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COPEPODA ASSOCIATED WITH ECHINOIDEA FROM THE WEST INDIES

by

JAN H. STOCK* & ARTHUR G. HUMES**

ABSTRACT

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Four species of Copepoda (three Siphonostomatoida, one Poecilostomatoida) are recorded as associates of shallow-water echinoids, from Curaçao, St. Martin, Jamaica, Puerto Rico, and the Bahamas. The siphonostomatoids *Chelacheres longipalpus* and *C. optans* belong to a new genus and species of the family Asterocheridae. Another species of the same family is provisionally attributed to *Asterocheres simulans* (T. Scott, 1898), previously recorded from Europe only. A fourth species, of the genus *Pseudanthessius* (family Pseudanthessiidae), belongs to a new species, *Ps. exilicornis.*

Key words: **Associated Copepoda, Asterocheridae, Pseudanthessiidae, West Indies, Echinoidea.**

INTRODUCTION

Copepod associates of echinoids have been recorded from the West Indies in papers by STOCK *et al.* (1963), HUMES & STOCK (1973), and STOCK & GOODING (1986). The first of the papers mentioned above describes *Pseudanthessius pectinifer* (on *Clypeaster rosaceus*) and *Meomicola amplectans* (on *Meoma ventricosa*), the second paper records *Macrochiron echinicolum* (on *Lytechinus variegatus,*

* c/o Institute for Systematics and Population Biology, University of Amsterdam, P.O. Box 94766, 1090 GT Amsterdam, The Netherlands.
** Boston University Marine Program, Marine Biological Laboratory, Woods Hole, MA 02543, U.S.A.

Echinometra viridis, and *Tripneustes ventricosus*), the third paper *Onychocheres alatus* (on *Diadema antillarum*). *Meomicola amplectans, Macrochiron echinicolum*, and *Onychocheres alatus* have been found again repeatedly, mainly in Curaçao (unpubl. records). The present paper describes the remaining copepods recovered from sea-urchins from Curaçao, St. Maarten (= St. Martin), Jamaica, Puerto Rico, and the Bahamas, viz. *Pseudanthessius exilicornis* n. sp. (on *Meoma ventricosa*), *Chelacheres longipalpus* n. gen., n. sp. (on *Echinometra lucunter, E. viridis,* and *Tripneustes ventricosus*), *Chelacheres optans* n. sp. (on *Echinometra lucunter*) and *Asterocheres* sp. [*cf. simulans* (T. Scott 1898)] (on *Lytechinus variegatus*).

MATERIAL AND METHODS

The hosts were collected by skin- or SCUBA-diving and directly isolated in plastic bags. Only in one case, the host was procured by dredging. In the laboratory, the hosts were placed in a 7% solution of magnesium-chloride or 5% ethanol in sea water. After a couple of hours, the associates are anaesthetized, and can be washed off, sorted under a dissecting microscope, and preserved in ethanol 70%. Entire specimens were studied in lactophenol or lactic acid, dissected specimens were mounted in Reyne's modification of Faure's medium.

Copepods treated in this paper have been deposited in the Zoölogisch Museum Amsterdam (ZMA) and the National Museum of Natural History (USNM), Smithsonian Institution, Washington.

TAXONOMIC PART

Family **PSEUDANTHESSIIDAE**

Genus **Pseudanthessius** Canu, 1889

Pseudanthessius exilicornis n. sp.

(Figs. 1-4)

Material: Frequent associate of the irregular echinoid, *Meoma ventricosa* (Lamarck), Curaçao (Netherlands Antilles). 1 ♀ (holotype), 1 ♂ (allotype), 157 paratypes, Piscadera Bay, between Hilton buoy and First buoy, in fine coral sand, depths between 2.5 and 13 m, various dates in 1973, 1974, and 1984 (ZMA Co. Co. 201.508).

Description: Female: Body length 1.06-1.21 mm, greatest width of cephalosome 0.42-0.48 mm (n=10). Ovisac 492 × 203 µm, containing a small

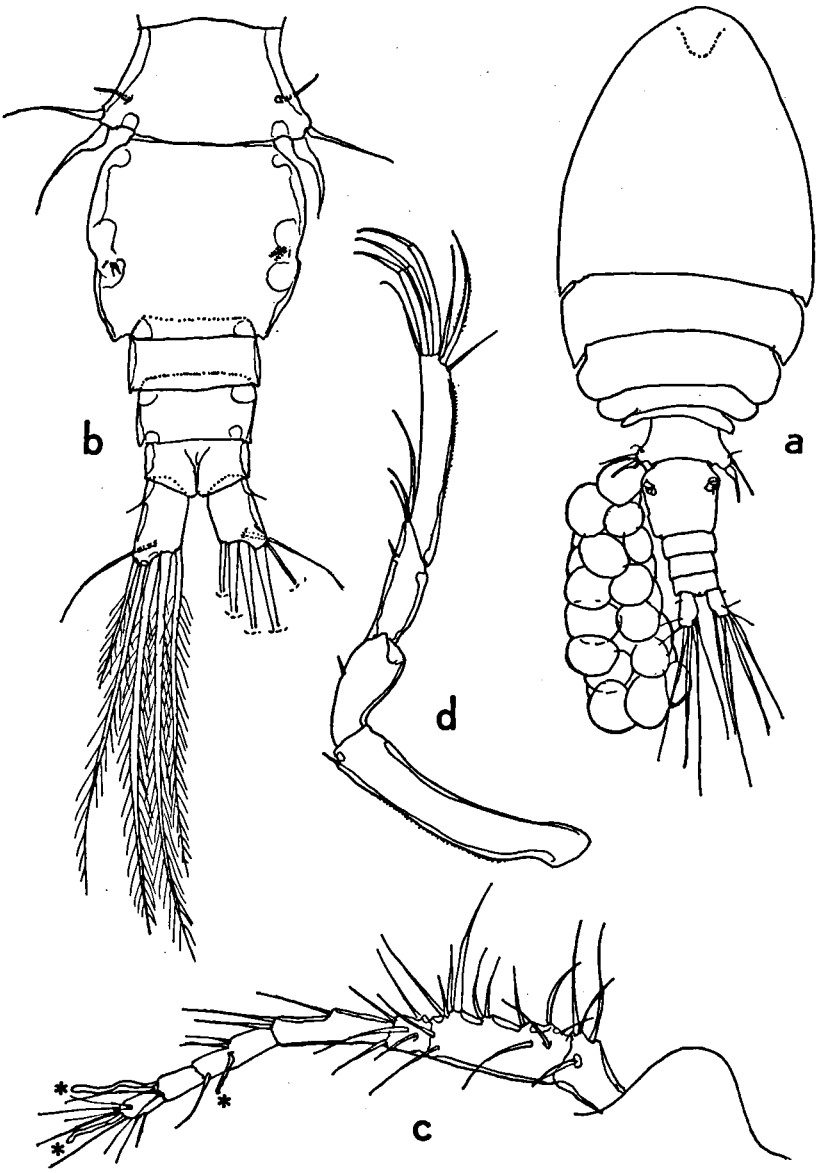

FIG. 1. *Pseudanthessius exilicornis* n. sp., ♀ (paratype). a, body, dorsal (scale 1); b, urosome, ventral (2); c, rostrum and antenna 1, aesthetascs marked with an asterisk (2); d, antenna 2 (3). Scales on Fig. 8.

