PYCNOGONIDA OF SAGAMI BAY

Huzio UTINOMI
Seto Marine Biological Laboratory, Sirahama

*With 9 Text-figures*

The present paper deals with the Pycnogonida from the collections in the Biological Laboratory of His Majesty the Emperor in Tokyo which have been assembled from Sagami Bay during the period from 1928 to 1958.

Although the pycnogonid collection is not extensive, only comprising 43 vials, it was revealed to represent 18 species belonging to 11 genera in all. Most of them are endemic to or common in Japanese waters, but a few which have been known only from southern tropical waters are added for the first time to the Japanese fauna. Moreover, the present collection revealed some remarkable examples, interesting from a taxonomic point of view, necessitating an emendation of some generic or specific characters in some genera of the Ammotheidae.

The pycnogonid fauna in Sagami Bay and the neighboring waters is locally better known than in other areas of Japan, thanks to the works by Japanese authors (FUKUI, KISHIDA, OHISHIMA and UTINOMI) and several foreign authors (BOHM, SLATER, HOEK, IVES, ORTMANN, LOMAN, HELFER, HEDGEPETH and STOCK). Earlier records of pycnogonids from this district by these investigators are given at the end of this paper in order to summarize our present knowledge of the pycnogonid fauna of Sagami Bay.

I am greatly indebted to Dr. Hirotaro HATTORI of the Biological Laboratory of His Majesty the Emperor and staff members for the privilege of studying this interesting collection.

In the following list the species marked with an asterisk (*) are now newly added to the Japanese fauna.

Family Nymphonidae

*Nymphon grossipes* (O. FABRICIUS?) KRÖYER
*Nymphon japonicum* ORTMANN

Family Callipallenidae

*Propallene longipes* (BOHM)
*Pallenopsis sibogae* LOMAN

1) Contributions from the Seto Marine Biological Laboratory, No. 323.

Description of the Species

Family Nymphonidae

Genus *Nymphon* J. C. Fabricius, 1794

1. *Nymphon grossipes* (O. Fabricius?) Kroyer

*Nymphon grossipes* Hedgpeth, 1948, p. 187, fig. 13a; Hedgpeth, 1949, p. 247 (synonymy); Utinomi, 1955, p. 4, fig. 1; Stock, 1955, p. 218.


*Remarks*: This circumpolar, boreal-arctic species was already collected off Simoda by the ‘Soyō-maru’ (Utinomi, 1955).

*Measurements of a male and a female in mm*:

<table>
<thead>
<tr>
<th></th>
<th>Male (no. 6)</th>
<th>Female (no. 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of proboscis</td>
<td>3.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Diameter of proboscis</td>
<td>—</td>
<td>0.7</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>6.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Width of trunk (excl. crurigers)</td>
<td>—</td>
<td>0.5</td>
</tr>
<tr>
<td>Length of crurigers</td>
<td>—</td>
<td>0.3</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Space between crurigers</td>
<td>—</td>
<td>0.3</td>
</tr>
</tbody>
</table>

1) Localities in the succeeding text are all included in Sagami Bay.
2. **Nymphon japonicum** *Ortmann*

*Nymphon japonicum* *Ortmann*, 1890, p. 158, pl. 24, fig. 1 (part); *Hedgpeth*, 1949, p. 249, fig. 20; *Utinomi*, 1951, p. 159; *Stock*, 1954, p. 18, fig. 6a-e; *Utinomi*, 1955, p. 5.


**Remarks:** This is prevalent and apparently endemic in Japanese waters.

**Family Callipallenidae**

**Genus Propallene** *Schimkewitsch*, 1909

3. **Propallene longiceps** (Böhm)

*Propallene longiceps* *Böhm*, 1879b, p. 59; *Ortmann*, 1890, p. 165, pl. 24, fig. 7; *Fukui*, 1918, p. 99; *Ohshima*, 1933a, p. 96; *Ohshima*, 1933c, p. 212, figs. 1-7.

*Propallene longiceps* *Schimkewitsch*, 1930, p. 282 (1929, fig. 3); *Ohshima*, 1936, p. 863 (listed only); *Stock*, 1954, p. 31, fig. 12a-b.

**Material:** 1 male and 1 female (Sp. No. *Pycn.* 23). Off Simoda, 20 m. ?-XI-1954.

**Remarks:** In a male specimen, a pair of rudimentary 2-jointed palps are present on the ventral side at the base of chelifores, as figured by *Schimkewitsch* and *Ohshima*. It is rather robust and shorter than that of the allied *P. kempi* (*Calman*), as noticed by *Stock* (1954). In a female specimen, the femur of all legs is plump, fusiform, containing 2 or 3 orange-colored eggs.

This species seems to be endemic to Japanese waters at present, and has often been recorded. The present material, brownish in color, is apparently benthic, but as exemplified by *Ohshima* (1933a, c) this is often found in plankton. Indeed, I have found this species in plankton samples collected by Dr. I. YamaZI during his plankton investigation in bays along the Japanese coasts (9 specimens from Kamaisi Bay of Tôhoku district on September 30, 1952; 12 specimens from Tanabe Bay of Kii district in September, 1956).

**Genus Pallenopsis** *Wilson*, 1881

4. **Pallenopsis sibogae** *Loman*

*Pallenopsis sibogae* *Loman*, 1911, p. 14; *Stock*, 1954, p. 63, fig. 36h-i (synonymy); *Utinomi*, 1955, p. 19, fig. 11.

**Material:** 1 female (Sp. No. *Pycn.* 7). South of ZyoGasima, 70 fathoms. 8-VIII-1936.

Remarks: This is the third record of occurrence in Japan. Formerly Stock (1954) recorded from the west of Kyusyu, 90 fms. and Utinomi (1955) from Suruga Bay, 79 m.

