

Hermit crabs of the genus *Nematopagurus* (Crustacea, Decapoda, Paguridae) from south-eastern South Africa and Madagascar: new records and new species

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KEY WORDS

Hermit crabs,
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new species,
new records,
southern Africa.

ABSTRACT

As part of an ongoing review of the hermit crab genus *Nematopagurus* A. Milne Edwards *et* Bouvier, a small, but diverse collection of specimens from eastern South Africa and Madagascar is reported on. Of the seven species present, four represent new taxa, two from South Africa and two from Madagascar. Three species are new records for South Africa.

RÉSUMÉ

Pagures du genre Nematopagurus (Crustacea, Decapoda, Paguridae) du Sud-Est de l'Afrique du Sud et de Madagascar : nouvelles découvertes et nouvelles espèces. Au cours d'une révision du genre de pagure *Nematopagurus* A. Milne Edwards *et* Bouvier, une petite mais riche collection de l'est d'Afrique du Sud et de Madagascar a été examinée. Parmi les sept espèces présentes, quatre sont nouvelles, deux d'Afrique du Sud et deux de Madagascar. Trois espèces sont signalées pour la première fois d'Afrique du Sud.

MOTS CLÉS

pagures,
Nematopagurus,
nouvelle espèce,
nouveau signalement,
Afrique du Sud.

INTRODUCTION

During the course of an ongoing review of the hermit crab genus, *Nematopagurus* A. Milne Edwards *et* Bouvier, 1892, a small, but very interesting collection of specimens of this genus from the eastern coast of South Africa was made available to the author. Given the relatively close proximity of this collection to Madagascar, long the duty station of ORSTOM's eminent biologist, Dr Alain Crosnier, to whom this volume is dedicated, it seemed only fitting that these species of *Nematopagurus*, and those from Madagascar, collected by Dr Crosnier himself, be dealt with separately.

Nematopagurus was established by A. Milne Edwards & Bouvier (1892) for the lone Atlantic species *Nematopagurus longicornis* A. Milne Edwards *et* Bouvier, 1892. From the Indo-Pacific, Alcock (1905a, b) described four new species and transferred *Catapagurus muricatus* Henderson, 1896 to *Nematopagurus*. Alcock's monograph (1905b) provided the principal source of information on the genus for the following sixty years. Since the mid 1960's, nine additional species have been described in, or assigned to *Nematopagurus*, all from the Pacific and/or Indian Oceans, and a considerably large number of undescribed species remain to be added. Many species of *Nematopagurus* are superficially quite similar, and only through the use of a suite of morphological characters can correct identifications be made. Alcock's (1905b) species descriptions provided only very general information; however, carcinologists often have been reluctant to establish new taxa even when faced with clear discrepancies (*e.g.* Kemp & Sewell 1912; Miyake 1978; Haig & Ball 1988).

Nematopagurus is characterized by the presence of eleven pairs of biserial phyllobranchiate gills (*cf.* McLaughlin & de Saint Laurent 1998); a broadly rounded rostral lobe, generally subequal chelipeds; semichelate fourth pereopods, each with a single row of corneous scales in the propodal rasp; males with a long filamentous right sexual tube orientated from right to left across the ventral thorax, and short left sexual tube; and

females with paired first pleopods modified as gonopods.

None of the faunistic reports of hermit crabs from Madagascar (*e.g.* Hoffmann 1874; Lenz & Richters 1881; Lenz 1910; Gravier 1920; Dehancé 1964) mention species of *Nematopagurus*; however, two species, both undescribed, are represented in the ORSTOM collections. In contrast, Kensley (1969) reported two species of *Nematopagurus* in south-east South African waters, one as *N. gardineri* Alcock, 1905, the second as *N. squamichelis* Alcock, 1905. Neither are conspecific with Alcock's taxa. A third species, identified only as "*? Nematopagurus* sp." based on a single female specimen was later recorded by Kensley (1978). All three species were collected off Natal at depths between 138 and 347 m, and all are represented in the present material.

Kensley's (1969) *N. gardineri* is the undescribed species, *N. meiringae* n.sp.; his *N. squamichelis* is conspecific with the Madagascar species described herein as *N. crosnieri* n.sp. Kensley's (1978) specimen of "*? Nematopagurus* sp." was returned to the collections of the Zoological Museum, University of Copenhagen (ZMUC). It has been reexamined and has proved to represent *N. spinulosensoris* McLaughlin *et* Brock, 1974, described originally from the Hawaiian Islands, but reported recently from the Red Sea (Türkyay 1986), Indonesia (McLaughlin 1997), and the Seychelles (McLaughlin & Hogarth 1998). Additional specimens of this species were collected during the *Meiring Naude* cruises. A second species from Madagascar, and one from off North Zululand, also are new to science. They are described herein as *N. chauseyensis* n.sp. and *N. kosiensis* n.sp. respectively. *Nematopagurus diadema* Lewinsohn, 1969, previously known only from the Red Sea, is formally recorded for the first time off North Zululand, although Witherington (1973) documented its presence in the Mozambique Channel in his unpublished dissertation. *Nematopagurus holthuisi* McLaughlin *et* Hogarth (1998), a species recently described from the Seychelles, is also present in South African waters. A key to the local species is presented.

MATERIALS AND METHODS

Materials for this study have come primarily from cruises of the South African research vessel *Meiring Naude* in the region off south-eastern South Africa, and the French research vessel *Vauban* in waters off Madagascar. These have been supplemented by Kensley's (1969) specimens of *N. "gardineri"* and *N. "squamichelis"* collected by scientists during the seventh cruise of the RV *Anton Bruun* during the International Indian Ocean Expedition (IIOE) of 1964, and deposited in the South African Museum, Cape Town (SAM). For comparative purposes, the holotype of *N. gardineri* was borrowed from the University Museum of Zoology, Cambridge (UMZC). Holotypes and some paratypes of the new species have been deposited in the Muséum

national d'Histoire naturelle, Paris (MNHN). As availability permitted, paratypes also have been deposited in the National Museum of Natural History, Smithsonian Institution, Washington D. C. (USNM) and South African Museum. Non-type materials remain in the author's personal collection (PMcL). One measurement, shield length (SL), measured from the tip of the rostrum, or midpoint of the rounded rostral lobe, to the midpoint of the posterior margin of the shield, provides an indication of specimen size. Terminology used in the diagnoses and descriptions generally follows that of McLaughlin (1974) with the exception of the fourth pereopod (after McLaughlin 1997) and telson (after McLaughlin & Forest 1997). The station designation CH indicates samples collected with a beam trawl.

KEY TO THE REGIONAL SPECIES

1. Diameter of cornea approximately equal to or exceeding peduncular length.
Dorsal surfaces of carpi and palms of chelipeds with transverse rows of scutes 2
- Diameter of cornea appreciably less than peduncular length. Dorsal surfaces of carpi and palms of chelipeds without transverse rows of scutes 3
2. Dorsomesial margin of palm of right cheliped and dorsolateral margin of left chela each with small spines. Dactyls of ambulatory legs very long, exceptionally slender, distally curved and strongly twisted *N. chauseyensis* n.sp.
- Dorsomesial margin of palm of right cheliped and dorsolateral margin of left chela unarmed. Dactyls of ambulatory legs moderately long, not exceptionally slender, distally curved but not strongly twisted *N. crosnieri* n.sp.
3. Dorsal surfaces of palms of chelipeds each with large rosette of tubercles
..... *N. diadema* Lewinsohn
- Dorsal surfaces of palms of chelipeds without large rosette of tubercles 4
4. Dorsal surfaces of chelae of both chelipeds covered with spines or spinules 5
- Dorsal surfaces of chelae of both chelipeds with median longitudinal row of spines 6
5. Spines of chelae with numerous spines modified by teardrop-shaped sensory structures *N. spinulosensoris* McLaughlin *et* Brock

- Spines of chelae without numerous spines modified by teardrop-shaped sensory structures *N. holthuisi* McLaughlin et Hogarth
- 6. Right cheliped each with median longitudinal row of spines extending full length of palm; dorsal surface with long dense setae distally on palm and proximally on fixed finger, scattered long setae on remaining surfaces *N. meiringae* n.sp.
- Right cheliped each with median longitudinal row of spines only in proximal third of palm; dorsal surface with only scattered long setae, no dense setae distally on palm and proximally on fixed finger *N. kosiensis* n.sp.

***Nematopagurus crosnieri* n.sp.**
(Fig. 1)

Nematopagurus squamichelis – Kensley 1969: 163, fig. 6a-d; not *Nematopagurus squamichelis* Alcock, 1905b.

MATERIAL EXAMINED. — **Madagascar.** *Vauban* stn CH 10, 12°43'S - 48°15'E, 360-345 m, 10.IV.1971, coll. A. Crosnier: holotype ♂ SL 6.8 mm (MNHN Pg 5537); paratypes, 1 ♂ SL 6.3 mm, 1 ovig. ♀ SL 6.1 mm (MNHN Pg 5538). — Stn CH 56, 23°36.3'S - 43°31.6'E, 395-410 m, 26.II.1973, coll. A. Crosnier: 1 ovig. ♀ SL 6.3 mm (USNM 276083). **South Africa.** *Anton Bruun* stn 370, 24°40'S - 35°28'E, 347 m, 18.VIII.1964: 2 ♂ SL 4.0, 4.5 mm, 1 ♀ SL 3.0 mm (SAM 19479).

TYPE MATERIAL — The holotype is a male with shield length of 6.8 mm from Madagascar, *Vauban* station CH 10 (MNHN Pg 5537). The other specimens mentioned here are paratypes.

DISTRIBUTION. — South Mozambique Channel to off Cap d'Ambre, Madagascar; 347-410 m.

HABITAT. — Shell substrate.

ETYMOLOGY. — This species is dedicated to Alain Crosnier, esteemed friend and colleague, and exalted leader of "Crosnier's Cronies".

DESCRIPTION

Shield broader than long; anterior margin between rostral lobe and lateral projections weakly concave; anterolateral margins sloping; posterior margin truncate or rounded; surface with few sparse tufts of short setae laterally and anteriorly. Rostrum very broadly rounded, not produced beyond level of lateral projections. Lateral projections strongly developed beneath anterior margin; each with laterally directed spinule.

Ocular peduncles short, 0.55-0.60 length of shield; dorsal surfaces each with median tuft of stiff setae at base of cornea, dorsomesial surface with sparse tuft of setae; corneae strongly dilated, corneal diameter equal to or exceeding peduncular length. Ocular acicles small, triangular; terminating subacutely, with deeply concave dorsal surface and prominent submarginal spine.

Antennular peduncles moderately short, exceeding distal margins of corneae by 0.25-0.45 length of ultimate segments. Ultimate and penultimate segments with few scattered setae. Basal segment with acute spine on lateral face distally.

