

BULLETIN ZOOLOGISCH MUSEUM



Vol. 4 No. 3

16-X-1974

MEDIO- AND INFRALITTORAL PYCNOGONIDA COLLECTED DURING THE I.I.O.E. NEAR THE LANDBASE ON NOSSI-BÉ, MADAGASCAR

Jan H. STOCK

ABSTRACT

Fourteen identifiable species of Pycnogonida are recorded from the Nossi-Bé area, from the intertidal zone down to some 8 meters. The collection comprises 2 new species (*Nymphopsis curtiscapus* and *Nymphon biformidens*), whereas the following 6 species are recorded for the first time from this general region: *Ammothella biunguiculata* (Dohrn, 1881), *Rhynchothorax mediterraneus* Costa, 1861, *Achelia sawayai* Marcus, 1940, *Anoplodactylus pycnosoma* (Helfer, 1938), *A. turbidus* Stock, 1974, and *Endeis biseriata* Stock, 1968.

INTRODUCTION

In two previous papers (Stock, 1965, 1968b), I have reported on Pycnogonida collected in the frame of the International Indian Ocean Expedition (I.I.O.E.). The present paper deals with a collection made in the same frame during the U.S. Program in Biology, in the neighbourhood of the landbase on the island of Nossi-Bé, Madagascar (= Malagasy Republic). All the pycnogonids in this collection were gathered by hand by Mr. J.J.

Rudloe, mostly intertidal, but some by skin-diving in the infralittoral zone down to 8 meters. I am indebted to the Smithsonian Institution Oceanographic Sorting Center, Washington, D.C., for entrusting me this interesting material, which is preserved now in the Zoölogisch Museum, University of Amsterdam, and to Mr. Jack Rudloe (our trails crossed more than once, including on Nossi-Bé) for reviving my most colourful memories during the study of the pickled specimens.

LIST OF STATIONS IN THE NOSSI-BÉ AREA, MADAGASCAR, J.J. RUDLOE, COLLECTOR

- JR 18. Ankify Beach (13° 33' 00" S 48° 20' 15" E), offshore near large rocks; depth 1.5-8 m; bottom coral, rock, sand; skin diving; Dec. 30, 1963.
- JR 19. Ankify Beach, off Massif d'Ankify (13° 33' 00" S 48° 20' 15" E); depth 0-0.2 m; sand flat, *Cymodocea*-grass; hand collecting;

- Dec. 31, 1963.
- JR 19A. Ambatoloaka Beach (13° 23' 57" S 48° 13' 07" E); depth 1.0-2.0 m; *Cymodocea*-meadows; Dec. 31, 1963.
- JR 22. Ambatomboka, Crater Point, mouth of crater (13° 24' 17" S 48° 13' 38" E); depth 0-0,3 m; rock, coral, alcyonarians; hand collecting; Jan. 2, 1964.
- JR 25C. As JR 22; volcanic rock; intertidal; Jan. 5, 1964.
- JR 26. Tanikeli (13° 28.7' S 48° 14.6' E); intertidal; rocky, boulders, tide pools; Jan. 6, 1964.
- JR 29. Ambatoloaka beach area (13° 23' S 48° 13' E); depth 1.5 m; rock and coral scattered over sandy bottom, eelgrass; skin-diving; Jan. 11, 1964.
- JR 29A. Point Tafondro (13° 24' S 48° 21' E); depth not stated; Jan. 11, 1964.
- JR 30. Ambarionaombi Point, on the northern end of Nosi-Komba (13° 26' 10" S 48° 21' 13" E); depth 1 m; on dead coral on muddy bottom; Jan. 12, 1964.
- JR 31. Nosi-Tanga (13° 21' 50" S 48° 11' 21" E); rocky barrier reef offshore; algae, eelgrass, sand; depth 0.3 m; hand collecting on and under rocks; Jan. 13, 1964.
- JR 33. South rock off Ambariobé (13° 26' 25" S 48° 22' 53" E); under intertidal rocks; hand collecting; Jan. 15, 1964.
- JR 33A. East Ambariobé Bay (13° 26' 10" S 48° 22' 52" E); dead coral rock, sand; depth 1 m; hand collecting; Jan. 15, 1964.
- JR 35. Same as JR 31; intertidal rocky barrier reef, rock, and sand; under stones; Jan. 17, 1964.
- JR 36. Ambariobé rocks (13° 26' 00" S 48° 22' 42" E); volcanic rocks, sand, tide pools; depth 0-0.4 m; rotenone poisoning; Jan. 18, 1964.

LIST OF MATERIAL COLLECTED (STATIONS
NUMBERS IN PARENTHESES)

Family Ammotheidae

Ammothella biunguiculata (Dohrn, 1881) (29, 33);
Ammothella indica Stock, 1954 (29, 30); *Ammothella pacifica* Hilton, 1942 (19, 29, 31, 33, 35);
Achelia nana (Loman, 1908) (25C, 29, 29A, 30, 31, 33, 36); *Achelia sawayai* Marcus, 1940 (31);

Nymphopsis curtiscapus n. sp. (31). Furthermore unidentifiable juvenile specimens of *Ammothella* sp. from St. 22, 25C.

Family Colossendeidae

Rhynchothorax mediterraneus Costa, 1861 (30).

Family Nymphonidae

Nymphon biformidens n. sp. (33A); *Nymphon* sp. juv. (22).

