). Accessory legs 9-jointed ..... **Pallene* Johnston.
(2). Accessory legs 5-jointed..... **Phoxichilidium* M. Edwards.
bb. Auxiliary claws wanting.
(1). Accessory legs 11-jointed ..... **Pseudopallene* Wilson.
(2). Accessory legs 6-jointed ..... **Anoplodactylus* Wilson.
(3). Accessory legs ? — jointed. Stigmata present (?)..... *Oomerus* Hesse?

B. Antennæ present, simple.
a. Palpi present. (*Achelidæ*).
b. Auxiliary claws present.
(1). Antennæ 3-jointed. Accessory legs 9-jointed. Palpi 8-jointed. *Oicebathes* Hesse.
(2). Antennæ 2-jointed. Accessory legs 10-jointed. Palpi 9-jointed. **Achelia* Hodge.
(3). Antennæ 1-jointed. Accessory legs 10-jointed. Palpi 6-jointed. *Tanystylum* Miers.
(4). Antennæ 1-jointed. Accessory legs 10-jointed. Palpi 9-jointed. *Carniger* Böhn.

bb. Auxiliary claws wanting.
(1). Antennæ 3-jointed. Accessory legs 10-jointed. Palpi 10-jointed. *Eurycide* Schiödte.
(2). Antennæ 2-jointed. Accessory legs 9-jointed. Palpi 5-jointed. *Pariboea* Costa.
(3). Antennæ 2-jointed. Accessory legs 8-jointed. Palpi 9-jointed. *Ascorhynchus* Sars.
(4). Antennæ 2-jointed. Accessory legs 10-jointed. Palpi 9-jointed. *Parazetes* Slater.
(5). Antennæ 2 (?)-jointed. Accessory legs 6-jointed. "Palpi 3-jointed." (1) *Pephredo* Goodsir?

C. Antennæ wanting.
a. Palpi present. (*Pasithoidæ*).
b. Auxiliary claws present.
(1). Accessory legs 9-jointed. Palpi 8-jointed ..... *Pasithoe* Goodsir.
(2). Accessory legs 9-jointed. Palpi 7-jointed ..... *Endeis* Costa.
bb. Auxiliary claws wanting.
(1). Accessory legs 10-jointed. Palpi 9-jointed. (2) *Rhopalorhynchus* Wood-Mason.

aa. Palpi wanting. (*Pycnogonidæ*).
(1). Auxiliary claws present. Accessory legs 7-jointed .... *Phoxichilus* Latreille.
(2). Auxiliary claws wanting. Accessory legs 10-jointed. **Pycnogonum* Brunnich.

(1). It is impossible to ascertain from Goodsir's original description exactly what are the characters of this genus.
(2). I cannot distinguish *Colossendeis* Jarzynsky from this genus.

The family characters must be regarded as still doubtful. Originally, all the forms were included by Latreille in a single family, the *Pycnogonidæ*. Subsequently those genera with antennæ were separated as *Nymphonidæ*. Dr. Semper has divided the latter into the *Nymphonidæ* with chelate antennæ, and the *Achelidæ* with simple antennæ; and in my "Synopsis" (*l. c.*) those genera with chelate antennæ, but without palpi (*Pallene*, *Phoxichilidium*, etc.), were characterized as *Pallenidæ*. A further division seems to me necessary, in the removal from the *Pyc-*

nogonidæ of those forms which possess palpi; and for this group the name *Pasithoidæ* may be used. The families will then stand as follows:

A. Antennæ present and chelate.
  Palpi present ..... *Nymphonidæ.*
  Palpi wanting ..... *Pallenidæ.*
B. Antennæ present, simple ..... *Achelidæ.*
C. Antennæ wanting.
  Palpi present ..... *Pasithoidæ.*
  Palpi wanting ..... *Pycnogonidæ.*

This arrangement is, it is true, somewhat artificial, but it affords a convenient division of the genera, and may, for the present, be retained.

Following, is a systematic account of the genera and species.

Family I, PYCNOGONIDÆ.

PYCNOGONUM Brünnich.

Body very broad and stout. Antennæ and palpi wanting. Accessory legs ten-jointed, wanting in the female. Legs stout, dactylus without auxiliary claws.

Pycnogonum littorale (Gröm) O. Fabr.

Phalangium littorale Ström, Söndmör, p. 209, Pl. I, fig. 17, 1762.

Acarus marinus Pallas, Misc. Zool., p. 188, Pl. XIV, figs. 21–23, 1766.

Pycnogonum balænarum L., Syst. Nat., ed. XII, I., p. 1028, 1767.—Chr. Fabr., Ent. Syst., vol. iv, p. 416, 1794.—Latreille, Hist. Nat. des Crust. et des Insectes, Tom. vii, p. 332, 1804.—Gen. Crust. et Insect., Tom. i, p. 144, 1806.

Pycnogonum littorale O. Fabr., Fauna Grönlandica, p. 233, 1780.—Abilgaard in O. F. Müller, Zool. Dan., Volumen 3, p. 68, Pl. CXIX, figs. 10–12, 1789.—Cuvier, Règne Animal, Arachnides, Pl. 21, figs. 1 to 1*d*.—Milne-Edwards, Hist. Crust., vol. iii, p. 537, Pl. 41, fig. 6.—Johnston, Mag. Zool. and Bot., vol. i, p. 376, Pl. XIII, figs. 1–3.—Kröyer, Nat. Tidss., 1ste Bind, 2det Hæfte, p. 126.—Isis, Jahrg. 1846, Heft vi, p. 442.—Voy. en Scand., Laponie, etc., Crust., Pl. 38, figs. 4*a–e*.—Norman, Rept. of the Brit. Assoc. for the Advancement of Sci. for 1868, p. 301.—Whiteaves, Ann. and Mag. Nat. Hist., Nov., 1872, p. 347; Rept. of a second Deep-sea Dredging Exp. to the Gulf of St. Lawrence [in 1872], p. 15 [Montreal, 1873 ?].—Möbius, die wirbellosen Thiere der Ostsee, p. 153, 1873.—Hoek, Niederländisches Archiv für Zool., Band iii, 3tes Heft, p. 236, Pl. XV, figs. 1–3, 1877.—Verrill, Amer. Journ. Sci., vol. x, p. 38, 1875.—Smith and Harger, Trans. Conn. Acad., vol. iii, p. 10, 1874.—Wilson, Trans. Conn. Acad., vol. v, p. 4, Pl. I, figs. 1 *a–b*, Pl. II, figs. 3 *a–b*, July, 1878.

Pycnogonum pelagicum Stimpson, Invertebrata of Grand Manan, p. 37, 1853.—Verrill, Amer. Journ. Sci., vol. vii, p. 502, 1874.

? *Pychnogonum littorale* Nicolet, in Gay, Historia fisica y politica de Chile, Zoologia, p. 308, Pl. 4, fig. 8, 1854.

PLATE I, FIGURES 1 TO 3.

Body very broad and flat. Lateral processes with scarcely any interval between them. Neck somewhat constricted, but broad and stout. Each segment has a prominent conical tubercle in the median line above, and one or two less prominent ones on each lateral process.

Oculiferous tubercle prominent, broad and rounded. Eyes black widely separated, remarkably small. Abdomen slender, decidedly clavate, truncated at the extremity. Rostrum large, slender, basal half slightly swollen, outer portion attenuated, truncated at the tip. There is a slight constriction near the middle and another near the extremity, which give it a distinctly sinuous outline.

Accessory legs very small and slender, composed of nearly equal short articulations, the first five of which are somewhat shorter than the others; the terminal joint is pointed and slightly curved; the outer joints bear a few small stout spines.

Legs very stout; the three basal joints are short and thick, the first with two or three obtuse prominences above; fourth about twice the second, with one or two prominent tubercles at the distal extremity above; fifth similar, but not so much produced distally; seventh joint or tarsus very short and nearly triangular; eighth (propodus) narrow, somewhat curved; dactylus nearly half as long as the propodus, very stout.

Many of the joints bear very short hairs, which are densely set on the inferior side of the tarsus and propodus. The entire surface of the animal is covered with very small rounded tubercles, which give it a scabrous appearance. Color light yellowish brown to dark brown, the legs often blackish near their extremity.

Length 16 millimeters; extent 38 millimeters.*

This species has a wide range. Phillippi records it from Naples, and it appears to be common along the whole northern coast of Europe. Nicolet described and figured a form from Chili which is certainly very closely allied to, if not identical with, ours, and Mr. Henry H. Sclater informs me that he has received specimens of a variety of this species from Japan. Dr. Böhm reports a single specimen from Kerguelen Island. On our coast it ranges, so far as now known, from Long Island Sound to the Gulf of St. Lawrence (*Whiteaves*), though its occurrence south of Cape Cod is exceptional. In the Bay of Fundy it is not uncommon under stones at low-water mark, and it extends down to 430 fathoms. It is sometimes found clinging to actinias; at Eastport, Me., 17 specimens were taken from *Bunodes stella*, growing on the rocks near low-water mark; and off Cape Sable, N. S., they were found in considerable numbers attached to the base of *Bolocera Tuediæ*.

A comparison of specimens from the Gulf of Maine and from Eastport, Me., with specimens from Valentia, Ireland, received by the museum of Yale College from the Rev. A. M. Norman, leaves no doubt of their identity. Stimpson's *P. pelagicum* is evidently only the immature form.

In my "Synopsis" (*l. c.*) reference was made to Dr. Hoek's observation of the presence of accessory legs in the male and their absence in the female of this species. As

* The length includes the rostrum and abdomen. The extent is the distance from tip to tip of the outstretched legs.

it has been recently shown that in all cases where accessory legs are possessed by only one sex, this is the *male* and not the *female*, this observation was, of course, correct; though Dr. Hoek did not extend it to the other species examined by him.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens.	Dry. Alc.
						No. and sex.	
4762	Long Island Sound; off Race Point Rock.	50	Shells, gravel, rock.	——, 1874	U. S. Fish Com.	1 ♂ O	Alc.
4979	Nantucket Shoals...	18–21	.....	Sept. —, 1874	....do	1 ♂	Alc.
5006	Massachusetts Bay; 1 mile south from Gloucester.	19	Rocks, sand..	——, 1878	....do	1 ♀	Alc.
4913	Gulf of Maine; 13½ miles S. E. from Cape Ann.	90	Soft mud.....	——, 1878	....do	1 ♀	Alc.
4761	14 miles N. E. from Cape Ann.	35	Stones, gravel	——, 1873	....do	1 ♂	Alc.
4933	20 miles E. from Cape Ann.	110	Soft mud....	——, 1878	....do	4 ♀	Alc.
4934	27 miles E. from Cape Ann.	85	Sandy mud, gravel.	——, 1878	..do	5 ♂, 5 ♀	Alc.
4920	Gulf of Maine; Cashe's Ledge.	52-90	Rocks	——, 1873	....do	1 ♀	Alc.
4764	E. from George's Bank; 41° 25′ N., 65° 42.3′ W.	430	....	Sept. 15, 1872	....do	3 ♂	Alc.
4763	Eastport, Me.; off Cherry Island.	20–25	....	——, 1872	....do	2 ♂, 2 ♀	Alc.
4760	Eastport, Me.; Johnson's Bay.	12	Rocks	——, 1872	....do	2 ♂	Alc.
4758	Eastport, Me.....	20	....do	——, 1872	....do	5 ♂, ♀	Alc.
4756	....do	L. w.	.....	——, 1872	....do	4 ♂, 7 ♀	Alc.
4754	....do	L. w.	.....	——, 1870	Expedition '70	6 ♂, 2 ♀	Alc.
4918	....do	L. w.	.....	Aug. 18, 1868	Expedition '68	4 ♂, 2 ♀	Alc.
4750	Eastport, Me.; on *Bunodes*.	L. w.	Rocks	——, 1864	Expedition '64	17 O	Alc.
4753	Eastport, Me.....	.....	.....	——, 1864	Expedition '64	1 ♂	Alc.
4706	W. from Brown's Bank; 42° 49′ N., 66° 19′ W.	82	Hard..	——, 1877	U. S. Fish Com	2 ♂, 15 ♀ ...	Alc.
4767	About 26 miles S. E. from Cape Sable, N. S.	59	Rocks	——, 1877	....do	2 ♂, 1 ♀	Alc.
4768	About 30 miles S. E. from Cape Sable, N. S.	91	Very fine sand	——, 1877	....do	1 ♀	Alc.
4765	About 44 miles S. E. from Cape Sable, N. S.	88	....do.....	—— —, 1877	....do	2 ♂, 13 ♀ ...	Alc.

Family II, ACHELIDÆ.

TANYSTYLUM Miers.

Body broad and stout. Antennæ rudimentary, one-jointed. Palpi six-jointed. Accessory legs ten-jointed, present in both sexes. Legs stout, dactylus with auxiliary claws.

Tanystylum orbiculare Wilson.

Trans. Conn. Acad., vol. v, p. 5, Pl. II, figs. 2 *a* to 2 *f*, Aug., 1878.

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

Pallene, sp., Smith in Report on the Invertebrata of Vineyard Sound, p. 550 (544).

PLATE III, FIGURE 11.

Body orbicular, deeply incised between the lateral processes, which are in close contact. Oculiferous segment extremely broad, neck not

evident. Oculiferous tubercle large and rounded. Eyes black. Abdomen rather large, tapering, truncated, and slightly bifid at the extremity; it usually projects vertically upward.

Rostrum very large, rounded-conical, little constricted at the base, somewhat shorter than the body.

Antennæ rudimentary, consisting of a single knob-like joint, which is thinly covered with hairs.

