

TRANSACTIONS.

I.—*The Pycnogonida dredged in the Faroe Channel during the Cruise of H.M.S. "Triton" (in August 1882). By Dr P. P. C. HOEK, Member of the Royal Academy of Science of the Netherlands. (Plate I.)*

(Communicated by Mr JOHN MURRAY.)

During the cruise of H.M.S. "Triton" a small but very interesting collection of Pycnogonids was made. Mr JOHN MURRAY sent it over to me, and asked me to prepare a report on it, which I gladly undertook to do.

The thirteen stations of the "Triton" cruise are situated about 60° lat. north, and between 6° and 9° 6' long. west of Greenwich. At six of these stations Pycnogonids were obtained. The depth of the sea at these stations varies from 433 to 640 fathoms; at two of them the bottom was hard ground or stones, at three the bottom was mud, at one ooze. At three of the stations the bottom temperature was about 45°, at the three others about 30°. The first three being in the so-called warm area, the latter in the cold area.

The number of species collected amounts to eleven. Three of them inhabit the cold area, and were not found in the warm area (*Nymphon Strömii*, Kröyer; *Colossendeis proboscidea*, Sab. spec.; and *C. angusta*, G. O. Sars); five species were observed only in the warm area (*Nymphon hirtipes*, Bell; *N. macrum*, Wilson; *N. longitarse*, Kröyer; *Pallene malleolata*, G. O. Sars; *Pallenopsis tritonis*, n. sp.). The remaining three seem to inhabit the cold as well as the warm area. *Nymphon macronyx*, G. O. Sars, however, is represented by several hundred specimens from the cold area, and by one specimen only from the warm area; and this is also the case with *Nymphon robustum*, Bell. Of both species the number of specimens collected at stations in the cold area was so large, that the occurrence of one specimen at a station in the warm area seems rather unimportant—it must be considered as a specimen which has got astray; but whether this happened before or after its being dredged, I cannot say with certainty. As in both instances the station in the warm area from which the single specimen was obtained follows one in the cold area,

at which several hundred specimens of the one, and upwards of fifty of the other, species were collected, it is even probable that—the same fishing apparatus (trawl) being used—one specimen was overlooked either remaining between the meshes of the trawl or clinging to the rope. The nature of the animals, with their long and numerous legs, each furnished with a claw, favours this suggestion. The only specimen which remains as inhabiting both areas is *Nymphon grossipes*, Oth. Fabr.: it is represented by eight specimens, four of which are from the cold water area, and four from the warm water area.

Comparing these facts with those furnished by the cruise of the “Knight Errant” (1880), of the “Vöringen” (1876 and 77–78), and of the “Willem Barents” (1878 and 1879), and also with what is known about the Pycnogonids of the North American coast (for which knowledge we are much indebted to the studies of Mr E. B. WILSON), we have made the following table, from which those species are excluded which have hitherto been only once observed :—

| Name of the Species. | Area in which H.M.S. 'Triton' caught it. | Area in which the 'Knight Errant' caught it. | Area in which G. O. Sars caught it. | Does it inhabit the Arctic Sea ? | Does it inhabit the Atlantic near the N. Ameri- can coast ? |
|---|--|---|---|--|---|
| <i>Nymphon robustum</i> , Bell, . . . | Cold | Cold | Cold | Yes | No |
| „ <i>macronyx</i> , G. G. Sars, . | Cold | Cold | Cold | ? | No |
| „ <i>Strömii</i> , Kröyer, . . . | Cold | Both | Cold | Yes | Yes |
| „ <i>hirtipes</i> , Bell, . . . | Warm | ... | Cold | Yes | Yes |
| „ <i>macrum</i> , Wilson, . . . | Warm | ... | ... | No | Yes |
| „ <i>longitarse</i> , Kröyer, . . | Warm | ... | Warm | Yes | Yes |
| „ <i>grossipes</i> , Oth. Fabr., . | Both | Cold | Cold | Yes | Yes |
| „ <i>serratum</i> , G. O. Sars, . | ... | ... | Both | Yes | No |
| <i>Colossendeis proboscidea</i> , Sab. spec., | Cold | Cold | Cold | Yes | No |
| „ <i>angusta</i> , G. O. Sars, . | Cold | ... | Cold | ? | Yes |
| <i>Pallene malleolata</i> , G. O. Sars, . | Warm | ... | Both | ? | No |
| <i>Pallenopsis tritonis</i> , n. sp., . . | Warm | ... | ... | No | Probably |

