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NANNASTACIDAE (CRUSTACEA: CUMACEA) FROM THE MALAYAN SHALLOW WATERS (SOUTH CHINA SEA)

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ABSTRACT

Four new species from the South China Sea are described: *Nannastacus muelleri* n.sp., *Nannastacus wisseni* n.sp., *Scherocumella fagei* n.sp. and *Scherocumella malayensis* n.sp. The descriptions of further 15 known species are complemented with new information (*Campylaspis amblyoda* Gamo, 1960, *Cumella cana* Hale, 1945, *C. hispida* Calman, 1911, *C. indosinica* Zimmer, 1952, *C. similis* Fage, 1945, *Nannastacus antipai* Petrescu, 1995, *N. gamoi* Băcescu, 1992, *N. gibbosus* Calman, 1911, *N. goniatus* Gamo, 1962, *N. inconstans* Hale, 1945, *N. mitreae* Petrescu, 1995, *N. pectinatus* Gamo, 1962, *Scherocumella nasuta* (Zimmer, 1914), *Schizotrema depressum* Calman, 1911 and *S. sakaii* Gamo, 1964). No Cumacea have been reported from the area as yet.

INTRODUCTION

The Cumacea from the South China Sea and West Pacific are partially known. Species have been described from the coasts of South - East Asia (Japan, China, Vietnam, Thailand), Indonesia and especially from Australia. There are no data about Cumacea from the Malayan coasts. The present contribution deals with a collection from the shallow waters of Malaysia (from the reefs around Mersing) made by Dr. Hans-Georg Müller (Germany) who kindly offered it to me.

MATERIAL AND METHODS

The samples including 1045 specimens were collected quantitatively with a handnet by H. G. Müller from 4 stations:

MAS - 2 Pulau Babi Besar, about 15 km off Mersing; reef-flat near sandy beach; in and under dead coral rocks, lower intertidal, 1.4. 1991.

MAS - 3 Pulau Babi Besar, about 15 km off Mersing; central part of reef-flat; in and under dead coral rocks, mainly covered with coralline algae, intertidal, 1 m, 1.4.1991.

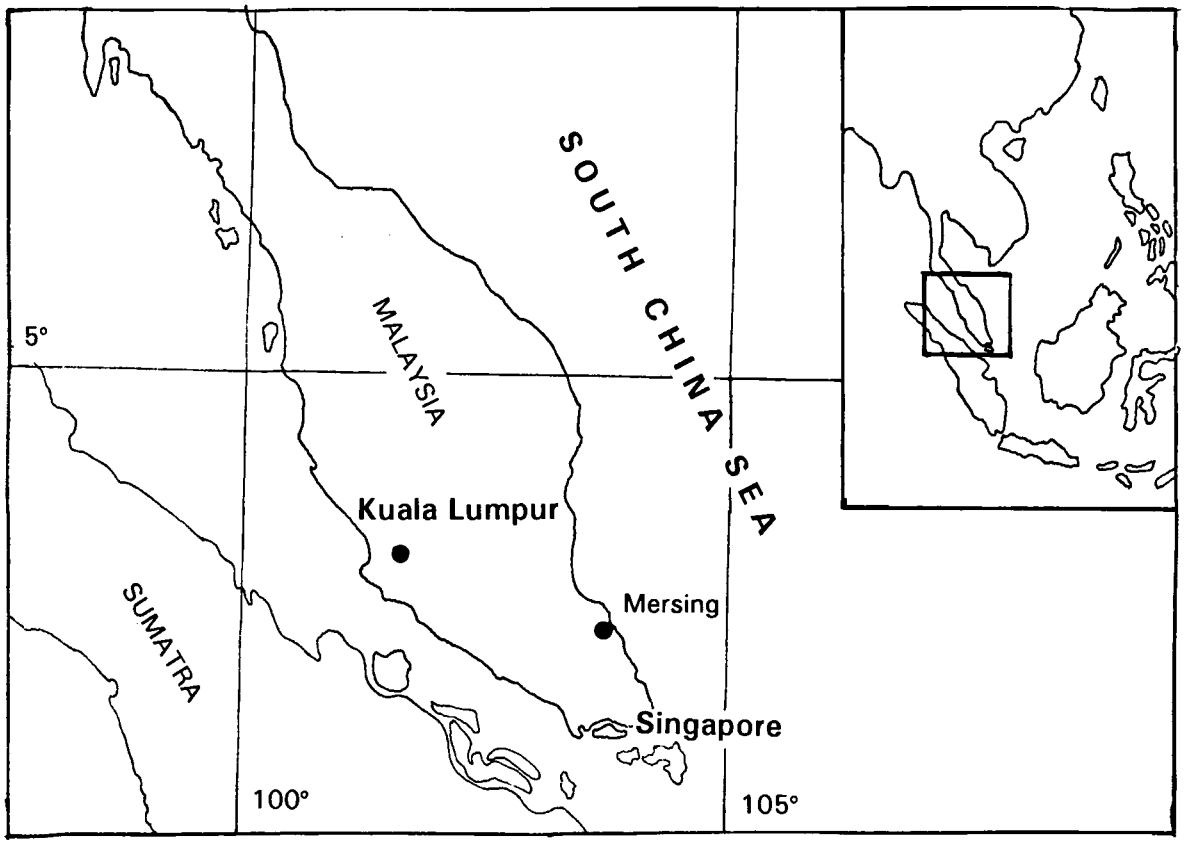

Fig. 1. Map of Malaysia with the collecting locality (Mersing).

MAS - 6 Pulau Babi Besar, about 15 km off Mersing; outer reef-flat and reef-margin; dead corals (*Acropora* sp., *Pocillopora damicornis*) covered with algae, sponges, hydroids and ascidians, 1-2 m , 2-9.4.1991.

MAS - 16 Pulau Tioman, about 60 km off Mersing; coral substrate of fringing reef, 1-3 m, 12-17.4.1991 (Fig. 1)

The type material is deposited in the Zoological Museum, University of Amsterdam (ZMA), "Grigore Antipa" National Museum of Natural History, Bucharest (GANMNH) and at the University of Singapore (US).The remaining material is deposited in the collections of the museum of Bucharest.

RESULTS

All 5 genera and 19 species described below (including 4 new species) belong to the family Nannastacidae Bate, 1866.

Campylaspis amblyoda Gamo, 1960 (Fig. 2)

Material: 1 female, stat. MAS-3; 2 females, stat MAS-6; 10 females, 1 male and 1 juvenile, stat MAS-16.

Description: Female body size: 2.01 mm. Gamo's description does not contain any reference to the mouth parts. Mandible (Fig. 2 C), pars incisiva with 5 flattened short teeth, lacinia mobilis with 4 flattened short teeth; 3 spine-like plumose setae between lacinia mobilis and pars molaris; a sharp, styliform pars molaris characteristic for the genus. Maxilla 1 (Fig. 2 D), protopod with 7 spines (5 bifid and 2 simple ones); endite with 4 plumose setae; long palp with one filament.

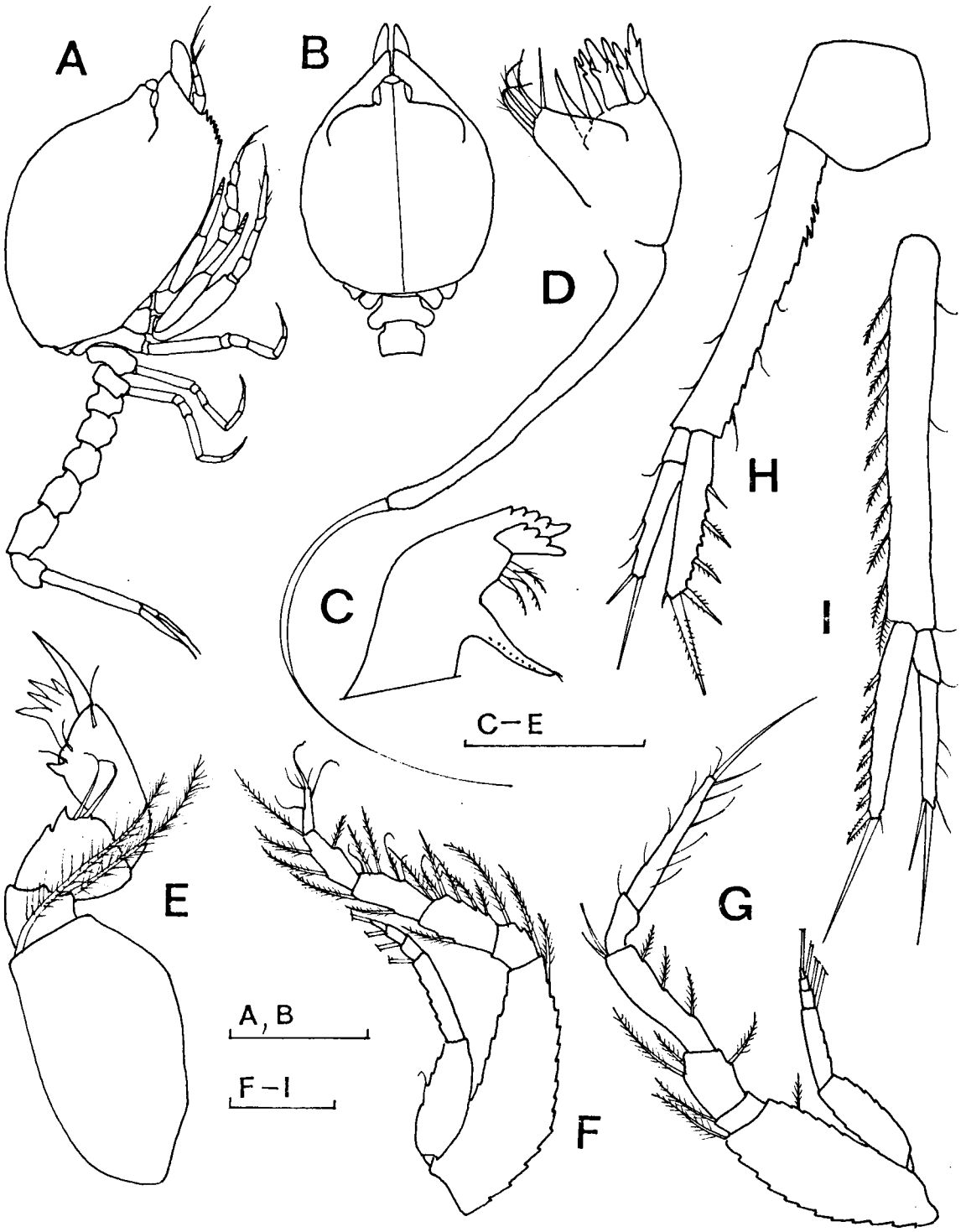

Fig. 2. *Campylaspis amblyoda* Gamo, 1960, A - H: female; I: male. A: body, lateral view; B: cephalothorax and free thoracic segments, dorsal view; C: mandible; D: maxilla 1; E: maxilla 2; F: maxilliped 1; G: maxilliped 2; H: pereopod 1; I: pereopod 2; J: uropod; K: uropod. Scale bars (in mm): A, B: 0.5; C - G: 0.1; H - K: 0.1.

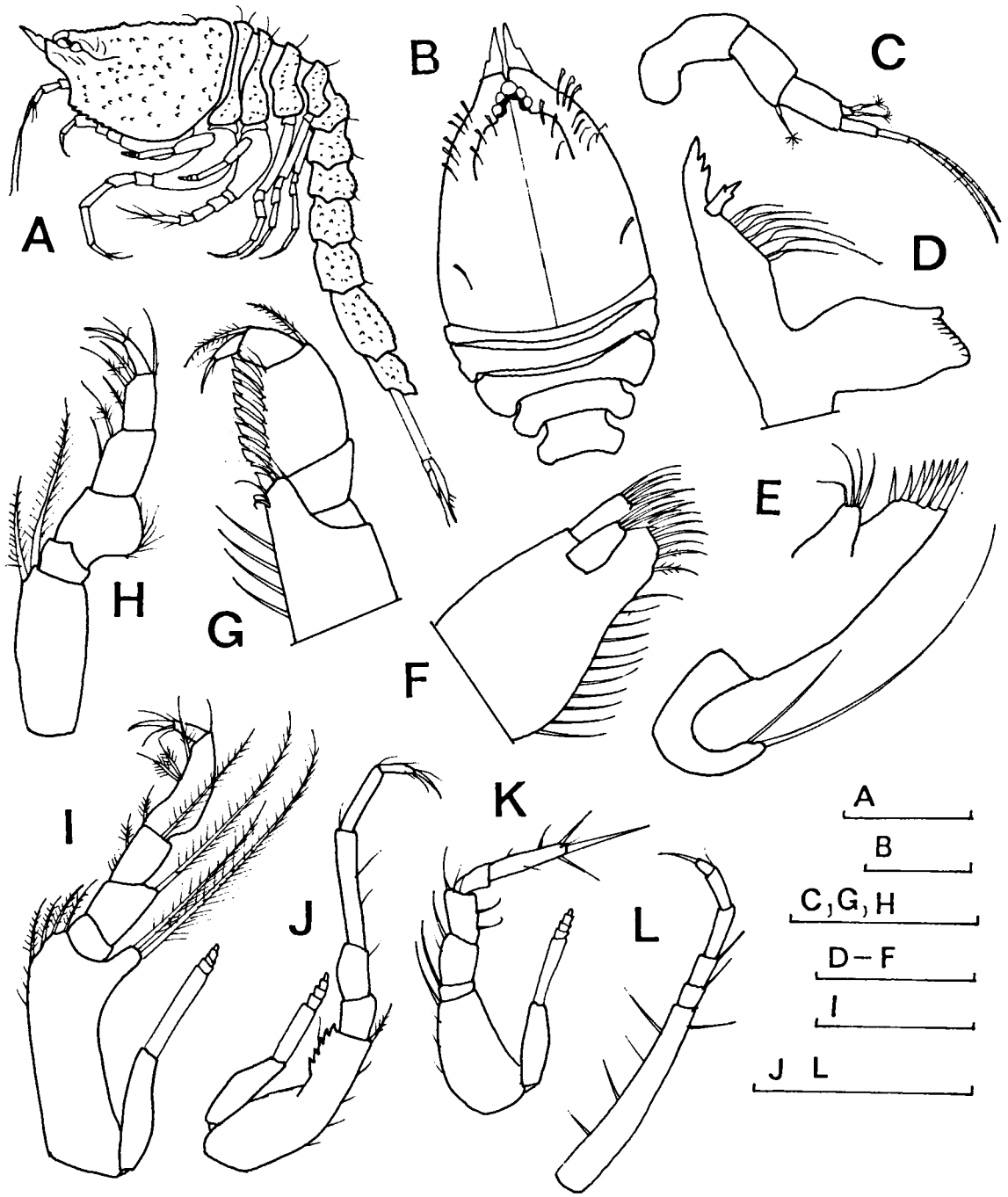

Fig. 3. *Cumella (Cumella) cana* Hale, 1945, female. A: body, lateral view; B: cephalothorax and free thorcacic segments, dorsal view; C: antenna 1; D: mandible; E: maxilla 1; F: maxilla 2; G: maxilliped 1; H: maxilliped 2; I: maxilliped 3; J: pereopod 1; K: pereopod 2; L: pereopod 3. Scale bars (in mm): A: 0.3; B: 0.2; C, G - I: 0.1; D - F: 0.05; J - L: 0.15.

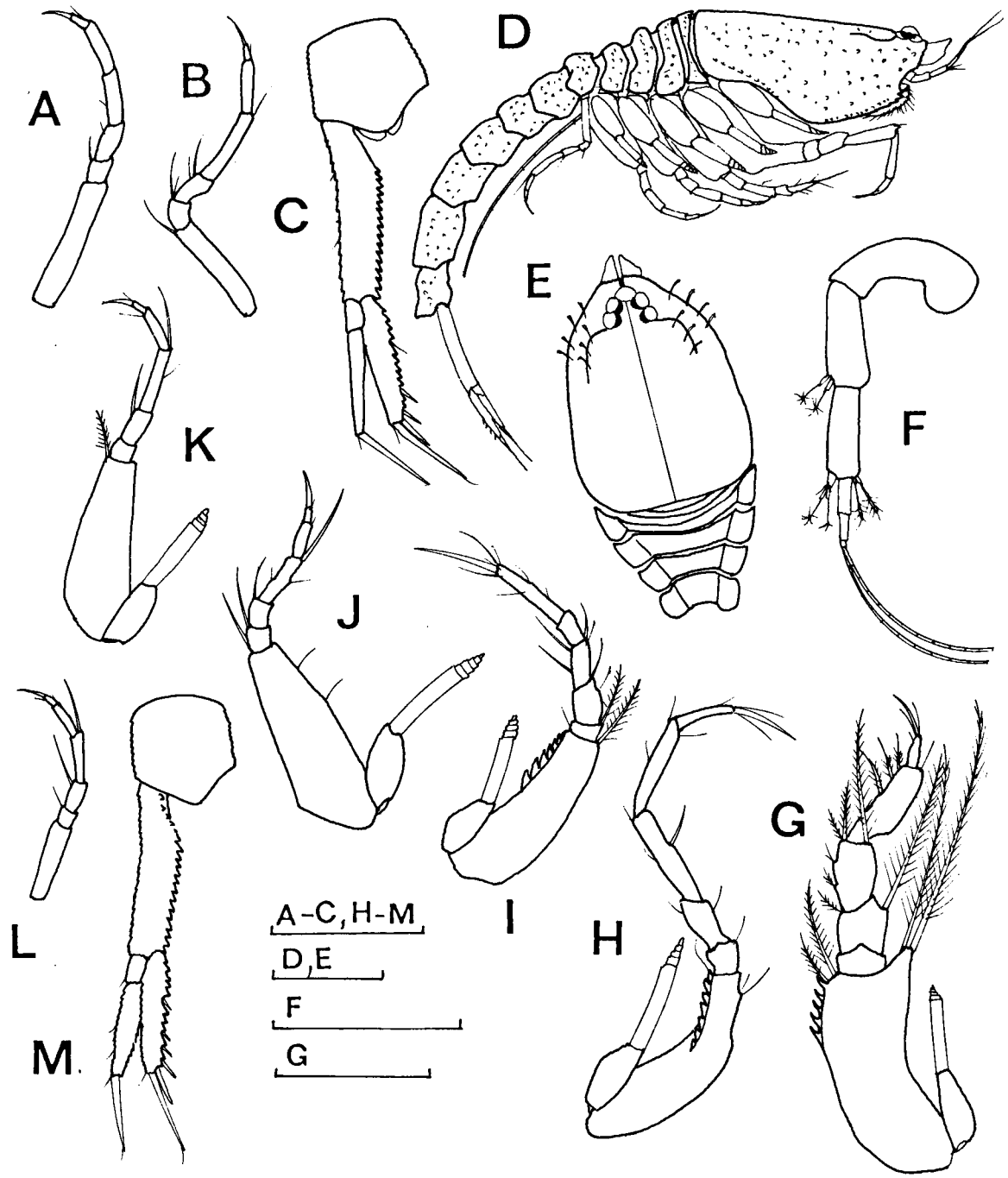

Fig. 4. *Cumella (Cumella) cana* Hale, 1945, A - C: female; D - M: male. A: pereopod 4; B: pereopod 5; C: uropod; D: body, lateral view; E: cephalothorax and free thoracic segements, dorsal view; F: antenna 1; G: maxilliped 3; H: pereopod 1; I: pereopod 2; J: pereopod 3; K: pereopod 4; L: pereopod 5; M: uropod. Scale bars (in mm): A - C, H - M: 0.15; D, E: 0.2; F, G: 0.1.