Palpi slightly longer than the rostrum; the first, second, fourth, and fifth joints are nearly equal, and about as long as broad; the third and sixth are nearly equal, and about twice the others. The outer joints are somewhat hairy, the terminal one most so.

Accessory legs about half as large in the female as in the male. In the latter the basal joint is somewhat swollen and about as long as broad. The second, fourth, and fifth are nearly equal, and longer than the third; the remaining joints are short, decreasing in size to the last, which is very small. In the male the proportions are nearly the same, but the third joint is proportionally longer, and all of the others are more robust. The three outer joints are nearly globose, the terminal one minute. This joint bears, in both sexes, two spines, one of which is sometimes bifid at the tip. Other spines occur on the four preceding joints and are sometimes bifid.

Legs rather stout, sparsely hairy, the fifth and sixth joints having, above, alternate depressions and elevations, producing a deeply sinuous outline; each of these elevations bears a number of hairs. The three basal joints are very stout and short; the three following are each about equal to the three basal joints united; tarsus nearly triangular, with two or three stout spines below; propodus strongly curved, with a series of stout curved spines on the lower margin, on the upper side hairy; dactylus more than half the propodus, stout and curved; auxiliary claws about half as long as the dactylus.

Color of alcoholic specimens light yellowish brown. Length 1.5 millimeters; extent 6.4 millimeters.

The egg-masses are three or four in number and of a light yellow color. In some specimens the embryos had escaped from the eggs; they closely resemble those of *Achelia*, described on p. —, and the antennæ are large and chelate.

This genus, recently described by Miers from specimens collected at Kerguelen Island, is interesting from the extreme reduction of the antennæ, thus offering a transition from the *Achelidæ* to the *Pasithoidæ*.

T. orbiculare extends from off Martha's Vineyard to Virginia; it is almost invariably found upon Hydroids or Ascidians growing on piles of wharves, etc., and down to 14 fathoms.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
	Off Point Comfort, Va.	.....	Mud	—— —, 1877	S. F. Clarke ...	1 ♂, 1 ♀	Alc.
4916	Brooklyn, N. Y	.....	.....	.....	D. C. Eaton	2.....	Alc.
	New Haven, Conn ..	.....	On piles	.....	S. I. Smith.....	1 ♀	Alc.
4772	Fisher's Island Sound.	10-12	....	July 13, 1874	U. S. Fish Com.	1 ♀	Alc.
5018	Off Stonington, Conn	.....	....	—— —, 1874	....do	1 ○	Alc.
4770	Vineyard Sound	14	....	—— —, 1871	....do	1 ♂, 2 ♀	Alc.
4774	Off Martha's Vineyard.	.....	....	.....	....do	6 ♂, 7 ♀, 2 ○.	Alc.

ACHELIA Hodge.

Body broad. Antennæ small, two-jointed, not chelate. Palpi eight-jointed. Accessory legs ten-jointed, present in both sexes. Legs stout; dactylus with auxiliary claws.

Achelia spinosa (Stimp.) Wilson.

Trans. Conn. Acad., vol. v, p. 7, pl. ii, figs. 1*a* to 1*k*, Aug., 1878.
Zetes spinosa Stimpson, Invertebrata of Grand Manan, p. 37, 1853.

PLATE I, FIGURE 4; PLATE II, FIGURE 8.

Body nearly orbicular, deeply incised, segments not apparent. Lateral processes separated by a distinct interval. Neck distinct, but very broad. Oculiferous tubercle large and prominent, acute. Eyes ovate, black. Abdomen very long and slender, bifid at the tip.

Rostrum large, thickest in the middle and tapering to both ends, truncated at the extremity.

Antennæ not quite half the rostrum. The basal joint is about four times as long as broad, somewhat swollen near the extremity, where there are two or three tubercles, each terminated by a stout hair. Second joint rounded and knob-like, with one or two hairs.

Palpi slightly longer than the rostrum; the first, third, and four outer joints are very short, the first somewhat swollen; the second and fourth are much longer and nearly equal; all but the basal joint are hairy, the four outer ones only on the exterior margin.

Accessory legs in the male rather large. The two basal joints are short and stout, followed by three longer and more slender ones. The remaining five are much shorter, the terminal one very small and nearly globular; it bears two very large flattened denticulated spines; each of the two preceding joints has a similar spine; the outer joints are sparsely hairy, most of the hairs pointing backward. In the female this appendage is much smaller and proportionally stouter; the two basal and five distal joints are nearly as in the male, but the third, fourth, and fifth are much shorter and stouter.

Legs rather long; the three basal joints are short and stout, the second longest; the three following joints are nearly equal, each about as long as the three basal joints united; tarsus small, about one-fourth the propodus; the latter is strongly curved and armed below with a series of short stout spines; dactylus about half the propodus, stout and curved; auxiliary claws more than half the dactylus. The entire surface of the legs and body is scabrous with numerous pointed hairy tubercles often tipped with spines; the lateral processes of the body have three or four of these tubercles near the exterior margin; the largest are on the basal joints of the legs; on the other joints they are much smaller. The legs are throughout hairy and most of the hairs are borne on prominent tubercles. Color of alcoholic specimens light brown. Length 2.6 millimeters; extent 8.4 millimeters.

The egg-masses of a male specimen from Eastport, Maine, contain embryos recently escaped from the egg. The antennæ of these are enormously large and strongly chelate. The basal joint bears, at its extremity, on the outer side, a long spine. The two remaining appendages consist of two basal joints and a long, slender, acute terminal one, bearing a spine near its middle. The body is nearly hemispherical and without trace of segmentation. Rudiments of the eyes have appeared. The rostrum is rounded-conical and much smaller than in the adult.

There can be, I think, no doubt of the identity of this form with Stimpson's *Zetes spinosa*. Its most closely allied European representative is *A. echinata* Hodge [Annals and Magazine of Natural History, 3d series, vol. xiii, No. lxxiv, p. 115, pl. xii, figures 7–10, 1864], and I at first thought it was identical with that species. A comparison of *A. spinosa* with three specimens of *A. echinata* from Heligoland, received from Professor Semper, shows the two species to be perfectly distinct. The latter species has a slender, tapering rostrum of a very different shape; the peculiar conical spinous tubercles upon the legs are much more numerous, larger, and more slender; the abdomen is much shorter and stouter. Moreover, in *A. echinata* the second joint, in at least the two posterior pairs of legs, has a very prominent, rounded, hairy tubercle, projecting from the lower and posterior side, which is wanting in our species.

This species ranges from Grand Manan, N. B., to Block Island Sound, though it appears to be peculiarly a northern form, being represented south of Cape Cod, thus far, by a single specimen. At Eastport, Me., it is very common upon Hydroids, Ascidians, and other animals, and under stones near low-water mark; in Casco Bay it is also frequently found under similar circumstances. A single specimen was dredged by the U. S. Fish Commission, off Block Island, August 30, 1874, 34 fathoms, mud, which is the most southern locality recorded, and also the greatest depth.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4785	Off Block Island	34	Mud	Aug. 30, 1874	U. S. Fish Com.	1 ♀	Alc.
	Ram Island Ledge, Casco Bay.	L. w.	Rocks	—— —, 1873	....do	17 ♂, 12 ♀	Alc.
4775	Eastport, Me	L. w.	....do	—— —, 1868	Expedition '68	1 ♂, 1 ♀	Alc.
	....do	L. w.	....do	—— —, 1870	Expedition '70	8 ♂ ♀	Alc.
4780	....do	20	....do	—— —, 1872	U. S. Fish Com.	1 ♀	Alc.
4781	....do		....do	—— —, 1872	....do	3 ♂, 4 ♀, 2 ○	Alc.

Achelia scabra, *sp. nov.*

Body nearly orbicular, without distinct segmentation. Lateral processes comparatively short and stout, scarcely separated from each other; all except the posterior pair have two prominent conical spinous tubercles on the upper side near the outer margin; there is a similar but larger tubercle on each side of the neck, anterior to the first lateral process. Oculiferous tubercle obtuse, very large and stout; eyes large and conspicuous, black. Abdomen long and slender, constricted in the middle, bifid at the tip; along the sides it is somewhat spinous.

Rostrum large and stout, obtusely rounded-conical.

Antennæ extending to about the middle of the rostrum, very stout; basal joint about two and a half times as long as broad, second joint very short and stout, ovoid.

Palpi nearly as in *A. spinosa*. The hairs upon the exterior margin of the distal joints are very stout and close-set.

Accessory legs also much like those of *A. spinosa*, and presenting similar sexual differences; in the female they are much smaller, and with the third, fourth, and fifth joints much shorter than in the male; the terminal joint is, in both sexes, very minute.

Legs rather long, very rough and tuberculose, so that the outlines, particularly of the outer joints, are very irregular; tarsus very short and small, propodus stout and curved, dactylus two-thirds the propodus; auxiliary claws very slender and small, scarcely one-fifth the dactylus. This latter joint has upon the lower (concave) margin three stout, curved, divergent spines, at the basal angle, followed by an irregular series of smaller ones. The tarsus is also armed, upon its lower side, with a number of spines.

The whole surface of the legs and body is rough and scabrous; many of the larger tubercles upon the legs are tipped with stout hairs or slender spines; but these are nearly wanting on the three basal joints, and are everywhere less numerous and conspicuous than in *A. spinosa*. Color in alcohol, dirty white. Length 2.3 millimeters.

This species, which I at first mistook for *A. spinosa*, is represented by only two specimens, as follows:

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from-	Specimens. No. and sex.	Dry. Alc.
4936	Cape Ann, N. N. W., 15 miles.	23	Gravel stones	—— —, 1878	U. S. Fish Com.	1♂	.....
4935	St. George's Banks..	45	....	—— —, 1873	....do	1♀	.....

The following are the most important points in which it differs from *A. spinosa*: The lateral processes are much shorter and in close contact, the three basal joints of the legs almost entirely lack the spinous tubercles characteristic of that species; the antennæ are much stouter, the rostrum stouter and less constricted at the base, and the auxiliary claws are less than half as large; (this last character affords the readiest means of distinguishing the two species.)

Family III, PALLENIDÆ.

PALLENE Johnston.

Body comparatively stout. Rostrum short, rounded. Antennæ robust, three-jointed, chelate. Palpi wanting. Accessory legs nine-jointed, present in both sexes. Legs very long; dactylus with auxiliary claws.

Pallene empusa Wilson.

Proc. Conn. Acad., vol. v, p. 9, Pl. III, figs. 2 *a* to 2 *g*, August, 1878.

PLATE II, FIGURES 5 to 7.

Body robust, smooth, distinctly segmented. Lateral processes well separated. Neck long, very slender at base. Oculiferous tubercle subacute, small, but prominent. Abdomen very small and short.

Rostrum nearly hemispherical, evenly rounded, smooth.

Antennæ sparingly hairy, short and stout. The opposable edges of the second and third joints are coarsely toothed, the teeth evenly rounded, so that the outline is deeply sinuous. There are about seven of these on the second joint, and many more, smaller ones, on the dactylus.

Accessory legs in the male about one-third the legs; the third joint is curved and about equal to the two basal joints united. Fourth joint considerably longer than the third, suddenly expanding at its distal extremity below; the five remaining joints are much shorter and nearly equal; the terminal one smoothly rounded at the extremity; each of the outer four joints is armed with a series of seven or eight spines; these are very broad and thin, with minute slender teeth, which do not extend to the base and are usually terminal; some of the spines are truncated, others smoothly rounded at the extremity. In the female the appendage

is considerably smaller, the third and fourth joints are much shorter and stouter, and the latter is not expanded at the extremity.

Legs enormously long, over four times the length of the body, very slender near the base, much stouter distally; the first and third joints are short, the second much longer, about five times the first; the three following are much longer and very stout; the fourth is usually distended by the generative organs; tarsus very short and nearly triangular; propodus nearly straight and very slender; it is very narrow at the base, expanding to two and a half times this width, near the extremity; on the inferior side, near the base, are four or five stout spines, followed by a series of much smaller and more slender ones; dactylus slender, more than half the length of the propodus; auxiliary claws slender, two-thirds as long as the dactylus. The legs bear a few scattered stout hairs, most numerous distally. Length 1.5 millimeters; extent 13 millimeters. Color in alcohol, white.

This interesting species is closely similar to the European *P. brevirostris* Johnston, the type of the genus, and it is possible that a larger series of specimens may prove the identity of the two forms. The Peabody Museum has received, from Professor Semper, three specimens of the European species, collected at Heligoland, in the North Sea; these specimens agree in having a shorter and broader neck than that of our species, and the rostrum is much longer. I think that the species must be kept separate unless a series of specimens show intermediate forms.

New Haven to Vineyard Sound. Several specimens were taken, in 1874, by Prof. S. I. Smith, from tubularian hydroids growing on the bottom of an old ship at Noank, Conn. Professor Verrill notes that the eyes are, in life, of a bright red color.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
5022	New Haven, Conn.	.....	.....	.....	S. I. Smith	1♂ 1♀	Alc.
	Off New Haven Light.	.....	.....	— —, 1865	A. E. Verrill	1	Alc.
4811	Noank Harbor, Conn.	3	Mud	— —, 1874	U. S. Fish Com.	4, 2♀, 1♂	Alc.
4808	Noank, Conn	.....	.....	— —, 1874	....do	7	Alc.
4810	Vineyard Sound	.....	.....	— —, 1871	....do	2	Alc.

PSEUDOPALLENE Wilson.

Body robust; neck broad and thick; rostrum more or less acute. Antennæ three-jointed, chelate; palpi wanting; accessory legs eleven-jointed, present in both sexes; legs stout and comparatively short, dactylus without auxiliary claws.

