

## Three new species of *Syngastes* from south-western Australia

(Tegastidae, Harpacticoida, Copepoda)

By Ilse Bartsch

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Three species of the tegastid genus *Syngastes*, viz. *S. foveatus*, spec. nov., *S. parilis*, spec. nov., and *S. porellus*, spec. nov. are described. The three species were found in samples of scrub-like intertidal and shallow subtidal algae from semi-exposed rocky platforms on Rottnest Island, Western Australia.

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### Introduction

The relatively little known Tegastidae are members of the phytal fauna (Hicks & Coull 1983) and are also found associated with corals (Humes 1981a, b, 1984) and bryozoans (Médioni & Soyer 1967). Thus far, only a single tegastid (*Tegastes* spec.) was mentioned from Western Australia (Nicholls 1941). In contrast, several tegastid species have been recorded from the northern and western Indian and the western Pacific Ocean (Thompson & A. Scott 1903, Sewell 1940, Krishnaswamy 1957, Ummerkutty 1968, Wellershaus 1970, Marcus 1977, Fiers 1983, 1986, Cottarelli & Baldari 1987).

Among the meiofauna associated with intertidal and shallow subtidal algae collected on Rottnest Island, tegastids were represented by the genera *Tegastes*, *Parategastes* and *Syngastes*. Three species of *Syngastes* proved to be closely related, though not conspecific with species known from the Indian and Pacific Ocean.

### Material and Methods

The specimens described were collected by the author in January 1991, during the Fifth International Marine Biological Workshop on Rottnest Island, south-western Australia. One of the basic aims of the workshop was to obtain information about species composition. The meiofauna, including the harpacticoids, was extracted by washing algae and colonial organisms with fresh water over a sieve with 100 µm mesh size. The material retained on the sieve was preserved in ethanol and later on sorted under a dissecting microscope.

Measurements were made on specimens in lactic acid. Whole specimens are mounted either in glycerine or in glycerine jelly, dissected specimens in glycerine jelly. Holotypes are deposited in the Western Australian Museum, Perth (WAM), paratypes in the Zoologische Staatssammlung München (ZSM) and in the WAM.

Abbreviations used are: A1 = first antenna (antennule), segments counted from the base onward (A1-1, A1-2); A2 = second antenna; enp = endopod, segments numbered 1 to 3 (counting from the base onward); exp = exopod; Md = mandible; Mx1 = 1st maxilla (maxillule); Mx2 = 2nd maxilla; Mxp = maxilliped; P1 to P6 = first to sixth thoracopod (pereiopod).



The setal formula, adopted from Lang (1948), shows the number of inner seta on the basal segment : inner seta on following segment : inner, apical and outer seta on distal segment : outer seta on preceding segment : outer seta on basal segment.

The decimal system gives the position of a seta, or other structure, with reference from the basal to the distal ends of a segment.

The terms filaments and denticles are used for superficial seta-like and scale-like structures without perforation of the integument.

## Systematics

### Family Tegastidae G. O. Sars, 1904

#### Genus *Syngastes* Monard, 1928

**Diagnosis.** Heavily sclerotized, amphipod-shaped harpacticoid with large cephalothorax (cephalosome plus first pedigerous somite). Abdominal somites reduced in size. Rostrum short and rounded. A1 with 5-8 segments. Exopod of A2 1- or 2-segmented. First endopodal segment of maxilliped palmate. P1 with 1-segmented exopod and endopod. Bases on P2, P3 and P4 elongate and slender. P2 and P3 with 3-segmented endopod and 2-segmented exopod. P4 with 2-segmented endopod and 3-segmented exopod. Female P5 wide, lamellar, with baseoendopod and exopod largely fused. Male P5 small. Genital double-somites enlarged.

#### *Syngastes foveatus*, spec. nov.

Figs 1-21

**Types.** Holotype: ♀, Rottneet Island, Bickley Point, amongst dense epifauna and epiflora on leaves of the seagrass *Amphibolis antarctica*, 1-2 m depth, 18.I.1991 (WAM). - Paratype: 1 ♀, same data as holotype (ZSM).

**Additional material examined:** 1 ♂, 1 ♀ (WAM), 1 ♂ (ZSM), Little Armstrong Bay, epiflora and epifauna on *Amphibolis antarctica*, 1-2 m, 16.I.1991; 4 ♀ ♀, 4 ♂ ♂, Little Armstrong Bay, *Ecklonia* spec. (Phaeophyta), 1-2 m, 16.I.1991 (author's collection).

**Diagnosis.** ♀ 360-395 µm long, ♂ 310-322 µm long. Body with foveate ornamentation. Cephalothorax without internal transverse rod. Female with 4 and male with 3 free thoracic somites. Postgenital somites short. Maxillipedal palm with spinose tubercle, tongue-like projection, 7+4 median, 4 lateral and 7+7 medial tines. P1-enp somewhat shorter but wider than P1-exp, both slightly shorter than basis. Endopods P2 to P4 longer than exopods. P4-enp1 widest at 0.7, with remarkably stout spine at 0.4 and spinule at 0.8.

## Description

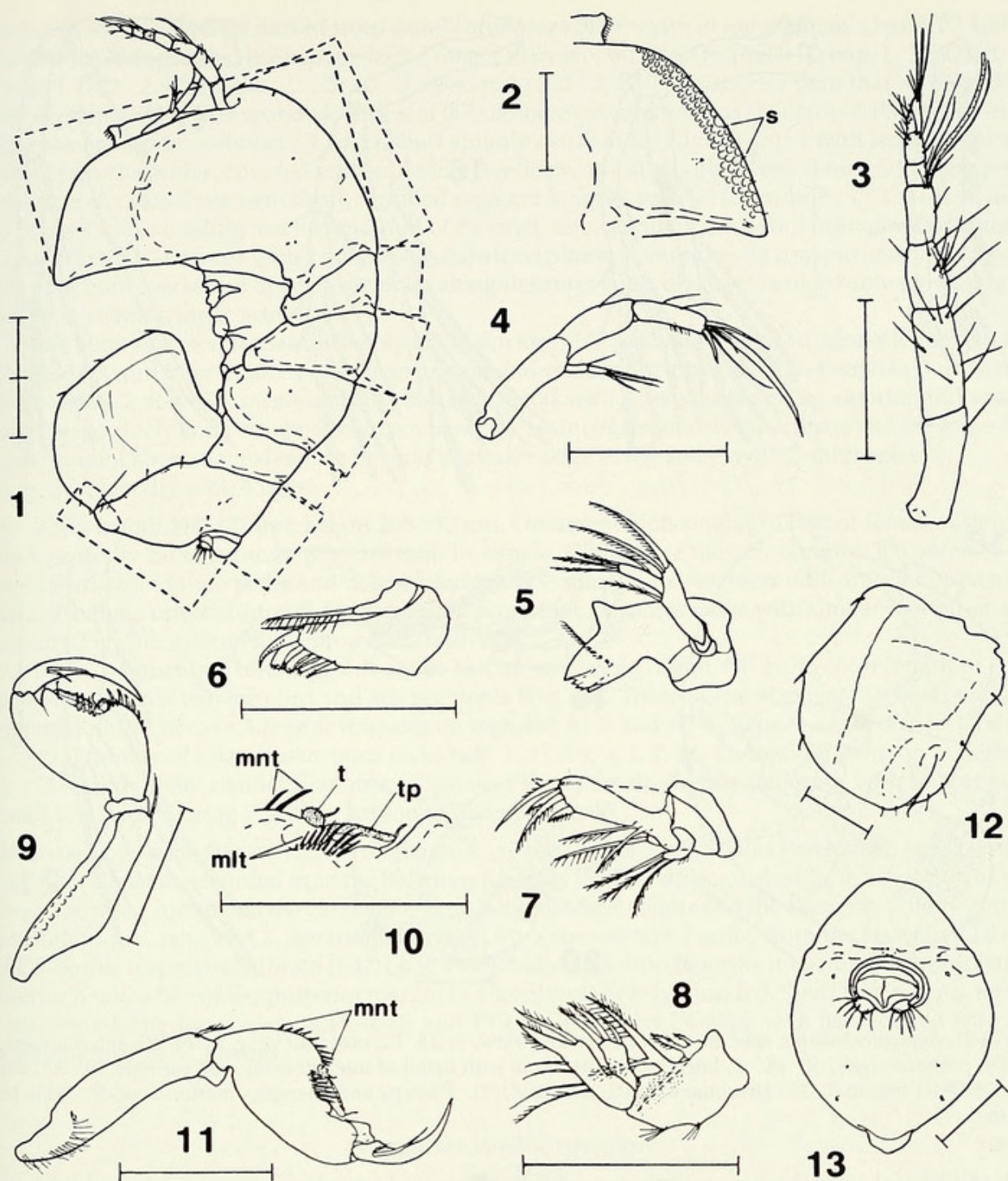
♀. Body length 360-395 µm, greatest height 255-279 µm, holotype 390/271 µm long/high. Integument of body and P5 rather uniformly foveate and with scattered setules and pores. Somite bearing P1 completely fused with cephalosome, no internal skeletal rod present (Fig. 1). Cephalothorax 181 µm long, greatest height 271 µm. Postero-ventral corner not spine-like. Delicate setules arranged along ventral margin of cephalothorax (Fig. 2). No hyaline membrane present. Free thoracic somites (in holotype) 54/85 µm, 65/115 µm, 75/106 µm, and 35/80 µm long/high. Abdomen 78 µm long, 138 µm high. Genital segment enlarged, scoop-like, terminating with rounded knob-like projection. Postgenital somites very short.