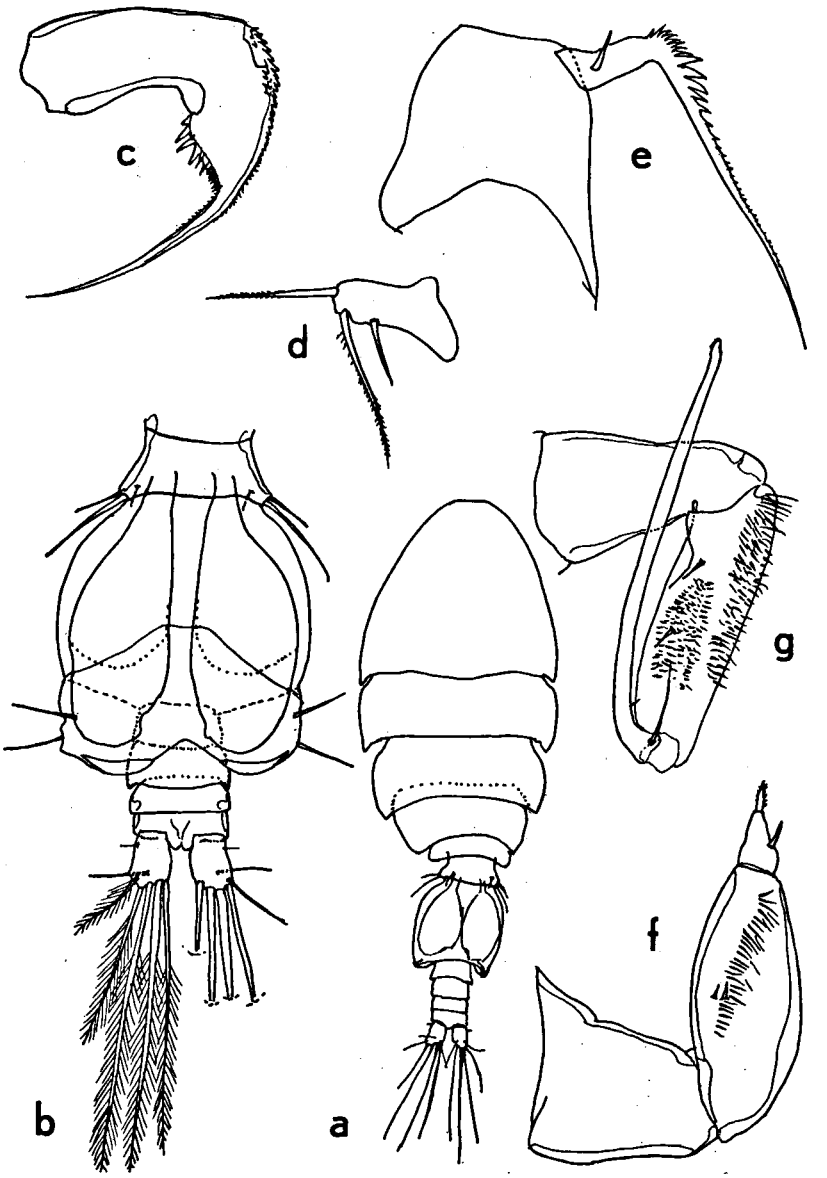

FIG. 2. *Pseudanthessius exilicornis* n. sp. (paratypes). a, body ♂, dorsal (scale 1); b, urosome ♂, ventral (2); c, mandible ♀ (4); d, maxilla 1 ♀ (4); e, maxilla 2 ♀ (4); f, maxilliped ♀ (4); g. maxilliped ♂ (3). Scales on Fig. 8.

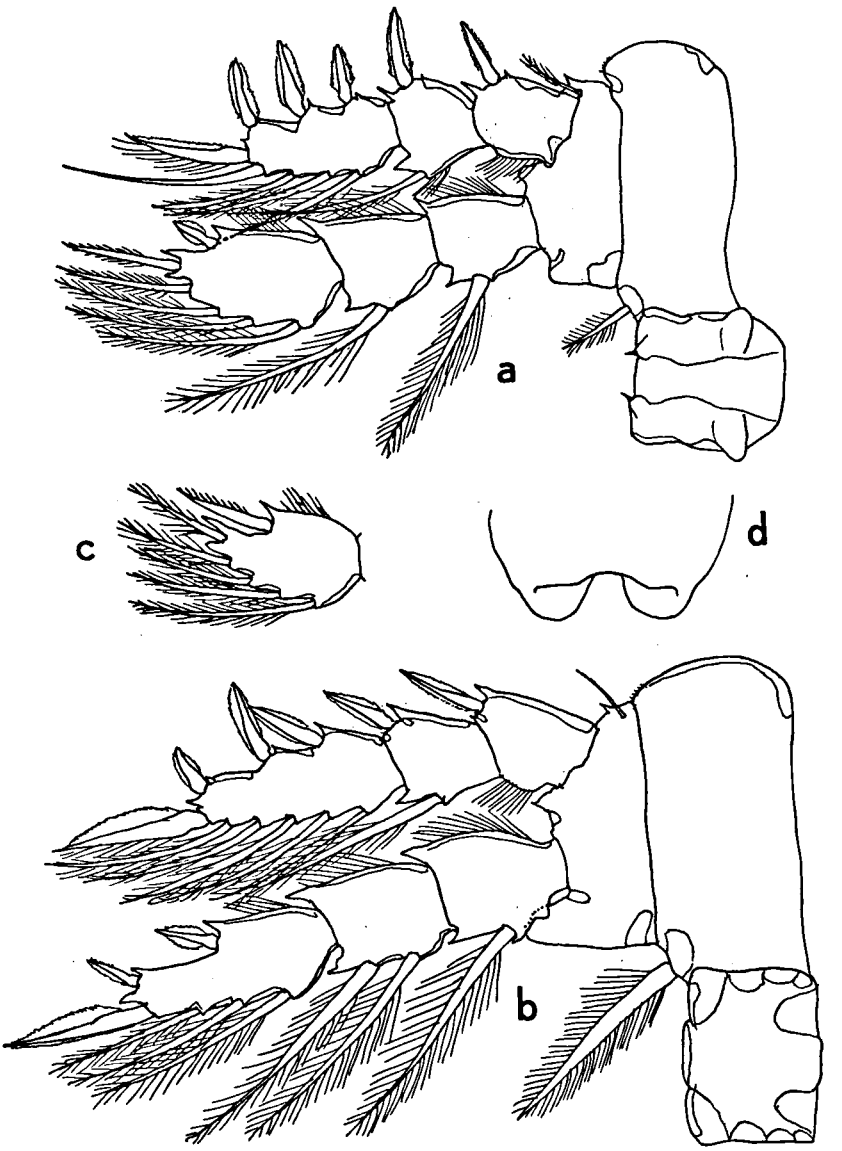

FIG. 3. *Pseudanthessius exilicornis* n. sp. (paratypes). a, leg 1 ♀ (scale 3); b, leg 2 ♀ (3); c, third endopodite segment of leg 1 ♂ (3); d, labrum ♀ (2). Scales on Fig. 8.

