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## THE PYCNOGONID GENUS *PROPALLENE* SCHIMKEWITSCH, 1909

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### ABSTRACT

The type material of *Pallene* (now *Propallene*) *longiceps* Böhm, 1879, from Enosima (Enoshima), Japan, is re-described. A new species of *Propallene*, *P. ardua*, is described from shallow waters and plankton tows near Kunduchi, Tanzania. Remarks on other species of the genus are provided, as well as a key to the species actually included in *Propallene*.

### INTRODUCTION

In 1879, Böhm described a pycnogonid, collected by Dr. Hilgendorf in Japan at (in the original spelling) Enosima, which is no doubt Enoshima island in Sagami Bay. The description of this *Pallene longiceps* was unaccompanied by illustrations. The species was found again by several other authors, who gave more or less detailed descriptions and figures (Ortmann, 1890; Ohshima, 1933b; Schimkewitsch, 1909 and 1929; Stock, 1954, and others). Schimkewitsch (1909) correctly assigned this species to a special genus, *Propallene*, in virtue of the presence of a 2-segmented

palp in the male sex. Although *P. longiceps* has repeatedly been collected since, several points in its morphology remained unsettled, such as the details of the sexual dimorphism, the structure of the male oviger, the shape and number of the cement gland apertures. In other points, the existing descriptions were contradictory, e.g. as to the length of tibia 2, the relative length of the basal palp segment, the slenderness of the 2nd palp segment, and the number of teeth on the fingers of the chela.

The situation became taxonomically confused when two very similar new species were described. Calman (1923) described (as *Parapallene*) a new species from India, *P. kempfi*; he did not examine any material of *P. longiceps* but based the distinction of the new taxon on a comparison with Böhm's and Ortmann's scanty notes. In 1955, Barnard described a new species of *Propallene*, *P. similis*, from South Africa, but remarked that he has not seen Böhm's and Ortmann's papers. Barnard's description is far from complete and poorly illus-

trated; he had a single male at his disposal.

An attempt to re-study the holotype of *P. similis* failed, since the vial in South African Museum, Cape Town, labelled as such contains an ammonoite and not a pallenid.

When I discovered another very similar *Propallene* among the pycnogonid material collected recently by Dr. M. Bacescu, of Bucarest, on the Tanzanian coast, the moment seemed to be right to do some revisionary work.

Up to now, the following species of *Propallene* are known: (1) *P. longiceps* (Böhm, 1879), the type-species of the genus; (2) *P. kempfi* (Calman, 1923); (3) *P. similis* Barnard, 1955; (4) *P. stocki* Fage, 1956; (5) *P. crassimana* Stock, 1959; (6) *P. orinipes* Stock, 1968. Of these, I have seen type material of the numbers 1, 5, and 6, and other material of the numbers 2 and 3. For the permission to study the type material of the generotype, *P. longiceps*, I am greatly indebted to Dr. H.-E. Gruner, Zoologisches Museum an der Humboldt Universität, Berlin (German Democratic Republic). Likewise, I wish to express my gratitude to Dr. T. Wolff, Zoologisk Museum, København, for the loan of specimens of *P. longiceps* and *P. kempfi*, and to Dr. M. Bacescu, for the Tanzanian samples of *Propallene*, which represented a new species, described in the sequel. In the following paragraphs, a re-description of *P. longiceps*, based on the types, is given, and some complementary notes on *P. kempfi* are provided. The new species from Tanzania is described, a new diagnosis of the genus *Propallene* is constructed, as well as a tentative key to the species actually included in that genus.

*Propallene longiceps* (Böhm, 1879).  
Figs. 1-20.

*Pallene longiceps* Böhm, 1879: 59-60; Ortmann, 1890: 165-166, pl. XXIV fig. 7; Shishido, 1899: 199; Fukui, 1919: 99; Ohshima, 1933a: 96; Ohshima, 1933b: 212-216, figs. 1-7.

*Propallene longiceps*.- Schimkewitsch, 1909: 11-12, fig. 3; Schimkewitsch, 1929: xli, fig. 3; Schimkewitsch, 1930: 282-287; Ohshima, 1936: 863; Stock, 1954: 31-33, fig. 12 a-b; Utinomi, 1959: 199; Utinomi, 1962: 96; Utinomi, 1965: 334, fig. 15; Utinomi, 1966, fig. 3B; Kikuchi, 1968: 175; Utinomi, 1971: 321-322; Sekiguchi, 1971: 137-139.

Material examined.- 5 syntypes: 2 ♂ oviger., 2 ♀, 1 juv. Enosima, Japar, coll. Hilgendorf, Zool. Mus. Berlin Pant. 32. (1 ♂ oviger. has been selected herewith as lectotype).

1 ♀. Misaki, Japan, abt. 3 fathoms, coll. Th. Mortensen, Zool. Mus. København.