A1 7-segmented, with long and wide aesthetasc on segment 4, and much smaller one on terminal segment (Fig. 3). Number of setae from the base onward (aesthetascs included), 1, 11, 10, 5, 2, 7, 10; length of segments, 37, 35, 25, 18, 9, 12, 10 µm.

A2 with 2-segmented endopod and exopod. Basal endopodal segment with dorsal seta. A2-end2 with ventral filaments, 2 dorsal setae, and 6 terminal setae, one of which is claw-like and twice as long the apical segment (Fig. 4). Exopod small, with 1 and 3 setae on basal and terminal segment, respectively.

Mandibular gnathobase with stout and spiny teeth plus 1 long, plumose inner seta. Mandibular palp





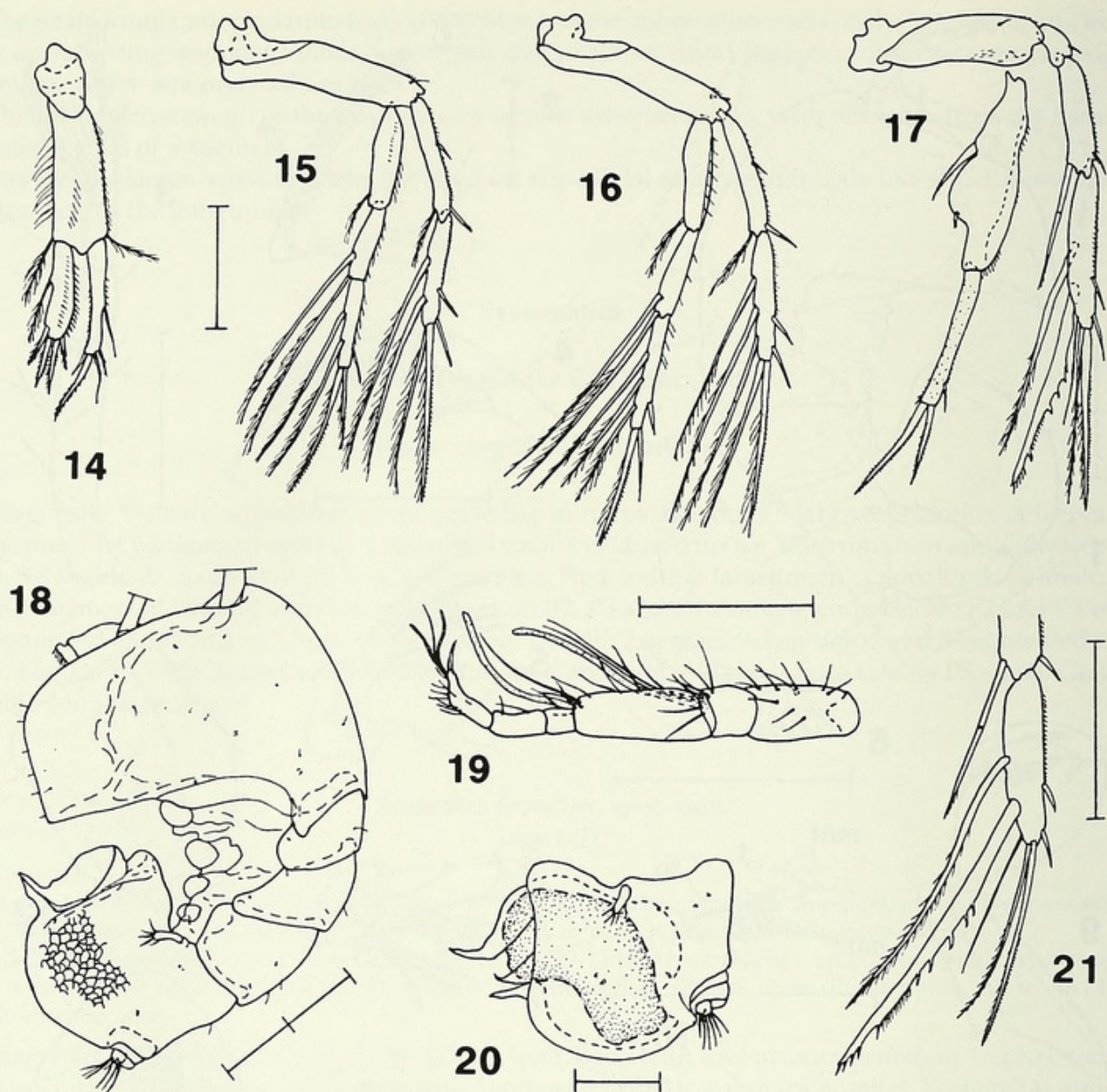
Figs 1-13. *Syngastes foveatus*, spec. nov. 1. ♀, lateral view (dashed line indicate measurements made); 2. Ventral cephalosome, ♀; 3. A1, dorsal view, ♀; 4. A2, medial view, ♀; 5. Md, lateral view, ♀; 6. Mx1, arthrite and coxa, ♀; 7. Mx1, lateral view, ♀ (arthrite in broken lines); 8. Mx2, lateral view, ♀; 9. Mxp, lateral view, ♀; 10. Detail of maxillipedal palm with 2 of the median tines, tubercle, tongue-like process and rows of medial tines, ♂; 11. Mxp, medial view, ♂; 12. P5, lateral view, ♀; 13. Urosome, distal view, ♀. Scale lines: 50 µm. (mlt, medial tines; mnt, median tines; s, setulae; t, tubercle; tp, tongue-like process)

with 7 setae, 4 of them inserted on the slender endopod and 2 on the basis (Fig. 5).