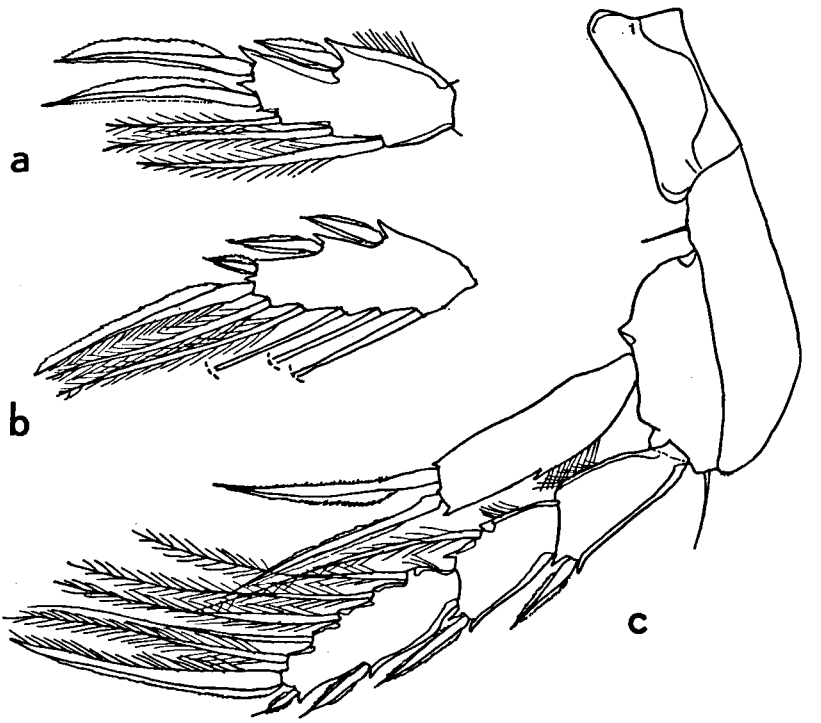

FIG. 4. *Pseudanthessius exilicornis* n. sp., ♀ (paratype). a, third endopodite segment of leg 3 (scale 3); b, third exopodite segment of leg 3 (3); c, leg 4 (3). Scales on Fig. 8.

number of large eggs (fig. 1a). Pedigerous segments 1 to 4 all free, segment 4 for the greater part covered by segment 3. Urosome (fig. 1b) 5-segmented, last 3 somites short, much wider than long, without ornamentation. Caudal ramus (fig. 1b) 56 × 37 μm (length measured along outer margin), i.e. about 1.5 times as long as wide. Ramus bears 7 (!) setae instead of 6: short seta on outer margin, at short distance of furcal implantation; long, naked dorsal seta near distal margin; 5 plumose terminal setae (lateralmost much shorter than four others, longest of which almost as long as urosome).

Rostrum short, broadly rounded (Fig. 1c). Antenna 1 (Fig. 1c) 7-segmented; setal armature of segments 4, 13, 5, 3, 3, 2, 7; one short aesthetasc on segments 5, 6, and 7.

Antenna 2 (Fig. 1d) 4-segmented, very thin and delicate. Segment 1 with 1 minute distal seta; segment 2 with 1 setule on inner margin; segment 3 with 1 setule on inner margin and 3 curved setae on distomedial corner; segment 4 distally with 3 long, thin claws, 1 heavy and 3 thin setae. Especially great elongation of segments 3 and 4, in relation to length of segment 2 noteworthy.

Labrum (Fig. 3d) with U-shaped emargination. Mandible (Fig. 2c) with widened basal part of lash and filiform distal part; convex and concave margins finely toothed. Maxilla 1 (Fig. 2d) with 1 short and 2 long setae. Maxilla 2 (Fig. 2e) with broad, heavy, unarmed basal segment; distal segment with 1 subbasal spine and long, filiform lash; convex margin of lash with (from proximal to distal) 6-8 small denticles, 5 or 6 larger denticles, and numerous minute denticles; concave margin unadorned. Maxilliped (Fig. 2f) with unarmed basal segment; segment 2 with 2 small, central spines, and single longitudinal row of spinules; segment 3 tapering, with 1 central seta, and pectinate distal spine or claw.

Leg 1 as illustrated (Fig. 3a); chaetotaxis formula 0-1 (coxopodite); 1-0 (basipodite); I-0, I-1, III-I-4 (exopodite); 0-1, 0-1, I-5 (endopodite). All setae plumose, except for smooth subdistal seta of exopodite segment 3. Laterodistal spine of endopodite segment 3 short (not overreaching tip of segment).

Leg 2 as in Fig. 3b. Endopodite segment 3 slender. Exopodite segment 1 with bump on medial margin; segment 3 with slightly swollen and crooked distolateral spine. Chaetotaxis 0-1; 1-0; I-0, I-1, III-I-5; 0-1, 0-2, I-II-3.

Leg 3 similar to leg 2, and with same (!) chaetotaxis formula, except for exopodite segment 3 (Fig. 4b) in which laterodistal spine is 'normal' and endopodite segment 3 (Fig. 4a) in which lateral and laterodistal spines are longer.

Leg 4 as in Fig. 4c. Medial coxopodal seta short; endopodite 1-segmented, with distinct tooth in middle of outer margin, distal spines only slightly shorter than segment. Chaetotaxis 0-1; 1-0; I-0, I-1, II-I-5; II.

Intercoxal plate squarish in P1, rectangular in P2 and P3, elongate trapezoidal in P4.

Leg 5 fused with first urosomite (Fig. 1b) with 1 short dorsal seta, and 2 distal elements, outer of which setiform, inner with curiously swollen base, giving it whip-like appearance.

Leg 6 represented by 2 small spines and 1 minute seta on dorsal surface of genital double-somite, near genital orifice.

Male: Body (Fig. 2a) length 0.91-1.03 mm, greatest width of cephalosome 0.32-038 mm (n=10). Caudal ramus (Fig. 2b) 49 × 31 µm. Urosome (Fig. 2b) 6-segmented, segment 3 visible in dorsal view, in ventral view partly covered by genital double-somite.

Antenna 1 as that of ♀, i.e. without extra or larger aesthetascs. Maxilliped (Fig. 2g) strongly prehensile; segment 2 with 2 spines and 2 patches of spinules; segment 3 without armature; claw long and thin, with 2 unequal subbasal setae.

Leg 1 (Fig. 3c) with slight sexual dimorphism in endopodal segment 3: laterodistal spine long, overreaching tip of segment (short in ♀). Long seta of leg 5 without strong basal swelling (Fig. 2b). Remaining appendages as in ♀.

Etymology: The specific name is composed of the Latin words *exilis* (=thin, powerless) and *cornu* (=horn), alluding to the very thin second antenna.

Remarks: The long, almost setiform distal claws of antenna 2 in combination with the short caudal ramus (≤ two times longer than wide) found in the new species, are reminiscent of *Ps. foliatus* STOCK, 1967 (from the sea-urchin *Echinothrix*, Gulf of Eilat), *Ps. pectinifer* STOCK, HUMES & GOODING, 1963 (from the sea-urchin *Clypeaster*, Antilles), and *Ps. sauvagei* CANU, 1891 (from various sea-urchins, Atlantic and Mediterranean coasts of Europe).

Of these, only *Ps. foliatus* shares a thin and elongate fourth segment of antenna 2 with the new species. However, *Ps. foliatus* can easily be distinguished, for instance by the armature of leg 5 ♀ (*foliatus:* with lanceolate spine; *exilicornis*: with whip-shaped element), the endopodite of leg 4 (without tooth on lateral margin in *foliatus*), the shorter lash of maxilla 2 in *foliatus*, and a different chaetotaxis of the endopodite of leg 3.

The presence of 7 setae on the caudal ramus, instead of the usual 6, may also be a specific character of this species.