Antennal peduncles moderately short, overreaching distal margins of corneae by 0.20-0.35 length of fifth segments. Fifth and fourth segments with few scattered setae. Third segment with small spine at ventrodial angle. Second segment with dorsolateral distal angle produced, terminating in acute spine, lateral and mesial margins with few stiff setae; dorsomesial distal angle with small spine. First segment unarmed. Antennal acicle moderately long, reaching beyond proximal half of ultimate peduncular segment; arcuate, terminating in acute spine; mesial margin with tufts of long stiff setae. Antennal flagella long, overreaching tip of right cheliped; occasionally few articles each with one or two very short setae or bristles, at least in proximal half.

Chelipeds subequal; right only slightly longer, but stouter than left, both moderately elongate. Dactyl slightly shorter to nearly equal to length of palm; cutting edge with three or four strong calcareous teeth proximally, corneous teeth distally, terminating in small corneous claw and

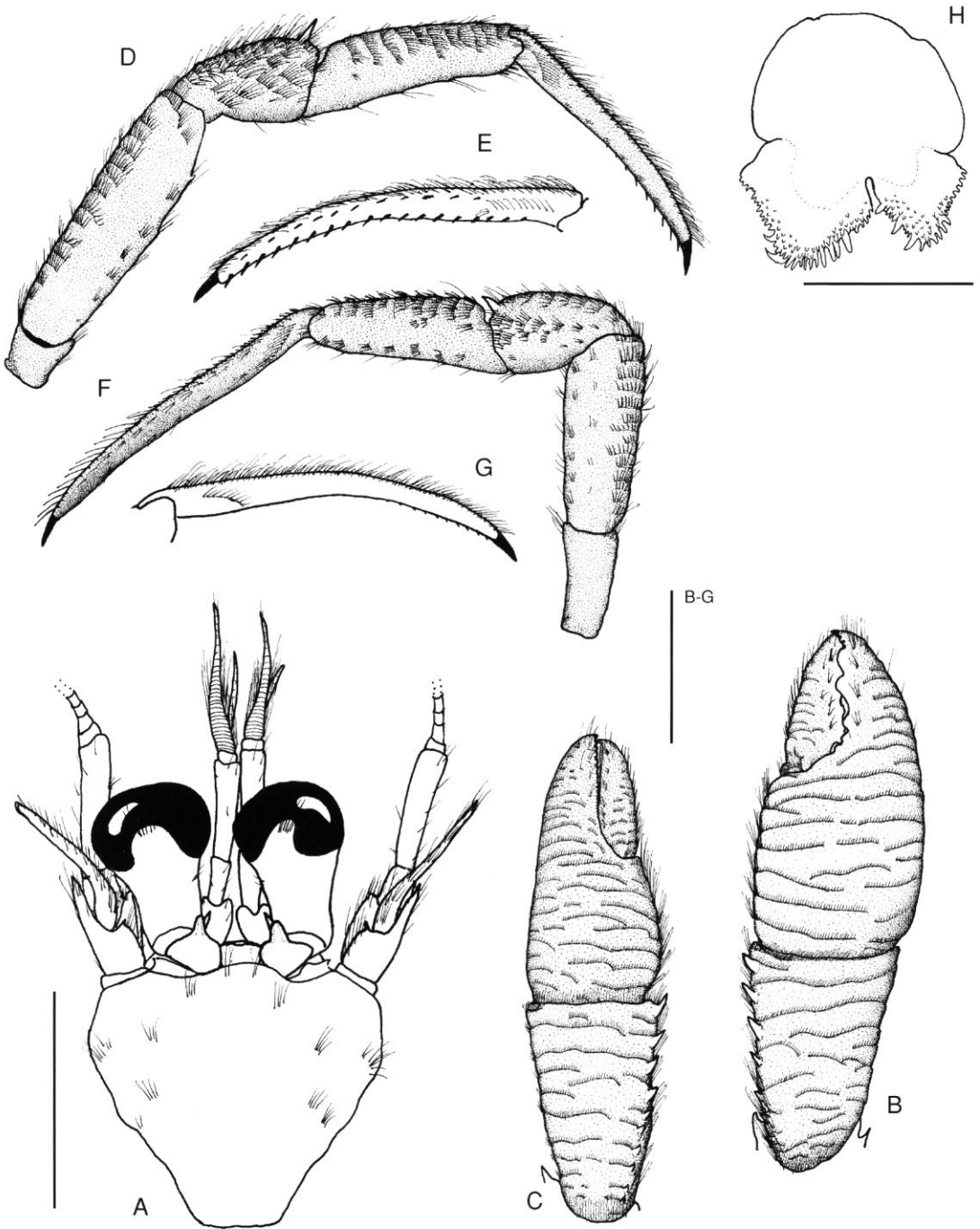


FIG. 1. — *Nematopagurus crosnieri* n.sp., paratype, ovigerous ♀ (SL 6.3 mm), Vauban stn CH 56 (USNM 276083); **A**, shield and cephalic appendages; **B**, carpus and chela of right cheliped (dorsal view); **C**, carpus and chela of left cheliped (dorsal view); **D**, right second pereopod (lateral view); **E**, dactyl of right second pereopod (mesial view); **F**, left third pereopod (lateral view); **G**, dactyl of left third pereopod (mesial view); **H**, telson. Scale bars: A, 5 mm; H, 2 mm; B-G, 1 mm.

slightly overlapped by fixed finger; dorsal surface with several low transverse scutes mesially and extending onto rounded dorsomesial margin, each with marginal row of short stiff setae, few tufts of short setae adjacent to cutting edge; mesial face with abundance of long setae. Palm 0.80 to nearly as long as carpus; dorsomesial margin not delimited; dorsal surface with eight or nine rows of partially to nearly complete transverse scutes continued onto lateral and mesial faces, each with marginal row of short stiff setae; proximal 0.75-0.80 of dorsal surface of fixed finger with moderately short transverse rows of scutes provided with marginal short stiff setae; distal 0.20-0.25 of dorsal surface with scattered tufts of setae; cutting edge with row of three or four strong calcareous teeth, small calcareous teeth near tip, terminating in small corneous claw; ventral surfaces of palm and fixed finger smooth, with few short transverse rows of long setae. Carpus approximately equal to length of merus; dorsodistal margin with row of uniformly short stiff setae; dorsomesial margin with row of strong spines; dorsal surface with complete or incomplete transverse scutes extending onto lateral and mesial faces and provided marginally with short stiff setae; dorsolateral margin not delimited; ventral surface with low protuberances and tufts of setae, occasionally small spine near ventrodistal margin. Merus subtriangular; dorsal margin, mesial and lateral faces all with transverse ridges and long stiff setae; ventrolateral margin with two widely-spaced spines in distal half, frequently few transverse ridges and stiff setae proximally; ventromesial margin with three widely-spaced spines, ventral surface with few low protuberances or ridges and tufts of setae. Ischium with small acute or blunt spine at ventrolateral angle.

Left cheliped usually reaching nearly to tip of dactyl of right; moderately slender. Dactyl slightly shorter to slightly longer than palm; cutting edge with row of small corneous teeth, terminating in small corneous claw and slightly overlapped by fixed finger; dorsomesial margin rounded, dorsal surface with tufts of short setae adjacent to cutting edge, rows of marginally setiferous scutes extending onto mesial face; ventral surface with few tufts of setae. Palm 0.65-0.80 length of car-

pus; dorsomesial margin rounded; dorsal surface, like that of right, with seven to nine transverse rows of complete or incomplete scutes, each extending onto lateral and mesial faces and provided with marginal row of short stiff setae; dorsal surface of fixed finger with several short transverse scutes, each with marginal fringe of short stiff setae; cutting edge with row of small calcareous teeth interspersed with corneous teeth. Carpus approximately 1.25 longer than merus; dorsodistal margin with uniform row of short stiff setae, dorsomesial margin with row of prominent spines, dorsolateral margin not delimited; dorsal surface with several complete or more frequently interrupted, marginally setiferous scutes extending onto lateral and mesial faces; ventral surface with low protuberances and tufts of setae. Merus subtriangular; dorsal surface with transverse ridges and stiff setae, distal margin with row of moderately long stiff setae; lateral and mesial faces with tufts of stiff setae; ventral surface with few low protuberances and tufts of setae; ventromesial margin with row of acute spines, decreasing in size proximally, ventrolateral margin with three or four spines distally and spinulose ridges in proximal half. Ischium with acute or blunt spine at ventrolateral angle. Ambulatory legs slightly overreaching right cheliped. Dactyls 0.25 to twice length of propodi; in lateral view straight or slightly curved ventrally (third right); in dorsal view, slightly twisted; each terminating in strong corneous claw; dorsal surfaces each with very short transverse rows of small corneous spines and moderately short stiff setae; mesial faces each with row of corneous spinules dorsally and row of corneous spines at ventral margin, short row of setae in midline proximally; lateral faces each with arched row of setae in proximal fourth and row of sparse tufts of short setae near dorsal and ventral margins. Propodi 0.25-0.35 longer than carpi; dorsal surfaces each with row of short transverse ridges extending onto lateral faces and set with short stiff setae; mesial and lateral faces with few scattered setae (second) or with longitudinal row of sparse tufts of short setae near ventral margin (third); ventral surfaces with few widely-spaced sparse tufts of setae, one or two corneous spines at ventrodistal angle. Carpi 0.50-0.75 length of

meri; dorsal surfaces each with spine at dorsodistal angle, frequently one additional spine in proximal half on second pereopods, occasionally also on third right, and all with row of tufts of stiff setae; lateral faces each with several short oblique rows of stiff setae, ventral surfaces each with few scattered sparse tufts of setae; mesial faces glabrous or with few tiny tufts of very short setae. Meri laterally compressed; dorsal surfaces each with row of transverse ridges and stiff setae; lateral faces each with one or two longitudinal rows of short setae; mesial faces glabrous or with very few sparse tufts of short setae; ventral surfaces of second pereopods each usually with acute spine distally and three or four blunt or spinulose protuberances accompanied by sparse tufts of setae; third with tufts of setae. Ischia each with few setae dorsally and ventrally. Anterior lobe of sternite of third pereopods roundly subrectangular, with long stiff setae medially and/or on anterior margin.

Males with well-developed, elongate, filiform sexual tube on coxa of right fifth pereopod, left with sexual tube developed only as enlarged papilla protruding from gonopore. Telson with posterior lobes asymmetrical, subtriangular; separated by deep median cleft; terminal margins oblique, each with one or more rows of acute spines; lateral margins oblique, each with row of small subacute spines increasing in size toward outer angle; dorsal surface frequently spinulose near terminal margins.

COLOUR
Not known.

