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Pycnogonida from the southwestern Indian Ocean

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ABSTRACT

Sixteen species of coastal or shelf Pycnogonida have been recorded from Madagascar, the Comoro Islands, and Mauritius. Two of these, *Nymphon crosnieri* and *Pallenoides opuntia*, are new to science. The ranges of *Nymphon arabicum*, *N. setimanus*, *Parapallene hodgsoni*, *Anoplodactylus digitatus*, *A. versluysi*, *Endeis meridionalis* and *E. clipeata* are considerably extended. *Ascorhynchus corderoi*, only known from Brazil, was found in Mauritius. In the light of recent work, *Achelia nana* may be identical with the wide-spread *A. echinata*. The original description of *Nymphon arabicum* is corrected, after re-examination of the types. A review of all uniunguiculate *Nymphon*-s is given. *Anoplodactylus digitatus* is synonymous with *A. investigatoris* and *A. saxatilis* (new synonymy). *A. pulcher* is synonymous with *A. stylops* (new synonymy). The "Si-boga" specimens attributed to *Endeis meridionalis* may not belong to that species.

INTRODUCTION

The present report deals with the Pycnogonida collected in coastal and shelf waters around Madagascar, the Comoro Islands, and Mauritius. In addition to a number of samples collected by the author in the Nosy Bé area (Madagascar) and on Mauritius¹⁾, a most interesting collection of dredged and trawled material, from the West and South coasts of Madagascar and from the Comoro Islands, was brought together by Dr. A. Crosnier (Paris). I wish to acknowledge my thanks to Dr. Crosnier for putting his material, and some valuable information pertaining to it, at my disposal. Mr. C. Michel, of

¹⁾ The fieldwork was supported by the National Science Foundation as a part of the U.S. Program in Biology, International Indian Ocean Expedition.

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the Mauritius Institute, Port Louis, kindly contributed one more sample to my collections.

Thanks are also due to Dr. A. G. Humes, leader of the base at Nosy Bé of the U.S. Program in Biology, whose perfect organization and constant help made the work and stay at the base a most pleasant experience. Dr. M. Pichon, staff member of the Centre d'Océanographie et des Pêches, Nosy Bé, joined me during SCUBA diving trips, both on Madagascar and Mauritius; I am indebted to him for his constant companionship and help. The assistance, with laboratory space, boat and road transport, of the Fisheries Office, Le Réduit, Mauritius, is acknowledged.

TAXONOMIC PART

Family Ammotheidae

Ascorhynchus corderoi du Bois-Reymond Marcus, 1952

Ascorhynchus corderoi DU BOIS-REYMOND MARCUS, 1952, p. 23—30, figs. 1—9.

Material examined. — 1 specimen. Baie du Tombeau, Mauritius, in coral from very shallow water. Feb. 14, 1964. Collected by Mr. C. Michel. (Z.M.A. coll. nr. Pa. 1565).

Remarks. — The present specimen agrees even in the finest details with *A. corderoi*, described in an excellent way by Mrs. Eveline DU BOIS-REYMOND MARCUS (1952) from the State of São Paulo, Brazil. No other records of this species are known to me, but the large disjunction in the distribution area (as far as we know it now: Brazil and Mauritius) has had no influence at all on the morphological characters of the species. Like so many of the type-specimens, the present animal is a hermaphrodite. It carried eggs on the ovigers and had at the same time well-developed ovaries extending into the legs. Mr. C. Michel, of the Mauritius Institute, who collected and presented to me this interesting species, noted that its live colour was light brown. The length (from the frontal margin of the cephalic segment to the tip of the abdomen) of the Mauritius specimen is 2.7 mm.

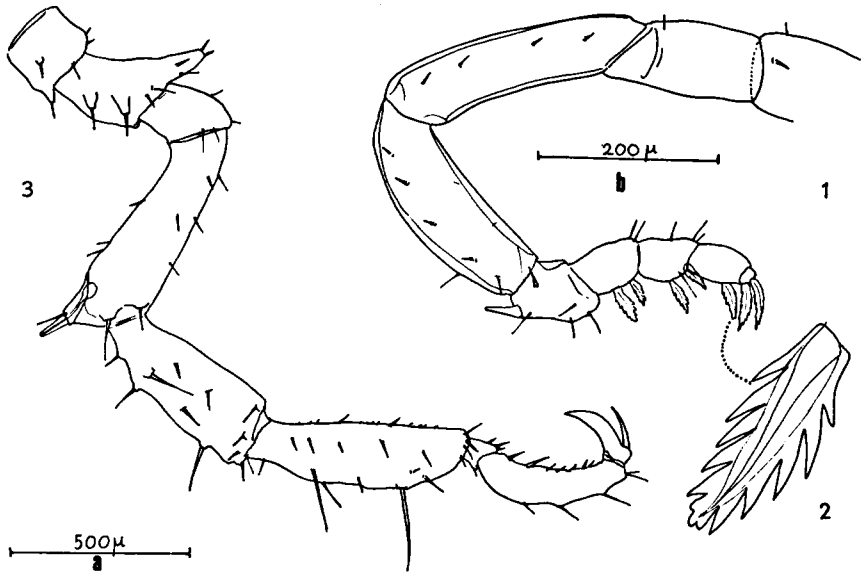
Achelia nana (Loman, 1908). Figs. 1—3.

Ammothea nana LOMAN, 1908, p. 60—61, pl. I figs. 1—13.

Achelia nana, STOCK, 1953, p. 300—301, fig. 14; STOCK, 1954, p. 97.

Material examined. — 3 ♀, 2 ♂ (ovig.), 1 chelate juvenile. On a sponge (*Tethya* or relative), Ambariobé (N. of Nosy Komba, Madagascar), depth about 1 meter. Jan. 16, 1964. (Z.M.A. coll. nr. Pa. 1587ab).

Remarks. — I compared the present specimens with Loman's type-material. They are identical. Loman's figure of the propodus suggests that all spines on the sole are of a size. However, in reality the basal 2 or 3 spines are much larger than the others. The male oviger possesses a recurved spine on the 6th segment, not illustrated by Loman. The present specimens are provided



FIGS. 1—3. *Achelia nana* (Loman)

1, oviger (scale b); 2, the compound spine of oviger segment 9, greatly enlarged; 3, fourth leg (scale a).

with a small pointed process on the left and right frontal margin of the cephalic segment.

In all these characters, *A. nana* (a species from tropical waters, hitherto recorded from several stations in the East Indian region) resembles so closely *A. echinata* Hodge, 1864 (from Europe, Japan, China, and the Red Sea) that I can predict their synonymy, as soon the "hardy soul" referred to by HEDGPETH (1961, p. 7) will monograph the genus *Achelia*. As a matter of fact, Hedgpeth showed so clearly the enormous variation existing in the species of this genus, that there is hardly any reason to keep *echinata* and *nana* apart. However, I do not feel called upon to frisk down the "circular primrose path" to which HEDGPETH alludes (1963, p. 1338), although I am pretty sure (to cite another famous overseas writer) there must be some "system in this madness".

? Tanystylum spec.

Material examined. — 1 chelate juvenile. Madagascar: Ambariobé, N. of Nosy Komba; intertidal, on the shell of a hermit-crab; Jan. 16, 1964. (Z.M.A. coll.nr. Pa.1588).

Remark. — I am unable to identify this juvenile.

Family Colossendeidae

Rhopalorhynchus lomani Stock, 1958

Lit. & syn.: cf. Stock, 1958b, p. 119—124, figs. 7—21.

Material examined. — 1 ♀. Comoro Islands: Lagoon of Mayotte, dredged in 49 m; fine sand. Collected by Dr. A. Crosnier, nr. MYT 107. (Z.M.A. coll.nr. Pa.1591).

Remarks. — This species is widely distributed along the coasts bordering the Indian Ocean, from Indonesia in the East, to the Arabian and Red Sea coasts in the Northwest. The nearest and southernmost record hitherto is that from the Percy Sladen Trust Expedition, Station C 12, Saya de Malha. This shallow bank is situated to the S.E. of the Seychelle Islands.