This genus has hitherto been confounded with *Pallene*, and some confusion has thus been caused in the diagnosis of that genus.

In *Pallene*, as described by Johnston (Mag. Zool. and Bot., vol. i, p.

380) the accessory legs are nine-jointed; the neck is constricted and more or less elongated as in *Nymphon;* the rostrum is short and nearly hemispherical; and the dactylus bears two very large auxiliary claws. The presence or absence of these claws is a good generic character; they are always two in number, are movably articulated to the dactylus, and are provided with a special set of muscles by means of which they are moved. It is to be observed, also, that the peculiar spines upon the outer joints of the accessory legs in *Pallene* are very unlike those of *Pseudopallene.*

Kröyer figures three species of "Pallene" in Gaimard's Voy. en Scand., Laponie, etc. (*P. discoidea*, *P. intermedia*, and *P. spinipes*). The first of these is undoubtedly a *Pseudopallene*, and probably also the other two, but, not having examined specimens of them, I have been unable to verify this.

Pseudopallene hispida (Stimp.) Wilson.

American Journal of Science and Arts, vol. xv, No. 87, p. 200, 1878.—Trans. Conn. Acad., vol. v, p. 10, Pl. III, figs. 1 *a* to 1 *e*, July, 1878.
Pallene hispida Stimpson, Invertebrata of Grand Manan, p. 37, 1853.

PLATE II, FIGURE 9.

Body oval, very broad, neck not constricted. Oculiferous tubercle small, rounded. Eyes ovate, light brown. Oculiferous segment half as long as the body. The second and third segments have, above, two prominent conical tubercles, each of which is tipped by a hair. The lateral thoracic processes are very broad and are not separated by any interval; they bear, on the outer margin, two to four acute, hairy tubercles. Abdomen twice as long as broad, truncate, hairy.

Rostrum slightly hairy, acute-conical, as long as the oculiferous segment, with a constriction on each side, below, giving it the appearance of being articulated at this point. The mouth is terminal and surrounded by a rosette of filamentary processes.

Antennæ very stout and swollen, hairy, tipped with amber-color, about twice as long as the rostrum; claws of chelæ blunt and rounded; basal joints enlarged near their attachment; the second joint has, on its lower margin, a prominent rounded tubercle behind which the dactylus closes.

Accessory legs slender; in the female the two basal joints are short, the third longer, the fourth and fifth still longer, sixth about as long as the third; the remaining joints are shorter and decrease in size to the last, which is spine-like and trifid at its extremity; the four outer joints are armed with four or five stout, smooth, curved spines. In the male these appendages are considerably longer and more slender, and the fifth joint has a prominent rim or shoulder at its distal extremity, as in *Pallene empusa*, which is armed below with a few stout spines. The terminal joint is not trifid but simply claw-like; it is attenuated toward the tip and abruptly incurved.

Legs very stout, the three basal joints short and overlapping each other; fourth joint as long as the three basal ones, much distended with the ovaries in the specimen described; fifth as long as the fourth, but much more slender; sixth still longer and more slender; tarsus very short, nearly triangular; propodus tapering from the base, slightly curved, armed on the inferior margin with five or six stout curved spines; dactylus curved, acute, about two-thirds as long as the propodus.

All of the legs bear a number of prominent, conical, spiny tubercles. These are arranged in longitudinal rows on some of the joints, particularly on the fifth and sixth, which thus appear deeply serrate on the margin. The entire surface of the body is rough and more or less hairy.

Color, in alcohol, light brown. Length 3 millimeters; legs 7.5 millimeters; accessory legs 3.7 millimeters.

I have seen only two specimens, namely:

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4812	Johnson's Bay, Eastport, Me.	12	Rocks	— —, 1872	U. S. Fish Com.	1 ♀	Alc.
5005	Grand Manan, N. B.	50–55	.....	— —, 1872	....do	1 ♂ + ○.....	Alc.

Stimpson first obtained this species from deep water off Grand Manan, "on *Ascidiæ callosæ*."

Pseudopallene discoidea (Kröyer) Wilson.

Trans. Conn. Acad., vol. v, p. 12, Pl. III, figs. 3*a* to 3*c*, July, 1878.

Pallene discoidea Kröyer, Nat. Tidss., 1ste Bind, 2det Hæfte, p. 120, 1844; Voy. en Scand., Laponie, etc., Pl. 37, fig. 3*a—g*; Isis, Jahrg. 1846, Heft vi, p. 443.

PLATE II, FIGURE 10.

Body oval, somewhat narrower than that of *P. hispida*, lateral processes in close contact. Abdomen pointed, slightly bifid at the tip.

Rostrum obtuse, slightly hairy, outline of sides convex.

Antennæ stout, but not so much so as in *P. hispida;* basal joint not enlarged near the base. Chelæ with the claws acute and finely serrated along the opposable margins, second joint with no tubercles on the inferior margin.

Accessory legs of the female short and stout, all of the joints being broad and short; fourth and fifth joints longest, terminal joint acute; the 7th, 8th, 9th and 10th joints have each a simple spine on the upper side.

Legs nearly as in *P. hispida*, but longer and more slender, particularly in their basal portion, where the joints do not overlap.

The legs and body are armed with conical hairy tubercles arranged nearly as in the preceding species. Color light yellowish brown. Length, 3 millimeters.

This species is represented by two female specimens, of which one was taken with *Caprella* on the tangles in 20 fathoms, rocky bottom, Eastport Harbor, by the United States Fish Commission, August 9, 1872; the other is simply labeled "Eastport Harbor, 1870."

This species is very similar to the last, and a larger number of specimens may show them to be identical. The specimens described present, however, well-marked differences, particularly in the shape and armature of the antennæ, the shape of the rostrum, abdomen, etc. Though not agreeing perfectly with Kröyer's figures of *P. discoidea*, there can be little doubt of the identity of our species with it.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4922	Eastport Harbor, Me	.....	.....	— —, 1870	Expedition, '70	1 ♀	Alc.
4813	....do	20	Rocks	— —, 1872	U. S. Fish Com.	1 ♀	Alc.

PHOXICHILIDIUM Milne Edwards.

Body slender; neck short. Rostrum cylindrical, rounded. Antennæ three-jointed, chelate. Palpi wanting. Accessory legs five-jointed, absent in the female. Legs slender; dactylus with auxiliary claws.

Phoxichilidium maxillare Stimpson.

Phoxichilidium maxillare Stimpson, Invertebrata of Grand Manan, p. 37, 1853.—Wilson, Trans. Conn. Acad., vol. v, p. 12, Pl. IV, figs. 1 *a* to 1 *e*, July, 1878.
Phoxichilidium minor Wilson, *op. cit.*, p. 13, Pl. IV, figs. 2 *a* to 2 *b*, July, 1878.

PLATE III, FIGURES 12 to 15.

Body rather stout. Oculiferous segment twice as broad as long. Oculiferous tubercle prominent, acute. Eyes ovate, nearly white in alcohol. Posterior segment much smaller and narrower than the next anterior. Abdomen small and rounded.

Rostrum stout, usually about as long as the oculiferous segment though the length is somewhat variable, nearly cylindrical, rounded at the extremity. It is sometimes slightly constricted a short distance from the tip; in other cases no such constriction is apparent, and the outline of the lateral margins may be slightly convex (*P. "minor"*).

Antennæ stout, almost destitute of hairs. Claws of the chelæ very strongly curved, quite smooth on the opposable margins; the dactylus projects somewhat beyond the extremity of the preceding joint, and is very thick and strong.

Accessory legs nearly one-third as long as the legs; basal joint stouter than the others; third joint longest; terminal joint strongly curved, smoothly rounded at the tip, armed on each side with six or eight simple spines directed backward, and below, with three or four stouter ones; the other joints have a few scattered hairs.

Legs comparatively stout, remarkably smooth in appearance, though with a very few scattered hairs; basal joint nearly quadrate, about half the length of the second, which is somewhat longer than the third; the three following are nearly equal and longer than the three basal joints united; propodus stout and curved, about four times the tarsus; on its inferior margin are five stout spines followed by a series of very small ones; dactylus stout, more than half the propodus; auxiliary claws small, varying from one-fifth to one-fourth the length of the dactylus.

Color blackish or sepia to nearly pure white. Length of adult specimens 2 to 4.75 millimeters; extent of legs 15 to 30 millimeters.

Most of the specimens from the Bay of Fundy are dark colored and of large size, and differ in several other particulars from those taken in Casco Bay, at Gloucester, Mass., and other southern localities. These differences are so striking that I was led to describe the southern form as a new species under the name *Phoxichilidium minor*. Since the publication of that description, however, a much larger series of specimens has been obtained, which shows conclusively that the two forms cannot be separated, though extreme forms appear very unlike. The southern form is almost always white in color, and very small, even when adult; it further differs in the shape of the rostrum and antennæ, and in being more slender in nearly all respects.

Phoxichilidium femoratum of Northern Europe is closely similar to this species, but is figured as being more slender, of a different color, and with the propodus and dactylus differently armed and shaped. I think it quite possible that they may be shown to be identical, but it seems preferable to keep them separate at present. The so-called "species" of this genus need revision (though in this respect the genus is not wholly without a parallel among the *Pycnogonida*), and undoubtedly a large series of specimens would reduce their number.

The observed range of *P. maxillare* is from Gloucester, Mass., to Halifax, N. S.; and in depth, from low water to 55 fathoms. At Eastport, Me., it is very common under stones at or near low-water mark, and frequently numbers of them cling to each other in a tangled mass.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4937	Gloucester, Mass.	L. w.	On piles	—— —, 1878	U.S. Fish Com.	12 ♂, 13 ♀	Alc.
4939	About 5 miles north from Cape Ann.	.....	.....	—— —, 1878	....do	24 ♂, 25 ♀	Alc.
	Ram Island Ledge, Casco Bay.	L. w.	Rocks	—— —, 1873	....do	22 ♂, 39 ♀	Alc.
5026	Casco Bay	D. w.	.....	—— —, 1873	....do	1 ♂	Alc.
5016	....do	.....	.....	—— —, 1878	....do	8 ♂, 12 ♀	Alc.
5025	Portland, Me	L. w.	On piles	—— —, 1878	....do	1 ♂, 3 ♀	Alc.
5004	Grand Manan, N. B.	50, 55	.....	—— —, 1872	....do	1 ♂	Alc.
	Eastport, Me.	L. w.	.....	—— —, 1868	Expedition, '68	14 ♂, 0 ♀	Alc.
	....do	L. w.	.....	—— —, 1870	Expedition, '70	7 ♂, 7 ♀	
	....do	L. w.	.....	—— —, 1872	U.S. Fish Com.	2 ♂, 6 ♀	Alc.
4795	Halifax, N. S.	L. w.	On piles	—— —, 1877	....do	1 ○	Alc.

ANOPLODACTYLUS Wilson.

Body slender. Rostrum cylindrical, rounded. Antennæ three-jointed, chelate. Palpi wanting. Accessory legs six-jointed, wanting in the female. Neck elongated, extending forward over the rostrum. Legs slender; dactylus without auxiliary claws.

This genus differs from *Phoxichilidium*, which it otherwise closely resembles, in the number of joints composing the accessory legs, and in the absence of auxiliary claws upon the dactylus. *Phoxichilidium* has been made to include several distinct types, among them a form having eleven-jointed accessory legs (*P. fluminense* Kr.), and "*Phoxichilidium cheliferum*" Claparède, a very remarkable form with the accessory legs ten-jointed and distinctly chelate.

Kröyer's *Phoxichilidium petiolatum* (Voy. en Scand., Laponie, etc., Pl. 38, fig. 3) belongs to *Anoplodactylus*, and probably also *Phoxichilidium virescens* Hodge.

Since the publication of my original description of this genus it has been pointed out to me that Say's genus *Anaphia* (described in 1821) may be identical with it. Say's description was based upon two specimens which did not possess accessory legs and were probably females; hence it is impossible to determine their exact generic characters. Nevertheless, their general agreement with the type of *Anoplodactylus* is so close that I think it probable that they are generically the same; and, if so, of course the name *Anaphia* should be used. To prevent possible confusion, however, the later name is retained until an opportunity is afforded for examination of specimens from the locality where Say's specimens were collected.

Anoplodactylus lentus Wilson.

American Journal of Science and Arts, vol. xv, No. 87, p. 200, 1878.—Trans. Conn. Acad., vol. v, p. 14, Pl. IV, figs. 3 *a* to 3 *e*, July, 1878.

Phoxichilidium maxillare Smith, Report on the Invertebrata of Vineyard Sound, &c., p. 250 [544], Pl. VII, fig. 35, 1874 [*non* Stimpson].

? *Anaphia pallida* Say, Journ. Acad. Nat. Sci. Phil., vol. 2, p. 59, Pl. V, figs. 7 and 7 *a*, 1821.

PLATE III, FIGURES 16 to 18.

Body slender, lateral processes widely separated. Oculiferous segment broad, as long as the two following segments united, not emarginate between the bases of the antennæ. Posterior segment somewhat elongated and very slender, the lateral processes directed obliquely backward. Neck swollen. Abdomen rather more than twice as long as broad, slightly bifid at the extremity. Oculiferous tubercle prominent, acute, placed far forward. Eyes ovate, light brown to black.

Rostrum large, longer than the oculiferous segment, somewhat constricted basally, so as to appear clavate; extremity subglobose.

Antennæ long and slender, hairy, their bases closely approximated; basal joint extending beyond the extremity of the rostrum; chelæ stout, hairy, claws acute, opposable edges smooth.