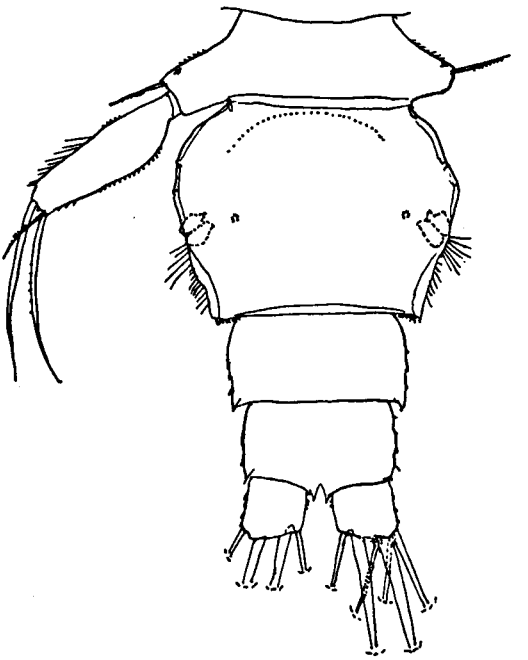

FIG. 5. *Asterocheres* sp. [cf. *simulans* (T. Scott, 1898)]. Urosome, ♀, ventral (scale 3). Scale on Fig. 8.

Family ASTEROCHERIDAE

Genus Asterocheres Boeck, 1859

Asterocheres sp. [*cf.* simulans (T. Scott, 1898)]

Fig. 5

Ascomyzon simulans T. SCOTT, 1898: 270, pl. XIII Figs. 1-9, pl. XIV Fig. 22; SARS, 1915: 89, pl. 55.
Asterocheres simulans; GIESBRECHT, 1899: 70, 115, 119.

Material: 3 ♀. From *Lytechinus variegatus* (Leske). CURAÇAO, Piscadera Inner Bay, near former sea-turtle hatchery, dredge, depth *c.* 3 m, 17 Dec. 1958 (ZMA Co. 201.509).

Remarks: This is a small species of *Asterocheres* (length of the 3 available females 657, 690, and 750 μm, greatest width of cephalosome 372, 392, and

401 µm). It agrees in every detail with the published descriptions of *A. simulans* SCOTT, 1898, with the possible exception of the caudal ramus. The ramus is described as broader than long, but in the present specimens it looks somewhat longer, although it depends on the method of measuring. Its length along the outer margin is 28 µm, along its inner margin 20 µm, and its width is 27 µm (Fig. 5).

Perhaps most disconcerting is the enormous distance between the previously known localities in Scotland and southern Norway, and the present locality in the neotropics. More material from the Antilles, preferably of both sexes, will be necessary to elucidate the taxonomic status of these animals. For the moment, the possible relationships to *A. simulans* may be stressed.

The colour of live specimens was a translucent orange, the intestine and ovaries were of a darker orange, and the eye was bright red.

Chelacheres n. gen.

Diagnosis: Asterocheridae. In general shape, chaetotaxis of legs 1 to 4, and structure of maxillae 1 and 2 and maxilliped, similar to *Asterocheres*, but differing from that genus in (1) antenna 1 (18- or 19-segmented in ♀, 16-or 17-segmented in ♂; aesthetasc on penultimate segment); (2) antenna 2 (endopodite armed with 1 claw-like spine on segment 2, and cheliform structure on segment 3); (3) mandible palp (strongly developed, distally with 2 long, robust setae bearing plumosities on outer margin only).

Etymology: From χηλη (chela) and αχηρης (troublesome, painful).

Type species: *Chelacheres longipalpus* n.sp., associated with regular sea-urchins. Second species *Chelacheres optans* n. sp.

Remarks: The cheliform second antenna distinguishes the new genus from the 35-odd other genera of the family.

Chelacheres longipalpus n. sp.

(Figs. 6-8)

Material: Frequent associate of various species of regular echinoids.

– 1 ♂ (holotype), 1 ♀ (allotype), 96 paratypes. From 27 specimens of *Echinometra lucunter* (L.). CURAÇAO, Piscadera Bay, under stones, depth 0.5 -1 m, 16 Nov. 1973 (ZMA Co. 201.510).

– 15 specimens, from *Echinometra lucunter* (L.). CURAÇAO, St. Michiels Bay, depth *c.* 1 m, 29 Oct. 1958 (ZMA Co. 201.511).

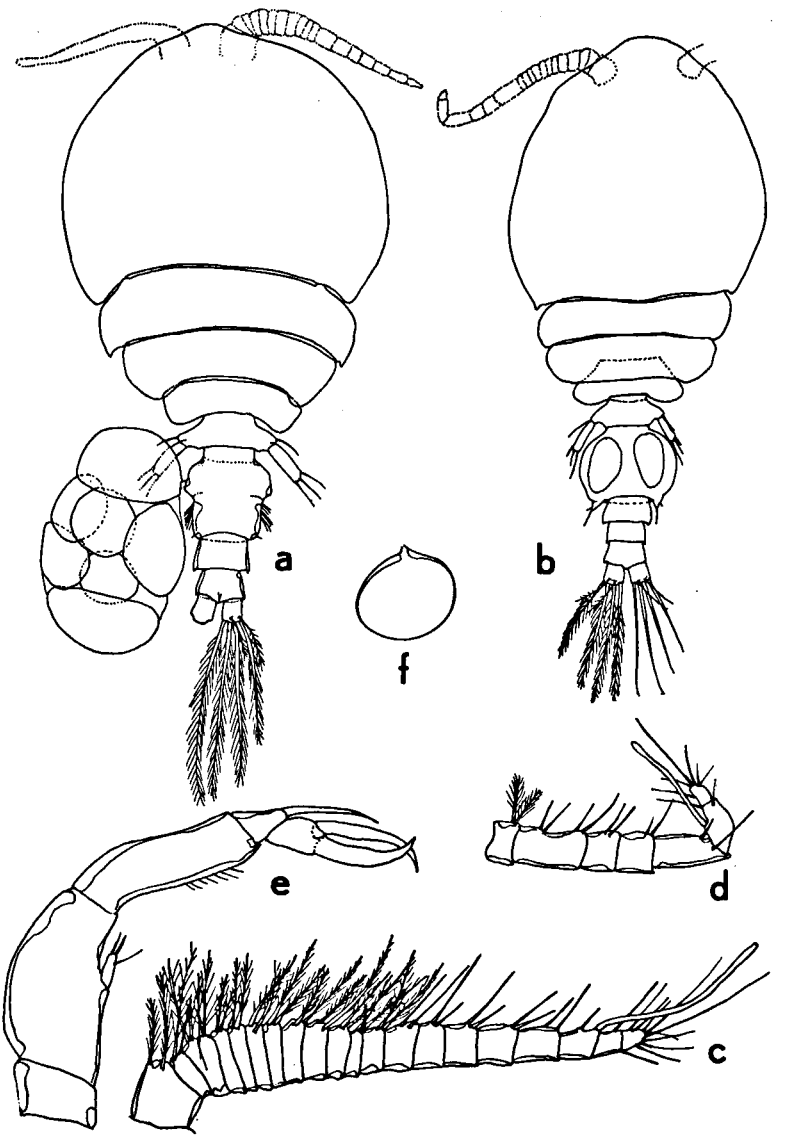

Fig. 6. *Chelacheres longipalpus* n. gen., n. sp. (paratypes). a, body ♀, dorsal (scale 5); b, body ♂, dorsal (5); c, antenna 1 ♀ (3); d, segments 11 through 17 of antenna 1 ♂ (3); e, antenna 2 ♀ (4); f, spermatophore (6). Scales on fig. 8.