Nymphon arabicum Calman, 1938. Figs. 4—12.

Nymphon arabicum CALMAN, 1938, p. 152—153, fig. 3.

Material examined. — 2 ♀, 2 juveniles. Madagascar, West coast: Banc de Pracel, W.S.W. of Nosy Vao; dredged in 35 m, muddy sand; June 1959. Collected by Dr. A. Crosnier, nr. CH 147. (Z.M.A. coll.nr. Pa.1604).

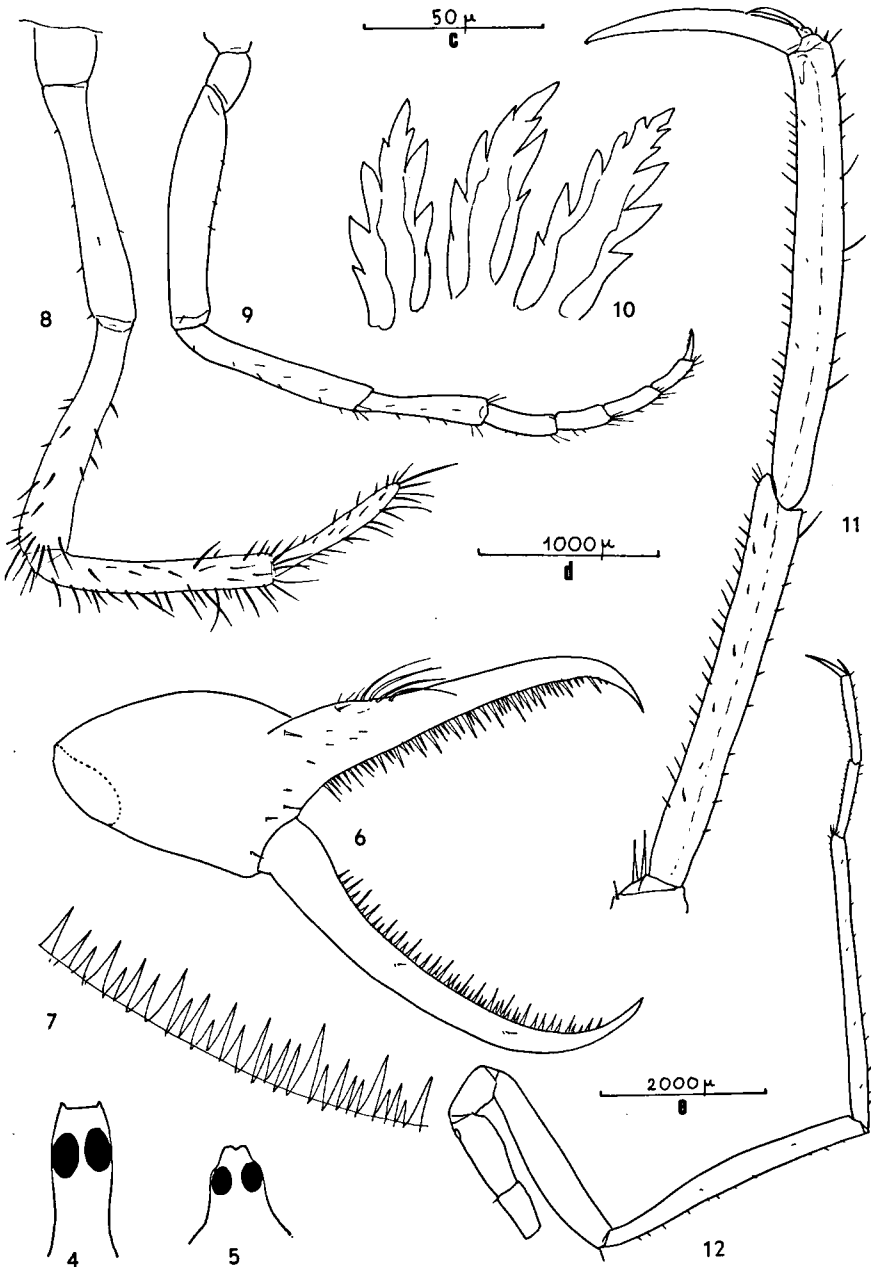
Remarks. — These specimens are in most characters in perfect agreement with Calman's original description. However, Calman stated there were 64 teeth on the movable, 35 teeth on the immovable finger of the chela. In one of the adult females in this collection, these numbers are 51 and 48, respectively. In order to decide whether this was a constant difference, I re-examined the types of *arabicum* in the British Museum (Natural History), London²). Altogether, 7 specimens were available; since none was selected as a holotype, all are syntypes. A ♀ syntype had about 55 teeth on the movable, and about 50 teeth on the immovable finger; a ♂ syntype had about 60 and 53 teeth, respectively. None of the syntypes checked had less than 50 teeth on either finger. It may be assumed, therefore, that Calman's figure of 35 teeth on the immovable finger was a misprint for 53.

The types differed chiefly from the Madagascar material in a slenderer ocular tubercle (cf. figs. 4 and 5). I do not think this is a sufficient basis for a taxonomic separation.

Variability has been observed in the length of the 2nd palp segment, which was distinctly longer than the 3rd in 6 out of 7 syntypes, and in 1 out of 4 Madagascar specimens. In the remaining syntype and in 3 Madagascar specimens the 2nd and 3rd segments are about equal in length. The tarsus which is about as long as, or even slightly longer than, the propodus in adults, is definitely shorter than it in the juveniles. Similar shortening of the tarsus in juveniles has been observed in several other *Nymphon* species e.g., in *N. rubrum* Hodge, 1865.

In the spine formula of the oviger there is no difference between the types (from the South Arabian coast) and the Madagascar material — 12 : 10 : 9

²) I am indebted Drs. Gordon, Fry, and Cook, for arranging everything in relation with the re-examination of the types.



FIGS. 4—12. *Nymphon arabicum* Calman
4, ocular tubercle in front view (♀ syntype of *arabicum*, B.M.N.H.);
5—12, ♀ from Madagascar: 5, ocular tubercle, front view (free hand
sketch); 6, chela (scale b); 7, teeth on the movable finger (scale a); 8, palp
(scale b); 9, oviger, compound spines omitted (scale d); 10, various
compound spines from oviger segment 7 (scale c); 11, distal segments of
second leg (scale b); 12, second leg (scale e).

9 :: 14 (♀ syntype); 14 : 11 : 9 : 9 :: 15 (♀ syntype); 13 : 10 : 8 : 8 :: 14 (♀ Madagascar).

The species was previously known only from two "John Murray" Stations on the the South Arabian coast. Hence, the present record constitutes a very considerable extension of the known range.

Nymphon setimanus Barnard, 1946. Figs. 13—17.

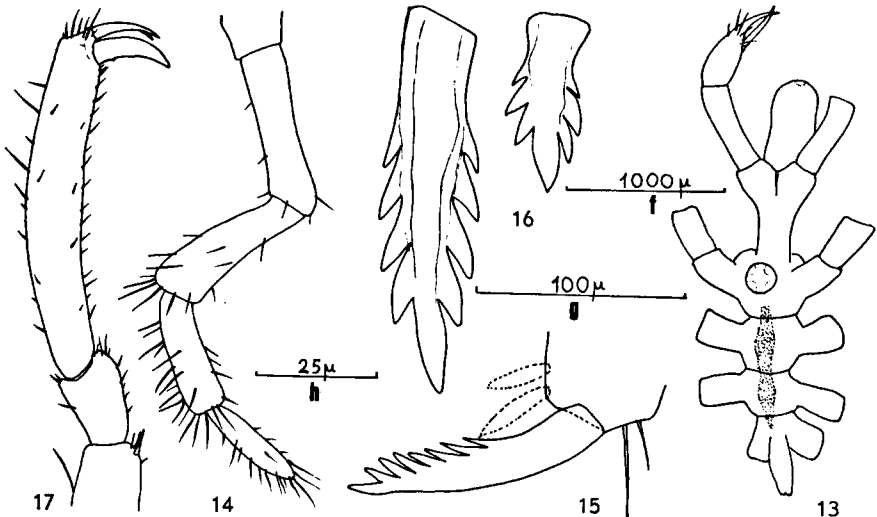
Nymphon setimanus BARNARD, 1946, p. 61; BARNARD, 1954, p. 103—105, fig. 8.