Mx1 with large, flattened arthrite ending with 7 apical spines and 1 stout seta (Fig. 6), outer (largest) spine bipectinate, other spines apically serrate. Coxa with 1 large, coarsely plumose seta. Basis elongate, with 4 apical spine-like setae, two of them rather short and strongly bipectinate. Endopod with 2 plumose setae. Exopod slightly larger, with filaments along inner edge and 3 terminal plumose setae (Fig. 7).

Mx2 2-segmented. Syncoxa with 2 tufts of filaments on posterior margin (Fig. 8). Basal endite delicate,





Figs 14-21. *Syngastes foveatus*, spec. nov. 14. P1, anterior view, ♀; 15. P2, posterior view, ♀; 16. P3, anterior view, ♀. 17. P4, posterior view, ♀; 18. ♂, lateral view (urosome with detail of integumental sculpturing); 19. A1, dorsal view, ♂ (A1-1 omitted); 20. Urosome with P5, lateral, ♂; 21. P4-exp2 and P4-exp3, anterior view, ♀. Scale lines: 50 µm.

with short basal setae, longer and plumose middle setae, and very long, prominently and bilaterally plumose distal seta. Middle endite with 2 long and wide plumose setae which are diverging at an angle of 60°. Apical endite with 3 spiniform, coarsely pectinate setae. Basis with wide terminal claw, 1 anterior and 4 posterior setae.

Maxilliped with short coxa. Basis elongate, 4 times longer than wide and distinctly longer than endopodal palm; lateral surface lightly reticulate (Fig. 9), base of medial surface with row of filaments (Fig. 11). Palm (in holotype) 60 µm long, 35 µm wide, with 7 wide median tines, rapidly increasing in size and, adjacent, 4 posterior smaller tines. Groove of palm with small, semi-spherical tubercle and tongue-like process, both delicately spinose (Fig. 10) and with bacilliform setule. Lateral margin of groove with 4 tines, medial margin with 7 long plus 7 much smaller tines (Fig. 10). Endopodal claw 45 µm long, with 2 medial and 2 lateral setae.

P1-basis with 1 inner and 1 outer seta (Fig. 14). Anterior surface and inner and outer edge of basis, exopod and endopod with rows of filaments and denticles. Exopod slightly longer but narrower than endopod. Setal formula of P1-enp: 221, of P1-exp: 023.

P2 to P4 (Figs 15-17) with short coxae and elongated bases. Each basis with a seta and delicate spinosity



near outer edge; seta on P4 moved from distal corner for about width of the segment's basis. P2 and P3 with slender endopod and exopod; endopod longer than exopod. Setal formula: P2-enp, 1 : 2 : 221 : 0 : 0; P2-exp, 1 : 222 : 2; P3-enp, 1 : 2 : 321 : 0 : 0; P3-exp, 1 : 322 : 2. P4-basis shorter than that of P3 and P2. Basal segment of P4-enp expanded, widest at 0.7 and here twice as wide as P2-enp and P3-enp. P4-enp1 with 1 strong, tapering seta at 0.4 and 1 short spinule at 0.8; outer edge of enp-1 with lamellar spinose crests. P4-end2 slender, covered with scale-like denticles, apically with 1 very short and 2 long setae. P4-exp slender, basal segment short, terminal segment longest; its setal formula: 0 : 1 : 322 : 1 : 1. Inner seta on P4-exp2 extending just beyond mid of P4-exp3, seta cannular, with wall of shaft interrupted at about 0.4 (Fig. 21). P4-exp3 with 3 inner setae, basal one plumose, middle seta conspicuously strong and solid, with both coarse and delicate denticles along the outer edge, distal seta remarkably slender. Inner apical seta slender, outer seta stout.

P5 with outer surface reticulate; in holotype 140  $\mu\text{m}$  long, 115  $\mu\text{m}$  wide, greatest diagonal length 160  $\mu\text{m}$ ; with about 30  $\mu\text{m}$  long fissure between exopodal and endopodal lobe (Fig. 12). Exopodal lobe with 5 delicate setae, 2 of which insert apically. Baseoendopod with 3 and 2 setae along anterior and ventral margin respectively and 1 seta posteriorly; none of the setae conspicuously bipectinate and/or spine-like.

Caudal rami short, not extending beyond posterior edge of the body: with 7 short setae.

Egg sac generally with 4 eggs.

♂. Body length 310-322  $\mu\text{m}$ , height 205-213  $\mu\text{m}$ . Ornamentation similar to that of female. Cephalothorax ventrally more truncate (Fig. 18) than in female. With 3 free thoracic somites. Urosome 86  $\mu\text{m}$  long, reticulate and with pores and delicate setules. Spermatophore reservoir with anterior operculum ending in a long, upward-turned and spiniform projection; posterior valve with similar though smaller structure (Fig. 20): intermediate projection tapering.

A1 with 7 segments. Third segment about half as long as A1-1 and A1-2 and  $\frac{1}{3}$  of length of A1-4. Wedge-like sclerite between 3rd and 4th segments (Fig. 19). Three apical segments slender, with 6th segment slightly concave. Large aesthetascs on segment A1-3 and A1-4, slender aesthetasc on terminal segment. Number of setae (aesthetascs included): 1, 11, 10, 9, 1, 2, 13. Endopodal palm on maxilliped (Fig. 11) slightly more slender than that of female. P5 very small, slightly flattened, with 5 short setae. Caudal setae, numbering 7, somewhat longer than in female.

Remarks. *Syngastes foveatus* is most similar to *S. gibbus* Geddes, 1968, *S. latus* Pesta, 1932, and *S. serratus* Lang, 1965. *S. gibbus*, recorded from the Bahamas (Geddes 1968), is distinguished from *S. foveatus*, as well as from the other species, on the basis of the hump-like thoracic somite and the elongate, acutely pointed cephalothorax. *S. latus* and *S. serratus* are known from the western Pacific, from the Hawaiian Islands and California respectively (Pesta 1932, Lang 1965). Males of *S. latus* have the urosome with conspicuous posterior hook, whereas the posterior margin in *S. foveatus* is evenly rounded. *S. serratus* is characterized by the remarkably long setae on P1-basis and P1-enp, and short P4-exp2 with its widened base, not resembling that of *S. foveatus*.

### *Syngastes parilis*, spec. nov.

Figs 22-43

Types. Holotype: ♀, Nancy Cove, intertidal corallines, 20.I.1991 (WAM). - Paratypes: 1 ♀, 1 ♂ (ZSM), 1 ♂ (WAM), same data as holotype.

Additional material examined: 2 ♀♀, 1 ♂, 3 copepodids, Nancy Cove, intertidal corallines and *Gelidium* (Rhodophyta) plus sediment in a pool on shoreline platform, 20.I.1991 (author's collection).

Diagnosis. ♀ 527-589  $\mu\text{m}$  long, ♂ 371-415  $\mu\text{m}$  long. Integument with delicate porosity and phacoid swellings. Both female and male with 3 free thoracic somites; posterior thoracic somite fused with genital somite. Maxillipedal palm with 8 median, 3-4 lateral and 11-15 medial tines. P1-exp much smaller than P1-enp. Endopods on P2 to P4 longer than exopods. P4-enp1 5 times longer than wide, with spiniform membrane and 2 minute spurs. Inner seta on P4-exp2 extending just beyond exp3. Male P5 clavate.