Family Callipallenidae

Callipallene sp. (juv. or fragm.) (26, 29)

Family Phoxichilidiidae

Anoplodactylus pycnosoma (Helfer, 1938) (18, 19, 29, 35); *Anoplodactylus turbidus* Stock, 1974 (29); *Anoplodactylus glandulifer* Stock, 1954 (19, 19A, 31, 36); *Anoplodactylus pectinus* Hedgpeth, 1948 (29, 30); *Anoplodactylus batangensis* (Helfer, 1938) (31); *Anoplodactylus* sp. (females or juv.) (22, 29, 33A); *Endeis biseriata* Stock, 1968 (29).

TAXONOMIC PART

Ammothella biunguiculata
(Dohrn, 1881) Fig. 1.

Ammothella biunguiculata Dohrn, 1881: 26, 105, 158-160, pl. VIII figs. 1-3; Ohshima, 1927b: 611-612, fig. 4; Ohshima, 1927d: 385-386, pl. VII figs. 7-8.

Ammothella (Ammothella) biunguiculata.- Bouvier, 1923b: 52, figs. 49, 49a; Ohshima, 1936: 866.

Ammothella biunguiculata.- Helfer & Schlottko, 1935: 64, 186, 200, 283; Kerneis, 1960: 170; Utinomi, 1966: 6, fig. 6; Stock, 1968a: 14, fig. 6; Utinomi, 1971: 330.

Ammothella biunguiculata.- Hedgpeth, 1941b: 259, pl. 10; Hilton, 1942b: 297-298, pl. 42; Hilton, 1942g: 97; Hedgpeth, 1949: 235, 238; Hedgpeth, 1952: 430; Bourdillon, 1954a: 151-153, pls. I-II.

Ammothella biunguiculata biunguiculata.- Clark, 1963, fig. 31 A-D.

Ammothella biunguiculata var. *californica* Hall, 1912: 93-95, figs. 50, 52 A, E, G, K; Hall, 1913: 127, 130, 132; Hilton, 1915a: 68; Hilton, 1915b: 204; Hilton, 1920: 93.

Ammothella biunguiculata var. *californica* ? .- Hilton, 1939: 32.

Ammothella biunguiculata var. *fusca* Hilton, 1942a: 50-51, fig. 7; Hilton, 1942g: 97; Eldredge, 1968 (?) (undated), page unnumbered (=10).

Ammothella biunguiculata var. *australiensis* Williams, 1939: 197-200, figs. 1-3.

Ammothella biunguiculata australiensis Clark, 1963: 63-66, fig. 31 E-H.

Material.- 1 female, St. 29; 1 male, 1 female, St. 33.

Remarks.- This species has been subdivided into

several varieties (*californica* from the West coast of the United States, *fusca* from Hawaii, *australiensis* from Australia, and the typical form from the Mediterranean Sea). Clark, 1963, was the first to stress certain structural details in the appendages to discriminate between some of these forms, which he treated as subspecies.

There are two unfortunate circumstances in this matter: (1) From the typical, mediterranean, form only 3 specimens are known, viz. an immature, chelate, holotype from Naples; Bourdillon's specimen, a female, from the Marseille region; and Kernefs' specimen from the Banyuls area (unillustrated). The structure of the male appendages is unknown. (2) I re-investigated Californian material, previously studied by Clark as well, and came to conclusions somewhat different from his. As a matter of fact, re-examination of Californian specimens ("var. *californica*"), Hawaiian specimens ("var. *fusca*") and the present Malagasy material, shows that each population is slightly different from the others, but that probably clinal variation is involved. I do not see the use of attributing varietal or subspecific names to each population, especially since we know nothing about the male morphology of typical (Mediterranean) material, and since no detailed description of the morphology of Japanese material is known.

There are clear differences between the Californian sample examined during this study (from San Pedro Point, Los Angeles) and the Malagasy samples, but the Hawaiian samples (from Honolulu and Oahu) tend to bridge the gap. So, the palp segment 6 tends to a rectangular shape (diameter at the top only $1\frac{1}{2}$ times that at the base) in Californian material, whereas in Malagasy material this segment assumes an almost triangular shape (distal diameter twice the proximal diameter). Palp segment 7 (California) has a poorly produced, semi-circular ventral outline, but is strongly produced, almost finger-shaped, in Malagasy material. Palp segment 9 (California) is almost circular in outline, but is clavate in Malagasy material. Similar differences are suggested by Clark's figures of Californian and Australian specimens, but my Californian material shows up less extreme than Clark's.

Clark's figure of the male oviger (California)

seems to be based on an aberrant specimen. The armature of segment 7, considered by Clark an important discriminating character, consists in all samples examined by me (California, Hawaii, Madagascar) of 2 long and 1 shorter seta. Segments 4 and 5 are least slender in Californian material, like signalized by Clark, most slender in Malagasy material, intermediate in Hawaiian specimens. The male oviger of Hawaiian material is peculiar in having segment 2 longer than any other segment (in California and Madagascar, segment 4 is the longest).

In conclusion, I attribute for the moment being all this material to *A. biunguiculata*, without using a trinomial distinction, and I adhere to Hedgpeth's view (1949: 238) that this is "that *rara avis* among the Pycnogonida, a cosmopolitan littoral species".

Ammothella indica Stock, 1954

Ammothella indica Stock, 1954b: 113-118, figs. 54, 55, 56c, 57 a-c; Stock, 1959: 551; Utinomi, 1959: 203-205, figs. 2-3; Stock 1968b: 11; Child, 1970: 292.

Material.- 1 specimen (fragm.), St. 29; 1 female, St. 30.