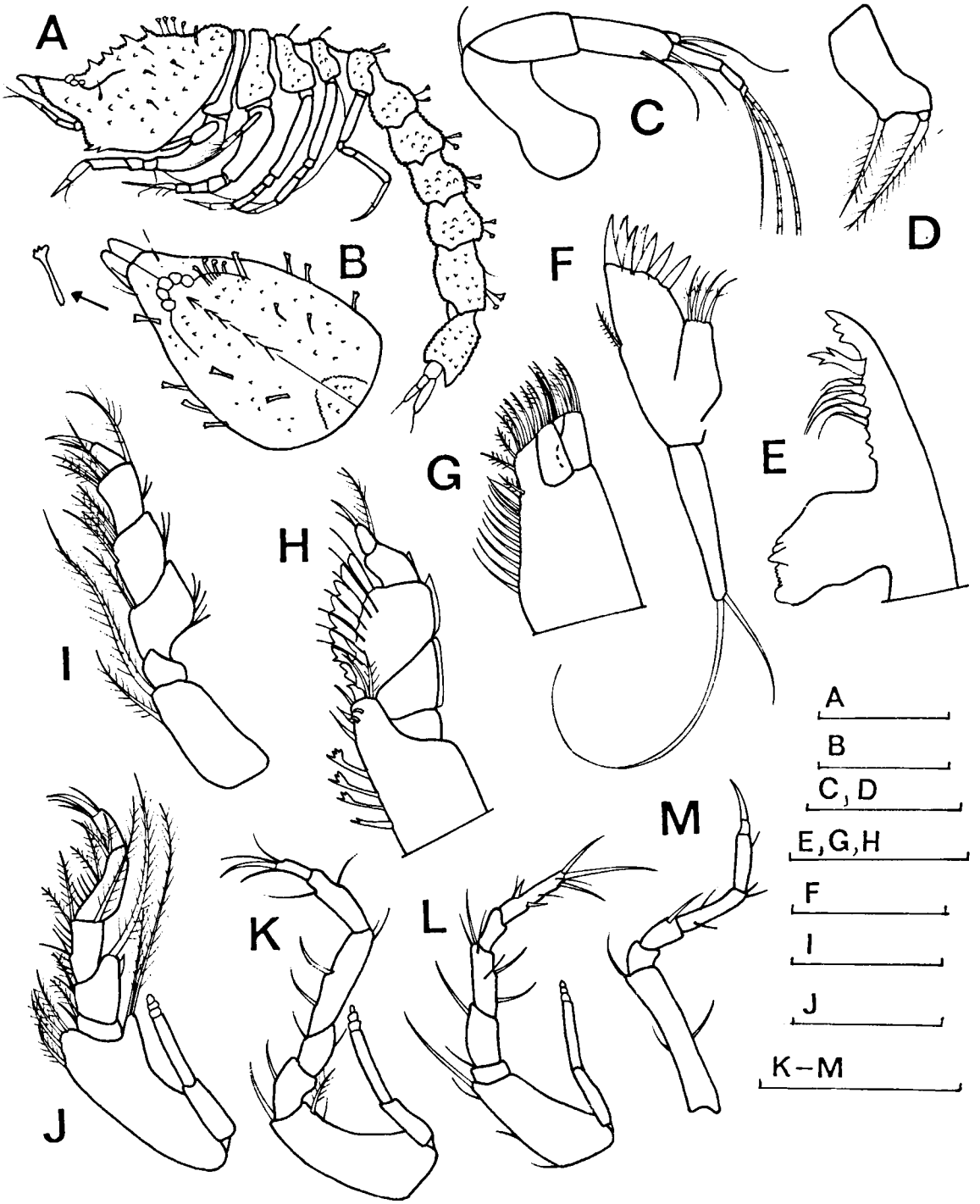

Fig. 5. *Cumella (Cumewingia) hispida* Calman, 1911, female. A: body, lateral view; B: carapace,dorsal view; C: antenna 1; D: antenna 2; E: mandible; F: maxilla 1; G: maxilla 2; H: maxilliped 1; I: maxilliped 2; J: maxilliped 3; K: pereopod 1; L: pereopod 2; M: pereopod 3. Scale bars (in mm): A: 0.5; B: 0.3; C, D, E, G - I: 0.1; F: 0.05; J: 0.15; K - M: 0.2.

Maxillla 2 (Fig. 2 E), narrow protopod with 4 simple setae. Maxilliped 1 (Fig. 2 F), with 2 hook-like spines on endite of basis as usual for the genus.

Remarks: Our specimens are very similar to those from Japan, but there are a few differences: female - carpus of maxilliped 2 (Fig. 2 G) with 2 teeth on outer margin versus 1; merus of pereopod 1 as long as carpus versus merus longer than carpus (Fig. 2 H); carpus of pereopod 2 (Fig. 2 I) with 2 short simple setae in outer distal corner versus a plumose one; uropodal peduncle (Fig. 2 J) with hairs instead of 5 small spines on the inner edge; endopod just a little longer than exopod, with longer spines on inner margin; male - uropodal peduncle (Fig. 2 K) with more numerous plumose setae on inner margin (10 versus 7); endopod with fewer spines on inner margin (6 versus 10).

Cumella (Cumella) cana Hale, 1945
(Figs 3, 4)

Material: 14 females, 1 male, stat. MAS-2; 14 females, 3 males, stat. MAS-3; 11 females, 1 male, stat. MAS-6; 13 females, stat. MAS-16.

Description: Body size: 1.30 mm (females), 1.18 mm (males). *Cumella cana* was firstly described by Hale in 1936 as *C. laeve* (Calman, 1911). He redescribed it and established its status as a new species - *Cumella cana* Hale (1945). I complete both descriptions with the following parts: mandible (Fig. 3 D), pars incisiva with 3 teeth, small lacinia mobilis with 3 teeth (the middle one, the longest); 6 spine-like simple setae between lacinia mobilis and pars molaris; truncated pars molaris with a small tubercle on its anterior corner; maxilla 1 (Fig. 3 E), long protopod with 8 simple spines; endite with 4 simple setae; short palp with 2 unequal glabrous filaments; maxilla 2 (Fig. 3 F), truncated, with 2 unequal endites, that never exceed the top of protopod; maxilliped 1 (Fig. 3 G), endite of basis with a tooth-like spine, 2 hook-like spines and 4 simple setae on outer margin; 8 bifid flattened spines mixed with simple setae on outer margin of carpus, a plumose seta in distal inner corner of carpus and propodus; maxilliped 2 (Fig. 3 H), basis with 2 plumose long setae on outer distal corner; bulky merus with a rounded hairy hump on inner margin; 2 small setae on outer margin of carpus; 2 simple setae on distal inner corner and 2 plumose ones on outer distal corner of carpus; dactylus as long as its claw.

Remarks: There are a few differences with the Australian specimens: female - integument finely granulose but also with few hairs (Fig. 3 A), carapace (Fig. 3 B) with club-like setae on its anterior half; maxilliped 3 (Fig. 3 I) with hairs and plumose setae on outer margin of basis (Hale's specimens with a serrate inner margin on its distal half, terminal spine shorter than dactylus (versus longer), more hairy pereopods 3-5 (Fig. 3 K), uropodal endopod (Fig. 4 C) with 3 subterminal spines instead of 4; male - the same club-like setae on carapace (Fig. 4 E); maxilliped 3 (Fig. 4 G) with teeth on the outer distal corner of basis, basis shorter than the rest of maxilliped (longer in Hale); pereopod 1 (Fig. 4 H), more hairy, dactylus with longer terminal setae; pereopod 2 (Fig. 4 I) with shorter basis and longer dactylus; little longer uropodal rami (rami: peduncle= 0.75 versus 0.66) (Fig. 4 M).

The species belongs to the subgenus *Cumella* Sars, 1865 because the male pseudorostrum is without lenses.

Cumella (Cumewingia) hispida Calman, 1911 (Figs 5, 6)

Material: 10 females, 4 males, stat. MAS-2; 22 females, 15 males, stat. MAS-3; 42 females, 8 males, stat. MAS-6; 18 females, 2 males, stat. MAS-16.

Description: Descriptions and illustrations of this species were done by Calman (1911), Stebbing (1913), Fage (1945) and Hale (1945), but all of them are incomplete. Only the shape of body, carapace, antenna 1, pereopods 3-5 and uropod are mentioned. So, I add the remaining parts. Female -(Figs 5, 6 A-C) - Antenna 2 (Fig. 5 C) with 2 unequal long plumose setae. Mandible (Fig. 5 E), pars incisiva with 3 teeth, lacinia mobilis with 3 teeth (the middle one longest) exceeds pars incisiva , 5 simple spine-like setae between lacinia mobilis and pars molaris, 2

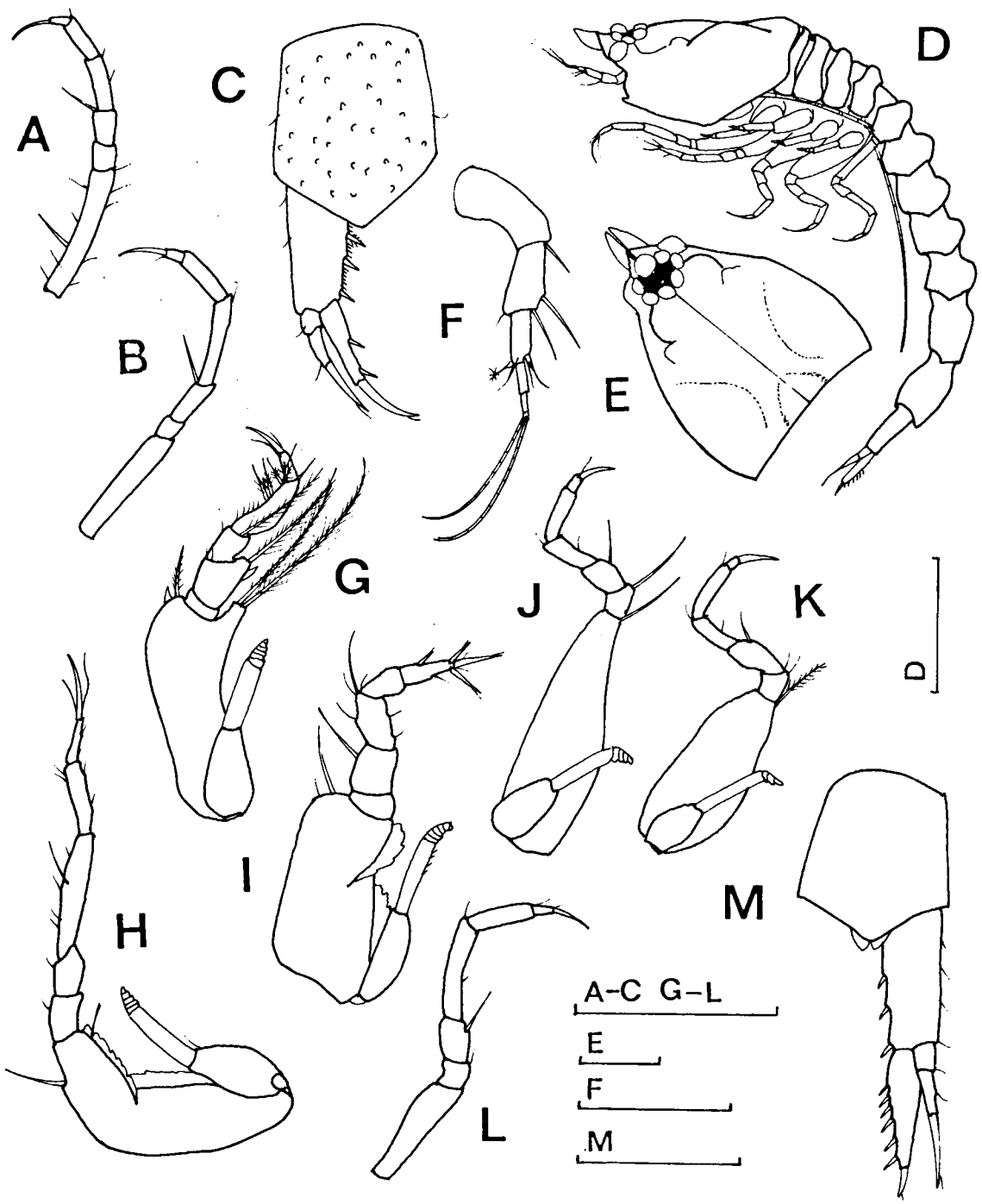

Fig. 6. *Cumella (Cumewingia) hispida* Calman, 1911, A - C: female; D - M: male. A: pereopod 4; B: pereopod 5; C: uropod; D: body, lateral view; E: carapace, dorsal view; F: antenna 1; G: maxilliped 3; H: pereopod 1; I: pereopod 2; J: pereopod 3; K: pereopod 4; L: pereopod 5; M: uropod. Scale bars (in mm): A - C, G - L: 0.2; D: 0.5; E, M: 0.25; F: 0.15.

small tubercles between those setae and pars molaris (on outer margin), truncated pars molaris with a strong tooth on outer margin. Maxilla 1 (Fig. 5 F), protopod with 7 simple spines, a plumose seta on inner margin, endite with 4 plumose setae, palp as long as protopod with 2 unequal filaments. Maxilla 2 (Fig. 5 G) truncated, top endite exceeds protopod. Maxilliped 1 (Fig. 5 H), basis with 4 hand- like spines and 3 simple setae on outer margin, its endite with 2 setae, a flattened hook-like spine and 2 smaller hook-like ones; 8 bifid flattened spines mixed with simple setae on outer margin of carpus; merus, carpus and propodus with an inner ridge, a plumose long seta on inner distal corner; dactylus shorter than its terminal setae. Maxilliped 2 (Fig. 5 I), short basis with 2 long plumose setae on outer distal corner, broadened merus, carpus and propodus, a long plumose seta on inner distal corner and 3 plumose setae on outer distal corner of propodus, dactylus shorter than its claw. Male - antenna 2 (Fig. 6 F), its flagellum does not exceed the 5th pleonite. Maxilliped 3 (Fig. 6 G) with a tooth on outer distal corner of basis, another stronger one on inner margin of merus; dactylus shorter than its claw. Pereopod 1 (Fig. 6 H) with a hyaline ridge on inner margin of basis (distal half), carpus longer than propodus, propodus longer than dactylus, dactylus shorter than its claw. Pereopod 2 (Fig. 6 I) with a hyaline ridge on the inner margin of basis, longer than 1/3 of the entire pereopod, carpus a little longer than merus and propodus, 3 unequal simple setae (the middle one the longest), short dactylus (dactylus: propodus= 1.1), 3 terminal setae spines shorter than dactylus. Pereopods 3, 4 (Fig. 6 J, K) with strong, broadened basis, longer than 1/3 of the entire pereopod, carpus as long as propodus.

Remarks: There are a few differences regarding especially the carapace: females could have 2-4 small teeth (4 in the biggest, ovigerous ones); immature males with 1-2 median dorsal teeth, integument of the whole body with club- like setae more numerous on carapace (Fig. 6 D, E).The males have lenses on pseudorostrum, so the species belongs to the subgenus *Cumewingia* Băcescu, 1971.

Cumella (Cumewingia) indosinica Zimmer, 1952 (Fig. 7)

Material: 2 males, stat. MAS-3.

Description: This is the first record of the species after its description by Zimmer from the waters of Vietnam and Cambodia in 1952. This description and illustration contains only the body, pereopods 1 and 5 and uropods. Antennae (Fig. 7 A,B), as usual for the genus. Mandible (Fig. 7 C), pars incisiva with 3 teeth, lacinia mobilis 3 unequal teeth, 5 spine-like simple setae between lacinia mobilis and pars molaris, 2 small tubercles between those setae and pars molaris, pars molaris with a tooth on anterior corner. Maxilla 1 (Fig. 7 D) with 8 simple spines on protopod; endite with 4 simple setae; palp as long as protopod, with 2 glabrous filaments. Maxilla 2 (Fig. 7 E), as usual for the genus, upper endite exceeds protopod. Maxilliped 1 (Fig. 7 F), basis with 4 plumose setae on outer margin, 2 hook-like spines and a bifid one on top of its endite; 8 bifid flattened spines on outer margin of carpus; dactylus as long as its claw. Maxilliped 2 (Fig. 7 G), basis with 2 unequal plumose setae on its distal outer corner (one of them exceeds carpus), merus with hairs on inner margin, carpus with hairs and 2 plumose short setae on outer and one on inner distal margin, dactylus as long as its claw. Maxilliped 3 (Fig. 7 H), a little curved, longer than half of the maxilliped, with 2 unequal plumose setae on its process and a tooth on its distal outer corner, slender articles, dactylus a little shorter than its claw. Pereopod 2 (Fig. 7 J), basis with a hyaline crest on inner margin, longer than half of the pereopod, simple setae on basis, merus and carpus; dactylus 2 times longer than propodus, with 2 small spines on outer margin, one on inner margin and 3 terminal spines, shorter than dactylus. Pereopod 3 and 4 (Fig. 7 K,L) with strong basis, basis of pereopod 3 longer than half of pereopod, basis of pereopod 4, shorter.

Remarks: Body with a granular integument. Few club-like setae on carapace, fewer than in *C. hispida.* Pseudorostrum with a pair of lenses (the species belongs to the subgenus *Cumewingia*). Body, pereopods 1 and 5 like in Zimmer's description (Fig. 7 I, M). Uropodal peduncle

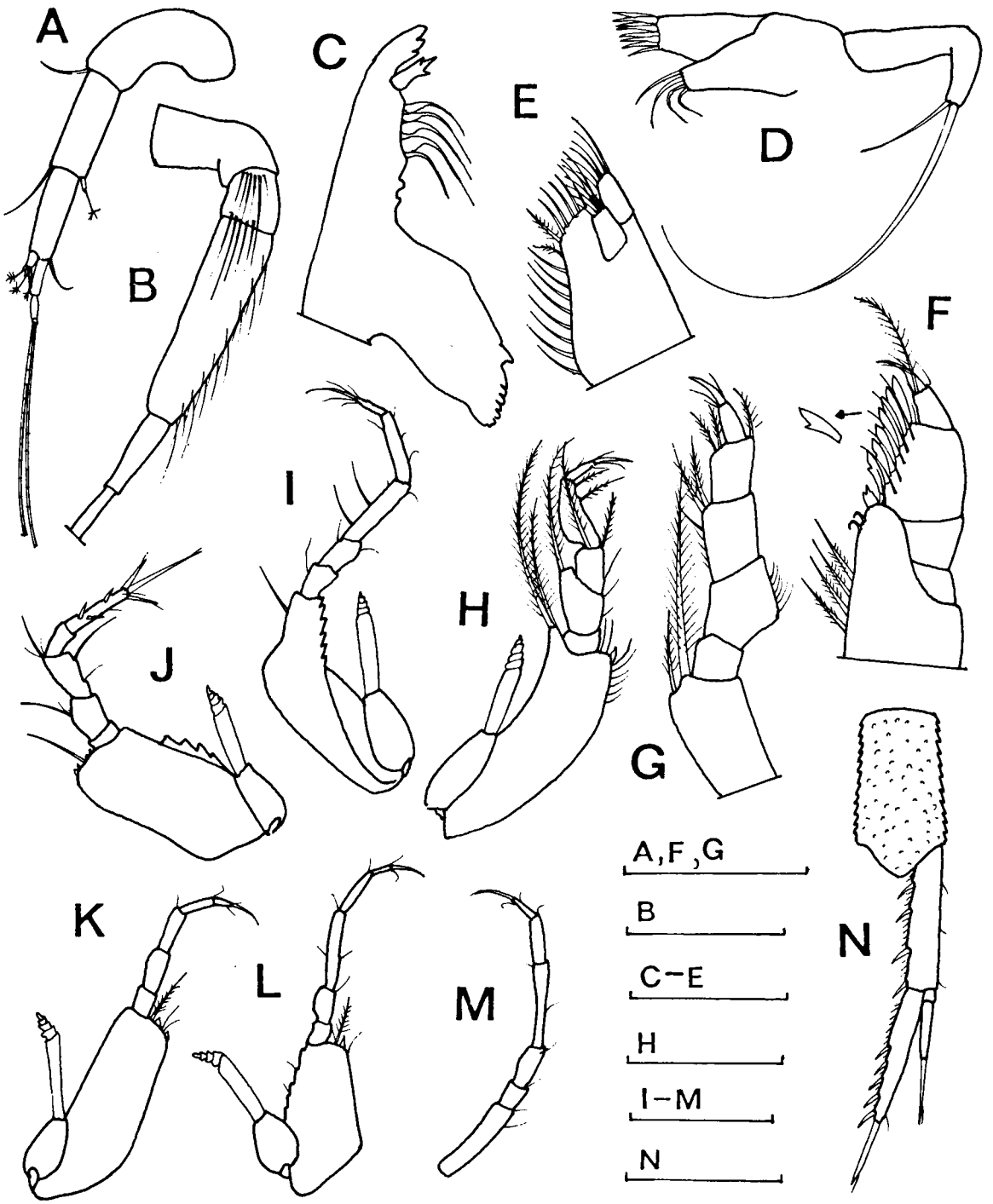

Fig. 7. *Cumella (Cumewingia) indosinica* Zimmer, 1952, male. A: antenna 1; B: antenna 2; C: mandible; D: maxilla 1; E: maxilla 2; F: maxilliped 1; G: maxilliped 2; H: maxilliped 3; I: pereopod 1; J: pereopod 2; K: pereopod 3; L: pereopod 4; M: pereopod 5; N: uropod. Scale bars (in mm): A,B,F,G: 0.1; C - E: 0.05; H, N: 0.15; I- M: 0.2.