From this table the following conclusions may be deduced :—

1. The species which inhabit the cold area in the Atlantic occur also in the Arctic Ocean (*N. robustum*, *C. proboscidea*); those which have not yet been observed in the Arctic may be expected to be found there (*N. macronyx*, *C. angusta*). They are not found near the American coast, or only at a very considerable depth (*Colossendeis angusta* at a depth from 810 to 1242 fathoms).

2. The species which inhabit the warm area in the Atlantic occur also at a much lower latitude near the American coast (*N. macrum*, *Pallenopsis*, spec.). They are not found in the Arctic Ocean.

3. The species which inhabit both areas in the Atlantic occur in the Arctic Ocean as well as near the American coast (*N. Strömii*, *N. hirtipes*, *N. grossipes*). *Nymphon serratum* inhabits both areas in the Atlantic; it has been observed in the Arctic, and will probably be found at a much lower latitude. *Pallene malleolata* inhabits both areas also, and will probably be found to have a wide northern as well as southern distribution.

4. The only species whose distribution does not seem to be in accordance with the temperature of the water it inhabits is *N. longitarse*. Hitherto it has only been observed in the warm water area, yet it inhabits the Arctic as well as the New England coast. However, I think this exception is of no consequence: in the first place, because it always, in the northern parts of the Atlantic at least, lives rather solitary, and therefore may be found in the future in the cold area also; and in the second place, because it is a somewhat uncertain species, and perhaps will turn out to be a variety of *N. grossipes*.

A few notes on the species submitted to my examination are appended here:—

1. *Nymphon robustum*, Bell.

A very large number of specimens of this species was obtained at Stations 8 and 9, fourteen specimens were dredged at Station 6, and one specimen was taken from the bottle which contained the Pycnogonids of Station No. 10. The specimens show the same difference with those of higher northern latitudes as do those dredged by the "Knight Errant" in 1880; they are not nearly so stout, and are smaller. Numerous specimens had attached to the legs a *Scalpellum*, for which I proposed the name *Scalpellum nymphocola*. It is a curious fact, that the specimens of the Barents Sea (and I studied also those of the third and fourth cruise of the Dutch schooner "Willem Barents") never had this Cirriped on their legs.

2. *Nymphon hirtipes*, Bell.

Only one small specimen of this species was dredged at Station No. 5. Mr EDMUND B. WILSON and Professor G. O. SARS apply to this species the name *N. hirtum*, Fabr. But the description of FABRICIUS (*Entom. System.*, 1794) is not only very brief, but it is totally insufficient to recognise the species. The species which KRÖYER (1845) described under the name *N. hirtum*, Fabr., no doubt differs from the present species (as is stated by Professor SARS and by

WILSON also). I therefore retain the name of FABRICIUS for KRÖYER's species, the first that has been described recognisable under that name, and I give to the other the name of BELL, whose figures and description doubtless refer to it.

Although this species is common in high northern latitudes (BELL, MIERS, HOEK), it seems to be rather scarce in the North Atlantic (Professor G. O. SARS only observed it once; it was not obtained by the "Knight Errant"; and the "Triton" collected only one specimen). Off Halifax it was taken in great numbers by the U.S. Fish Commission in 1877 (Wilson).

3. *Nymphon Strömii*, Kröyer.

During the cruise of H.M.S. "Triton" this species was met with on three different occasions. At Station 9 about forty specimens of it were taken; at Station 8, three, and at Station 6, one specimen. It was not observed at one of the stations of the warm area, as happened during the cruise of the "Knight Errant."

4. *Nymphon macronyx*, G. O. Sars.

