

NEW DISTRIBUTIONAL RECORDS OF SPECIES OF THE SUB-FAMILY
ASTEROPINAE (OSTRACODA) FROM INDIAN SEAS

C. MERRYLAL JAMES

Central Marine Fisheries Research Institute, Cochin

ABSTRACT

The plankton samples obtained during the cruises of 'R.V. VARUNA' along the west coast of India, Gulf of Mannar and the Laccadive Sea have brought to light the occurrence of 4 species of ostracods, *Diasterope bisetosa* Poulsen, *Parasterope nana* Poulsen, *Synasterope oculata* (Brady) and *Asteropina nodulifera* Poulsen belonging to the sub-Family Asteropinae. Being new records for the Indian Seas, they are described and illustrated here.

INTRODUCTION

THE species of the sub-Family Asteropinae are known to occur in tropical, sub-tropical, temperate and boreal regions but their records are few. They are found mostly in the shallow coastal waters, in sandy or muddy bottom or among coral shingles and most of the recorded species have been obtained from dredging and bottom trawl samples and a few from near the surface.

The plankton samples obtained during the research cruises of R. V. VARUNA from along the west coast, Gulf of Mannar and the Laccadive Sea have brought to light the occurrence of 4 species of ostracods—*Diasterope bisetosa* Poulsen, *Parasterope nana* Poulsen, *Synasterope oculata* (Brady) and *Asteropina nodulifera* Poulsen. Of these, *D. bisetosa* and *A. nodulifera* are represented in the collections by males from the Gulf of Mannar. These two species have been recorded previously only from the Red Sea from male specimens. *P. nana* known previously only from the Gulf of Siam is represented by both males and females in the present collections. *S. oculata* earlier recorded from off Trincomalee, Ceylon was also obtained from the Gulf of Mannar.

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DESCRIPTIONS OF SPECIES

Genus *Diasterope* Poulsen 1965

Diasterope bisetosa Poulsen (Fig. 1 a-j)

Diasterope bisetosa Poulsen 1965, p 355, fig. 118 (Type locality: Red Sea)

Material: 'R. V. VARUNA' Station: 4372 (08°46'N - 78° 21'E) 8-3-1969; 1 mature male, length 1.25 mm; IOS Net open tow from 15 - 0 m; depth at station 18 m; night collection.

Description: Female unknown.

Male

Carapace (Fig. 1 a-c) : length 1.25 mm, height 0.8 mm; about 35 medial bristles present on rostrum; about 23 bristles present below incisur along anterior rounding and until point where medial list approaches shell margin; 18-20 bristles along ventral margin which continues with 4 or 5 short bristles off middle of posterior ridge which has 24-26 flap-like bristles.

First antenna (Fig. 1 d) : 2nd joint has rows of short hairs; 3rd to 8th joints are as in genus; *b*-bristle of 7th joint has 4-6 filaments; *d*-bristle absent; *g*-bristle longer than *b*-bristle and with 8 filaments; *c* and *f*-bristles longer than shell with 23 or 24 filaments.

Second antenna: distomedial bristle of protopodite bare; endopodite 3-jointed, prehensile (Fig. 1 e); 2nd joint longer than first joint with 2 long, bare bristles; 3rd joint shorter than 2nd joint and with a thread-like proximal bare bristle almost as long as joint; transverse ridges present at tip of 3rd joint.

Mandible (Fig. 1 f): coxale without bristle at basis of endite; its ventral branch has 3 oblique rows of spines proximally and distal part terminates in 3 small pointed teeth; larger dorsal branch has rounded marginal teeth proximally and dorso-distal margin has a short bristle not surpassing terminal spine.

Basale endite has 4 terminal bristles; among the 4 triaenid bristles, in between 2nd and 3rd triaenid bristles are one long bare dwarf-bristle and one thumb-formed peg; ventral margin of basale has 4th triaenid bristle; all triaenid bristles have only 3 or 4 pairs of spines; dorsal margin of basale has one bare mid-bristle and 2 long corner bristles with marginal hairs.

Exopodite 3/4 as long as dorsal margin of first endopodite joint; 1st endopodite ventrally has 3 bristles: dorsal margin of 2nd endopodite joint has 2 long, bare proximal bristles; stout *a*, *b*, *c* and *d*-bristles obliquely furrowed proximally and ringed distally; between *b* and *c*-bristles is a long, slender laterally placed bristle; laterally between *c* and *b*-bristles another long, slender, bare bristle and medially a row of 5 pectinate bristles; *d*-bristle and distal corner bristles with marginal hairs; distoventral margin has 3 long, bare bristles; end-joint has 6 unmodified bristles.

Maxilla (Fig. 1 g): epipodite triangular and half as long as basale, distal part fringed with short hairs; dorsal margin of basale has one proximal and one distal bristle which are short and bare; 2 groups of 4+3 endite bristles; ventral margin of basale has one short, bare mid-bristle and one long distal bristle with marginal hairs; first endopodite joint almost completely united with basale and has 2 bare bristles; end-joint has one long bare bristle; "baleen-comb" of usual type.