### Description

♀. Length 527-589  $\mu\text{m}$ , greatest height 365-396  $\mu\text{m}$ , holotype 540  $\mu\text{m}$  long (Fig. 22). Integument uniformly ornamented with delicate porosity (Fig. 24) and minute phacoid swellings (which may join to a



reticulum). Cephalothorax in holotype 310  $\mu\text{m}$  long, 395  $\mu\text{m}$  high. Internal transverse rod-like sclerite about 50  $\mu\text{m}$  long and not extending to dorsum. Ventral margin and surface of cephalosome with minute pits, each with a delicate setule (Fig. 23). Similar setules also present on all thoracomers and urosome. No ventral membrane present. Length/height of successive free thoracic somites 75/167  $\mu\text{m}$ , 95/174  $\mu\text{m}$ , and 105/149  $\mu\text{m}$ . Posterior thoracic somite fused with genital and postgenital somites. Urosome 178  $\mu\text{m}$  long, 185  $\mu\text{m}$  high. Scoop-like genital somite ending with rounded, slightly axe-shaped knob. Pair of large pores on either side of anus, a pair of setae anterior to anus, and numerous setules within minute pits. Further setules, setae and pores as illustrated (Fig. 34).

A1 7-segmented (Fig. 27), with large aesthetasc on segment A1-4, and smaller one on apical segment. Length of segments: 40, 55, 30, 21, 10, 9, 17  $\mu\text{m}$ ; their number of setae (aesthetascs included): 1, 11, 10, 5, 3, 3, 10.

A2 with ventral row of delicate filaments on the basis (Fig. 25). Apical segment with the 2 dorsal setae inserted adjacent, ventrally with 4 pectens with bristle-like filaments (Fig. 26). Posterior claw long, about 3 times the length of preceding apical segment. Exopod small, 2-segmented, with 1 and 3 setae, respectively.

Mandibular gnathobase with strong, both blunt and spinose teeth, a short seta-like spinule and a long plumose seta (Fig. 28). Mandibular palp rather wide. Its basis with long filaments along outer edge and shorter ones along inner edge. Palp with 6 setae, 3 of them inserted on the small, subquadrangular endopod (Fig. 33). Setae on basis coarsely plumose.

Mx1 with stout arthrite bearing 1 strong seta and 7 wide teeth; lateral (outer) tooth conspicuously large and its concave edge serrate; successive 6 teeth shorter and with wide, serrate tips; medial (inner) tooth longer than 5 preceding teeth but not as large as lateral tooth. Coxa ending with 1 long plumose seta, with barbs of plume arranged in two rows along the seta's posterior flank. Basis flattened, subrectangular in outline (Fig. 29); its truncate apical edge with 4 wide, serrate setae (2 large and 2 small ones). Exopod short, cylindrical, with 2 setae. Endopodal protuberance with 1 shorter seta and 1 long coarsely plumose seta.

Mx2 2-segmented. Syncoxa with single tuft of filaments in posterior half (Fig. 30). Basal endite delicate, with 1 long and conspicuously plumose and 2 small setae; middle endite ending with 1 long, plumose seta; apical endite with 2 wide setae, both with brush-like arranged barbs. Basis terminating with 1 pectinate anterior seta, 1 stout claw and 4 posterior setae of which the basalmost is strongly plumose.

Maxillipedal basis 107  $\mu\text{m}$  long (diagonally) and 32  $\mu\text{m}$  wide; basally with rows of filaments; apically with single seta (Fig. 31). Palm-like end1 100  $\mu\text{m}$  long, greatest height (55  $\mu\text{m}$ ) in about the segment's mid. With 2 + 6 triangular median tines, the latter rapidly increasing in size. Semispherical tubercle and tongue-like process spinose; both with bacilliform setule. Groove with 3-4 lateral (Fig. 32) and 11-15 long medial tines (Fig. 31). Distal claw stout, with 2 short lateral and 2 medial setae, 1 of the latter being large, the other small. Concave flank of claw with delicate spinosity (Fig. 32).

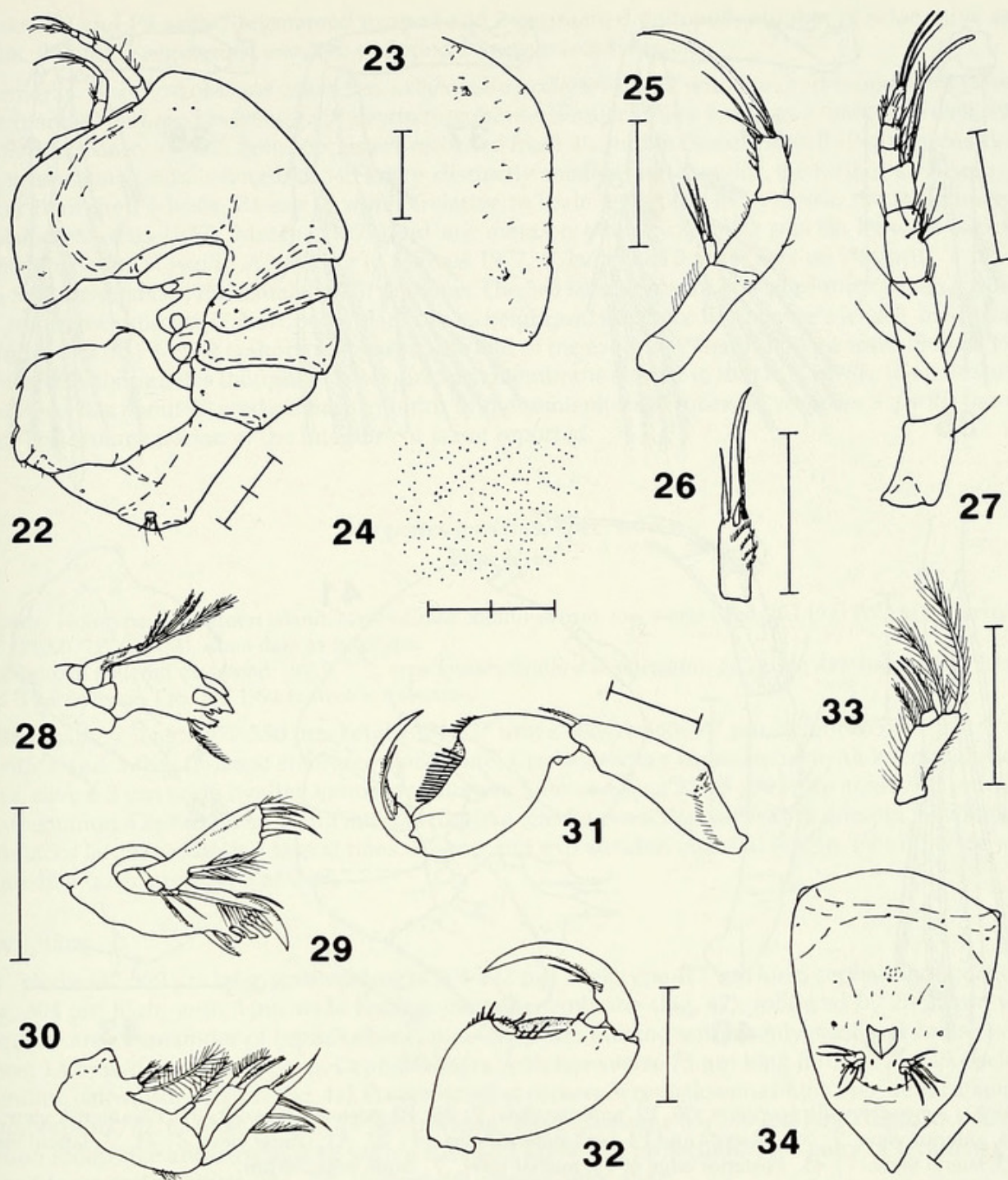
P1-basis with 1 slender inner and 1 very short, delicately plumose outer seta; adjacent groove armed with tine-like filaments. Exopod small, slightly curved (Fig. 35), with 2 apical and 3 outer setae. Endopod about as long as basis, its setal formula, 320. Basalmost inner seta coarsely plumose; successive seta solid, curved, with serrate inner edge; apical setae delicately barbed. Lateral edge of endopod with rows of short filaments.