Remarks.- New to Madagascar. Otherwise widely distributed from South Africa to the Society Islands and to Japan.

Ammothella pacifica Hilton, 1942

Ammothella pacifica Hilton, 1942d: 49-50; Stock, 1968b: 10.

Material.- 1 male ovig., St. 19; 1 specimen (fragm.), St. 29; 1 male, 1 female, 1 juv., St. 31; 1 female, St. 33; 1 male ovig., St. 35.

Remarks.- The formal re-description of Hilton's species, prepared already long ago for the 2nd edition of Edmundson's Shore and Reef Fauna of Hawaii, still is not in print at the moment of this writing. *Ammothella pacifica* is very close to *A. indica* Stock, 1954, but has a much longer first scape segment and less slender distal palp segments.

The species was already known from Madagascar (Stock, 1968b).

Achelia nana (Loman, 1908)

Achelia nana.- Stock, 1965: 14-15 (refs.); Stock, 1968b: 16.

Material.- 1 male, 1 female, St. 25C; 1 female, 1 juv., St. 29; 1 female, 3 juv., St. 29A; 1 male ovig., St. 30; 2 males, 1 juv., St. 31; 4 males, 3 females, 1 juv., St. 33; 1 female, 1 juv., St. 36.

Remarks.- This species is widely distributed in the Indo - West Pacific; it was previously recorded from Madagascar by Stock, 1968b.

Achelia sawayai Marcus, 1940

Achelia sawayai.- Fry & Hedgpeth, 1969: 104 (refs.).

Material.- 1 male ovig., 1 male, 2 females, 1 juv., St. 31.

Remark.- An amphiatlantic, tropical species, recorded here for the first time from the Indian Ocean.

Nymphopsis curtiscapus n. sp. Fig. 2.

Material.- 1 male ovig. (holotype), 1 chelate juvenile (paratype), St. 31.

Description.- Male: Trunk without segmentation lines. Two mid-dorsal tubercles, provided with numerous spine-like projections; each mid-dorsal tubercle about as tall as the ocular tubercle. Low rugose tubercles on the cephalon near the lateral side of the chelifore implantation. Lateral processes touching or almost touching at their basis, separated by a small interval at their distal end. Each lateral process with 2 branched, denticulated or toothed processes near the tip. Ocular tubercle cylindrical, with a low distal point; eyes well-pigmented, the anterior pair smaller than the posterior pair. Abdomen curved, armed with 2 pairs of stronger processes and several smaller ones.

Proboscis with a narrower, cylindrical basal part, and a swollen distal part.

Chelifore scape 2-segmented. Segment 1 with 1 major toothed process, segment 2 with 2 such major processes; distally, segment 2 is widened. The chela is implanted in a cup-shaped excavation of the scape; it is reduced and non-chelate (in the juvenile specimen in this collection, it is still perfectly chelate).

Palp 10-segmented. Spiniferous tubercles occur on segment 4. There are 6 shorter segments distad of segment 4, a unique situation in this genus.

Oviger 10-segmented. Segment 3 curved. Segments 4

and 5 the longest, 5 with long distal setae. Long setae also on segments 6, 7, and 8. Segments 9 and 10 devoid of setae, but with 1 and 2, almost smooth, claw-like, special spines, respectively. Legs, in particular the tibiae, with very long, finger-shaped, toothed and spine-tipped processes, arranged in 2 rows. A long genital spur on the ventral surface of coxa 2 of legs 3 and 4. Propodus curved, with 3 slightly denticulated spines on the heel, and some 7 spines on the sole. Auxiliary claws equally well developed on all legs, about half as long as the main claw. The cement gland opens through a low, chimney-shaped process, on the dorsal surface at a short distance from the end of the femur.

Remarks.- With the existing keys to the species in this genus (Sawaya, 1947; Hedgpeth, 1948; McCloskey, 1967⁺), the present species keys out as *Nymphopsis muscosa* Loman, 1908. It is, however, quite different from that species, the most easily visible differences being the well-spaced crurigers and the chelifores overreaching the proboscis in *muscosa*.

The only "compact" species with short chelifores is *N. denticulata* Gordon, 1932, which has, however, 8-segmented palps⁺⁺ and is devoid of compound processes on body and appendages.

The present new species differs from all others in the genus in having a 10-segmented palp (with 6 short distal articles), 9 being the normal, and 8 the exceptional number (in *denticulata* and sometimes in *armata*, see Flynn, 1919b).

The short chelifores of the present species have inspired the proposed specific name, *curtiscapus*.

Measurements of the male, holotype (in mm).-

Length (frontal margin cephalic segment to tip abdomen)	1.86
Length abdomen (dorsal)	0.93
Width across 2nd lateral processes	1.41
Length proboscis (ventral)	1.62
Greatest diameter proboscis	0.70
Length scape	0.91

⁺ The keys of Hedgpeth and McCloskey omit *N. melidae* Sawaya, 1947.

⁺⁺ Although Gordon's text (1932: 123) calls the palp 9-segmented, the figure (fig. 70b) shows only 4 short distal palp segments, thus an 8-segmented palp.

Third leg:

coxa 1	0.44	tibia 2	1.02
coxa 2	0.52	tarsus	0.13
coxa 3	0.28	propodus	0.79
femur	1.09	claw	0.50
tibia 1	0.94	auxiliary claw	0.26

Rhynchothorax mediterraneus Costa, 1861.
Fig. 3.