Probably: *Nymphon andamanense*, CALMAN, 1938 (non CALMAN, 1923 !), p. 151—152.

Material examined. — 1 specimen (genital pores not visible). Madagascar: region of Fort Dauphin, 2½ miles W. of Pointe Itaperina, in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2. (Z.M.A. coll.nr. Pa.1602).

Remarks. — Barnard illustrates only the distal part of the chela of this species, so it seems useful to insert here some figures of other parts of the body. Except for the number of compound oviger spines and the number of teeth on the oviger claw, the present specimen agrees perfectly with Barnard's description. The oviger formula of the Madagascar specimen is 12 : 8 : 7 : 7 :: 7 (against 15—19 : 12—13 : 11—12 : 11—13 :: 13 according to Barnard). Since no genital pores are discernible in the present specimen, the lower number of spines might be due to the immaturity of the material.

The compound oviger spines are, as in related species like *N. spiniventris*



FIGS. 13—17. *Nymphon setimanus* Barnard

13, trunk in dorsal view (scale f); 14, palp (scale b); 15, terminal portion of oviger (scale g); 16, one of the proximal spines (left) and one of the central spines (right) of the 7th oviger segment (scale h); 17, distal segments of third leg (scale b).

Stock, 1953 and *N. maculatum* Carpenter, 1910, polymorphic. The polymorphism in this case affects the size (and not the shape or structure) of the spines. The proximal and distal spines of segment 7 are much longer than the central ones (cf. fig. 16); on segments 8,9, and 10 only the distal spines are larger.

As in *N. maculatum*, the trunk and appendages bear a marked pattern of pigmentation, persistent in alcohol. Brown pigment is present in the following places: in a narrow band in the mid-dorsal line of the trunk, starting slightly behind the ocular tubercle, to the basis of the abdomen; in some dots on the dorso-distal end of the 2nd and 3rd coxae; in a number of spots on the ventral surface of the femur, slightly beyond the middle of the segment.

The two specimens of a *Nymphon* species from the South Arabian coast, recorded by CALMAN, 1938, under the name of *N. andamanense* Calman, 1923, seem to correspond in every detail with the present species. CALMAN (p. 151—152) signalized already a number of differences between his 1938 and his 1923 material, and remarked (p. 147): "The names given to the species of *Nymphon* . . . are to be regarded merely as provisional determinations. They do no more than record the existence in these waters of a number of closely related forms, whose specific identity, mutual relations and geographical range will remain uncertain . . ."

Barnard records *N. setimanus* from several South African localities, from Knysna in the West, to Port Shepstone on the Natal coast in the North East.

Nymphon crosnieri n.sp. Figs. 18—27.

Material examined. — 1 ♂ (holotype), 2 ♀ (paratypes). Madagascar, West coast: Banc de Pracel, W.S.W. of Nosy Vao; dredged in 35 m; bottom muddy sand. June 1959. Collected by Dr. A. Crosnier, nr. CH 147. (Z.M.A. Pa. 1603). (The Banc de Pracel is situated near Cap St. André).

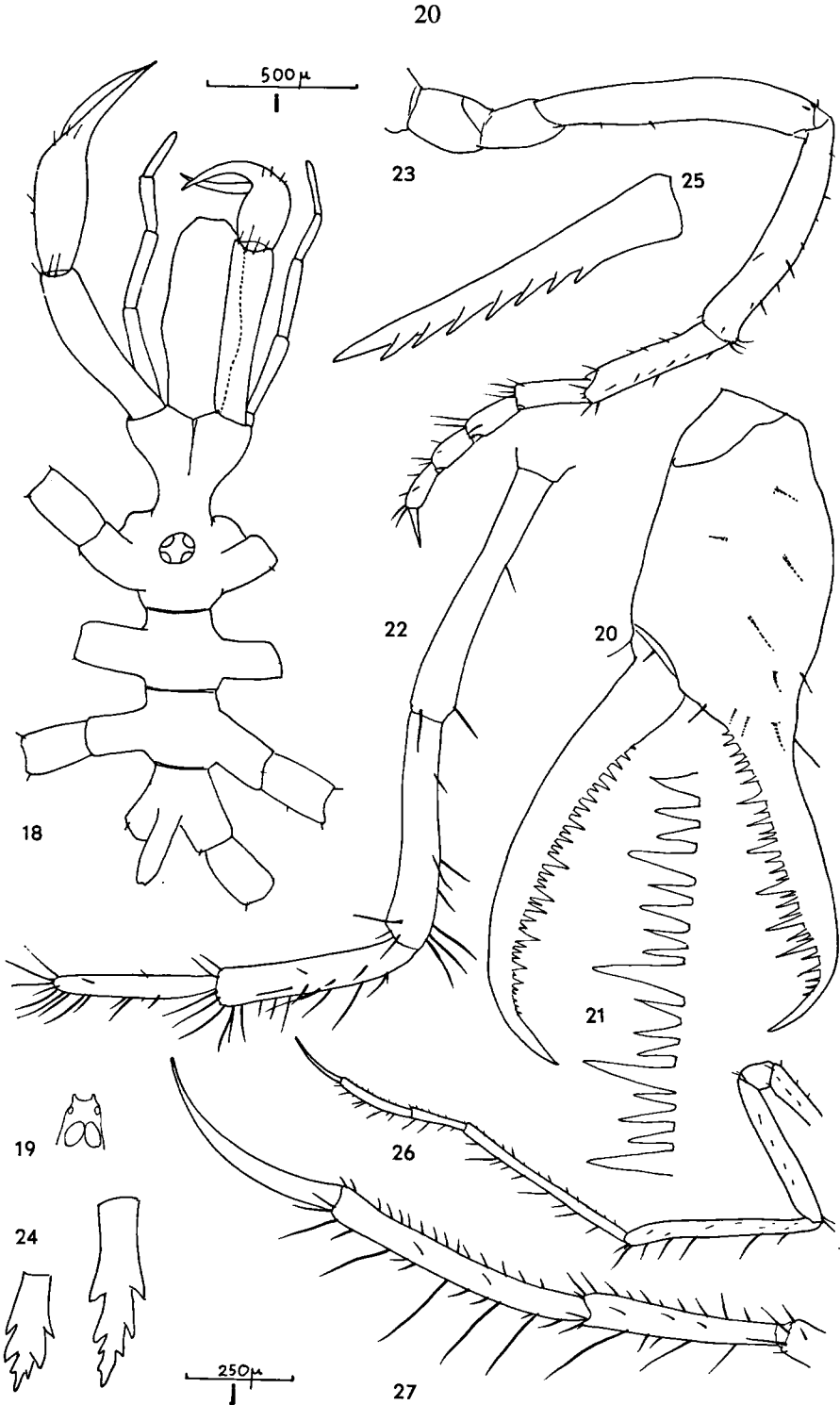
Description. — The trunk is completely segmented. The lateral processes (each armed with a minute setule) are separated by slightly more than their own diameter. The neck is rather heavy, not very long. The oviger implantation is conspicuous, it is in contact with the first lateral process. The ocular tubercle is slightly tapering, apically truncate; in front view 2 minute dorsal points are visible. The eyes are distinct, as are the lateral sense organs. The abdomen reaches to the middle of coxa 1 of leg 4.

The proboscis is cylindrical, with a distinct swelling in the middle.

The chelifore scape is nearly as long as the proboscis. The chela is slender; the fingers are distinctly longer than the palm; 29 teeth occur on the immovable, 34 teeth on the movable finger. Larger teeth alternate with several (1 to 4) smaller teeth.

The 2nd to 5th palp segments diminish regularly but slightly in length. All segments are slender.