Accessory legs stout, roughened by minute tubercles, the outer joints with many short stout hairs, most of which are directed backward; the two basal joints are very stout, the first shorter than its width, the second about twice as long; third nearly two and a half times the second, somewhat clavate, suddenly constricted a short distance from the base; fourth half the length of the third, considerably longer than the fifth; sixth much smaller than the preceding.

Legs very long and slender; first and third joints very short; second longer and clavate; the three following joints are much longer, sixth longest; tarsus very short, deeply emarginate; propodus curved, with a rounded lobe near the base bearing five or six strong spines; these are followed by a series of much smaller ones; dactylus stout, about two-thirds the length of the propodus. Entire surface of the body scabrous. Legs with a few scattered hairs, which are most numerous on the outer joints.

The sexes resemble each other closely, but the females do not possess accessory legs; the female is, as a rule, slightly larger than the male. Length 7 millimeters; legs 30 millimeters.

This species is nearest to "*Phoxichilidium petiolatum*" Kr., of Europe. In the latter species, however, according to the figures, the anterior segment is much more slender, and it is emarginate between the bases of the antennæ, which are thus separated by a distinct interval; the posterior segment is represented as stouter and shorter; the rostrum more abbreviated; and the propodus of a different shape. Kröyer figures the accessory legs with seven joints, probably mistaking the constriction near the base of the third joint for an articulation.

Common between tide-marks and down to six fathoms in Vineyard Sound, where it is found on shelly bottoms "clinging to and creeping over the hydroids and ascidians." "It is most frequently deep purple in color, but gray and brown specimens are often met with" (*Verrill*). It is also taken rarely in the Bay of Fundy, there being a single specimen in a vial with *Phoxichilidium maxillare* and *Pycnogonum littorale* from Eastport.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4807	Long Island Sound	.....	.....	—, 1874	U. S. Fish Com.	1 ♀	Alc.
4804	Cataumut Harbor	4	Eel-grass	—, 1875	do	1 ♂	Alc.
4800	Vineyard Sound, Mass	3–5	Gravel	—, 1871	do	8 ♂, 16 ♀	Alc.
4803	do	.....	.....	—, 1875	do	2 ♂, 3 ♀	Alc.
4925	do	8	Hard	—, 1875	do	3 ♂, 7 ♀	Alc.
5021	Wood's Holl, Mass	.....	.....	—, 1875	do	1 ♂	Alc.
	Eastport, Me	.....	.....	.....	.....	1	Alc.

Family IV, NYMPHONIDÆ.

AMMOTHEA Leach.

Body broad, neck scarcely apparent. Rostrum large, tapering. Antennæ small, three-jointed, chelate. Palpi eight-jointed. Accessory legs nine-jointed; in the female five-jointed (?). Legs slender. Auxiliary claws present.

Ammothea achelioides Wilson.

Trans. Conn. Acad., vol. v, p. 16, Pl. V, figs. 1 *a* to 1 *e*, July, 1878.

PLATE IV, FIGURES 19 and 20.

Body very broad, oval, segments not evident, lateral processes scarcely separated. Oculiferous tubercle prominent, acute; eyes dark; abdomen long and very slender, bifid at the extremity.

Rostrum large, tapering, extremity rounded.

Antennæ about three-fourths as long as the rostrum; basal joint narrowest near the middle, somewhat hairy, with one or two prominent tubercles, each tipped by a slender spine; chela with the claws very slender and strongly curved, armed with a few small spines on the opposable edges.

Palpi slender, longer than the rostrum, sparsely hairy, most so on the distal joints; the first, third, and four distal joints are very short; terminal one shortest; sixth longest; the second and fourth are nearly equal and more than twice the basal joint.

Accessory legs, in all the specimens examined, very short, swollen and pellucid, so that the joints could with difficulty be distinguished. They are composed of five joints; a very short basal one and four other longer ones; the terminal one is tapering, smoothly rounded at the tip. It seems probable that these appendages are either those of the female, or of the immature male.

Legs short, rather slender; the three basal joints are short, followed by three which are nearly equal and about as long as the three basal joints united; tarsus very short; propodus gently curved, with two stout spines on the inferior margin near the base, followed by a few smaller ones; dactylus nearly two-thirds the length of the propodus, rather stout; auxiliary claws two-thirds the dactylus.

The legs are rough and hairy, the hairs usually arising from tubercles or swellings. These tubercles are very large and acute-conical near the outer margin of the body-processes and upon the first joint of the legs; on the outer joints they are smoothly rounded and less elevated, often producing a sinuous outline most apparent on the fourth, fifth, and sixth joints.

Color of alcoholic specimens, light yellowish brown. Length 1.4 millimeters; extent 5.2 millimeters.

Three specimens only, taken in the Bay of Fundy by the United States Fish Commission, in 1872. In general appearance it is closely similar to *Achelia spinosa*. It is apparently nearest to the "*Ammothoa brevipes*," of Hodge, described from the Durham coast, though quite distinct from that species, so far as can be judged from the original figures. The antennæ, in our species, are more slender and with much smaller spines on the chela, and the proportions of the palpal joints are very different; the abdomen is far longer and more slender, and the legs are not so spinous.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4814	Bay of Fundy	.....	.....	—— —, 1872	U. S. Fish Com.	2.....	Alc.
4779	Grand Manan, N. B.	.....	.....	—— —, 1872	....do	1.....	Alc.

NYMPHON Chr. Fabricius.

Body slender. Neck distinct. Rostrum cylindrical, rounded. Antennæ three-jointed, chelate. Palpi five-jointed. Accessory legs present in both sexes, eleven-jointed. Legs slender; dactylus with auxiliary claws.

All the species of *Nymphon* are slender, some of them exceedingly so. The antennæ are slender and the claws of the chelæ are armed along their opposable edges with a series of close-set, slender spines. The sexes generally resemble each other closely, the chief differences being found in the accessory legs. These appendages are armed, in both sexes, with a series of flattened denticulated spines, found upon the seventh, eighth, ninth, and tenth joints. The auxiliary claws are usually of small size, and sometimes minute. They are peculiarly deep-water forms, rarely occurring at a depth of less than twenty fathoms, and sometimes extending down to great depths. For this reason almost nothing is known of their habits, though their external development has been well studied. In certain species the specific characters are extremely variable, as described below.

Nymphon Strömii Kröyer.

Nat. Tidss., 1ste Bind, 2det Hæfte, p. 111, 1844; Voy. en Scand., Laponie, etc., pl. 35, figs. 3 *a–f*.—Norman, Rept. of the Brit. Assoc. for the Advancement of Sci. for 1868, p. 301.—Miers, Ann. and Mag. Nat. Hist., 4th series, vol. 20, No. 116, p. 109.—Wilson, Trans. Conn. Acad., vol. v, p. 17, Pl. VI, figs. 1*a* to 1*h*, July, 1878.

Probably *Pycnogonum grossipes* Abilgaard, in O. F. Müller's Zoologica Danica, vol. iii, p. 67, Pl. CXIX, figs. 5–9, 1788.

Nymphon giganteum Goodsir, Ann. and Mag. Nat. Hist., vol. xv, No. xcviii, p. 293, 1845.—Norman, Rept. of the Brit. Assoc. for the Advancement of Sci, for 1868, p. 301.—Whiteaves, Ann. and Mag. Nat. Hist., Nov., 1872, p. 347; Rept. of a Sec. Deep-sea Dredging Exp. to the Gulf of St. Lawrence [in 1872]. Montreal, 1873?—Verrill, Am. Journ. Sci. and Arts, vol. vii, p. 411; vol. vi, p. 439, 1874.

?*Nymphon gracilipes* Camil Heller, Die Crustaceen Pycnogoniden und Tunicaten der K. K. Österr-Ungar. Nordpol-Exp., p. 16, Taf. iv, fig. 15, Taf. v, figs. 1, 2.

PLATE V. PLATE VI, FIGURE 29.

Body very stout, nearly smooth. Neck very short, but deeply constricted. Oculiferous segment large, longer than the two following segments united, stout and swollen anterior to the constriction of the neck. Oculiferous tubercle prominent, smoothly rounded. Eyes very distinct, black, ovate. Abdomen small, tapering toward the extremity.

Rostrum rather large, nearly cylindrical though slightly expanded in the middle.

Antennæ smooth, rather slender; basal joint as long as the rostrum; claws of chelæ remarkably slender and elongated, gently curved, when closed meeting along nearly their whole length; they are armed along their opposable margins with a series of small spines, which are more erect and much more numerous upon the dactylus.

Palpi much longer than the rostrum; basal joint stout, very short; second and third much longer, nearly equal; fourth and fifth a little less and more slender, sparsely hairy.

Accessory legs stout, slightly hairy; the three basal joints are nearly as broad as long; the following three are much longer, the sixth shortest and about as long as the three basal joints united; the remaining joints are much shorter and more slender, the terminal one acute and claw-like, with a row of spines on the inferior edge; the denticulated spines vary considerably and are sometimes nearly smooth.

Legs very long and slender; first and third joints short, about half the second; the three following are very long, sixth longest, fifth shortest; propodus and tarsus slender, nearly equal, hairy; the former is not armed with spines; dactylus long and slender, very acute, about three-fifths the length of the propodus; auxiliary claws very small, about one-fifth the dactylus. Color, when living, light salmon-yellow, the legs often annulated with broad reddish rings. Egg-masses large, two to four in number, bright yellow. Length of largest specimens 15 millimeters; extent 140 millimeters; accessory legs 19 millimeters.

This fine species is not uncommon; it attains its greatest size on muddy bottoms in deep water. Taken at many localities in Massachusetts Bay, off Gloucester and Salem; in the Gulf of Maine off Cape Ann; Casco Bay 50–70 fathoms; Eastport, Me. (Professor Verrill); off Halifax, N. S.; Bedford Basin, Halifax; Orphan Bank, Gulf of Saint Lawrence (*J. F. Whiteaves*). It is found on all bottoms, though, as a rule, it may be regarded as a "muddy-bottom species." The observed

range on our coast, in depth, is from 7½ fathoms (Gloucester Harbor, mud and sand) to 115 fathoms (27–31 miles E. S. E. from Cape Ann, gravelly bottom).

I cannot distinguish this species from Goodsir's *N. giganteum*. *Nymphon gracilipes*, of Heller, is also very closely similar to, if not identical with, this species. In his figure, however, the dactylus is represented of nearly the same length with the propodus, and it may be distinct. The "*Pycnogonum grossipes*," figured in the "Zoologica Danica," is certainly not *N. grossipes* Fabr., and it seems to me most probable that it is to be referred to *N. Strömii*.

It is worthy of note that the arch of the upper side of the oculiferous segment, when laterally viewed, is very variable, as is also the length of the constricted portion or "neck."

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4972	Gloucester, N. ¼ W. 6½ miles.	45	Mud	— —, 1878	U.S. Fish Com.	2♂, 1♀	Alc.
4837	Salem, W. N. W. 9 to 11 miles.	35	....do	— —, 1877	....do	2	Alc.
4838	Salem, W. N. W. 13 miles.	11–50	Soft mud	— —, 1877	....do	1♂, 1♀	Alc.
4839	Cape Ann, N. W. 14 miles.	90	....do	— —, 1877	....do	4	Alc.
4973	Cape Ann, W. N. W. 30 to 31 miles.	110	Soft brown mud	— —, 1878	....do	1	Alc.
4998	Gloucester, N. 5½ to 7 miles.	40–45	....do	— —, 1878	....do	3♂, 1♀	Alc.
4995	Cape Ann, W. by N. 4½ to 5½ miles.	57–68	Soft mud, concretions.	— —, 1878	....do	9	Alc.
4845	Cape Ann, N. W. ½ N. 11 miles.	51	Mud, gravel & stones.	— —, 1877	....do	4	Alc.
4966	Cape Ann, N. W. ½ W. 13 miles.	53	Mud and stones	— —, 1878	....do	1	Alc.
4967	Gloucester, Harbor	7½	Mud and sand	— —, 1878	....do	1♀	Alc.
4968	Cape Ann, N. W. 4 to 5 miles.	42	Mud, clay nodules.	— —, 1878	....do	2♀	Alc.
4969	Cape Ann, N. W. by W. 6 to 7 miles.	54	Sand, clay nodules.	— —, 1878	....do	1♂, 2♀	Alc.
4970	Cape Ann, N. W. by W. 7 miles.	75	Sand	— —, 1878	....do	1♂	Alc.
4997	Cape Ann, N. W. 7½ to 8 miles.	32–36	Sand and pebble.	— —, 1878	....do	3♂, 1♀	Alc.
4971	Cape Ann, W. N. W. 27 to 31 miles.	115	Gravel	— —, 1878	....do	8	Alc.
4835	Off Isles of Shoals	36	Clay, mud, and sand.	— —, 1874	....do	1♀	Alc.
4833	Cashe's Ledge, N. 6 to 15 miles.	52–90	Rocks	— —, 1873	....do	11	Alc.
4834	Casco Bay, Me	50		— —, 1873	....do	1♂	Alc.
4832	....do	72		— —, 1873	....do	1♀	Alc.
	Eastport, Me			— —, 1870	Expedition '70		
4842	Cape Sable, N. S., N. W. 18 to 22 miles.	59	Pebbles and sand	— —, 1877	....do	1♂	Alc.
4844	Off Halifax, N. S., 8½ miles.	52	Sandy mud	— —, 1877	....do	3♀	Alc.
4843	Halifax, Bedford Basin.	35	Soft mud	— —, 1877	....do	1 ○	Alc.

Nymphon macrum, *sp. nov.*

PLATE IV, FIGURES 21 to 23.