Fifth limb (Fig. 1 h): epipodial appendage has about 45-50 plumose bristles; laterally on 'comb' are one long plumose and 3-4 short bristles.

Sixth limb (Fig. 1 i): concave anterior margin with 2 endite bristles; anterior pointed corner of end-joint has 3 plumose bristles; a row of 19 plumose bristles present along broadly rounded posterior angle of end-joint and 2/3rd of ventral

margin, setae around angles being largest; anterior and posterior margins of limb fringed with hairs.

Seventh limb: has 3+3 distal and 3+3 or 2+2 proximal cleaning bristles with upto 4 bells.

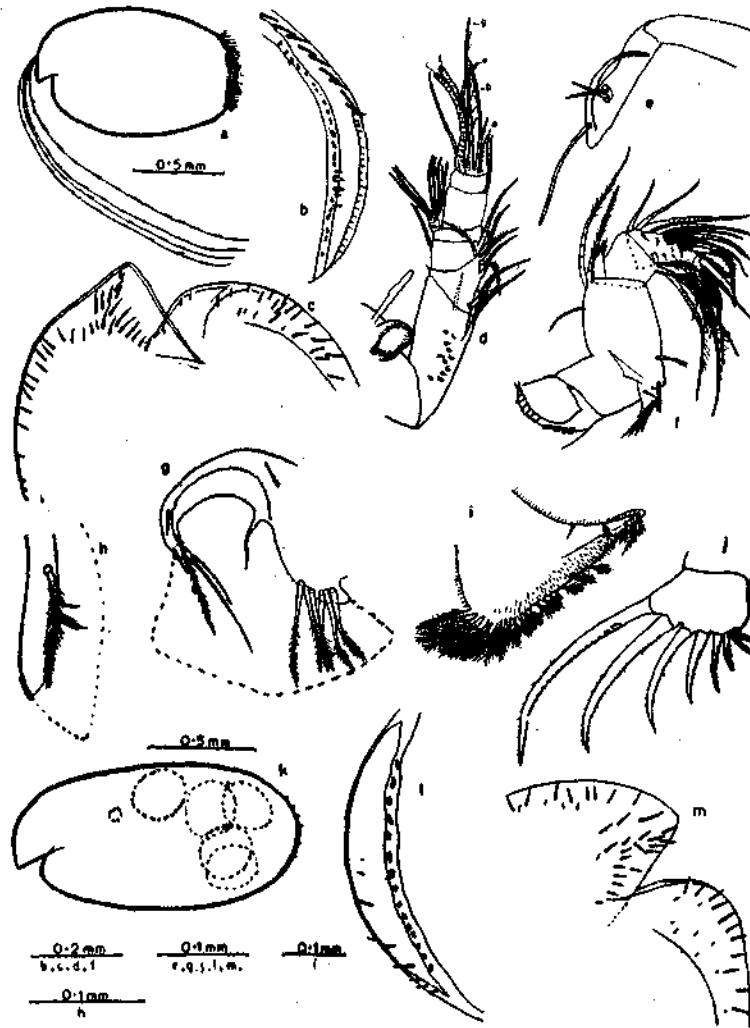


Fig. 1. *Diasterope bisetosa* Poulsen. Male (a - j): a. lateral view of shell; b. posterior process left shell, mv; c. anterior left shell, mv; d. first antenna; e. endopodite of second antenna; f. mandible; g. maxilla; h. fifth limb; i. sixth limb; j. furca. *Parasterope nana* Poulsen. Female (k - m) - k. lateral view of shell; l. posterior process of left shell, mv; m. anterior left shell, mv.

Copulatory limb: consists of a broad stem ending with 2 lobes.

Furca (Fig. 1 j): each lamella has 6 claws and 2 bristle-like claws; first 3 claws have short hairs distally along convex margin; along concave margin of each claw are rows of small, sharp teeth and spines.

Lateral eye with 20 ommatophores. *Gills present*.

Distribution: Poulsen (1965) described this species from 2 mature males measuring 1.17 mm and 1.16 mm from the Red Sea obtained from surface collections using artificial light. The present record extends the distribution of this species to the Gulf of Mannar along the South East coast of India.

Remarks: The presence of 2 or 3 terminally placed spines on the tip of the ventral branch of the coxale endite of the mandible; the exopodite of the mandible being more than 50 per cent of the length of dorsal margin of the 1st endopodite joint; and the presence of a long, slender laterally placed bristle between *b* and *c*-bristles of the 2nd endopodite joint of the mandible, help in assigning the present specimens to the genus *Diasterope*. In the presence of 2 bristles on the 2nd joint of the endopodite of second antenna and in other diagnostic characters, it agrees with *Diasterope bisetosa* Poulsen. In having fewer bristles on the surface of the rostrum, on epipodial appendage of 5th limb; more bristle on endite parts of 6th limb; presence of rows of hairs on 2nd joint of first antenna and on the 2nd endopodite joint of the mandible, the present specimen differs from the description of the holotype (Poulsen, 1965). Since Poulsen obtained only 2 specimens the differences noted here may be considered as variations to be expected in this species.

