SCI. MAR., 57(1): 41-49 SCIENTIA MARINA 1993

Domicola lithodesi n. gen. n. sp. (Amphipoda: Calliopiidae), inhabitant of the pleonal cavity of a South African lithodid crab*

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SUMMARY: *Domicola lithodesi*, a new genus and species of gammaridean amphipod is described. It is placed in the family Calliopiidae. Two specimens, a male and a preparatory female, were collected in August 1990 from the pleonal cavity of the lithodid crab *Lithodes ferox* (Filhol, 1885), an anomuran crab caught at 300 m depth from off Namibia. The more relevant characters are: anophtalmous; body smooth, gammarid-like, male smaller than female, urosomite 1 with a prepeduncular spine; telson broad, entire, unlobed and unarmed; short rostrum; accessory flagellum scale-like, calceoli absent; lower lip without inner lobes; coxa 4 posteriorly excavated; gnathopods basic, subequal, with numerous palmar spines; dactyls on P3-7 with specialized adhesive organs; coxal gill 7 present; uropods eusirid type.

Key words: Domicola lithodesi Amphipoda, Calliopiidae, SW Africa, new genus, new species.

RESUMEN: *Domicola lithodesi* N. GEN. N. SP. (AMPHIPODA: CALLIOPIIDAE), HABITANTE DE LA CAVIDAD PLEONAL DE UN CANGREJO LITÓDIDO DEL SUR DE ÁFRICA. — Se describe *Domicola lithodesi*, nuevo género y especie de anfípodo perteneciente a la familia Calliopiidae. Dos ejemplares anoftalmos, macho y hembra, fueron colectados en agosto de 1990 procedentes de la cavidad pleonal del cangrejo litódido *Lithodes ferox* (Filhol, 1885), capturado a unos 300 m de profundidad frente a las costas de Namibia. Los caracteres más relevantes son: anoftalmia; cuerpo liso, gammariforme, macho menor que la hembra, urosomito 1 con espina prepeduncular; telson grueso, entero, no bilobado e inerme; rostro breve; flagelo accesorio escamoso, vestigial, calcéolos ausentes; faltan los lóbulos internos del labio inferior; placa coxal 4 excavada posteriormente; gnatópodos básicos, ovales subiguales, con numerosas espinas palmares; dáctilos 3-7 con órganos adherentes especializados; branquia coxal 7 presente; urópodos de tipo eusírido.

Palabras clave: Domicola lithodesi, Amphipoda, Calliopiidae, SO África, nuevo género, nueva especie.

INTRODUCTION

The amphipod described herein is part of the material collected during the BENGUELA cruises off Namibia in order to develop fishery research in the upwelling area of the Benguela current between 1979 and 1990. The study area is located between latitudes 23°S and 30°S and between 100 and 500 m depth (ABELLÓ and MACPHERSON, 1991).

*Received February 4, 1992. Accepted April 27, 1993.

MATERIAL AND METHODS

Two specimens are available, male and female. Both were in a premoulting stage when collected, since a new tegument was already developed below the actual. Individuals were found within the pleonal cavity of a male of the anomuran crab *Lithodes ferox* (Filhol, 1885) (Family Lithodidae), whose cephalothoracic length was 128 mm. The crab was caught on August, 7, 1990, at a depth of 295-306 m off Namibia (24°13′ S, 13° 38′ E).

The specimens were cleared with lactic acid and stained with chlorazole black; after dissection they were stored as mounts in Faure. Seven slides with

body parts and appendages are preserved in the Institut de Ciències del Mar collection (Barcelona).

A number of papers dealing with the amphipod fauna of southern Africa and deep water amphipods have been available to check the significance of the present description (STEBBING, 1910; K. H. BARNARD 1916, 1932, 1940; J. L. BARNARD, 1961, 1969; GRIFFITHS, 1974, 1976), including the recent availability of an updated general set of keys and descriptions for worldwide marine gammaridean amphipods (BARNARD and KARAMAN, 1991).

Domicola n. gen.

Etymology: Domicolous is a common term for amphipods having a house or a fixed residence; from latin *domus*,house.
Gender: Masculine.