Rhynchothorax mediterraneus Costa, 1861: 8-9, pl. I figs. 1-2; Dohrn, 1881: 90, 98, 117, 118, 119, 120, 211-215, pl. XVII figs. 1-9; Arnaud, 1972: 408; Krapp, 1973b: 121, 123.
Possibly this species: Zago, 1970: 1-5, figs. 1-7. Non *R. mediterraneus* Zilberberg, 1963: 21-25, pl. I figs. 1-4.

Material.- 1 adult female, St. 30.

Remarks.- There are only three certain records of this species, all from the western Mediterranean Sea (Costa, Dohrn, Arnaud). Zilberberg's records from Trinidade Island (20°30'S 29°22'W) are certainly not identical with *R. mediterraneus* (see Page & Stock, 1966; Arnaud, 1974).

I have compared the present Malagasy specimen with a male taken in 90 meters in the Gulf of Marseille, S. of Riou Island, kindly put at my disposal by Madame F. Arnaud. Although the localities Nossi-Bé and Marseille are oceans apart, the specimens are absolutely identical. Zago's specimen from the coast of Brazil, though very similar to *R. mediterraneus*, differs from the present material in having palp segment 2 less elongated, and the dorsodistal projection of the 2nd palp segment relatively longer, and in having dentated oviger spines (simple in *mediterraneus*). As said before, the present record extends the range of the mediterranean species to the southwestern Indian Ocean. The measurements (in mm) of the female from Nossi-Bé are as follows:

Length (tip proboscis to tip 4th lateral process)			0.83
Tip 4th lateral process to tip abdomen			0.15
Width across 2nd lateral processes			0.36
Length proboscis			0.37
Greatest diameter proboscis			0.17
First leg:			
coxa 1	0.10	tibia 2	0.20
coxa 2	0.09	tarsus	0.04
coxa 3	0.06	propodus	0.16
femur	0.25	claw	0.08
tibia 1	0.27		

Nymphon biformidens n. sp. Fig. 4.

Material.- 1 specimen, probably a ripening female, holotype, St. 33A.

Description.- Trunk rather heavy, completely segmented. Lateral processes shorter than the diameter of the trunk, separated by a distance slightly larger than their own width. Abdomen short, reaching to the end of the 4th lateral process. Neck short, with a heavy cephalon. Eye tubercle low, somewhat damaged in the only specimen available; eyes well-pigmented.

Proboscis with a swollen basal half and a slightly tapering, almost cylindrical distal half.

Scape slender. Chela subequal to the scape; palm slender, hairy; fingers shorter than the palm.

Movable finger curved, armed with 3 simple (needle-shaped) proximal teeth and 5 bifid distal teeth. The proximal cusp of these bifid teeth is much smaller than the distal cusp. Immobile finger straight, armed with 5 simple, proximal teeth, and 5 bifid distal teeth.

Palp segment 2 slightly longer than 3; segment 4 only a little longer than wide; segment 5 rather elongated, 4 + 5 about equal to segment 3. Long setae, especially on the segments 4 and 5.

Oviger with several long setae on segments 5 and 6. Compound spine formula 10:9:8:10. Each compound spine with some 7 lateral teeth, basal teeth not enlarged. Terminal claw slender, thin, armed with a row of minute cilia, but without teeth

Only leg 1 is present in the holotype. This is very slender and thin. The second tibia is by far the longest segment, the femur is shorter than either of the tibiae. Several short setae on the leg segments, longer setae on the propodus. Tarsus more than 3 times as long as wide, less than half as long as the propodus. Propodus straight; armed on the sole, but also on the posterior, anterior, and dorsal surfaces with longer and shorter setae. No spines on the sole. Claw short, inner surface provided with minute rugosities. Auxiliary claws very much longer than the main claw, armed with rugosities, arranged more or less in 2 rows.

Remarks.- This new species belongs with 4 other *Nymphon* species in a strongly coherent group that is characterized by (1) an untoothed terminal

oviger claw; (2) auxiliaries that are longer than the main claw; (3) often, the auxiliaries and/or the main claw are pectinate or rugose on their internal margin.

These characters may well be sufficient to base a subgenus on. The following species show this combination of characters: *N. aequidigitatum* Haswell, 1885, *N. giraffa* Loman, 1908, *N. floridanum* Hedgpeth, 1948, and *N. aemulum* Stock, 1974.

The present new species shows a mixture of characters of these 4 species, but also some peculiarities of its own. The palp has a rather short distal article (as in *aemulum*); the chela has a slender palm (as in *aequidigitatum*); the fingers bear bifid teeth (as in *floridanum*), but the two cusps in each bifid tooth are, unlike *floridanum*, of unequal size, whereas moreover only part of the teeth is bifid⁺; the ornamentation of the claw and auxiliary claws is as in *floridanum* and *aemulum*; the shortness of the neck is as in *aequidigitatum* and *aemulum*, etc.

The compound oviger spines of *biformidens* bear a limited number (about 7) of lateral teeth, and are not of the callipallenid type as in the other species. The dimorphism in the chelar teeth is also peculiar, as is the low number of these teeth (8-10 in *biformidens*, 9-15 in *aemulum*, 15-19 in *floridanum*, 23 in *giraffa*, 35-40 in *aequidigitatum*).

We seem to have here a group of closely similar tropical species, ranging from south-eastern Australia to Japan and Madagascar in the Indo-West Pacific, and having a second distribution centre in the West Indies and Florida.