Descriptive notes.- The trunk is slightly more slender in male than in female; this is expressed by the slenderness of the neck and the space between the lateral processes. The lateral processes are slightly longer than the diameter of the corresponding trunk segment. Trunk segments 2 and 3 are slightly longer than wide (width measured at the posterior articulation of the segment). Ocular tubercle low, flattened, rounded; eyes not visible in the present (preserved) specimens; lateral sense organs distinct. Abdomen short, cylindrical, expanded at the base where it is wedged in between the 4th pair of lateral processes, implanted somewhat ventrad.

Chela with long, gaping fingers; movable finger with 6, immovable with 4 to 5 teeth; palm with several long setae. No obvious sexual dimorphism. Palp only present in male. Basal segment squarish, short, unarmed. Distal segment very elongated, finger-shaped, with a slight constriction at about 40% of its length. This constriction, when observed *in situ*, looks very much like an articulation; this is, however, an optical illusion: when mounted, no segmentation appears to be present. Distally, the palp bears 5 long, stiff setae.

Male oviger with reversed spinules on segments 4 and 5. Segment 5 is the longest, distally provided with a setiferous lobe and a pointed apophysis. Segment 7 with 4 long distal setae. The compound spine formula is 10:9:10:10. No terminal claw. The compound spines are polymorphous: the more proximal ones on each segment are lanceolate, with some 7 lateral teeth; the more distal ones are wider, with 3 or 4 very large basal teeth and a distal lobe laterally provided with 0 to 2 very small teeth.

Female oviger lacks reversed spinules. Segment 4 is the longest; segment 5 lacks distal lobes; segment 7 is without setae. The compound spines are of the same shape as in male, arranged according to the formula 10:10:8:12.

Legs of male fairly slender. Coxa 3 bears long ventral setae. Femur with a ventral row of 12 to 17 cement gland ducts. Tibiae, more in particular the second, with a row of long setae on both its anterior and posterior surfaces. Such long anterior and posterior setae are likewise present on the propodus. Propodus with 2 basal spines, the distalmost of which is very elongate; these spines

are distally provided with about 3 crenulations (which may be worn and then hardly discernible). The sole is almost straight, armed with 11 or 12 slightly S-shaped spines, each placed on a distinct socle. The claw is slender; auxiliary claws are absent.

Legs of female with strongly swollen femora, containing the ovaries. These legs are only slightly less setose than in male. Propodal structure and armature as in male.

Remarks.- The rather compact body shape, the feebly curved propodus, the very elongate spines on the propodal heel, and the high number (> 10) of cement gland ducts in male, characterize this species. *Propallene similis* Barnard, 1955, is (as the name suggests) very similar indeed to *P. longiceps* (see Stock, 1959: 558-559, fig. 4 for additional figures, based on the ♀ sex, of *P. similis*). Since the male of *similis* is imperfectly described by Barnard, I refrain for the moment from synonymizing the two taxa.

Ortmann's statement (1890: 165) that the 2nd tibia is only half as long as the first, is erroneous. Usually the 2nd tibia is only a trifle shorter than the first; in the large (old ?) female from Misaki (vide infra), referred to by Stock, 1954, the 2nd tibia is even slightly longer than the first.

Ohshima's (1933b) figure 6 is incorrect in that the palp is illustrated with a short instead of with a slender distal segment. Schimkewitsch's figures (1909, 1929) are mistaken in that the constriction of palp segment 2 is illustrated as an articulation.

None of the specimens studied here has such low numbers of teeth of the chelar finger, as shown in Utinomi's (1966) fig. 3B.

In addition to a series of new figures (1-14) of the syntypes, I include also some new figures of the Misaki female (figs. 15-20), to supplement my earlier, 1954, illustrations. As mentioned above, this specimen differs from the syntypes, in having tibia 2 slightly longer than tibia 1, and in having 7 instead of 6 teeth on the movable finger of the chela.

As shown in the synonymy, there are quite a few literature records of this species, though there are few trustworthy illustrations of it. All pub-

lished records are from Japan, where *P. longiceps* is, according to Utinomi (1971) "prevalent and abundant in shallow waters". Like several other species of the genus *Propallene*, *P. longiceps* is often taken in in pelagic tows at night (Ohshima, 1933b; Utinomi, 1971). *P. similis*, which might, as said, be synonymous with *P. longiceps* is known from southern Africa (Algoa Bay, Mossel Bay).

Measurements (in  $\mu\text{m}$ ).-

	♂ (syntype)	♀ (Misaki)
Length trunk (frontal margin cephalic segment to tip of abdomen)	2293	2430
Width across 2nd lateral processes	1098	1233
Diameter cephalon	568	803
Length scape	505	--
Length chela	390	--
Length proboscis (ventral)	548	--
Greatest diameter proboscis	340	--
Length palp	345	--
Diameter of eggs on the male oviger	229-237	--

Measurements of the segments of the leg

	P2 ♂ (syntype)	P? ♀ (syntype)	P3 ♀ (Misaki)
coxa 1	430	350	338
coxa 2	545	458	673
coxa 3	338	320	247
femur	1258	1305	1663
tibia 1	1120	1085	1315
tibia 2	1100	1045	1385
tarsus	68	69	95
propodus	654	592	783
claw	392	369	533
distal diameter of coxa 2	230	225	305
proximal diameter of coxa 2	170	164	231

*Propallene kempi* (Calman, 1923).  
Figs. 21-26.