REMARKS
Kensley (1969) identified three specimens from the southern end of the Mozambique Channel (*Anton Bruun* stn 370, IIOE) as *Nematopagurus "squamichelis"* Alcock, 1905 presumably because of the "imbricating squamae" covering the chelae and carpi of the chelipeds. However, Kensley's (1969: fig. 6b, c) figures suggested a species more closely related to *Nematopagurus scutellichelis* Alcock, 1905b (pl. 12, fig. 3). Reexamination of Kensley's specimens (SAM 19479) has confirmed the conspecificity of his *N. "squamichelis"* with *N. crosnieri* n.sp. The new species is readily dis-

tinguished from both of Alcock's species. Alcock's *N. squamichelis* is described as having the squamiform, imbricating tubercles of the palms forming several series; the dorsomesial of the palm and dorsolateral margins of the palm and fixed finger are spinose. These margins are unarmed in *N. crosnieri*, and the squamae of the dorsal surfaces of the chelae do not form several distinct series. *Nematopagurus scutellichelis* was described and illustrated by Alcock (1905b: 112, pl. 12, fig. 5) as having almost nude chelipeds and ambulatory legs. The meri and carpi of the second and third pereopods were reportedly squamose, while the propodi were scutellated, the squamae and scutes being nude and polished. The carpi of both pairs were described with spinose dorsal margins. As may be seen in figure 1D, E, the ambulatory legs of *N. crosnieri* are abundantly setose on the dorsal and lateral surfaces of the propodi and carpi; the dorsal surfaces of the carpi do not have a row of spines.

Nematopagurus crosnieri bears a close resemblance to *N. scutelliformis* McLaughlin, 1997, not only in the form of the scutes of the chelae and carpi, and setation, but in the form of the telson. However, the chelae of *N. crosnieri* lack the spines on the dorsomesial margins of the palms and dorsolateral margins of the palms and fixed fingers that are present in *N. scutelliformis*.

Nematopagurus chauseyensis n.sp.
(Fig. 2)

MATERIAL EXAMINED. — **Madagascar.** *Vauban* stn CH 43, 15°24.5'S - 46°02'E, 250-265 m, 7.XI.1972, coll. A. Crosnier: 1 ♀ SL 4.3 mm (MNHN Pg 5540). — Stn CH 47, 15°20'S - 46°11.8'E, 245-250 m, 7.XI.1972: 2 ♂♂, 1 ovig. ♀ SL 3.5-5.0 mm (MNHN Pg 5541). — Stn CH 56, 23°36'S - 43°31.6'E, 395-410 m, 26.II.1973, coll. A. Crosnier: 1 ♀ SL 4.5 mm (MNHN Pg 5542), 1 ♂ SL 4.5 mm (MNHN Pg 5539), 1 ovig. ♀ SL 4.3 mm (USNM 276084), 1 ♀ SL 4.3 mm (SAM).

TYPE MATERIAL. — The female, SL 4.5 mm, from *Vauban* station CH 56 (MNHN Pg 5539) is the holotype. All other specimens mentioned here are paratypes.

DISTRIBUTION. — Madagascar; 245-410 m.

HABITAT. — Gastropod shells.

ETYMOLOGY. — This species is named for the French island of Chausey, home of Alain Crosnier, and official gathering place for “Crosnier’s Cronies”.

DESCRIPTION

Shield as broad or broader than long; anterolateral margins sloping; anterior margin between rostrum and lateral projections concave; posterior margin truncate; dorsal surface with several tufts of setae. Rostrum very broadly rounded, not produced to level of lateral projections. Lateral projections prominent, roundly triangular or subquadrate, each with laterally directed submarginal spine.

Ocular peduncles short, 0.75-0.80 length of shield; surfaces each with dorsomedian row of stiff setae at base of cornea, and sparse tufts of short setae dorsally and mesially; corneae strongly dilated, corneal diameter equal to or exceeding peduncular length. Ocular acicles small, triangular; terminating subacutely, with deeply concave dorsal surface and prominent submarginal spine.

Antennular peduncles moderately short, exceeding distal margin of corneae by 0.25-0.50 length of ultimate segment. Ultimate segment with longitudinal row of tufts of setae on dorsal surface. Penultimate segment with few scattered setae. Basal segment with numerous short setae dorsally and distally, prominent spine on lateral face.

Antennal peduncles moderately short, overreaching distal margin of cornea by 0.20-0.35 length of fifth segment. Fifth with few short setae dorsally and distally. Fourth segment with long stiff setae, especially on ventral surface. Third segment with small spine at ventrodistal angle completely concealed by long stiff setae. Second segment with dorsolateral distal angle produced, terminating in simple or bifid spine, lateral and mesial margins with long stiff setae; dorsomesial distal angle with small spine. First segment produced ventrolaterally as flattened subacute lobe. Antennal acicle moderately long, reaching to or beyond proximal half of ultimate peduncular segment; slightly arcuate, terminating in acute spine; mesial margin with numerous tufts of long stiff setae. Antennal flagella long, overreaching tip of right cheliped; occasionally few articles

each with one or two very short setae or bristles, at least in proximal half.

Chelipeds subequal; right slightly stronger than left, but often somewhat shorter. Dactyl slightly shorter than palm; cutting edge with elongate fused pair of strong calcareous teeth separated from single similar calcareous tooth by two smaller calcareous teeth, few corneous teeth distally, terminating in small corneous claw and slightly overlapped by fixed finger; proximal half of dorsal surface with several low, short transverse scutes mesially and extending onto rounded, unarmed dorsomesial margin, each scute with marginal row of short stiff setae, tufts of somewhat longer setae distally and adjacent to cutting edge; mesial face and ventral surface with numerous short transverse ridges and longer setae. Palm 0.75-0.85 length of carpus; dorsomesial margin creased by series of short transverse scutes, each with small spine and fringe of stiff setae; dorsal surface with eleven to fifteen irregular transverse rows of short scutes continued onto lateral face, each with marginal row of short stiff setae; proximal 0.75-0.80 of dorsal surface of fixed finger with irregular transverse rows of short scutes provided with marginal short stiff setae, also continued onto lateral face as short transverse ridges with longer setae; distal 0.20-0.25 of dorsal surface nearly smooth, with only scattered tufts of setae; cutting edge with row of strong calcareous teeth, small calcareous teeth interspersed with corneous teeth distally, terminating in small corneous claw; ventral surfaces of palm and fixed finger with short transverse ridges and moderate to long setae. Carpus slightly shorter than merus; dorsodistal margin with row of short stiff setae; dorsomesial margin with row of moderately strong spines; dorsal surface with irregular transverse rows, each consisting of three to six short scutes, extending onto dorsal half of lateral face, and provided marginally with short stiff setae; dorsolateral margin not delimited; lateral, mesial and ventral surfaces with transverse ridges and moderate to long setae. Merus subtriangular; dorsal margin with row of transverse ridges and short to moderately long setae; lateral and mesial faces each with transverse ridges, longest in ventral third, and long stiff setae; ventrolateral margin with two to

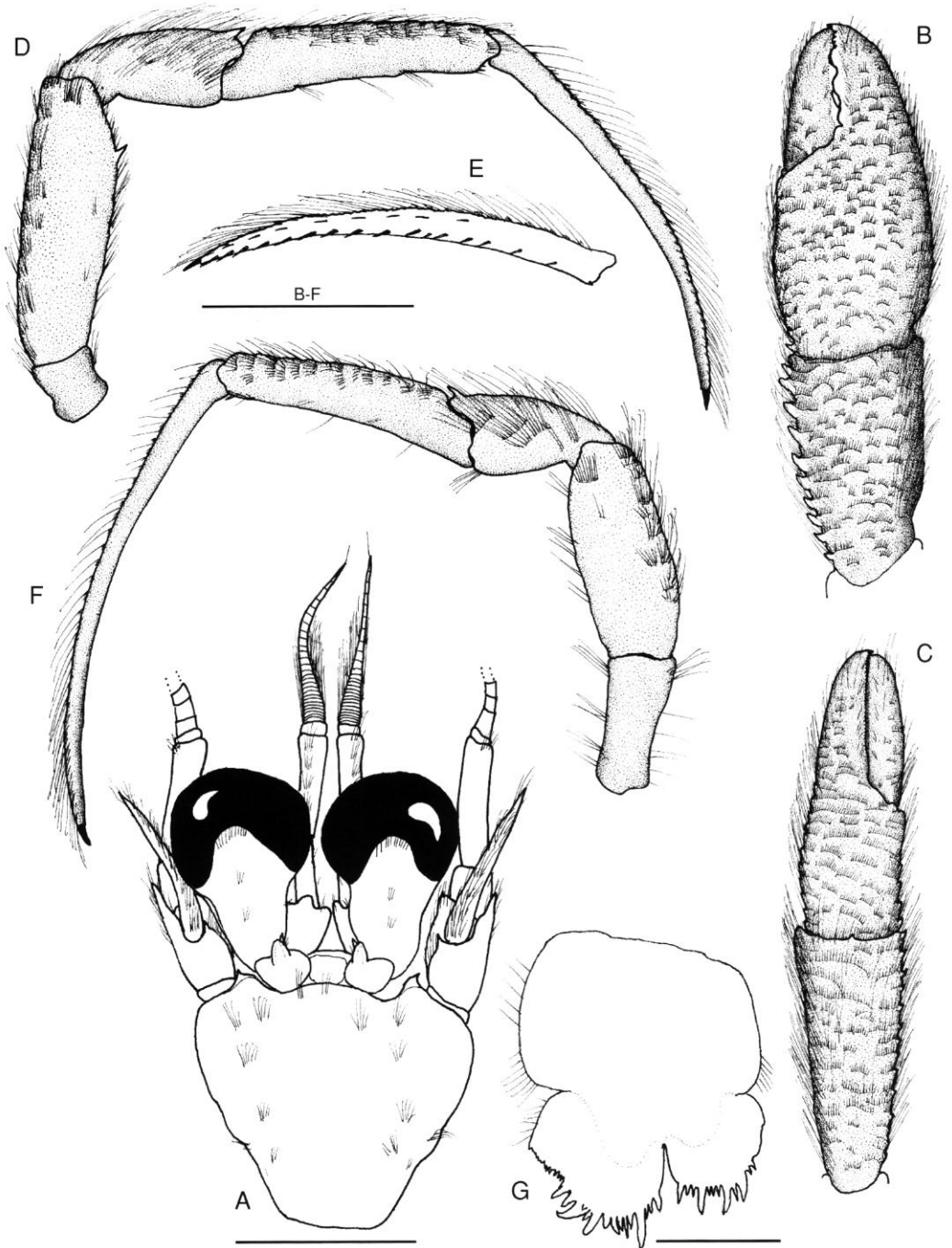


FIG. 2. — *Nematopagurus chauseyensis* n.sp., paratype, ♀ (SL 4.3 mm), Vauban strn CH 43 (MNHN Pg 5540); A, shield and cephalic appendages; B, carpus and chela of right cheliped (dorsal view); C, carpus and chela of left cheliped (dorsal view); D, right second pereopod (lateral view); E, dactyl of right second pereopod (mesial view); F, left third pereopod (lateral view); G, telson. Scale bars: A, 3 mm; B-F, 5 mm; G, 1 mm.

four acute spines in distal half; ventromesial margin with one to three spines; ventral surface with three or four transverse ridges, each with long stiff setae and occasionally one or two small spines. Ischium with few stiff setae; one spine at ventrolateral distal angle.