This species was first observed by Professor SARS during the first cruise of the "Vöringen" (1876); it was again collected in the Faroe Channel during the summer of 1880 ("Knight Errant"); and it is now dredged for the third time by H.M.S. "Triton." Professor SARS collected four specimens; the "Knight Errant" took about thirty specimens; and the "Triton" several hundreds. These specimens were obtained in about lat. 60° north, whereas SARS got his specimens at 62° 44' 5". Whether its distribution will be found to extend still further north, I cannot say with certainty. I only think it very probable, as this species is an inhabitant of the cold area.

At Station 8, several hundred specimens of this species were taken,

| | | | |
|---|--------------------------|---|---|
| „ | 9, about fifty specimens | „ | „ |
| „ | 6, „ two „ | „ | „ |

and one specimen (see p. 1) was found in the bottle containing the Pycnogonids from Station 10.

One of the specimens of Station 8 has no eyes; or, better perhaps, has no pigment in its eyes.

5. *Nymphon macrum*, Wilson.

WILSON, Pycnogonida of New England, *Report U.S. Commission of Fish and Fisheries*, vi. (1878), 1881, p. 487, pl. iv., figs. 21-23.

Syn. *Nymphon brevicollum*, Hoek, Report "Challenger" Pycnogonida, 1881, p. 45, pl. iii. figs. 13-15; pls. xv. figs. 12 and 13.

The general appearance of this species is much like *N. Strömii*. When studying the details as to the length of the joints of the palpi, of the tarsal joints

of the legs, the structure of the first segment of the body, of the oculiferous tubercle, &c., it is, however, easily distinguished not only from the above named, but also from other species of the genus.

The eggs of *N. Strömii* are small and very numerous; those of *N. macrum* are very large, each egg-mass containing a few eggs only.

This species inhabits the warm water area. Four specimens were collected at Station 10; nineteen specimens at Station 11.

The U.S. Fish Commission took this species at a few localities in the Gulf of Maine, in from 85 to 115 fathoms; the "Challenger" south of Halifax, in 83 fathoms. The depth at which it was collected during the cruise of H.M.S. "Triton" was between 516 and 555 fathoms.

6. *Nymphon grossipes*, Oth. Fabr.

In all, eight specimens which I refer to this species were collected. In most of its characters this species is very variable; its conical and acutely pointed oculiferous tubercle, the length of the third joint of the palpus, which is longer than the second joint, and the armature of the second tarsal joint of the leg, are, I think, the best marks for its distinction.

Hitherto, this species was, in the Northern Atlantic, only observed in the cold area. H.M.S. "Triton" collected four specimens in the warm and four in the cold area, viz., three at Station 6, one at Station 9, and four at Station 10.

7. *Nymphon longitarse*, Kröyer.

At Station 11, at a depth of 555 fathoms, two specimens of this species were dredged. They are very small specimens, having an extremely attenuated appearance, with blunt oculiferous tubercles, and with the first tarsal joint twice as long as the second.

8. *Colossendeis proboscidea*, Sab. spec.

This robust species is represented by a single specimen taken at Station 9, at a depth of 608 fathoms. For a figure of this species I refer to my paper on the Pycnogonids of the "Willem Barents."

9. *Colossendeis angusta*, G. O. Sars.

G. O. Sars, Prodröms descriptionis, *Arch. for Math. og Naturv.*, ii. p. 268, 1877.

(Plate I. fig. 8.)

This species is known from a short (Latin) description by Professor G. O. Sars. Mr WILSON (*Bull. Mus. Comp. Zool.*, viii. 1881, p. 243) got specimens of what he believes to be the same species from deep water in the Atlantic, between N. lat. 38° and 41°, and W. long. 65° and 73°, and points out several differences of greater or less importance between his specimens and those of Sars.

Some of these differences may be due to variation of the species, the others to the provisional character of the paper of Professor Sars. Nor would I have insisted upon this disagreement had not the specimens collected with H.M.S. "Triton" shown also some of the variations from the description of Sars pointed out by Wilson.