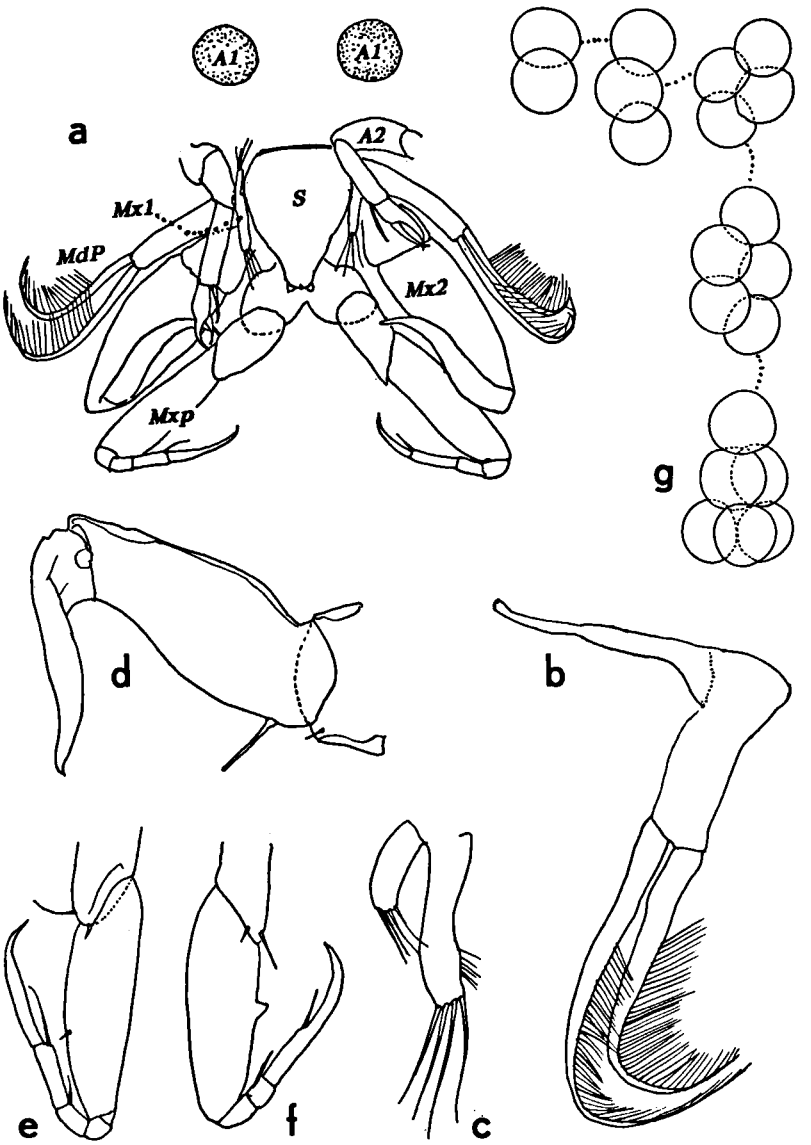

Fig. 7. *Chelacheres longipalpus* n. gen., n. sp. (paratypes). a, general organisation of cephalosomal appendages ♀, ventral (semi-diagrammatic) (scale 2); b, mandible ♀ (4); c, maxilla 1 ♀ (4); d, maxilla 2 ♀ (3); e, maxilliped ♀ (3); f, maxilliped ♂ (3); g, variation in ovisac shape and egg number (7). Scales on fig. 8.

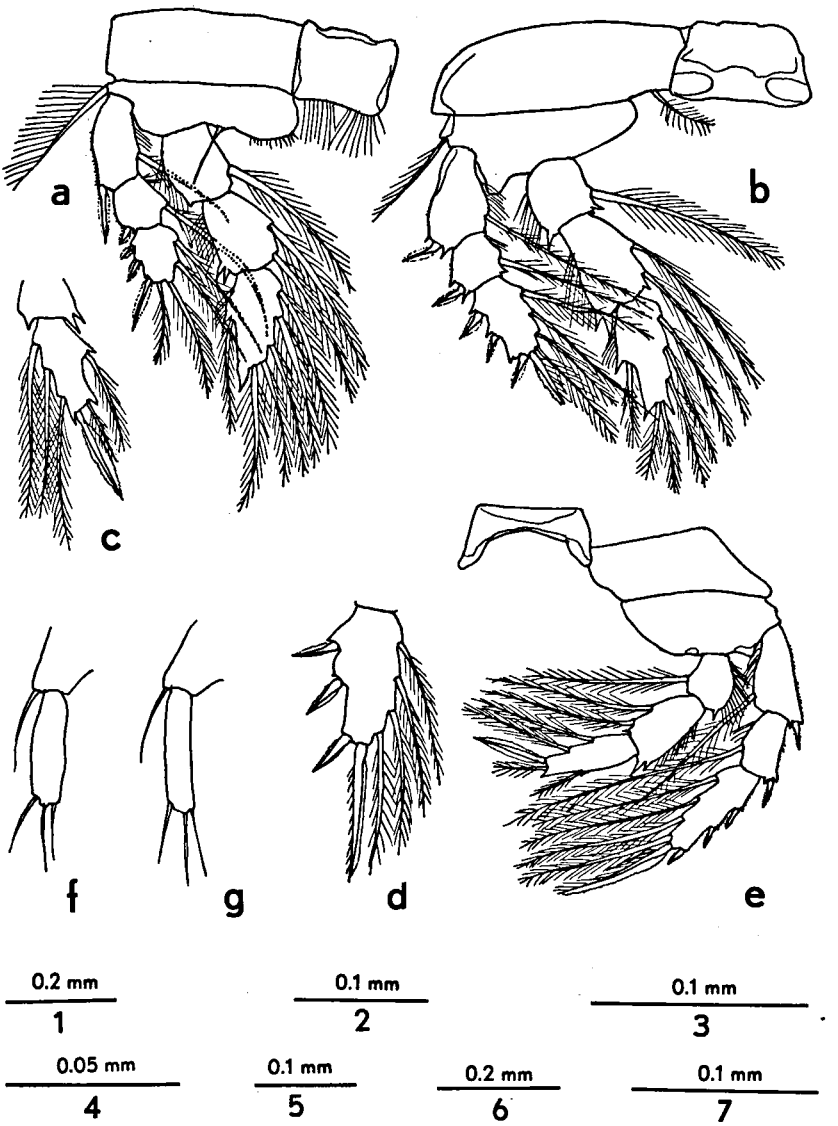

Fig. 8. *Chelacheres longipalpus* n. gen., n. sp. (paratypes). a, leg 1 ♀ (scale 3); b, leg 2 ♀ (3); c, third endopodite segment of leg 3 ♀ (3); d, third endopodite segment of leg 2 ♂ (4); e, leg 4 ♀ (3); f, leg 5 ♀ (3); g, leg 5 ♀ (4).