*Parapallene kempi* Calman, 1923: 277-278, fig. 6.  
*Propallene kempi*.- Calman, 1937: 534; Gnanamuthu, 1950: 39-47, figs. 1-4; Stock, 1954: 33-34, fig. 12 c-f.  
Doubtful record: Arnaud, 1972: 161-162, figs. 3-6 (see under *P. ardua*).

Material examined.- 1 ♂. Singapore, low tide, coll. Sv. Gad, Zool. Mus. København.

Remarks.- The Singapore specimen, recorded by me in 1954, has been re-examined and some new figures have been made. The chelar fingers have only 3 or 4 teeth. The legs are not very setose or spinose. The 2nd coxa is very elongate; it is more than 4 times as long as the basal diameter of the articulation. There are 8 cement gland ducts on the femur of leg 3. The propodus is curved; the heel spines

are less elongate than in *P. longiceps*, distally crenulated; sole with 6 or 7 spinules. Ovipiger segment 4 is less slender than in *longiceps*, but the distal armature of segment 5 is similar to that of *longiceps*; segment 7 with 3 distal setae. Compound spine formula 10:7:6:8; the compound spines show the polymorphism usual for the genus *Propallene*.

Measurements (male) in  $\mu\text{m}$ .-

Length trunk (frontal margin cephalic segment to tip of abdomen)	1483
Width across the 2nd lateral processes	725
Length cephalic segment	640
Diameter cephalon	368
Third leg:	
coxa 1	273
coxa 2	440
coxa 3	202
femur	760
tibia 1	703
tibia 2	698
propodus	476
claw	284
distal diameter coxa 2	164
proximal diameter coxa 2	97

Remarks.- The great slenderness of the body (as illustrated by Calman, 1923, and Stock, 1954) and legs (particularly distinct in the elongate 2nd coxa) characterize this species. Calman's material came from the Gulf of Manaar and from Waltair (Madras), Gnanamuthu's specimens from Madras, and Stock's material from Singapore. Arnaud's (1972) specimens from Madagascar may belong to another species; at any rate the 2nd coxa is illustrated shorter than usual for *P. kempfi*.

*Propallene ardua* n.sp. Figs. 27-41.

Material examined.- 18  $\sigma$ , 29  $\text{♀}$ , 34 juveniles and larvae, taken at different dates and at various depths (0-24 m) near Kunduchi (25 km N. of Dar es Salaam, Tanzania), partly in dredging, partly in the plankton at night; Dec. 1973 and Jan. 1974. Holotype  $\sigma$ , allotype  $\text{♀}$ , and 22 paratypes in the Museum of Natural History "Gr. Antipa", Bucarest; 5 paratypes in the Zoölogisch Museum, Amsterdam.

Description.- Trunk completely segmented. Lateral processes shorter than the diameter of the trunk, separated by a distance that is equal to, or less than, their own diameter. Neck rather long, gradually widening into the cephalon. Abdomen very short, somewhat trapezoidal in shape, slightly bent downward. Ocular tubercle low, rounded or roundedly conical; eyes not distinctly pigmented (or pigment lost in preserved state?).

Chelifore scape 1-segmented in both sexes. Chela

armed with several long setae on the more or less triangular palm, and with a row of some 4 long setae implanted from the proximal part of the immovable finger to the articulation of the movable finger. Both fingers curved, gaping when closed, with 3, 4 or 5 (very rarely 6) teeth in both sexes.

Palp only present in male, 2-segmented. Basal article very short, unadorned. Distal article very elongate, reaching far beyond the middle of the proboscis, but not overreaching it; armed in its distal part with some 6 setae.

Ovipiger of male: segment 5 the longest, distally provided with a setiferous lobe and a pointed process; a row of (usually curved) spinules is implanted on segments 3, 4, and 5; segment 6 is short, segment 7 is longer again, distally armed with 4 to 6 long setae; no terminal claw. Special spines on ovipiger segments 7 to 10, according to the formula 10:10:8:9. The more proximal compound spines on each segment are lanceolate, with some 8 regular lateral denticles on either side; the more distal compound spines are shorter and much wider, the two basal lateral denticles are enlarged, sometimes in a delirious way.

Ovipiger of female: segment 4 the longest; neither curved spines, nor long setae on the segments (2 shorter distal setae are present on segment 5); segment 5 without distal apophysis or process; compound spine formula 12:10:9:11; shape of the spines as in male.