The largest specimen collected by the "Triton" measures 20 mm.; the proboscis, which is slightly swollen a little behind the middle, is not quite 10 mm. The abdomen, according to Sars and Wilson, is one-third the length of the trunk; in the "Triton" specimens, however, it is only one-fourth that length. The third (second, Sars) joint of the palpus is a great deal longer than the fifth (fourth, Sars). The eighth joint of the palpus is globose, and much shorter than the two last. The claw of the ovigerous leg is not confluent with the last joint (Sars): in my specimens, as in those of Wilson, there is a distinct articulation between them. The colour of the specimens is beautiful orange.

There are in all eight specimens. Of these five are from 16 to 20 mm., and about, or quite, full grown. The three other specimens measure from 9 to 12 mm., and are furnished with very slender and three-jointed mandibles (fig. 8). The last joint of these mandibles terminate in minute rudimentary chelæ.

I observed the same in a young male specimen of *Colossendeis gracilis* collected during the cruise of H.M.S. "Challenger" (*vide* Report "Challenger" *Pycnogonida*, p. 69). It is a very curious fact that some of the species of the genus *Colossendeis* retain a pair of appendices of the larval state almost till the animal has reached the size of the adult; and these appendices do not remain in the extremely small and feeble condition of larval life, but grow with the proboscis till the length of this part of the body surpasses half its length when full grown. Probably the mandibles are only lost when the animal comes to maturity.

This species is an inhabitant of the cold water area; the highest latitude at which it has been observed is $63^{\circ} 10' 2''$: it has not been found as yet in the Arctic region. Sars obtained it from 417, the "Triton" from 466 to 640 fathoms. Off the eastern coast of the United States Mr Agassiz has dredged it at a depth of from 810 to 1242 fathoms—a striking instance of the southward extension of Arctic forms in deep water, as Mr Wilson says; for though it has not been found in the Arctic Ocean as yet, we may safely conclude, from its occurrence in the cold water area, that hereafter it will be met with there.

Seven specimens were taken at Station No. 8 and one at Station No. 6.

10. *Pallene malleolata*, G. O. Sars.

G. O. Sars, *Crustacea et Pycnogonida nova*, *Arch. for Math. og Naturv.*, iv. p. 469, 1879.

(Plate I. fig. 7.)

I know this species only from the description of Professor G. O. Sars.

Four robust specimens were taken at Station No. 10 at a depth of 516 fathoms. It is the only representative of the genus found at a considerable depth in high northern latitudes. Professor SARS collected it between N. lat. 72° 27' and 80°; the station at which the "Triton" dredged it is N. lat. 59° 39' 30", in the warm area.

11. *Pallenopsis tritonis*, n. sp.

(Plate I. figs. 1-6.)

Animal slender, the lateral processes, at the end of which the legs are inserted, being distinctly separated from each other. Dark yellow coloured, smooth: no tubercles or hairs are visible on the surface of the body even when studied with a lens. Legs not very hairy; the structure of the hairs, as in numerous species of *Pallene* and *Pallenopsis*, furnished with small barbs pointing towards the tip.

Proboscis nearly cylindrical, slightly swollen a little behind the middle. Mouth large, as in the other species of the genus (*Pallenopsis oscitans*, Hoek, spec. &c.). The length of the proboscis is not quite equal to that of the oculiferous and two succeeding segments taken together.

Oculiferous segment longer than the two following taken together, somewhat swollen in front, where it overhangs the base of the proboscis, and where it is furnished with the rounded oculiferous tubercle. Of the eyes the two anterior ones have very large clear lenses; the other two are a great deal smaller and are placed at the back side of the tubercle, a dark reddish and rhombiform pigment spot being placed at the tip of the tubercle.

The form of the other segments is the same as in other species of the genus; the abdomen is cylindrical, its length corresponds with that of the second and third segments taken together (fig. 1).

The mandibles are very slender, the two basal joints extend beyond the tip of the rostrum, third joint considerably swollen, with the claws curved and not so long as in *P. longirostris*, Wilson (fig. 2).