Diagnosis: Body compressed, smooth, without dorsal processes, carina or spines; rostrum short. Antennal sinus shallowly emarginate. Eyes absent. Urosomite 1 with prepeduncular spine. Telson entire, short, deep, slightly longer than wide, with rounded unarmed margins. Antennular peduncle short, segments progressively shortened, third segment not produced; accessory flagellum unisegmented, scale-like; calceoli absent on both sexes. Epistome upper lip with keeled projection. Mouthparts basic. Mandibular left lacinia mobilis 7-dentate, right 3-dentate; molar triturative; subequal length of segments 2 and 3 of palp. Lower lip without inner lobes. Maxilla 1 with elongated lobes, palp longer than outer lobe, this one with 11 spine teeth. Maxilla 2 inner plate shorter than outer plate and without facial setae, but with two distinct medial setae. Maxilliped with pectinated palp segment 3 and non spinose inferior margin of segment 4, unguis short. Gnathopods basic, not eusirid type, with unlobed non-elongated carpus and oval propodus; G2 subequally shaped and slightly larger than G1. Coxae ordinary, coxa 4 with posterior excavation. Pereopods not elongate, simple, segment 2 of P5-P7 posteriorly lobate; presence of adhesive structures on inner face of dactyls of P3-P7; unguis short. Gills simple, on coxae 2-7. Epimeral plates smooth, with short ventral spines. Uropods eusirid type, outer rami shorter than inner rami; uropod 3 not extended beyond uropod 1, rami lanceolate, longer than peduncle, spinose.

Domicola lithodesi n. sp.
(Figs. 1-5)

Etymology: from *Lithodes*, its supposed host where it was found: inhabiting *Lithodes* house.

Description: *Male holotype* (Fig. 1,b). Length: 6.8 mm. Eyes absent. Colour in preserved state yellowish. Body laterally compressed, not carinate, with smooth dorsum part of metasome and urosome segments, and with poorly setose appendages. Urosome segments free. Head (Fig. 2,a) with a short triangular rostrum, well marked lateral lobes and shallow antennal sinus (Fig. 2,b). Urosome segment 1 with a prepeduncular ventral spine near the basis of the uropod. Telson (Fig. 2,h) broad, not laminar, 1.07 times longer than wide, entire, without traces of lobes and with rounded posterior margin, lacking spines, but with row of small setae in oblique line proximally on each dorsolateral part. Small sensory setae on posterior margin.

Lateralia (Fig. 2,g) of the foregut armature (Fig. 2,f) (COLEMAN, 1991; 1992) with marginal row of 13 strong spines, and irregularly placed thin setae. Furthermore, there are 3 strong but short spines at the ventral basis of that row, on outer face of the lateralia.

Antenna 1 (Fig. 3,a, flattened after slide pressure) lacking distal flagellum segments, being therefore shorter than half the body length. Peduncle with short segments of decreasing length from 1st to 3rd. Flagellum at least of 26 segments, the proximal 11 wider than long, then progressively more elongate. Roughly half of the segments bear distally an olfactory seta, length of which encompasses that of corresponding segment. Accessory flagellum (Fig. 3,b) rigid and unisegmented, scale-like, shorter than first main flagellum segment and 4.7 times as long as wide. It bears 1 apical, 2 subapical and 1 medial setae. Setae or spines on peduncle segments short, thin and mainly limited to distal part of segment.

Antenna 2 (Fig. 3,c, flattened) missing distal flagellum segments as well. Segments poorly armed and not strongly elongated like those of antenna 1. Gland cone short. Up to 17 flagellum segments conserved, progressively elongated, lacking calceoli. First segment slightly longer than second plus third.

Upper lip (Fig. 2,e) entire, with rounded ventral margin. Distally, in front of epistome, it develops free dorsal helmetlike expansion, triangular and pointed apically in frontal view.

Mandible (Fig. 3,d) basic, with a well developed ridged molar part. Incisor with 8-9 teeth. Lacinia mobilis asymmetric; on right mandible a trifid lacinia mobilis (Fig. 3,f), on left mandible a 7-dentate stronger lacinia (Fig. 3,e). Spine row composed of 7 lifting elements. First segment of the 3-segmented palp subquadrate, unarmed. Second segment as long as third, with long ventral setae. Third segment with a ventral margin straight, bearing 12 medium ventral, 2 subapical and 3 long apical setae; dorsally, 4 groups of