Distinctive characters.—Antennæ extremely slender, with the claws of the chelæ much curved. Accessory legs separated from the first

lateral processes by a distinct interval. Terminal joint of palpus very slender. Tarsus longer than the propodus. Auxiliary claws nearly two-thirds the dactylus.

Body very smooth and rather robust, for the genus, with the lateral processes separated by an inter-space about equal to their width. Oculiferous segment constricted, so as to form a short and narrow neck, nearly as in the preceding species; there is a slight, though distinct, interval between the process bearing the accessory legs and that of the first pair of ambulatory legs. Above, there is a distinct sulcus running backward from midway between the bases of the antennæ. Oculiferous tubercle acutish, prominent, situated just anterior to the first pair of lateral processes; eyes large, ovate, light colored, surrounded by dark pigment. Posterior segment narrow with the lateral processes directed backward; abdomen slender and tapering, distinctly bifid.

Rostrum about as long as the oculiferous segment, nearly cylindrical, slightly swollen in the basal half. Antennæ extremely slender—more so than in any other species of the genus known to me; basal joint somewhat longer than the rostrum; chela much elongated; claws, when closed, crossing each other at a considerable distance from their tips. Both claws are armed with a dense row of spines, which gradually decrease in length toward the tips, and finally disappear, leaving the terminal portion bare for some distance; these spines are larger and more crowded on the movable claw; on the other, larger spines alternate with from one to three smaller ones. In one specimen there were 109 such spines upon the movable claw and 184 upon the other.

Palpi with a very short and stout basal joint, about one-sixth or one-seventh as long as the second; the third is considerably less than the second, the fourth still shorter, the terminal one less than the fourth and extremely slender and straight. The entire appendage is slightly hairy.

Accessory legs resembling those of *N. grossipes;* in the male they are considerably longer than in the female, the fifth joint is more slender and elongated, and with a strong s-shaped curvature. The outer joints bear a few scattered hairs.

The legs are very slender, especially the outer four joints, and sparsely hairy; the proportions of the joints are about as in *N. longitarse*, but the tarsus is only about 1⅓ times the propodus; both these joints have a close and pretty regular series of small, slender spines along the entire inferior margin. Dactylus slender and acute, rather more than half the propodus; *auxiliary claws very large*, nearly two-thirds the dactylus.

Color in alcohol, light yellowish-white. Length of a large specimen 9.3 millimeters. Extent 72 millimeters.

This species is very distinct, and the specific characters appear to vary but slightly. It is, in general appearance, much like *N. Strömii*, but may be at once distinguished by the large auxiliary claws. The interval between the accessory legs and the first pair of ambulatory legs

is a feature which I have not seen in any other species of the genus. It has been taken at a few localities in the Gulf of Maine in from 85 (or perhaps less) to 115 fathoms. A single specimen is known from Banquereau, off Nova Scotia. All the specimens, as shown below, are from deep water, and most of them from muddy bottoms.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4960	Cape Ann, W. N. W. 30 miles.	90–115	Mud, gravel, stone.	—, 1878	U. S. Fish Com.	4♂, 3♀	Alc.
4962	Cape Ann, W. N. W. 30 to 31 miles.	110–115	Mud and stone	—, 1878	....do	8♂, 12♀	Alc.
4963	Cape Ann, W. N. W. 29 to 30 miles.	85	Mud, stone, sand.	—, 1878	....do	2♀	Alc.
4978	Off Manhegan Island, G. Maine.	5–90	Mud or sand	—, 1874	....do	1	Alc.
4841	Cape Ann, W. 140 miles.	112	Gravel	—, 1877	....do	2♀	Alc.
4965	From cable of schooner Marion, Banquereau, N. S.			Aug. 25, 1878	....do	1♂	Alc.

Nymphon longitarse Kröyer.

Nat. Tidss., 1ste Bind, 2det Hæfte, p. 112, 1844; Voy. en Scand., Laponie, etc., Pl. 36, fig. 2*a–b*.—Wilson, Trans. Conn. Acad., vol. v, p. 19, Pl. VII, figs. 2*a* to 2*h*, July, 1878.—G. O. Sars, Archiv for Mathematik og Naturvidenskab, Andet Bind, Tredie Heft, p. 366, 1877.

PLATE VI, FIGURES 30 and 31.

Entire animal extremely slender. Body smooth. Oculiferous segment produced into a very long slender neck, expanding anteriorly for the attachment of the antennæ. Posterior segment very narrow, lateral process directed nearly backward. Abdomen small, tapering. Oculiferous tubercle rounded, eyes black, ovate.

Rostrum slender, rounded, shorter than the basal joint of the antennæ.

Antennæ very slender, slightly hairy; claws of chelæ very long and slender, their tips crossing when closed; the spines with which they are armed are larger and less numerous than those of *N. Strömii*.

Palpi resembling those of *N. Strömii*, but more slender and with the fourth joint shorter than the third or fifth.

Accessory legs remarkably slender; the three basal joints are very short and nearly equal; fourth nearly twice the length of the first three united; fifth somewhat less; sixth equal to the three basal joints, about twice the seventh; the remaining joints decrease to the last, which is claw-like with a few spines on its inferior margin; spines of the distal joints decidedly curved.

Legs resembling those of *N. Strömii* but much more slender and with the tarsus very long, nearly twice the propodus; both these joints are very slender, nearly straight, and along their entire inferior margin is a

regular series of small hairs; dactylus nearly straight, very acute, more than half the propodus; auxiliary claws very small, about one-fourth the propodus. The legs are sparsely hairy, the hairs longest near the outer extremities of the joints, where they often form a semicircle on the upper side. Color, when living, light salmon or nearly white. Sometimes "irregularly and conspicuously striped across the body and legs with bright purple; body clear white" (*Prudden*). Length 7 millimeters; extent 65 millimeters.

This species may be usually distinguished by its extremely attenuated appearance, which is more marked than in any other species of the genus. The neck varies considerably, and in some specimens is much stouter than in others.

Common off Salem and Gloucester, Mass., and at numerous localities in the Gulf of Maine, off Cape Ann; Jeffrey's Ledge; off Isles of Shoals; off Casco Bay; Bay of Fundy; St. George's Banks; off Cape Sable, N. S.; off Halifax. The observed bathymetric range is from 16 to 115 fathoms. It occurs on all bottoms, but is more frequently observed on muddy botto ms. The females seem to be more common than the males

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from.	Specimens. No. and sex.	Dry. Alc.
4849	Salem, W. N. W. 9 to 11 miles.	33	Sand, mud..	—— —, 1877	U. S. Fish Com.	3♀.....	Alc.
4851	....do.....	35	Mud, clay nodules.	—— —, 1877	....do	3♂, 1♀....	Alc.
4852	Salem, W. N. W. 8 to 9 miles.	33	Soft mud...	—— —, 1877	....do	1♀.....	Alc.
4853	Salem, W. N. W. ½ N. 13 miles.	48	....do	—— —, 1877	....do	1♂, 2♀....	Alc.
4850	Gloucester, N. about 5½ miles.	45	Mud.....	—— —, 1877	....do	1♂.....	Alc.
4947	Gloucester, N. 10 to 13 miles.	45	....do	—— —, 1878	....do	4♀.....	Alc.
4948	Gloucester, N. ¼ W. 6½ miles.	45	Soft mud....	—— —, 1878	....do	2♀.....	Alc.
5023	Gloucester, N. 5½ to 7 miles.	43	....do	—— —, 1878	....do	1♂.....	Alc.
4854	Cape Ann, N. W. 14 miles	90	....do	—— —, 1878	....do	1♀.....	Alc.
4860	Cape Ann, N. W. ½ N. 12 to 14 miles.	75	Mud.....	—— —, 1877	....do	1.....	Alc.
4861	Cape Ann, N. W. ½ N. 11 miles.	51	Mud, gravel, rock.	—— —, 1877	....do	3♂, 1♀....	Alc.
4941	Cape Ann, N. by W. ¼ W. 4½ miles.	38	Mud.....	—— —, 1878	....do	1♀.....	Alc.
4943	Cape Ann, N. W. 4 to 5 miles.	38–42	Mud, sand, stone.	—— —, 1878	....do	2♀.....	Alc.
4945	Cape Ann, N. W. by N. 6 to 7 miles.	73–75	Soft mud ...	—— —, 1878	....do	2♂, 6♀....	Alc.
4989	Cape Ann, N. W. ½ N. 6 to 7 miles.	54–60	Sand, mud..	—— —, 1878	....do	1♀.....	Alc.
4990	Cape Ann, W. by N. ½ N. 4½ to 5½ miles.	57–68	Soft mud, concretions.	—— —, 1878	....do	2♀.....	Alc.
5015	Cape Ann, W. N. W. 27 to 31 miles.	90–115	Mud, gravel, stone.	—— —, 1878	....do	1♀.....	Alc.
4942	Cape Ann, N. W. ¾ N. 4½ miles.	38	Pebbles, sand	—— —, 1878	....do	1♂, 1♀....	Alc.
4992	Cape Ann, N. 6½ miles ..	32	Rock, stones	—— —, 1878	....do	1♀.....	Alc.
4993	Cape Ann, N. ¼ W. 10 miles.	28	Sand, stone .	—— —, 1878	....do	1♂, 2♀....	Alc.
5024	Cape Ann, N. ¼ W. 7½ to 8 miles.	32–35	Sand, pebbles	—— —, 1878	....do	1♀.....	Alc.
4949	Massachusetts Bay.....	56	Mud.....	—— —, 1873	....do	1♂.....	Alc.
4976	Jeffrey's Ledge.....	26	Gravel, stone	—— —, 1873	....do	1♀.....	Alc.

Specimens examined.—Continued.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from.	Specimens. No. and sex.	Dry. Alc.
4848	Off Isles of Shoals			— —, 1874	U. S. Fish Com.	1♂	Alc.
4846	Cashe's Ledge, N. 6 to 15 miles.	52-90	Rocks	— —, 1873	....do	1♂	Alc.
4863	Off Cape Elizabeth	72		— —, 1873	....do	1♀	Alc.
4847	Casco Bay	64		Aug. 6, 1873	....do	1♂	Alc.
4864	....do			— —, 1873	....do	1♀	Alc.
4977	Manhegan Island, E. 2 miles.	48	Soft mud	— —, 1874	....do	1♂	Alc.
4865	Bay of Fundy			— —, 1872	....do	1♂	Alc.
4855	Cape Sable, N. S., N. W. 27 to 32 miles.	88-90	Sandy mud	— —, 1877	....do	3♂, 2♀	Alc.
4856	Cape Sable, N. S., N. W. 18 to 22 miles.	59	Sand, gravel, stone.	— —, 1877	....do	1♂	Alc.
1852	Latitude 42° 44′, longitude 64° 36′.	60	Gravel, stone, shale.	— —, 1872	....do		Alc.
4857	Narrows at mouth of Bedford Basin, Halifax.	16	Shale, stone.	— —, 1877	....do	2♂	Alc.
4859	Chebucto Light, N. W. by W. 8½ miles.	52	Sand, mud	— —, 1877	....do	3♀	Alc.
4858	Outer harbor, Halifax		Rocks	— —, 1899	....do	1 ♀	Alc.

Nymphon grossipes (L.) Chr. Fabr.

? *Phalangium marinum* Ström, Söndmör, p. 208, 1762.

? *Phalangium grossipes* Linné, Syst. Nat., ed. xii, i, p. 1027, 1767.

Pycnogonum grossipes O. Fabr., Fauna Grönlandica, p. 229, 1780.

? *Nymphum grossipes* Sabine, Suppl. to the Appendix Capt. Parry's First Voy, age, p. 225, 1824.

Nymphon grossipes Chr. Fabr., Ent. Syst., Tom. 4, p. 217, 1794.—Latreille, Hist. Nat des Crust. et des Insect., Tom. vii, p. 333, 1804; Genera Crust. et Insect., Tom. i, p. 143, 1806.—Kröyer, Grönlands Amfipoder, S. 92, 1838 [*teste* Kröyer]; Nat. Tidss., 1ste. Bind, 2det Hæfte, p. 208, 1844; Oken's Isis, Jahrg. 1846, Heft vi, p. 442; in Gaimard's Voy. en Scand., Laponie, etc. Pl. 36, figs. 1*a–h*.—Stimpson, Invertebrata of Grand Manan, p. 38, 1853.—Packard, Mem. Bost. Soc. Nat. Hist., vol. i, p. 295, 1867.—Buchholz, Zweite Deutsche Nordpolfahrt, Crust., p. 396, 1874.—Verrill, Am. Jour. Sci., vol. vii, p. 502, 1874.—Möbius, Die wirbellosen Thiere der Ostsee, p. 153, 1873.—Wilson, Trans. Conn. Acad., vol. v, p. 20, Pl. VII, figs. 1 *a–q*, July, 1878.

Nymphon mixtum Kröyer, Nat. Tidss., 1ste Bind, 2det Hæfte p. 110, 1844; in Gaimard's Voy. en Scand., Laponie, etc., Pl. 35, figs. 2 *a–f*.—Norman, Rept. of the Brit. Assoc. for the Advancement of Sci. for 1868, p. 301.—Buchholz, op. cit., p. 397, 1874.—Lütken, Lists * * * compiled for the Brit. North Pole Exp., p. 164, 1875.—Sars, Archiv für Math. og Naturvidenskab, andet Bind, Tredie Hefte, p. 366, 1877.

Nymphon brevitarse Kröyer, Nat. Tidss., 1ste Bind, 2det Hæfte, p. 115, 1844; in Gaimard's Voy. en Scand., Laponie, etc., Pl. 36, figs. 4 *a–f*—Reinhardt, Nat. Bidrag til en Beskr. af Grönland, p. 38, 1857.—Lütken, Lists compiled for the Brit. North Pole Exp., p. 164, 1875.—[=*Nymphum hirsutum* Kröyer, Grönlands Amfipoder, S. 92, 1838, *teste* Kröyer].