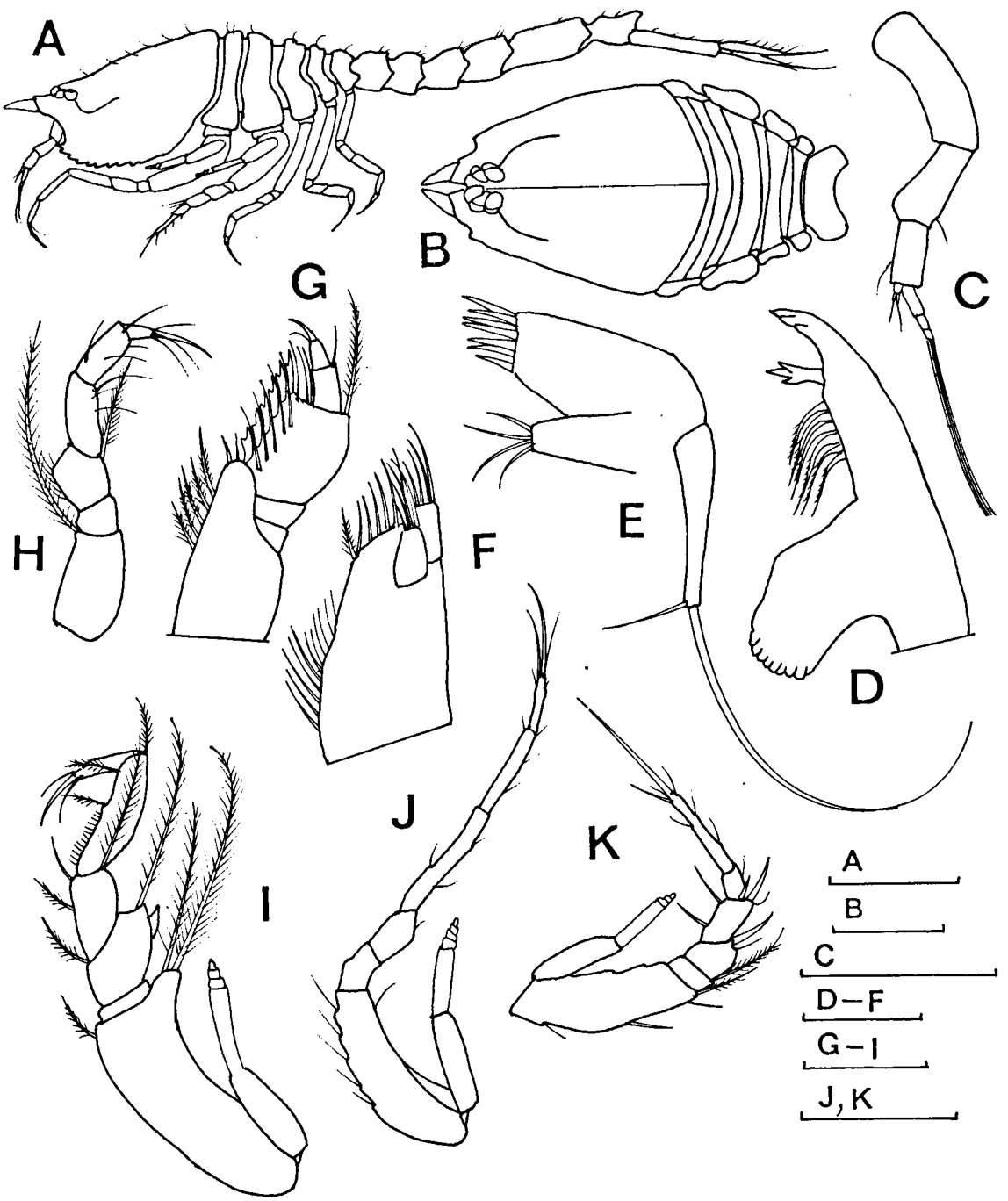

Fig. 8. *Cumella (Cumella) similis* Fage, 1945, female. A: body, lateral view; B: cephalothorax and free thorcic segments, dorsal view; C: antenna 1; D: mandible; E: maxilla 1; F: maxilla 2; G: maxilliped 1; H: maxilliped 2; I: maxilliped 3; J: pereopod 1; K: pereopod 2. Scale bars (in mm): A : 0.3; B: 0.2; C, G - I: 0.1; D - F: 0.05; J, K: 0.15.

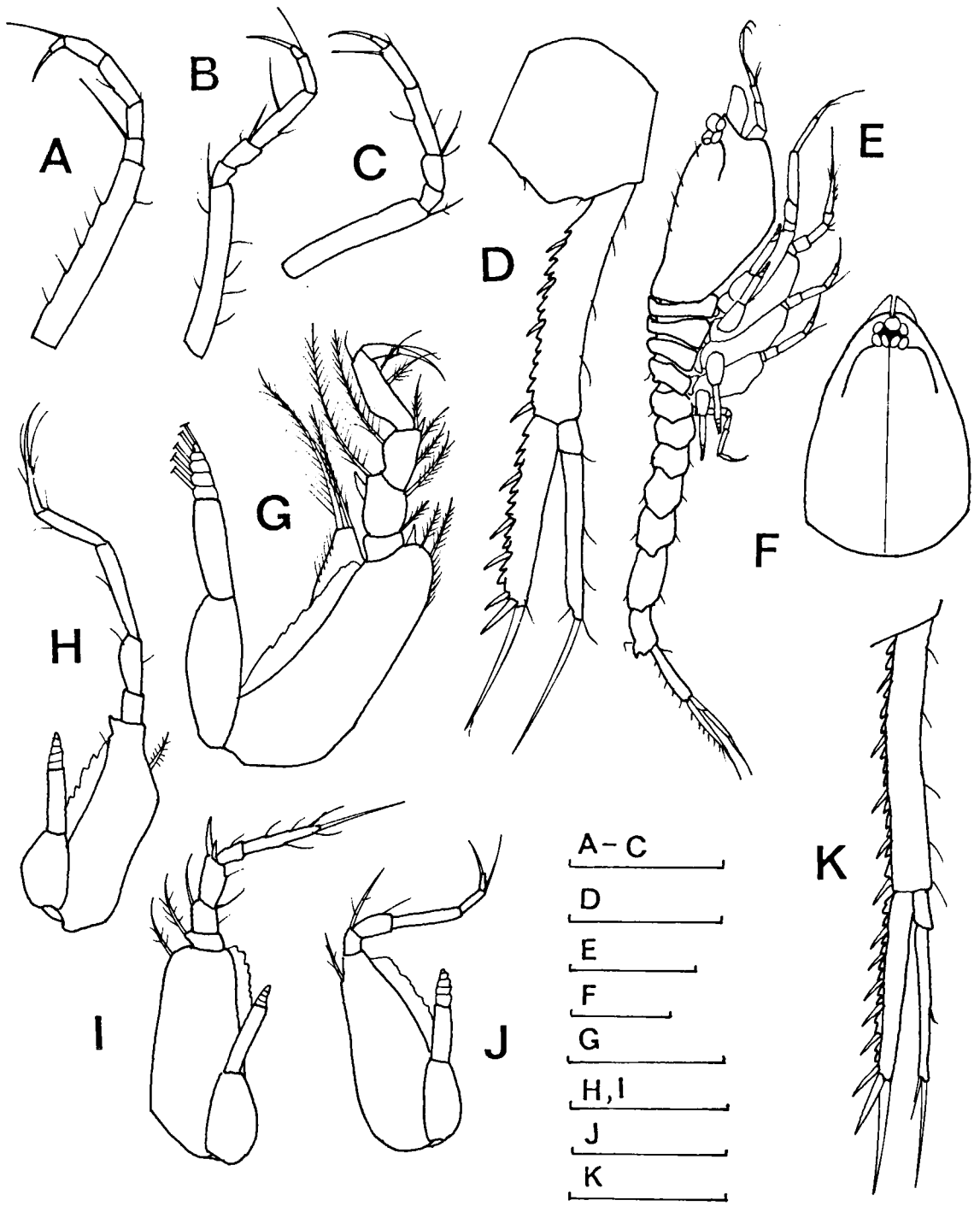

Fig. 9. *Cumella (Cumella) similis* Fage, 1945, A - D: female; E- K: male. A: pereopod 3; B: pereopod 4; C: pereopod 5; D: uropod; E: body, lateral view; F: carapace, dorsal view; G: maxilliped 3; H: pereopod 1; I: pereopod 2; J: pereopod 3; K: uropod. Scale bars (in mm): A - C, H - K: 0.15; D, G: 0.1; E: 0.3; F: 0.2.

with fewer spines on inner margin (Fig. 7 N).

Cumella (Cumella) similis Fage, 1945
(Figs 8, 9)

Material: 2 females, 1 male, stat. MAS-2; 7 females, 11 males, stat. MAS- 3; 5 females, 1 male, stat. MAS-6; 5 females, 1 male, stat. MAS-16.

Description: Fage (1945) described the species based only on the males. Hale (1945) described *Cumella munroi* (both sexes), but he synonymized it in 1949 with *Cumella similis* Fage which was described 4 months earlier. Later, Watling (1991) in his revision of some Nannastacidae considered *C. munroi* and *C.similis* as distinct species, but Băcescu (1992) agreed with Hale's statement: " I can find no valid differences between the Southern Queensland material recorded as *munroi* ınd that described at about the same time by Fage from Annam ". I add to the descriptions of Fage and Hale the following observations: Female - Body size: 1.32 mm. Mandible (Fig. 8 D), pars incisiva with 3 teeth, small lacinia mobilis with 3 unequal teeth, 6 spine-like plumose setae between lacinia mobilis and pars molaris, strong, truncated pars molaris. Maxilla 1 (Fig. 8 E), protopod with 7 simple spines, endite with 4 simple setae, palp, smaller than protopod, with 2 glabrous filaments. Maxilla 2 (Fig. 8 F), as usual for the genus. Maxilliped 1 (Fig. 8 G), basis with 5 plumose setae on outer margin, 2 spines on its endite; 6 bifid flattened spines interspersed with 2 rows of parallel simple setae on outer margin of carpus. Maxilliped 2 (Fig. 8 H), basis with a long plumose seta that exceeds carpus, merus with hairs on inner margin and with a plumose seta on its outer distal corner, slender carpus, propodus and dactylus with simple setae, dactylus shorter than its terminal claw and setae. Maxilliped 3 (Fig. 8 I), basis with a short plumose seta on its distal outer corner and 2 long plumose ones on its process, merus with a tooth on inner margin. Male - Body size: 1.23 mm. Pereopod 3 (Fig. 9 J), strong basis with a hyaline ridge like in first 2 pairs, carpus 2 times longer than propodus.

Remarks: Body and pereopods of our specimens are similar to the material of Fage and Hale. There are a few differences regarding mainly the uropods: peduncle and endopod with serrate inner margins, hairs on outer margin of peduncle, fewer spines on inner margin of peduncle (4 in females, 5 in males versus 6 in both sexes) (in Hale both sexes have the same number of spines on endopod, which is generally affected by dimorphism). I agree that indeed *Cumella munroi* is a synonym for *Cumella similis.*

KEY TO THE SPECIES OF *CUMELLA* FROM THE MALAYAN WATERS

Males

1 - Pseudorostrum with lenses (*Cumewingia* s.g.) 2
Pseudorostrum without lenses (*Cumella* s.g.) 3
2 - Slender uropods .... *indosinica* Zimmer, 1952
Thick uropods .... *hispida* Calman, 1911
3 - Slender uropods, peduncles with spine..... ..... *similis* Fage, 1945
Thick uropods, peduncles without spines... ..... *cana* Hale, 1945

Females

1 - Long uropods, peduncles longer than last pleonite 2
Short uropods, peduncles shorter than last pleonite ..... *hispida* Calman, 1911
2 - Granular integument, uropodal peduncles without spines ..... *cana* Hale, 1945
Smooth integument, uropodal peduncles with spines..... *similis* Fage, 1945

Nannastacus antipai Petrescu, 1995 (Fig. 10)

Material: 1 female, stat. MAS-6; 1 female, stat. MAS-16.

Description: I complete the previous description with some mouth parts. Mandible (Fig. 10 A), pars incisiva with 4 teeth, lacinia mobilis with 3 unequal teeth (2 longer), 6 spine-like simple setae between lacinia mobilis and pars molaris, pars molaris with a rounded tooth. Maxilla 1 (Fig. 10 B), protopod with 9 simple spines, endite

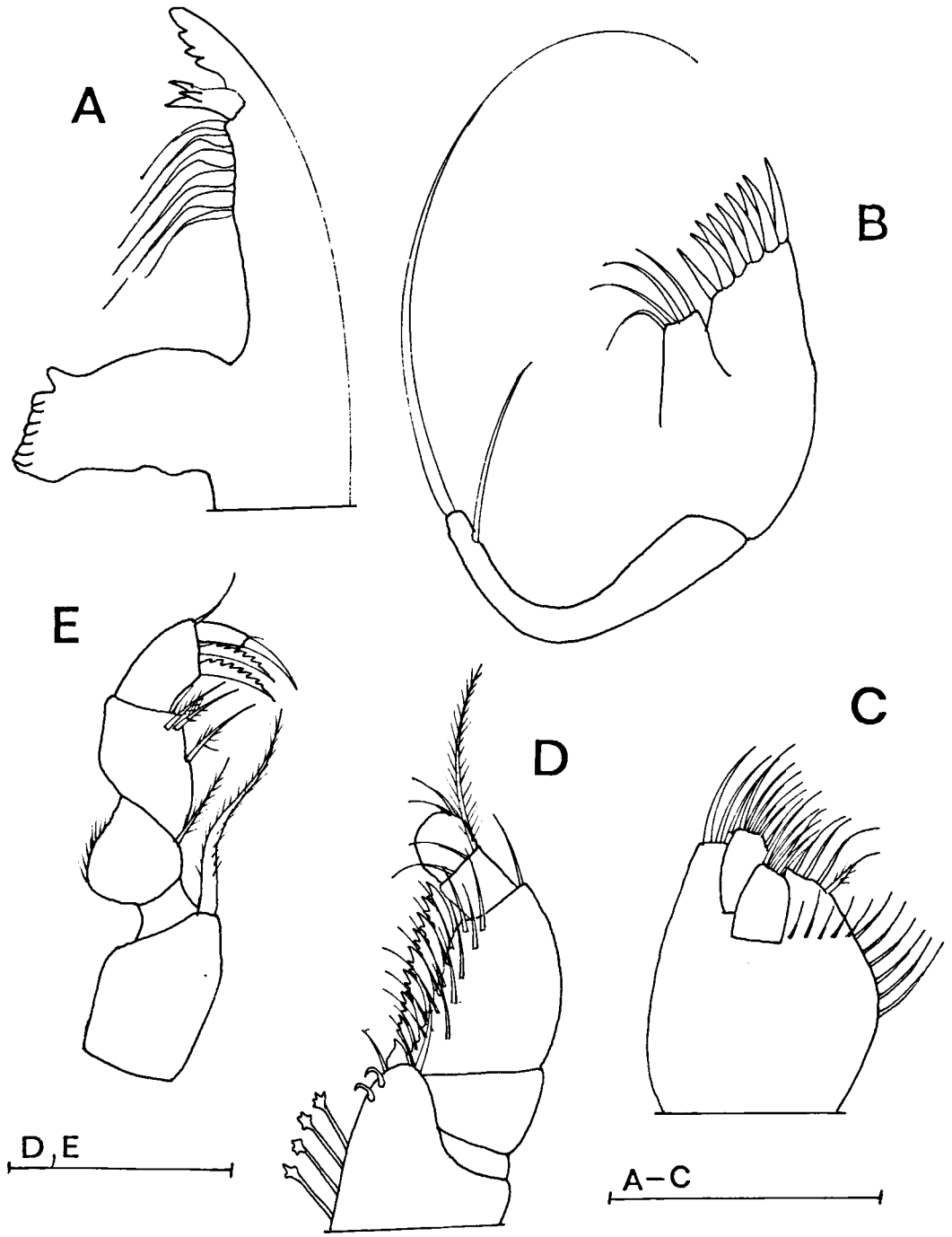

Fig. 10. *Nannastacus antipai* Petrescu, 1995. A: mandible; B: maxilla 1; C: maxilla 2; D: maxilliped 1; E: maxilliped 2. Scale bar (in mm): A - E: 0.1.

with 4 simple setae, palp a little longer than protopod, with 2 unequal glabrous filaments. Maxilla 2 (Fig. 10 C), small, flattened protopod with 6 simple setae on its outer margin, 5 simple shorter setae in a row between outer endite and outer margin of protopod, inner endite exceeds top of protopod. Maxilliped 1 (Fig. 10 D), basis with 4 hand-like spines on outer margin, one flattened spine, 2 simple setae and 2 hook-like spines on its endite; 8 trifid flattened spines interspersed with 2 parallel rows of simple setae on outer margin of carpus; square propodus with a long plumose seta on its inner distal corner; round dactylus with 2 short simple terminal setae. Maxilliped 2 (Fg. 10 E) with short strong articles, basis with a long plumose seta that does not exceed carpus, club-like merus with hairs on inner margin and one short plumose seta in outer distal corner, strong carpus (the longest article excepting basis) with 4 plumose short setae on outer margin, propodus with 2 serrate spines in distal outer corner, slender dactylus as long as its claw.

Remarks: The descriptions of only a few species of *Nannastacus* contain mouth parts: *N. georgi* Stebbing (1900) (mandible and maxilliped 2), *N. mitreae* Petrescu (1995) (maxilliped 1 and 2), *N. ossiani* Stebbing (1900) (mandible, maxillipeds 1 and 2), *N. parvulus* Paulson (1875) (mandible, maxilla 1, maxillipeds 1 and 2), *N. sarsii* Kossmann (1880) (mandible, maxillipeds 1 and 2). The mandible of *Nannastacus* is more related to that of *Cumella*, but pars incisiva with 4 teeth instead of 3. Maxilla 1 is also similar to *Cumella* (with 2 filaments). Maxilla 2 differs by the transversal row of short setae of the protopod. Maxillipeds 1 and 2 are related to *Cumella*, too, but maxilliped 1 of *Nannastacus* is very characteristic for its dactylus and maxilliped 2 for serrate spines of propodus.

Nannastacus gamoi Băcescu, 1992 (Fig. 11)

Material: 1 female, stat. MAS-6; 4 females, stat MAS-16.