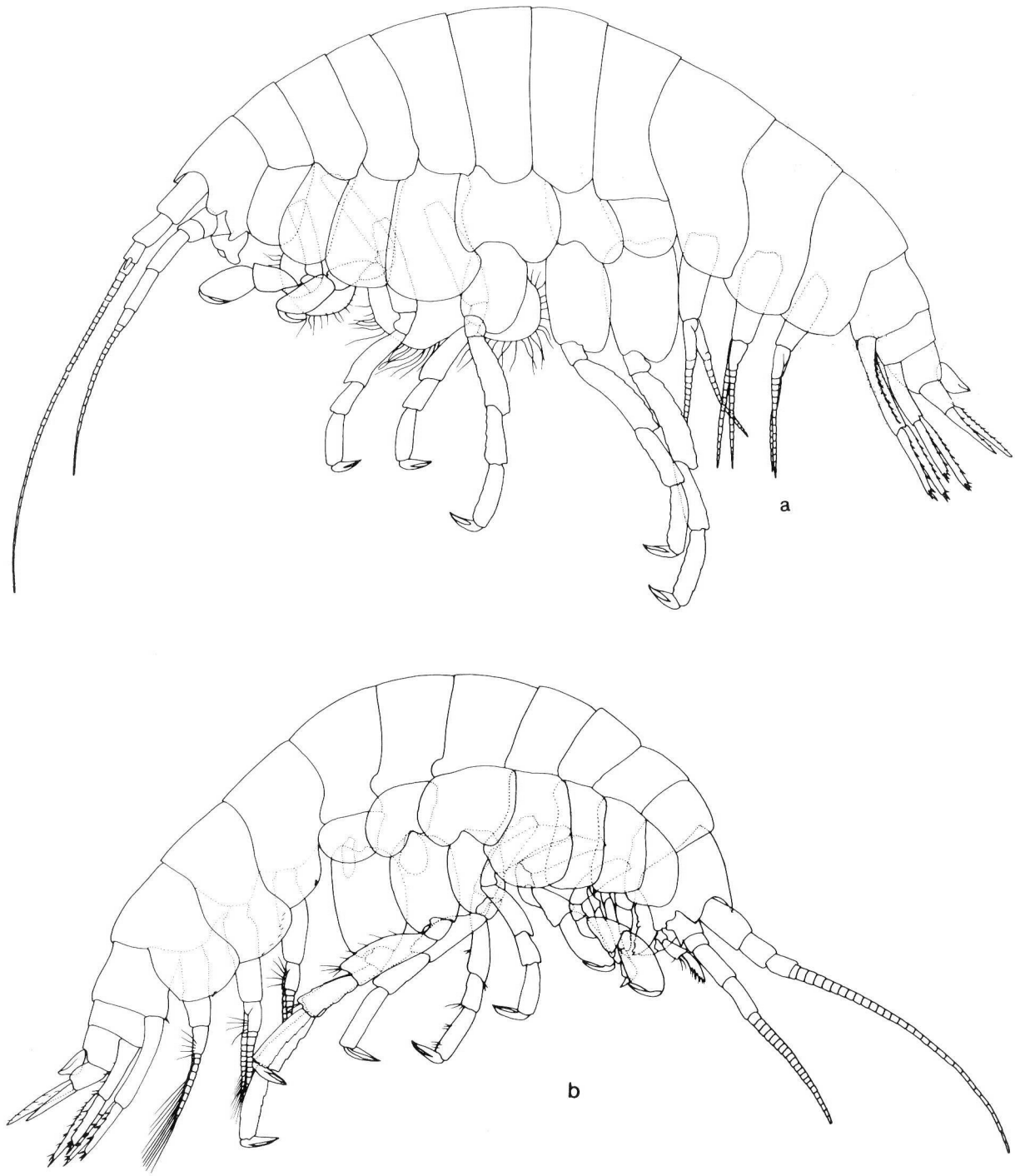

FIG. 1. — *Domicola lithodesi* n. gen., n. sp.: **a**, ♀ (A); **b**, ♂ (B).

1-2 setae; distal half of segment with rows of small scales, 4 acicules per row.

Lower lip (Fig. 3,h) symmetrical, finely setulose at distal part. Posterolateral processes of outer lobes well developed. Inner lobes absent.

Maxilla 1 (Fig. 3,i) with 10 setae on medial margin of an elongated inner plate. Outer plate with 11 strong spines medially serrulate; medial spines expanded distally, with distinct hooked tip, whereas lateral spines are regularly tipping. Palp bisegmented, widely overreaching distal margin of outer plate. Second segment 3 times as long as first, with 7 strong spines and 3 setae on the right maxilla. Left maxilla (Fig. 3,j) similar to right, although with thinner spines.