P2, P3 and P4 with endopod longer than exopod (Figs 36-38). Setal formula: P2-enp, 1 : 2 : 221 : 0 : 0; P2-exp, 1 : 222 : 2; P3-enp, 1 : 2 : 321 : 0 : 0; P3-exp, 1 : 322 : 2. P4-enp1 flattened, with crest-like serrate outer lamellae. Inner edge of P4-enp1 with large spiniform lamella and 2 small spur-like setae, inserted at 0.78 and 0.98. P4-enp2 slender, its length 0.42 of that of P4-enp1; outer margin of enp2 serrate. Two inner setae small, 2 apical setae long and serrate, outer seta spine-like. P4-exp with 0 : 1 : 322 : 1 : 1 setae. Inner seta on P4-exp2 long, cannular, with some few tines at 0.66 and ending with serrate tip (Fig. 39). P4-exp3 slightly longer than P4-exp1 plus P4-exp2; 3 long inner setae inserted almost equidistant; basal and distal seta apically flattened, middle seta solid, coarsely serrate and with widened terminal tooth. Inner apical seta bilaterally plumose, outer apical seta with outer margin serrate and inner edge plumose.

P5 lamellar, with baseoendopod and exopod largely fused (Fig. 42). Fissure between endopodal and exopodal lobe about 20  $\mu\text{m}$  long. Baseoendopod with 3 anterior short and spinelet-like setae, 1 conspicuously stout, delicately bipectinate seta and 1 apical setule. Posterior delicately serrate margin of P5 with 4 (1 baseoendopodal, 3 exopodal) slender setae plus the 2 setae on the exopodal apical lobe (Fig. 43).

Caudal rami short, subapical in position. With inner tubercle and 7 short setae; the longer setae slightly extending beyond posterior margin of body.





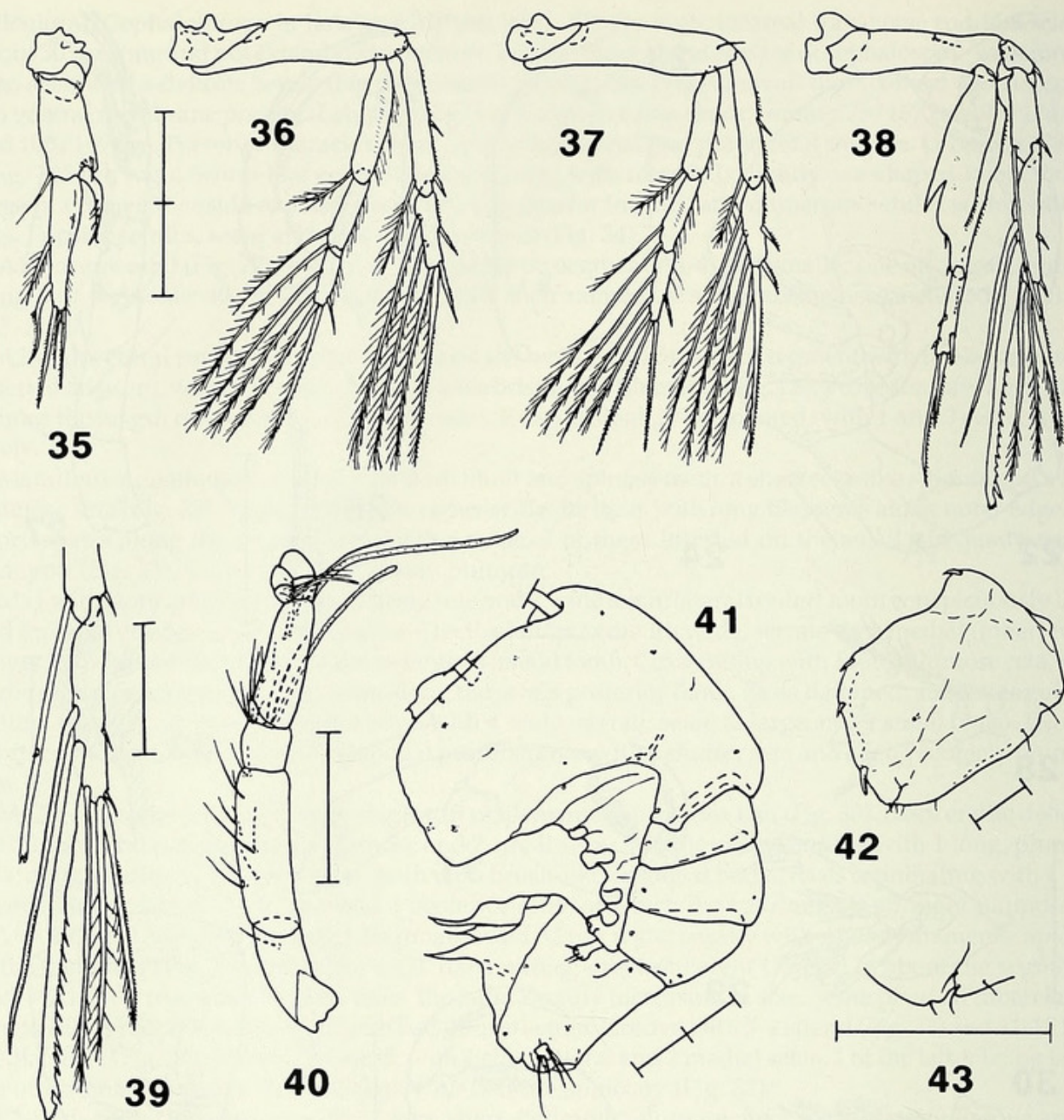
Figs 22-34. *Syngastes parilis*, spec. nov. 22. ♀, lateral view; 23. Ventral cephalosome, ♀; 24. Detail of middle cephalosome, ♀; 25. A2, lateral view, ♀; 26. A2, terminal segment, ventral view, ♀; 27. A1, dorsal view, ♀; 28. Md, lateral view, ♀; 29. Mx1, lateral view, ♀; 30. Mx2, lateral view, ♀; 31. Mxp, medial view, ♀; 32. Mxp, endopodal palm and claw, lateral view, ♀; 33. Mandibular palp, lateral view, ♀; 34. Abdomen, distal view, ♀. Scale lines: 50 µm.

Egg sac with 4 eggs.

♂. Body length 371-415 µm, height 266-278 µm. Ornamentation similar to that of female. Ventral margin of cephalothorax more truncate than that of female (Fig. 41), with small irregularly arranged pits. Urosome 125 µm long. Anterior operculum of spermatophore reservoir ending with long, upward-bent spiniform projection; posterior projection slightly shorter. Intermediate spine slender, pointed.