The oviger (♂) is not very elongate. Segment 4, nearly straight and practically unarmed, is the longest. Segments 1 to 3 are not inflated. Segment 5 is slightly curved and bears a small distal apophysis, armed with a few longer setae. Segment 6 is half as long as segment 4. Segments 7 to 10 bear



compound spines, according to the formula 7 : 5 : 4 : 4. The terminal claw is shorter than segment 10 and bears 7 teeth. The compound spines are provided with 3 or 4 lateral teeth on each side.

The legs are thin; longer setae occur chiefly on the tibiae, the tarsus and the propodus. These setae are longer than the diameter of the segments. Tibia 2 is the longer segment. The female femur is slightly heavier than the male one, but is not conspicuously inflated. A row of about 13 cement gland pores is present on the ventral surface of the male femur. The tarsus is $\frac{3}{4}$ of the propodus, the claw $\frac{4}{5}$ of the propodus. The ventral margin of the tarsus and of the propodus is armed with a row of small spines; no propodal heel or larger basal spines exist. The claw is curved; auxiliary claws are absent.

Measurements of the ♂ (holotype) in mm. —

Total length (frontal margin cephalic segment to tip of abdomen)	1.67
Width across 2nd lateral processes	0.72
Length scape	0.62
First leg	
coxa 1	0.27
coxa 2	0.55
coxa 3	0.23
femur	1.24
tibia 1	1.56
tibia 2	1.72
tarsus	0.48
propodus	0.64
claw	0.52

Remarks. — In addition to the new species described in the preceding lines, 35 other *Nymphon* species devoid of auxiliary claws came to my notice. These species are, in alphabetical order:

1. *affine* Stock, 1951
2. *albastrossi* Hedgpeth, 1949
3. *australe* Hodgson, 1902
- 3a. *australe* var. *caecum* Gordon, 1944
4. *calypso* Fage, 1959
5. *charcoti* Bouvier, 1911
6. *comes* Flynn, 1928
7. *compactum* Hoek, 1881
8. *cognatum* Loman, 1928 (= ?*longituberculatum* Olsen, 1913)
9. *falcatum* Utinomi, 1959
10. *femorale* Fage, 1956
11. *galathea* Fage, 1956
12. *gerlachei* Giltay, 1934
13. *hamatum* Hoek, 1881
14. *hedgpethi* Stock, 1953

Figs. 18—27. *Nymphon crosnieri* n.sp.

18, trunk in dorsal view, ♀ (scale i); 19, ocular tubercle in front view (free hand sketch); 20, chela, ♂ (scale a); 21, some teeth of the immovable finger, ♂ (scale g); 22, palp, ♂ (scale a); 23, oviger, ♂ (scale j); 24, two compound oviger spines, ♂ (scale h); 25, terminal oviger claw, ♂ (scale h); 26, first leg, ♂ (scale f); 27, distal segments of first leg, ♂ (scale j).

15. *lanare* Hodgson, 1907
16. *laterospinum* Stock, 1963
17. *longicollum* Hoek, 1881
18. *longicoxa* Hoek, 1881
19. *mauritanicum* Fage, 1942
20. *microctenatus* Barnard, 1946
21. *natalense* Flynn, 1928
22. *nipponense* Hedgpeth, 1949
23. *ochoticum* Losina-Losinsky, 1961
24. *ohshimai* Hedgpeth, 1949
25. *phasmatodes* Böhm, 1879 (= *capense* Hodgson, 1908)
26. *proceroides* Bouvier, 1913
27. *procerum* Hoek, 1881
28. *profundum* Hilton, 1942 (= *noctum* Hilton, 1942)
29. *prolatum* Fage, 1942
30. *soyae* Utinomi, 1959
31. *tenuimanum* Hodgson, 1914
32. *tenuipes* Bouvier, 1913
33. *typhlops* (Hodgson, 1914)
34. *uniguiculatum* Hodgson, 1914
35. *uniunguiculatum* Losina-Losinsky, 1933

Three uniunguiculate Nymphonidae have been provisionally considered as belonging to the genus *Heteronymphon*, although the presence of a terminal oviger claw is a disconcerting feature of these three species: *H. birsteini* (Turpaeva, 1955), *H. bioculatum* Turpaeva, 1956, and *H. profundum* Turpaeva, 1956.

N. longituberculatum Olsen, 1913, is so incompletely known, that it could not properly be inserted in the following key. It may be near to *N. calypso* Fage, 1959. Hedgpeth, 1948, considers it as a possible synonym of *N. cognatum* Loman, 1928.

The uniunguiculate *Nymphon* species listed above can be divided into a number of (artificial) species-groups, that may be identified as follows:

- 1a) Eyes absent, ocular tubercle absent or vestigial.
Species nrs. 3a³⁾, 7, 10, 11, 13, 14, 16, 27, 28, 31, 33.
- b) Eyes usually present, ocular tubercle always present 2.
- 2a) Palp segments 2, 3, 4, and 5 subequal; segments 4 and 5 combined about twice as long as segment 2.
Species nrs. 5, 9, 12, 15, 34, 35.
- b) Palp segments 2 to 5 of different mutual lengths; segments 4 and 5 combined $\frac{2}{3}$ to $\frac{3}{2}$ as long as segment 2 3.
- 3a) Palp segment 5 distinctly longer than segment 4.
Species nrs. 2, 17, 19, 22, 23, 24, 30.
- b) Palp segments 4 and 5 of equal length or segment 4 the longer one 4.
- 4a) Tibia 1 equal to or longer than tibia 2.
Species nrs. 3³⁾, 4, 21, 26.
- b) Tibia 2 the longer segment 5.
- 5a) Basal protuberance of oviger well in front of the first lateral process.
Species nrs. 18, 29.
- b) Basal protuberance of oviger in contact with the first lateral process 6.

3) The auxiliary claws are vestigial in this species.

- 6a) Chela with very numerous (300—400) minute teeth.
Species nr. 20.
b) Less than 100 teeth on each finger.
Species nrs. 1, 6, 8, 25, 32.

Nymphon crosnieri n.sp. falls, when we follow this key, in a group of species with *affine*, *comes*, *cognatum*, *phasmatodes* and *tenuipes*. Of these, only *tenuipes* possesses long setae on the tibiae. Also in the general shape of the trunk and in the structure of the appendages, the new species agrees more closely with *tenuipes* than with any of the other species mentioned. Some of the characteristics of these species are summarized in Table I.

TABLE I. Salient characters in certain *Nymphon* species

	total number of oviger spines	number of teeth on oviger claw	number of lateral teeth on compound oviger spines	number of cement gland pores (♂)	number of teeth on chela
<i>crosnieri</i>	20 (♂)	7 (♂)	3—4	13	29—34
<i>tenuipes</i>	33 (♂)	10 (♂)	3	6—7	39—42
<i>comes</i>	more than 52 (♀ ♂)	c. 20 (♀ ♂)	7—10	more than 70	c. 50
<i>affine</i>	44 (♀)	c. 20(♀)	6—7	—	30—32
<i>phasmatodes</i>	47 (♀ ♂)	12 (♀ ♂)	7—10	—	61
<i>cognatum</i>	42 (♀)	c. 20 (♀)	?	—	?

This table may serve in distinguishing the various species. From *N. phasmatodes*, the new species differs, moreover, in the quite different structure of the male oviger (described and illustrated for *phasmatodes*, under the name of *capense*, by GORDON, 1932a). The chela of *tenuipes* differs from that of *crosnieri* in having a much longer, narrow palm (cf. GORDON, 1932b, fig. 11b). The ♂ oviger of *tenuipes* has a longer 5th segment, but no terminal apophysis. *N. affine* has a more compact body and a much shorter claw on the legs. *N. comes*, which is closely related to *affine*, has also a shorter claw, whereas the terminal palp segment is only half as long as the penultimate. *N. cognatum* is distinguished by its palp, of which segment 3 is slightly over half as long as segment 2, whereas in *N. crosnieri* the 3rd segment is only slightly shorter than the 2nd.

Family Callipallenidae

Callipallene spec.

Material examined. — 1 fragmentary specimen. Blue Bay near Mahébourg, Mauritius. On the coral, *Porites somaliensis*, growing in a lagoon, at about 1 m. Feb. 9, 1964. Collected by J. H. Stock. (Z.M.A. Pa. 1566).