Maxilla 2 (Fig. 3,k) with two well developed

FIG. 2. — *Domicola lithodesi* n. gen., n. sp.: **a**, head ♂ dorsally (C); **b**, ♂ antennal sinus (E); **c**, head ♀ (C); **d**, ♀ epistome (C); **e**, ♂ upper lip (D); **f**, ♂ foregut (D); **g**, detail of the lateralia (G); **h**, ♂ telson (D); **i**, ♀ telson (E); **j**, ♂ epimeral plates 1-3 from right to left (C).

plates; inner plate with a somewhat pointed distal margin. Distal margin of outer plate bordered with row of 15 setae and overlapping row of 11 short and 2 stouter setae. Distal margin of inner plate with two rows of 12 setae. Facial setae absent. Medial margin with 2 stouter setae. Inner plate of left maxilla 2 reduced in male (Fig. 3,l).

Maxilliped (Fig. 3,m) with the inner plate reaching 1/3 of length of second palp segment. Its distal margin bears 2 wide and short spines. Tip of outer

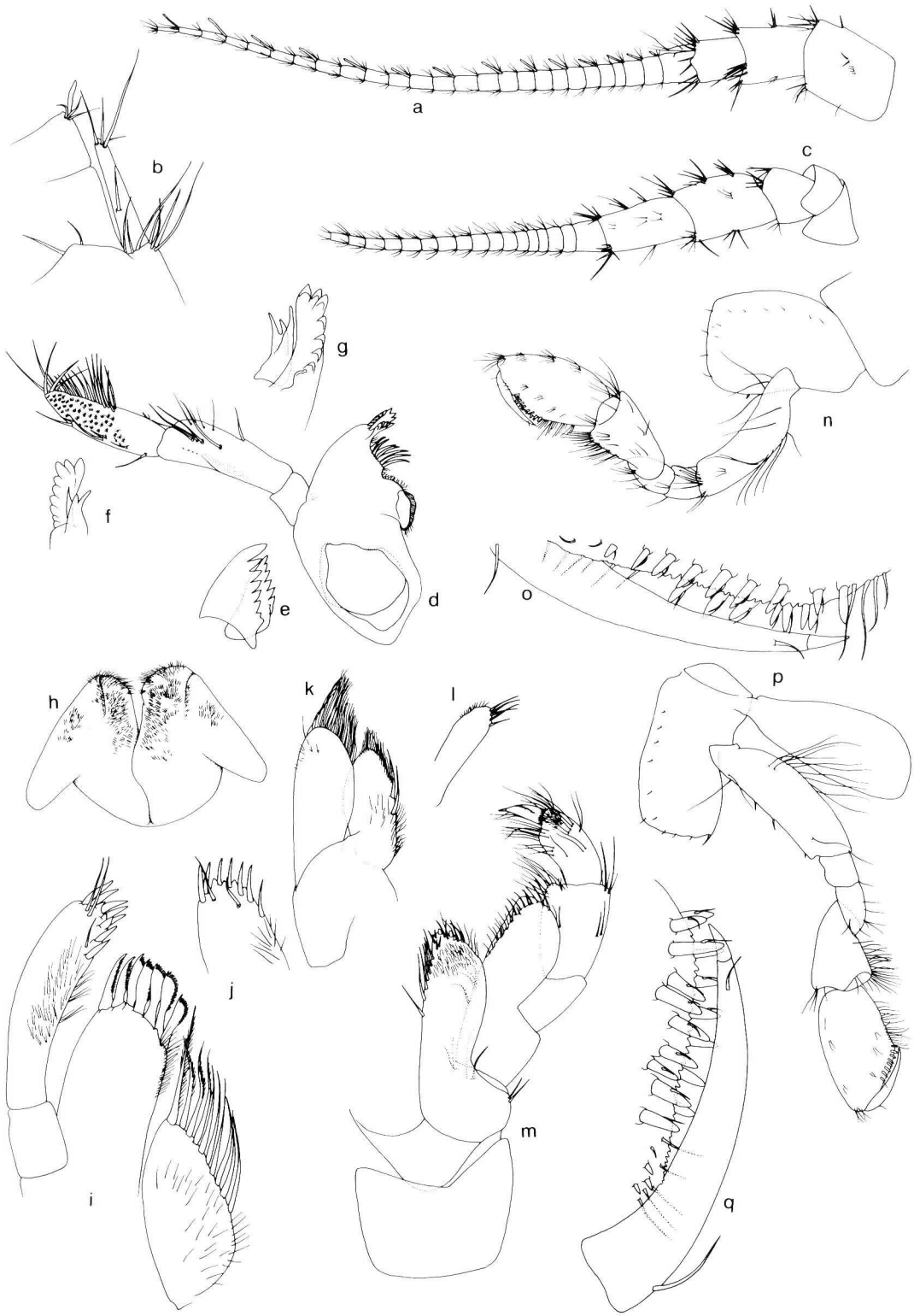

FIG. 3. — *Domicola lithodesi* n. gen., n. sp.: **a**, ♂ antenna 1 (C); **b**, ♂ accessory flagellum (F); **c**, ♂ antenna 2 (C); **d**, ♂ left mandible (D); **e**, ♂ left incisor and lacinia to next moult (F); **f**, ♂ right incisor and lacinia (F); **g**, ♀ right incisor and lacinia (F); **h**, ♂ lower lip (D); **i**, ♂ right maxilla 1 (F); **j**, ♂ left maxilla 1, tip of palp (F); **k**, ♂ right maxilla 2 (D); **l**, ♂ left maxilla 2, inner lobe (D); **m**, ♂ maxilliped (D); **n**, ♂ gnathopod 1 (C); **o**, detail of the palm (G); **p**, ♂ gnathopod 2 (C); **q**, detail of the palm (G).

plate not reaching distal margin of second palp segment, lacking spines, and provided with row of medial setae placed submarginally. Palp 4-segmented, segment 3 distally barbulate and with a row of spines. Unguis very short.

Coxal plates 1-4 large, longer than wide, with rounded ventral margins, poorly setose. Posterior margin of coxae 1-3 scarcely spinose; posterior margin of coxa 4 smooth, emarginate. Coxae 5-6 bilobed, posterior lobe setose, that of coxa 6 deep, the ante-