A1 8-segmented, with 4 basal and 4 apical segments (Fig. 40); segment 2 1.3 longer than both segment A1-1 and A1-4. Short crescentic wedge between A1-3 and A1-4. Apical segments slender, short and crooked. Large aesthetasc on 3rd and 4th segment, small one on terminal segment. Number of setae on





Figs 35-43. *Syngastes parilis* spec. nov. 35. P1, anterior view, ♀; 36. P2, posterior view, ♀; 37. P3, anterior view, ♀; 38. P4, anterior view, ♀; 39. P4-exp2 and P4-exp3, anterior view, ♀; 40. A1, lateral view, ♂; 41. ♂, lateral view; 42. P5, lateral view, ♀; 43. Posterior edge of P5, medial view, ♀. Scale lines: 50 µm.

basal segments (aesthetascs included): 1, 11, 11, 9. P5 clavate, with 3 apical setae. Caudal rami short, placed anterior to anus, with inner tubercle and 7 setae; longest seta being 6 times the diameter of the ramus.

Copepodids. Stage III 292/198 µm, stage IV (♀) 363/267 µm, and stage V (♂) 362/217 µm long/high. Copepodids with integument delicately reticulate rather than punctate. The three stages with 3 free thoracic segment.

Copepodid stage III with 5-segmented A1 (with 2 basal and 3 terminal segments); maxilliped with 4 median, 1 lateral and 9 medial tines. P4 with flattened exo- and endopod, both 1-segmented. P5 represented with 2 distinct apical setae from endopodal lobe and 3 outer setae. Longest seta on caudal rami about 6-7 times the length of the rami.

Copepodid stage IV (female) with 6-segmented A1 (segments corresponding to female A1-3 and A1-4 fused). Maxilliped with 4 median, 1 lateral and 9 medial tines. Exopod on P2-P4 2-segmented. P5 lamellar, its setation similar to that of female and with 1 of the setae being conspicuously stout. Caudal rami short, the longest seta about 4 times the length of the ramus. Genital segment slightly protruding.

Copepodid stage V (male) with 7-segmented A1 (3 basal and 4 apical segments), apical segments



slender. P2 and P3 with 3-segmented exopod and 2-segmented endopod; number of setae same as in adults. P4 with 3-segmented exopod; endopod 1-segmented, flattened.

Remarks. The most obvious characters in *Syngastes parilis* are the P1 with the short exopod and P4 with the expanded endopod bearing a spiniform membrane. Similar P1 are found in *S. indicus* Sewell, 1940, and *S. kunzi* Marcus, 1977. Both species are recorded from the Indian Ocean (Sewell 1940, Marcus 1977).

*Syngastes kunzi*, with a length of 343  $\mu\text{m}$ , is distinctly smaller than *S. parilis*, the former's P1-exp is 1.5 longer than the P1-basis, P4-exp is wider (relative to its length) than in *S. parilis*; the integument is areolated (Marcus 1977). Marcus (1977) did not mention a long, cannular seta on P4-exp2 which is characteristic for *S. parilis*. According to Marcus 1977, *S. kunzi* has 3 inner seta on P4-enp1.

In *Syngastes indicus*, the female is 470  $\mu\text{m}$  long. The 3rd somite has an anterior hump which is absent in *S. parilis*; the urosome is short, both relative to its height and the preceding somite's length. In *S. indicus*, the inner seta on P4-exp2 is short, not reaching to end of the exopod; P4-enp shows a spine (Sewell 1940: text-fig. 8G), though it is thought to be a spiniform membrane similar to that in *S. parilis*; the palm of the maxilliped has about 10 median tines anterior to the semispherical tubercle, whereas *S. parilis* has 6+2 tines. The ornamentation of the integument is not reported.

### *Syngastes porellus*, spec. nov.

Figs 44-63

Types. Holotype: ♀, Rottneet Island, Nancy Cove, corallines from low water edge, 20.I.1991 (WAM). - Paratypes: 2♀♀ (ZSM), 1♂ (WAM), same data as holotype.

Additional material examined: 3♀♀, 1♂, type locality (author's collection); 1♂, Little Armstrong Bay, *Ecklonia* spec. (Phaeophyta), 1 m, 16.I.1991 (author's collection).

Diagnosis. ♀ length 477-550  $\mu\text{m}$ , height 304-327  $\mu\text{m}$ ; ♂ length 440-447  $\mu\text{m}$ , height 265-267  $\mu\text{m}$ . ♀ and ♂ with 4 and 3 free thoracic somites respectively. Cephalothorax ornamented with evenly scattered pores, save a 3  $\mu\text{m}$  wide hyaline ventral membrane followed by a 20-25  $\mu\text{m}$  wide area with reticulate ornamentation. Cephalothorax with internal rod-like sclerite extending halfway to dorsum. Maxillipedal palm lacks large medial and lateral tines. P1-enp and exp slender, equal in length. P4-enp wide, with a spur-like inner projection at 0.48.

### Description

♀. Body 447-550  $\mu\text{m}$  long, greatest height 304-327  $\mu\text{m}$ . Holotype 477  $\mu\text{m}$  long, cephalothorax 261  $\mu\text{m}$  long, 304  $\mu\text{m}$  high, with 3  $\mu\text{m}$  wide hyaline ventral membrane (Fig. 47), followed by 20-25  $\mu\text{m}$  wide reticulate area, remainder of cephalothorax and body ornamented with evenly scattered coarse pores, almost 1  $\mu\text{m}$  wide and 1  $\mu\text{m}$  deep. Cephalothorax with transverse 75  $\mu\text{m}$  long internal rod-like sclerite extending halfway to dorsum (Fig. 44). Postero-ventral corners of cephalosome blunt. Free thoracic somites in holotype 62/82, 65/107, 97/122, 60/80  $\mu\text{m}$  long/high. Urosome 65/150  $\mu\text{m}$  long/high; its posterior portion scoop-like and terminating with a rounded knob-like projection. Two pairs of terminal pores moved to ventral position (Fig. 53). Postgenital somites very short.