Remarks. — The legs are all separated from the body. I did not endeavour to make a specific identification in this difficult genus on the basis of this fragmentary specimen.

Pallenoides opuntia n.sp. Figs. 28—37.

Material examined. — 2 ♂, 3 ♀ (1 ♂ is made the holotype, the other specimens are paratypes). Madagascar: region of Fort Dauphin, 2½ miles W. of Pointe Itaperina, trawled in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2. (Z.M.A. coll.nr. Pa.1599).

Description. — Male: The body is completely segmented. The cephalon (or crop) is rather wide and merges gradually into the short neck. Low, spiniferous tubercles arise from the crop. Three such tubercles are present on each lateral process. An inconspicuous spinule is present on the dorsal surface of trunk segments 2 and 3. The eye tubercle is low, truncate in front view; the eyes are large, well-pigmented and of mutually equal size; the lateral sense organs are distinct. The abdomen is short, not overreaching the 4th lateral process, and truncate at its tip.

The proboscis is reminiscent of that in *Parapallene*. The oral fringe is not very much pronounced.

The chelifore scape bears several spiniferous tubercles. The chela is robust, the fingers are nearly straight and close without gap. Both fingers have practically smooth inner margins.

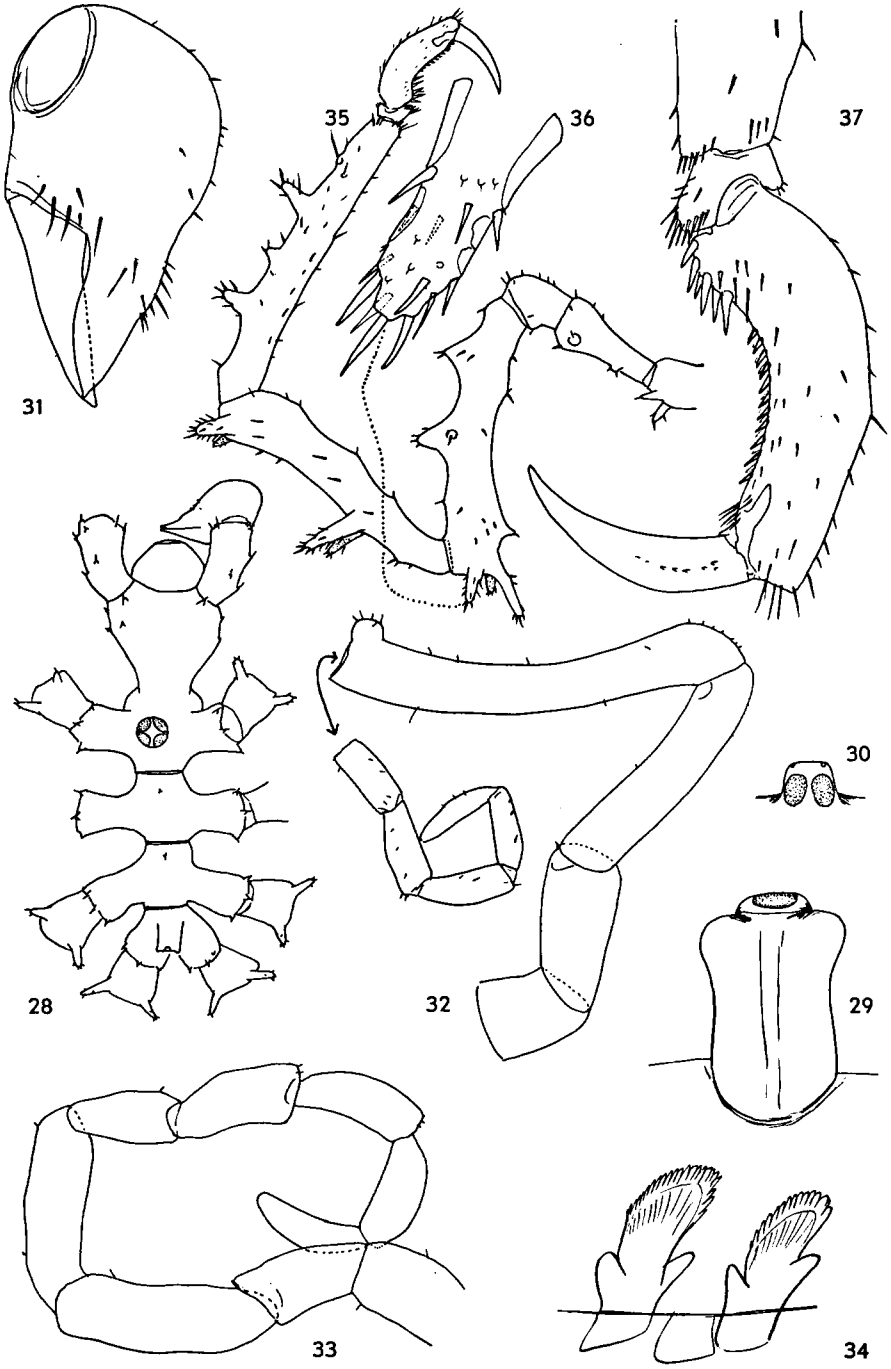
No palps.

Oviger 10-segmented. The 5th segment is long, curved, and provided with a distal apophysis. The distal 5 segments are subequal; there is no terminal claw. The spine-formula is 8 : 6 : 5 : 9. The compound spines consist of one large basal denticulation and a distal finely serrated portion, the latter just as in *Callipallene*.

The legs are very spinose, especially the longer segments. Coxa 1 with 2 spiniferous, finger-shaped dorsal processes. Three lower dorsal, spiniferous tubercles (1 proximal and 2 distal) on coxa 2. Femur with 2 strong ventral humps, triangular in outline; near the distal one of these humps, a low tubercle arises; disto-dorsally, the femur bears 3 long spiny spurs. Tibia 1 the shorter, tibia 2 the longer segment. Tibia 1 with 2 long proximo-distal and 2 shorter dorsal spiny spurs; the ventral margin of this segment is not much distorted. Tibia 2 with 2 principal dorsal processes and several smaller ones; the ventral margin is straight. Tarsus short, without strong spines. The propodus is

FIGS. 28—37. *Pallenoides opuntia* n.sp.

28, trunk in dorsal view, ♂ (scale f); 29, proboscis, in ventral view, ♂ (scale i); 30, ocular tubercle in front view (free hand sketch); 31, chela, ♂ (scale j); 32, oviger, ♂ (scale b); 33, oviger, ♀ (scale j); 34, compound spines of oviger segment 7, ♂ (scale h); 35, second leg, ♂ (scale f); 36, one of the distal projections of the femur, ♂ (strongly enlarged); 37, distal segments of second leg, ♂ (scale j).



strongly arched; the heel is distinct, armed with 6 stronger spines, whose margins are smooth. The propodal sole carries 2 rows of spinules. The claw is somewhat curved; the auxiliary claws are lacking, but the lateral surface of the claw is armed with some small spinules.

The genital pores are small; they could be demonstrated on the ventral surface of the 2nd coxa of legs 2, 3, and 4. I could not make out their presence on leg 1.

Female: Slightly less spinose than the male. The segments 4 and 5 of the oviger are subequal and not elongated. The formula of the compound spines is 7 : 6 : 6 : 8. The genital pores are large and present on the ventral surface of the 2nd coxa of all legs.

Remarks. — Three species belonging to this genus are actually known: the type-species *P. magnicollis* Stock, 1951 (from Lüderitz Bay), *P. spinulosa* Stock, 1955⁴⁾ (from the Virgin Islands), and *P. proboscidea* Barnard, 1955⁵⁾ (from Algoa Bay, South Africa). Barnard's figures of *proboscidea* suggest a very close affinity with *spinulosa*, but the legs of *proboscidea* are neither described nor illustrated. Since BARNARD (1955, p. 106) remarked that his species "agrees generally with the genotype except for the presence of an apical lobe on 5th joint of oviger", it could be inferred that the legs of *proboscidea* agree with those of "the genotype", *P. magnicollis*. In that case, *P. proboscidea* would be very distinct from *spinulosa*, since the latter has many spiniferous processes on the legs, whereas *P. magnicollis* lacks such processes.