The palpi are represented by very small globular knobs implanted laterally near the base of the proboscis.

The ovigerous legs (figs. 3 and 4) have the first joint almost globular, the second, fourth, and fifth joints of considerable and nearly equal length, the third a great deal longer than the first, and also a little longer than the sixth joint, which is swollen at the distal extremity. Seventh to tenth joints gradually diminishing in length, and at the same time growing more slender. Tenth joint rather elongate. Joints first to fifth are sparsely hairy, joints sixth to tenth covered with numerous spines; those at the distal extremity of the sixth joint are a great deal stouter, and are placed in a complete ring.

The legs are exactly thrice as long as the body (with the proboscis enclosed);

the length of the different joints is as follows :—First and third joint as long as the lateral process, at the end of which the leg is inserted. Second joint more than thrice as long as the first, slightly swollen towards its distal extremity. Fourth joint more than twice as long as the second, and even a little longer than the fifth joint. Sixth, seventh, and eighth joints combined once and a half as long as the fifth. First to fourth joint almost of the same thickness, fifth to eighth joint gradually growing more slender; all the joints are furnished with a longitudinal darker coloured stripe, as is common in Pycnogonids. The first three joints of the legs are almost quite smooth, the outer joints rather hairy. The structure of the last two joints of the leg can be judged from fig. 5. They are not so slender as the same joints of *P. longirostris* as figured by WILSON. The armature, however, is much the same as in that species.

The only specimen of this species which was collected by the "Triton" is a male; as far as I could make out without mutilating the animal, the small genital pores are only present on the two hindmost legs, and situated ventrally near the distal extremity of the second joint. The ovigerous leg contains a glandular organ with small opening near the beginning of the fourth joint, and so does the fourth joint of all the legs. Of the latter the porus is placed at the end of a tubular process* inserted about the middle of the joint. As shown in fig. 6, the excretory canal, which passes through the tubular process, has a vesicular swelling at its base. Most probably these glandular organs do not occur in the females of this species.

The intestinal cæcum which enters the mandible in this species is well developed (fig. 2); it can be traced till in the last, the claws bearing joint. The total length of the body is $8\frac{5}{7}$ mm., that of a leg of the hindmost pair 26 mm.

Together with *Pallene malleolata*, *Nymphon macronyx*, and *N. macrum*, this interesting Pycnogonid was dredged at Station 10 of the cruise of H.M.S. "Triton." A young Lamellibranch mollusc (an oyster ?) is affixed to one of its legs.

Mr E. B. WILSON (1881) proposed a new genus for those Pycnogonids which come near to *Phoxichilidium*, M. Edw., but which are characterised by three-jointed (four-jointed, WILSON) mandibles and ten-jointed ovigerous legs present in both sexes. Moreover, it is distinct on account of the existence of rudimentary palpi. WILSON describes two species as belonging to this genus, *P. forficifer* and *P. longirostris*, and he supposes that KRÖYER'S *Phoxichilidium fluminense* should also be referred to this genus. No doubt he is right in this supposition, although the extra articulation of the mandible is wanting

* WILSON hints that this glandular duct might be a character of generic significance. It occurs, however, in numerous genera, as in *Phoxichilidium*, *Oorhynchus*, &c.

in this species. If the genus *Pallenopsis* be accepted, four other species of deep-sea Pycnogonids, collected during the voyage of H.M.S. "Challenger," and described in my report on the Pycnogonids as belonging to *Phoxichilidium*, Milne Edw., belong doubtless to it also. So we have eight species of this genus, the range of depth and geographical distribution of which may be judged from the following list :—

| Name of the Species. | Depth in Fathoms. | Geographical Distribution. |
|---|-------------------|----------------------------|
| <i>Pallenopsis fluminensis</i> , Kröyer, spec., | 7-20 | Patagonia, Brazil. |
| " <i>patagonica</i> , Hoek, spec., | 45-175 | Patagonia. |
| " <i>forficifer</i> , Wilson, | 262-333 | Off South Carolina. |
| " <i>longirostris</i> , Wilson, | 500 | South of Cape Cod. |
| " <i>tritonis</i> , n. sp., | 516 | Faroe Channel. |
| " <i>pilosa</i> , Hoek, spec., | 1600-1950 | Southern Indian Ocean. |
| " <i>oscitans</i> , Hoek, spec., | 1675 | Atlantic, West of Azores. |
| " <i>mollissima</i> , Hoek, spec., | 1875 | Off Yeddo (Japan). |