5. *Pallenopsis virgata* Loman

*Pallenopsis virgatus* Loman, 1908, p. 69, pl. 9, fig. 134; pl. 10, figs. 135-136; Heddge, 1949, p. 277, fig. 36g-h; Utinomi, 1951, p. 160.


Measurements of a male in mm:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of proboscis</td>
<td>2.5</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>5.0</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>1.5</td>
</tr>
<tr>
<td>Length of crurigers</td>
<td>1.5</td>
</tr>
<tr>
<td>Length of 4th leg</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Remarks: As in the preceding *sibogae*, there is a rounded tubercle below the basis of the chelifore as a vestige of palp. The presence of paired tubercles on the dorso-distal end of coxa 1 and a strong protuberance on the ventro-distal end of coxa 2 is characteristic to this species.

Hitherto records in Japanese waters are from the southwest of Omaezaki, 34-37 fathoms ('Albatross' Station 3730) and from off Yuzaki, Kii Peninsula, 25-35 m.

Family Phoxichiliidiidae

Genus *Anoplodactylus* Wilson, 1878

6. *Anoplodactylus versluysi* Loman

*Anoplodactylus versluysi* Loman, 1908, p. 73, pl. 3, figs. 33-39; Stock, 1954, p. 48, figs. 38a, 39.


Remarks: Two specimens, both female and young male, largely coincide with the description of *A. versluysi* by Loman (1908) and Stock (1954), although a few differences are found.

In a female specimen, the oviger is lacking, but its vestige is seen inserting between the bases of the first leg and the proboscis. Lateral processes are widely separated by twice their own diameter. On the ventral surface of the proboscis there is a large, somewhat conical, mound instead of 4 papillae (such as figured by Stock). The ocular tubercle is sharply pointed at tip and with 4 well-pigmented
eyes rather downwards. Of the legs, coxa 1 is armed with a spiny tubercle at the dorso-distal end.

In a young male, the characteristic tubercle on the ventral surface of the proboscis is indistinct, as LOMAN neither mentioned nor figured. Probably such variation in the ventral outgrowth of the proboscis may be dependant on the sexual difference. The oviger is short and unsegmented. However, the presence of a peculiar tall ocular tubercle and a spiny tubercle on the distal end of coxa 1 indicates to be identical.

**Measurements of a young female in mm:**
- Length of proboscis: 1.0
- Length of trunk: 2.5
- Length of abdomen: 0.5

**Family Ammiothecidae**

**Genus Achelia Hodge, 1864**

7. *Achelia echinata* Hodge

(Fig. 1)

*Achelia echinata* Utinomi, 1954, p. 11, figs. 4-5 (synonymy).

*Achelia echinata* ssp. *nasuta* Stock, 1956, p. 98, fig. 16a (synonymy).


**Remarks:** All the material from Sagami Bay agree well with the specimens from Akkeshi Bay, Hokkaido (Utinomi, 1954, p. 11) and those from Tsingtao, North China which were described under the varietal name var. *sinensis* (Lou, 1936a, p. 19, figs. 7-9, pls. II-IV).

In naming the specimen (a female) obtained off the Marine Biological Station, Misaki, 200 fathoms, Stock (1956, p. 98) adopted a subspecific name *nasuta* Marcus, 1940 (substitute for ssp. *orientalis* Losina-Losinsky, 1933).

The typical form of *Achelia echinata* Hodge is widely distributed in the North Atlantic waters as far south as the Cape Verde Islands. Recently Stock (1955) recorded it from St. Croix, West Indies. It was not known from the western side of the Atlantic before, yet he did not detect any reliable difference between the West Indian material and the European form.

With respect to the affinity of the oriental form, Lou (1936a) lay too much stress on the relative length of the chelifore and abdomen to the trunk, as differentiating from the European form. Stock (1956) also emphasizes the slenderness of legs and
the larger size in adults of the oriental form, relative to the European form.

In my opinion, however, such differences in size seem to be less reliable for exact discrimination of many individuals from different localities. Even if such differences are recognizable as constant, the proposal of nasuta by Marcus (1940) to cover the Losinna-Losinsky's homonymy is unnecessary, since Lou's var. name sinensis precedes Marcus' ssp. name nasuta.

As to another form Achelia echinata var. japonica, briefly described by Ortmann (1890) from Kadsyama (=Katuyama), mouth of Tokyo Bay, I already suggested that it is not identical with Achelia echinata.

According to Ortmann's figure (pl. 24, fig. 6), the proboscis is plump, nearly oval instead of being pointed distally, the chelifore relatively very short, the trunk as long as wide, well-segmented, without tubercles and the abdomen very short, almost hidden below. It may be, if distinct, allied to either A. bituberculata Hedgpeth or A. ohshimai Utinomi more closely than to other species. Rediscovery of new material will decide its status finally.

Achelia echinata seems to be essentially a boreal species ubiquitous in the northern hemisphere. Its range can be extended to the eastern Mediterranean (Stock, 1958, p. 1) and to the Red Sea (Calman, 1938, p. 160).

8. Achelia superba (Loman)

Ammotheca superba Loman, 1911, p. 11, pl. 1, figs. 14-15 & pl. 2, figs. 16-24; Fukui, 1918, p. 98 (listed only); Ohshima, 1936, p. 866 (listed only).
Material: 1 male (Sp. No. Pycn. 15). Kannonzuka-dasi, Amadaiba, 70 m. 13–XI–
1950.
1 ovigerous male (Sp. No. Pycn. 19). Maruyama-dasi, Amadaiba, 80 m. 12–VII–
1952.
8 ovigerous males (Sp. No. Pycn. 43). Between Kannonzuka-dasi and Aoyama-dasi,
Amadaiba, 75–82 m. 19–XII–1958.
Remarks: This deep-water species unique for the genus has been frequently
collected in Sagami Bay, ranging from 37 m to 180 m in depth.