? *Nymphon rubrum* Hodge, Nat. Hist. Trans. Northumb. and Durham, p. 41, Pl. X, fig. 1, (1865, *t.* Zool. Rec.).

? *Nymphon gracile* Leach, et auct.

PLATE VI, FIGURES 32 to 37. PLATE VII, FIGURE 42.

Body slender, smooth. Oculiferous segment variable; in some specimens nearly as short and stout as in *N. Strömii*, in others much longer

and very slender. Oculiferous tubercle very prominent, conical, very acute. Eyes black, oval or nearly round. Abdomen small, tapering, often bent upward.

Rostrum large, somewhat variable, but usually shorter than the oculiferous segment, slightly swollen at the extremity.

Antennæ slender, basal joint about as long as the rostrum; chela similar to that of *N. longitarse*, but stouter, the claws shorter, slightly hairy.

Palpi slender, with a few small hairs most numerous on the outer joints; basal joint nearly quadrate, about one-fourth the second; third slightly longer than the first two united; fourth less than half the third; fifth longer, slender, tapering, somewhat variable, being stouter in some specimens than in others.

Accessory legs very slender. In the female they are, on an average, about one-eighth the extent of the legs; in the male about one-sixth. The joints have nearly the same proportions as in *N. longitarse*, but the fourth and fifth joints are longer and still more slender.

Legs long and slender, proportions of the first six joints nearly as in *N. Strömii*. Tarsus extremely variable in length (Pl. VII, figs. 1*b* to 1*g*); in young specimens it is less than half the propodus, while in some large adult specimens it is nearly twice that joint; the propodus is armed, on the inferior margin, with a series of slender, slightly curved spines, which are longest proximally; dactylus about two-thirds the propodus; auxiliary claws less than half the dactylus. The legs are sparsely hairy, the hairs often forming, as in *N. longitarse*, a semicircle on the outer extremities of the joints. Color, when living, light salmon-yellow, the legs often banded with reddish or light purple. Length 10.5 millimeters; extent 90 millimeters.

This species is, in most of its characters, extremely variable. Kröyer's *N. brevitarse* and *N. mixtum* are undoubtedly, I think, forms of *N. grossipes*. The former are young specimens, with a short, thick neck, very short tarsus, and abbreviated rostrum; the latter are those having a long slender neck, and with the tarsus from one and a half to two times the propodus. From the large collection in the Peabody Museum I have formed an almost complete series from extreme forms of *N. brevitarse* to undoubted *N. mixtum*, though in none of the specimens of the latter species is the tarsus quite so long as that figured in the Voy. en Scand., Laponie, etc. The palpi, also, vary considerably with age.

The variation is due in part to age, but is not sexual, since male specimens with egg-masses present the same differences. In some specimens the antennæ are tipped with brown, or jet black; in others they are white. The terminal joint of the legs is sometimes similarly tipped with brown.

The following table gives the relative length of the tarsus and propodus in a series of specimens selected to show the variation. The joints

measured are, in all but one or two cases, from the second leg of the right side.

	Propodus. mm.	Tarsus. mm.	Ratio of t. to p.
a (*N. brevitarse*)	0.465	0.249	0.54
b	0.498	0.332	0.65
c	0.930	0.670	0.72
d (*N. grossipes*)	1.094	1.094	1.00
e	.999	1.195	1.20
f	1.062	1.328	1.25
g	1.295	1.093	1.315
h (*N. mixtum*)	1.228	1.892	1.541

In Pl. VI, figs. 33 to 35, the variation of the neck is shown. All the latter specimens are adult males.

This and the preceding species are the commonest of the group. The most southerly locality from which I have seen specimens is Long Island Sound (two young specimens, 50 fathoms, off Race Point Rock, 1874); and the most northerly is Orphan Bank in the Gulf of St. Lawrence, dredged by Mr. Whiteaves in 1873; Dr. Packard has recorded it from Labrador. Taken by the United States Fish Commission off Salem and Gloucester, 19 to 48 fathoms; Gulf of Maine, off Cape Ann, 18 to 90 fathoms; off Isles of Shoals; off Cashe's Ledge; off Cape Elizabeth; Casco Bay, common; St. George's Banks, 50 fathoms; common off Halifax, 16 to 101 fathoms; Bedford Basin, Halifax Harbor, 35 fathoms, soft, oozy, offensive black mud. In depth the observed range is from 12 to 110 fathoms. Like the preceding species, it is found upon nearly all bottoms, but it seems to be less of a muddy bottom species, and is more often taken on rocky or gravelly bottoms.

It seems to me not improbable that Leach's *Nymphon gracile* is identical with *N. grossipes*, though none of the descriptions and figures of that species, which I have seen, suffice to identify it with certainty. The species of *Nymphon* from Northern Europe are in considerable confusion, and stand in need of revision.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
4891	Long Island Sound, W. of Race Point Rock.	50	Rock, shells, gravel.	—— —, 1874	U. S. Fish Com.	2♀	Alc.
4893	Salem, W. N. W. 9 to 11 miles.	33	Sand, mud...	—— —, 1877	....do	1♂, 1♀	Alc.
4904	.....do	35	Mud, clay ...	—— —, 1877	....do	1♂, 4♀	Alc.
4905	Salem, W. N. W. 13 miles.	48	Soft mud	—— —, 1877	....do	2♂, 4♀	Alc.
4892	Salem, W. N. W. 5 to 7 miles.	22	Gravel	—— —, 1877	....do	2♂, 8♀	Alc.
4894	.....do	20	Rocks.....	—— —, 1877	....do	1♂, 1♀	Alc.
4895	.....do	19–20	Gravel	—— —, 1877	....do	2♂, 1♀	Alc.
4897	Salem, W. N. W. 6 to 7 miles.	26	Gravel, stone	—— —, 1877	....do	2♂, 3♀	Alc.
4950	Gloucester, N. 3½ to 4½ miles.	33	Rocks.....	—— —, 1878	....do	1♂	Alc.

Specimens examined—Continued.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from.	Specimens. No. and sex.	Dry. Alc.
5011	Gloucester, N. 3 to 4 miles.	25–26	Sand, gravel, stone.	—— —, 1878	U. S. Fish Com.	1♂	Alc.
4952	Gloucester, N. N. W. 4 to 6 miles.	19½	Sand, gravel.	—— —, 1878	....do	2♂, 1♀	Alc.
4987	Gloucester, N. by E. 2½ to 4 miles.	19–23	Sand, gravel, stone.	—— —, 1878	....do	2♂	Alc.
5010	Gloucester, N. to N. by W. 5½ to 7 miles.	40–45	Soft brown mud.	—— —, 1878	....do	1	Alc.
4955	Gloucester, N. ¼ W. 6¼ miles.	45	Mud	—— —, 1878	....do	1♀	Alc.
4912	Cape Ann, N. W. ½ N. 11 miles.	50	Mud, gravel, &c.	—— —, 1877	....do	1♂	Alc.
4951	Cape Ann, N. W. ¾ W. 13 miles.	53	Rock to mud	—— —, 1878	....do	1♀	Alc.
4953	Cape Ann, N. W. 4 to 5 miles.	42	Sand, mud, clay nodules.	—— —, 1878	....do	1♀	Alc.
4954	.....do	38	Mud to rock.	—— —, 1878	....do	1♂	Alc.
4956	Cape Ann, W. N. W. 30 to 31 miles.	110	Soft brown mud.	—— —, 1878	....do	1♂	Alc.
5009	Cape Ann, N. W. by N. 7 miles.	73–75	Soft mud	—— —, 1878	....do	1	Alc.
4906	Cape Ann, N. W. 14 miles.	90	Mud	—— —, 1878	....do	1♀	Alc.
5002	Cape Ann, N. 8½ miles.	32	Rock, stones	—— —, 1878	....do	1♂	Alc.
5000	Cape Ann, N. E. 2½ miles.	18	Rough rock	—— —, 1878	....do	1♂	Alc.
4958	Cape Ann, N. N. W. 15 miles.	23	Stone, gravel, shells.	—— —, 1878	....do	1♂, 2♀	Alc.
4957	Cape Ann, W. N. W. 29 to 30 miles.	85	Gravel, pebbles.	—— —, 1878	....do	2♂	Alc.
4880	Cape Ann, S. W. 14 miles.	33	Gravel, stone	—— —, 1873	....do	1♂, 2♀	Alc.
4890	Off Isles of Shoals	35	Clay, mud, sand.	—— —, 1874	....do	2♀	Alc.
4930	Cashe's Ledge, N. 6 to 15 miles.	52–90	Rocks	—— —, 1873	....do	1♂, 1♀	Alc.
4885	Off Cape Elizabeth	68		Aug. 13, 1873	....do	1♂	Alc.
4881	Casco Bay			—— —, 1873	....do	2♂, 7♀	Alc.
4883	.....do			July 17, 1873	....do	2♂	Alc.
4884	.....do	34		Aug. 27, 1873	....do	1♀	Alc.
4886	.....do	18		Aug. 27, 1873	....do	1♀	Alc.
4888	Manhegan Island, N. 8 miles.	64	Mud or sand.	—— —, 1873	....do	1♂	Alc.
1308	Latitude 41° 25', longitude 66° 25'.	50	Sand, shells.	—— —, 1872	....do	1♂	Alc.
4877	Grand Manan, N. B.			—— —, 1872	....do	7♂, 14♀	Alc.
5003	.....do	50–55		—— —, 1872	... do	3	Alc.
4866	Eastport, Me			—— —, 1868	Expedition '68.	3♂, 21♀	Alc.
4870	.....do			—— —, 1870	Expedition '70.	6♂, 23♀	Alc.
4868	Eastport, Me., off Head Harbor.	100		—— —, 1870	....do	4♀	Alc.
4872	Eastport, Me., Johnson's Bay.	12	Rocks	Aug. 7, 1872	U. S. Fish Com.	3	Alc.
4875	Eastport Harbor, Me.	20	....do	Aug. 7, 1872	....do	1♂, 1♀	Alc.
4873	.....do	60	Mud	Aug. 16, 1872	....do	5♀	Alc.
4879	Eastport, Me., off Cherry Island.	20–25		—— —, 1872	....do	1♀	Alc.
4876	Eastport, Me			—— —, 1872	....do	1♂, 8♀	Alc.
4898	Bedford Basin, Halifax.	35	Soft mud	—— —, 1877	....do	1♀	Alc.
4909	.....do	26	....do	—— —, 1877	....do	1♀	Alc.
4903	Chebucto Light, N. W. by W. 9 miles.	53	Mud, fine sand.	—— —, 1877	....do	1♂	Alc.
4899	Halifax, outer harbor	25	Gravel	—— —, 1877	....do	2♂, 3♀	Alc.
4900	Narrows at mouth of Bedford Basin.	16	Stone, shells.	—— —, 1877	....do	1♀	Alc.
4901	Chebucto Light, N. by E. 26 miles.	101	Fine sand	—— —, 1877	....do	2♂	Alc.
4902	Halifax, outer harbor.	16	....do	—— —, 1877	....do	1♀	Alc.
4908	.....do	20	Shingly	—— —, 1877	....do	1♀	Alc.
4910	.....do	25	Rocks	—— —, 1877	....do	2♂	Alc.
4911	.....do	43		—— —, 1877	....do	2♂, 2♀	Alc.
4880	Orphan Bank, Gulf of St. Lawrence.			—— —, 1873	....do	1♂	Alc.

Nymphon hirtum Fabricius.

Ent. Syst., vol. iv, p. 417, 1794.—Kröyer, Nat. Tidss., 1ste Bind, 2det Haefte, p. 113; Voy. en Scand., Laponie, etc., Pl. 36, figs. 3 *a–g*.—Norman, Rept. of the Brit. Assoc. for the Advancement of Sci. for 1868, p. 301.—Buchholz, Zweite Deutsche Nordpolfahrt, p. 397, 1874.—Miers, Ann. and Mag. Nat. Hist., 4th series, vol. 20, No. 116, pp. 108–9, Pl. IV, fig. 3, 1877.—G. O. Sars, Archiv for Mathematik og Naturvidenskab andet Bind, Tredie Hefte, p. 365, 1877.

Nymphon hirsutum Sabine, Supplement to the Appendix, Capt. Parry's First Voyage, p. 226, 1824.

Nymphon hirtipes Bell, Belcher's Last of the Arctic Voyages, Crust., p. 401, Pl. XXXV, fig. 3, 1855.—Wilson, Trans. Conn. Acad., vol. v, p. 22, Pl. V, figs. 2 and 3; Pl. VI, figs. 2 *a* to 2 *k*, July, 1878.

Nymphon femoratum Leach, Zool. Misc., vol. i, p. 45, Pl. 19, fig. 2, 1814.—Johnston, Mag. Zool. and Bot., vol. 1, p. 380, 1837 (*teste* Hodge).

PLATE VII, FIGURES 38 TO 41.

Body very robust, lateral processes scarcely separated. Oculiferous segment broad and stout, neck very thick. Oculiferous tubercle much elevated, slender, rounded. Eyes ovate, black. Abdomen slender, tapering from the middle toward the base and tip.

Antennæ very hairy, rather stout, basal joint slightly longer than the rostrum; claws of chelæ slender, acute, very strongly curved, when closed crossing each other at a considerable distance from the tips. The spines, with which they are armed, are rather long, slender, and not very closely set; toward the base they become strongly curved or even hook-shaped.