Description: I only complete the description of the missing mouth parts. Mandible (Fig. 11 A), as usual for the genus, its lacinia mobilis has 3 unequal teeth (one median, longer and 2 lateral, smaller). Maxilla 1 (Fig. 11 B) , protopod with 8 simple spines, endite with 4 simple setae, palp longer than protopod, with 2 glabrous filaments. Maxilla 2 (Fig. 11 C), as usual for the genus. Maxilliped 1 (Fig. 11 D), basis with 4 hand-like spines and 3 setae on its endite; 7 trifid flattened spines interspersed with 2 parallel rows of simple setae on outer margin of carpus, a row of simple setae on its inner margin; round dactylus, its anterior margin, toothed. Maxilliped 2 (Fg. 11 E) with a rounded, bulky propodus.

Nannastacus gibbosus Calman, 1911
(Fig. 12)

Material: 65 females, 58 males, stat. MAS-2; 132 females, 45 males, stat. MAS-3; 98 females, 10 males, stat. MAS-6; 54 females, 15 males, stat. MAS-16.

Description: Only the mouth parts are described here. Mandible (Fig. 12 A) and maxillae (Fig. 12 B, C) are similar to those of the previous species. Maxilliped 1 (Fig. 12 D), basis with 4 simple setae on outer margin, a flattened and 2 hook-like spines on its endite; 7 trifid flattened spines (different from those of *N. gamoi*) interspersed with 2 parallel rows of simple setae on outer margin and another one on inner margin of carpus; round dactylus with a toothed anterior margin.

Remarks: Maxilliped 2 (Fig. 12 E) like in *N. gamoi.*

Nannastacus goniatus Gamo, 1962
(Figs 13, 14)

Material: 94 females, stat. MAS-2; 18 females, stat. MAS-3; 33 females, 6 immature males, stat. MAS-6; 16 females, stat. MAS-16.

Description: Mandible (Fig. 13 B), pars incisiva with 4 teeth, lacinia mobilis with 3 unequal teeth (the median tooth the longest), 5 simple spine-like setae between lacinia mobilis and pars molaris. Maxilla 1 (Fig. 13 C), protopod with 8 simple spines; endite with 4 simple setae; palp longer than protopod, with 2 glabrous unequal filaments. Maxilla 2 (Fig. 13 D), as usual for the

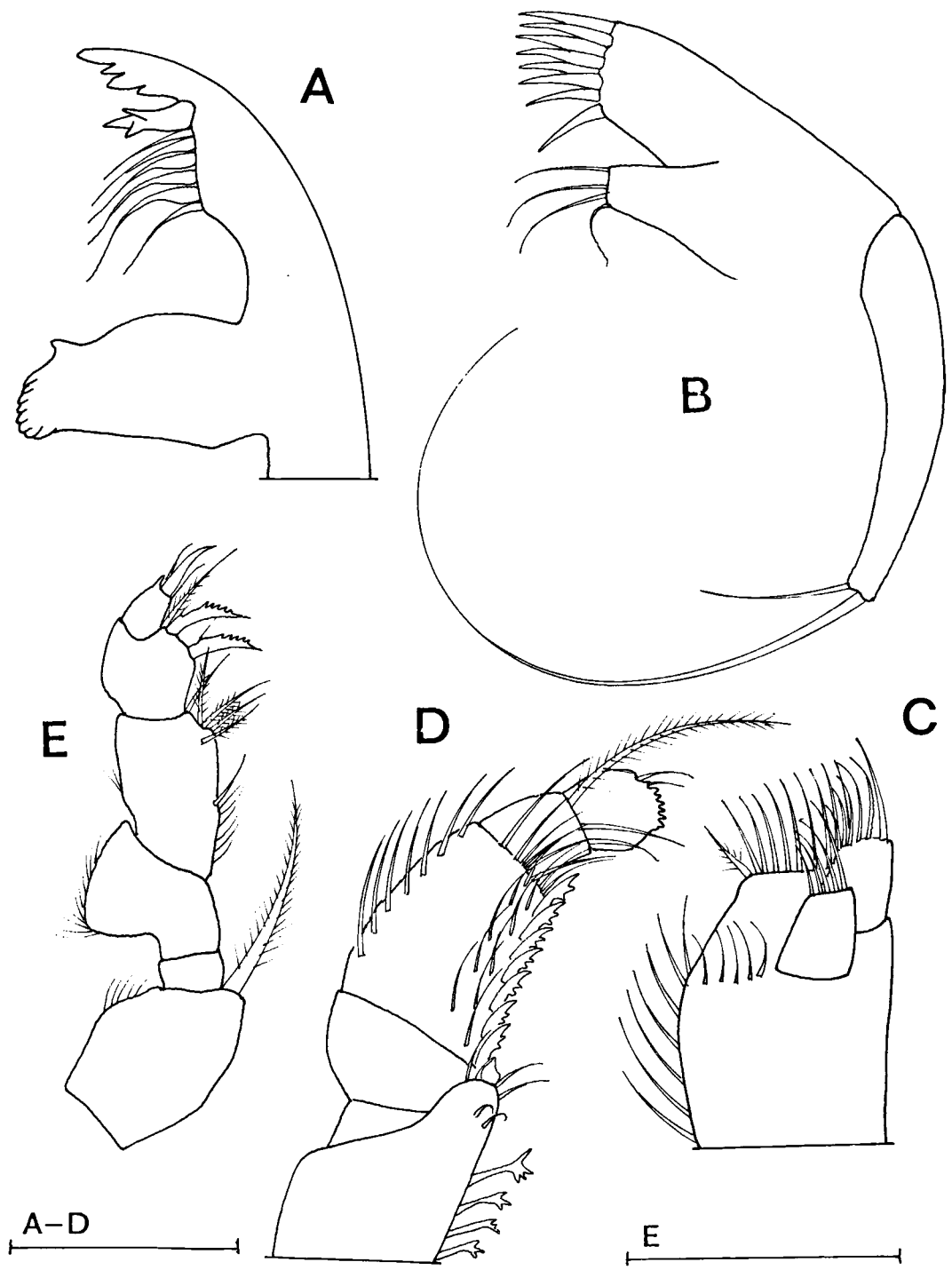

Fig. 11. *Nannastacus gamoi* Băcescu, 1992. A: mandible; B: maxilla 1; C: maxilla 2; D: maxilliped 1; E: maxilliped 2. Scale bars (in mm): A - D: 0.05; E: 0.1.

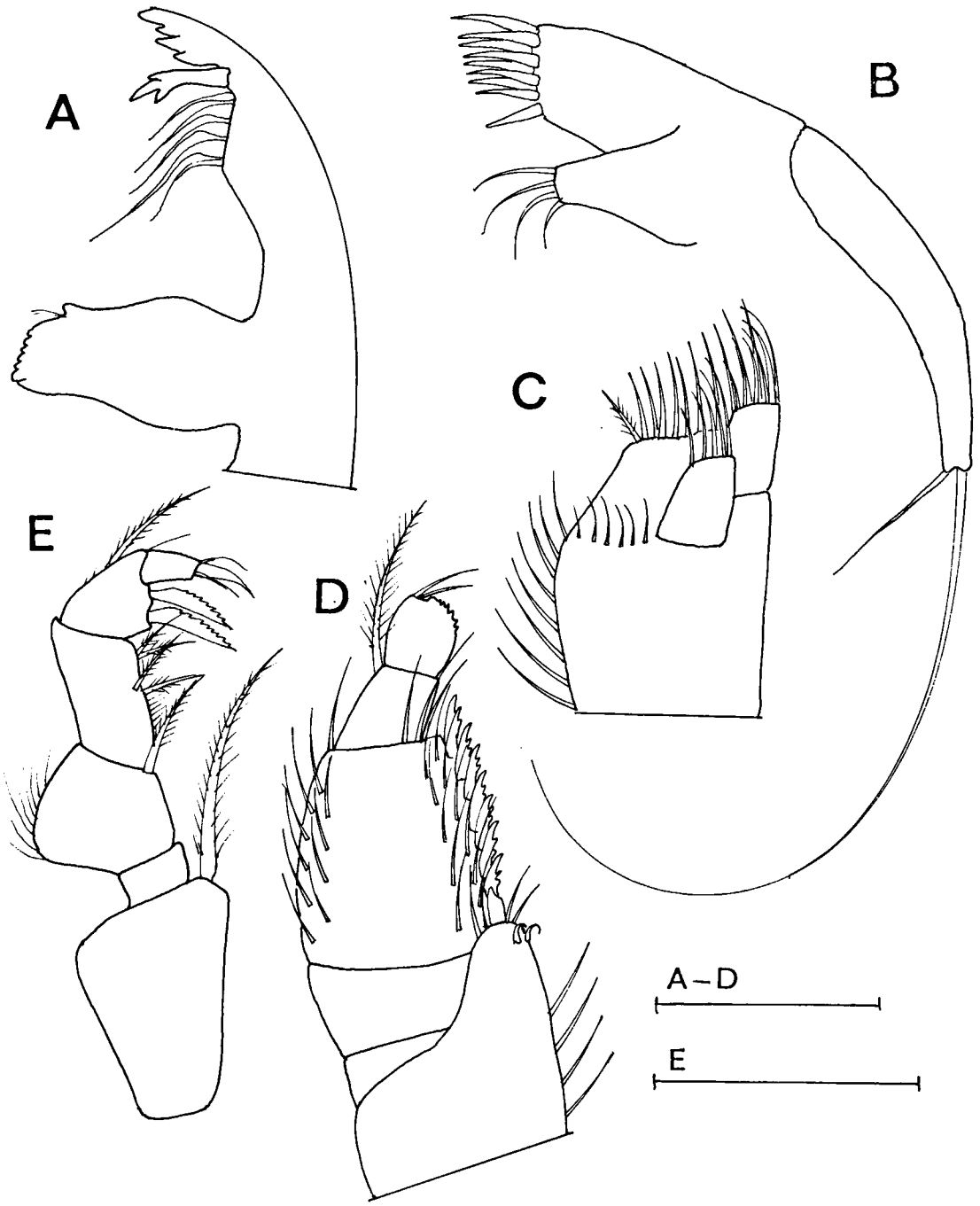

Fig. 12. *Nannastacus gibbosus* Calman, 1911. A: mandible; B; maxilla 1; C: maxilla 2; D: maxilliped 1; E: maxilliped 2. Scale bars (in mm): A- D: 0.05; E: 0.1.

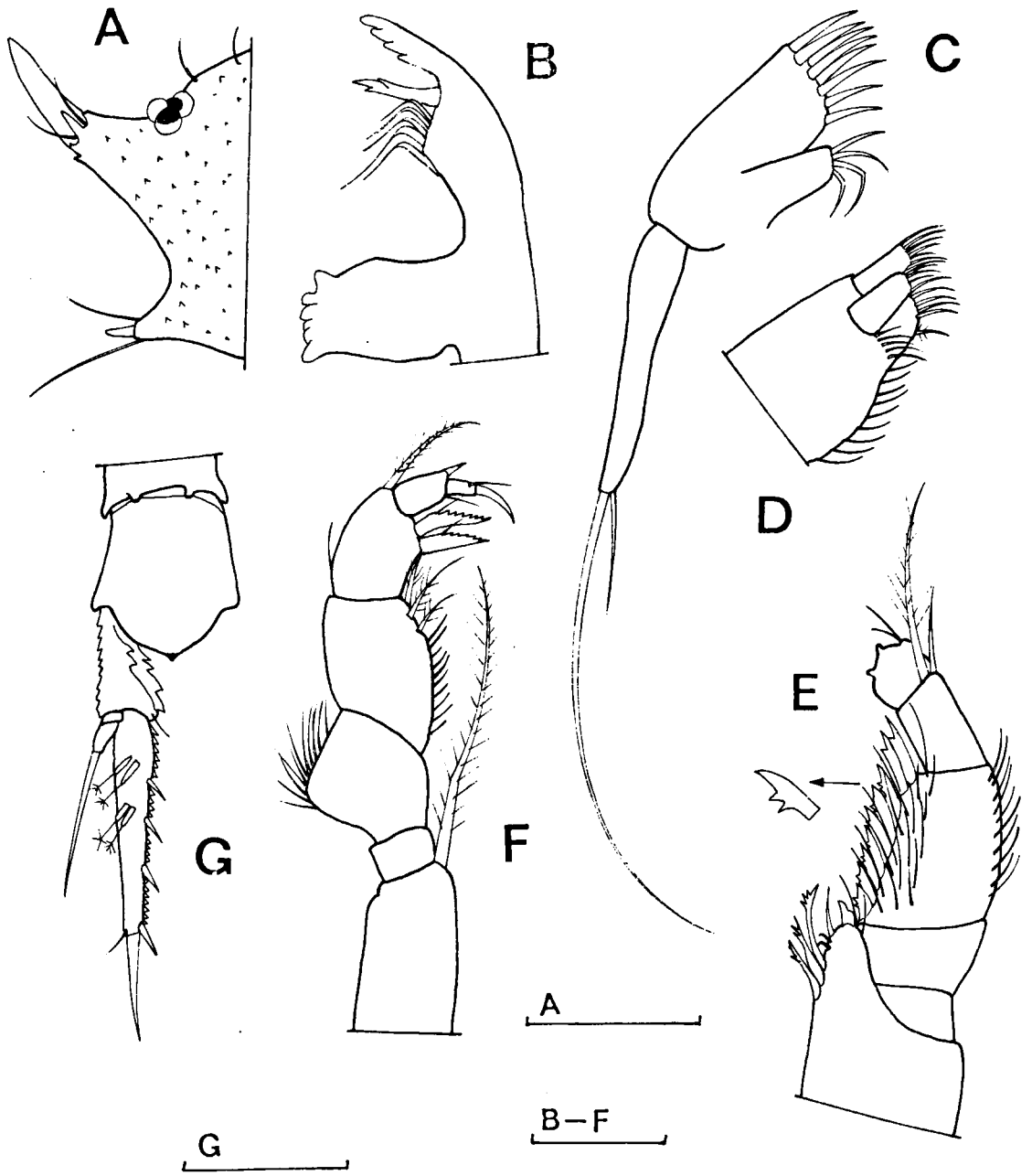

Fig. 13. *Nannastacus goniatus* Gamo,1962, female. A: carapace, antero - lateral part; B: mandible; C: maxilla 1; D: maxilla 2; E: maxilliped 1; F: maxilliped 2; G: uropod. Scale bars (in mm): A, G: 0.15; B -F: 0.05.

genus. Maxilliped 1 (Fig. 13 E), basis with 3 hand-like spines (different than in *N. antipai* and *N. gamoi*) on outer margin, one flattened and 2 hook-like spines and 3 simple short setae on its endite; carpus with 7 trifid flattened spines (like in *N. gibbosus*) and 2 bifid ones in distal outer corner interspersed with 3 parallel rows of simple setae on outer margin of carpus and a row of setae on its inner margin; propodus longer than large (1.8:1); round dactylus with 2 simple short setae and 2 small teeth on its anterior margin. Maxilliped 1 (Fig. 13 F), as usual for the genus, with 2 strong serrate spines on distal outer corner of carpus.

I figured anterior margin of the carapace (Fig. 13 A) and the uropod (Fig. 13 G) in more detail, the latter has a serrate inner margin of peduncle.

Immature male (Fig. 14): Carapace and pleon like in female. Maxilliped 3 (Fig. 14 A) with short and strong articles; basis longer than 1/3 of the maxilliped, massive, with a long inner process that exceeds basis of carpus; carpus longer than propodus; dactylus as long as its 3 claws. Pereopod 1 (Fig. 14 B), basis shorter than 1/3 of the pereopod, hyaline ridge on inner margin; propodus longer than carpus, with setules on outer margin, dactylus shorter than its claw. Pereopod 2 (Fig. 14 C), basis a little shorter than 1/2 of the pereopod, hyaline ridge on inner margin, carpus as long as propodus and dactylus combined, with 2 simple setae on distal outer corner; setules on outer margins of propodus and dactylus; dactylus as in female. Pereopod 3 (Fig. 14 D) carpus as long as propodus. Pereopod 4 (Fig. 14 E), carpus shorter than propodus. Pereopod 5 (Fig. 14 F), carpus as long as propodus. Maxilliped 3 and pereopods 1- 4 with not fully developed exopods. Uropod (Fig. 14 G), with peduncle shorter than last pleonite (0.64:1), longer than exopod (3 times longer) and shorter than endopod (0.54:1), inner serrate margin; exopod much shorter than endopod (0.18:1) with a long terminal seta (seta: exopod= 0.66); endopod with 2 pairs of median plumose setae and 4 spines and a short seta on the inner margin (nonserrated), short terminal spine (spine: endopod= 0.48).

Remarks: The original description (Gamo, 1962) is based only on the females. Our immature males clearly belong to this species because of the shape of the carapace (with folds) and of pleonites 1 and 2 with pairs of dorsal spines. The most important difference of these immature males (with most of the characters like in females) is the uropod (length and number of spines of the endopod).

Nannastacus inconstans Hale, 1945 (Fig. 15)

Material: 6 males, stat. MAS-3; 4 males, stat. MAS-6; 2 males, stat. MAS-16.

Description: Carapace (Fig. 15 A, B) has a sculptured integument intermediate between the two forms described by Hale (cristate and reticulate) with large granules on the pseudorostrum, small spiniform tubercles on antero-lateral corner and small granules disposed in a reticulate pattern on the rest of carapace; two rows of flattened tubercles producing the appearance of a pair of longitudinal, a little curved crests (not so longitudinally like in Hale), between each eye and the middle of carapace (Fig. 15 C). Antenna 1 (Fig. 15 E) with short articles, 2 long simple setae in distal outer corner of basal article of peduncle, median article with a tubercle with sensory hairs in distal inner corner, characteristic for the genus and 2 long simple setae in its distal outer corner, the shortest article of peduncle. Maxilliped 3 (Fig. 15 F) with 2 teeth on outer margin of basis, one tooth on inner margins of merus and carpus short propodus, no longer than carpus. Pereopods 3, 4 (Fig. 15 I, J) with a hyaline ridge on inner margin of basis, have carpus the longest article of all (except basis). Uropod with shorter endopod than of the cristate form, with 3 median sensory hairs and 2 hairs on inner serrate margin (endopod: peduncle= 2.58 in our specimens and 2.85 in Hale's cristate form) (Fig. 15 L). I also figured the pleon in dorsal view for its characteristic structure (Fig. 15 D). Mandible, maxillae, maxillipeds 1 and 2, as usual for the genus. Body size: 1.09 mm.

Remarks: Pereopods 1, 2, 5 like in Hale's description (Fig. 15 G, H, K). Uropod is more similar to that of the reticulate form of Hale.