– 1 ♂, from 5 *Echinometra lucunter* (L.). BAHAMAS, Turtle Rocks, southern end of South Bimini, 8 June 1959; same locality, same host, 1 ♂, from 5 hosts, 12 June 1959 (in collection of AGH).
– 3 ♂, 4 copepodids, from 19 *Echinometra lucunter* (L.). BAHAMAS, west beach at North Bimini, near Lerner Marine Laboratory, 9 June 1959; same locality and host, 5 ♀. 6 ♂, 2 copepodids, 11 June 1959 (in collection of AGH).
– 1 ♀, 2 ♂, from 13 *Echinometra lucunter* (L.). PUERTO RICO, El Corral, 3 miles south of La Parguera (western Puerto Rico), 30 July 1959 (in collection of AGH).
– 33 ♀, 27 ♂, from 55 *Echinometra lucunter* (L.). PUERTO RICO, Majimo Reef, La Parguera Bay, 2 August 1959 (in collection of AGH).
– 5 ♀, 11 ♂, from 400 *Echinometra lucunter* (L.). PUERTO RICO, Terremoto Reef, La Parguera Bay, 5 August, 1959 (in collection of AGH).
– 550 ♀, 488 ♂, 31 copepodids, from 190 *Echinometra lucunter* (L.). PUERTO RICO, entrance to Phosphorescent Bay, near La Parguera, 10 August 1959 (USNM 268437); and 444 ♀, 398 ♂, 27 copepodids, same locality and host, from 20 hosts, 16 August 1959 (ZMA Co. 201.554).
– 84 ♀, 106 ♂, 24 copepodids, from 28 *Echinometra lucunter* (L.). JAMAICA, Lime Cay, near Port Royal, Kingston, 30 August 1959 (in collection of AGH).
– 6 specimens, from *Echinometra lucunter* (L.). ST. MARTIN, Burgeux Bay, tidal zone, 3 Feb. 1959 (ZMA Co. 201.513).
– 38 specimens, from *Echinometra viridis* A. Ag. CURAÇAO, Fuik Bay, depth *c.* 1 m, 10 Dec. 1958 (ZMA Co. 201.512).
– 1 ♂, from *Tripneustes ventricosus* (Lamarck). CURAÇAO, Boca Santu Pretu, estate Noordkant, in rock pool, 6 Jan. 1959 (ZMA Co. 201.514).

Description: Female: Body (Fig. 6) length 667-761 μm, greatest width of cephalosome 339-443 μm (n = 10). Ovisacs elliptical or of variable shape, 266-294 μm long, 170-175 μm wide, about as long as urosome, containing few (*c.* 10) large eggs (number of eggs per ovisac may be as low as 2 , see Fig. 7g). Spermatophore elliptical (Fig. 6f).

Cephalosome almost circular (except posterior margin); first pedigerous segment incorporated in cephalosome. Metasome segments gradually decreasing in width. Urosome with 2 post-genital segments. Genital double-somite 'pinched' in central part, genital orifices in front of constriction and row of setules on lateral margin behind constriction. No ventral ornamentation on urosome segments. Caudal ramus 34 × 25 μm, almost as long as anal segment, armed with 6 setae, all plumose, of which 4 long terminal, 1 mediodorsal, and 1 laterodorsal.

Antenna 1 (Fig. 6c) 18-segmented, if counted along posterior, non-setiferous margin, but 19-segmented if counted along anterior edge (resulting from the fact that segment 3 may partially be divided); distal segment showing traces of subdivision as well. Aesthetasc on segment 17 (or 18). All setae on segments 1 through 11 (or 12) plumose, those on remaining segments naked.

Antenna 2 (Fig. 6e) with 2-segmented protopodite, short, 1-segmented exopodite (armed with 3 setae), and slender endopodite. Endopodite segment 1 with lateral row of setules; segment 2 with slender, claw-like distal spine; segment 3 assuming shape of slender chela.

Siphon short, reaching to insertion of maxillipeds, broadly pear-shaped (Fig. 7a). Mandible (Fig. 7b) consisting of a stylet with slightly widened tip and a strong, 1-segmented palp, extending laterally beyond the mouthparts (Fig. 7a). Palp bearing 2 long, thick distal setae, distally recurved in anterior direction, outer margin of each seta densely covered with long setules, inner margin naked. Maxilla 1 (Fig. 7c) consisting of short outer lobe, and longer inner lobe, each lobe with 4 distal setae, those of outer lobe shorter than on inner lobe. Maxilla 2 (Fig. 7d) with spinule on segment 1, obtuse spine (or aesthetasc?) on segment 2, and S-shaped claw. Maxilliped (Fig. 6e) with 2-segmented basal part ('hand') and 4-segmented distal part ('claw'); segment 1 of 'hand' with 1 seta, segment 2 with small triangular spinule; segments 2 and 3 of 'claw' each with 1 seta.

Rami of legs 1 to 4 (Figs. 8a, b, c, e) showing same chaetotaxis formula as in *Asterocheres* (see for instance STOCK 1987). Coxopodite of legs 1 and 4 without medial seta, that of legs 2 and 3 with plumose medial seta. Intercoxal plate 1 rectangular, free margin setulose. Intercoxal plates 2 and 3 trapezoidal, naked. Intercoxal plate 4 narrow, with concave free margin, naked. Legs 1 to 3 with lateral basipodal seta, which bears setulettes on outer margin only. Endopodite segment 2 of all legs with 2 laterodistal spiniform processes. Distal spiniform process of endopodite segment 3 of leg 1 strongly developed. Leg 5 (Fig. 8f) straight, 54 × 17 µm, distally with 3 setae.

Male: Smaller than ♀ (body length 595-651 µm); urosome 5-segmented; genital somite with regularly convex sides (Fig. 6b). Caudal ramus 24 × 24 µm. Antenna 1 (Fig. 6d) 17-segmented, segments 1 through 11 as in ♀; geniculation between segments 15 and 16; aesthetasc on segment 16. Cephalic appendages as in ♀, but for maxilliped, which bears, instead of a spinule, a distinct triangular projection on segment 2 (Fig. 7f).

Legs 1 to 4 as in ♀, but for a longer terminal spine on endopodite segment 3 of leg 2 (Fig. 8d). Length/width ratio of leg 5 (Fig. 8g) greater than in ♀ (37×10 µm).

Live colour: Eye red; cephalosome and metasome with intense purple dots and stripes; urosome purple; ovisacs greenish-black.

Etymology: The specific name, *longipalpus*, alludes to the prominent mandibular palp.

Chelacheres optans n. sp.

Figs. 9-11.

Material: 1 ♀ (holotype), 1 ♂ (allotype), 15 ♀ + 10 ♂ (paratypes) (ZMA Co. 201.553), 9 ♀ + 7 ♂ (paratypes) (USNM), 5 ♀ + 2 ♂ (paratypes, dissected, in collection of second author). From 55 echinoids, *Echinometra lucunter* (L.), PUERTO RICO, Majimo Reef, La Parguera Bay, depth 2 m, 2 August 1959.

Description: Female: Body (Fig. 9a) with broad flattened prosome; covered with many small sensilla (Fig. 9a, b). Length 0.93 mm (0.91-0.95 mm) and greatest width 0.55 mm (0.53-0.57 mm) based on 10 specimens. Greatest dorsoventral thickness 0.26 mm. Ratio length to width of prosome 1.15:1; ratio length of prosome to that of urosome 1.9:1. Somite bearing leg 5 (Fig. 9b) 55 × 133 μm. Genital double-somite 114 × 120 μm, slightly wider than long, widest in anterior third, tapered posteriorly; ratio 0.95 : 1. Genital areas located laterally near middle of double-somite, both areas with 2 minute setae (Fig. 9b, c). Two postgenital somites from anterior to posterior 52 × 68 μm and 57 × 62 μm.

Caudal ramus (Fig. 9d) elongate, 75 × 23 μm, ratio 3.26:1. Outer (lateral) seta, inserted dorsally, 99 μm long, dorsal seta 78 μm, outermost terminal seta 130 μm, innermost terminal seta 190 μm, and 2 median terminal setae 148 (outer) and 200 μm (inner); all setae with lateral setules.

Ovisac (Fig. 9e) approximately 400 × 230 μm, containing 8 eggs each about 117 × 127 μm in diameter.

Rostral area (Fig. 10d) not well developed and protruding forward only slightly. Antenna 1 (Fig. 9f) 350 μm long. Third segment partially divided, resulting in count of 18 segments along posterior nonsetiferous edge, but 19 segments if counted along anterior edge. Length of segments (as measured along posterior margin): 20 (36 μm along anterior margin), 9, 9, 9, 9, 11, 13, 12, 10, 16, 20, 23, 23, 23, 23, 25, 30, and 28 μm, respectively. Armature 2, 2, 2+2, 2, 2, 2, 2, 6, 2, 2 (1 spiniform), 2, 2, 2, 2, 2, 2, 2+1 aesthetasc, and 7. All setae smooth except 1 plumose seta on segment 1. Aesthetasc on segment 17 (or 18).