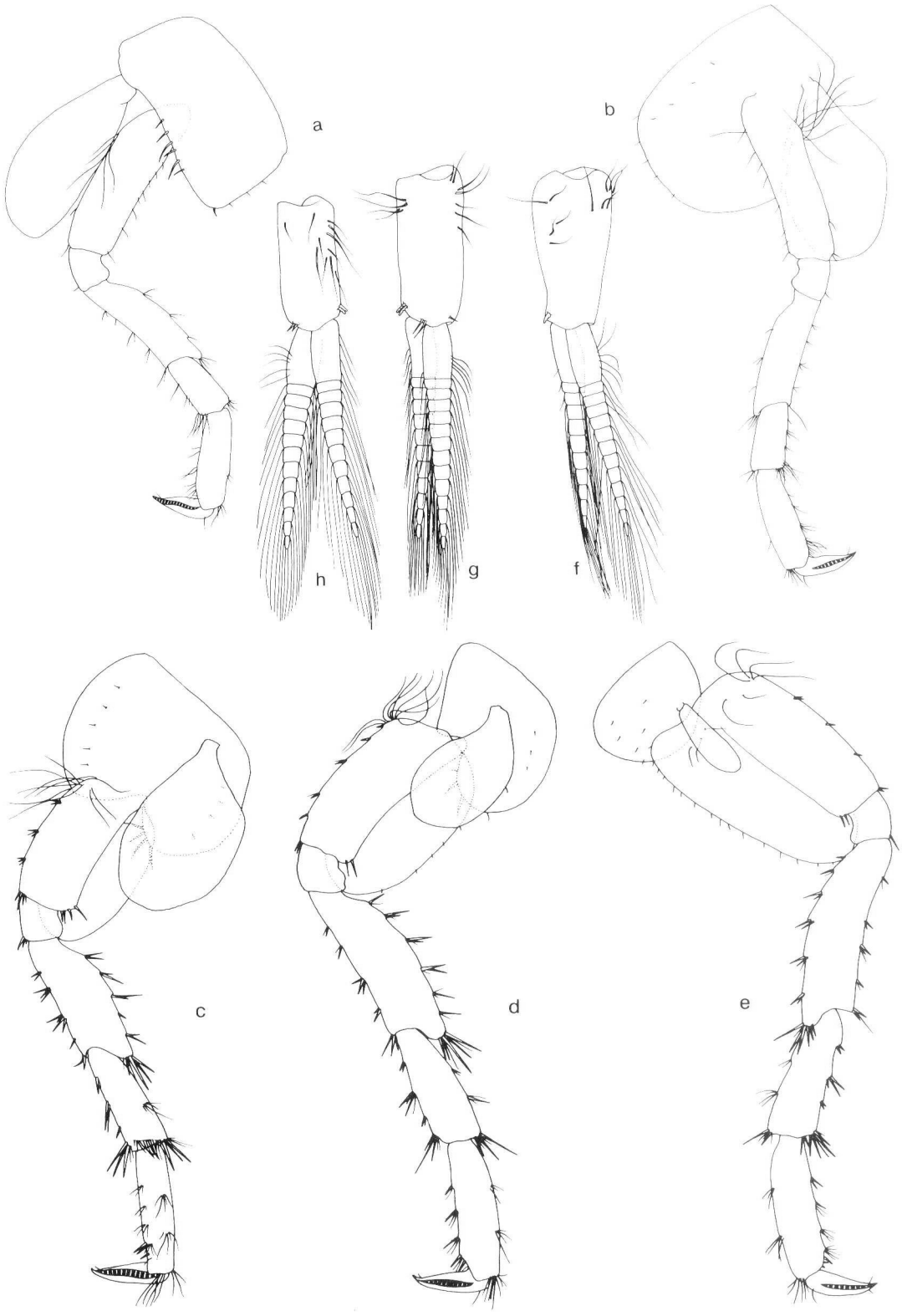

FIG. 4. — *Domicola lithodesi* n. gen., n. sp.: **a**, ♂ pereopod 3 (C); **b**, ♂ pereopod 4 (C); **c**, ♂ pereopod 5 (C); **d**, ♂ pereopod 6 (C); **e**, ♂ pereopod 7 (C); **f**, ♂ pleopod 1 (C); **g**, ♂ pleopod 2 (C); **h**, ♂ pleopod 3 (C).

rior lobe reduced. Coxa 7 semicircular, unarmed, only with sensory setae. Gills large and globose on P2-6, reduced in P7. Stalks short.

Gnathopod 1 (Fig. 3,n) subchelate, oval; propodus 1.25 times longer than carpus, this unlobed. Palmar margin (Fig. 3,o) serrate, half as long as propodus, armed with 16 strong spines in two rows. Dactyl slender, unguis short. Gnathopod 2 (Fig. 3,p) a bit longer than 1; propodus 1.35 times longer than carpus. Palmar margin (Fig. 3,q) serrate, half as long as