Genus Ammothella Verrill, 1900

9. Ammothella indica Stock
(Figs. 2 & 3)

Ammothella indica Stock, 1954, p. 113, figs. 54–56c, 57a–c.

Fig. 2. Ammothella indica Stock.
Immature specimen (Sp. No. 5), distal joints of legs
omitted. (×28)

Material: 2 juveniles (Sp. No. Pycn. 5b). 30 m south of Enosima. Depth un-
recorded. 8–VIII–1936.

Remarks: Two immature specimens obtained in Sagami Bay, only 2.3 mm in
total length from the tip of proboscis to the end of abdomen, agree well with Ammo-
thella indica Stock (1954) recorded only from Sunda Straits (30 m deep) and Singapore
(at low tide).
The trunk is distinctly segmented, with long lateral processes which are separated by about half their own diameter. The ocular tubercle is very elongated, constricted at base, with 4 well-pigmented eyes near the distal end; on each side of its base a spine-bearing protuberance (not mentioned by Stock) is situated.

Abdomen is much long, curved upwards; in the middle and near the end there are brushes of simple and peculiar, somewhat shorter, hollow spines.

Proboscis is pyriform, widest in the middle and finely striated in rings. Chelifores, longer than proboscis, are also adorned with normal and hollow spines though loosely.

Fig. 3. *Ammothella indica* Stock.
A, ocular tubercle and chelifores; B, fourth leg; C, distal joints of fourth leg; D, palp; E, abdomen; F, oviger still undeveloped.
(F ×28, B ×33, C ×67, A, D, E ×207)

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The scape is 2-jointed, distal joint about twice as long as proximal one. The chela is still chelate, composed of strongly incurved fingers, gaping when closed.

Palpus 9-jointed, with normal spines and setae only. Oviger still undeveloped, 4-jointed only.

All legs are very slender and armed with hollow spines and normal spines rather sparsely. Propodus slender, slightly curved and with 2 or 3 basal spines and 6 or 7 smaller distal spines. Terminal claw is strong and auxiliaries slender, only a little shorter than the former.

Genus *Nymphopsis* Haswell, 1884

10. *Nymphopsis muscosa* Loman

*Nymphopsis muscosa* Loman, 1908, p. 52, pl. 13, figs. 175-188; Loman, 1911, p. 11; Fukui, 1918, p. 99 (listed only); Ohshima, 1936, p. 864 (listed only).

*Material*: 1 male (Sp. No. Pycn. 10). 600 m west of Nisinosaki, Hatune, 17 m. 29-VIII-1940.


*Measurements of an ovigerous male in mm*:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Length of chelifore</td>
<td>2.0</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>2.0</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Genus *Cilunculus* Loman, 1908

11. *Cilunculus armatus* (BöhM)

*Cilunculus armatus* Utinomi, 1955, p. 27, fig. 16 (synonymy).


*Measurements of a female in mm*:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of chelifore</td>
<td>0.4</td>
</tr>
<tr>
<td>Length of proboscis</td>
<td>2.5</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>3.0</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Genus *Ascorhynchus* G. O. Sars, 1877

12. *Ascorhynchus japonicum* Ives

1 male (Sp. No. Pycn. 3). South of Amadaiba, 150 fathoms. 8-IX–1935.

Measurements of a large male (no. 14) in mm:

- Length of proboscis: 15.0
- Length of trunk: 20.0
- Length of abdomen: 6.5
- Length of chelifore: 5.0
- Length of fourth leg: 85.0

13. *Ascorhynchus auchenicum* (Slater)

(Fig. 4A)

*Parazetes auchenicus* Slater, 1879, p. 281; Hoek, 1881, p. 26 (listed only).
*Ascorhynchus bicornis* Ortmann, 1890, p. 162.
*Ascorhynchus ramipes* Loman, 1911, p. 9 (partim).
*Ascorhynchus* sp. (from Hōzyō, Prov. Awa) Fukui, 1918, p. 97 (figured only).
*Ascorhynchus minutus* Schmekewitsch, 1929, p. 111, figs. 26–27 (not Hoek).
*Ascorhynchus auchenicus* Calman, 1922, p. 199, figs. 1–4; Ohshima, 1936, p. 864 (listed only);
Hedgpeth, 1949, p. 291.
*Ascorhynchus auchenicum* Stock, 1954, p. 124, figs. 59–60 (synonymy).


Remarks: Recently Stock (1954) discussed in detail on the dissimilarity between *As. auchenicum* and *As. minutum* Hoek known only from South Australia.

*As. auchenicum* appears therefore to be confined to Japanese waters at present. As Stock suggests, *As. minutus* recorded by Schmekewitsch (1929) from Misaki is apparently an error for *As. auchenicum*.

In the present material, the median tubercles on the dorsum of the trunk are comparatively low, while the distal tubercle of the crurigers is tall and robust. In the legs, coxa 1 is provided with a pair of strong tubercles obliquely projecting at the distal end, and coxa 2 with a knob-like, low tubercle about midway on the dorsal surface.