Measurements of the holotype (in mm).-

Length (frontal margin cephalic segment to tip 4th lateral process)	1.23
Width across 2nd lateral processes	0.54
Greatest diameter cephalon	0.35
Length proboscis (ventral)	0.66
Greatest diameter proboscis	0.31
Length scape	0.52
Length chela	0.50
First leg:	

coxa 1	0.21	tibia 2	2.20
coxa 2	0.46	tarsus	0.19
coxa 3	0.19	propodus	0.40
femur	1.32	claw	0.062
tibia	1.55	auxiliary claw	0.106

+ The proposed specific name alludes to the 2 forms of teeth on the fingers of the chela in the new species.

Anoplodactylus pycnosoma (Helfer, 1938)

Anoplodactylus pycnosoma.- Stock, 1954b: 75-77, fig. 33 (refs).

Material.- 1 female, St. 18; 1 male, 1 female, 2 juv., St. 19; 1 male, St. 29; 1 male ovig., St. 35.

Remarks.- This Indo-Pacific species is very close indeed to European *A. angulatus* (Dohrn, 1881). The cement gland openings in *A. pycnosoma* may show up as transverse slits (see Stock, 1953a, fig. 5f; Stock, 1954b, fig. 33f), but in the present specimens they show up as a row of pores or small openings, as in *A. angulatus* (see Krapp, 1973a, fig. 6d).

The remaining differences are of degree: *A. pycnosoma* is less slender than *A. angulatus*. Thus, the proboscis of *angulatus* is more elongate (see Dohrn, 1881, pl. XII fig. 1) than that of *pycnosoma* (see Stock, 1953a, fig. 5b; Stock, 1954b, fig. 33b); the 2nd coxa is much more than twice as long as wide in *angulatus* (see Krapp, 1973a, fig. 6c), not much longer than wide in *pycnosoma* (see Stock, 1953a, fig. 5e; Stock, 1954b, fig. 33e). The 2nd tibia of the 3rd leg is also less slender in *pycnosoma* than in *angulatus*. The structure of the ovigers is, however, very similar in both species (in Stock's figures - 1953a, 1954b - of *pycnosoma* the reversed spines on segment 5 are omitted, but these are present like in *angulatus*). The species is new to the south-western Indian Ocean.

Anoplodactylus turbidus Stock, 1974

Stock, 1974 (in press), refs.

Material.- 2 young males, 1 female, St. 29.

Remarks.- Was hitherto known from the Red Sea only.

Anoplodactylus glandulifer Stock, 1954

Anoplodactylus glandulifer Stock, 1954b: 80-84, fig. 36; Stock, 1958a: 3; Stock 1968b: 49; Arnaud, 1973: 955.

Material.- 2 males, St. 19; 2 females, St. 19A; 2 males ovig., 1 juv., St. 31; 1 male, 1 female, St. 36.

Remarks.- The male from St. 36 has 3 short cement gland ducts on the femur, like the specimen recorded by Stock, 1968b, from Mombasa. The 2

ovigerous males from St. 31 have even a higher number of cement gland ducts: 4 in the smallest of the two males, and 5 in the largest. The smaller male has moreover a very compact trunk - somewhat like *A. robustus* (Dohrn, 1881) - but the larger male has normally spaced lateral processes. The oviger (with its very elongated 2nd segment) and the propodal armature agree with those in typical specimens. I do consider these specimens, therefore, at least provisionally, identical with *A. glandulifer*.

The species was already known from Madagascar (Arnaud, 1973).

Anoplodactylus pectinus Hedgpeth, 1948

Anoplodactylus pectinus.- Stock, 1974 (in press), refs.

Material.- 1 leg of a male, St. 29; 1 female, 2 juv., St. 30.

Remarks.- This species was recorded already before from Madagascar (Arnaud, 1973). As far as known, it has a disjunct distribution (Madagascar and western tropical Atlantic).

Anoplodactylus batangensis (Helfer, 1938)

Anoplodactylus batangensis.- Stock, 1974 (in press), refs.

Material.- 1 male ovig., 1 male, St. 31.

Remarks.- A circumtropical species, recorded before from Madagascar (Arnaud, 1973).

Endeis biseriata Stock, 1968

Endeis biseriata Stock, 1968b: 57-60, fig. 21 (lit., syn.).

Material.- 1 female, St. 29.

Remark.- New to the southwestern Indian Ocean, but widely distributed along the coasts of south-east Asia.

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Dr. Jan H. STOCK
 Professor in Systematic and Geographic Zoology
 Institute of Taxonomic Zoology, University of Amsterdam
 Plantage Middenlaan 53
 Amsterdam C. -- The Netherlands