Of these, six are true deep-sea species, the two others are shallow-water inhabitants. The deep-sea species have the mandibles three-jointed (as are those of the young of *Colossendeis* and *Ascorhynchus*); the two shallow-water species show a transitory form between those with three and those with two-jointed mandibles. In the mandible of *P. patagonica* a trace of an articulation is visible dorsally, but totally wanting when seen from the ventral side; in *P. fluminensis*, a little beyond the middle, the basal joint of the mandibles is furnished with a row of hairs, and seems to be divided into two.

Within the limits of the genus *Pallenopsis* the change of three-jointed into two-jointed mandibles has taken place. That the three-jointed mandible must be considered as the original form is shown by the mandibles of different species of *Ascorhynchus* and *Colossendeis*; though they exist in these genera as rudimentary or larval organs only and are too small and too weak to be of use to the animal, they are distinctly three-jointed. Larval parts, or parts which have grown rudimentary, are no more strongly influenced by circumstances; hence they often retain their original condition. No doubt it is a very curious coincidence, that the deep-sea species show the original condition of the mandibles, whereas the shallow-water forms are furnished with these organs in the more robust condition of most of the other genera of Pycnogonids.

Finally, I wish to point out that the new species for which I have proposed the name *P. tritonis* comes very near to *P. longirostris*, Wilson. I was long uncertain whether I should refer my specimen to that species or should describe it as a new one. I chose the latter, because of numerous, though perhaps not very important, differences between his description and my specimen. Should

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the two forms prove identical—as I think it very probable they will do when examined comparatively—they give new evidence of the wide range of deep-sea species.

LIST OF THE STATIONS at which Pycnogonids were taken by H.M.S. "Triton."