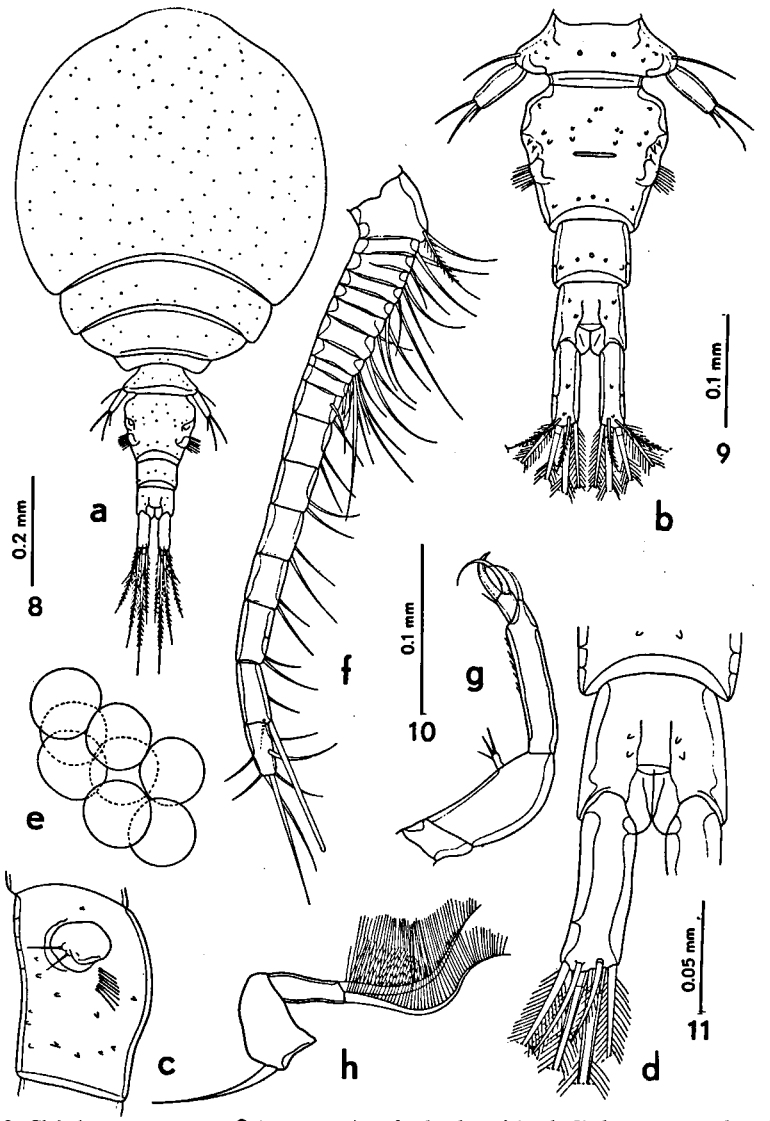

Fig. 9. *Chelacheres optans* n. sp., ♀ (paratypes). a, body, dorsal (scale 8); b, urosome, dorsal (9); c, genital double-somite, lateral (10); d, anal somite and caudal ramus, dorsal (11); e, ovisac, ventral (8); f, antenna 1, ventral (10); g, antenna 2, anterior (10); h, mandible, anterior (9).

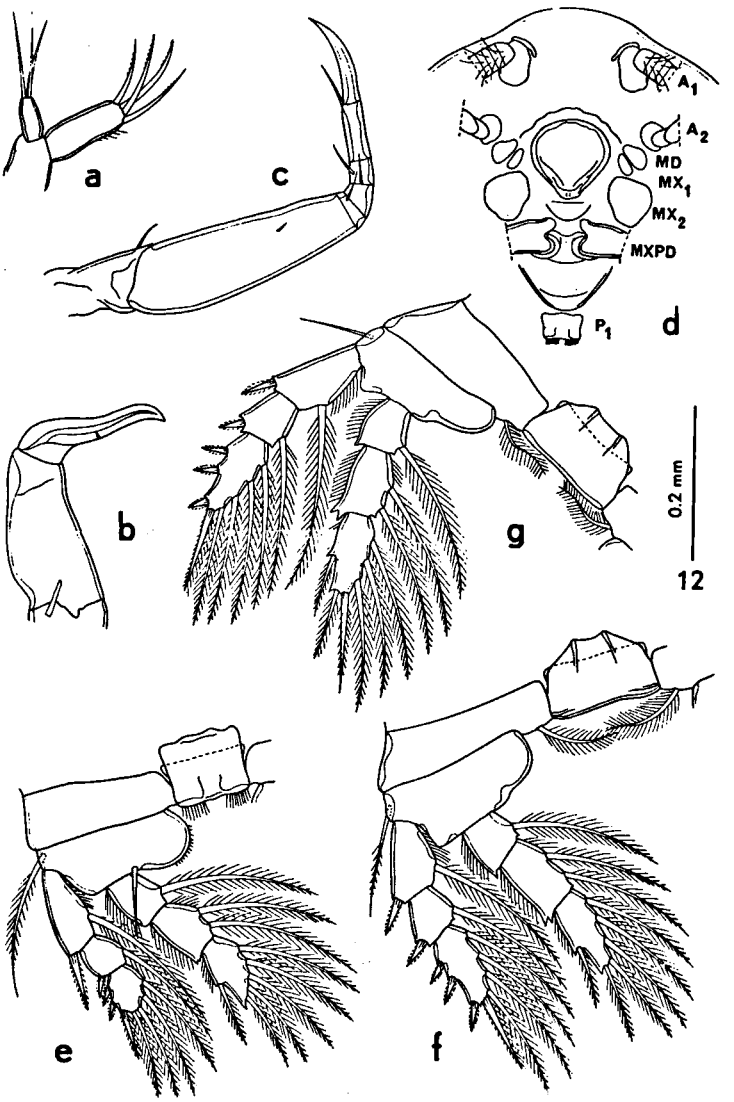

Fig. 10. *Chelacheres optans* n. sp., ♀ (paratypes). a, maxilla 1, posterior (scale 11); b, maxilla 2, posterior (9); c, maxilliped, posterior (10); d, central region of cephalosome to show rostrum, siphon, and postoral area, ventral (12); e, leg 1 and intercoxal plate, anterior (10); f, leg 2 and intercoxal plate, anterior (10); g, leg 3 and intercoxal plate, anterior (10). Scales on figs. 9-10.