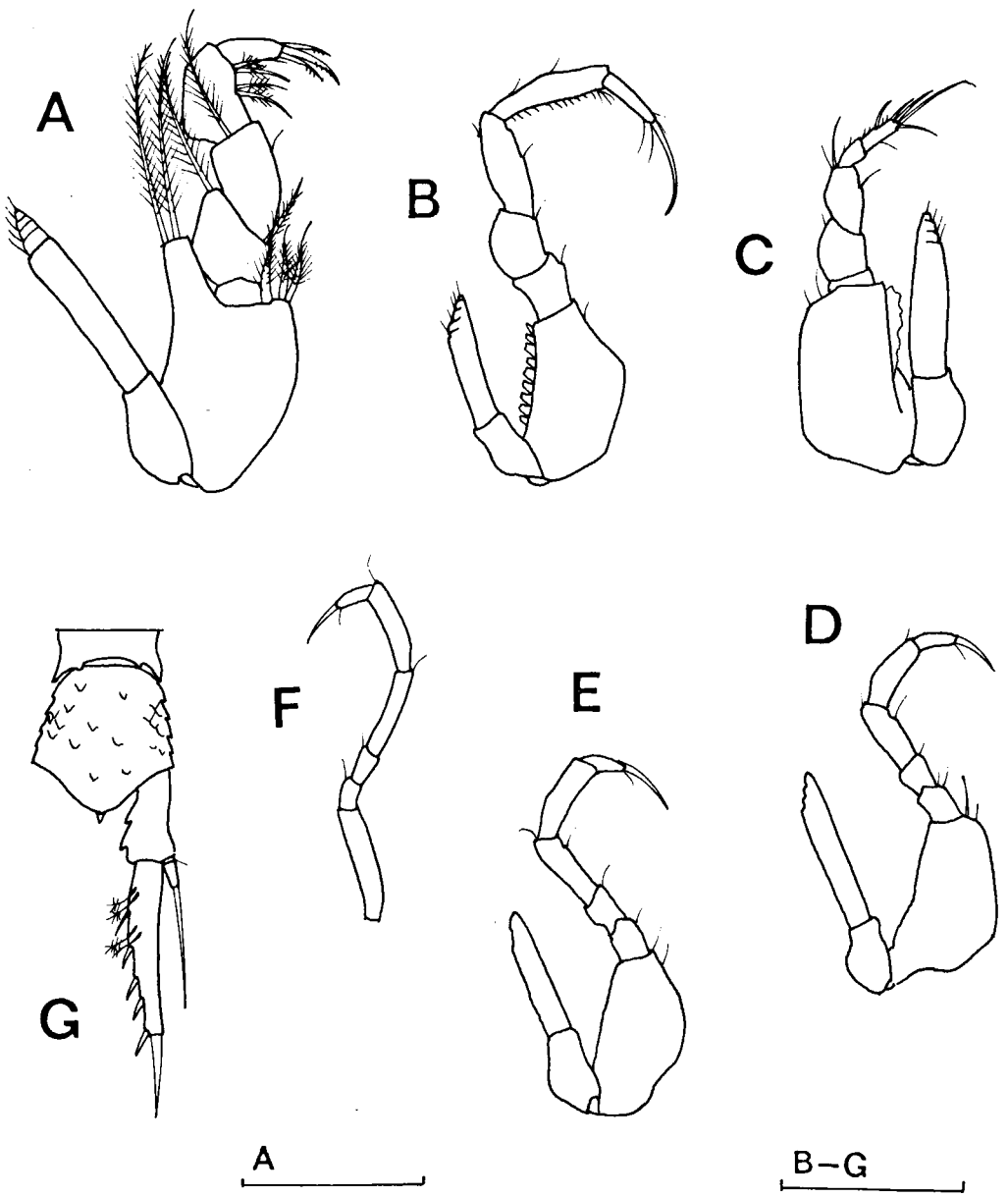

Fig. 14. *Nannastacus goniatus* Gamo, 1962, immature male. A: maxilliped 3; B: pereopod 1; C: pereopod 2; D: pereopod 3; E: pereopod 4; F: pereopod 5; G: uropod. Scale bars (in mm): A: 0.1; B - G: 0.15.

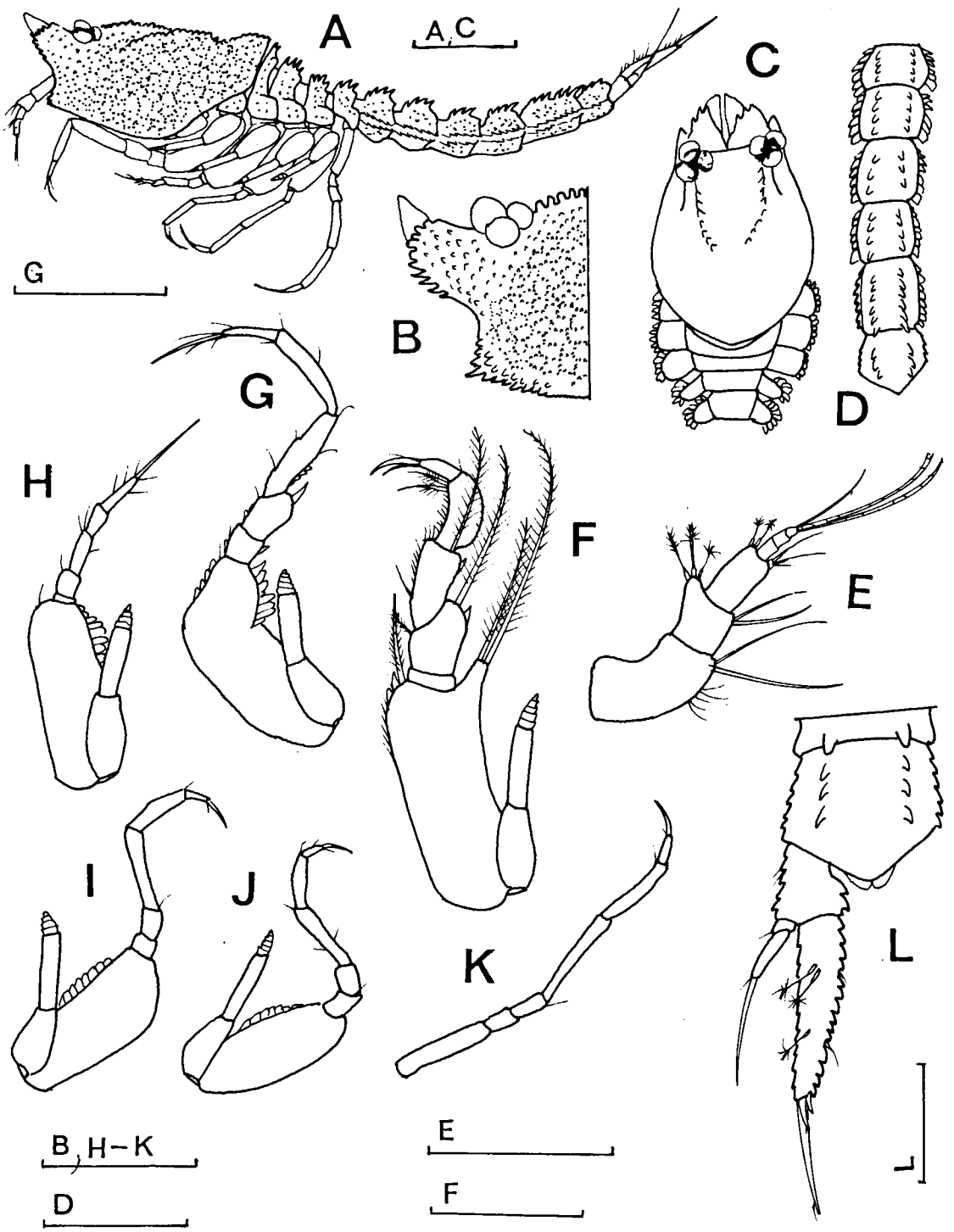

Fig. 15. *Nannastacus inconstans* Hale, 1945, male. A: body, lateral view; B: carapace, antero- lateral part; C: cephalothorax and free thoracic segments, dorsal view; D: pleon, dorsal view; E: antenna 1; F: maxilliped 3; G: pereopod 1; H: pereopod 2; I: pereopod 3; J: pereopod 4; K: pereopod 5; L: uropod. Scale bars (in mm): A - D, H - K: 0.2; E, F, L: 0.1; G: 0.15.

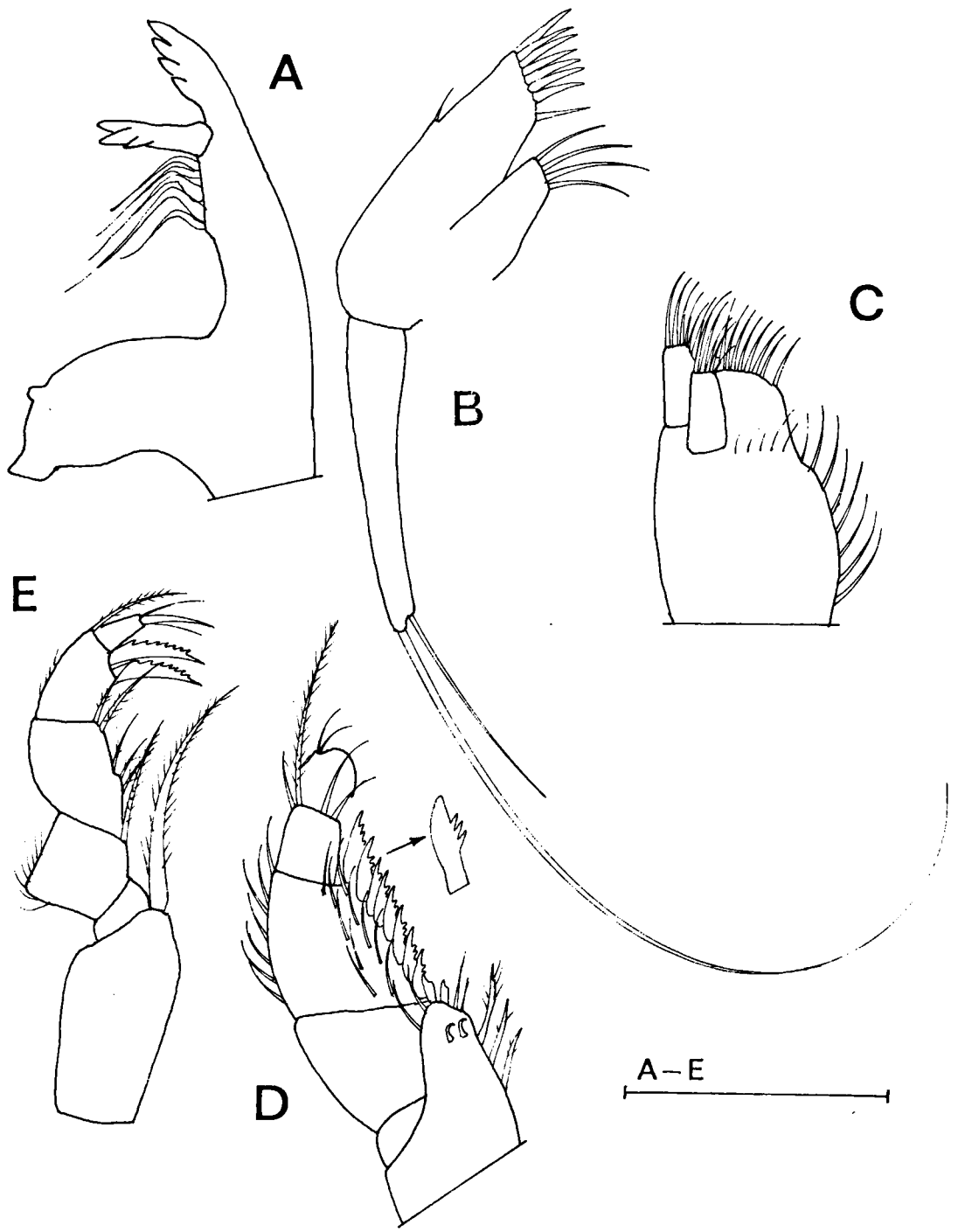

Fig. 16. *Nannastacus mitreae* Petrescu, 1995. A: mandible; B: maxilla 1; C: maxilla 2; D: maxilliped 1; E: maxilliped 2. Scale bar (in mm): A - E: 0.1.

Nannastacus mitreae Petrescu, 1995
(Fig. 16)

Material: 1 female, stat. MAS-2; 9 females, stat. MAS-3; 15 females, 1 male, stat. MAS-6; 19 females, 2 males, stat. MAS-16.

Description: Mandible (Fig. 16 A), pars incisiva with 4 teeth, strong lacinia mobilis with 3 unequal teeth (2 longer, almost like in *N. antipai*), 5 simple spine-like setae between lacinia mobilis and pars molaris, pars molaris with a small anterior tubercle. Maxilla 1 (Fig. 16 B) with a hair on inner margin of protopod, 8 simple spines on its top; endite with 4 simple setae; palp as long as protopod, with 2 glabrous unequal filaments. Maxilla 2 (Fig. 16 C), as usual for the genus. Maxilliped 1 (Fig. 16 D) with 3 setulate spines on outer margin of basis, 2 bifid and 2 hook-like spines and 4 short simple setae on its endite; carpus with 7 flattened hand-like short spines (on other type than those of the previous species of *Nannastacus*) and 2 bifid flattened longer spines on outer margin, two parallel rows of simple setae interspersed with the spines and one row of simple setae on inner margin; propodus a little longer than large; rounded dactylus with 2 small simple setae and with a smooth margin. Maxilliped 2 (Fig. 16 E), as usual for the genus.

Nannastacus muelleri n.sp. (Figs 17, 18)

Material: Holotype: female, ZMA Cu- 202163a; paratypes: 13 females, (stat. MAS-2) GANMNH 49511; 2 females (stat. MAS-3) ZMA Cu- 202163b; 2 females (stat. MAS-6) US.

Type locality: Pulau Babi Besar, about 15 km off Mersing (Eastern Malaysia), between dead corals, 1 - 2 m, 1.4.1991.

Description: Granulous integument with few spines on carapace, pereon and pleon.(Fig. 17 A). Body size: 1.08 mm. Carapace (Fig. 17 A, B), globular, with small granules on the whole surface, 2 parallel rows of 5 spiniform dorsal tubercles on the posterior half of carapace, few long simple, curved setae; short toothed, upturned pseudorostrum; anterior corner of carapace with a strong spine projecting from the anterior margin; serrated ventral margin; carapace longer than 1/3 of the entire body (0.38), longer than high (1.3:1); eyelobe with a pair of eyes (3 lenses each). Pereonites with serrated edges; pereonites 2 and 3 with a pair of long lateral spines, pereonite 3 also with 2 long dorsal spines, pereonite 4 with 2 short and one long dorsal spines, pereonite 5 with 3 long dorsal spines; each pereonite with a pair of long simple setae. Pleonites 1-3 with a pair of long lateral spines and setae and one median dorsal long spine; pleonite 4 with a pair of long lateral spines and setae and a pair of short dorsal spines; pleonite 5 with 2 pairs of long lateral setae and 3 pairs of curved dorsal spines; last pleonite with numerous setae, a pair of long lateral setae and 2 pairs of short dorsal spines (Fig. 17 C). Antenna 1 (Fig. 17 D) with slender peduncle, basal article (the longest), with 3 long simple setae on distal outer corner, median article with a tubercle on inner margin with 2 sensory setae and 2 long, simple setae on its distal outer corner; distal article longer than the median one; accessory flagellum not longer than the basal article of main flagellum. Mandible (Fig. 17 E), as usual for the genus, lacinia mobilis with 3 teeth progressively shorter; 4 spine-like simple setae between lacinia mobilis and pars molaris, pars molaris with a tubercle on anterior corner. Maxilla 1 (Fig. 17 F), protopod with 6 bifid spines and a simple outer one, endite with 4 simple setae, palp longer than protopod, with 2 glabrous unequal filaments (ratio = 4.56). Maxilla 2 (Fig. 17 G), as usual for the genus. Maxilliped 1 (Fig. 17 H), basis with 3 hand-like spines on outer margin, one flattened bifid, 2 hook- like spines and 3 simple short setae on its endite; 6 flattened bifid spines interspersed with 2 parallel rows of simple setae on outer magin of carpus; square propodus; round dactylus with 2 short simple setae and smooth margin. Maxilliped 2 (Fig. 17 I), as usual for the genus, 3 simple setae and setules on outer margin of carpus; strong curved serrate spines on distal outer corner of propodus. Maxilliped 3 (Fig. 17 J), basis longer than 1/3 of maxilliped, 2 long plumose setae on its inner process and 2 short plumose setae on its distal outer corner, carpus as long as propodus. Pereopod 1 (Fig. 17 K), basis 1/3 of the entire pereopod, with 3 parallel rows of small granules; carpus shorter than

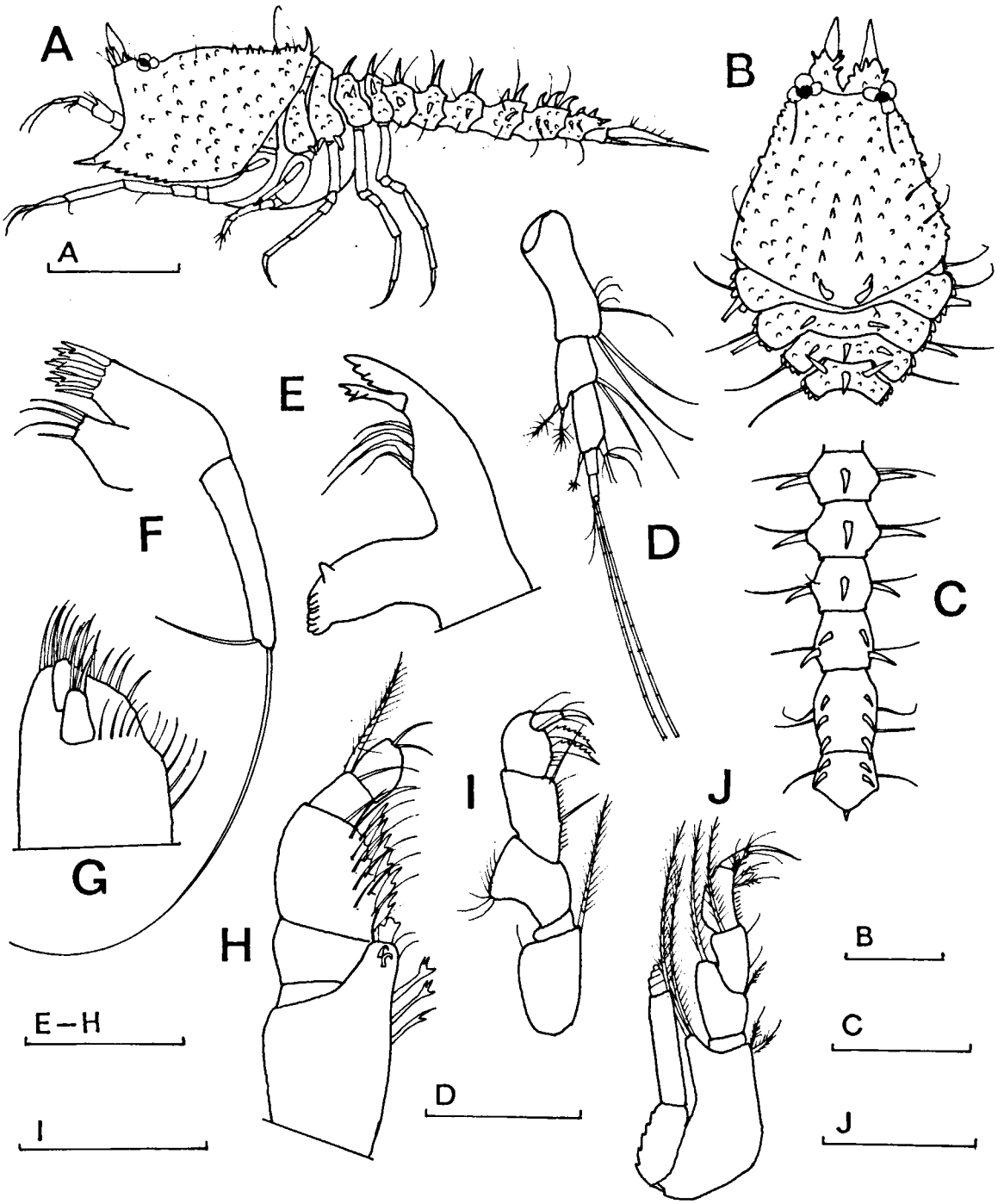

Fig. 17. *Nannastacus muelleri* n.sp., female. A: body, lateral view; B; cephalothorax and free thoracic segments, dorsal view; C: pleon, dorsal view; D: antenna 1; E: mandible; F: maxilla 1; G: maxilla 2; H; maxilliped 1; I: maxilliped 2; J: maxilliped 3. Scale bars (in mm): A: 0.3; B, C: 0.2; D, I, J: 0.1; E - H: 0.05.