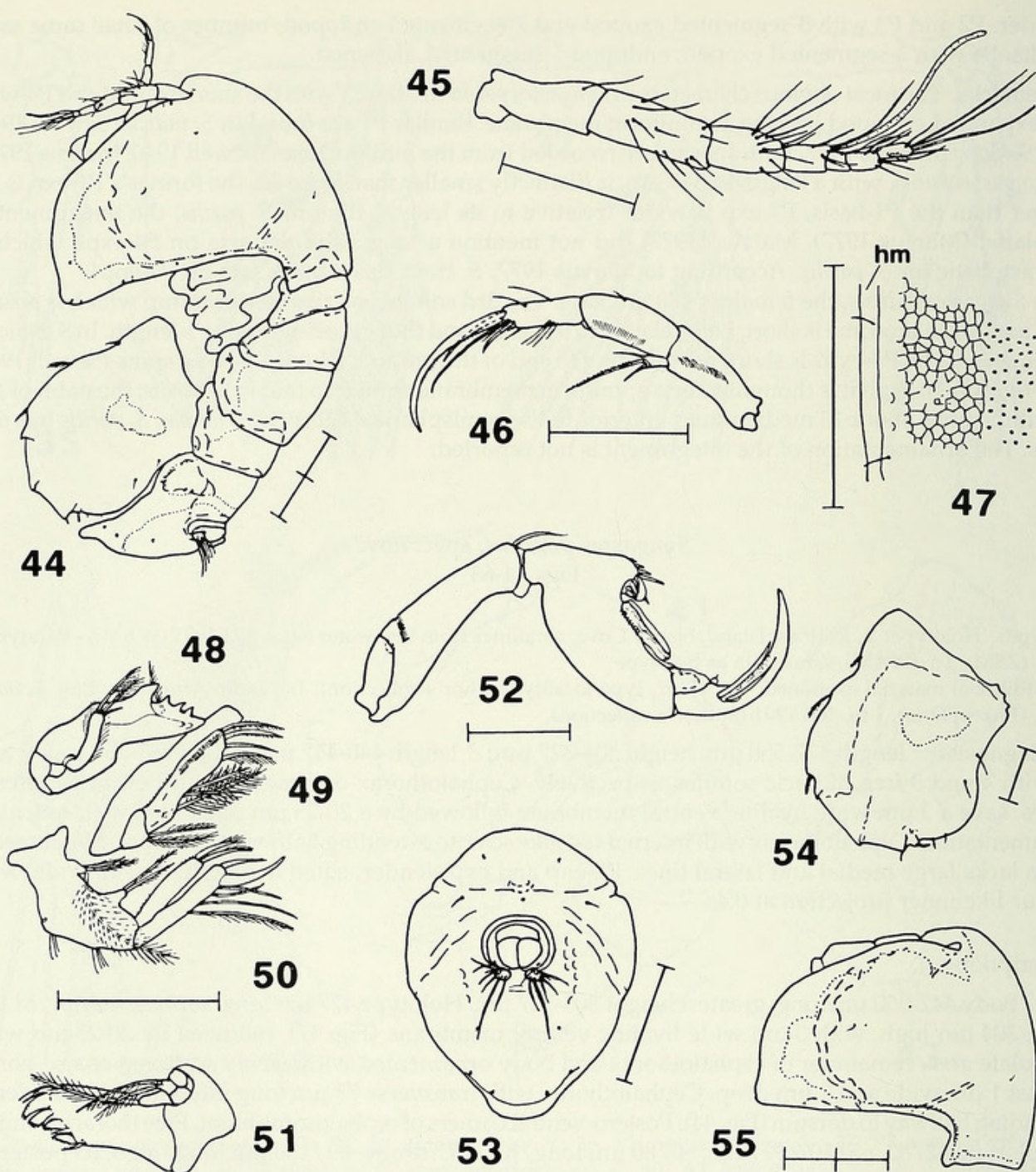
A1 7-segmented, with long aesthetasc on 4th segment and smaller one on apical segment (Fig. 45). Length of segments, 45, 45, 30, 16, 10, 11, 11  $\mu\text{m}$ ; their number of setae (aesthetascs included), 1, 11, 10, 5, 1, 7, 8.

A2 with short 2-segmented exopod; the small apical exopodal segment with 1 long, serrate and 1 short, almost plain seta, basal segment with 1 short seta. Enp1 with 1 delicate dorsal seta; enp2 with the 2 dorsal setae inserted as illustrated (Fig. 46), stiff ventral and apical filaments, and 3 slender plus 3 wider, claw-like terminal setae; the longest delicately serrate claw-like seta longer than preceding endopodal segment (Fig. 46).

Md with long, plumose seta. Gnathobase with strong teeth which in turn bear denticles. Mandibular palp slender, less than half the coxal length, with numerous filaments and 3 apical setae (Fig. 48).

Mx1 with flattened arthrite. Oblique edge, from outer (lateral) to inner corner, with 1 seta, 1 tapering, pectinate tooth, 3 wide and apically serrate teeth, 1 small tooth, 1 wide tooth with long serrate edge, 1 slightly pectinate spinelet (Fig. 51). Coxa with 1 long coarsely plumose seta. Basis elongate, flattened, with a row of delicate filaments along anterior margin (Fig. 49); the 4 apical setae subequal in length. Exopod and endopod each with 2 setae. Setae on enp and exp distinctly plumose.



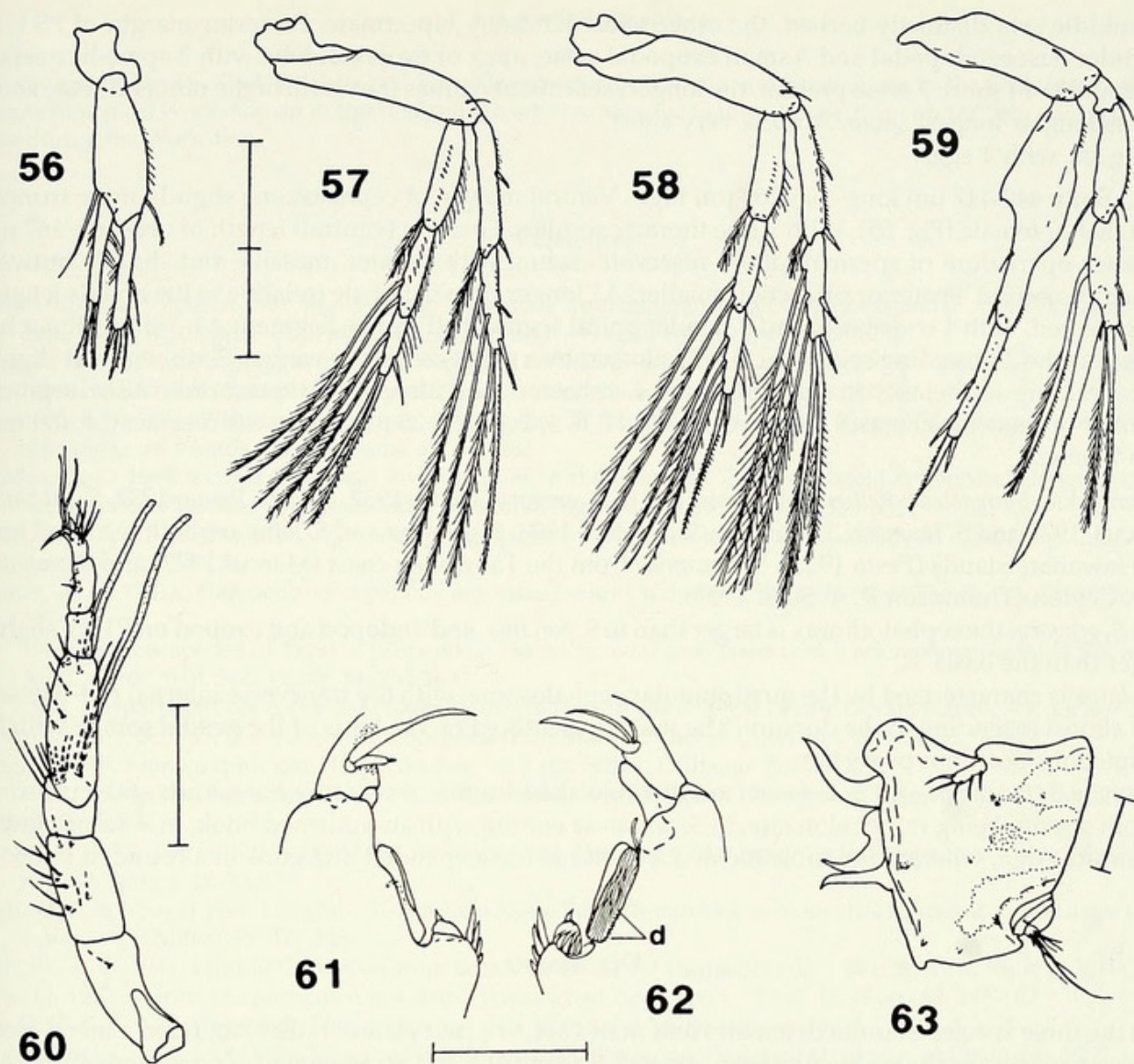


Figs 44-55. *Syngastes porellus*, spec. nov. 44. ♀, lateral view (stippled lines surround porose areolae); 45. A1, medial view, ♀; 46. A2, lateral view, ♀; 47. Detail of ventral cephalosome, ♀; 48. Md, lateral view, ♀; 49. Mx1, lateral view, ♀; 50. Mx2, lateral view, ♀; 51. Mx1, arthrite, coxa and exopod, ♀; 52. Mxp, lateral, ♀; 53. Urosome, distal view, ♀; 54. P5, lateral view, ♀ (stippled line encircles porose areolae); 55. Cephalothorax, lateral view, ♂ (stippled lines surround porose areolae). Scale lines: 50 µm. (hm, hyaline membrane)

Mx2 with syncoxa being longer than basis. Posterior margin of syncoxa with 2 tufts of short filaments (Fig. 50). Basal endite delicate, with 1 very long, conspicuously plumose and 2 shorter delicately plumose setae. Middle endite with 2 plumose seta. Apical endite with 2 serrate bristles. Basis slender, terminating with a claw, 1 anterior and 4 posterior setae.