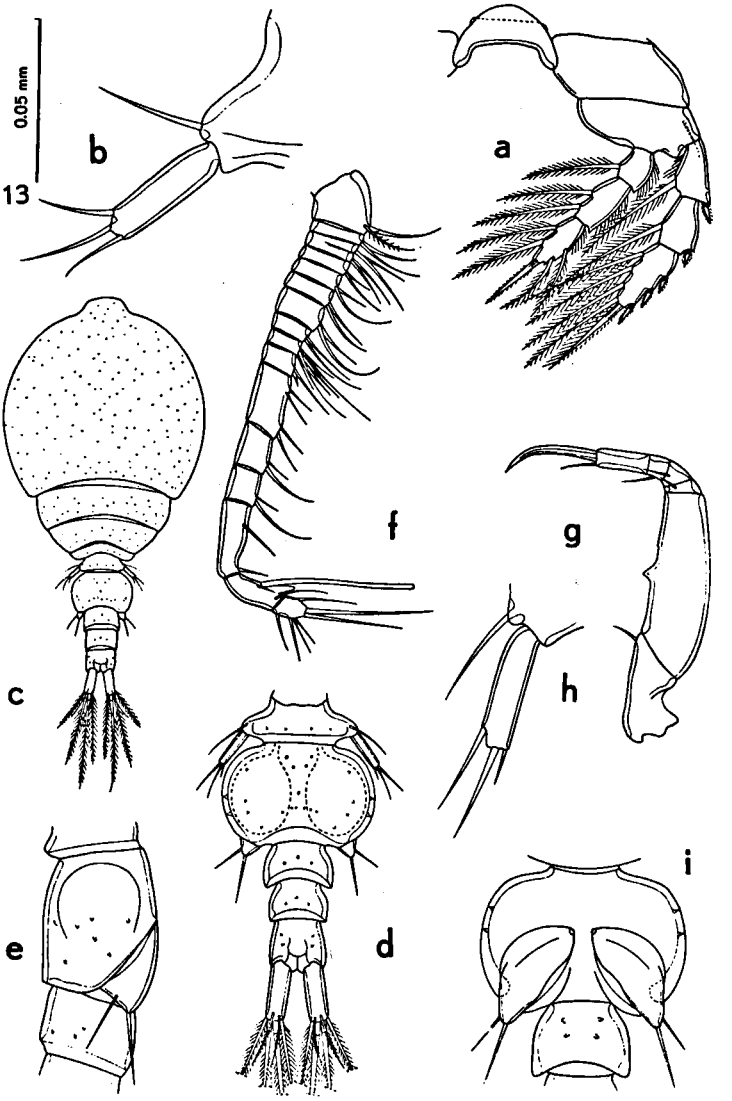

Fig. 11. *Chelacheres optans* n. sp. (paratypes). a, leg 4 ♀ and intercoxal plate, anterior (scale 10); b, leg 5 ♀, dorsal (11); c, body ♂, dorsal (8); d, urosome ♂, dorsal (9); e, genital somite ♂, lateral (10); f, antenna 1 ♂, ventral (10); g, maxilliped ♂, posterior (10); h, leg 5 ♂, ventral (13); i, genital somite ♂ showing leg 6 and first postgenital somite, ventral (10). Scales on figs 9-11.

Antenna 2 (Fig. 9g) 180 μm long including recurved claw. Terminal segment with claw of 23 μm, 1 long recurved seta, and 1 short seta.

Siphon short and pyriform (Fig. 10d). Mandible (Fig. 9h) with stylet 70 μm. Maxilla 1 (Fig. 10a) with 2 lobes bearing 3 and 4 setae, respectively. Maxilla 2 (Fig. 10b) with short aesthetasc on proximal (precoxal) part of 'segment 1'. Maxilliped (Fig. 10c) long and slender, 5-segmented; armature 1, 1, 1, 1, 1, and 1 + claw. Ventral area between maxillipeds and first pair of legs as in Fig. 10d.

Legs 1 to 4 (Figs 10e-g, 11a) with 3-segmented rami. Formula for armature as follows:

P1	coxa 0-0; basis 1-I; exp I-1, I-1, II-I-4; enp 0-1, 0-2, 1-5
P2 & P3	coxa 0-1; basis 1-0; exp I-1, I-1, III-I-4; enp 0-1, 0-2, 1-2-3
P4	coxa 0-0; basis 1-0; exp I-1, I-1, III-I-4; enp 0-1, 0-2, 2-I-2.

Basipodites of leg 1 with outer seta unusually long, 90 μm, and inner spine 40 μm (Fig. 10e). Endopodite of leg 3 with third segment with inner of 2 terminal setae spiniform (Fig. 10g).

Leg 5 (Fig. 11b) with unornamented free segment elongate, 55 × 15 μm, ratio 3.67:1. Three terminal setae 35, 41, and 30 μm from outer to inner. Seta on body near insertion of free segment 44 μm. All setae smooth.

Leg 6 represented by 2 small setae on genital area (Fig. 9b, c).

Colour of living specimens pink, eye red.

Male: Body (Fig. 11c) flattened with broad prosome as in female. Length 0.74 mm (0.72-0.76 mm) and greatest width 0.41 mm (0.40-0.43 mm), based on 10 specimens. Greatest dorsoventral thickness 0.17 mm. Ratio of length to width of prosome 1.31:1. Ratio of length of prosome to that of urosome 1.83:1.

Somite bearing leg 5 (Fig. 11d) 34 × 96 μm. Genital somite in dorsal view 86 × 125 μm, wider than long, ratio 0.69:1. Length 94 μm, including leg 6. Three postgenital somites from anterior to posterior 42 × 60, 34 × 50, and 43 × 49 μm.

Caudal ramus similar to that of female but shorter, 55 × 23 μm, ratio 2.39:1.

Body surface with many sensilla as in female (Fig. 11c).

Rostral area similar to that of female but protruding anteriorly (Fig. 11c). Antenna 1 (Fig. 11f) geniculate, 16-segmented along posterior non-

setiferous edge, 17-segmented along anterior edge, third segment partially divided as in female. Armature 2, 2, 2+2, 2, 2, 2, 2, 2, 6, 2 (1 spiniform), 4, 2, 2, 2, 2+1 aesthetasc, and 7. All setae smooth except 1 plumose on first segment. Segment 11 evidently formed by fusion of 2 segments. Penultimate segment bearing long aesthetasc and having thumb-like process. Antenna 2 as in female.

Siphon, mandible, maxilla 1, and maxilla 2 as in female. Maxilliped (Fig. 11g) showing sexual dimorphism in lacking seta, but having thorn-like process on second segment.

Legs 1 to 4 like those of female. Leg 5 (Fig. 11h) with free segment 36 × 10 μm, ratio 3.6:1. Leg 6 (Fig. 11e, i) posteroventral flap on genital somite bearing 2 setae 47 μm and 23 μm. Spermatophore seen only inside body of male.

Colour as in female.

Etymology: The name *optans*, from Latin *opto*, to choose, alludes to the presence of both *C. optans* and *C. longipalpus* only on *Echinometra lucunter*, although in the type-localty of *C. optans*, near La Parguera, Puerto Rico, many individuals of the echinoid *Diadema antillarum* were living in the immediate vicinity on the same coral masses.

Remarks: *Chelacheres optans* may be distinguished from *C. longipalpus* by the elongate caudal ramus. Other points of distinction in the new species are: larger body size (average length of female 0.93 mm versus 0.71 mm in *C. longipalpus*) and broader prosome (greatest width 0.55 mm versus 0.39 mm in *C. longipalpus*), the reduction in the number of plumose setae on segments 1 to 11 of the first antenna, and the presence of a thumb-like process on the penultimate segment of the male first antenna.

Remark on the second maxilla of *Chelacheres*. The presence of an obtuse spine (or aesthetasc?) on 'segment 1', the proximal (precoxal) part (*C. optans*) or segment 2 (*C. longipalpus*) of maxilla 2 in most, but not all, specimens of both sexes is remarkable. It should be noted, however, that in one species of the related genus *Asterocheres*, *viz.* in *A. aesthetus* Ho, 1984, an aesthetasc is reported from 'segment 1' of maxilla 2, whereas *Sinopontius aesthetascus* BOXSHALL, 1990, also possesses an aesthetasc on 'segment 1'. The taxonomic significance and the function of the maxillary aesthetasc are obscure at the moment.

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