Legs rather slender. In male, about 9 cement gland tubules arise on the ventral surface of the femur; in female, the femur is strongly swollen to contain a limited number (1 to 3) large eggs. The 2nd tibia ( $\sigma$ ) bears an anterior and a posterior row, each of 4 to 6 long setae; about 3 long setae are found on the propodus as well. In female, these long setae are absent. The femur is the longest segment, tibia 1 the shortest of the three longer articles. The 2nd coxa is 2.9 to 3.4 times as long as its proximal diameter ( $\sigma$ ,  $\text{♀}$ ). The propodus is moderately curved, tapering towards the distal end; heel with 2 basal spines, the distal end of which is crenulated; sole with about 10 spinules, each placed on a low socle, each with a more or less marked hump or indentation near the proximal end. Claw slender. In several specimens, e.g. in the holo- and allotype, a marked prominence is present at the base of the claw. In several other

specimens, this prominence is less distinct. It is supposed, that the prominence is retractable into the articulation membrane of claw/propodus (cf. figs. 29, 30, 31).

Measurements of paratypes (in $\mu\text{m}$ ).	♂	♀
Length trunk (frontal margin cephalic segment to tip of abdomen)	1628	1603
Diameter trunk (across 2nd lateral processes)	738	708
Diameter trunk (2nd segment, without lateral processes)	273	270
Length proboscis (ventral)	409	--
Greatest diameter proboscis	257	--
Length scape	388	--
Length chela	433	--
Palp segment 1	40	--
Palp segment 2	287	--
Third leg:		
coxa 1	293	201
coxa 2	445	384
proximal diameter coxa 2	136	118
coxa 3	230	232
femur	863	832
tibia 1	785	635
tibia 2	798	734
tarsus	63	61
propodus	535	447
claw	353	330

Remarks.- I have hesitated whether I should base a new species on the present material, or attribute it to *P. longiceps* (Böhm, 1879) or *P. kempfi* (Calman, 1923). After re-examination of the type-material of *longiceps* (in the Berlin Museum) and of additional material of *longiceps* and *kempfi* (in the Copenhagen Museum) (*vide supra*), I arrived at the conclusion that the Tanzanian material must be considered a separate species, which is, however, exceedingly close to *longiceps* and *kempfi*. The proposed specific name, *ardua* (Latin, = difficult) alludes to this situation.

The new species differs from the Japanese *P. longiceps* in its smaller size (e.g., the P3 ♀ of *ardua* is 3.9 mm long, that of *longiceps* 5.4-7.1 mm), in the more strongly curved propodus with shorter heel spines, and in the lower number of cement gland ducts (less than 10). *P. ardua* agrees with *longiceps* in the more compact configuration of the trunk and the not very elongated 2nd coxa.

*P. kempfi*, known from south-eastern Asia, differs from *P. ardua* in the following respects: the lateral processes of *kempfi* are longer than the diameter of the trunk (versus shorter in *ardua*); the length of trunk segment 3 in *kempfi* is more than the diameter of the trunk at the boundary of segments 2 and 3 (less than that diameter in *ardua*); the lateral processes of *kempfi* are separated by

intervals that are wider than the diameter of the lateral process (less in *ardua*); the 2nd coxa in *kempfi* is more slender ( $4\frac{1}{2}$  times as long as its basal diameter) than in *ardua* ( $< 3\frac{1}{2}$  times); finally, the 2nd tibia of *kempfi* (at least in the single male that I have examined) is devoid of rows of long setae, whereas such rows are present in *ardua*. The body size of *kempfi* agrees rather well with that of *ardua*.

*P. crassimanus* Stock, 1959, a species known from south-eastern Africa, has more teeth on the fingers of the chela, the propodus and its claw are more heavily built, and the number of cement glands is higher (about 15).

Arnaud, 1972, recently recorded *P. kempfi* from Madagascar. Several of the salient differences that separate *P. kempfi* from *P. ardua* are not illustrated by Arnaud, except for the 2nd coxa which resembles that of *ardua* and not that of *kempfi*. In the light of the close zoogeographical relationship between the Malagasy and Tanzanian marine littoral faunae, it would not be surprising if Arnaud's presumed material of *P. kempfi* would turn out to be *P. ardua*.

#### DIAGNOSIS OF THE GENUS *PROPALLENE*.

The type-species, *P. longiceps*, being more completely known now, it is possible to adjust the previous diagnosis (Stock, 1954: 31) of *Propallene* as follows:

Trunk well-segmented. Ocular tubercle in the posterior part of the cephalic segment. Abdomen small, implanted somewhat ventrad. Proboscis roughly of type D'. Scape 1-segmented. Chela with gaping, toothed fingers. Palp 2-segmented, only present in male. Ovipiger 10-segmented (♂, ♀). Segment 5 (♂) with distal apophysis, and opposite distal hook-like process. Compound spines present, in 1 row, proximal and distal spines on each segment very dissimilar in shape (♂, ♀). No terminal ovipiger claw (♂, ♀). Cement glands (♂) opening through numerous (6-17) short ducts on the ventral surface of the femur. Propodal heel spines (often?) crenulated. No auxiliary claws. Habitat: shallow waters, often pelagic. Distribution: Japan, south-eastern Asia, southern and south-eastern Africa, Madagascar, Sierra Leone.