In the posterior legs, the terminal claw is less than one-third as long as the propodus. In the anterior legs, however, it is much shorter. The abdomen reaches to the end of coxa 1 of the last legs. A pair of minute tubercles which are not so prominent as the paired frontal tubercles on the head are seen on the dorsal surface of the stalk of proboscis.
Measurements of a male (no. 29) in mm:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of proboscis</td>
<td>5.0</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>8.0</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>1.9</td>
</tr>
<tr>
<td>Length of crurigers</td>
<td>1.5</td>
</tr>
<tr>
<td>Width of trunk (excl. crurigers)</td>
<td>0.7</td>
</tr>
<tr>
<td>Space between crurigers</td>
<td>1.0</td>
</tr>
<tr>
<td>Diameter of crurigers</td>
<td>0.5</td>
</tr>
</tbody>
</table>

14. *Ascorhynchus ramipes* (Böhm), syn. nov.

(Fig. 4B)

*Gnamptorhynchus ramipes* Böhm, 1879b, p. 56, fig. 1.

*Ascorhynchus ramipes* Hoek, 1881, p. 25 (listed only); Oertmann, 1890, p. 161, pl. 24, fig. 4; Loman, 1911, p. 6 (partim); Fukui, 1918, p. 98 (listed only); Ohshima, 1936, p. 865 (listed only); Hedgpeth, 1949, p. 292.

*Ascorhynchus* var. *tsingtaoensis* Lou, 1936a, p. 3, figs. 2-6, pl. 1, figs. 1–10; Ohshima, 1936, p. 865 (listed only).

*Ascorhynchus latus* Calman, 1923, p. 270, figs. 2–3.

*Ascorhynchus laticauda* Stock, 1954, p. 128, fig. 63a–c.


Remarks: All the specimens agree well with Lou’s detailed descriptions of *As. ramipes* var. *tsingtaoensis* from North China and also of Calman’s *As. latus* from the Gulf of Manaaar, India and the Gulf of Siam, both of which are undoubtedly synonyms of *As. ramipes* (Böhm) originally described from Sagami Bay. Possibly both synonymies were derived from Böhm’s deficient description of the type specimen.
This species seems to be nearly related to the preceding *auchenicum*. Yet it may be easily distinguished by the following characteristics:

The median tubercles on the trunk-dorsum are rather blunt, the distal tubercle on the crurigers are also knob-like. Of all the legs, coxa 1 is armed with a pair of finger-like processes extending horizontally near the distal end and coxa 2 with a shorter finger-like process dorsally projecting near the distal end. And also, the claw is absent in the first legs. A pair of small frontal tubercles are present on the head, but none on the dorsal surface of the stalk of the proboscis.

As all earlier records show, this species is apparently a shallow-water dweller and widely distributed in the Indo-West Pacific area.

**Measurements of a male (No. 8) in mm:**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of proboscis</td>
<td>3.0</td>
</tr>
<tr>
<td>Width of trunk (across 2nd crurigers)</td>
<td>3.0</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>5.5</td>
</tr>
<tr>
<td>Width of trunk (excluding crurigers)</td>
<td>0.7</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>2.5</td>
</tr>
<tr>
<td>Diameter of crurigers</td>
<td>1.5</td>
</tr>
<tr>
<td>Length of crurigers</td>
<td>1.0</td>
</tr>
</tbody>
</table>

15. *Ascorhynchus glaberrimum* Schimkewitsch

*Ascorhynchus glaberrimus* Schimkewitsch, 1929, p. 107, figs. 23-25; Ohshima, 1936, p. 865 (listed only).

*Ascorhynchus glaberrimum* Utinomi, 1955, p. 26, fig. 15.

**Material**: 2 males (Sp. No. Pycn. 44). Between Kannonzuka-dasi and Aoyama-dasi, Amadaiba, 76-78 m. 22-XII-1958.

**Remarks**: In the present two specimens, the dorsum of the trunk is destitute of median tubercles, 4 eyes near the tip of the ocular tubercle are non-pigmented and the terminal claw is small in the first legs. In the chelifores, the chelae are reduced to a minute rudiment, but the scape is short and robust.

**Measurements of a male in mm**:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of proboscis</td>
<td>3.0</td>
</tr>
<tr>
<td>Diameter of proboscis</td>
<td>1.5</td>
</tr>
<tr>
<td>Length of trunk</td>
<td>5.0</td>
</tr>
<tr>
<td>Length of crurigers</td>
<td>1.0</td>
</tr>
<tr>
<td>Length of abdomen</td>
<td>1.3</td>
</tr>
<tr>
<td>Length of chelifore</td>
<td>0.7</td>
</tr>
</tbody>
</table>

**Genus Lecythorhynchus** Böhm, 1879

*Corniger* Böhm, 1879a, p. 187 (name preoccupied).


**Emended diagnosis of the genus**: Trunk slender, distinctly segmented with well-chitinized sutures. Legs slender, almost smooth, not much setigerous, with prominent chitinous septa or thickenings running dorso-medially in coxa 1 and laterally in the rest. Crurigers widely separated. Abdomen moderately robust. Proboscis cylindrical. Chelifore 1- or 2-jointed in adult; chela either reduced or present; if any, chelate
or achelate. Palp long, 9-jointed, with S-like curved distal joints. Ovigers 10-jointed, with smooth or feebly denticulate spines. Propodus of all legs produced distally, claw strong, auxilliaries large.

Genotype: Lecythorhynchus hilgendorfi (BÖHM).

Remarks: As discussed in detail by Stock (1954, p. 141) under the genus Tanystylum, the genus Lecythorhynchus is closely related to Achelia, but differs from it in the one-jointed chelifores in adults, 9-jointed palps and well-segmented, elongate body, as far as the earlier known species are concerned. However, the finding of a new unique species (L. hedgpethi as here named), having 2-jointed palps in adults necessitates an emendation of the generic diagnosis.