Genus *Parasterope* Poulsen, 1965

Parasterope nana Poulsen 1965, (Fig. 1 k-m and 2 a-o)

Parasterope nana Poulsen 1965, p. 396-471, Fig. 131, 132 (*Type locality*: Gulf of Siam).

Material: 'R. V. VARUNA' Stations: 1169: 15°51'N, 73°11'E; 25-8-'62. 55-0 m (2 F, without embryos). 2192: 09°30'N, 75°59'E; 8-4-'64; 30-0 m (2 M) 2229: 11°00'N, 75°4'E; 20-4-'64; 10-0 m (5 F, without embryos, 2 F, with embryos). 2242 A: 11°32'N, 74°59'E; 27-4-'64; 59-0 m (1 F, with embryos). 2249: 11°07'N 75°43'E; 27-4-64; 15-0 m (1 F with embryos).

Description

Female: length 0.95 - 1.01 mm.

Carapace (Fig. 1 k - m): elongate with height 54 per cent of length; dorsal margin evenly but very weakly arched at middle; ventral margin straight; rostrum with about 34 medial bristles - 14 bristles in a row inside anterior margin of rostrum, 8-9 bristles on ascending list, about 7 bristles behind latter close to incisur; 27-29 bristles below incisur along anteroventral shell rounding; 14 short bristles along ventral margin; posterior ridge with 15 short flap-like bristles—in most cases only circular granulate bases of them visible; medial surface between ridge and shell margin with 8 short bristles and 7 short spines; selvage narrow, low bulge of selvage off inferior margin of incisur fringed with hairs.

First antenna (Fig. 2 a): first joint bare; second joint with a dorsal bristle having stiff hairs and a disto-lateral bristle which is bare; dorsal margin of third joint with 6 bristles of which 4 are clustered apico-dorsally, ventrally joint has a

very short bare bristle; dorsal bristle of 4th joint long and with short marginal hairs; one short and one long disto-ventral bristles are bare, longer bristle reaches to end of 6th joint; 5th joint sensory bristle with 6 long terminal filaments; 6th joint medial bristle with minute marginal hairs and 1.5 times as long as 5th to 7th joints; *a*-bristle bare, as long as length of 5th to 7th joints; *b*-bristle little longer than *a* bristle with 3 filaments; *c*-bristle slender and longer than *b*-bristle with 3 filaments; *d*-bristle absent; *e*-bristle slender and bare; *g*-bristle longer than *f*-bristle, having 3 or 4 filaments.

Second antenna: protopodite with a short disto-medial bristle; unsegmented endopodite has a long bare terminal bristle; exopodite without basal spines.

Mandible (Fig. 2 b - d): coxale has no bristle at basis of endite; ventral branch has 3 or 4 rows of strong spines and hairs; ventral margin of dorsal branch has 5 smaller rounded teeth; basale endite has 4 finely pectinate terminal bristles, 2 triaenid bristles with 5 or 6 pairs of spines, 2 dwarf-bristles and a glandular peg; dorsal margin of basale has a slender, bare midbristle and 2 bare corner bristles, longer bristle reaching end of second endopodite joint; exopodite 80 per cent of length of first endopodite joint and disto-dorsally it has few shorter hairs; dorsal margin of 2nd endopodite with one short, bare proximal bristle; *c* and *d*-bristles stouter than *a* and *b*-bristles; between *b* and *c*-bristles one bare, short medial bristle and a longer lateral bristle; off *c*-bristle a medial row of one longer, pectinate and 3 shorter bristles; laterally between *c* and *d*-bristles a long, bare slender bristle present; disto-ventral corner has 3 long bristles, 2 with short marginal hairs; serrated claw-like bristle of end-joint is about 112 per cent of length of 2nd and 3rd joints; 3 claw-like, longer bristles obliquely furrowed; lateral and ventral dorsal bristle, a long slender bare bristle and medially a shorter slender bare bristle present.

Maxilla: Proximal 3 slender bristles of endite distally plumose; dorsal group has 3 long, stout plumose bristles; basale has 2 short bare bristles laterally; single bare bristle present proximal to middle of ventral margin; 'baleen-comb' is of usual type; β -bristle long and bare; end-joint has a single long bare bristle.

Fifth limb: epipodial appendage has about 45 plumose bristles; dorsal margin of 'comb' bare; distal rounding with a fringe of hairs; laterally one long plumose bristle surpassing end of 'comb' and in between this and ventral margin of 'comb' are present 4 or 5 bare bristles.