TENTATIVE KEY TO THE SPECIES OF *PROPALLENE*,  
BASED ON ADULT ♂

- 1a) Lateral processes separated by more than twice their own diameter.  
*P. crinipes* Stock, 1968  
Strait of Malacca
- b) Lateral processes separated by about their own diameter, or less..... 2.
- 2a) Palp segment 2 about 3 times as long as wide, unarmed.  
*P. stocki* Fage, 1956  
Sierra Leone
- b) Palp segment 2 much more than 3 times as long as wide, setiferous..... 3.
- 3a) Movable finger of chela with 3 or 4 (rarely 5 or 6) teeth. At most 10 cement gland ducts.. 4.
- b) Movable finger with 6 to 8 teeth. More than 10 cement gland ducts <sup>1)</sup>..... 5.
- 4a) Coxa 2 very slender (length > 4 times its basal diameter); lateral processes longer than the diameter of the trunk. Tibia 2 without rows of long setae.  
*P. kempfi* (Calman, 1923)  
South-eastern Asia
- b) Coxa 2 moderately slender (length < 4 times its basal diameter); lateral processes shorter than the diameter of the trunk. Tibia 2 with rows of long setae.  
*P. ardua* n. sp.  
Tanzania
- 5a) Propodus very strongly curved, heavy. Basal spines on propodal heel relatively short in comparison with the heavy propodus.  
*P. crassimanus* Stock, 1959  
South-eastern Africa
- b) Propodus almost straight, slender. Basal spines on propodal heel very elongate.  
*P. longiceps* (Böhm, 1879)  
Japan  
and *P. similis* Barnard, 1955  
South Africa

## REFERENCES

- ARNAUD, F., 1972. Pycnogonides des récifs coralliens de Madagascar, 3. Famille des Callipallenidae. Téthys, Suppl. 3: 157-164, figs. 1-6.
- BARNARD, K.H., 1955. Additions to the fauna-list of South African Decapoda and Pycnogonida. Ann. So. Afr. Mus., 43 (1): 1-107, figs. 1-53.
- BÖHM, R., 1879. Zwei neue, von Herrn Dr. Hilgendorf in Japan gesammelte Pycnogoniden. Sitzber. Ges. naturf. Freunde, Berlin, 1879 (4): 53-60, figs. a-c.
- CALMAN, W.T., 1923. Pycnogonida of the Indian Museum. Rec. Ind. Mus., 25 (3): 265-299, figs. 1-17.
- , 1937. The type-specimens of *Pallene australiensis* Hoek (Pycnogonida). Ann. Mag. nat. Hist., (10) 20: 530-534, figs. 1-6.
- FAGE, L., 1956. Sur deux espèces de Pycnogonides du Sierra Léone. Bull. Mus. nation. Hist. nat. Paris, (2) 28 (3): 290-295, figs. 1-6.
- \*FUKUI, T., 1919. [The structure and kinds of the Pycnogonida]. Rigakukai, 16 (2): 95-99. [in Japanese].
- GNANAMUTHU, C.P., 1950. Notes on the morphology and development of a pycnogonid, *Propallene kempfi* (Calman). Proc. zool. Soc. Bengal, 3 (1): 39-47, figs. 1-4.
- KIKUCHI, T., 1968. Faunal list of the *Zostera marina* belt in Tomioka Bay, Amakusa, Kyushu. Publ. Amakusa mar. biol. Lab., 1 (2): 163-192.
- \*OHSHIMA, H., 1933a. [Pycnogonida as plankton organisms]. Dōbutsugaku Zasshi, 45 (532/533): 96. [in Japanese].
- , 1933b. Pycnogonids taken with a tow-net. Annot. zool. Japon., 14 (2): 211-220, figs. 1-14.
- , 1936. A list of Pycnogonida recorded from Japanese and adjacent waters. Zool. Mag. Tokyo, 48 (8-10): 861-869. [in Japanese].
- ORTMANN, A., 1890. Bericht über die von Herrn Döderlein in Japan gesammelten Pycnogoniden. Zool. Jahrb. (Syst.), 5 (1): 157-168, pl. XXIV.
- SCHIMKEWITSCH, W., 1909. Nochmals über die Periodicität in dem System der Pantopoden. Zool. Anz., 34 (1): 1-13, figs. 1-3.
- , 1929. Pantopoda. Faune URSS Pays limitroph., 1: i-cxv, pls. I-IV, text-figs. 1-57.
- , 1930. Ibid., 2: 225-555, pls. V-X, text-figs. 58-166.
- SEKIGUCHI, K., 1971. Egg-carrying habit and embryonic development in a pycnogonid, *Propallene longiceps*. Zool. Mag. Tokyo, 80 (4): 137-139.
- \*SHIGHIDO, I., 1899. [Seaspider species occurring in our country]. Dōzatsu, 11 (128): 195-200. [in Japanese].
- STOCK, J.H., 1954. Pycnogonida from Indo-West-Pacific, Australian, and New Zealand waters. Vidensk. Medd. dansk naturh. Foren., 116: 1-168, figs. 1-81.
- , 1959. On some South African Pycnogonida of the University of Cape Town Ecological Survey. Trans. roy. Soc. So. Afr., 35 (5): 549-567, figs. 1-9.
- , 1968. Pycnogonida collected by the Galathea and Anton Bruun in the Indian and Pacific Oceans. Vidensk. Medd. dansk naturh. Foren., 131: 7-65, figs. 1-22.
- UTINOMI, H., 1959. Pycnogonida of Sagami Bay. Publ. Seto mar. biol. Lab., 7 (2): 197-222, figs. 1-9.
- , 1962. Pycnogonida of Sagami Bay -- Supplement. Publ. Seto mar. biol. Lab., 10 (1): 91-104.
- \*-----, 1965. [Pycnogonida]. In: Shin Nippon Dōbutsu Zukan (New illustr. Encycl. Fauna Japan), 2: 333-338, figs. A-D, 12-31. (Hokuryū-kan, Tokyo). [in Japanese].
- , 1966. [Subphylum Pycnogonida]. Dōbutsu Keitōbunrui-gaku, 7 (B): 1-14. (Nakayamashoten, Tokyo). [in Japanese].
- , 1971. Records of Pycnogonida from shallow waters of Japan. Publ. Seto mar. biol. Lab., 18 (5): 317-347.
- \*- not seen in the original.