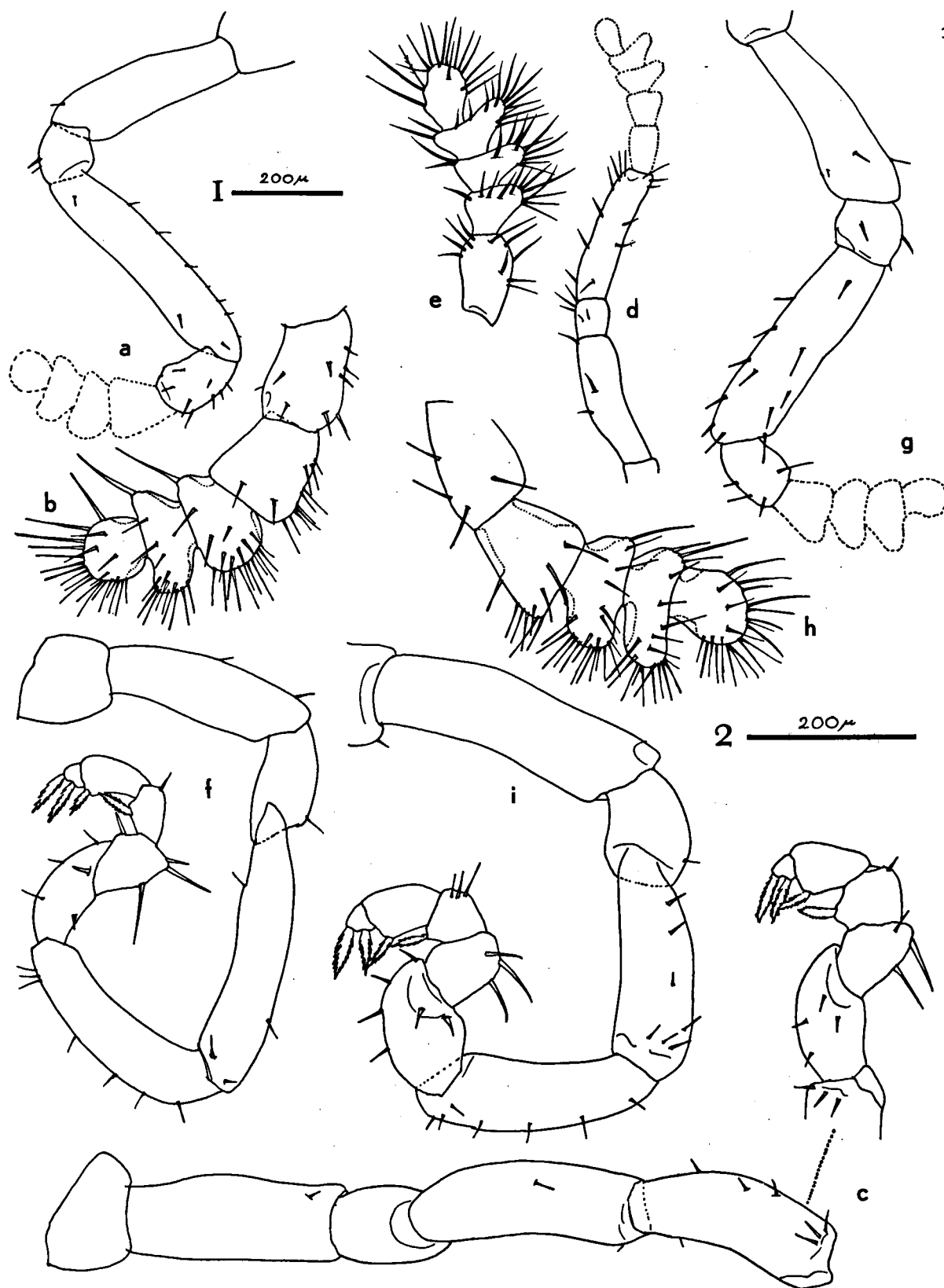


Fig. 1. *Ammothella biunguiculata* (Dohrn, 1881): a-c, ♂ from San Pedro Point, Los Angeles, California; d-f, ♂ from Nossi-Bé, Madagascar (Station JR 33); g-i, ♂ from Oahu, Hawaii. a, palp, distal segments sketched only (scale 1); b, distal palp segments (2); c, oviger (1); d, palp, distal segments sketched only (same scale as a); e, distal palp segments (same scale as b); f, oviger (2); g, palp, distal segments sketched only (same scale as a); h, distal palp segments (same scale as b); i, oviger (same scale as c).