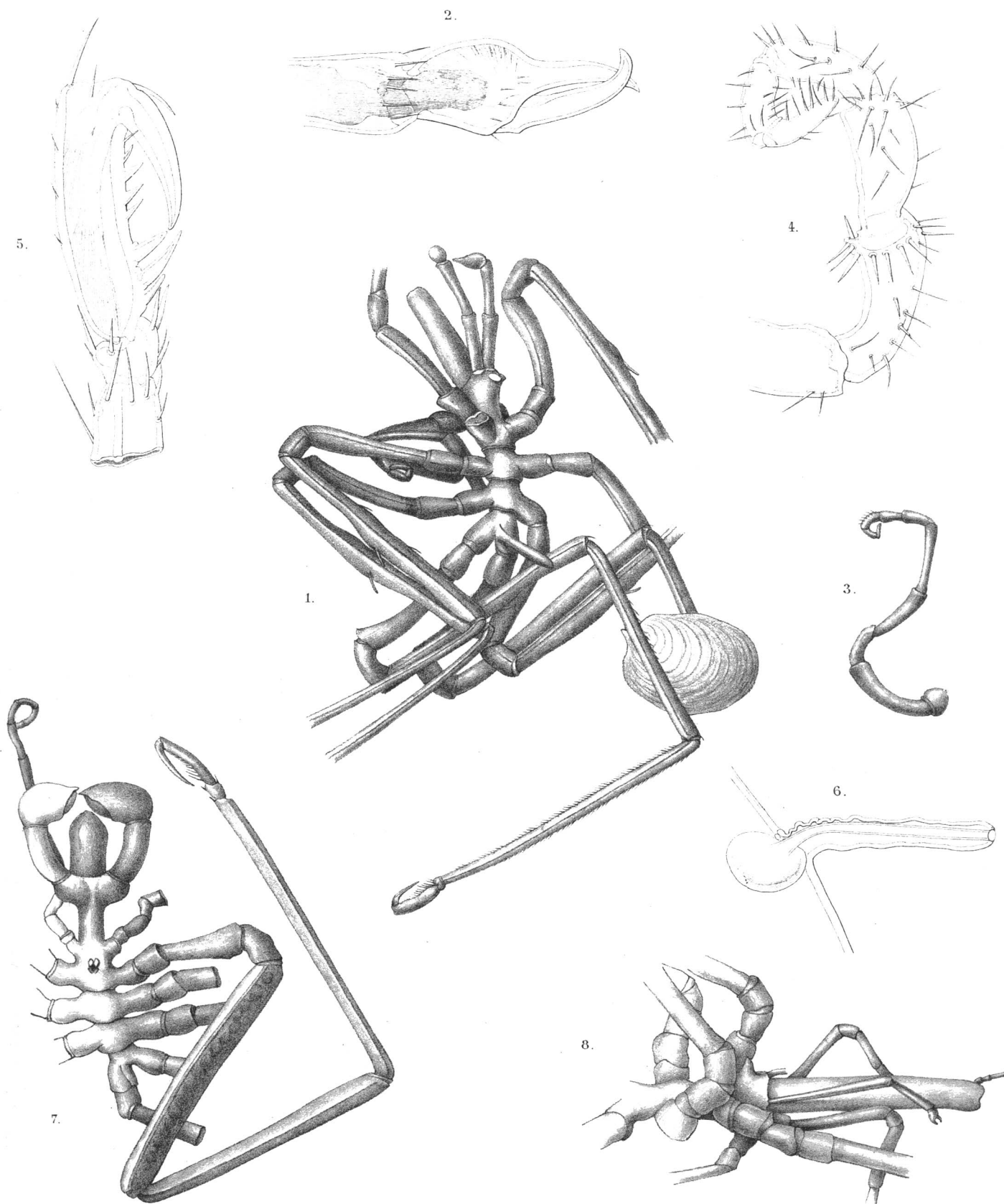
- Station No. 5, August 9, 1882.—Lat. 60° 11' 45" N., long. 8° 15' W.; 433 fathoms. Bottom, hard ground; temp. 43°, 5 (Trawl).
Station No. 6, August 17, 1882.—Lat. 60° 9' N., long. 7° 16' 30" W.; 466 fathoms. Bottom, stones; temp. 30°–29°, 5 (Dredge).
Station No. 8, August 22, 1882.—Lat. 60° 18' N., long. 6° 15' W.; 640 fathoms. Bottom, mud; temp. 30° (Trawl).
Station No. 9, August 23, 1882.—Lat. 60° 5' N.; long. 6° 21' W.; 608 fathoms. Bottom, mud; temp. 30° (Trawl).
Station No. 10, August 24, 1882.—Lat. 59° 40' N., long. 7° 21' W.; 516 fathoms. Bottom, mud; temp. 46°–49°, 5 (Trawl).
Station No. 11, August 28, 1882.—Lat. 59° 39' 30" N., long. 7° 13' W.; 555 fathoms. Bottom, ooze; temp. 45°, 5 (Trawl and Dredge).

EXPLANATION OF PLATE I.

Figs. 1–6, illustrating *Pallenopsis tritonis*, n. sp.

- Fig. 1. Animal, dorsal view; magnified 7 diameters.
Fig. 2. Last joint of the mandible; magnified 41 diameters.
Fig. 3. Ovigerous leg; magnified 7 diameters.
Fig. 4. Last five joints of the ovigerous leg; magnified 41 diameters.
Fig. 5. Last two joints and claw of one of the legs; magnified 41 diameters.
Fig. 6. Tubular process of one of the legs; magnified 94 diameters.
Fig. 7. *Pallene malleolata*, G. O. Sars, dorsal view; magnified 6 diameters.
Fig. 8. *Colossendeis angusta*, G. O. Sars, lateral view of the anterior part of the body; magnified 7 diameters.

(All the figures are drawn with the camera lucida.)



A.J. Wendel lith.