Sixth limb: anterior margin has 2 bare endite bristles followed by fringes of short hairs; pointed anterior corner has 2 short bare bristles; ventral margin and rounded posterior corner bare of bristles except usual fringes of hairs; antero-lateral sole distally fringed with hairs.

Seventh limb: has 2+2 or 3+3 distal and 2+1 proximal cleaning bristles with 2 to 4 bells; each half of terminal "comb" with 6+6 teeth with broad bases and pointed tips.

Furca (Fig. 2 e): each lamella has 8 claws arranged more or less in a graded series with the dorsal three claws weak, of which one is dorsally bent; claws one to three have short spines intercepted at regular intervals with longer spines; convex margin of first claw proximally with a series of short hairs.

Male (Fig. 2 f - o): Length 1.55 mm.

Carapace (Fig. 2 f - h): more elongate than in female; its height about 50 per cent of length; greatest height before middle of shell; medial surface of rostrum with about 60 bristles, 8 or 9 on ascending list and 16 behind list; about 65 scattered bristles present below incisur along antero-ventral shell rounding; along ventral shell margin are present about 45 bristles of which 27 are arranged closely in

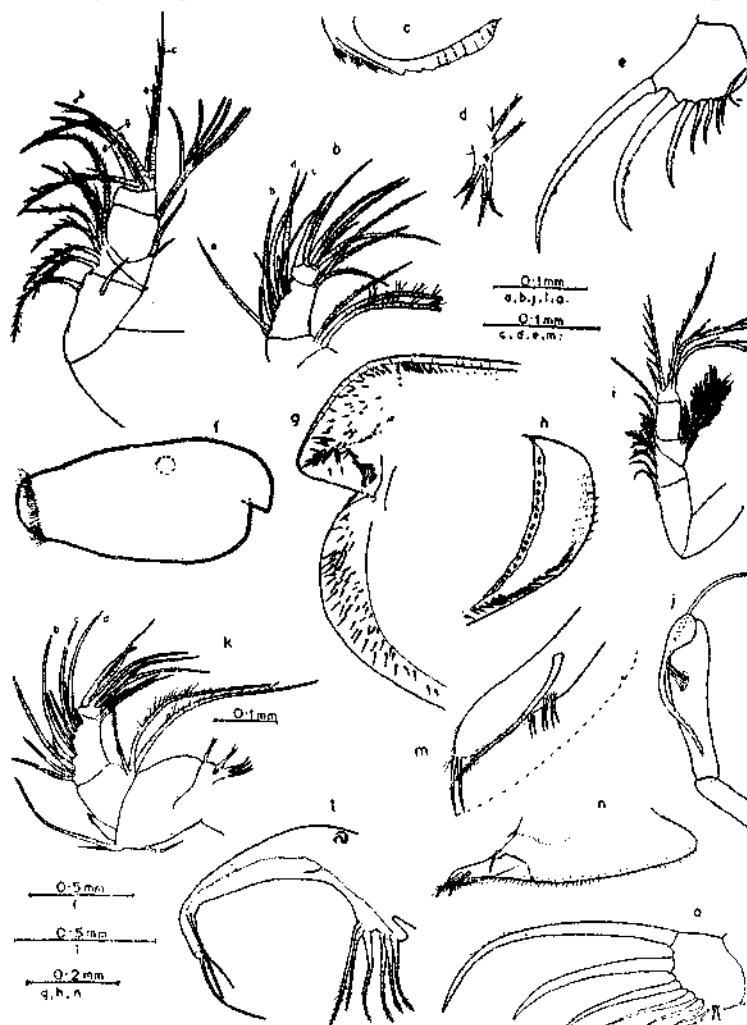


Fig. 2. *Parasterope nana* Poulsen. Female (a - e): a. first antenna; b. mandible; c. coxale endite of mandible; d. basale endite of mandible; e. furca. Male (f - o)- f. lateral view of shell; g. anterior right shell, mv; h. posterior process, right shell mv; i. first antenna; j. endopodite of second antenna; k. mandible; l. maxilla; m. fifth limb; n. sixth limb; o. furca.

a line at postero-ventral rounding of shell margin; medial shell surface between ridge and posterior margin of shell with about 10 short spines; medial ridge of posterior shell margin weakly developed and with 15+3 flap-like bristles; mostly only circular granulate bases of bristles visible.

First antenna (Fig. 2 i): joints relatively longer than in female but number of bristles on first to 4th joints as in female; 4th joint with 2 bare disto-ventral bristles of almost equal length; single long bristle of 6th joint bare; claw-like *a*-bristle short, bare and measuring 57 per cent of length of 5th to 7th joints; *b*-bristle as long as 3rd to 7th joints and bears 5 filaments; *c* and *f*-bristles with about 23 filaments; *d*-bristle absent; *e*-bristle bare and not as long as *b*-bristle; *g*-bristle considerably longer than *b*-bristle and with 8 filaments.