Left cheliped moderately slender. Dactyl slightly longer to nearly twice length of palm; cutting edge with row of small corneous teeth, terminating in small corneous claw and slightly overlapped by fixed finger; dorsal surface with row of sparse tufts of setae adjacent to cutting edge, few short marginally setiferous scutes proximally, extending onto mesial face dorsally; dorsomesial margin not delimited; mesial and ventral surfaces also with numerous long setae. Palm 0.65-0.75 length of carpus; dorsomesial margin not delimited, but with one or two spines proximally; dorsal surface, like that of right, with seven to eleven irregular transverse rows of short scutes, extending onto mesial and lateral faces and provided with marginal row of short stiff setae; dorsal surface of fixed finger with several transverse rows of short scutes in proximal 0.65-0.75, each with marginal fringe of short stiff setae, distal quarter to third nearly smooth, but with scattered tufts of setae; ventral surfaces all with short transverse rows of long stiff setae; cutting edge of fixed finger with row of small calcareous teeth interspersed with corneous teeth. Carpus approximately equal to slightly longer than merus; dorsodistal margin with row of short to moderately long stiff setae, dorsomesial margin with row of spines partially concealed by long stiff setae, dorsolateral margin not delimited; dorsal surface with irregular transverse rows of short, marginally setiferous scutes extending onto lateral face; mesial and ventral surfaces with tufts of stiff setae. Merus subtriangular; dorsal surface with transverse ridges and stiff setae, distal margin with row of moderately long stiff setae; lateral and mesial faces with tufts of stiff setae; ventral surface with low sometimes spinose ridges and long setae; ventromesial margin with one to three spines in distal 0.65, ventrolateral margin with two to four spines in distal half and few short sometimes spinulose ridges in proximal half. Ischium with spine at ventrolateral distal angle and scattered tufts of setae.

Ambulatory legs overreaching right cheliped by 0.10-0.25 length of dactyls. Dactyls very slender, 0.35-0.50 longer than propodi; in lateral view, curved ventrally; in dorsal view, strongly twisted in distal third to half; each terminating in small corneous claw; dorsal surfaces each with one or two rows of very short corneous spines and long stiff setae; mesial faces each with row of corneous spinules dorsally; lateral faces each with few scattered setae; ventral surfaces each with row of eleven to seventeen strong corneous spines increasing in size distally. Propodi 0.25-0.35 longer than carpi; dorsal surfaces each with row of short transverse scute-like ridges extending onto lateral faces and set with short to moderately long stiff setae; mesial and lateral faces with scattered setae; ventral surfaces usually with widely-spaced sparse tufts of setae, one or two corneous spines at ventrodistal angle. Carpi 0.50-0.85 length of meri; dorsal surfaces each with spine at dorsodistal angle and transverse rows of tufts of stiff setae; mesial and ventral surfaces each with few scattered tufts of long setae; lateral faces each with three to several short to moderately long transverse rows of stiff setae. Meri each with row of transverse ridges and stiff setae on dorsal surfaces; lateral and mesial faces usually with few tufts of setae; ventral surfaces with few tufts of setae, second also with one spine distally. Ischia each with setae dorsally and ventrally. Anterior lobe of sternite of third pereopods subsemicircular, with long stiff setae on anterior margin.

Males with well-developed, elongate, filiform sexual tube on coxa of right fifth pereopod, left one with very short sexual tube. Telson with posterior lobes slightly asymmetrical, subsemicircular to subrectangular; separated by deep median cleft; terminal margins rounded, each with row of long spines interspersed with smaller spines and extending onto lateral margins, sometimes with adjacent row of spinules on dorsal surface.

COLOUR

Not known.

REMARKS

Nematopagurus chauseyensis bears a considerable resemblance to Alcock's (1905b) *N. squamichelis*

in having very short ocular peduncles with strongly dilated corneae, antennular and antennal peduncles that overreach the distal margins of the corneae, and the carpi and chelae of the chelipeds that are covered dorsally with transverse rows of setiferous short scutes. Alcock's specimen has not been available for reexamination; however, from his description and figure (Alcock 1905b: 113, pl. 12, fig. 1) *N. squamichelis* and *N. chauseyensis* are easily differentiated. Alcock's taxon is described as having spines on both the dorsomesial and dorsolateral margins of the palms of both chelipeds. *Nematopagurus chauseyensis* lacks spines on the poorly defined dorsolateral margin of the right chela, and has only

one or two spines on the dorsomesial margin of the palm of the left cheliped. Additionally the ambulatory dactyls of *N. squamichelis* are described and illustrated as being stout and moderately long. The dactyls of *N. chauseyensis* are distinctly longer and much more slender.

Nematopagurus diadema Lewinsohn, 1969
(Fig. 3)

Nematopagurus diadema Lewinsohn, 1969: 74, fig. 13.

MATERIAL EXAMINED. — **South Africa.** North Zululand, Sodesana Bay, off Gobey's Point, *Meiring Naude* stn ZG 4, 27°26.2'S - 32°44.7'E, 120-150 m, 2.VI.1987: 1 ovig. ♀ SL 3.5 mm (PMcL).

DISTRIBUTION. — Red Sea; Mozambique Channel; 62-150 m.

HABITAT. — Lewinsohn (1969) reported the use of several species of gastropod shells.

DIAGNOSIS

Shield broader than long; surface with few very small tufts of setae. Rostrum rounded and nearly

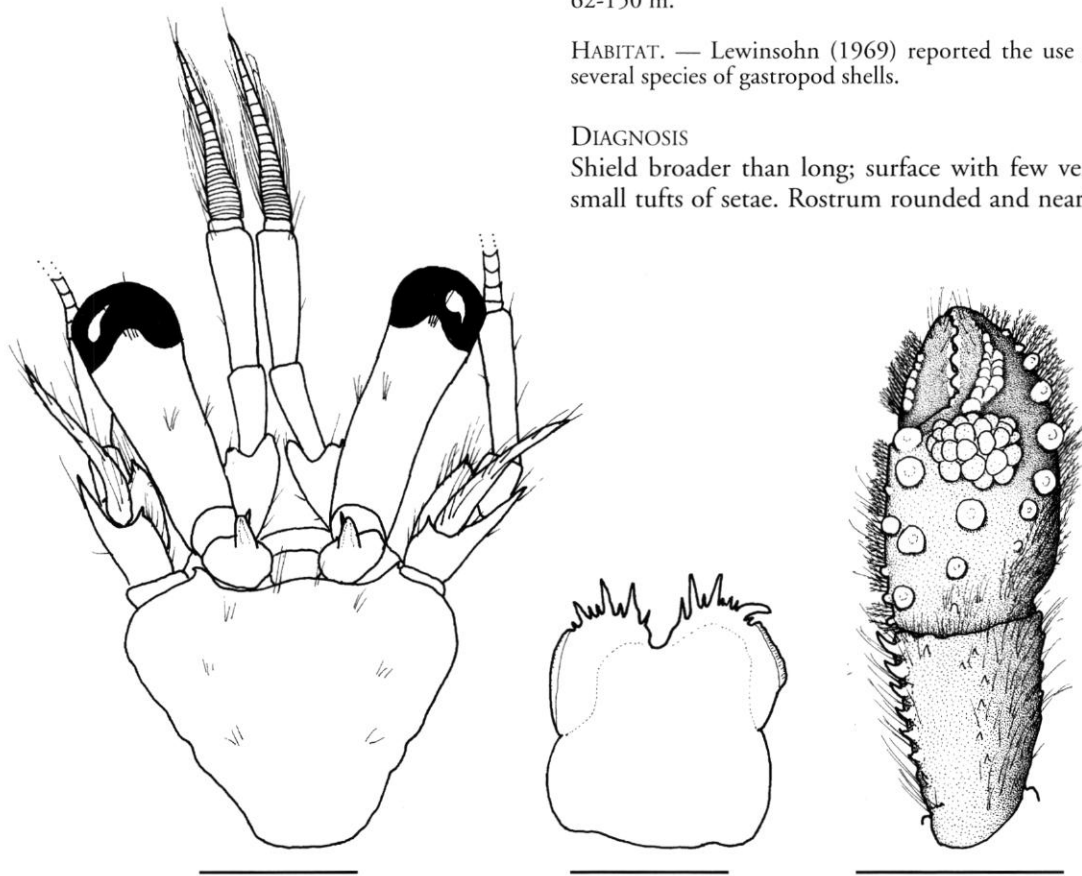


FIG. 3. — *Nematopagurus diadema* Lewinsohn, 1969, ovigerous ♀ (SL 3.5 mm), *Meiring Naude* stn ZG 4 (PMcL); **A**, shield and cephalic appendages; **B**, telson; **C**, carpus and chela of right cheliped (dorsal view). Scale bars: A, 1 mm; B, 2 mm; C, 0.5 mm.

obsolete. Lateral projections each with outwardly directed tiny spine. Ocular peduncles relatively long, approximately as long as shield; corneae slightly dilated. Ocular acicles relatively small, triangular, terminating subacutely, with submarginal spine. Antennular peduncles overreach distal margin of corneae by 0.25-0.33 length of ultimate segment. Antennal peduncles reaching beyond bases of corneae, but not to distal margins. Antennal acicle nearly reaching distal margin of ultimate peduncular segment.

Chelipeds similar, but right distinctly stronger. Right cheliped with row of rounded tubercles on dorsomesial surface of dactyl and adjacent row of tufts of plumose setae, neither extending to distal third; fixed finger with double row of similarly rounded tubercles in dorsal midline. Palm with elevated rosette (cluster) of rounded tuberculate platelets distally; dorsomesial margin with few small widely-spaced tubercles and adjacent irregular row of large almost pear-shaped tubercles, dorsal midline with two similar pear-shaped tubercles and one subacute small spine; dorsolateral margin of palm and fixed finger with row of widely-spaced similar tubercles and adjacent tufts of plumose setae. Carpus with row of acute spines on dorsomesial margin, few small spines on dorsal surface distally, and irregular row of small spines laterally. Ventrolateral margin of merus with one very prominent spine and few smaller spines proximally and on ventral surface; ventromesial margin with two small spines.

Left cheliped armed similarly to right, but dorso-proximal margin of palm with dense plumose setae not present on right.

Ambulatory legs similar. Dactyls 0.35-0.50 longer than propodi; dorsal margins each with row of long spiniform bristles; ventral margins each with eight to ten corneous spines. Propodi each with row of tufts of setae on dorsal margins. Carpi each with dorsodistal spine, second also with additional spine in proximal half. Meri with tufts of setae dorsally and ventrally.

Telson with subequal posterior lobes separated by moderately broad median cleft; terminal margins each with three or four strong spines interspersed with smaller spines; lateral margins each with weakly calcified marginal plate, more distinct on left.

COLOUR

In preservative only a faint hint of longitudinal stripes on the lateral surfaces of ambulatory legs remains.