The new species differs from *magnicollis* in its spurred, tuberculate, spinose legs; in the shape of its oviger spines; and in the shape and armature of the chela.

Both *proboscidea* and *spinulosa* have strong mid-dorsal tubercles on the trunk segments 2 and 3, while only a vestigial spine exists in that place in *opuntia*. The strong basal pair of denticulations in the oviger spines of *opuntia* forms another good character, just as do the smooth fingers (crenulated in *proboscidea* and *spinulosa*).

The proposed specific name, *opuntia*, refers to the spine-bearing processes on the legs.

Measurements of a male (in mm). —

Length (frontal margin cephalic segment to tip of abdomen)	2.88
Width across 2nd lateral processes	1.53
Greatest width cephalon	0.83
Second leg: coxa 1—0.43; coxa 2—0.74; coxa 3—0.43; femur — 2.06; tibia 1—1.75; tibia 2—2.26; tarsus — 0.13; propodus — 0.81; claw — 0.55.	

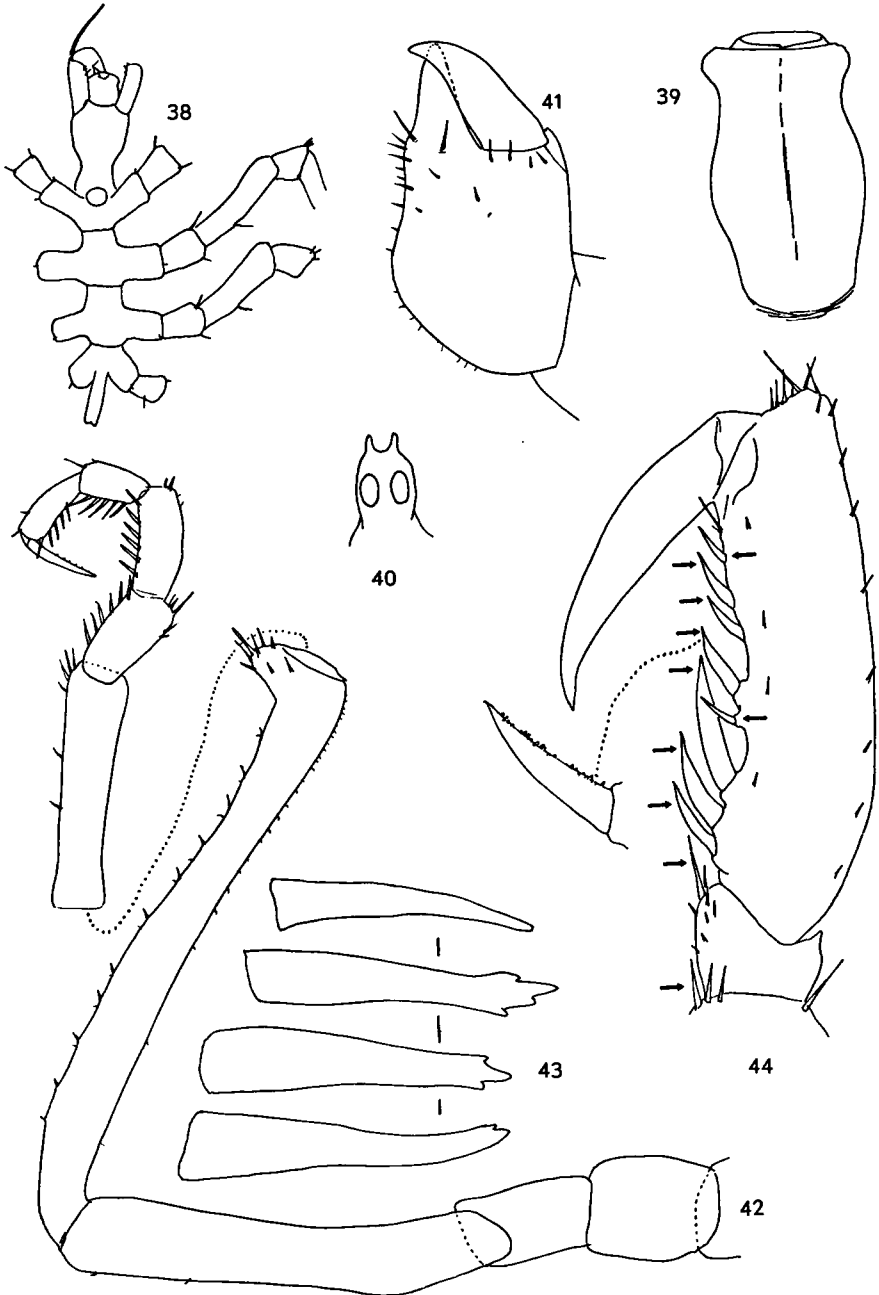
Parapallene hodgsoni Barnard, 1946. Figs. 38—44.

Parapallene hodgsoni BARNARD, 1946, p. 61; BARNARD, 1954, p. 112, fig. 13.

Material examined. — 1 ♂, 3 ♀. Madagascar: region of Fort Dauphin, 2½ miles

⁴⁾ Description published Nov. 22, 1955.

⁵⁾ Description published Dec. 1955 (postmark Dec. 28, 1955).



FIGS. 38—44. *Parapallene hodgsoni* Barnard

38, trunk in dorsal view, ♂ (scale e) 39, proboscis in ventral view; 40, front view of ocular tubercle (free hand sketch); 41, chela, ♂ (scale b); 42, oviger, ♂ (scale b); 43, compound spines, ♂ (scale c); 44, distal segments of leg; the rugose spines are indicated by an arrow (scale j).

W. of Pointe Itaperina; trawled in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2 (Z.M.A. coll.nr. 1598).

Remarks. — It seems advisable to add more figures to the scanty illustrations of Barnard. A feature not noticed in Barnard's publications is the rugose distal margin of several spines on the legs. In fig. 44 the rugose spines are indicated by an arrow. Moreover, one dorso-distal spine on the femur and one on tibia 1 are rugose. The rugosities are not placed in a row; in several spines only the basal part is rugose.

Only females of *P. hodgsoni* were recorded hitherto. The male has a characteristic apophysis on oviger segment 5 (fig. 42). The formula of the compound oviger spines is 6 : 6 : 5 : 5, thus somewhat lower than Barnard's figures (8—9 : 8—9 : 7 : 7—6). The spines are very elongate, smooth or with a few denticulations at the extreme distal part.

The species was known only from one South African locality, "off East London and Hood Point, 47—52 fath."

Family Phoxichilidiidae

Anoplodactylus digitatus (Böhm, 1879)

Phoxichilidium (*Anoplodactylus*) *digitatum* BÖHM, 1879, p. 184—185, Pl. II figs. 2—2b.

Anoplodactylus digitatus, LOMAN, 1908, p. 74—76, Pl. II figs. 25—28; STOCK, 1958a, p. 139 (footnote; re-examination of the holotype), fig. 2.

Anoplodactylus investigatoris CALMAN, 1923, p. 288—289, fig. 14; SUNDARA RAJ, 1927, p. 158; STOCK, 1954, p. 85—86, figs. 37a—b, 38b; BOURDILLON, 1955, p. 593—594, Pl. II figs. 1—3.

Anoplodactylus saxatilis CALMAN, 1923, p. 287—288, fig. 13 (new synonymy); SUNDARA RAJ, 1927, p. 158; CALMAN, 1927, p. 405; STOCK, 1954, p. 80, fig. 37 c—e; STOCK, 1958 a, p. 139, fig. 1; STOCK, 1958c, p. 4.

Material examined. — 1 ♀. Madagascar: Ambariobé (N. of Nosy Komba), on the alcyonarian, *Parerythropodium fuscum* (Thomson & Henderson), depth c. 1 m. Jan. 15, 1964. (Z.M.A. coll.nr. Pa. 1589).