Second antenna (Fig. 2 j): exopodite as in female; endopodite prehensile and 3-jointed; 2nd joint with 3 bristles of almost equal length; 3rd joint slightly undulate in distal three fourths of its length and with a proximal bristle which is shorter than joint.

Mandible (Fig. 2 k): basale endite resembles that of female except that bristles in latter appear stouter and stronger; exopodite 59 per cent of length of first endopodite joint; innermost of three bristles of first endopodite relatively more plumose than in female; 2nd endopodite dorsal margin has 3 bare short proximal bristles followed by *a*-bristle; between *b* and *c* bristles 2 short, bare medial bristles and one long, bare lateral bristle present; between *c* and *d*-bristles 2 long bare lateral bristles a row of 3 short medially placed bristles present distal to *d*-bristle; 3 long bare bristles present at disto-ventral corner; end-joint with 6 bristles of which outermost is claw-like and long being as long as combined lengths of 2nd and 3rd joints; distal 3 bristles longer and more slender being as long as combined lengths of 2nd and 3rd joints; remaining 2 bristles situated near outer and inner margins are relatively shorter and bare.

Maxilla (Fig. 2 l): 3+3 endite bristle groups; basale has 2 short, curved, bare bristles laterally and inner to it a single bare bristle is present; the remaining bristles are as in female.

Fifth limb (Fig. 2 m): epipodial appendage 52 plumose bristles; between lateral bristle and ventral margin of comb are 4 or 6 bare bristles arranged in 2 or 3 pairs.

Sixth limb (Fig. 2 n): similar to that of female, except that 2 bristles at anterior end are sub-equal, but relatively longer and plumose.

Seventh limb: no sexual dimorphism observed.

Furca (Fig. 2 o): claws arranged in a graded series and relatively longer than in female; first claw bears weaker spines on distal concave margin and a few hairs on distal convex margin.

Copulatory limb: consists of a broad stem ending with 2 lobes. *Lateral eyes* with 20 to 22 ommatophores in male and 16 to 18 ommatophores in female. *Gills* present.

Distribution: South coast of Thailand in the Gulf of Thailand; South West coast of India.

Remarks: The size of the male and female varies from 0.95 - 1.55 mm against 1.1 - 1.28 mm described by Poulsen (1965). The mature male described here has a greater number of bristles on the rostrum, medially on the posterior ridge, on the medial surface between the ridge and the posterior shell margin and

more number of filaments on the *g*-bristle of the first antenna as compared to the specimens from the Gulf of Thailand. The females do not show much variation from Poulsen's description except that the medial surface between the ridge and the shell margin has a lesser number of bristles. The shape of the shell in the female, slightly differs from that of the type in which "the shell tapers gently from its middle towards the posterior margin, to the effect that the posterior part of the shell is much narrower than the anterior part". In the present specimens the shell has a broadly rounded posterior shell margin. The number of cleaning bristles and the number of 'comb' teeth on the 7th limb are fewer than in the type. Thus in general the specimens agree with the descriptions of *Parasterope nana*. The greater number of bristles in the specimens may be related to an increase in the size compared to the male described from the coast of Thailand.

Genus *Synasterope* Poulsen, 1965

***Synasterope oculata* G.S. Brady (Fig. 3 a-i)**

Asterope oculata Brady, 1902, p. 179, pl. 21, fig. 6-13 (*Type locality*: Off Trincomalee in the east coast of Ceylon); Scott, 1905, p. 365 Skogsberg, 1920, p. 480.

Synasterope oculata Poulsen, 1965, p. 413, fig. 137.

Material: 'R. V. VARUNA' Station: 4371 (08° 46' N. 78° 17' E), 8-3-1969, one mature male, length 1.6 mm; 1/2 metre No. 21 Nylon bolting cloth net-open tow from 15-0 m at night.

Description: Female unknown.

Male

Carapace (Fig. 3 a-c): length 1.6 mm, height 0.87 mm; about 37 medial bristles on rostrum, 5 on ascending list and 5 behind list; below incisur along antero-ventral rounding of shell margin are present about 28 bristles; list along ventral margin with 8 - 10 short bristles; posterior ridge with 29 or 30 flap-like bristles, between them are about 70 short spines; between ventral part of ridge and posterior margin is an irregular row of about 17 short bristles.

First antenna (Fig. 3 d): first and second joint with rows of minute short hairs; no lateral bristle on 2nd joint; *b*-bristle of 7th joint with 5 filaments; *c* and *f*-bristles with about 22 or 23 filaments; *e*-bristle almost as long as *b*-bristle; *g*-bristle with 8 filaments and longer than *b*-bristle.

Second antenna (Fig. 3 e): disto-medial bristle of protopodite short, bare; endopodite 3 - jointed, prehensile, proximal bristle on 3rd joint shorter than joint; outer margin of 3rd joint distal to proximal bristle undulate; exopodites with basal spines on 3rd to 8th joints; tufts of hairs present on distal corners of 2nd to 8th joints, opposite to bristles.