The lobe-like extension in the 5th joint of the palps has been considered as a specific characteristics in L. marginatus Cole. It is unusually developed in a new species L. hedgpethi and probably L. ovatus Hilton (if distinct). Probably its strong development concerns with the distortion of the flagellum-like distal joints, and therefore it may deserve one of the generic characteristics of Lecythorhynchus, as already recognized by Loman (1911, p. 9). Again, none of such special process for the genital opening as usually exists in Achelia is found in the 2nd coxae of legs. The structure of oviger spines and their arrangement resemble most closely those of Tanystylum. In these respects, Lecythorhynchus seems to be more related to the genus Tanystylum than to the genus Achelia within the Ammotheidae.

On the other hand, the conformation of the body and legs recalls the other families such as Nymphonidae, Phoxichiliidiidae and Colossendeidae in the slenderness and the almost smoothness and also in the formation of distinct chitinous septa or thickenings along the mid-dorsal line in the first coxae and along the mid-lateral lines in the succeeding joints of all legs, though interruptedly in the middle of each joint.

The 3 species of the genus known at present are keyed as follows:

1 a) Chelifore 1-jointed, reduced in adults, though 2-jointed in larvae. .......................... 2
1 b) Chelifore 2-jointed, well developed in adults; body and legs not pigmented ............

.................................................. L. hedgpethi n. sp.

2 a) Body and legs banded by dark brownish patterns; 5th joint of palps more or less inflated ventrally............................... L. hilgendorfi (BÖHM) (=L. marginatus COLE)
2 b) Body and legs darkly pigmented; 5th to 7th joints bearing each a ventral lobe (if distinct)

.............................................. L. ovatus Hilton

16. Lecythorhynchus hilgendorfi (BÖHM) BÖHM, syn. nov.

(Figs. 5 & 6)

Corniger hilgendorfi BÖHM, 1879a, p. 187, pl. 2, figs. 3-3d.
Lecythorhynchus hilgendorfi BÖHM, 1879c, p. 140.
Lecythorhynchus hilgendorfi LOMAN, 1911, p. 8, pl. 2, figs. 28-29; OHSHIMA, 1927a, p. 610, figs. 1-3; OHSHIMA, 1927b, p. 380, pl. 7, figs. 1-6; SCHIMKEWITSCH, 1929, p. 54, figs. 10-11; OHSHIMA, 1936, p. 867 (listed only); LOU, 1936b, p. 133, figs. 1-4, 5A & pls. 11-13;

— 13 —
**Lecythorhynchus marginatus** Cole, 1904, p. 260, pl. 11, figs. 1-2 & pl. 15, figs. 1-8; Schimkewitsch, 1929, p. 50, figs. 7-9; Schmitt, 1934, p. 69; Helfer, 1938, p. 184; Hilton, 1939a, p. 34; Hilton, 1939b, p. 73, pl. 2, fig. 10; Hedgpeth, 1941, p. 255 (keyed and figured); Hilton, 1943b, p. 4; Hedgpeth, 1951, p. 111; Hedgpeth, 1954, p. 206, fig. 49j (keyed only); Stock, 1954, p. 139, fig. 69a-c.

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**Fig. 5.** *Lecythorhynchus hilgendorfi* (Böhm).

A, distal joints of a female (Sp. No. 11); B, the same of a male (Sp. No. 33); D, oviger of a female (Sp. No. 11); E, simple oviger spines of a female.

(B • C ×33, A, D ×55, E ×510)


Remarks: This species is fairly well represented on the Japanese coasts and thus the material of all stages is plentifully available for comparison.

This species was originally described by Böhm (1879a, c) from Enosima in Sagami Bay, and seems to be prevalent all along the coasts of Japan, ranging from Hokkaido to China. Afterwards, some of the authors such as Schimkewitsch, Losininsky, Helfer and Stock referred the specimens having the strongly inflated 5th joint in the palps to L. marginatus which was first recorded by Cole (1904) from
the Californian coast (San Pedro Point and Dillon Beach), where it is very common according to American authors.

The principal differences between the two species, as enumerated by Stock (1954, p. 140), seem to be not absolutely distinctive, largely depending upon the relative length as well as size in every joint of the appendages, so that it may be subject to individual variation. Certainly wrong drawings, when mounted on a slide at different levels, are largely due to the strong curvature of palps, thus these may mislead one especially concerning the exact shape of the 5th and succeeding joints of palps, which form together a flagellum as in other crustacean antennae. The same may be said for the arrangement and number of compound spines on the ovigers. Two figures of palps retouched after original sketching by means of the camera lucida are given here for comparison (Figs. 5C and 6C). As figured herein, the 5th joint of the palps is more or less inflated ventrally, variable in individuals, though not so well pronounced as in the next hedgthropetii n. sp.

The genital opening is distinct on the ventral surface of the 2nd coxae of legs, situated on a slight protuberance near the distal end, but it is very minute (about 15μ in diameter) (cf. Fig. 6A, o).

As to the Hawaiian form L. ovatus, described by Hilton (1942b, 1943), I have no personal knowledge at present, but if Hilton's statement and figure are to be trusted, it may be a good species on account of the serrate appearance of the palps (according to Hedgpeth, however, that is illusory). Even if it is either distinct from L. hilgendorfi or not, at least Cole's L. marginatus seems to be synonymous with L. hilgendorfi. Indeed, according to Hedgpeth (1951, p. 111; 1954, p. 206), the Californian specimens also are marked in fresh material by conspicuous brownish purple bands on the legs (and trunk). To be sure, this littoral pycnogonid is widely distributed on both the coasts, east and west, in the northern Pacific, as in the case of Ammothella bi-unguiculata (Dohrn).