Remarks. — As I indicated in a previous publication (STOCK, 1958a), *A. digitatus* was known only from females, whereas the closely resembling form, described under the name of *A. saxatilis*, was only known from males and juveniles. My suspicion that they were in fact one and the same species, has been confirmed recently, by material collected by Mr. U. Safriel, of the Hebrew University of Jerusalem. His samples, from Mikhmoret on the Mediterranean coast of Israel, contained both males and females, which proved definitely that *saxatilis* is the male of *digitatus*.

The species has a wide distribution: Indonesia, Singapore, Burma, India, Suez Canal; Mediterranean coast of Israel; Martinique. The southernmost record hitherto was that of LOMAN, 1908, from the Kangeang Islands (Java Sea). The present record extends the range of the species to Madagascar in the southwestern Indian Ocean.

I am indebted to Dr. J. Verseveldt, of Zwolle, the Netherlands, for the identification of the alcyonarian host.

Anoplodactylus pulcher Carpenter, 1907. Fig. 45.

A. pulcher CARPENTER, 1907, p. 97—98, Pl. 12 figs. 13—19; STOCK, 1954, p. 84.
A. stylops LOMAN, 1908, p. 71, Pl. II figs. 20—24 (new synonymy).

Material examined. — 2 ♂ (both ovigerous). Madagascar (West coast): Banc de Pracel, W.S.W. of Nosy Vao; dredged in 35 m; bottom: muddy sand. June 1959. Collected by Dr. A. Crosnier, nr. CH 147 (Z.M.A. coll. nr. Pa. 1590). (The Banc de Pracel is situated near Cap St. André).

1 ♂ (ovigerous). Madagascar: region of Fort Dauphin, 2½ miles W. of Pointe Itaperina; trawled in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2 (Z.M.A. coll. nr. Pa. 1600).

Remarks. — This very characteristic species is known from three places in the Indian Ocean only: the Maldives (CARPENTER, 1907), Paumben, India (STOCK, 1954) and Banda (LOMAN, 1908). The number of setae on the lateral processes varies between 3 and 6 (as I observed already in my 1954 paper).

Re-examination of Loman's syntypes of *A. stylops* has convinced me that this species is synonymous with *A. pulcher*.

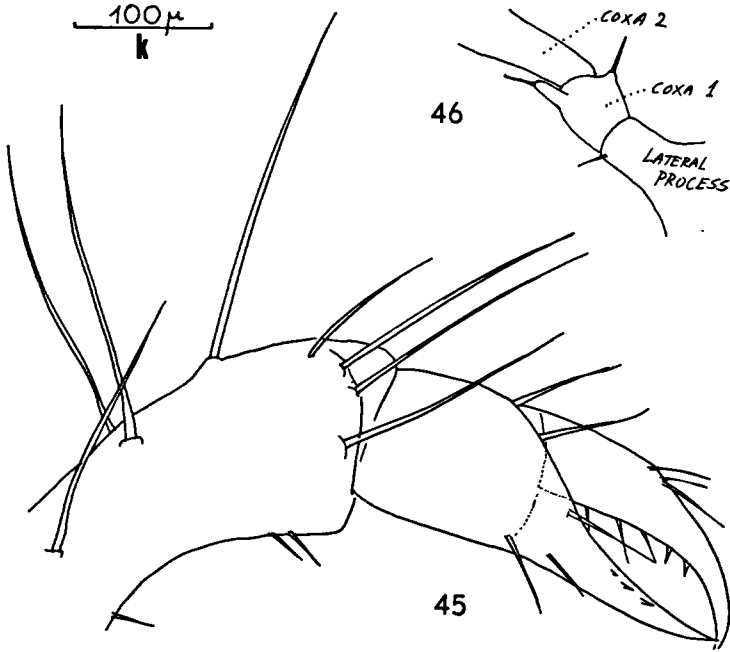
Anoplodactylus versluysi Loman, 1908. Fig. 46.

A. versluysi LOMAN, 1908, p. 73—74, Pl. III figs. 33—39; STOCK, 1954, p. 84—85. figs. 38a, 39.

Material examined. — 1 ♂ (ovigerous). Madagascar: region of Fort Dauphin, 2½ miles W. of Pointe Itaperina; trawled in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2 (Z.M.A. coll. nr. Pa. 1601).

Remarks. — This specimen closely resembles Loman's types (with which I have compared it), although the legs of the present male are slightly less spinose than in the types. Not indicated in the original description, but present both in the types and in the Madagascar specimen, is the exact armature of the lateral processes and the first coxae. The lateral processes, especially the first one, carry a spine on their posterior margin. The first coxae of all legs bear a finger-shaped process, tipped with a spine, on their postero-distal corner, and a lower tubercle, likewise tipped with a spine, on their antero-distal corner.

This species has previously been recorded from Singapore and four localities in Indonesian waters. The present record thus constitutes a very considerable extension of the known range.



FIGS. 45—46. 45, chela of ♂ of *Anoplodactylus pulcher* Carpenter (scale k); 46, basal portion of first leg, ♂, of *Anoplodactylus versluysi* Loman (free hand sketch).

Endeis meridionalis (Böhm, 1879)

E. meridionalis, CALMAN, 1923, p. 291—293, fig. 15 (lit.).

Material examined. — 1 ♂ ovig., 1 ♀. Madagascar: Tany Kely (a small island South of Nosy Bé). Depth c. 1 m. On green algae, *Chlorodesmis hildenbrandii*. Febr. 1962, Collected by Dr. A. Crosnier. (Z.M.A. coll.nr. Pa. 1593).

Remarks. — Apart from the higher number of cement gland pores (about 22 on the 3rd leg), this form is undistinguishable from the Atlanto-Mediterranean *E. spinosa* (Mont.). It has, like *E. spinosa*, small spinules on the collar and the 2nd tibia is only a trifle longer than the femur. The 3rd coxa lacks strong spines or spine-like tubercles, but many Mediterranean specimens of *E. spinosa* agree with *E. meridionalis* in this respect.

I have checked LOMAN's (1908) Siboga specimens attributed to *E. meridionalis* and find them to fall into two groups. The littoral and shallow water specimens possess long femoral spurs (LOMAN, 1908, Pl. XI fig. 155) and seem to belong to an undescribed species. The deeper water specimens (Siboga Stations 172, 258, and 315) more closely resemble another Atlanto-Mediterranean species, *E. charybdaea* (Dohrn, 1881). None of Loman's specimens is identical with the present material or with the samples described and illustrated by CALMAN, 1923, under the name of *meridionalis*.

The collector remarked on the label that the live specimens were of a green color, matching that of the algae on which they were found.

E. meridionalis is new to the African coast. Previous records were from Singapore and Tor (= El Tûr) in the Gulf of Suez (BÖHM, 1879); from Madras and Christmas Island (CALMAN, 1923), whereas Loman's doubtful records came from the Indonesian Archipelago.

Endeis mollis (Carpenter, 1904)

Phoxichilus mollis CARPENTER, 1904, p. 182—183, figs. 1—7; CARPENTER, 1907, p. 98; LOMAN, 1908, p. 77—78.

Endeis mollis, CALMAN, 1923, p. 293—294, fig. 16; CALMAN, 1927, p. 408; CALMAN, 1938, p. 160; STOCK, 1951, p. 17—18, figs. 23—24; BOURDILLON, 1954, p. 4—8, figs. 1—3, chart; BARNARD, 1954, p. 130—132, fig. 21; STOCK, 1957, p. 85—86.

?*Chilophoxus charibdaeus*, FAGE, 1942, p. 84, fig. 6.

?*Phoxichilus charybdaeus* Schimkewitsch, 1887, p. 271; SCHIMKEWITSCH, 1889, p. 220.

Material examined. — 2 ♀. Madagascar: region of Fort Dauphin, 2½ miles W. of Pointe Itaperina; trawled in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2 (Z.M.A. coll.nr. Pa. 1596).

1 ♀. Madagascar: Ambovombe (25° 10' S.—40° 06' E), 12 miles of the coast; trawled in 60 m; bottom empty shells. Oct. 28, 1958. Collected by Dr. A. Crosnier, nr. CH 10 (Z.M.A. coll.nr. Pa. 1597).