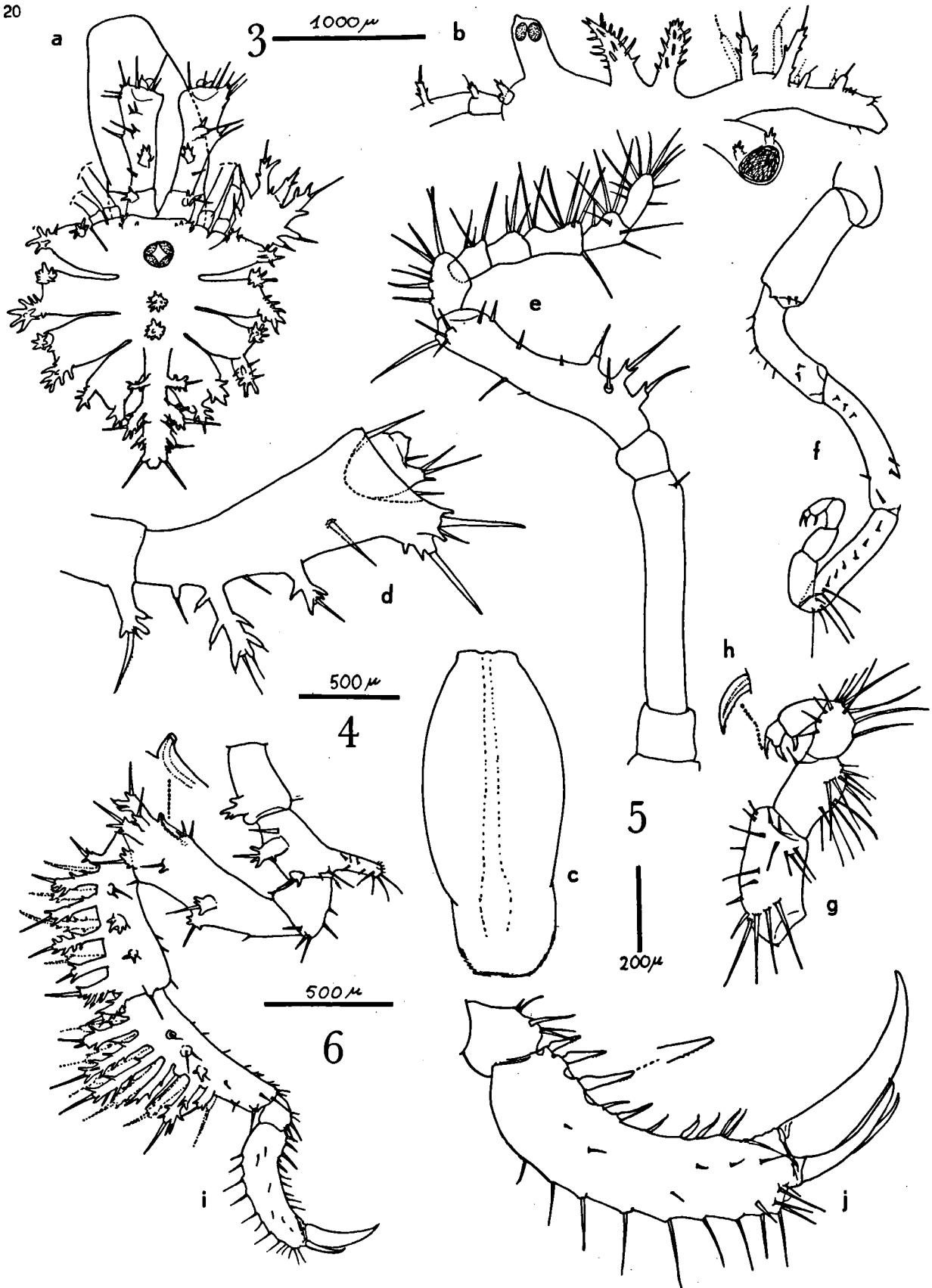


Fig. 2. *Nymphopsis curtiscapus* n. sp., ♂ holotype. a, trunk, dorsal (scale 3); b, contour of dorsum, from the left (4); c, proboscis, ventral (4); d, chelifore (5); e, palp (5); f, oviger (6); g, distal oviger segments (1); h, compound spine of oviger segment 10 (free-hand sketch); i, third leg (3), with cement gland more enlarged; j, distal segments of 3rd leg (5).