17. **Lecythorhynchus hedgthropetii**, spec. nov.

(Figs. 7-9)

**Material:** 1 male (Sp. No. Pycn. 22—paratype). Warezima, 8 fathoms. 26-V-1952.
1 male (Sp. No. Pycn. 32—paratype). Kannonzuka-dasi, Amadaiba, 80 m. 5-VI-1957.

**Description of Holotype:** Body much larger than that of L. hilgendorfi, but not pigmented whatever. Trunk rather stout, distinctly segmented; sutures well-chitinized;
dorsum slightly ridged transversely in each segment in front of sutural lines. Cephalic segment slightly prolonged anteriorly, a little longer than wide in outline. Lateral processes a little longer than wide and separated by their own diameter. Ocular tubercle situated in the center of cephalic segment, erect, rather low, slightly pointed at tip, with 4 well-pigmented eyes. Abdomen comparatively long, elongate, projecting obliquely upwards. Surface minutely granular but not hairy.

Proboscis cylindrical, nearly as long as trunk, projecting obliquely downwards a little, somewhat tapering towards the base.
Chelifore elongate, distinctly 2-jointed, as long as cephalic segment and slightly less than half the length of proboscis. Scape slender, elongate; chela short and achelate; surface granular, almost unhairy.

Palpus very long, 9-jointed, sharply curved upwards at the 5th joint which is conspicuously produced distally; strongly setose in distal joints. The 6th joint is inserted at middle of the upper surface of the 5th joint. The terminal joint is elongate, somewhat flattened, a little longer and narrower than the penultimate joint.

Oviger 10-jointed, delicately granular and twisted in a complicated manner. Oviger spines, recalling those of the genus *Tanystylum*, are either simple or feebly denticulate and situated rather irregularly inside in the terminal 4 joints as in the following manner—2:3:4:3:4. These number may vary when simple setae or spinules are counted together.

Legs considerably longer than in *L. hilgendorfi* and not pigmented whatever; they are somewhat over five times the length of the trunk, measuring about 20 mm in total length. All joints slender uniformly, smooth, though when examined in detail, feebly setose. Coxa 1 slightly longer than wide, coxa 2 about three times as long as wide with a slight swelling about midway on the dorsal surface and a slight swelling on the ventral surface distally, coxa 3 about half as long as coxa 2 but a little wider. Femur most plump of all joints and adorned with long setae dorso-distally. Tibia 1 rather plump but lesser than femur and scatteredly adorned with a few setae usually about midway. Tibia 2 longest of all joints, uniformly slender and adorned with a

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Fig. 8. *Lecythorhynchus hedgpethi*, n. sp.
A, fourth leg of a male, holotype (Sp. No. 24); B, distal joints of the same.
(A ×8, B ×25)
long seta near the distal end as in *L. hilgendorfi*. Tarsus shortest and armed with over 5 spines ventrally and with 1 or 2 spines dorsally. Propodus heavy, slightly curved, with a prominent distal process, armed ventrally with 5 basal spines and densely packed distal smaller spines and dorsally with many setae in a row, lateral surface strongly granular. Main claw strong, more than half the length of propodus; auxiliary claws rather strong, about 3/4 as long as main claw.

**Remarks:** This new species may possibly be identical with an unnamed species obtained once at the 'Albatross' Station 3730 (southwest of Omae-zaki, 34-37 fathoms) which HEDGPETH (1949, p. 296, fig. 44e-f) hesitantly referred to the genus *Lecythorhynchus* owing to the undeveloped appearance of the oviger and the uniquely 2-jointed chelate chelifores. However, the general conformation of the body and all appendages suggests its closest affinity with the genus *Lecythorhynchus*, as discussed above. Indeed, in the case of *L. hilgendorfi* too, according to Lou's detailed study on the postembryonal development, the chelifores are distinctly 2-jointed and chelate in larval stages, but later reduced to mere knobs in adults.

Therefore, a new name for this unique species is now given after Dr. HEDGPETH who first noticed it. The habitat of this new species is apparently deeper bottoms instead of intertidal.
Measurements of a male (holotype) in mm:

- Length of proboscis: 2.5
- Width of cephalic segment (at frontal edge): 1.0
- Length of trunk: 3.0
- Width of trunk across 2nd seg. (incl. crurigers): 1.5
- Length of abdomen: 1.5
- Height of ocular tubercle: 0.5
- Length of chelifore (scape): 1.0
- Height of ocular tubercle: 0.5

Fourth leg:

<table>
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<tr>
<th>Joint</th>
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<tr>
<td>Coxa 1</td>
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<td>6.20</td>
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<tr>
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<tr>
<td>Propodus</td>
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<tr>
<td>Main claw</td>
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<tr>
<td>Auxiliary claws</td>
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</tbody>
</table>

Family Pycnogonidae

Genus *Pycnogonum* BRUNNICH, 1764

18. *Pycnogonum tenue* KISHIDA

*Pycnogonum littorale* var. *tenue* SLATER, 1879, p. 283; ORTMANN, 1890, p. 167; SCHIMKEWITSCH, 1929, p. 15.

*Pycnogonum tenue* KISHIDA, 1927, p. 989, fig. 1903; OHSHIMA, 1936, p. 867 (listed only); OHSHIMA & KISHIDA. 1947, p. 1010, fig. 2865; HEDGPEITH, 1949, p. 303, figs. 48b, 50c-d; STOCK, 1954, p. 162, fig. 80; UTINOMI, 1955, p. 36, fig. 22.