Remarks. — The present specimens differ from *E. meridionalis* by a much smoother body and smoother legs, by a longer 2nd coxa and a much longer 2nd tibia, and finally by a less curved propodus.

The species is widely distributed in the region of the former Tethys-Sea. To the distribution map given by BOURDILLON (1954) the records from Southern Arabia (CALMAN, 1938), Zululand (BARNARD, 1954), Columbia (STOCK, 1957), and Madagascar (present paper) should be added.

Endeis clipeata (Möbius, 1902)

Phoxichilus clipeatus (in text) and *Ph. clypeatus* (on plate) MÖBIUS, 1902, p. 196, Pl. XXX figs. 6—10.

Endeis clipeatus, FLYNN, 1928, p. 29; BARNARD, 1954, p. 129—130, fig. 20; STOCK, 1956, p. 89; STOCK, 1959, p. 563; STOCK, 1962, p. 285.

Material examined. — 1 ♀. Madagascar: 10 miles S-SE of Fort Dauphin, dredged in 80 m; bottom shelly sand and gravel. Oct. 18, 1958. Collected by Dr. A. Crosnier, nr. D 5. (Z.M.A. coll.nr. Pa. 1594).

1 ♀, 2 ♂ Madagascar: region of Fort Dauphin, 2½ miles W. of Pointe Itaperina, trawled in 50 m; bottom shelly sand. Oct. 19, 1958. Collected by Dr. A. Crosnier, nr. CH 2. (Z.M.A. coll.nr. Pa. 1595).

Remarks. — Hitherto, this species has been found only in South Africa. There are numerous records, ranging from off Saldanha Bay on the West coast of the Cape Province (STOCK, 1962) to the Natal coast (31° S.). The

present record extends the range of the species to the southern part of Madagascar (25°01' S—47°00' E).

LITERATURE CITED

Most papers published prior to 1935 are not included in this list; they are enumerated in HELFER & SCHLOTTKE's comprehensive bibliography (1935).

BARNARD, K. H.

- 1946 Diagnoses of new species and a new genus of Pycnogonida in the South African Museum. — *Ann. Mag. nat. Hist.*, (11) **13** : 60—63.
- 1954 South African Pycnogonida. — *Ann. So. Afr. Mus.*, **41-3** : 81—158.
- 1955 Additions to the fauna-list of South African Crustacea and Pycnogonida. — *Ann. So. Afr. Mus.*, **43-1** : 1—107.

BOURDILLON, A.

- 1954 Contribution à l'étude des Pycnogonides de Tunisie. — *Notes Sta. océanogr. Salammbô*, **35** : 1—8, 1 pl.
- 1955 Les Pycnogonides de la croisière 1951 du „Président Théodore Tissier”. — *Rev. Trav. Inst. Pêches marit.*, **19-4** : 581—609, pl. i—iii.

CALMAN, W. T.

- 1938 Pycnogonida. — *John Murray Exp., sci. Repts.*, **5-6** 147—166.

FAGE, L.

- 1942 Pycnogonides de la côte occidentale d'Afrique. — *Arch. Zool. exp. gén.*, **82** (N. & R.) — **2** : 75—90.
- 1956 Les Pycnogonides du genre Nymphon. — *Galathea Rep.*, **2** : 159—165.
- 1959 Pycnogonides. — *Rés. sci. Camp. "Calypso"*, **4** : 235—239.

GILTAY, L.

- 1934 Pycnogonides. — *Rés. Voy. "Belgica", Zool.*, **1934** : 1—16.

GORDON, I.

- 1932a Re-description of some type-specimens of Pycnogonida of the genus Nymphon. — *Ann. Mag. nat. Hist.*, (10) **9** : 97—120.
- 1932b Pycnogonida. — *Discovery Repts.*, **6** : 1—138.
- 1944 Pycnogonida. — *B.A.N.Z. Antarct. Res. Exp., Repts.*, (B) **5-1** : 1—72.

HEDGPETH, J. W.

- 1949 Report on the Pycnogonida collected by the Albatross in Japanese waters in 1900 and 1906. — *Proc. U.S. nation. Mus.*, **98-3231** : 233—321.
- 1961 Pycnogonida. — *Rep. Lund Univ. Chile Exp.*, **40** (in: *Lunds Univ. Årsskr.*, (N.F.) (2) **57-3**) : 1—18.
- 1963 Pycnogonida of the North American Arctic. — *J. Fish. Res. Bd. Canada*, **20-5** : 1315—1348.

HELPER, H. & E. SCHLOTTKE

- 1935 Pantopoda. — *Bronns Kl. u. Ordn. Tierreich*, **5-4** (2) : 1—314 (Leipzig, Akad. Verlagsges.).

HILTON, W. A.

- 1942 Pantopoda. Pantopoda chiefly from the Pacific. I. Nymphonidae. — *Pomona J. Ent. Zool.*, **34-1** : 3—7.

LOMAN, J. C. C.

- 1908 Die Pantopoden der Siboga-Expedition. — *Siboga Monogr.*, **40** : 1—88, pl. i—xv.

LOSINA-LOSINSKY, L. K.

- 1961 Mnogokolenchatye (Pantopoda) dalnjewostotschnych morjei SSSR [Pantopoda of the far eastern seas of the USSR] (in Russian). — *Issledovania Dalnjewostotschnych morjei SSSR*, **7** : 47—117.

MARCUS DU BOIS-REYMOND, E.

1952 A hermaphrodite pantopod. — *Anais Acad. Bras. Ciênc.*, 24-1 : 23—30.

STOCK, J. H.

1951 Pantopoda. — *Rés. sci. Crois. Navire-École Belge „Mercator”*, 5 (in: *Mém. Inst. Roy. Sci. nat. Belg.*, (2) 43): 1—23.

1953 Contribution to the knowledge of the pycnogonid fauna of the East Indian archipelago. — *Biol. Res. Snellius Exp.*, 17 (in: *Temminckia*, 9): 276—313.

1954 Pycnogonida from Indo-West-Pacific, Australian, and New Zealand waters. — *Vidensk. Medd. Dansk naturh. Foren.*, 116 : 1—168.

1955 Pycnogonida from the West Indies, Central America, and the Pacific coast of North America. — *Vidensk. Medd. Dansk. naturh. Foren.*, 117 : 209—266.

1956 Tropical and subtropical Pycnogonida, chiefly from South Africa. — *Vidensk. Medd. Dansk naturh. Foren.*, 118 : 71—113.

1957 Pantopoden aus dem Zoologischen Museum Hamburg, 2. — *Mitt. Hamburg. zool. Mus. Inst.*, 55 : 91—106.

1958a The Pycnogonida of the Erythrean and of the Mediterranean coasts of Israel — *Bull. Sea Fish. Res. Stat. Haifa*, 16 : 3—5.

1958b The pycnogonid genus *Rhopalorhynchus* Wood-Mason, 1873. — *Tijdschr. Ent.*, 101-2 : 113—137.

1958c Pycnogonida from the Mediterranean coast of Israel. — *Bull. Res. Council Israel*, (B : Zool.) 7B-3/4 : 137—142.

1959 On some South African Pycnogonida of the University of Cape Town Ecological Survey. — *Trans. Roy. Soc. S. Afr.*, 35-5 : 549—567.

1962 Second list of Pycnogonida of the University of Cape Town Ecological Survey. — *Trans. Roy. Soc. S. Afr.*, 36-4 : 273—286.

1963 South African deep-sea Pycnogonida, with description of five new species. — *Ann. S. Afr. Mus.*, 46-12 : 321—340.

TURPAEVA, E. P.

1955 [New species of seaspiders (Pantopoda) from the Kurile-Kamchatka trench] (in Russian). — *Trudy Inst. Okeanol.*, 12 : 322—327.

1956 Pantopoda of the genus *Heteronymphon* from the North-West of the Pacific. — *Bull. Moskov. O-ba. Isp. Prirodi*, 61-2 : 67—72.

UTINOMI, H.

1959 Pycnogonida of Sagami Bay. — *Publ. Seto mar.biol. Lab.*, 7-2 : 197—222.

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