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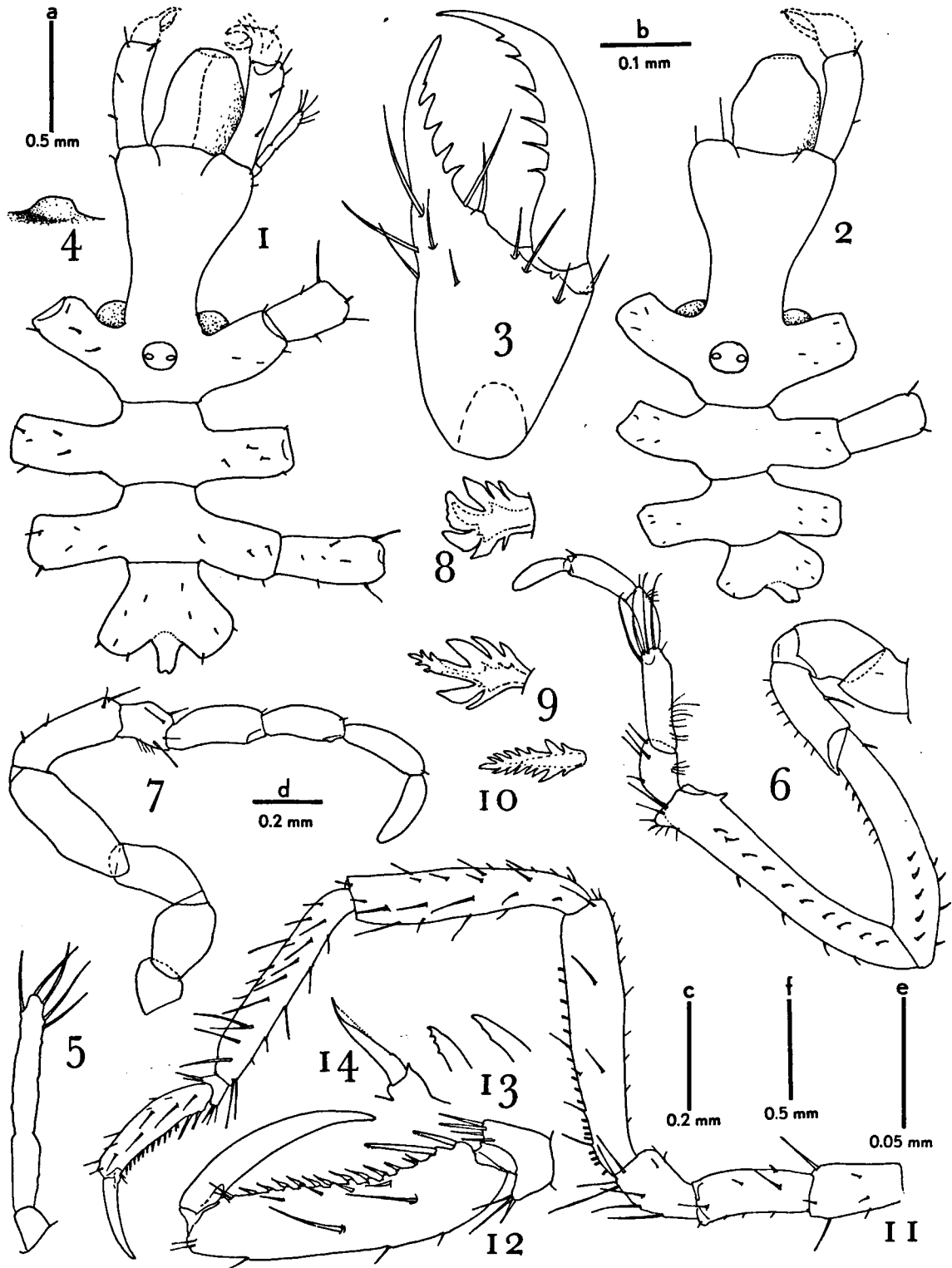
Institute of Taxonomic Zoology (Zoologisch Museum)