Measurements of a male in mm:

- Length of proboscis: 2.5
- Length of trunk: 4.5
- Length of abdomen: 2.0

Synopsis of Pycnogonids Hitherto Known from Sagami Bay and Its Surrounding Waters

Nymphonidae

*Nymphon grossipes* (O. FABRICIUS?) KRÖYER

UTINOMI, 1955, p. 4 (Sōyō St. 269, off Simoda).

*Nymphon japonicum* ORTMANN

ORTMANN, 1890, p. 158 (the material from Sagami Bay is, according to STOCK, a separate species *N. ortmanni*); LOMAN, 1911, p. 8 (various localities in Sagami Bay, 150-350 m); OHSHIMA, 1936, p. 862 (Minami Amadaiba, 260 fms. as *N.

* indicates the species contained in the collections of the His Majesty's Biological Laboratory and reported in this paper.
Pycnogonida of Sagami Bay 217


Nymphon ortmanni Helfer
Helfer, 1938, p. 164 (Sagami Bay, as noted above); Stock, 1953a, p. 34 (Sagami Bay); Stock, 1954, p. 20 (off Misaki, Okinose, 80-120 fms.).

Nymphon micropedes Hedgpeth
Hedgpeth, 1949, p. 254 (Albatross St. 5080, 505 fms.); Ohshima & Kishida, 1947, p. 1007 (Tokyo Bay & Sagami Bay, as N. japonicum Ortmann).

Nymphon benthos Hedgpeth
Hedgpeth, 1949, p. 256 (Albatross St. 5085, 622 fms.).

Nymphon nipponense Hedgpeth
Hedgpeth, 1949, p. 267 (Albatross St. 4980, Tōtōmi-nada, 507 fms.).

Callipallenidae

*Propallene longiceps (Böhm)
Böhm, 1879b, p. 59 (Enosima, as Pallene longiceps); Ortmann, 1890, p. 165 (Kadsiyama=Katuyama, as Pallene longiceps); Fukui, 1918, p. 97 (Kamakura, as Pallene longiceps); Ohshima, 1933a, p. 96, 1933c, p. 212 (Misaki, as Pallene longiceps); Stock, 1954, p. 31 (Misaki, 3 fms.).

Pallenopsis mollissima (Hoek)
Hoek, 1881, p. 87 (Challenger St. 237, off Bōsyō, 1875 fms., as Phoxichilidium mollissimum); Hedgpeth, 1949, p. 277 (Albatross St. 5080, SW of Sagami Bay, 505 fms.).

*Pallenopsis virgata Loman
Hedgpeth, 1949, p. 277 (Albatross St. 3730, SW of Omae-zaki, 34-37 fms.).

Pallenopsis sibogae Loman
Utinomi, 1955, p. 19 (Sōyō St. 278, Suruga Bay, 79 m).

Pallenopsis spec.
Loman, 1911, p. 13 (Sagami Bay, as Pallenopsis n. sp. ? which is acc. to Schimekewitsch (1930, p. 237) probably P. hoekiana Schimekewitsch).

Phoxichiliidae

Phoxichilidium ungellatum Hedgpeth

Anoplodactylus gestiens (Ortmann)
Ortmann, 1890, p. 166 (Kadsiyama=Katuyama, 70-200 fms., as Phoxichilidium gestiens); Loman, 1911, p. 13 (Sagami Bay, 150-180 m); Hedgpeth, 1949, p. 284 (Albatross Sts. 3703, 3715, 3739, Suruga Bay, 31-68 fms.); Stock, 1954, p. 71 (off Misaki, Okinose, 80-120 fms.).
Anoplodactylus mamillosus Stock
Stock, 1954, p. 72 (Sagami Bay, 300-400 fms.).

Anoplodactylus pycnosoma (Helfer)
Stock, 1953a, p. 41, 1954, p. 75 (Misaki, beneath low tide).

*Anoplodactylus versluysi Loman
Not ever recorded from Japan (incl. Sagami Bay).

Anoplodactylus spec.
Hedgpeth, 1949, p. 284 (Albatross Sts. 5075, 5078, Tōtōmi-nada, 22-514 fms.).

Anoplodactylus spec.
Stock, 1954, p. 88 (Misaki, beneath low tide).

Ammothidae

Achelia japonica Utinomi
Ortmann, 1890, p. 164 (Kadsiyama=Katuyama, shallow water, as Achelia echinata var. japonica); Utinomi, 1954, p. 14 (renamed only).

*Achelia superba (Loman)
Loman, 1911, p. 11 (Sagami Bay, 80-180 m, as Ammothaea superba); Stock, 1954, p. 96 (Misaki, about 20 fms.); Utinomi, 1955, p. 23 (Sōyō St. 376, SW of Omaezaki, 64 m).

*Achelia echinata Hodge
Fukui, 1918, p. 97 (Hōzyō, as Achelia sp.); Stock, 1956, p. 98 (off Misaki, 200 fms., as A. echinata ssp. nasuta).

Achelia bituberculata Hedgpeth
Hedgpeth, 1949, p. 287 (Misaki); Stock, 1954, p. 94 (Misaki, coast).

Achelia spinosa (Stimpson)
Stock, 1954, p. 96 (Sagami Sea, 400 fms.).

Achelia spec. (?) [larva]
ohshima, 1933a, p. 94, 1933c, p. 61 & p. 65 (Hōzyō, as Ammothaea (?) sp. attached to a nudibranch Armina variolosa Bergh).

Ammothella profunda Hedgpeth
Hedgpeth, 1949, p. 289 (Albatross St. 5083, Tōtōmi-nada, 624 fms.).

*Ammothella indica Stock
Not ever recorded from Japan (including Sagami Bay).

*Nymphopsis muscosa Loman
Loman, 1911, p. 11 (off Misaki 50 m, Zusi 130 m).