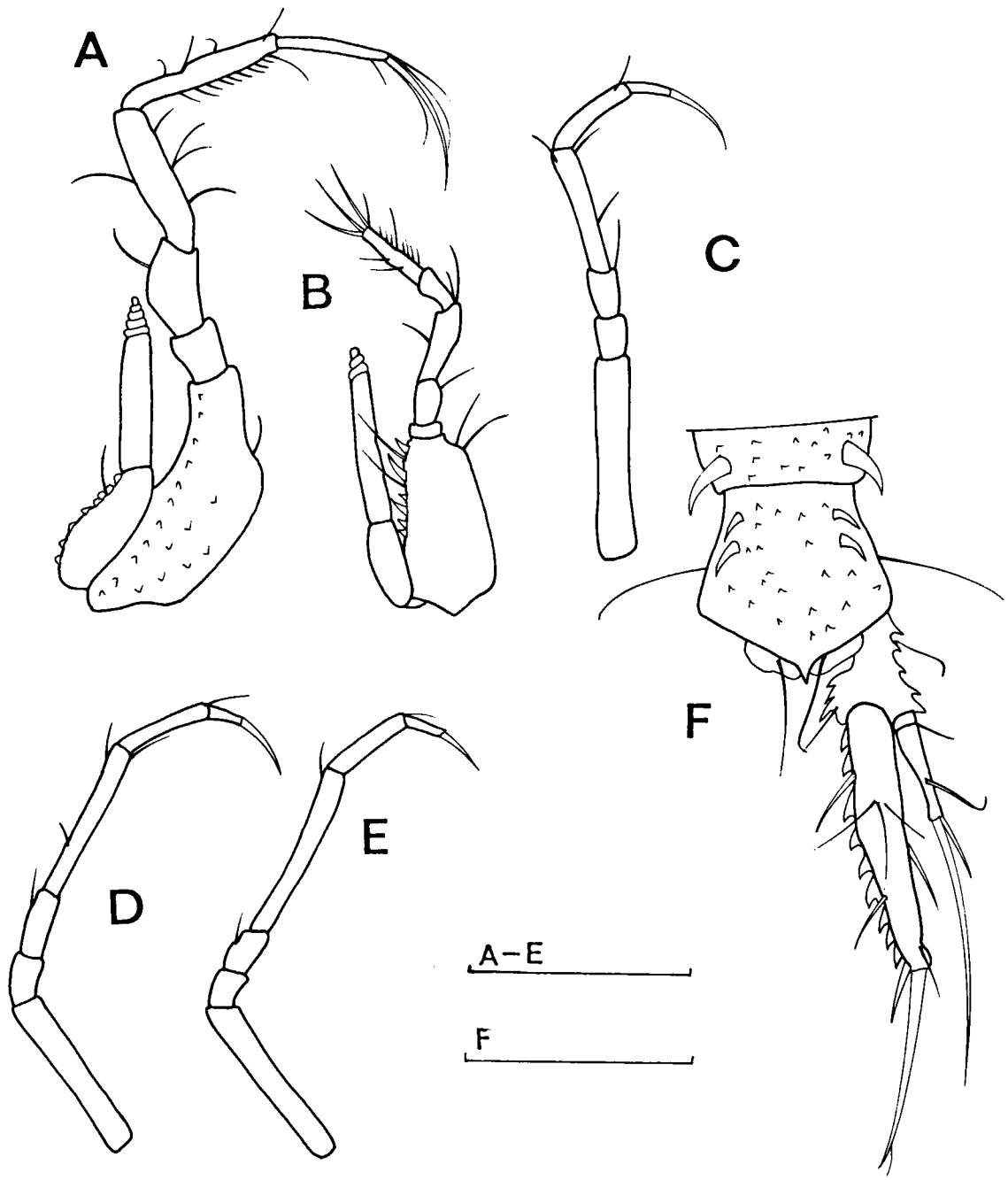

Fig. 18. *Nannastacus muelleri* n.sp., female. A: pereopod 1; B: pereopod 2; C: pereopod 3; D: pereopod 4; E: pereopod 5; F: uropod. Scale bars (in mm): A - E: 0.15; F: 0.1.

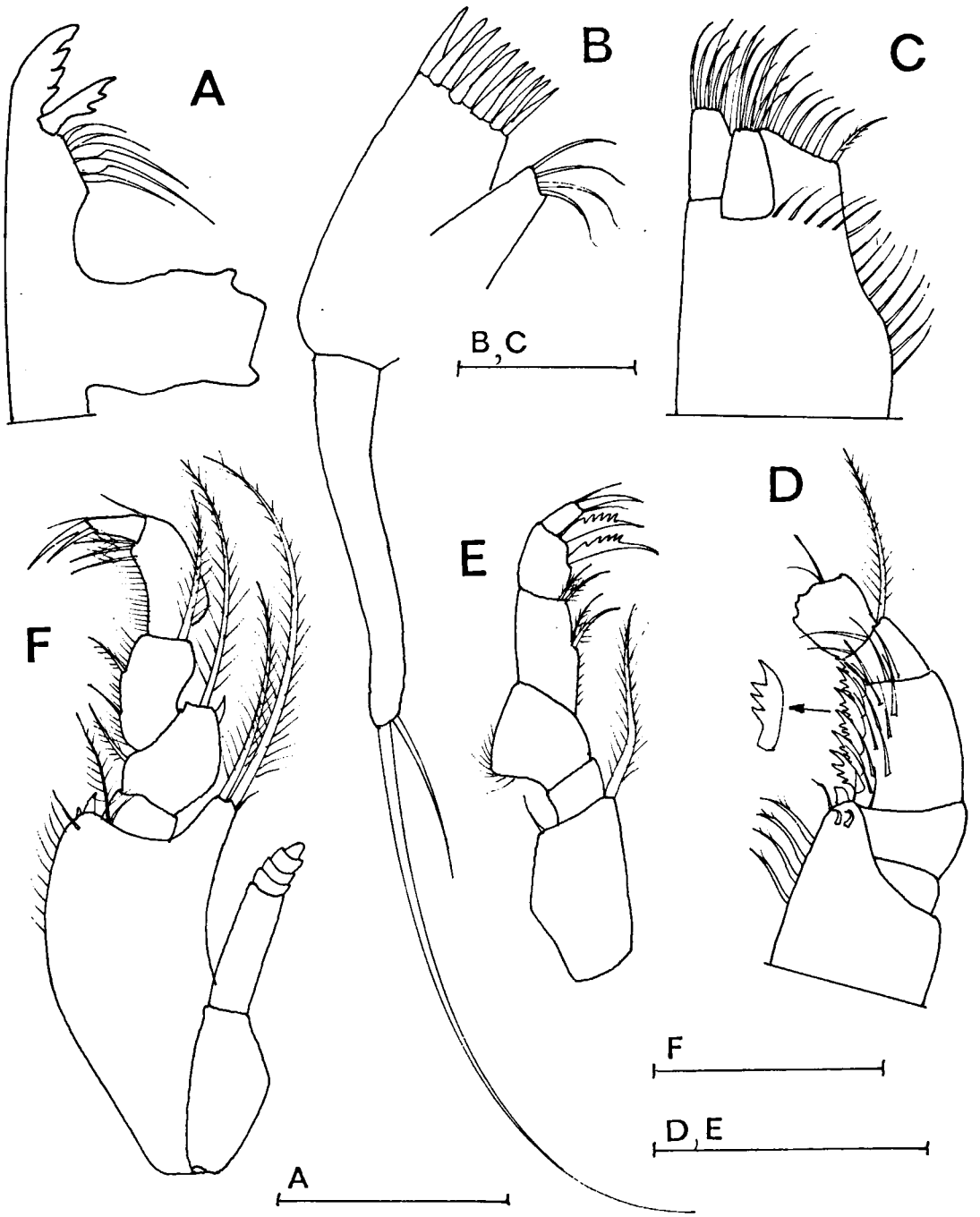

Fig. 19. *Nannastacus pectinatus* Gamo,1962. A: mandible; B; maxilla 1; C: maxilla 2; D: maxilliped 1; E; maxilliped 2; F: maxilliped 3. Scale bars (in mm): A- C: 0.05; D- F: 0.1.

propodus, but longer than dactylus; dactylus shorter than its claw. Pereopod 2 (Fig. 18 B), basis longer than 1/3 of the entire pereopod, strong, with hyaline teeth on inner margin; carpus with 2 short simple setae on its outer distal corner; propodus a little longer than half of dactylus; dactylus with 2 short simple setae on inner margin, one short seta and few setules on the outer one and 4 terminal setae, shorter than dactylus. Pereopods 3- 5 (Fig. 18 C - E) slender, carpus the longest article except basis, dactylus shorter than its claw. Pereopod 5 longer than pereopods 2 - 4. Uropodal peduncle (Fig. 18 F) shorter than last pleonite (0.53:1), with serrate margins, exopod as long as peduncle, with 3 simple setae on outer margin and a long terminal simple seta (2 times longer than exopod), endopod longer than peduncle and exopod (2.56:1), with a simple short seta on outer margin, 3 median ones, serrate inner margin, 2 short simple setae on inner margin and 2 unequal spines (spine: endopod = 0.73).

Etymology: The species is dedicated to Dr. Hans Georg Müller who donated to me the cumaceans collected from the Malayan waters.

Remarks: Nannastacus muelleri n.sp. is most related to *N. gamoi* Băcescu, 1992 among the spiny females of *Nannastacus,* especially regarding the maxilliped 3, pereopods (except the teeth from inner margin of basis from pereopods 1, 3-5) and uropod (endopod with a longer terminal spine). The major differences are: less spines on entire body, especialy on carapace, less spines and granules on antenna 1, maxilliped 3 and pereopods; maxilla 1 with bifid spines on protopod (a unique character within the studied species of the genus), maxilliped 1, bifid spines on carpus versus trifid and dactylus with a smooth versus crested anterior margin. Further studies on the maxilla 1 of the known species will clarify the taxonomic importance of the shape of protopod spines within the genus.

Nannastacus pectinatus Gamo, 1962
(Fig. 19)

Material: 16 males, stat. MAS-2; 13 males, stat. MAS-3.

Description: I complete the original description (Gamo, 1962) with the following parts: Mandible (Fig. 19 A), as usual for the genus, lacinia mobilis with 3 unequal teeth, 5 spine-like setae between lacinia mobilis and pars molaris. Maxilla 1 (Fig. 19 B), protopod with 10 simple spines, slender endite with 4 simple setae, palp longer than protopod, with 2 unequal glabrous filaments (ratio = 3.57:1). Maxilla 2 (Fig. 19 C), as usual for the genus. Maxilliped 1 (Fig. 19 D), basis with 4 setulated spines, a flattened tooth-like spine, 2 hook- like spines and 3 short simple setae on its endite; 6 flattened short hand- like spines interspersed with 3 parallel rows of simple setae on outer margin of carpus; dactylus with a toothed anterior margin. Maxilliped 2 (Fig. 19 E), as usual for the genus, merus only with setules on inner margin.

Remarks: Mandible with lacinia mobilis as in *N. goniatus* Gamo, 1962. Carpus of maxilliped 1 with spines as in *N. mitreae* Petrescu, 1995. Maxilliped 3 of our specimens has a shorter process of basis and teeth on outer margin of basis and on inner margin of merus (Fig. 19 F).

Nannastacus wisseni n.sp. (Figs 20, 21)

Material: Holotype: female (stat. MAS-2) ZMA Cu- 202164a; allotype: male (stat. MAS-6) ZMA Cu- 202164b; paratypes: 1 female, 3 males (stat. MAS-2) ZMA Cu- 202164c ; 2 females, 7 males (stat. MAS-3) GANMNH 49612; 8 males (stat. MAS-16) US.

Type locality: Pulau Babi Besar, around Mersing, Eastern Malayan coast, South China Sea, between dead corals, 1 - 2 m, 1. 4. 1991.

Description: Female (Figs 20, 21 A - D). Integument with small tubercles. Length: 2.3 mm. Carapace (Fig. 20 A, B) represents almost a third of the entire body, longer than high (length : height = 1.54); expanded postero-laterally, the widest across the posterior half and raised postero-dorsally, antero-lateral angle is acute, ending in with a subterminal and a strong terminal spine; branchial regions are much swollen; a dorsal median strong tooth-like spine and a pair of larger tubercles at basis of eyelobe; 3 pairs of

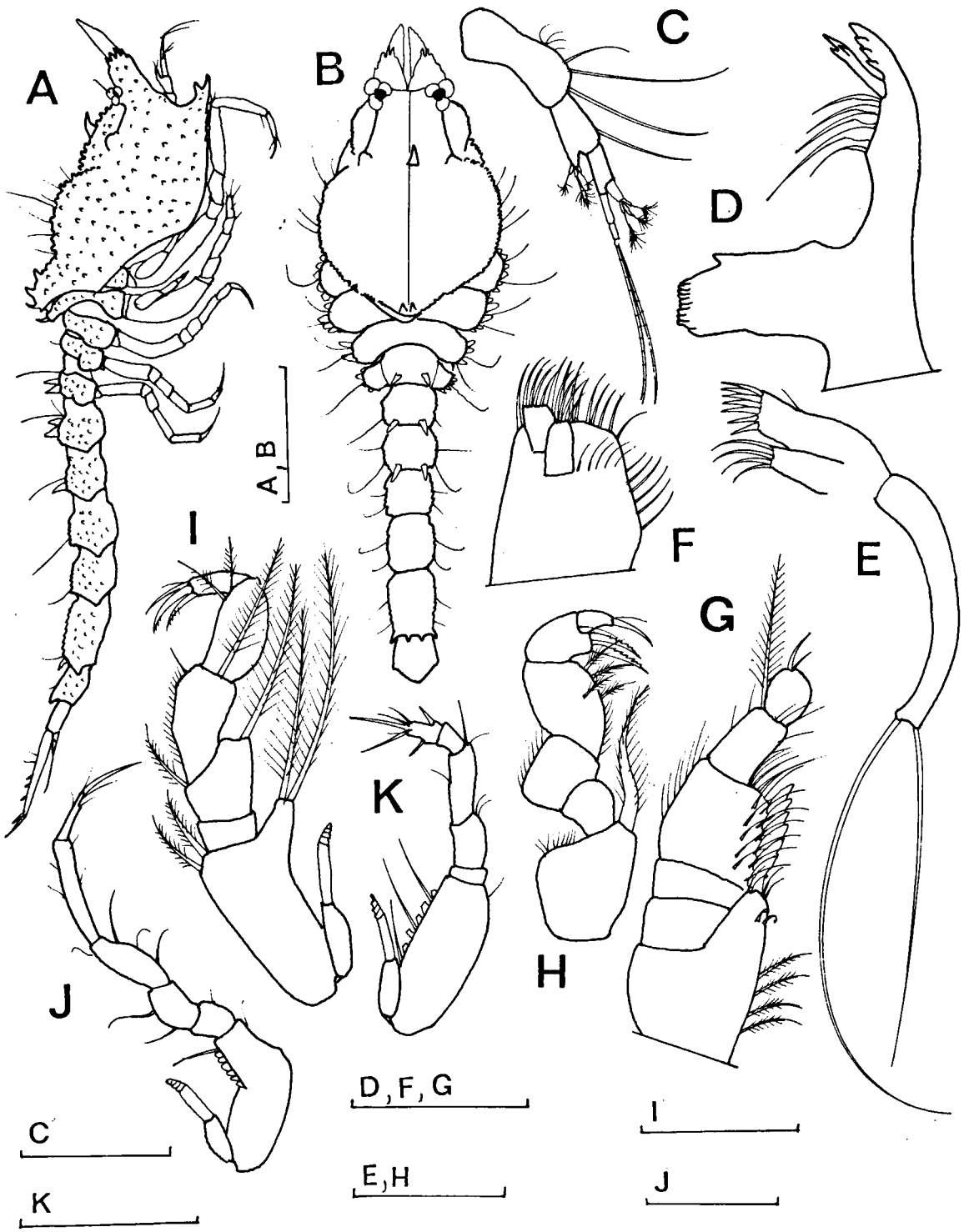

Fig. 20. *Nannastacus wisseni* n.sp. female A: body, lateral view; B: body, dorsal view; C: antenna 1; D; mandible; E: maxilla 1; F: maxilla 2; G: maxillliped 1; H: maxilliped 2; I: maxilliped 3; J: pereopod 1; K: pereopod 2. Scale bars (in mm): A, B: 0.5; C, I: 0.15; D- H: 0.1; J; 0.25; K: 0.2.

dorsal median teeth in posterior corner, sparse long hairs; pseudorostral lobes are directed upwards. As seen from aside the front of the lobes is truncated and armed with serrations; a pair of eyes (3 lense each). All pereonites with flattened spines on lateral border; pereonites 1 and 5 with a pair of dorsal spines. First two pereonites (Fig. 20 B) with a pair of dorsal spines. Long simple setae on pereon and pleon. Antenna 1 (Fig. 20 C), first article longer than the other two combined, with 3 long simple setae on its distal outer corner; second article with a tubercle with plumose sensory setae on inner margin and a long simple seta on outer. Mandible (Fig. 20 D), pars incisiva with 4 teeth, lacinia mobilis with 3 unequal teeth, long and slender, exceeds pars incisiva; 5 spine-like simple setae between lacinia mobilis and pars molaris; pars molaris with a small tubercle on anterior margin. Maxilla 1 (Fig. 20 E), protopod with a simple seta on its inner margin and 7 simple spines on its top; endite with 4 simple setae; palp longer than protopod, with 2 unequal glabrous filaments (ratio = 2.65: 1). Maxilla 2 (Fig. 20 F), as usual for the genus. Maxilliped 1 (Fig. 20 G), basis with 4 plumose setae on its outer margin ; a flattened tooth-like, 2 hook-like spines and 3 short simple setae on the top of its endite; 6 flattened bifid spines interspersed with 2 parallel rows of simple setae on outer margin of carpus; long propodus, a little shorter than carpus; setules on both margins and a long plumose seta on its inner distal corner; round dactylus with smooth margins and 2 setules. Maxilliped 2 (Fig. 20 H) with strong, flattened articles, basis with setules on inner margin and a long strong plumose seta in outer distal corner; ischium with setules on outer margin; setules also on inner margin of merus; setules and short plumose setae on outer margin of carpus, 2 strong serrate spines on its outer distal corner; dactylus shorter than its claw. Maxilliped 3 (Fig. 20 I), basis 1/3 of the entire maxilliped, short inner process (slightly exceeds ischium) with 2 long plumose setae, 2 short plumose setae on its outer distal corner; carpus longer than dactylus, with setules on outer margin; dactylus longer than its claws. Pereopod 1 (Fig. 20 J), basis 1/3 of the entire pereopod, small hyaline ridge on inner margin; slightly swollen carpus, shorter than propodus; propodus longer than dactylus; dactylus as long as its claw. Pereopod 2 (Fig. 20 K), basis longer than 1/3 of the entire pereopod, hyaline ridge and sparse long simple setae on inner margin; carpus longer than propodus and dactylus combined, 2 simple setae on distal outer corner; short dactylus (dactylus: propodus = 1.14), setules and a short seta on each side, 5 unequal terminal setae (median seta, longer than dactylus). Pereopod 3 (Fig. 21 A), basis shorter than 1/3 of the entire pereopod, carpus shorter than propodus. Pereopod 4 (Fig. 21 B), basis 1/4 of the entire pereopod; carpus as long as propodus. Pereopod 5 (Fig. 21 C), basis shorter than 1/3 of the entire pereopod, carpus as long as propodus. Uropodal peduncle (Fig. 21 D) little shorter than last pleonite (0.85 : 1), longer than exopod (2.66 : 1), shorter than endopod (0.44 : 1); endopod more longer than exopod (7.07 : 1), 2 short plumose setae on outer margin, 4 short spines on inner margin and a short terminal spine (spine: endopod = 4.18).