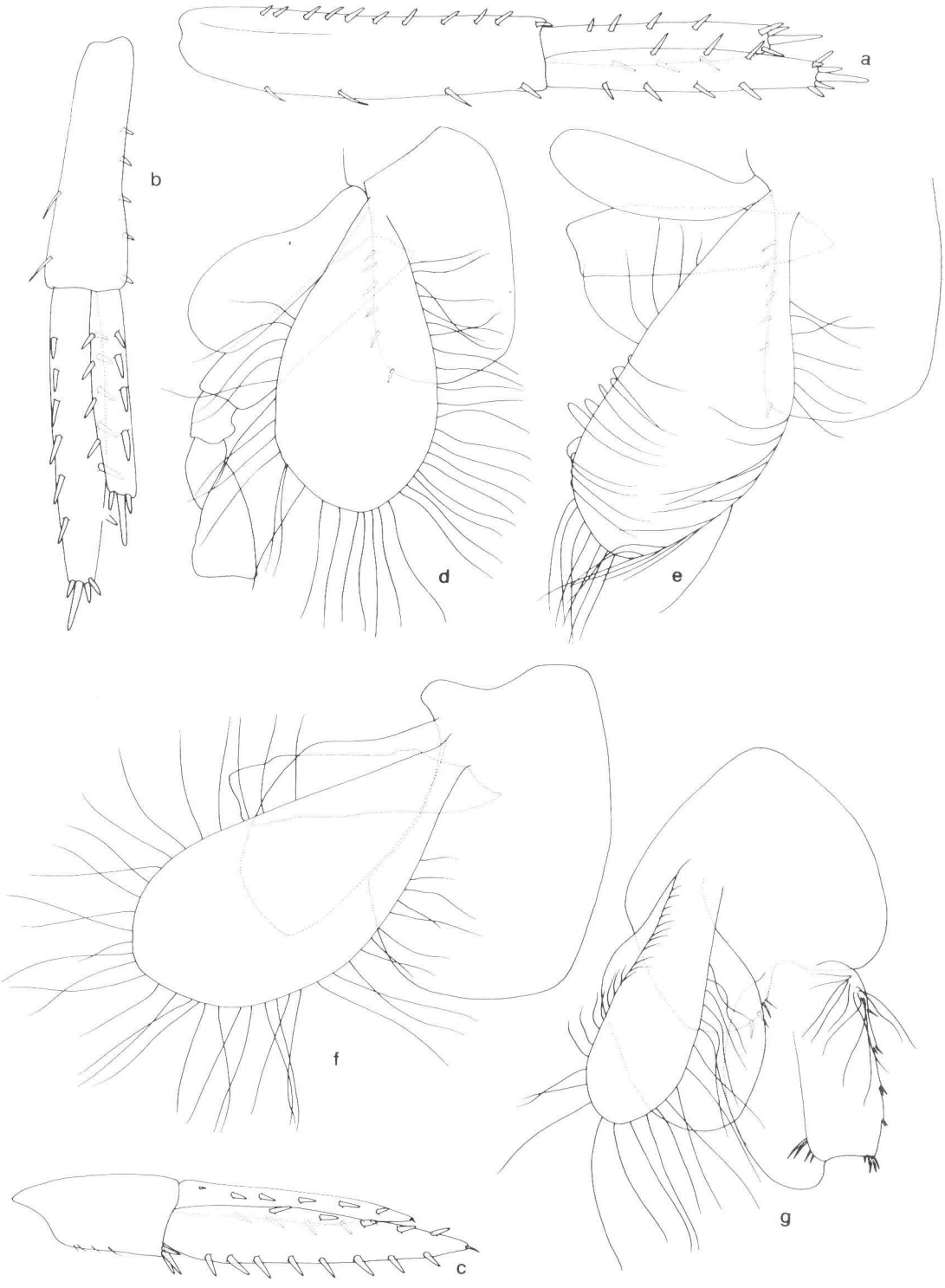

FIG. 5. — *Domicola lithodesi* n. gen., n. sp.: **a**, ♂ uropod 1 (D); **b**, ♂ uropod 2 (D); **c**, ♂ uropod 3 (D); **d**, oöstegite 2 (C); **e**, oöstegite 3 (C); **f**, oöstegite 4 (C); **g**, oöstegite 5 (C).

segment, armed with 16 strong spines in two rows. Basis of both gnathopods with long and thin setae, mainly on posterior margin.

Pereopods (Fig. 4 a-e) with large dactyls perpendicular to propodus. Inner face of dactylus of P3-P7 with longitudinally transformed medial area, adhesive, of about 16-20 quadrangular subareas recognized. Each subarea is 12-16 μm long, looking as if made up of numerous parallel fibrilar structures with 0.8 μm intervals. The overall structure protrudes be-

yond dactylar surface, and shows a planar or subconcave surface apparently to make adhesion effective. The outer face of dactyls of P3-P7 bear a small unconspicuous unguis-like tooth subdistally.

Pereopods 3 and 4 subequal, P4 the longest. Segments setose, hardly spinose on basis and merus posterior margin. Carpus and propodus are short, twice and 3 times as long as wide, for both pereopods. Pereopods 5-7 increase progressively in length. Basis posteriorly slightly expanded; when seen on inner face, distinct primitive straight basis is recognizable, even with a set of setae on the posterodistal margin. Posterodistal corner of lobes strongly overhanging. Merus armed with spines on anterior and posterior margins. Carpus and propodus with spinose anterior and setose posterior margins.

Epimeral plates (Fig. 2,j) with almost rounded posterior angle, barely acute. Ventral margins with spines, lacking setae. Pleopods (Fig. 4,f-h) slightly decreasing in length in posterior direction. Peduncles with long setae and 1 (Pl 1) or 2 retinacula (Pl 2-3). Rami subequal, with many long plumose setae. Basal segments of the endopodites with 4 clothespeg spines on inner margin.

Uropods slender, spinose, scarcely setose, with well developed peduncle and rami. Uropod 1 (Fig. 5,a): peduncle with 11-12 dorsal and 4 medial spines, without basoventral spine; endopodite longer than exopodite, both armed with marginal and apical spines. Uropod 2 (Fig. 5,b) with increased differences in length between rami. Uropod 3 (Fig. 5,c) lanceolate, peduncle with thin medial and strong apical spines. Rami with two rows of spines and small apical spine.