Mandible (Fig. 3 f, g): coxale without bristle at basis of endite; coxale ventral branch has 4 or 5 rows of spines; dorsal branch has 6 or 7 rounded marginal teeth of varying size; basale endite has 4 finely pectinate terminal bristles, one dwarf bristle, a glandular peg and 3 triaenid bristles; basale ventral margin with a short

bare bristle; dorsal margin has a slender bare mid bristle and one short and one long corner bristles; exopodite about 80 percent of length of first endopodite joint; 2nd endopodite dorsal margin has 2 bare proximal bristles; between *b* and *c*-bristles one short plumose medial bristle and no long lateral bristle present; between *c* and

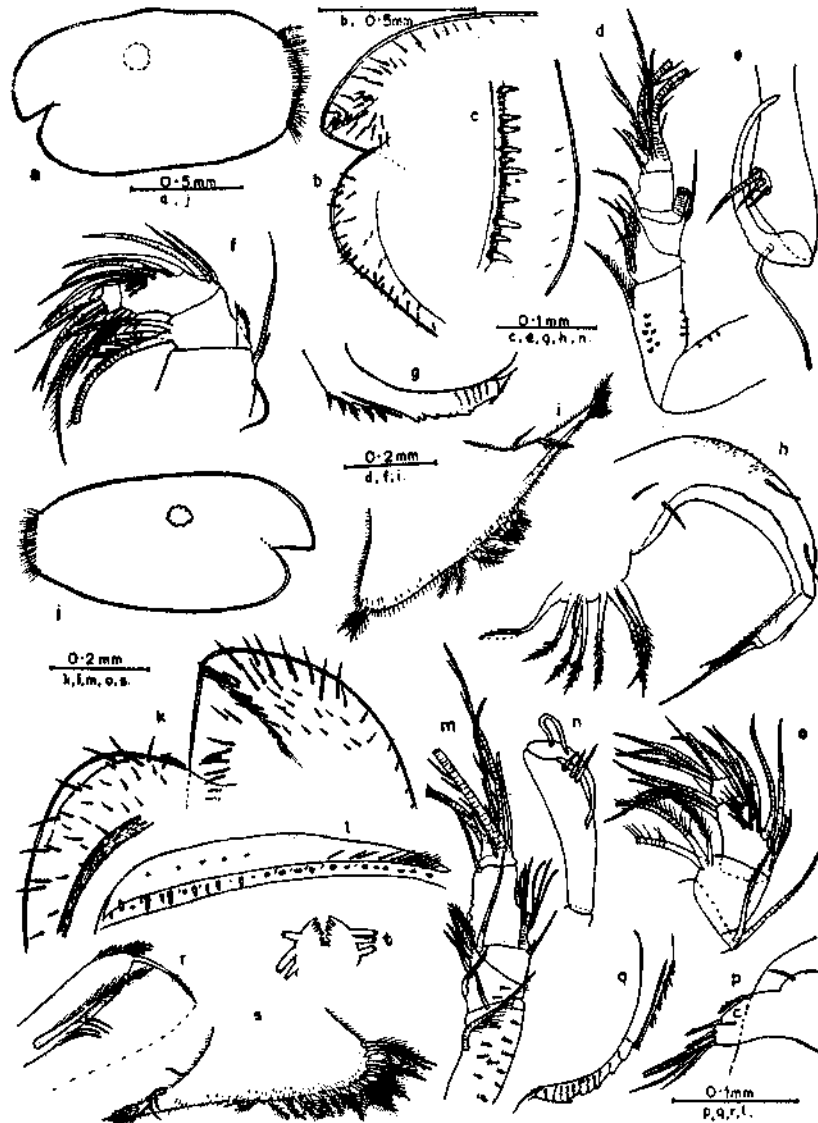


Fig. 3. *Synasterope oculata* (Brady). Male (a - i): a. lateral view of shell; b. anterior right shell, medial view; c. part of right posterior ridge and shell margin, mv; d. first antenna; e. endopodite of second antenna; f. mandible; g. coxale endite of mandible; h. maxilla, i. sixth limb. *Asteroptina nodulifera* Poulson. Male (j-t): j. lateral view of shell; k. anterior right shell, mv; l. posterior process, right shell, mv; m. first antenna; n. endopodite of second antenna; o. mandible; p. basale endite of mandible; q. coxale endite of mandible; r. fifth limb; s. sixth limb; t. distal part of seventh limb.

d is one long bare lateral bristle, medially a row of 5 short bristles with hairs; disto-ventral corner has 3 long bristles—one with short marginal hairs; end-joint with 6 bristles of which outermost opposite to claw-like bristle has marginal hairs.

Maxilla (Fig. 3 h) : 4+4 endite bristle groups; basale dorsal margin with one short bare proximal and 2 longer bare distal bristles; dorsal margin fringed with minute hairs proximal to distal bristles; ventral margin has one short bristle proximally of the middle and one long plumose distal bristle; endopodite bristles are as usual.