Palpi very stout; basal joint nearly quadrate, half the length of the second; the remaining joints decrease regularly to the last. The appendage is densely hairy; on the outer three joints the hairs are densely plumose.

The accessory legs differ considerably in the sexes. In the female there are three short basal joints, followed by two which are considerably longer, nearly equal, and somewhat clavate; the sixth is about two-thirds the fifth, and the remaining joints become successively smaller to the last, which is acute and claw-like, and armed below with a series of spines. In the male the appendage is larger and stouter, the fifth joint is about twice as long as the corresponding joint in the female, and near its outer extremity it is swollen and furnished on each side with a dense tuft of long hairs; the spines of the outer joints are scarcely denticulated and alike in both sexes.

Legs comparatively stout, often distended with the generative organs; first and third joints about as long as broad; second longer, somewhat clavate, longer in the male than in the female; the three following joints are much longer, the sixth longest; tarsus short, half the propodus, which has, below, a series of slender spines; dactylus about two-thirds the propodus; auxiliary claws very small and slender, about one-fifth the dactylus. All the appendages are thickly covered with

coarse hairs, which are most numerous on the outer joints. The body is slightly hairy or nearly naked. Color light dull yellow. Adult specimens are very frequently covered with rubbish, and living Bryozoa, Sponges, Rhizopods, etc., are often attached to them. Length 12 millimeters; extent 73 millimeters.

This species has not before been recorded from our coast, though taken in great numbers off Halifax by the United States Fish Commission in 1877. It occurs on rocky, gravelly, or muddy bottoms, down to 50 fathoms. Sept. 24th, 1877, several hauls made off Halifax in 50 fathoms, muddy bottom, brought them up by hundreds, clinging to the meshes of the trawl-net. A single specimen was dredged off Salem, Mass., in 48 fathoms, soft mud. Many of the specimens had egg-masses. In some of these, young were found in various stages of growth. In the earliest stage observed (Plate VII, figure 41) the body is very large and swollen, without a trace of segmentation. The rostrum is short and directed downward. The five anterior pairs of appendages are developed, the posterior one rudimentary. The basal joint of the antennæ bears a long flagellum.

Specimens examined.

Number.	Locality.	Fathoms.	Bottom.	When collected.	Received from—	Specimens. No. and sex.	Dry. Alc.
	Off Salem, Mass	48	Soft mud	— —, 1877	U. S. Fish Com.	1	Alc.
4816	Chebucto Light, N. W. by W. 9 miles.	53	Mud, rocks.	— —, 1877	do	75+ ♂ ♀	Alc.
4818	Chebucto Light, N. W. by W. 8½ miles.	52	Sandy mud	— —, 1877	do	150+ ♂ ♀	Alc.
4823	Chebucto Light, N. 9 miles.	57	Mud, sand, gravel, st.	— —, 1877	do	3 ♂, 5 ♀	Alc.
4931	Sambro Light, W. by N. 10 miles.	42	Gravel, rocks	— —, 1877	do	1 ♂, 1 ♀	Alc.
4827	Sambro Light, W. by N. 9 miles.	42	Fine sand	— —, 1877	do	2 ♀	Alc.
4828	West from last	42	Sand, rocks.	— —, 1877	do	4 ♂, 1 ♀	Alc.
4822	Outer Harbor, Halifax.	25	Rocks	— —, 1877	do	2 ♂, 1 ♀	Alc.

It is, unfortunately, a difficult matter to know whether the name *hirtum* should really be applied to this form. It is impossible to determine from Fabricius's very brief description of *N. hirtum* from the "Norwegian Ocean"; and hence most writers, including Kröyer, who first fully described and figured the species, have referred to it as "*Nymphon hirtum* Fabr.?" Our specimens differ from Kröyer's figures in Gaimard's "Voyages en Scandinavie, Laponie," etc., in several particulars, most notably in the form of the antennæ and proportions of the palpal joints; Kröyer's specimens were from Iceland. G. O. Sars, in a recent paper (Archiv for Mathematik og Naturvidenskab, andet Bind, Tredie Hefte, p. 365, 1877), records, from the same region, a form which he identifies with *N. hirtum* Fabr. and with *N. hirtipes* Bell, but which "*vix* = *N. hirtum* Kröyer." It seems to me probable, under these circumstances,

that Kröyer's figures are inaccurate, and that, therefore, the name *N. hirtum* must be restored.

The following table is intended to show the general geographical and bathymetrical distribution of the species described in this paper. To indicate those localities from which I have examined specimens the mark of affirmation (!) is used; in cases where the locality is given on other authority, the + sign is used. A few of the species occur in the deeper waters far to the southward of their ordinary limits; this is indicated by the ± sign.

	Geographical distribution.																							Bathymetrical distribution.		
	Virginia.	Long Island Sound.	Vineyard Sound.	Off Martha's Vineyard.	Off Nantucket.	Massachusetts Bay.	Off Isles of Shoals.	Casco Bay.	Saint George's Banks.	Gulf of Maine.	Bay of Fundy.	Off Cape Sable, Nova Scotia.	Off Halifax.	Off Nova Scotia.	Gulf of St. Lawrence.	Labrador.	Greenland.	Northern Europe.	Mediterranean.	South Pacific.	Kergnelen.	Littoral.	Fathoms.	European.
Pycnogonum littorale (*Ström*) *O. Fabr.*	—	±	—	—	—	—	....	....	—	—	—	—	....	....	+	.....	+	—	+[1]	†+[2]	+[3]	+	0 – 430	.....
Tanystylum orbiculare *Wils*	—	±	—	—	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	.....	0 – 14	.....
Achelia spinosa (*St.*) *Wils*	....	±	....	....	....	....	....	—	....	....	—	....	....	....	....	.....	....	....	.....	.....	.....	+	0 – 34	.....
Achelia scabra *Wils*	....	....	....	....	....	....	....	—	—	—	—	....	....	....	....	.....	....	....	.....	.....	.....	.....	23 – 45	.....
Pseudopallene hispida (*St.*) *Wils*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	.....	0 – 12	.....
Pseudopallene discoides (*Kr.*) *Wils*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	.....	0 – 26	.....
Pallene empusa *Wils*	....	—	—	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	.....	0 – 3	.....
Phoxichilidium maxillare *St.*	....	....	....	....	....	—	—	—	....	—	....	—	—	....	....	.....	....	....	.....	.....	.....	+	0 – 55	.....
Anoplodactylus lentus *Wils*	....	—	—	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	+	0 – 55	.....
Anemothea achelioides *Wils*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	.....	3 – 8	.....
Nymphon Strömii *Kr.*	....	....	....	....	....	....	....	....	....	....	....	....	....	—	—	.....	+	+	.....	.....	.....	.....	.....	.....
Nymphon macrum *Wils*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	.....	7½ – 115	.....
Nymphon longitarse *Kr.*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	—	.....	....	+	.....	.....	.....	.....	85 – 115	.....
Nymphon grossipes *Fabr.*	....	±	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	+	.....	.....	.....	.....	18 – 116	*220
Nymphon hirtum *Fabr.*	....	....	....	....	....	—	....	....	....	....	....	....	....	....	....	.....	....	+	.....	.....	.....	.....	12 – 110	*116
																							25 – 57	*28

[1] *Teste* Philippi.

[2] *Teste* Nicolet.

[3] *Teste* Böhm.

[4] *Teste* G. O. Sars.

LIST OF WORKS REFERRED TO IN THIS ARTICLE.

The following list of works upon the Pycnogonida referred to in the synonymy or elsewhere in this paper has been appended to render the references more intelligible and easier of access. The list has no pretensions to being considered a complete or even tolerably full bibliography of the subject, but contains only the titles of such works as have been used in the preparation of this report.

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EXPLANATION OF PLATES.

PLATE I.

FIG. 1. Pycnogonum littorale, 469, male; dorsal view.
2. The same; ventral view.
3. The same; *a*, accessory leg; *b*, ambulatory leg.
4. Achelia spinosa, 473; *a*, general dorsal view; *b*, antenna; *c*, spine from accessory leg.

PLATE II.

FIG. 5. Pallene empusa, 476; dorsal view.
6. The same; *a*, ventral view of rostrum and part of the oculiferous segment; *c c'*, spines from accessory leg.
7. The same; antenna.
8. Achelia spinosa, 473; terminal joints of leg.
9. Pseudopallene hispida, 478; *a*, general dorsal view; *b*, antenna; *c*, spine from accessory leg.
10. Pseudopallene discoidea, 479; *a*, dorsal view of body; *b*, antenna; *c*, accessory leg of female.

PLATE III.

FIG. 11. Tanystylum orbiculare, 471; *a*, general dorsal view; *b*, terminal joints of leg; *c*, palpus; *d*, accessory leg of female; *f f'*, spines from accessory legs.
12. Phoxichilidium maxillare, 480; dorsal view of body.
13. The same (smaller southern form); terminal joints of leg.
14. The same (larger form, from Eastport).
15. The same; *a*, accessory leg; *b*, ova; *c*, antenna.
16. Anoploductylus leatus, 482; dorsal view of body.
17. The same; antenna.
18. The same; *a*, terminal joints of leg; *b*, accessory leg.

PLATE IV.

FIG. 19. Ammothea acheliodes, 484; dorsal view of body; *r*, rostrum; *a*, antenna; *b*, palpus; *d*, abdomen; *e*, oculiferous tubercle; *e'*, etc., lateral processes; *l*, legs; *b* (smaller figure), accessory leg.
20. The same; *a*, terminal joints of leg; *b*, antenna; *c*, palpus.
21. Nymphon macrum, 487; dorsal view of oculiferous segment; terminal joints of leg; palpus.
22. The same; *a*, antenna; *b*, spines from fixed claw; *c*, spines from movable claw.
23. The same; accessory legs of male and female (both are enlarged to the same amount).

PLATE V.

FIG. 24. Nymphon Strömii, 485; lateral view, natural size.
25. The same; lateral view of body.
26. The same; dorsal view, natural size.
27. The same; *a*, accessory leg; *b*, spine from accessory leg.
28. The same; antenna.

PLATE VI.

FIG. 29. Nymphon Strömii, 485; dorsal view of body.
30. Nymphon longitarse; *a*, dorsal view of body; *b*, terminal joints of leg; *c*, *c'*, *c''*, spines from accessory leg.
31. The same; antenna.
32. Nymphon grossipes, 491; *a*, dorsal view of body; *b*, lateral view of body.
33 to 36. The same; series to show variation in oculiferous segment.
37. The same; series to show variation in length of propodus.

PLATE VII.

FIG. 38. Nymphon hirtum, 495; dorsal view; *r*, rostrum; *a*, antenna; *b*, palpus; *c*, accessory leg; *d*, abdomen; *l*, leg.
39. The same; *a*, fifth joint of accessory leg of male; *b*, corresponding joint of female.
40. The same; antenna.
41. The same; recently hatched larva.
42. Nymphon grossipes; antenna.

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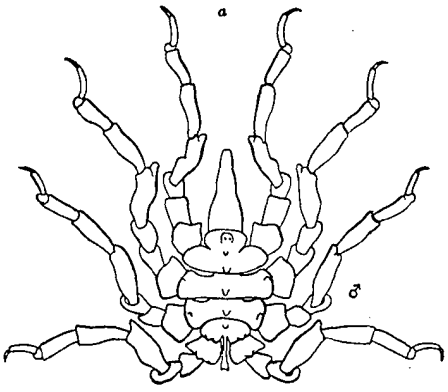
4. Achelia spinosa, 473; *a*, general dorsal view; *b*, antenna; *c*, spine from accessory leg.

Fig. 1.



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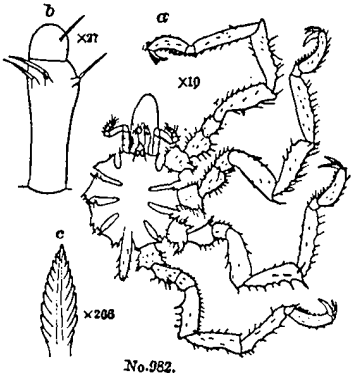

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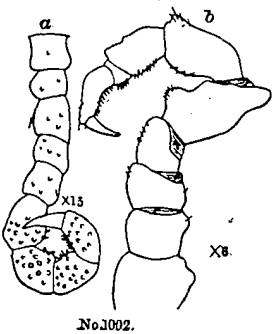

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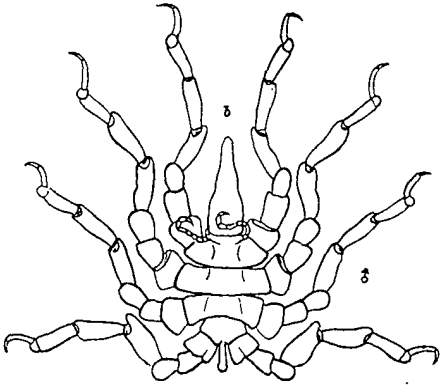

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PLATE II.

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6. The same; *a*, ventral view of rostrum and part of the oculiferous segment; *c c'*, spines from accessory leg.

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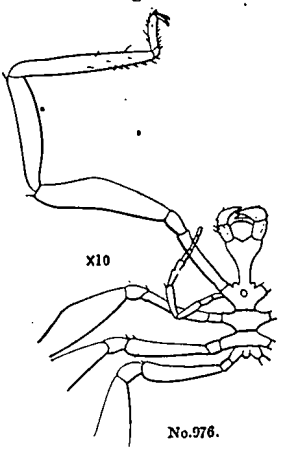
Fig. 5.