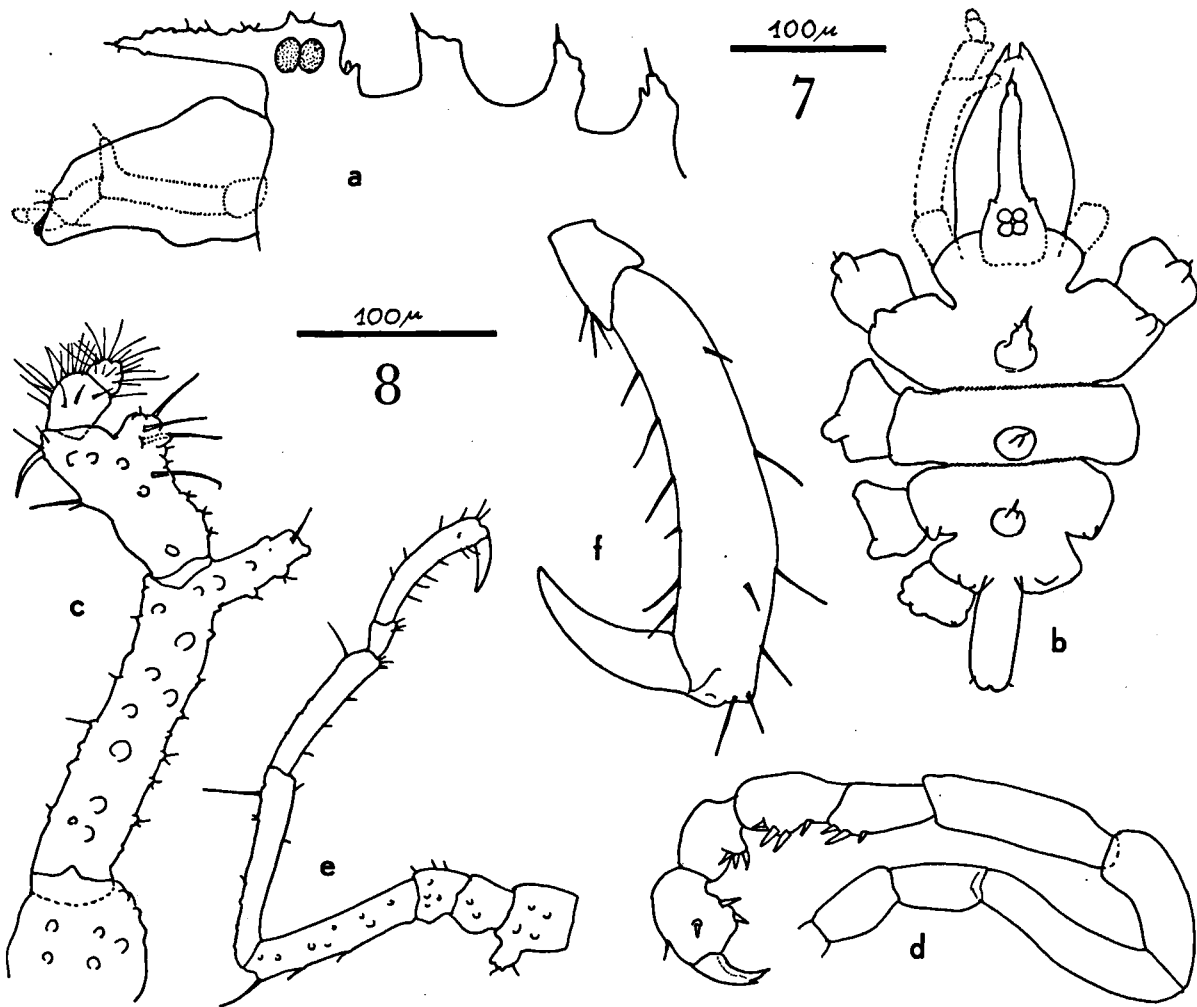


Fig. 3. *Rhynchothorax mediterraneus* Costa, 1861, ♀, from Nossi-Bé, Madagascar (Station JR 30). a, trunk, from the left (1); b, trunk, dorsal (1); c, palp (7); d, oviger (7); e, first leg (1); f, distal segments of first leg (8).

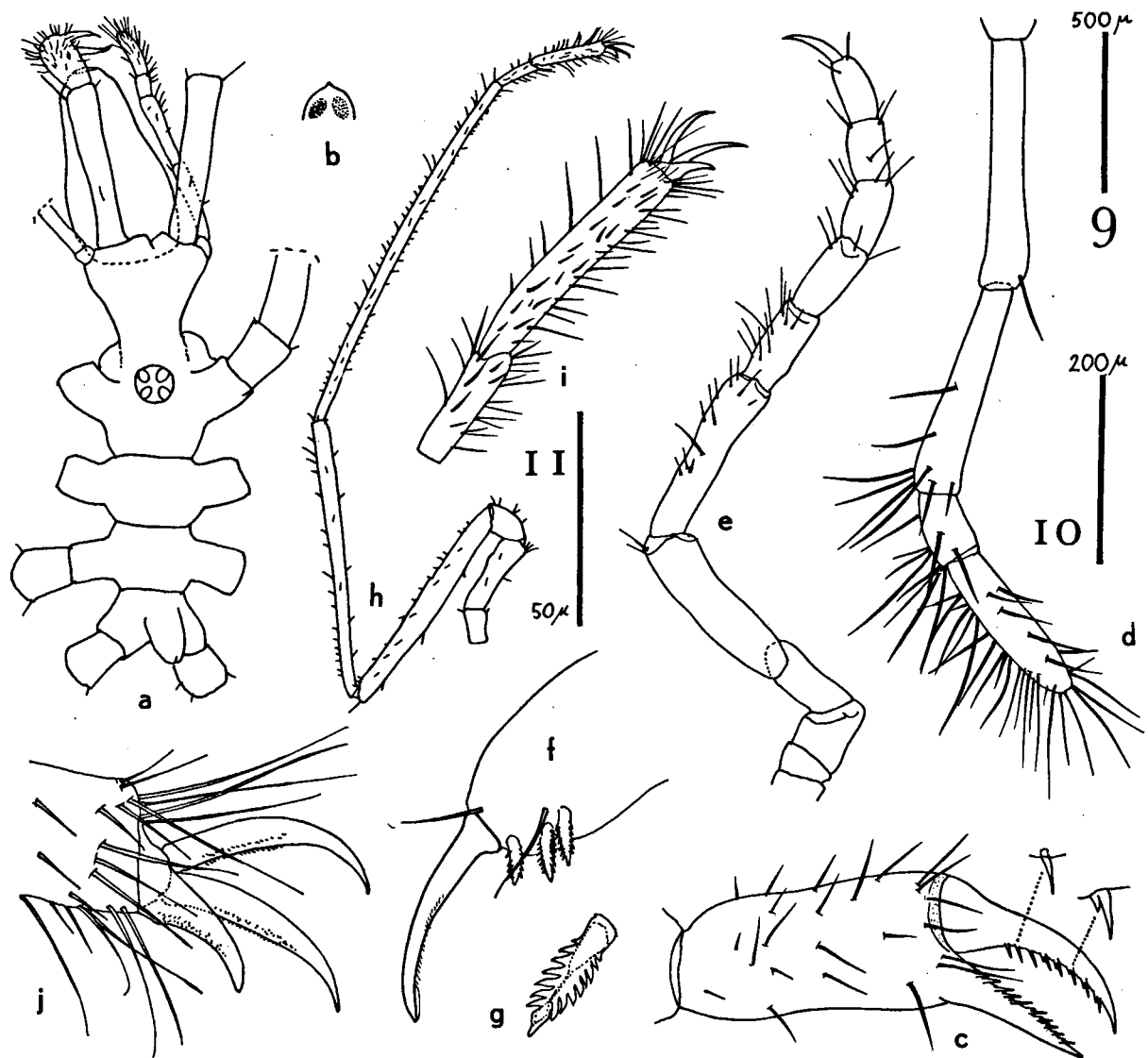


Fig. 4. *Nymphon biformidens* n. sp., ♀ holotype. a, trunk, dorsal (9); b, ocular tubercle, from the right (free-hand sketch); c, chela (10), two of the teeth more enlarged; d, palp (10); e, oviger (7); f, distal portion of oviger (8); g, compound spine 9 of oviger segment 10 (11); h, first leg (3); i, distal segments of first leg (1); j, claw and auxiliary claws (8).