Mxp with short coxa. Basis and endopodal palm both about 100 µm long (Fig. 52). Palm with 4 wide median tines, increasing in size. Semispherical tubercle flanked by 5 wide tines (Fig. 62), tubercle not spinose, ending with spine-like tip. Tongue-like process with fingerprint-like ornamentation. Medial tines lacking, row of lateral tines reduced to minute denticles (Fig. 62). Terminal claw with 3 lateral bristles, 1 long medial bristle and 1 short, finger-like medial seta which ends with minute apical spur (Fig. 61). Inner surface of claw delicately spinose.





Figs 56-63. *Syngastes porellus*, spec. nov. 56. P1, anterior view, ♀; 57. P2, posterior view, ♀; 58. P3, posterior view, ♀; 59. P4, posterior view, ♀; 60. A1, lateral view, ♂; 61. Detail of maxillipedal palm and claw, medial view, ♂; 62. Detail of maxillipedal palm and claw, lateral view, ♂; 63. Urosome, lateral, ♂ (stippled lines surround porose areolae). Scale lines: 50 µm. (d, denticles)

P1 with lamellar basis 1.27 longer than both P1-enp and P1-exp. Endopod and exopod similar in length (Fig. 56), both slender, about 10 times longer than wide. Endopod with 1 inner and 2 apical setae, all 3 setae inserted adjacent. Outer margin of P1-enp with numerous filaments. Exopod articulated posterior to endopod, with setal formula 023; margins with filaments.

P2 and P3 with endopod longer than exopod. P2-basis with a small hump (Fig. 57); no such hump on P3-basis (Fig. 58); both bases with posterior seta and long row of short filaments. Setal formula of P2-enp, 1 : 2 : 221 : 0 : 0; P2-exp, 1 : 222 : 2; P3-enp, 1 : 2 : 320 : 0 : 0; P3-exp, 1 : 322 : 2. P2-exp1 and P3-exp1 with outer margin delicately serrate and with reticulate sculpturing. Inner surface of endopod with filaments.

P4-exp2 and P4-exp3 equal in length. P4-enp1 widened anterior to the segment's mid and with a minute lamellar dent (no seta) at 0.48 (Fig. 59). Inner setae inserted at 0.73 and 0.88. Lamellae along outer margin with rows of small denticles. Enp2 slender, about 8 times longer than wide and about half as long as preceding segment. Setal formula: P4-enp, 2 : 220 : 0; P4-exp, 0 : 1 : 322 : 1 : 1. Length of inner, cannular seta on P4-exp2 about twice the segment's width. Middle inner seta on exp3 strong, its basal third rather smooth, middle third with scattered larger plus smaller denticles, distal third with row of minute tines only. Posteriormost seta very short and delicate.

P5 enlarged, greatest diagonal length 222 µm, lamellar, with porose areola (Fig. 54). Baseoendopod and exopod almost completely fused, fissure less than 50 µm. Anterior margin with 3 bristle-like setae,



the middle seta distinctly barbed, the other setae delicately bipectinate. Posterior margin of P5 with 1 slender baseoendopodal and 3 small exopodal setae; apex of exopodal lobe with 2 spine-like seta.

Caudal rami short; 7 setae present, the longest seta about 6 times the width of the ramus, 5 setae about half as long as longest setae, 7th seta very short.

Egg sac with 4 eggs.

♂. Body 440-447 µm long, 265-267 µm high. Ventral margin of cephalosome slightly more truncate than that of female (Fig. 55). With 3 free thoracic somites. Greatest (ventral) length of urosome 167 µm. Anterior operculum of spermatophore reservoir ending with slender, massive and slightly outward turned projection. Posterior projection smaller. A1 longer than in female (relative to the body's length), 7-segmented, with 4 wide basal and 3 slender apical segments (Fig. 60). Segment A1-3 short, about half as long as the 2 preceding segments. A1-3 followed by a small crescentic wedge. Sixth segment slightly concave. Long aesthetascs on segments 3 and 4, a shorter, more slender aesthetasc on terminal segment. Number of setae (aesthetascs included), 1, 11, 11, 8, 1, 2, 11. P5 25 µm long, with 5 setae. Caudal rami with 7 setae.

Remarks. *Syngastes porellus* is most similar to *S. gregoryi* Pesta, 1932, *S. latus* Pesta, 1932, *S. tanzaniae* Marcus, 1977 and *S. twynami* Thompson & A. Scott, 1903. *S. gregoryi* and *S. latus* are both recorded from the Hawaiian Islands (Pesta 1932), *S. tanzaniae* from the Tanzanian coast (Marcus 1977) and *S. twynami* from Ceylon (Thompson & A. Scott 1903).

In *S. gregoryi* the cephalothorax is larger than in *S. porellus*, and endopod and exopod on P1 are slightly longer than the basis.

*S. latus* is characterized by the quadrangular cephalosome, with the transverse internal rod-like sclerites almost extending to the dorsum. The male is identified on the basis of the genital somite with the conspicuous posterior projection.

Female *S. tanzaniae* and *S. twynami* are distinguished from *S. porellus* by the nature of the urosome, in both species being rather elongate, in *S. tanzaniae* ending with an upturned hook, in *S. twynami* with a truncate edge, whereas the urosome in *S. porellus* is less expanded and ends in a rounded knob.

## Discussion

In the three species examined, females and males are, at a first glance, rather similar in general facies; however, males are always smaller than females. Sculpturing and arrangement of pores and outline and setation of mouthparts and legs P1 to P4 is the same in both sexes.

The most marked difference between females and males is in the genital region. Females have either four thoracic somites (*Syngastes foveatus*, *S. porellus*) or the P5-bearing somite is fused with the genital somite (*S. parilis*) leaving three free thoracic somites. The genital double-somite is ventrally produced into a scoop-like structure. Together with the lamellar P5, with baseoendopod and exopod almost completely fused, a spacious brood pouch is formed for the single egg sac, generally containing four eggs. The males have three free thoracic somites. The P5-bearing somite and the genital somite are fused. The P5 are very reduced in size. The genital somite is produced ventrally, forming a spermatophore reservoir with its ventral orifice closed with opercula.

Another sexual dimorphism is found in the shape and setation of the first antenna. In the three species described, the male first antenna is longer than that of the conspecific female, with seven (*S. foveatus*, *S. porellus*) or eight segments (*S. parilis*), whereas the female A1 has seven segments. Males have large aesthetascs on the third and fourth segments, females on the fourth segment.

In all three species, the ventral margin of the cephalothorax is more truncate in males than in females; the postero-ventral edge is almost rectangular in the males.

Both females and males have 7 caudal setae, those of the males are slightly longer (relative to length of the body) than in females.

Sexual dimorphism in P4, as described for the tegastid *Feregastes wellensi* Fiers, 1986 (Fiers 1986), is not found in the three described species of *Syngastes*.



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