REMARKS

The North Zululand specimen exhibits some differences from Lewinsohn's description of his Red Sea specimens. Specifically, the South African specimen has distinctly shorter ultimate segments in the antennular peduncles, shorter ambulatory dactyls, and an additional postero-dorsal spine on the carpus of each second pereopod; however, these differences are well within the ranges of variation seen in species of *Nematopagurus*. The South African specimen shares the distinctive and unique armature of the chelae with Red Sea specimens of *N. diadema*, and there is no doubt that it is correctly assigned to this taxon. Witherington (1973) in an unpublished doctoral dissertation also reported a specimen of *N. diadema* from an *Anton Bruun* station in Mozambique Channel.

Nematopagurus holthuisi

McLaughlin *et* Hogarth, 1998

(Fig. 4)

Nematopagurus holthuisi McLaughlin *et* Hogarth, 1998: 25, figs 19-26.

Nematopagurus muricatus – Laurie 1926: 161; not *Nematopagurus muricatus* (Henderson, 1896).

MATERIAL EXAMINED. — **South Africa.** North Zululand, SE Kosi River mouth, *Meiring Naude* stn ZA 29, 26°54.3'S - 32°54.8'E, 48 m, 8.VI.1987: 1 ovig. ♀ SL 2.8 mm (PMCL).

DISTRIBUTION. — Seychelles, North Zululand, South Africa; 45-48 m.

HABITAT. — Collected on muddy sand, *Halimeda* and seagrass beds in the Seychelles; habitat not reported for the North Zululand specimen.

DIAGNOSIS

Shield as broad or broader than long; dorsal surface with sparse tufts of setae anteriorly and laterally. Rostrum broadly rounded, weakly produced or nearly obsolete, not reaching level of lateral projections. Lateral projections roundly

triangular, each usually with prominent submarginal spine. Ocular peduncles 0.80-0.90 length of shield; dorsal surfaces each with median tuft of stiff setae at base of cornea, one additional tuft on mesial surface and short row on dorsal surface proximally; corneae somewhat dilated. Ocular acicles narrowly triangular; terminating acutely, with concave dorsal surface and prominent submarginal spine. Antennular peduncles overreaching distal margin of corneae by 0.20-0.50 length of ultimate segment. Antennal peduncles not overreaching distal margin of cornea. Second segment with dorsolateral distal angle produced, terminating in simple or bifid spine, lateral margin with one or two tufts of stiff setae, occasionally also with tiny spinule; dorsomesial distal angle with small spine. Antennal acicle reaching distal half of ultimate peduncular segment;

arcuate, terminating in acute spine; mesial margin with few moderately long stiff setae. Antennal flagella slightly longer than outstretched right cheliped; every article with one or two very short setae.

Chelipeds subequal; right slightly longer and stronger. Dactyl somewhat shorter than palm; very slightly overlapped by fixed finger; dorsal surface unarmed or with few small spines, most numerous proximally, few tufts of setae distally, dorsomesial margin with row of stronger spines extending nearly to tip. Palm slightly shorter than carpus; dorsomesial margin with row of small spines; dorsal surface with scattered long setae and covered with extremely short fine setae and numerous but not densely packed, small spines, median longitudinal row of spines slightly stronger proximally; dorsolateral margin with

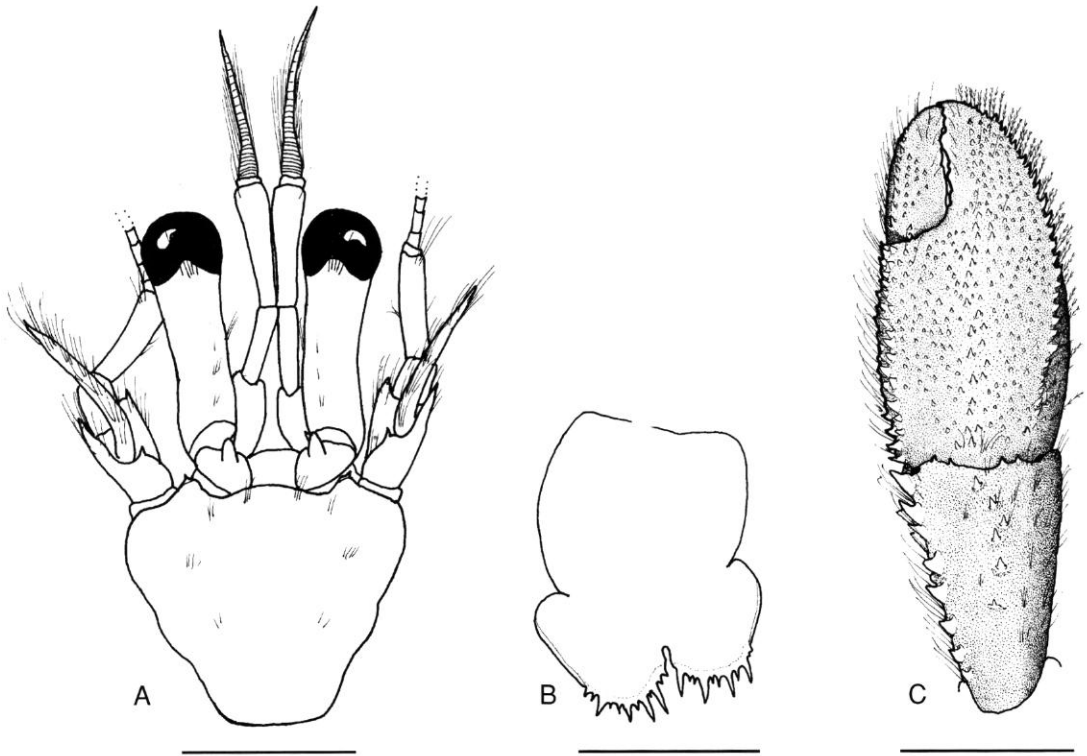


FIG. 4. — *Nematopagurus holthuisi* McLaughlin *et* Hogarth, 1998, ovigerous ♀ (SL 2.8 mm), Meiring Naude strn ZA 29 (PMCL); A, shield and cephalic appendages; B, telson; C, carpus and chela of right cheliped (dorsal view, fine setae of palm and fixed finger not shown). Scale bars: A, B, 2 mm; C, 1 mm.

row of spines extending to tip of fixed finger; dorsal surface of fixed finger with similar covering of small spines proximally and scattered longer setae distally. Carpus with one or two small spines on dorsodistal margin and sometimes one additional spine adjacent to margin, dorsomesial margin with row of spines; dorsal surface practically glabrous, dorsolateral margin with more irregular row of slightly smaller spines; mesial and ventral surfaces with tufts of long stiff, iridescent setae. Merus with two strong spines on ventrolateral margin distally; ventromesial margin with one to three spines in distal half; ventral surface with two transverse rows of two or three acute, subacute or blunt spines and tufts of long stiff iridescent setae.

Left cheliped reaching beyond base of dactyl of right; moderately slender. Dactyl slightly longer than palm; slightly overlapped by fixed finger; dorsal surface unarmed or with few small spines in proximal half, dorsomesial margin with row of spines extending nearly to tip, surfaces all with stiff setae. Palm approximately 0.50 length of carpus; dorsomesial margin with row of small spines; dorsal surface covered with extremely short fine setae and numerous, but not densely packed, small spines, median longitudinal row on slightly raised midline more distinct proximally; dorsolateral margin with row of spines, extending nearly to tip of fixed finger; surfaces with long stiff setae. Carpus with spine dorsodistal margin; dorsomesial and dorsolateral margins each with row of spines. Merus with one or two spine on ventrolateral margin and sometimes small spine at ventrolateral distal angle; ventromesial margin with two strong spines in distal half; ventral surface with transverse row of few small spines or tubercles distally, transverse unarmed or spinulose ridge proximally.

Ambulatory legs all of approximately equal length. Dactyls of second pair approximately 1.10 length of propodi, dactyls of third pair about 1.25 length of propodi; dorsal surfaces each with row of corneous spines and few moderately long setae; mesial faces each with row of short corneous spines dorsally; ventral margins each with row of eight to ten (second), and eleven or twelve (third) corneous spines. Propodi each with low protuberances and tufts of short setae on dorsal

surfaces; one small corneous spine at each ventrodistal angle, and one additional corneous spine near mid-length. Carpi all with small spine at dorsodistal angle; second pair each with one or two additional small spines on dorsal surface in proximal half. Meri with widely-spaced tufts of setae dorsally; ventral margins each with low protuberances (sometimes spinose on second) and tufts of stiff setae. Anterior lobe of sternite of third pereopods subquadrate, with few marginal setae.

Coxa of fifth right pereopod with long sexual tube directed across ventral thorax and coiled in distal half; left tube short, directed somewhat posteriorly. Telson with posterior lobes practically symmetrical; separated by moderately deep median cleft; terminal margins somewhat rounded, left with four or five moderately large spines, right with four; lateral margins each with distinct chitinous plate, left sometimes with one to three tiny spinules.

COLOUR

In preservative: ocular peduncles each with band of color near proximal margin ultimate segment. One distal or subdistal and one median circular band of color on both dactyl and fixed finger of each cheliped. Ambulatory legs longitudinally striped as follows: ischia each with three stripes on lateral face; meri, carpi and propodi each with one dorsal, one ventral, and three lateral stripes, with the upper and lower lateral stripes interrupted medially on the meri and propodi. Dactyls of the ambulatory legs with faint uniform coloration and darker subdistal band (after McLaughlin & Hogarth 1998).

REMARKS

McLaughlin & Hogarth (1998) described *N. holthuisi* from specimens collected during the Netherlands Seychelles Expedition of 1992-1993, and indicated that this was the same species reported from the Seychelles by Laurie (1926) as *N. muricatus* (Henderson, 1896). As noted by McLaughlin & Hogarth (1998), *N. holthuisi* is even more similar to *N. lewinsohni* Türkay, 1986 in the general armature of the chelae, but *N. holthuisi* is readily distinguished by its: (1) longer, more slender ocular peduncles

with only slightly dilated corneae; (2) longer antennular peduncles; (3) ambulatory legs that are all of relatively equal total length; and (4) carpi of second pereopods that have one or two proximal spines in addition to the dorsodistal spine. The single specimen of *N. holthuisi* collected during the *Meiring Naude* cruise agrees quite well with the Seychelles specimens, although the spines of the chelipeds are a little smaller, and the meri each have an additional spine on the ventromesial margin. This is the first record of this species in South African waters.

Nematopagurus kosiensis n.sp.
(Fig. 5)

MATERIAL EXAMINED. — **South Africa.** North Zululand, Sodesana Bay, Off Gobey's Point, *Meiring Naude* stn ZG 4, 27°26.2'S - 32°44.7'E, 120-150 m, 2.VI.1987: 1 ovig. ♀ SL 3.5 mm (MNHN Pg 5543).

TYPE MATERIAL. — The single ovigerous female from off Gobey's Point, Sodesana Bay, North Zululand, South Africa is the holotype.

DISTRIBUTION. — Known only from type locality off North Zululand, South Africa; 120-150 m.