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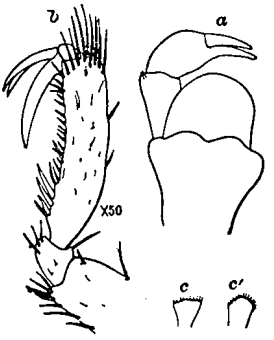

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Fig. 7.

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Fig. 8.

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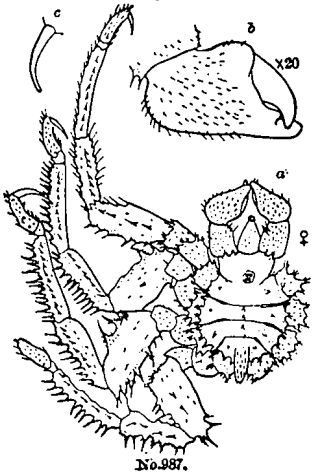
Fig. 9



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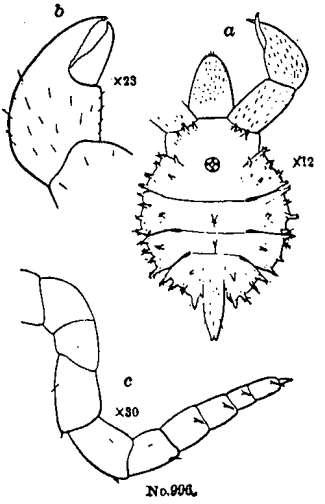

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PLATE III.

FIG. 11. Tanystylum orbiculare, 471; *a*, general dorsal view; *b*, terminal joints of leg; *c*, palpus; *d*, accessory leg of female; *f f'*, spines from accessory legs.

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16. Anoplodactylus leatus, 482; dorsal view of body.

17. The same; antenna.

18. The same; *a*, terminal joints of leg; *b*, accessory leg.

Fig. 13.

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Fig. 11.

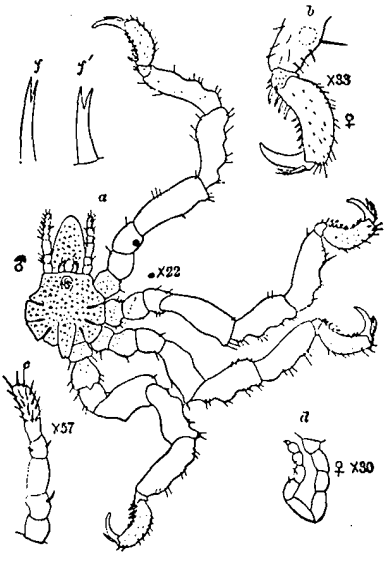

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Fig. 14.

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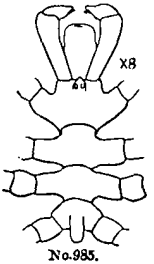

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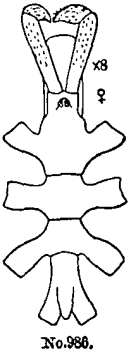

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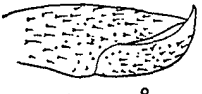

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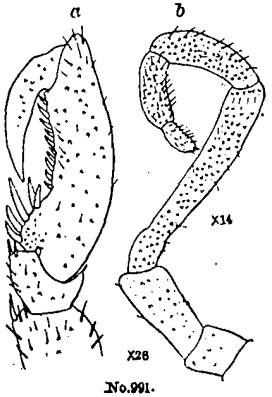

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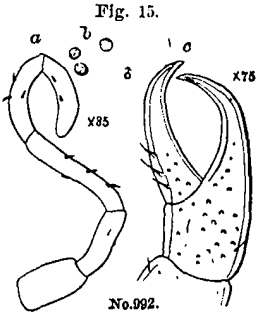

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PLATE IV.

FIG. 19. Ammothea acheliodes, 484; dorsal view of body; *r*, rostrum; *a*, antenna; *b*, palpus; *d*, abdomen; *e*, oculiferous tubercle; *s'*, etc., lateral processes; *l*, legs; *b* (smaller figure), accessory leg.

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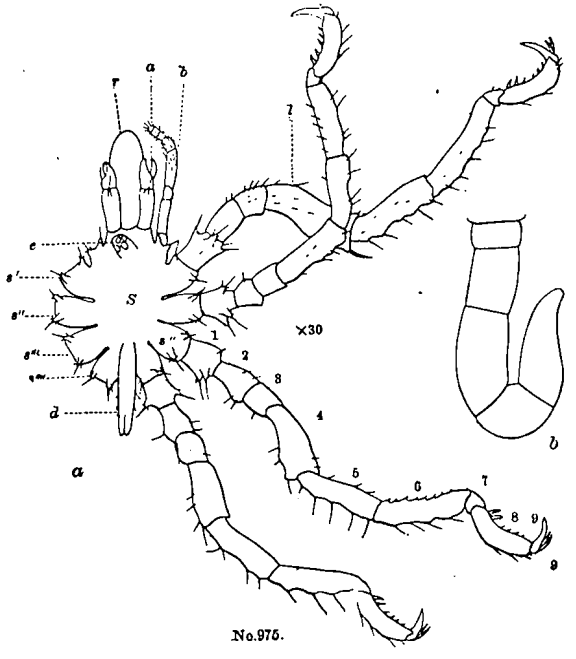

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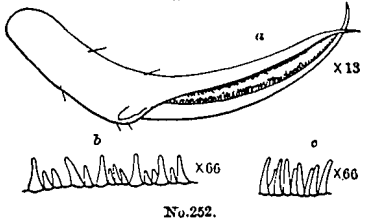
Fig. 22



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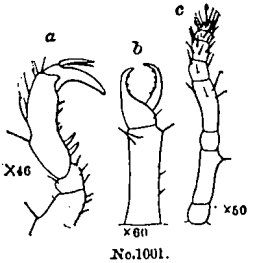

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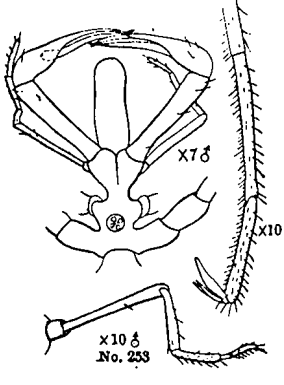

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Fig. 23.

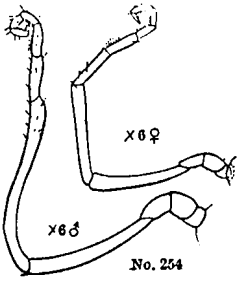

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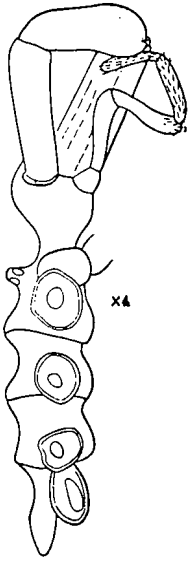
PLATE V.

FIG. 24. Nymphon Strömii, 485; lateral view, natural size.
25. The same; lateral view of body.
26. The same; dorsal view, natural size.
27. The same; *a*, accessory leg; *b*, spine from accessory leg.
28. The same; antenna.

Fig. 25.



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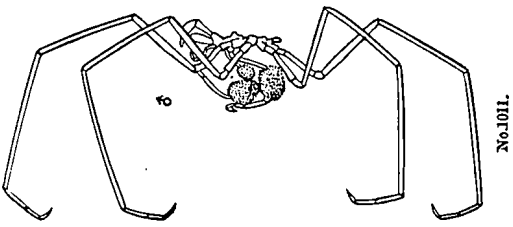

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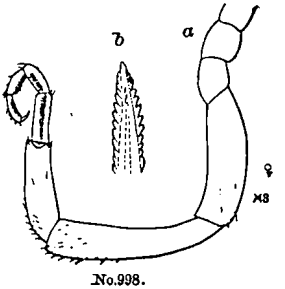

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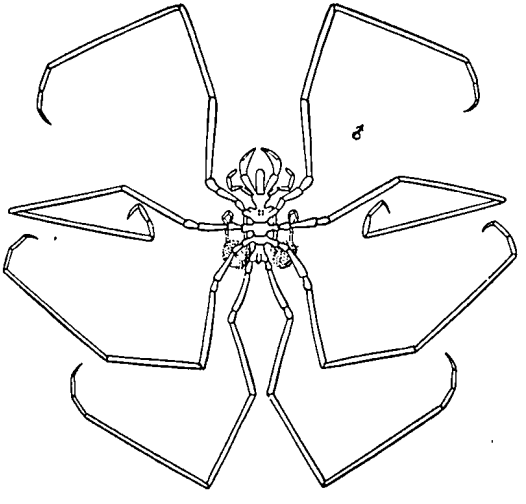

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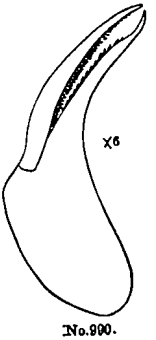

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PLATE VI.

FIG. 29. Nymphon Strömii, 485; dorsal view of body.

30. Nymphon longitarse; *a*, dorsal view of body; *b*, terminal joints of leg; *e*, *e'*, *e''*, spines from accessory leg.

31. The same; antenna.

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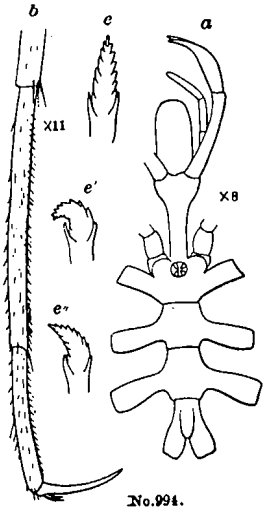
37. The same; series to show variation in length of propodus.

Fig. 30.



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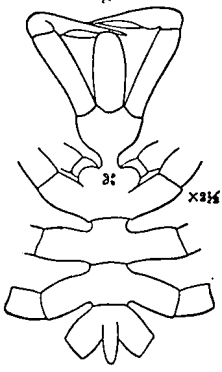

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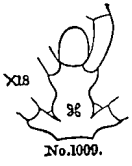

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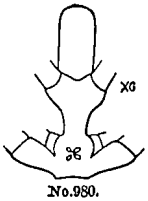

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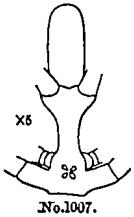
Fig. 31.

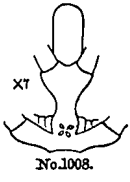
No.999.

Fig. 36.



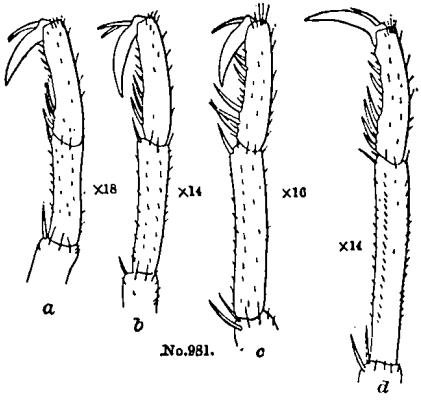
No.1007.

Fig. 35.



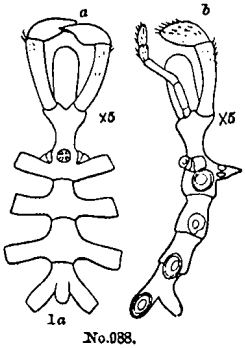
No.1008.

Fig. 37.



No.981.

Fig. 32.



No.988.

PLATE VII.

FIG. 38. Nymphon hirtum, 495; dorsal view; *r*, rostrum; *a*, antenna; *b*, palpus; *c*, accessory leg; *d*, abdomen; *l*, leg.

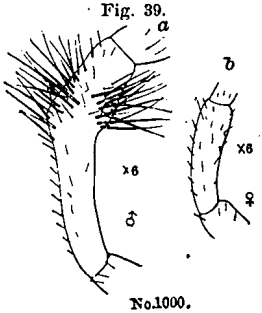
39. The same; *a*, fifth joint of accessory leg of male; *b*, corresponding joint of female.

40. The same; antenna.

41. The same; recently hatched larva.

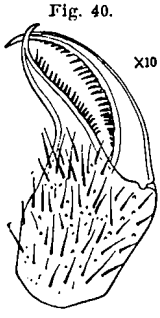
42. Nymphon grossipes; antenna.

Fig. 39.



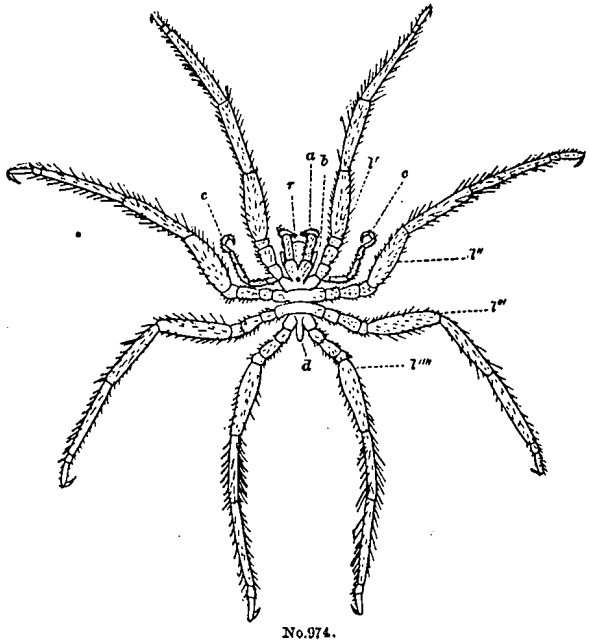
No.1000.

Fig. 40.



No.995.

Fig. 38.



No.974.

Fig. 41.

No.984.

Fig. 42.

No.979.