*Cilunculus armatus (Bohm)
Bohm, 1879c, p. 141 (Enosima, as Lecythorhynchus armatus); Ortmann, 1890, p. 163 (Kadsiyama=Katuyama, as Parazetes pubescens); Loman, 1911, p. 9 (off Enosima, Misaki & Zusi, 80-131 m); Hedgpeth, 1949, p. 274 (Albatross St. 3734, SW of Omaezaki, 36-48 fms.); Utinomi, 1955, p. 28 (Sōyō St. 236, off Sunosaki, Sagami Bay, 251 m).
Scipiolus spinosus Utinomi

Utinomi, 1955, p. 31 (Sōyō St. 284, Senoumi, Suruga Bay, 71 m).

Scipiolus validus Stock

Stock, 1957a, p. 91 (Uraga Canal, 21 fms.).

*Ascorhynchus auchenicum (Slater)

Orthmann, 1890, p. 162 (Tokyo Bay & Sagami Bay, 100 fms., as Ascorhynchus bicornis); Loman, 1911, p. 6 (off Misaki 50–80 m, off Enosima 80 m, as As. ramipes (part)); Fukui, 1918, p. 97 (Hōzyō, as Ascorhynchus sp.); Schmekewitsch, 1929, p. 111 (Misaki, as As. minutus Hoek); Hedgpeth, 1949, p. 291 (Albatross St. 3707, off Osezaki, Suruga Bay, 60–70 fms.); Stock, 1954, p. 124 (off Misaki, 3–300 fms.).

*Ascorhynchus ramipes (Böhm)

Bohm, 1879b, p. 56 (Enosima, as Gnamptorhynchus ramipes); Orthmann, 1890, p. 161 (Sagami Bay, 50–100 fms.); Loman, 1911, p. 5 (Sagami Bay, 50–80 m (part)); Hedgpeth, 1949, p. 292 (Tokyo Bay).

*Ascorhynchus japonicum Ives


Ascorhynchus cryptopygium (Orthmann)

Orthmann, 1890, p. 159 (Sagami Bay, 60–150 fms.); Loman, 1911, p. 7 (Uraga Canal); Stock, 1954, p. 121 (Sagami Bay, 80–120 fms.); Utinomi, 1955, p. 24 (Sōyō St. 236, off Sunosaki, 251 m).

Ascorhynchus glabroides Orthmann

Loman, 1911, p. 7 (Sagami Bay).

*Ascorhynchus glaberrimum Schmekewitsch

Not ever recorded from Sagami Bay.

*Lecythorhynchus hilgendorfi (Böhm)

Böhm, 1879a, p. 187 (Enosima, 3–4 fms., as Corniger hilgendorfi); Böhm, 1879c, p. 140 (Enosima, renamed as above); Loman, 1911, p. 8 (Enosima, redescribed Böhm’s type); Ohshima, 1933a, p. 95 (Tateyama Bay); Hedgpeth, 1949, p. 296 (near Chochi = Chōshi or Toyōi, northeast cape of Bōsō Peninsula); Stock, 1954, p. 139 (Misaki, shore, as L. marginatus).

*Lecythorhynchus hedgpethi Utinomi (n. sp.)

Hedgpeth, 1949, p. 296 (Albatross St. 3730, SW of Omae-zaki, Tōtōmi-nada, 34–37 fms., as ? L. spec.).

Tanystylum scrutator Stock

Stock, 1954, p. 142 (Misaki, shore).
Austrodecidae

_Austrodecus tubiferum_ Stock

Stock, 1954, p. 153 (Okinose, 100 fms., as _A. gordonae_ (part)); Stock, 1957b, p. 75 (Okinose, renamed as above).

Colossendeidae

_Colossendeis japonica_ Hoek

Hoek, 1898, p. 295 (_Challenger_ St. 237, off Bōsō Peninsula, 1875 fms.).

_Colossendeis colossea_ Wilson

Loman, 1911, p. 4 (Sagami Bay, as _C. gigas_ Hoek); Hedgpeth, 1949, p. 299 (_Albatross_ St. 5082, Tōtōmi-nada, 662 fms.).

_Colossendeis macerrima_ Wilson

Loman, 1911, p. 4 (Okinose Bank, 1400 m, as _C. leptomorpha_ Hoek); Hedgpeth, 1949, p. 299 (_Albatross_ St. 5083, Tōtōmi-nada, 624 fms.).

_Colossendeis dophleini_ Loman

Loman, 1911, p. 4 (near Misaki); Hedgpeth, 1949, p. 300 (_Albatross_ St. 5079, Tōtōmi-nada, 475-505 fms.).

_Colossendeis chitinosa_ Hilton

Hedgpeth, 1949, p. 301 (_Albatross_ St. 3703, Senoumi, Suruga Bay, 31 fms. & Sagami Bay).

Pycnogonidae

*_Pycynogonum tenue_ Kishida

Ortmann, 1890, p. 167 (Sagami Bay, 100 fms., as _P. litorale var. tenue_ Slater); Kishida, 1927, p. 989 (Locality not given); Hedgpeth, 1949, p. 303 (_Albatross_ Sts. 3707, 3708, 3716; Osezaki, Suruga Bay, 60-125 m).

_Pycynogonum ungellatum_ Loman

Loman, 1911, p. 7 (Sagami Bay).

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(especially concerned with the Japanese fauna.)


——— 1879c. Ueber Pycnogoniden. Ibid., 1879, no. 9, pp. 140-142.


---- 1939b. A collection of pycnognids (sic) from Santa Cruz Island. Ibid., vol. 31, no. 4, pp. 72-74, pls. 1-2.