HABITAT. — Collected from sandstone rubble with glass sponges.

ETYMOLOGY. — This species is named for the region of the type locality, SE of the mouth of the Kosi River, Zululand, South Africa.

DESCRIPTION

Shield longer than broad; anterolateral margins sloping; anterior margin between rostrum and lateral projections somewhat concave; posterior margin truncate; dorsal surface with sparse tufts of setae generally circumscribing gastric region. Rostrum very obtusely and roundly triangular, reaching level of right lateral projection, slightly overreaching left. Lateral projections prominent, obtusely triangular, right with small submarginal spine, left unarmed.

Ocular peduncles approximately 0.80 length of shield; dorsal surfaces each with sparse median tuft of stiff setae at base of cornea, two very sparse tufts on dorsal surface and additional tuft mesially; corneae not noticeably dilated, width about

0.35 peduncular length. Ocular acicles small, triangular; terminating acutely, with concave dorsal surface and prominent submarginal spine.

Antennular peduncles overreaching distal margin of corneae by nearly 0.80 length of ultimate segment. Ultimate segment with one or two fine setae. Basal segment with prominent spine on dorsolateral margin.

Antennal peduncles overreaching distal margin of cornea by approximately 0.20 length of fifth segment. Fifth and fourth segments with few setae. Third segment with sparse tuft of stiff setae at ventrodial angle. Second segment with dorsolateral distal angle produced, terminating in strong spine, lateral margin with few setae; dorsomesial distal angle with small spine. First segment with one spinule on ventrolateral margin distally. Antennal acicle long, overreaching distal margin of cornea and reaching distal half of ultimate peduncular segment; arcuate, terminating in acute spine; mesial margin with few moderately long stiff setae. Antennal flagella missing.

Chelipeds subequal; right slightly longer and stronger. Dactyl slightly shorter than palm; cutting edge with two proximal and one median strong calcareous teeth separated by row of small calcareous denticles, row of corneous teeth distally, terminating in small corneous claw and very slightly overlapped by fixed finger; convex dorsal surface and dorsomesial margin with scattered sparse tufts of moderately long setae; mesial and ventral surfaces with scattered long setae. Palm slightly shorter than carpus; dorsomesial margin with row of small spines; dorsal midline with longitudinal row of spines in proximal third, dorsal surface with few very sparse tufts of setae; dorsolateral margin with row of tiny spinules extending approximately half length of fixed finger; dorsal surface of fixed finger with scattered, moderately long setae; cutting edge with three moderately small calcareous teeth proximally, one large calcareous tooth medially and row of quite small calcareous teeth distally, terminating in small corneous claw; lateral and ventral surfaces of palm and fixed finger with scattered setae. Carpus slightly longer than merus; dorsodistal margin with one prominent spine, dorsomesial and dorsolateral margins each with row of slender acute spines and long, moderately stiff

setae; dorsal surface with few scattered long setae; lateral, mesial and ventral surfaces all with sparse tufts of long setae, ventrolateral distal angle with spinule. Merus subtriangular; dorsodistal margin with row of moderately stiff long setae; dorsal margin, mesial, lateral and ventral faces all with short transverse rows of long setae; ventrolateral margin with two widely-spaced acute spines distally, spinule and spinulose protuberances proximally; ventromesial margin with one strong spine at distal angle and one marginal smaller spine in distal half. Ischium with few setae dorsally and ventrally; ventrolateral distal angle with acute spine.

Left cheliped long, reaching almost to tip of dactyl of right; moderately slender. Dactyl approximately 0.25 longer than palm; cutting edge with row of small corneous teeth, terminating in small corneous claw and very slightly overlapped by fixed finger; rounded dorsal surface with two rows of widely-spaced sparse tufts of long setae; mesial and ventral surfaces with few moderately long setae. Palm approximately 0.65 length of carpus; dorsomesial margin with row of quite small spines; dorsal surface with short longitudinal row of small spines in slightly elevated midline, not extending onto fixed finger; dorsal surface laterad of midline microscopically rugose, dorsolateral margin with row of very small spinules, extending nearly to distal half of fixed finger; all surfaces with scattered long setae; cutting edge of fixed finger with row of small calcareous teeth. Carpus slightly longer than merus; dorsodistal margin with one acute spine; dorsomesial and dorsolateral margins each with row of spines strongest mesially; mesial, lateral and ventral surfaces all with short transverse rows of long stiff setae; ventrolateral distal angle with minute tubercle. Merus subtriangular; dorsodistal margin with row of stiff setae, dorsal surface with transverse rows of setae; ventromesial margin with three small spines in distal half, transverse ridges and setae proximally; ventrolateral margin with three stronger spines in distal half, spinulose protuberances proximally. Ischium with row of widely-spaced spinules and setae on ventromesial margin; ventrolateral distal angle with small spine.

Ambulatory legs elongate, overreaching tips of

chelipeds by nearly half lengths of dactyls. Dactyls 1.10-1.20 length of propodi; dorsal surfaces each with few short setae and row of corneous bristles; mesial faces each with row of small corneous spines dorsally; lateral faces with few scattered setae; ventral margins each with row of ten to thirteen corneous spines. Propodi 1.35-1.40 longer than carpi; dorsal surfaces each with row of widely-spaced low protuberances and sparse tufts of setae; row of widely-spaced small corneous spinules on ventral surfaces. Carpi 0.65-0.75 length of meri; dorsal surfaces each with dorsodistal and dorsoproximal spine and row of tufts of sparse setae; ventral and lateral surfaces with few setae. Meri with few setae dorsally and ventrally, ventral margins of second pair each with acute spine at lateral distal angle and one additional spine in distal half. Ischia unarmed. Anterior lobe of sternite of third pereopods subquadrate, with few marginal setae. Male not known. Telson with median indentation indicating anterior and posterior lobes; anterior lobes distinctly narrower than posterior lobes; latter practically symmetrical, separated by distinct median cleft; terminal margins roundly oblique, each with row of moderately strong calcareous spines interspersed with smaller spines; lateral margins each with spinose weakly calcified plate.

COLOUR

In preservative: most colour has faded, but a pair of longitudinal stripes is still apparent on the lateral faces of meri and carpi of chelipeds and on meri, carpi and propodi of second and third pereopods.

REMARKS

In the armature of the chelipeds, this species most closely resembles *N. longicornis* from the Atlantic. However, the shorter ocular peduncles with strongly dilated corneae, and the single dorsodistal spine on each carpus of the second pereopods immediately distinguishes *N. longicornis* from the South African species. There is also a superficial similarity between *N. kosiensis* and *N. alcocki* McLaughlin, 1997 described from Indonesia. The armature of the chelipeds and ambulatory legs is very similar in the two species,

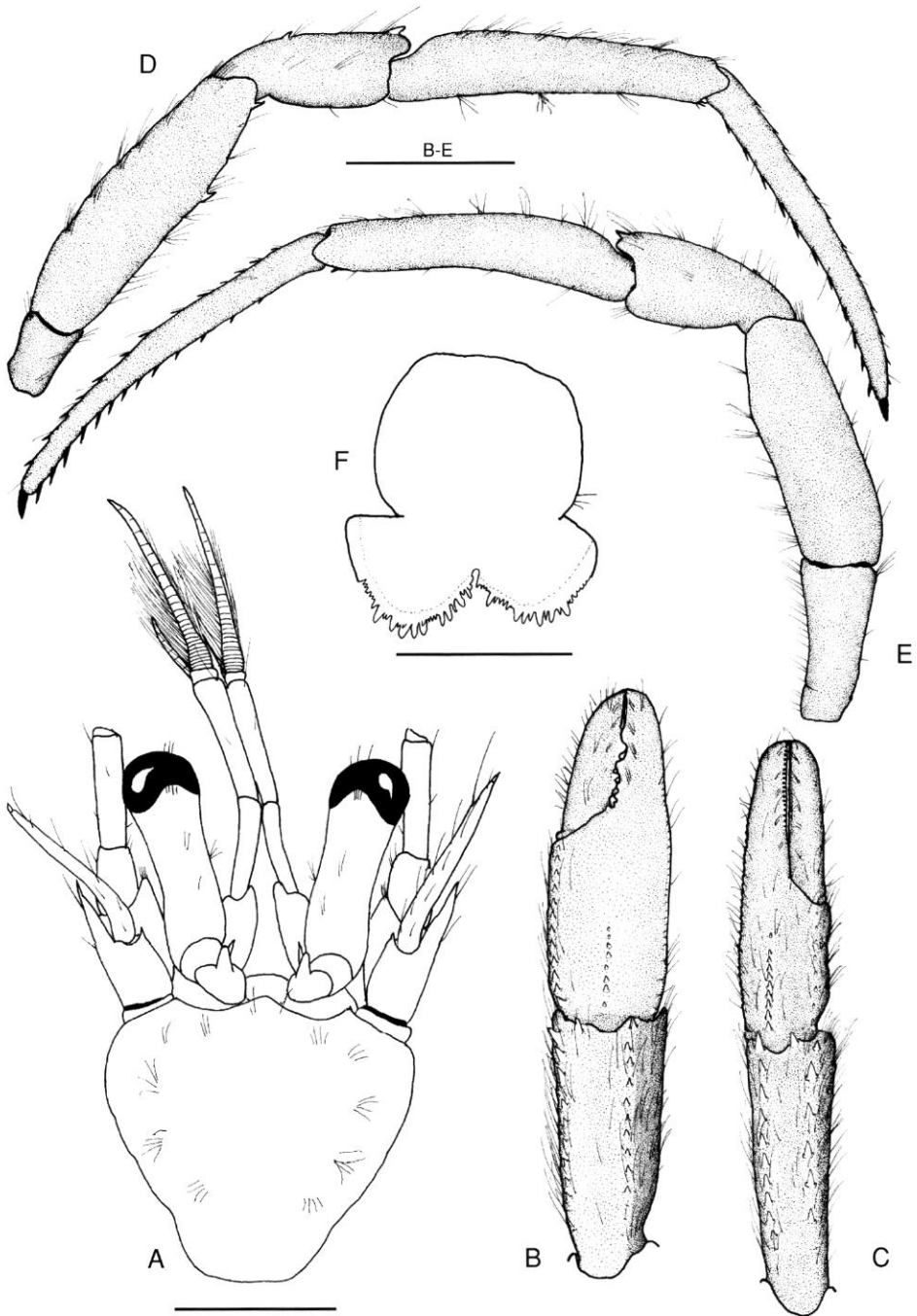


FIG. 5. — *Nematopagurus kosiensis* n.sp., holotype ovigerous ♀ (SL 3.5 mm), Meiring Naude stn ZG 4 (MNHN Pg 5543); **A**, shield and cephalic appendages; **B**, carpus and chela of right cheliped (dorsal view); **C**, carpus and chela of left cheliped (dorsal view); **D**, right second pereopod (lateral view); **E**, left third pereopod (lateral view); **F**, telson. Scale bars: A, 2 mm; B-E, 3 mm; F, 1 mm.

but the dorsal surfaces of the palms and fixed fingers of *N. alcocki* have an abundance of short setae that is lacking on those surfaces in *N. kosiensis*. As in *N. longicornis*, the ocular peduncles of *N. alcocki* are short, stout and the corneae distinctly dilated. Additionally, the anterior lobe of the sternite of the third pereopods in *N. alcocki* is roundly subrectangular, but subquadrate in *N. kosiensis*; the telson of *N. alcocki* has four or five large spines and only one or two spinules extending onto the lateral margin, whereas the terminal margins of the telson of *N. kosiensis* have numerous large and smaller spines and the plate of the lateral margin is spinose over the entire length.