Fifth limb: epipodial appendage has about 61 plumose bristles; between lateral bristle and ventral margin of 'comb' are 4 bare bristles arranged as 2 pairs; comb-bristles arranged in 2 rows with few long hairs distally.

Sixth limb (Fig. 3 i): anterior margin with one proximal bare and one distal plumose bristles; pointed anterior corner has 4 short plumose bristles; ventral margin with a row of 8 plumose bristles; broadly rounded posterior corner has 2 plumose bristles; fringes of short hairs present along margins of limb.

Seventh limb: with 3+3 distal and 3+3 proximal cleaning bristles with 2 to 4 bells; each half of terminal comb has about 14 teeth.

Copulatory limb: consists of a broad stem ending with 2 lobes.

Furca: each lamella has 6 claws and 2 bristle-like claws; convex margin of 1st claw with minute hairs, concave margin with minute spines; other claws normal.

Dorsum with fringes of hairs. *Lateral eyes* large with about 20 ommatophores. *Median eye* pigmented. *Gills* present.

Distribution: Off Tuticorin in the Gulf of Mannar; Trincomalee and Cruz Bay along the east coast of Ceylon and Red Sea from the Indian Ocean; in the Atlantic Ocean off Buenos Aires.

Remarks: The original description of *Synasterope oculata* was based on the material obtained from Trincomalee and Cruz Bay along the east coast of Ceylon by Brady (1902). Skogsberg (1920) redescribed the species based on a damaged male from the same sample. Scott (1905) recorded this species from the Gulf of Mannar, but without any description. Poulsen (1965) obtained 5 males of this species from the Red Sea and partially redescribed the species pointing out that since Brady's incomplete description is based on a juvenile female in which specific characters are not fully developed, we have to consider the female of *S. oculata* as unknown. Skogsberg (1920) also found no adult female specimens in the original material.

The present specimen (male) agrees with the Red Sea specimens in the following characters in which Skogsberg's description differs: in the absence of (a) lateral bristle on the first joint of first antenna; (b) short disto-ventral bristle on basale of maxilla. It differs from the Red Sea specimen in having more number of spines between each flap-like bristle on the posterior ridge. The age and the condition of the specimens may account for some of the differences noticed between the present specimen and the earlier descriptions.

d is one long bare lateral bristle, medially a row of 5 short bristles with hairs; disto-ventral corner has 3 long bristles—one with short marginal hairs; end-joint with 6 bristles of which outermost opposite to claw-like bristle has marginal hairs.

Maxilla (Fig. 3 h) : 4+4 endite bristle groups; basale dorsal margin with one short bare proximal and 2 longer bare distal bristles; dorsal margin fringed with minute hairs proximal to distal bristles; ventral margin has one short bristle proximally of the middle and one long plumose distal bristle; endopodite bristles are as usual.

Fifth limb: epipodial appendage has about 61 plumose bristles; between lateral bristle and ventral margin of 'comb' are 4 bare bristles arranged as 2 pairs; comb-bristles arranged in 2 rows with few long hairs distally.

Sixth limb (Fig. 3 i): anterior margin with one proximal bare and one distal plumose bristles; pointed anterior corner has 4 short plumose bristles; ventral margin with a row of 8 plumose bristles; broadly rounded posterior corner has 2 plumose bristles; fringes of short hairs present along margins of limb.

Seventh limb: with 3+3 distal and 3+3 proximal cleaning bristles with 2 to 4 bells; each half of terminal comb has about 14 teeth.

Copulatory limb: consists of a broad stem ending with 2 lobes.

Furca: each lamella has 6 claws and 2 bristle-like claws; convex margin of 1st claw with minute hairs, concave margin with minute spines; other claws normal.

Dorsum with fringes of hairs. *Lateral eyes* large with about 20 ommatophores. *Median eye* pigmented. *Gills* present.

Distribution: Off Tuticorin in the Gulf of Mannar; Trincomalee and Cruz Bay along the east coast of Ceylon and Red Sea from the Indian Ocean; in the Atlantic Ocean off Buenos Aires.

Remarks: The original description of *Synasterope oculata* was based on the material obtained from Trincomalee and Cruz Bay along the east coast of Ceylon by Brady (1902). Skogsberg (1920) redescribed the species based on a damaged male from the same sample. Scott (1905) recorded this species from the Gulf of Mannar, but without any description. Poulsen (1965) obtained 5 males of this species from the Red Sea and partially redescribed the species pointing out that since Brady's incomplete description is based on a juvenile female in which specific characters are not fully developed, we have to consider the female of *S. oculata* as unknown. Skogsberg (1920) also found no adult female specimens in the original material.

The present specimen (male) agrees with the Red Sea specimens in the following characters in which Skogsberg's description differs: in the absence of (a) lateral bristle on the first joint of first antenna; (b) short disto-ventral bristle on basale of maxilla. It differs from the Red Sea specimen in having more number of spines between each flap-like bristle on the posterior ridge. The age and the condition of the specimens may account for some of the differences noticed between the present specimen and the earlier descriptions.