Plantage Middenlaan 53

Amsterdam C. -- The Netherlands

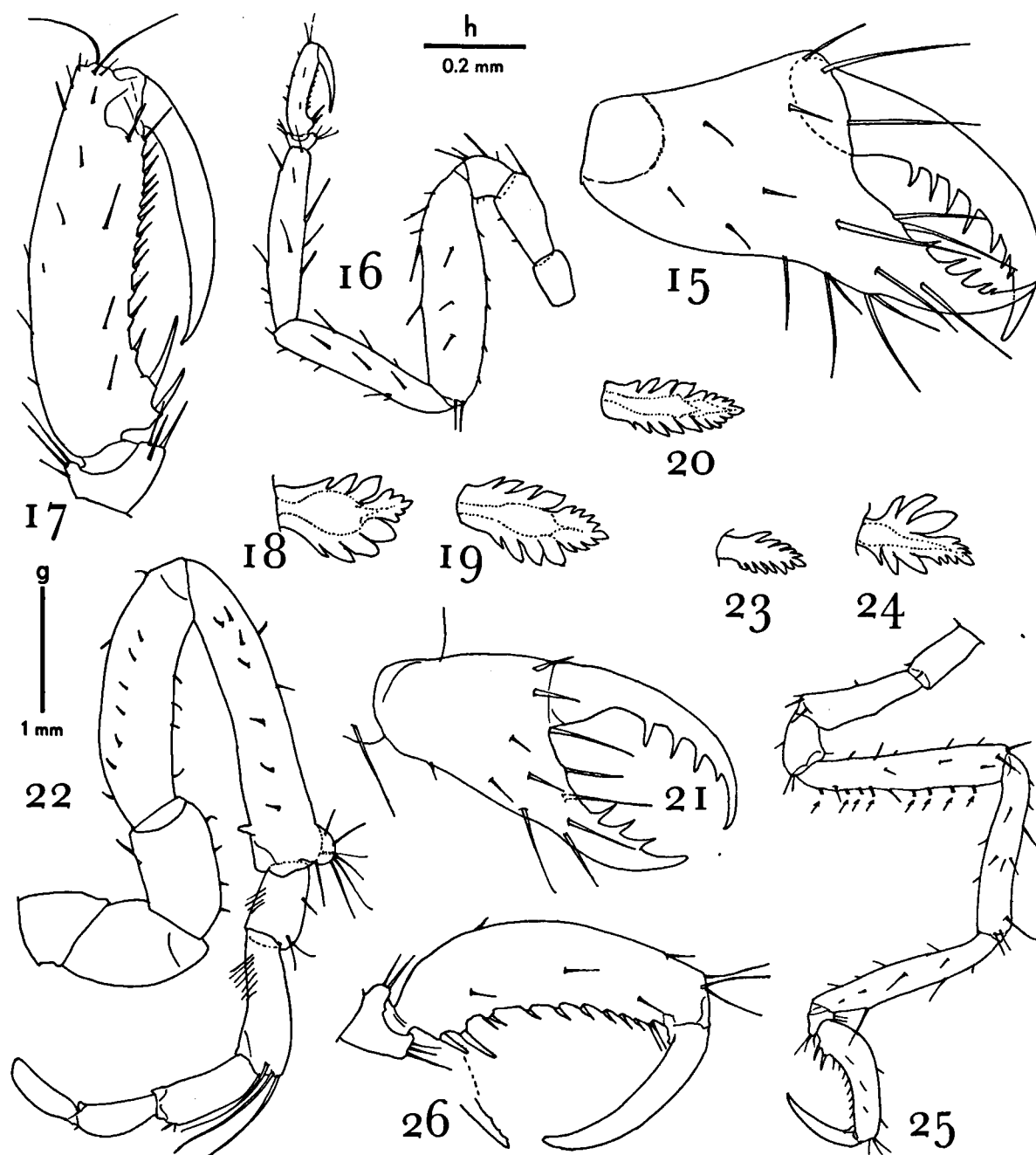
<sup>1)</sup> Cement glands of *P. similis* are not described.

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Figs. 1-14. *Propallene longiceps* (Böhm, 1879). Syntypes from Enoshima (Enosima), Japan.

1, trunk of ♂, dorsal (scale a); 2, trunk of ♀, dorsal (a); 3, chela, ♂ (b); 4, ocular tubercle, ♀, from the left (free-hand sketch); 5, palp, ♂ (c); 6, oviger, ♂ (d); 7, oviger, ♀ (d); 8, terminal spine of oviger segment 10, ♀ (e); 9, tenth spine of oviger segment 8, ♀ (e); 10, second spine of oviger segment 7, ♀ (e); 11, leg 2, ♂ (f); 12, distal leg segments, ♀ (c); 13, distal end of longest propodal heel spine (left: not worn; right: worn), free-hand sketch; spine of propodal sole (free-hand sketch).