Nematopagurus meiringae n.sp.

(Fig. 6)

Nematopagurus gardineri – Kensley 1969: 163, figs 6e-h; not *Nematopagurus gardineri* Alcock, 1905a.

MATERIAL EXAMINED. — **South Africa.** Transkei, off Mgazi, *Meiring Naude* stn J3, 31°46.3'S - 29°30.9'E, 96 m, 15.VIII.1982: 1 ♂ SL 2.8 mm (MNHN Pg 5544). — Off Durban, Natal, *Anton Bruun* stn 390, 29°35'S - 31°42'E, 138 m, 9.IX.1964: 1 ♂ SL 2.4 mm (SAM A19478).

TYPE MATERIAL. — The male with a shield length of 2.8 mm from off Mgazi, South Africa (MNHN Pg 5544) is the holotype. The male from off Durban (SAM A19478) is the paratype.

DISTRIBUTION. — Southeastern South Africa, off Transkei and Natal; 96-138 m.

HABITAT. — Sand and rubble substrate.

ETYMOLOGY. — Named for the research vessel *Meiring Naude*.

DESCRIPTION

Shield generally smooth, with few tufts of setae laterally; very slightly broader than long; anterior margin between nearly obsolete rostral lobe and lateral projections weakly concave; anterolateral margins terraced; posterior margin roundly truncate. Lateral projections produced, each with small marginal spine.

Ocular peduncles moderately long, 0.60-0.80 length of shield; one or two stiff setae on mesial surface and one or two tufts of thinner setae on

dorsal surface; corneae dilated, maximal corneal width included 1.5-2.0 times in peduncular length; ocular acicles triangular, terminally subacute, with small submarginal spine.

Antennular peduncles overreaching distal margins of corneae by 0.25-0.35 length of ultimate segment. Ultimate segment with one or two dorsodistal setae and one or two widely-spaced tufts on dorsal surface. Basal segment with small spine on lateral face.

Antennal peduncles reaching to or nearly distal margins of corneae. Fifth and fourth segments with few moderately stiff setae. Third segment with small spine at ventrodistal angle, partially obscured by long stiff setae. Second segment with dorsolateral distal angle produced to approximately mid-length of fourth segment, with terminal spine and few stiff setae; dorsomesial distal angle with small spine. First segment with distolateral margin unarmed, ventrolateral margin with one to three small spines distally. Antennal acicle reaching to distal half of fifth peduncular segment, arcuate, terminating in strong spine, and with sparse tufts of long setae on mesial face. Antennal flagellum long, with one or two short setae every two to six articles, at least proximally.

Chelipeds generally similar; right cheliped slightly stouter and distinctly longer than left. Dactyl 0.75-0.80 length of palm; dorsomesial margin with three or four small spines proximally; dorsal and mesial surfaces with numerous long setae providing very setose marginal appearance; dorsal midline with row of moderately small spines, not reaching to tip; cutting edge with several calcareous teeth in proximal 0.75, corneous teeth distally, terminating in corneous claw and slightly overlapped by fixed finger. Palm slightly shorter than carpus; dorsomesial margin with irregular row of strong spines, dorsal midline slightly elevated and armed with row of similarly-sized spines extending onto fixed finger proximally; dorsolateral margin also with row of moderately strong spines, decreasing in size proximally on palm and distally on fixed finger, but not extending to tip; dorsal surface otherwise unarmed (holotype) or with cluster of four small spines distomesially; dorsal surface of palm distally and fixed finger proximally with long, moderately

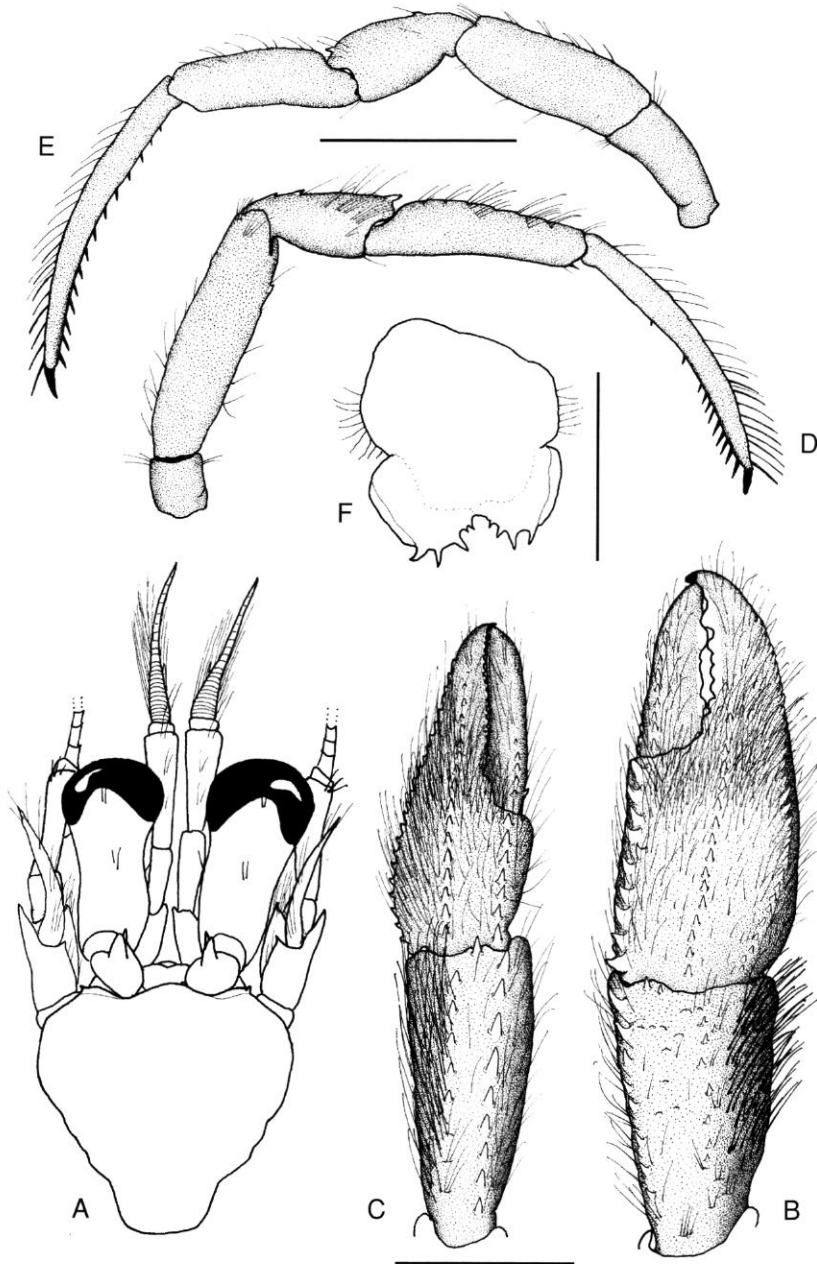


FIG. 6. — *Nematopagurus meiringae* n.sp., holotype ♂ (SL 2.8 mm), Meiring Naude strn J3 (MNHN Pg 5544); **A**, shield and cephalic appendages; **B**, carpus and chela of right cheliped (dorsal view); **C**, carpus and chela of left cheliped (dorsal view); **D**, right second pereopod (lateral view); **E**, left third pereopod (lateral view); **F**, telson. Scale bars: A-C, 2 mm; D, E, 3 mm; F, 1 mm.

dense setae, remainder of dorsal surface of palm and fixed finger with sparser covering of moderately short to moderately long setae, partially concealing armature; mesial and lateral faces with transverse ridges and long setae; ventral surfaces of palm, fixed finger and dactyl all with scattered long setae. Carpus slightly longer than merus; dorsomesial margin with row of strong spines and long stiff setae, dorsal surface with few low protuberances, dorsodistal margin with prominent spine and one much smaller spine; dorsolateral margin not distinctly delimited, but with row of much smaller spines and transverse rows of long, very stiff, iridescent setae extending onto lateral face; mesial face also with transverse rows of long setae; ventrolateral distal angle with adjacent small spine. Merus with short transverse rows of stiff setae; ventromesial margin with row of three moderately widely-spaced spines in proximal 0.65; dorsolateral margin with one or two prominent and one or two smaller spines in proximal 0.75; ventral surface with transverse

rows of setae. Ischium with few tufts of setae dorsally and ventrally.

Left cheliped with dactyl 0.10-0.30 longer than palm; dorsomesial margin with long setae partially concealing strong spine near proximal angle; dorsal surface with short proximal row of four or five small spines in midline and numerous long setae; mesial face with short perpendicular rows of long setae dorsally and ventrally. Palm approximately 0.50-0.55 length of carpus; dorsomesial margin with long setae not concealing row of moderately strong spines; dorsolateral margin with dense long setae at least partially concealing row of spines decreasing in size on fixed finger but not extending to tip; dorsolateral surface unarmed, but with covering of long moderately dense setae, dorsal midline with row of spines becoming considerably smaller on fixed finger and not extending to tip; dorsomesial surface of palm unarmed, but with sparser covering of long setae. Carpus with row of strong spines and long setae on dorsomesial margin; dorsolateral margin also with long setae par-

TABLE 1. — Characters distinguishing *N. gardineri* Alcock, 1905 from *N. meiringae* n.sp.

Character	<i>N. gardineri</i> Alcock, 1905	<i>N. meiringae</i> n.sp.
Ocular peduncles	Nearly equal to length of shield	Approximately 0.80 of shield length
Corneal diameter	Included approximately 3 times in peduncle length	Included 1.5-2 times in peduncle length
Right cheliped: dactyl	Row of spines on dorsomesial margin; dorsal surface with few tufts of setae spines	3-4 proximal spines on dorsomesial margin; dorsal surface with median row of spines
Right cheliped: palm	Dense long setae proximally on dorsal surface; dorsal surface mesially and laterally each with 2 rows of small spines	Dense long setae distally on dorsal surface; dorsal surface mesially and laterally unarmed or cluster of few spines mesially
Right cheliped: carpus	Dorsal surface with iridescent sheen	Dorsal surface without iridescent sheen
Left cheliped: dactyl	Row of spines on dorsomesial margin; dorsal surface with few tufts of setae	1 spine on dorsomesial margin proximally; dorsal midline with row of 4 or 5 spines
Left cheliped: palm	Dense long setae on dorsal surface proximally; dorsomesial and dorsolateral surfaces each with several small spines	Dense long setae on lateral surface extending onto fixed finger; dorsomesial and dorsolateral surfaces unarmed
Telson	Terminal margins each with several strong spines interspersed with smaller spines and extending onto lateral margins	Terminal margins each with 1 or 2 small spines near midline, 3 large spines laterally, and not extending onto lateral margins

tially concealing short row of smaller spines; dorsodistal margin with one small spine; mesial and lateral faces with low protuberances and tufts of setae, ventrolateral margin with spinule at angle. Merus with few long setae dorsally; ventromesial margin with row of three widely-spaced spines in proximal 0.75; ventrolateral margin with three spines in distal half; ventral surface with few long setae. Ischium with sparse tufts of setae dorsally and ventrally.