Genus *Asteropina* Strand
Asteropina nodulifera Poulsen (Fig 3 j-t)

Asteropina nodulifera Poulsen, 1965, p. 447-451, fig 148, 149 (Type locality: Red Sea).

Material: 'R. V. VARUNA' Station: 4372 (08° 46'N, 78° 21'E), 8-3-1969, one mature male, length 1.55 mm; in IOS net open tow from 15-0 m, night collection; depth at Station 18 m.

Description: Female unknown.

Male

Carapace (Fig. 3 j, - l): length 1.55 mm, height 0.7 mm; total number of medial bristles on rostrum is about 56 and their disposition is as in Poulsen's description of the type; below incisur along antero-ventral margin are about 10 long bristles, between this row and list are about 23 scattered short bristles; along ventral margin close to list are about 8 short bristles; in narrow interval between ventral half of posterior ridge and shell margin is a row of about 12 long, closely placed bristles; posterior ridge has about 22 or 23 flap-like bristles and short spines, in most cases only their granular bases being visible; between dorsal part of ridge and shell margin are about 5 circular dark spots.

First antenna (Fig. 3 m): second joint and part of third joints have rows of short hairs; bristles of 3rd to 8th joints are as for species; 5th joint characterised by having rounded processes on dorsal margin; bristle of 6th joint with minute marginal hairs.

Second antenna (Fig. 3 n): protopodite without hairs or spines on margins and without disto-medial bristle; endopodite 3-jointed, prehensile, with 3 bristles on 2nd joint which decreases in length distally; 3rd joint strongly curved with a furrowed tip; slender proximal bristle little more than half as long as joint; first exopodite joint with rows of hairs; 2nd to 8th joints have tufts of long hairs disto-dorsally; 3rd to 8th joints with small basal spines.

Mandible (Fig. 3 o - q): coxale without bristle at basis of endite; ventral branch has 4-6 short rows of spines along its ventral margin, distal part terminating with 3 short spines; dorsal branch has 5 or 6 rounded marginal teeth along ventral margin and a curved main spine — tip terminating as a short spine; distal bristle placed on dorsal margin at some distance from tip which it surpasses by little more than half its length.

Basale endite with 4 bare terminal bristles and 3 weak triaenid bristles with marginal spines; one bare dwarf bristle and a small glandular peg present; ventral margin of basale near endite with a bare bristle; dorsal margin of basale has no mid-bristle, 2 terminal bristles with few spines; exopodite about one fourth length of 1st endopodite joint; first endopodite ventrally has 3 bristles as in genus; dorsal margin of 2nd endopodite joint with one short and 2 long bare proximal bristles; *a*, *b* and *c*-bristles bare; *d*-bristle with a few marginal spines; between *b* and *c* are 4 medial bristles, one long bare close to margin and 3 medially situated short bare bristles; off *c* is a row of 3 medial bristles - one long pectinate and 2 small bare bristles; between *c* and *d*-bristles one long slender bare lateral bristle and medially, 3 shorter

bristles present; *d*-bristle with marginal hairs; distal corner bristle slender and bare disto-ventral margin with 3 usual bristles; end-joint has 6 bristles which are of same type as for species.

Maxilla: epipodite about half length of protopodite; dorsal margin of basale bare; two groups of endite bristles comprise typical 4+3 bristles; ventral margin of basale has one short bare mid-bristle and one long distal plumose bristle; first endopodite joint with one short anterior bristle and another bare bristle which reaches more than half length of terminal bristle of end-joint.

Sixth limb: (Fig. 3 s): anterior margin with 2 bare bristles; anterior pointed corner of end-joint has 5 bristles; along broadly rounded posterior angle of end-joint and 2/3 of ventral margin is a row of about 18 plumose bristles—those around angles being longest; fringes of hairs present along margins of limb.

Seventh limb (Fig. 3 t): with 3+3 distal and 3+2 proximal bristles having upto 4 bells; comb has 6+6 teeth.

Copulatory limb: consists of a broad shaft ending in two lobes.

Furca: each lamella has 6 curved claws and 2 bristlelike claws; along concave margin of each claws nos. 1+6 with rows of fine spines; lamellae without hairs.

Lateral eyes with about 22 ommatophores. *Median eye* and *Frontal organ* as for the species. *Gills* present.

Distribution: Red Sea; Off Tuticorin in the Gulf of Mannar.

Remarks: In the lesser number of bristles on the rostrum, on basale endite of mandible (8+1 versus 9+1), exopodite part of 5th limb; more bristles on the endite parts of the 6th limb; and the presence of minute rows of hairs on 2nd and 3rd joints of the first antenna, the present specimen differs from the description of the type from the Red Sea, but agrees with it in all diagnostic characters.

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