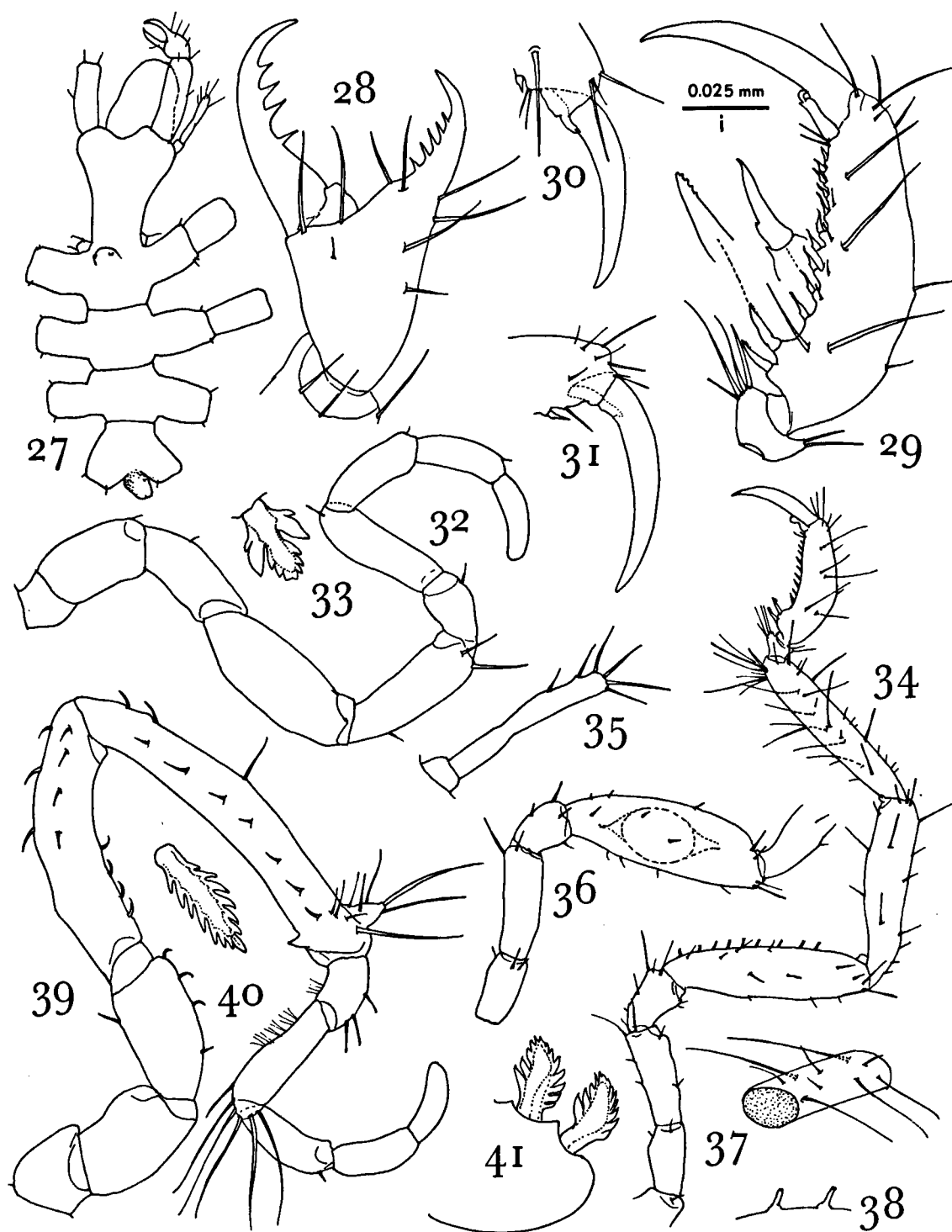
Figs. 15-20. *Propallene longiceps* (Böhm, 1879). Female from Misaki, Japan.

15, chela (scale c); 16, leg (g); 17, distal leg segments (h); 18, terminal spine of oviger segment 10 (e); 19, terminal spine of oviger segment 9 (e); 20, proximal spine of oviger segment 7 (e).

Figs. 21-26. *Propallene kempi* (Calman, 1923). Male from Singapore.

21, chela (scale b); 22, oviger (c); 23 proximal spine of oviger segment 9 (e); 24, distal spine of oviger segment 9 (e); 25, leg 3 (a); 26, distal segments of leg 3 (c).





Figs. 27-41. *Propallene ardua* n. sp. From the type locality, Kunduchi (Tanzania).

27, trunk of male, dorsal (scale a); 28, chela, ♂ (b); 29, distal segments of 3rd leg, ♂ (c); 30, 31, claw of 3rd leg, ♂, in different specimens (c); 32, oviger, ♀ (c); 33, distal compound spine from 9th oviger segment, ♂ (free-hand sketch); 34, 3rd leg, ♂ (a); 35, palp, ♂ (c); 36, proximal segments of leg 3, ♀ (a); 37, section of the 2nd tibia, ♂ (free-hand sketch); 38, cement gland ducts, ♂ (free-hand sketch); 39, oviger, ♂ (c); 40, proximal compound spine from oviger segment 7, ♂ (free-hand sketch); 41, distal part of oviger segment 10, ♂ (i).