Male (Fig. 21 E - M). Length: 2.01 mm. Reticulate glabrous integument. Carapace (Fig. 21 E), 0.28 of the entire body length; longer than in female (length : height = 1.9), less swollen in the posterior half, only with a pair of dorsal tubercles at basis of eyelobe; pseudorostrum, shorter, without serrations; antero-lateral border concave at obtuse angle; antero-lateral corner with a small tooth followed by a short serration. Pereonites without characteristic flattened spines on lateral borders; last pereonite without dorsal spines; flattened spines more evident on lateral borders of first 4 segments; 2 pairs of spines in postero-dorsal corner of first 2 segments and a pair of strong spines (stronger than in female) in posterior extremity of pleonite 5 (the longest of all) (Fig. 21 F). Antenna 1, first article of peduncle shorter than the other two combined, with 2 pairs of long simple setae (one longer, exceeding the extremity of peduncle); second article as long as the third one, with a tubercle on inner margin; accessory flagellum with plumose sensory setae, one of them exceding the end of main flagellum. Antenna 2 with 3 short plumose setae on outer distal corner of first article of peduncle, the other two with few groups of short setae; flagellum reaches the end of pleon. Maxilla 1, ratio of filaments = 1.68, smaller than in female.

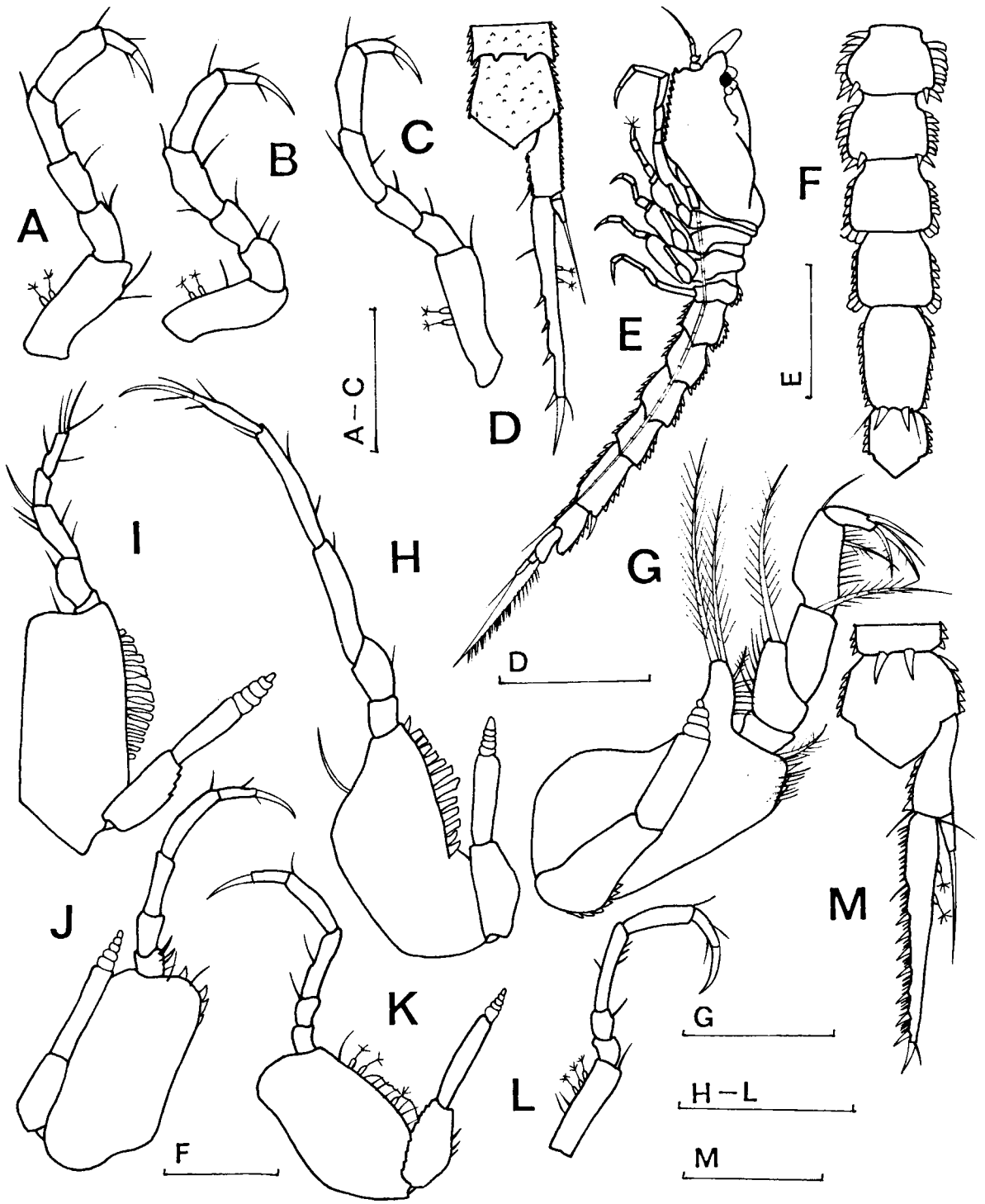

Fig. 21. *Nannastacus wisseni* n.sp., A - D: female; E -M: male. A: pereopod 3; B: pereopod 4; C: pereopod 5; D: uropod; E: body, lateral view; F: pleon, dorsal view; G: maxilliped 3; H: pereopod 1; I: pereopod 2; J; pereopod 3; K: pereopod 4; L: pereopod 5; M: uropod. Scale bars (in mm): A- C, M: 0.2; D, G: 0.15; E: 0.5; F, H- L: 0.25.

Maxilliped 2 with 2 plumose setae (one longer) on outer margin of basis (one in female). Maxilliped 3 (Fig. 21 G) with a more developed basis, a little shorter than half of the maxilliped, a short serration, a spine and a short plumose seta on outer distal corner, setules and a short plumose seta on outer margin and 2 long plumose setae on top of process; carpus a little shorter than propodus. The other mouth parts and maxillipeds are like in female. Pereopod 1 (Fig. 21 H), basis longer than 1/3 of the entire pereopod, long ridge of flattened hyaline spines on inner margin, a long simple seta on outer margin at distal half; carpus a little shorter than propodus; propodus longer than dactylus; dactylus as long as its claw. Pereopod 2 (Fig. 21 I), strong basis with a ridge of flattened hyaline spines on inner margin, longer than half of pereopod; carpus longer than merus and propodus, dactylus a little longer than propodus (1.25), with 5 unequal terminal setae (the median one longer than dactylus). Pereopod 3 (Fig. 21 J), basis a little shorter than a half of pereopod, strong tooth-like spine in distal outer corner; carpus shorter than propodus; dactylus with a strong claw. Pereopod 4 (Fig. 21 K), basis much shorter than half of pereopod, with a ridge of flattened hyaline spines on inner margin; carpus as long as propodus. Pereopod 5 (Fig. 21 L), basis 0.27 of the entire pereopod; carpus longer than propodus. Uropodal peduncle (Fig. 21 M) a little shorter than last pleonite (0.92), with an inner serrate margin, longer than exopod (3.12), longer than in female; exopod with a long terminal seta (seta: exopod = 2.75), shorter than endopod (0.46); endopod 6.75 times longer than exopod, with setules and 7 short spines on inner margin, 2 short plumose sensory setae on outer one and a short terminal spine (spine: endopod = 0.73).

Etymology: With regret I dedicate this species to the memory of Ben van Wissen (1944 - 1996), Head of the Exhibition Department of the Instituut voor Systematiek en Populatiebiologie (Zoölogisch Musem), Amsterdam (1978 - 1996), as a pious homage and posthumous thanks for the highly competent advice regarding museology and exhibitions on natural history he kindly offered to me and for his warmth and friendship shown during my scholarship in Amsterdam (1993).

Remarks: Nannastacus wisseni n.sp. is related to other species from adjacent waters (Japan, Indonesia and Australia): *N.antipai* Petrescu, *N.gibbosus* Calman, *N. goniatus* Gamo, *N. inflatus* Hale and *N. mitreae* Petrescu. Only females of *N. wisseni* n.sp. have one dorsal median spine on carapace and acute antero-lateral corner with 2 teeth.The same number and disposition of spines on pereon and pleon is found in *N. antipai* and *N. goniatus*. Antenna 1 is similar in all species. Maxilla 1 has a different number of spines on protopod and all these species have 2 highly unequal filaments except *N. wisseni*. This new species has bifid spines on carpus of maxilliped 1 like *N. muelleri* n.sp. (it differs by plumose setae versus hand-like spines on basis), the others, with trifid spines. Maxilliped 3 is like in *N. antipai*, with shorter process of basis than in the others. Pereopod 1 is very similar with that of *N. gibbosus*, *N. goniatus*, *N. inflatus* and *N. mitreae*. Pereopod 2 of *N. wisseni* has a short dactylus like in *N. gibbosus*, *N. goniatus* and *N. inflatus*. Uropod of *N. wisseni* differs by the number of spines on endopod (4 versus 3 or 5).
The male is closely related to *N. antipai* (form of carapace), *N. gibbosus* and *N. inflatus* (with different number of spines on endopod).

KEY TO THE SPECIES OF *NANNASTACUS* FROM THE MALAYAN WATERS

Males

1 - Pereon and pleon with tubercles or spines ... 2
Pereon and pleon without tubercles or spines 5

2 - Spines or tubercles on all segments of pereon and pleon 3
Spines or tubercles on few segments of pereon and pleon 4

3 - Long uropodal exopod (50 % shorter than endopod) ..... *pectinatus* Gamo, 1962
Short uropodal peduncle (less than 50 % shorter than endopod) ... *inconstans* Hale, 1945

4 - Pereonite 5 and pleonites 1 and 2 with spines, granular integument .... *antipai* Petrescu, 1995

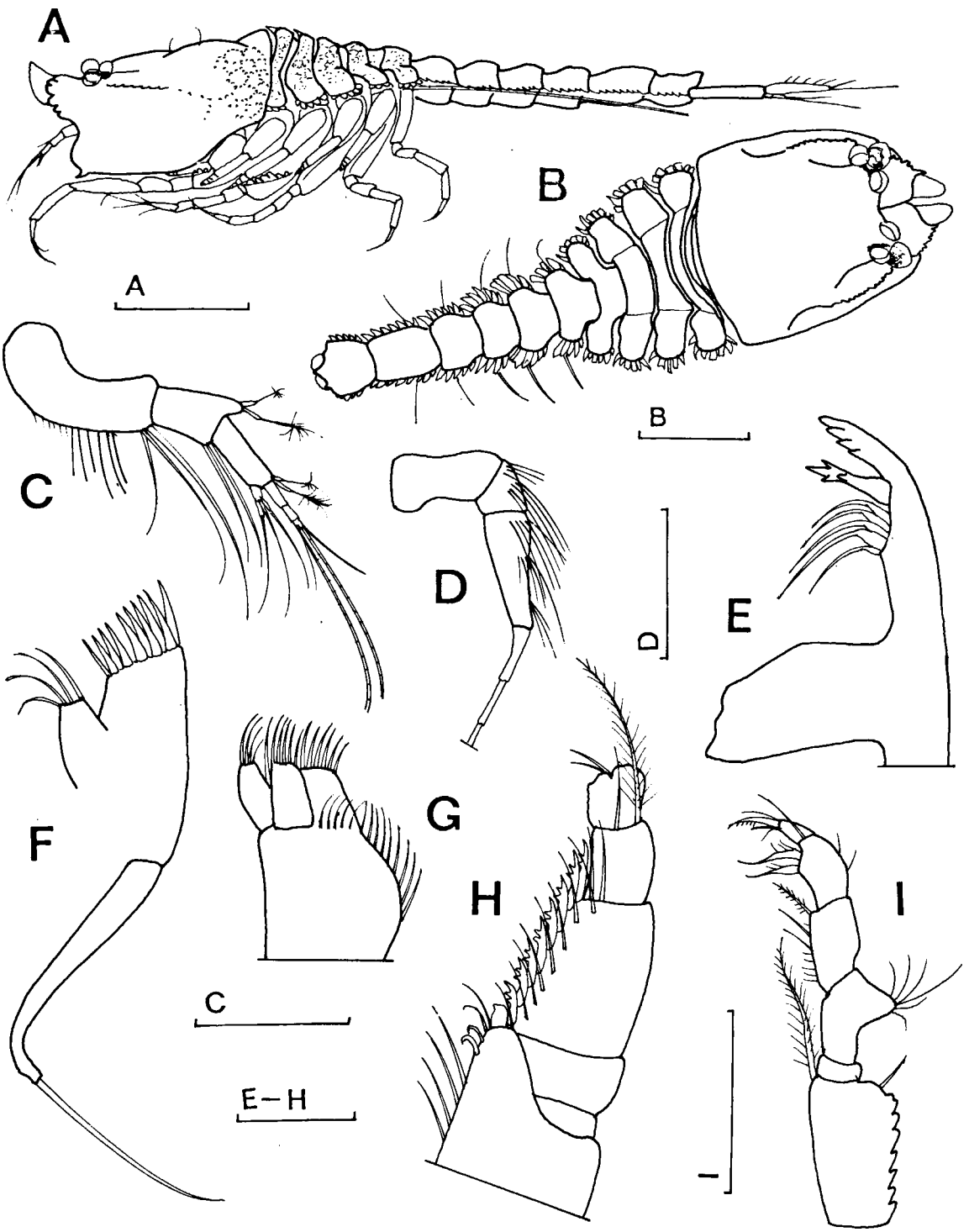

Fig. 22. *Scherocumella fagei* n.sp., male. A: body, lateral view; B: body, dorsal view; C: antenna 1; D: antenna 2; E: mandible; F: maxilla 1; G: maxilla 2; H: maxilliped 1; I: maxilliped 2. Scale bars (in mm): A: 0.3; B: 0.25; C, I: 0.1; D: 0.15; E - H: 0.25.

Only pleonites 1, 2 and 5 with spines, smooth integument ..... *wisseni* n.sp.

5 - Acute antero-lateral angle of carapace..... ..... *mitreae* Petrescu, 1995
Obtuse antero-lateral angle of carapace ..... *gibbosus* Calman, 1911

Females

1 - Acute antero-lateral angle of carapace 2
Blunt antero-lateral angle of carapace .... *antipai* Petrescu, 1995

2 - Integument densely spinose .... *gamoi* Bācescu, 1992
Integument not densely spinose 3

3 - Carapace and pereon with granular integument 4
Carapace and pereon without granular integument 6

4 - Long uropodal exopod (exopod longer than 1/3 of endopod) ..... *muelleri* n.sp.
Short uropodal exopod (exopod shorter than 1/3 of endopod) 5

5 - Carapace, pereon and pleon with spines ..... *wisseni* n.sp.
Only carapace with spines .... *mitreae* Petrescu, 1995

6 - Pleon with spiniform granules on first two segments ..... *goniatus* Gamo, 1962
Pleon without spiniform granules .... *gibbosus* Calman, 1911

Scherocumella fagei n.sp. (Figs 22, 23)

Material: Holotype: male (stat. MAS-3) ZMA Cu- 202165; paratype: male (dissected, on slide; stat. MAS-3) GANMNH 49613.

Type locality: Pulau Babi Besar, about 15 km off Mersing, Eastern coast of Malaysia, South China Sea, central part of reef flat, in and under dead coral rocks, mainly covered with coralline algae, 1 m, 1. 4. 1991.

Description: Length: 1.61 mm. Integument with small spiniform tubercles disposed in a reticulated pattern. Carapace (Fig. 22 A, B), a little longer than 1/3 of the entire body, longer than high (length : height = 1.6); a serrate lateral fold on each side, between back of the eye up to the middle of the branchial region, sparse hairs; pseudorostrum armed with a blunt serration; evident rounded notch; antero-lateral corner with a small tooth. Flattened spines on the edges of each pereonite; pereonites 1 and 2 with a pair of dorsal blunt spines. Pleonites with flattened spines on their edges (more developed on pleonites 1 - 3). Antenna 1 (Fig. 22 C), first article of peduncle longer than the other two combined; setules, simple setae (3 of them longer)on its outer margin; second article with a tubercle with plumose sensory setae on inner margin and 2 long simple setae on outer margin; accessory flagellum shorter than the first article of main flagellum, with long sensory setae. Flagellum of antenna 2 reaching end of last pleonite, with groups of simple setae on second and third article of peduncle. Mandible (Fig. 22 E), pars incisiva with 4 teeth, long lacinia mobilis with 4 unequal teeth (one of them longer), 5 spine-like simple setae between lacinia mobilis and pars molaris; truncated pars molaris with a smooth anterior margin. Maxilla 1 (Fig. 22 F), protopod with 10 simple spines; endite with 4 simple setae; palp longer than protopod and its unique glabrous filament. Maxilla 2 (Fig. 22 G), endites articulated at the same level, both of them exceeding the protopod; protopod with simple setae on its top and on outer bulky margin, a row of 5 shorter simple setae between basis of endite and outer margin of protopod. Maxilliped 1 (Fig. 22 H), basis with 4 simple setae on outer margin, a flattened tooth-like spine, 2 hook-like spines and 4 short simple setae on its endite; carpus, the longest article except basis, with 8 trifid flattened spines interspersed with a parallel row of simple setae on outer margin; propodus longer than large, with a long simple seta and a plumose longer one on its distal inner corner; rounded dactylus with 2 short apical setae, its anterior margin with volutes. Maxilliped 2 (Fig. 22 I), basis with a serrate inner margin and a long plumose seta in its distal outer corner; merus, the longest article except basis, with simple setae on its inner bulky margin; carpus with setules, simple setae and a plumose short seta on outer margin; propodus with 2 setulated spines in distal outer corner; dactylus shorter than its claw. Maxilliped 3 (Fig. 23 A), basis longer than half of maxilliped, setules and 2 short plumose

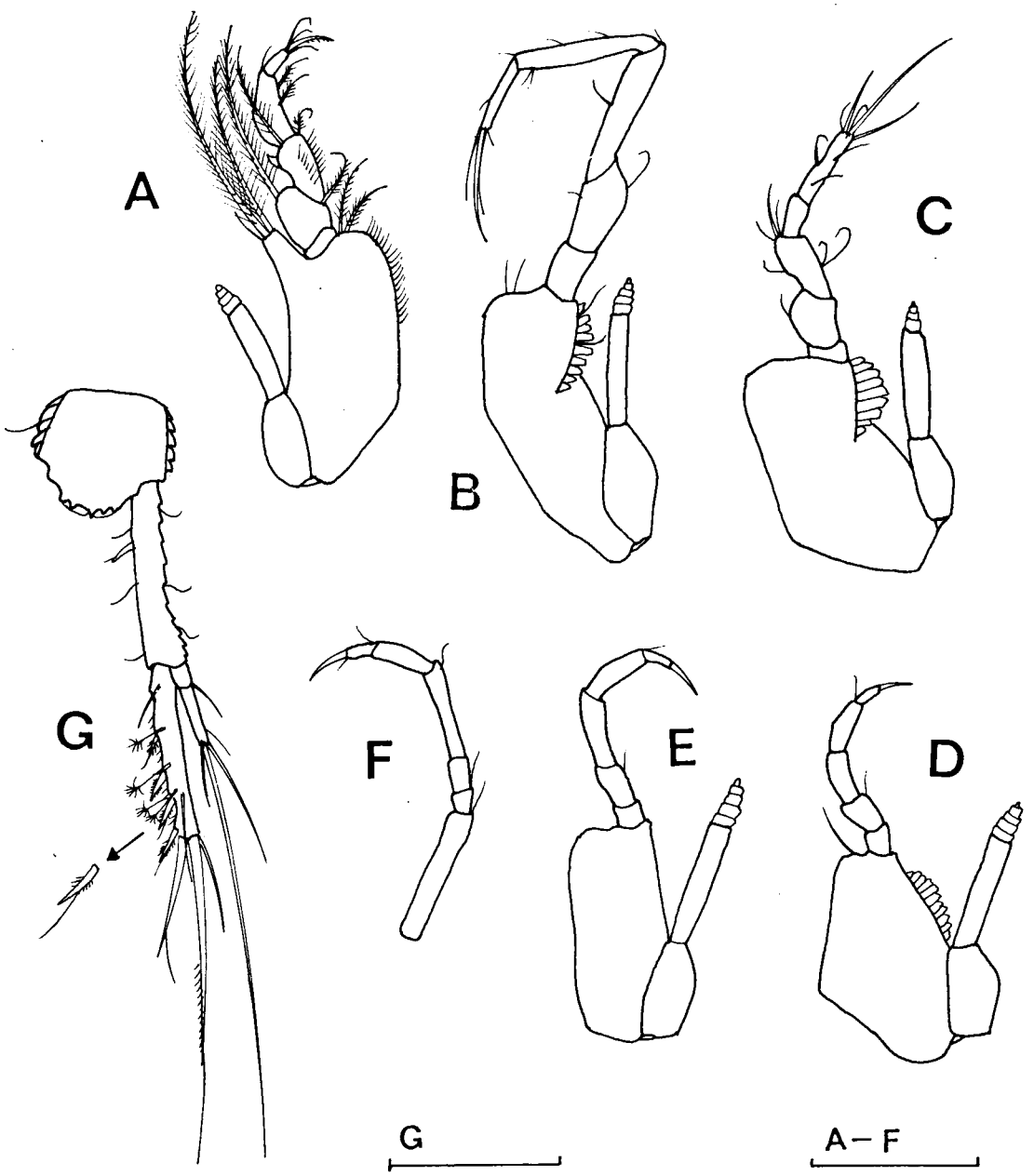

Fig. 23. *Scherocumella fagei* n.sp., male. A: maxilliped 3; B: pereopod 1; C: pereopod 2; D: pereopod 3; E; pereopod 4; F: pereopod 5; G: uropod. Scale bar (in mm): A - G: 0.15.