Ambulatory legs with dactyls 1.40-1.60 longer than propodi; dorsal margins each with row of long corneous bristles in distal half and moderately long stiff setae proximally; ventral margins each with eight to thirteen corneous spines. Propodi of right longer than left; dorsal surfaces each with low protuberances and short to moderately long stiff setae; ventral surfaces each with corneous spine at distal margin and one additional corneous spine in distal half (paratype only), tufts of stiff setae proximally. Carpi each with dorsodistal spine, on second pereopod separated by low protuberances and tufts of stiff setae from two small spines in proximal half. Meri each with low protuberances and tufts of stiff setae dorsally and ventrally; second often also with small spine on ventral margin in distal 0.25. Fourth pereopods missing in both holotype and paratype. Sternite of third pereopods subsemicircular, and slightly skewed to left, with marginal long setae.

Well developed right sexual tube forming one or two loops. Telson with transverse indentation suggesting separation into anterior and posterior portions; asymmetrical posterior lobes separated by shallow median cleft, terminal margins each with three strong spines and one or two smaller spines; lateral margins each with distinct chitinous plate.

COLOUR
Not known.

REMARKS

Alcock's (1905a, b) description of *N. gardineri* was based on a specimen collected by E. Stanley Gardiner, whose materials have, for the most part, been deposited in the collections of the University Museum of Zoology, Cambridge, U. K. Having now examined Alcock's type speci-

men, an ovigerous female (SL 2.1 mm), it is not difficult to understand why Kensley (1969) thought he was reporting Alcock's taxon. With the exception of the shorter and more broadly dilated corneae, *N. meiringae* n.sp. is superficially quite similar to Alcock's (1905a: pl. 68, fig. 3; 1905b: pl. 12, fig. 2) illustrations. However, as may be seen from table 1, when the two species are critically evaluated, there is no doubt of their distinctiveness. Whether other reports of *N. gardineri* (i.e. Miyake 1978; Haig & Ball 1988) actually represent Alcock's (1905a, b) taxon, *N. meiringae*, or other, possibly undescribed species of the genus, remain to be determined.

Nematopagurus spinulosensoris

McLaughlin *et* Brock, 1974

(Fig. 7)

Nematopagurus spinulosensoris McLaughlin *et* Brock, 1974: 246, figs 1-3. — McLaughlin & Lane 1975: 520, pls 1-3. — McLaughlin 1997: 510, figs 20d, 41a, b.

Nematopagurus spinulosensorius — Türkay 1986: 139 (misspelling).

Nematopagurus muricatus — Thompson 1943: 424. — Miyake 1978: 129; not *Nematopagurus muricatus* (Henderson, 1896).

? *Nematopagurus* sp. — Kensley 1978: 258, fig. 4.

MATERIAL EXAMINED. — **South Africa.** Th. Mortensen's Java-South Africa Expedition, stn 24, off Durban: 1 ♀ SL 6.9 mm (ZMUC CRU 2663). — Off Natal, *Meiring Naude* stn A-14, 31°08.9'S - 30°15.7'E, 111 m, VIII.1981: 1 ♂ SL 8.7 mm (PMcL). — Stn X3, 30°22.6'S - 30°50.8'E, 124 m, 19.VIII.1981: 1 ♀ SL 4.4 mm (PMcL). — Stn X6, 30°23.2'S - 30°50.8'E, 140 m, 19.VIII.1981: 1 ♂ SL 6.5 mm (PMcL).

DISTRIBUTION. — Hawaiian Islands; Japan; Maldive Islands, Indonesia; east coast of South Africa; 111-250 m.

HABITAT. — Sand and sponge rubble.

DIAGNOSIS. — Shield longer than broad. Rostrum usually obtusely rounded, occasionally obtusely triangular. Ocular peduncles overreached by both antennular and antennal peduncles; corneae usually strongly dilated.

Ocular acicles acutely triangular, moderately slender, with prominent longitudinal furrow and very strong submarginal spine.

Chelipeds subequal, right usually somewhat larger; chelae and carpi of both chelipeds with numerous sensory-modified spines on dorsal surfaces. Right cheliped with dorsal surface of dactyl generally flattened, dorsomesial margin, or dorsal surface mesially, usually with irregular longitudinal row of unmodified small spines or tubercles. Palm with irregular single or double row of modified or unmodified moderately strong spines on dorsomesial margin; dorsal surface with several irregular rows of customarily modified spines, extending onto fixed finger proximally; dorsolateral margin with single or double row

of moderately strong, usually modified spines, extending onto fixed finger as single row of blunt modified or unmodified spines or tubercles. Carpus with row of strong unmodified spines on dorsomesial margin; dorsal surface with very irregular rows of moderately strong, generally modified spines; laterodistal margin with acute spine. Distal margin of merus usually with one to three strong acute spines; ventrolateral margin with row of few to several strong spines; mesiodistal margin and ventromesial face distally usually with few small spines.

Left cheliped with short row of small unmodified spines or spinulose tubercles usually in dorsal midline of dactyl. Palm with single or double row of frequently modified spines on dorsome-

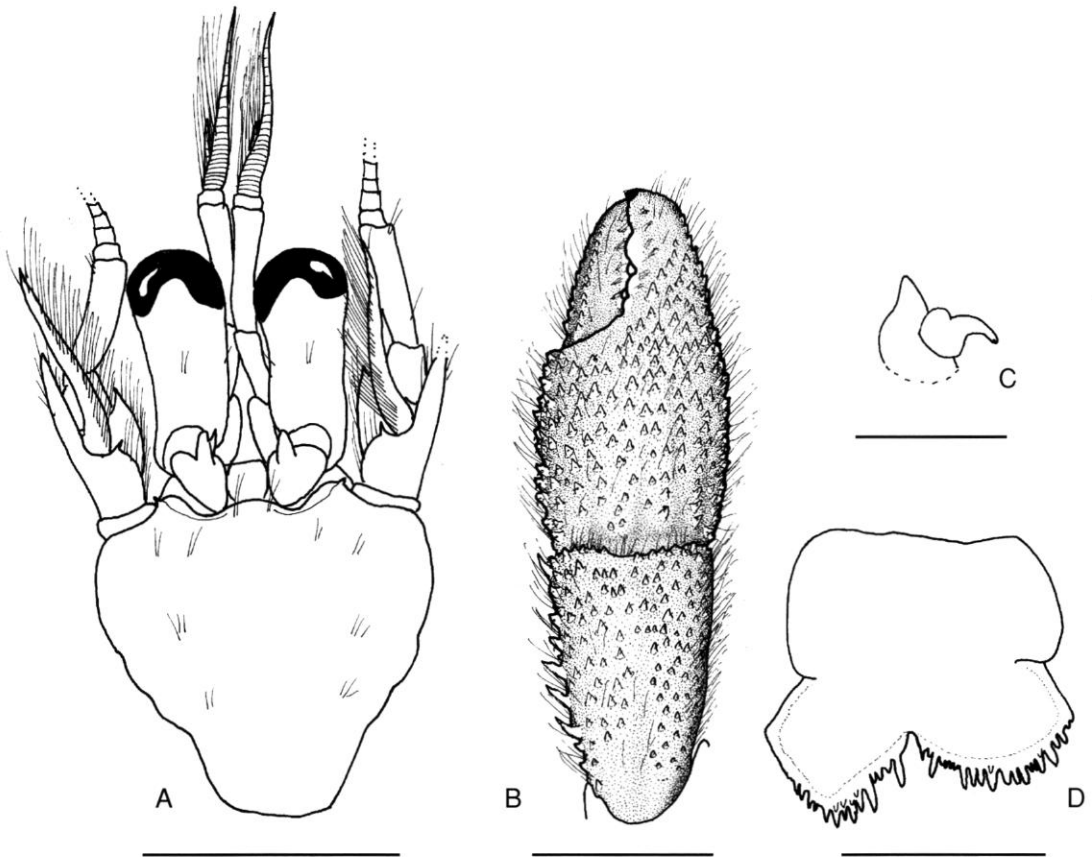


FIG. 7. — *Nematopagurus spinulosensoris* McLaughlin et Brock, 1974, ♂ (SL 6.5 mm), Meiring Naude stn X6 (PMCL); A, shield and cephalic appendages; B, carpus and chela of right cheliped (dorsal view); C, enlargement of single sensory-modified spine; D, telson. Scale bars: A, B, 5 mm; D, 2 mm; C, 0.5 mm.

sial margin; dorsal midline with two or three irregular rows of usually modified spines extending onto fixed finger; dorsolateral margin with double or triple row of small modified spines proximally becoming single row of small unmodified spines or tubercles on fixed finger. Carpus with row of frequently unmodified spines on dorsomesial margin; dorsal surface with two or three irregular rows of modified spines proximally, tending to cluster distally, distal margin occasionally with one or two spines; dorsolateral margin with single or double row of commonly modified spines. Merus with one to three spines on distal margin; ventromesial and ventrolateral margins each with one row of spines.

Second and third pereopods generally similar. Dactyls long, slender; ventral surfaces each with one row of ten to fifteen strong corneous spines. Carpi each with one row of strong spines on dorsal surfaces. Sternite of third pereopods with subsemicircular anterior lobe, anterior margin with long stiff setae.

Coxa of left fifth pereopod with vas deferens usually slightly protruded. Telson with posterior lobes subtriangular or subquadrate, left usually slightly larger; separated by very shallow median cleft; terminal and usually also lateral margins weakly calcified, terminal margins rounded or somewhat oblique, each with numerous small calcareous spines marginally and several stronger calcareous acute or blunt spines submarginally; lateral margins unarmed or occasionally each with one row of small calcareous spines or spinules.

COLOUR

In life: chelipeds and ambulatory legs generally vivid salmon-pink, bordering on iridescent; antennal flagella bright yellow.

In preservative: shield pale orange or straw-colored; ocular peduncles light orange with dark orange ring proximally. Chelipeds very pale orange with white spines; carpi with darker red-orange proximally and ventrally. Ambulatory legs pale orange with lighter longitudinal stripes on dactyls and propodi; carpi pale orange with darker red-orange proximally; meri pale orange and white (McLaughlin & Brock 1974).

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