Female allotype (Fig. 1,a). Length: 12.6 mm. Urosomite 1 prepeduncular spine present. Mouthparts as in male, right mandible with trifid lacinia mobilis (Fig. 3,g); inner plate of left maxilla 2 normal, not reduced. Propodus of second gnathopod 1.06 times longer than that of gnathopod 1, as in male. Gnathopods are not conspicuously different in relative size when compared with male. As a reference, propodus are 0.43 times longer than the length of coxa 4, whereas 0.57 in male. Oöstegites (Fig. 5,d-g) on coxae 2 to 4 broad, on coxa 5 more linear. Telson (Fig. 2,i) 1.2 times longer than wide.

Systematic position and affinities

Following BOUSFIELD's (1977) character state assumptions, *Domicola lithodesi* is characterized by the following apomorphic states: sexes similar (but for body size), reduced accessory flagellum, calceoli absent, eyes absent, poorly spinose maxillipedal plates, presence of rostrum, urosome dorsally smooth, smooth gnathopod dactyls, P4 longer than P3, basofacial spine absent, uropods non-setose and telson entire and unarmed.

Within the gammaroidean group and at a superfamily level (BOUSFIELD, 1982) the *Eusiroidea* contain 7 families with a major number of characters shared in *Domicola*, except for uncleft telson. This leads to the inclusion of the new genus within the family Calliopiidae, otherwise considered simply as eusiridpontogeneiids with fused telsonic lobes (BARNARD, 1969).

In turn, BARNARD and KARAMAN (1991) consider a single family, Eusiridae, that includes calliopiids, pontogeneiids and gammarellids, taking it as a primitive cluster of amphipods (see also BOUSFIELD, 1982) where a major basic common character is the reduction of the accessory flagellum. Furthermore, many genera have also reduced medial and facial setation on inner plates of maxilla 1. The basic gnathopods of the new species moves it away from strictly eusirids, whereas uropod morphology is in agreement with a typical eusirid, with spinose lanceolate and 1-segmented uropod-3 rami.

Calliopiidae (sensu BOUSFIELD, 1982; SCHRAM, 1986) generally leave a short apical V-notch remembering an ancestral bilobed telson, but retain also representatives with a fused unlobed telson, among which *Domicola* is placed. Within calliopiids, the special dactylar structures in *Domicola* remember the pectinate dactyls in such related genera as *Metaleptamphopus* Chevreux, 1911 and *Membrilopus* Barnard & Karaman, 1987 (BARNARD and KARAMAN, 1991), the morphologically closest relatives. Last genus, with its monotypic species *M. membrisetata* inhabiting deep waters of southwestern Africa, seems particularly close to *Domicola* in its overall morphology, and share in particular the presence of two distinct setae on medial margin of the inner plate of maxilla 2. Between calliopiids with oval, subchelate non-elongated gnathopod segments, the two genera commented share with *Domicola* the absence of lower lip inner lobes and the rounded posterior margin of telson. The main differences separating these genera are the strongly pectinate dactyls of pereopods, a diagnostic feature for *Membrilopus*, whereas neither a spinose pecten is found on dactyls in *Domicola*, nor are its adhesive organs placed on anterior sides (BARNARD, 1961), but on inner sides of dactyls. The anophtalmous condition is another major peculiarity for the new genus. Moreover, in *Metaleptamphopus pectinatus* there is not accessory flagellum and uro-

pods 3 are huge, and in *Membrilopus membrisetata* dactyls of maxilliped are spinose.

It is remarkable that a number of genera associated to decapod crustaceans have developed specific morphologies in dactyls, such as the prehensile subchelate pereopods in the anophtalmous *Bouvieriella*. This fact suggests to SHAW (1988) the possibility of some clinging association, that we ratify in *Domicola* by its location from within a decapod pleonal cavity, thus being not a mere result from an attraction to baited traps, but a consequence of an at least epibiotic or phoretic behaviour. Nevertheless, it is premature to assume the new species is an obligatory commensal.

In what concerns host distribution, it is interesting to note that the highest densities of *Lithodes ferox* are found between 400 and 500 m (ABELLÓ and MACPHERSON, 1986), with seasonal bathymetric differences in the size and sex distribution (ABELLÓ and MACPHERSON, 1991). Geographically, Namibian off-shore waters form one of the southernmost localities for *Lithodes ferox*, since the general distribution of this deep-water anomuran is basically in tropical West Africa, between Mauritania and Namibia (MACPHERSON, 1988; ABELLÓ and MACPHERSON, 1992).

ACKNOWLEDGEMENTS

Dr. R. Villanueva (Barcelona) collected the specimens. Dr. E. Macpherson (Barcelona) kindly provided all facilities to this study.

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Scient. ed. E. Macpherson.