setae on the distal half of outer margin, its short process reaches half of the merus, with 2 long plumose setae; carpus as long as propodus, with a tooth on inner margin; dactylus shorter than its claw. Pereopod 1 (Fig.23 B), basis longer than 1/3 of pereopod with a short ridge of hyaline flattened spines on distal inner half; carpus shorter than propodus; dactylus shorter than its claw. Pereopod 2 (Fig. 23 C), basis a little shorter than 1/2 of pereopod, with a short hyaline ridge like in pereopod 1; carpus with 3 unequal simple setae on its outer distal corner (not exceeding extremity of propodus); dactylus 2 times longer than propodus, with 2 simple short setae on inner margin and one on outer margin as well as 5 simple terminal setae (2 shorter, curved ones, the median one, longer than dactylus). Pereopod 3 (Fig. 23 D) with basis longer than 1/2 the length of the pereopod, inner ridge hyaline; carpus as long as propodus. Pereopod 4 (Fig. 23 E), basis without hyaline ridge; carpus longer than propodus. Exopods of maxilliped 3 and pereopods 1 - 4 with small basis. Perepod 5 (Fig. 23 F), basis shorter than 1/2 of pereopod; carpus longer than propodus. Uropodal peduncle (Fig. 23 G) longer than last pleonite (1.45 : 1), 2 times longer than exopod and as long as endopod, serrate outer margin, a spine with sensory bristle on inner margin, 3 setules on each margin; exopod shorter than endopod (exopod : endopod = 0.47), with 2 setules on outer margin and 3 terminal unequal simple setae (the median one 4.7 times longer than exopod); endopod with short setules and 4 setulated spines with sensory bristles on inner margin, a plumose sensory seta near each spine, terminal simple seta and 2 setae with sensory bristles (one of them is setulated, longer than endopod, also with a long bristle).

Etymology: The species is dedicated to the memory of the French Cumacea specialist Louis Fage, who previously studied the fauna of South China Sea (1945).

Remarks: Scherocumella fagei n.sp. is closely related to *S. stephenseni* (Fage, 1945). There are a few differences: form of carapace, the disposition of its folds and the integument (*S. stephenseni* with a pair of strong granules on pereonites 4 and 5, with shorter flattened spines on edges of pereon and pleon). Uropodal peduncle of Fage's species is thicker, without a spine on inner serrate margin; exopod a little shorter than peduncle, with a shorter terminal seta; endopod longer than peduncle, with 7 setulated spines on the inner margin and with a shorter terminal simple spine. Fage's description and illustration contain only the body, pereopods 4 and 5 and the uropod of male.

This is the first description of mouth parts and maxillipeds 1 and 2 of this genus considered by Watling (1991) to be closely related to *Nannastacus* (in fact he placed some of the species of *Nannastacus* within this new genus). Antenna 1, maxillipeds 1 and 2 are similar in both genera. The only differences can be found in the mandible (lacinia mobilis with 4 teeth versus 3, pars molaris without tubercle of *Nannastacus*), maxilla 1 with one filament (versus 2) and maxilla 2 (disposition of endites).

Scherocumella malayensis n.sp. (Fig. 24)

Material: Holotype: male (stat. MAS-3) ZMA Cu- 202166.

Type locality: Pulau Babi Besar, about 15 km off Mersing, central part of reef flat, in and under dead corals, mainly covered with coralline algae, intertidal - 1 m, 1.4. 1991.

Description: Length: 1.15 mm. Glabrous integument with very scarce setae on whole body. Carapace (Fig. 24 A, B) a little bulky in the anterior half, with a pair of small tubercles at basis of eyelobe; represents 0.33 of the entire length of body; length : height = 1.6; straight pseudorostrum; rounded notch at right angle; antero-lateral corner slightly acute, without teeth or serration. Antenna 1 (Fig. 24 C) with a curved peduncle as long as the other two combined, with 2 long simple curved setae in distal outer corner; second article with a tubercle with a plumose sensory seta on inner margin; minute accessory flagellum with very short sensory setae. Flagellum of antenna 2 (Fig. 24 A) not exceeding the 4th pleonite. Maxilliped 3 (Fig. 24 D) with a basis longer than half of maxilliped, its process not exceeding the half of merus; carpus

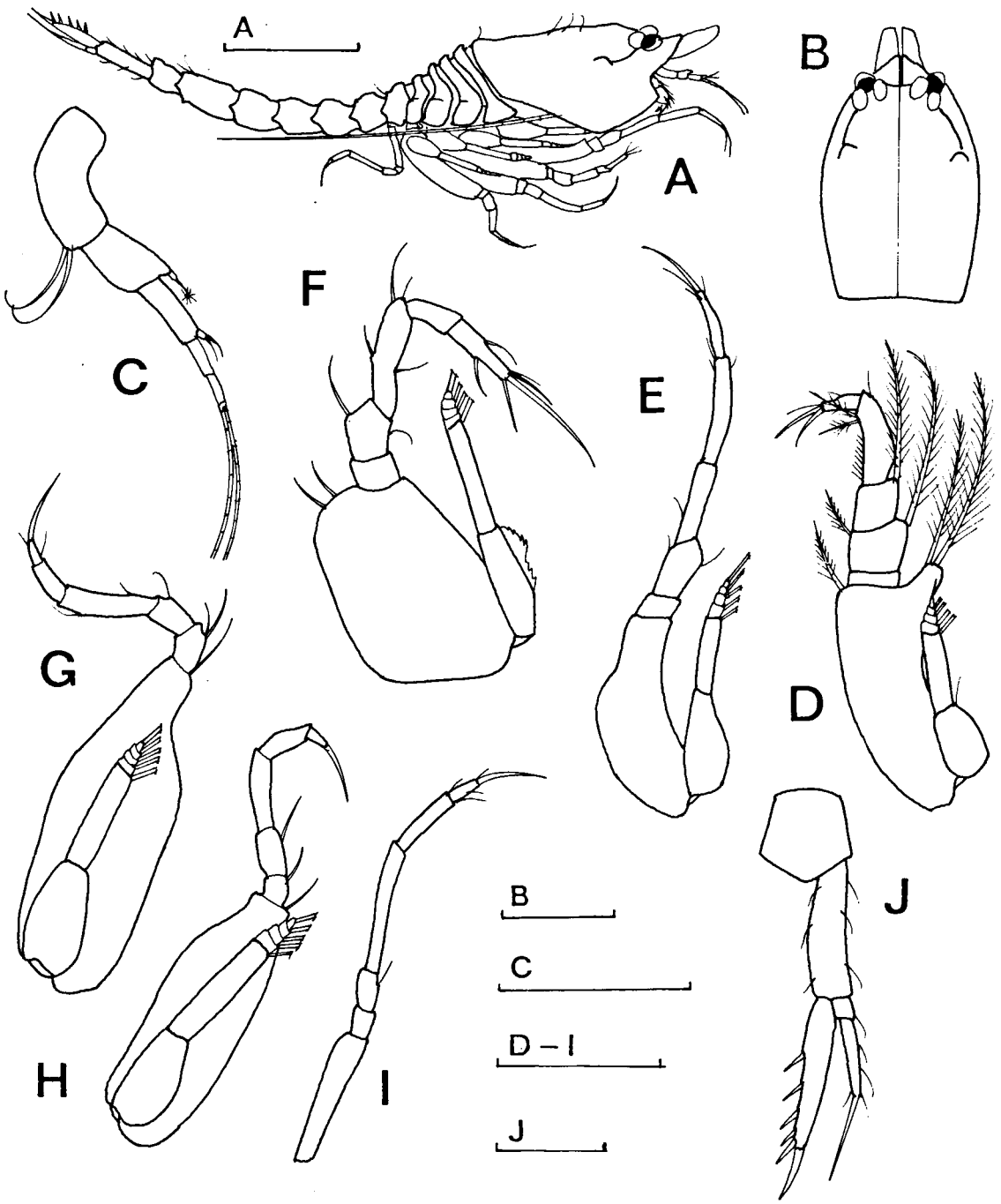

Fig. 24. *Scherocumela malayensis* n.sp., male. A: body, lateral view; B: carapace, dorsal view; C; antenna 1; D: maxilliped 3; E: pereopod 1; F: pereopod 2; G: pereopod 3; H: pereopod 4; I: pereopod 5; J: uropod. Scale bars (in mm): A: 0.3; B: 0.2; C-J: 0.1.

much shorter than propodus; dactylus shorter than its claw. Pereopod 1 (Fig. 24 E), basis longer than 1/3 of the entire pereopod; slender articles; carpus shorter than propodus and longer than dactylus; dactylus as long as its claw. Pereopod 2 (Fig. 24 F) with strong basis, longer than 1/3 of the entire pereopod, simple short setae on basis, merus, carpus (2 uneqal ones on the outer distal corner); dactylus 1.3 times longer than propodus, a short simple seta on each margin, 4 terminal simple setae (3 short, one longer than dactylus). Pereopods 3 and 4 (Fig. 24 G, H) with strong basis; carpus longer than propodus, more evidently in the 3rd pair; dactylus with a long, thin claw. Pereopod 5 (Fig. 24 I), basis more than 1/3 of the entire pereopod; carpus is evidently longer than propodus; dactylus shorter than its thin claw. Uropodal peduncle (Fig. 24 J) 1.5 times longer than last pleonite, with 3 short simple setae on each margin, longer than exopod (1.36 : 1), shorter than endopod (0.88 : 1); exopod : endopod = 0.64; exopod with 3 short simple setae on outer margin and 3 terminal simple setae (the longest shorter than exopod); endopod with 5 simple spines on inner margin and terminal short spine with a sensory bristle (spine : endopod = 0.35).

Etymology: The name refers to the type locality - East coast of Malaysia.

Remarks: Scherocumella malayensis n.sp. is especially related to the group of species with a short pseudorostrum and a shorter uropodal peduncle: *S. nichollsi* (Hale, 1949), *S. pilgrimi* (Jones, 1963), *S. sheardi* (Hale, 1945), *S. stephenseni* (Fage,1945) and *S. vieta* (Hale, 1949). Their carapace is more similar with *Cumella* than with *Nannastacus*. Only *S. sheardi* and *S. nichollsi* have a glabrous integument, without tubercles, spines on pereon and pleon. None of these species has tubercles at the basis of eyelobe like in this new species. Only *S. malayensis* n.sp. does not have uropodal peduncle with serrate margins or with spines.

Scherocumella nasuta (Zimmer, 1914)
(Fig. 25)

Material: 1 female, stat. MAS - 2; 10 females, 5 males, stat. MAS - 3; 4 females, stat. MAS- 6.

Description: I add to the previous descriptions (Zimmer, 1914; Hale, 1945) the following parts: antenna 1 (Fig. 25 A), all the articles of peduncle with serrate margins, first article longer than the other two, with 2 long curved simple setae on distal outer corner, second article shortest, with a tubercle with a long plumose sensory seta on inner margin, third article with 3 short plumose sensory setae on inner distal corner; accessory flagellum shorter than first article of main flagellum; mandible (Fig. 25 B), pars incisiva with 4 teeth (upper tooth smaller), lacinia mobilis with 4 unequal teeth (one longer), 5 spine-like setae between lacinia mobilis and pars molaris, pars molaris with 2 small tubercles on anterior margin only in the right mandible (Fig. 25 C); maxilla 1 (Fig. 25 D), protopod with 10 simple spines on its top and a plumose seta on inner margin, endite with 4 simple setae, palp longer than protopod and its unique glabrous filament; maxilla 2 (Fig. 25 E), as usual for the genus. Maxilliped 1 (Fig. 25 G), basis without setae on outer margin, endite with 2 flattened tooth- like spines, a short simple seta and 2 hook-like spines, carpus with 5 trifid and 2 bifid flattened spines on outer margin, rounded dactylus with a toothed margin. Maxilliped 2 (Fig. 25 G), basis with a long plumose seta, merus as long as carpus, with a plumose short seta on outer margin, propodus with 2 strong serrate spines on distal outer corner like in *Nannastacus*.

Remarks: Even based on the more complete descriptions of two species of this genus I could assume that other elements of morphology could be added to those used by Watling when he separated this genus (form of carapace, of pseudorostrum, uropodal peduncle longer than last pleonite like in *Cumella*): lacinia mobilis of mandible with 4 teeth (versus 3), maxilla 1 with only one filament (like in *Campylaspis*). Other characters are allmost common with *Nannastacus*: antenna 1, maxilla 2 and first two maxillipeds.

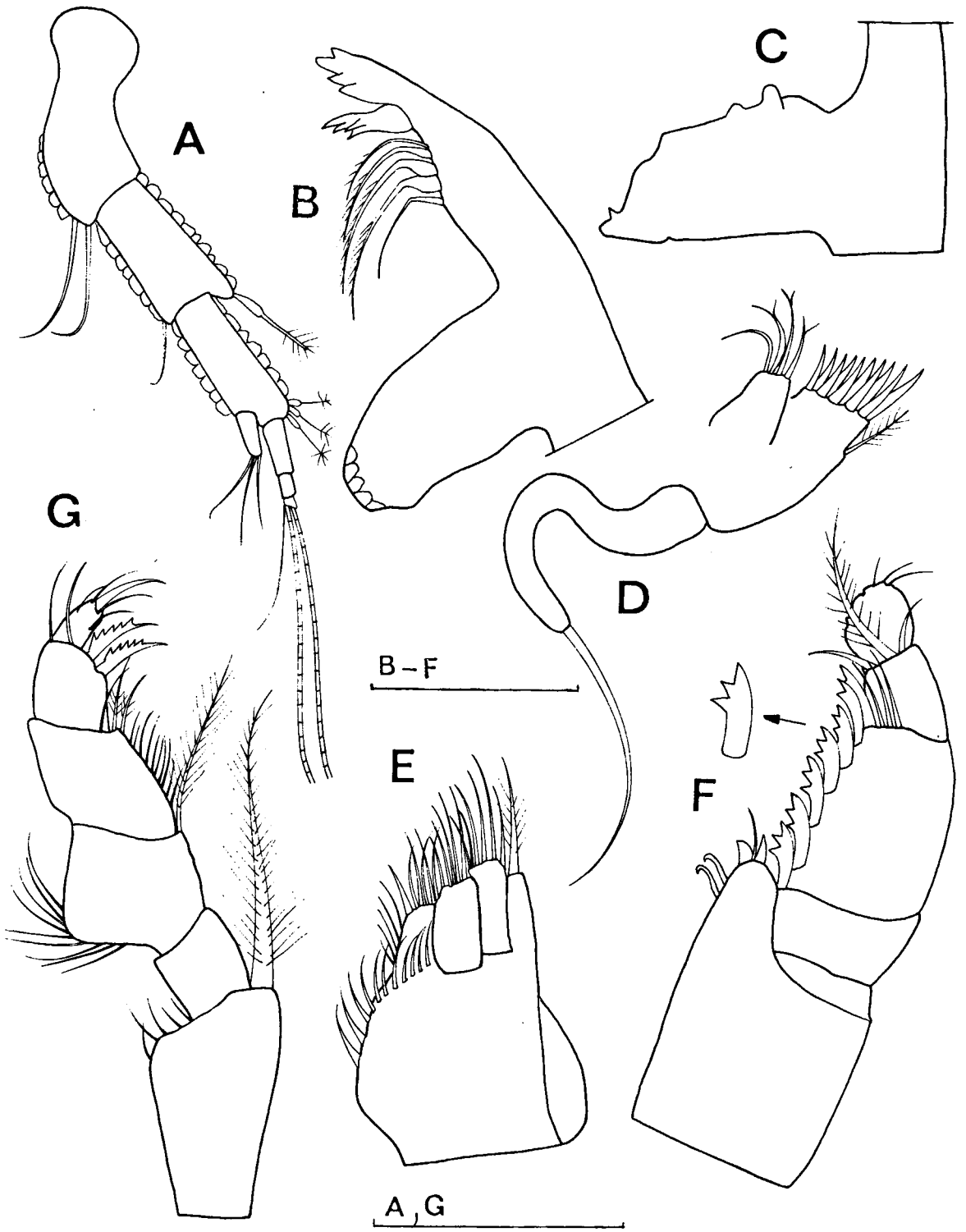

Fig. 25. *Scherocumella nasuta* (Zimmer, 1914), male. A; antenna 1; B: left mandible; C: right mandible, pars molaris ; D: max illa 1; E: maxilla 2; F: maxilliped 1; G: maxilliped 2. Scale bars (in mm): A, G: 0.1; B- F: 0.05.

KEY TO THE SPECIES OF *SCHEROCUMELLA* (MALES) FROM THE MALAYAN WATERS

1 - Carapace with long pseudorostrum ..... *nasuta* (Zimmer, 1914)
Carapace with short pseudorostrum 2
2 - Edges of pereon and pleon with flattened spines, uropods with very long terminal setae and spines ..... *fagei* n.sp.
Smooth edges of pereon and pleon ..... *malayensis* n.sp.

Schizotrema depressum Calman, 1911 (Figs 26, 27)

Material: 2 females, stat. MAS-3; 4 females, 2 immature males, stat. MAS-6.

Description: Calman's description and illustration contain only the body, pereopods 2 and 5. I add the missing parts. Antenna 1 (Fig. 26 C), first article of peduncle longer than the other two combined, with long simple setae on distal outer corner, second article with a tubercle with 3 short plumose sensory setae on inner margin and a long simple seta on distal outer corner, longer than third article; minute accessory flagellum with 3 short sensory setae. Mandible (Fig. 26 D), pars incisiva with 4 teeth, lacinia mobilis with 4 teeth (2 longer ones), 5 spine- like simple setae between lacinia mobilis and pars molaris (placed towards lacinia mobilis), truncated pars molaris without tubercles on anterior margin. Maxilla 1 (Fig. 26 E), protopod with a short simple seta on inner margin and 10 simple spines on its top; endite with 4 simple setae; palp longer than protopod with 2 unequal filaments. Maxilla 2 (Fig. 26 F) like in *Scherocumella*. Maxilliped 1 (Fig. 26 G) with 3 setulated and one hand-like spine on outer margin of basis, one flattened tooth- like spine, 3 short simple setae and 2 hook- like spines on its endite; 6 trifid flattened spines and one trifid like a fork on outer margin of carpus interspersed with 2 parallel rows of simple setae; propodus longer than large, with 2 simple setae and one longer plumose seta on its distal end; round dactylus with 2 short simple setae. Maxilliped 2 (Fig. 26 H), basis with a long plumose seta on outer margin; bulky merus not longer than carpus, with setules on inner margin; carpus with 4 short plumose setae on distal corner; propodus with 2 strong setulated spines; dactylus with a pointed setulated spine. Maxilliped 3 (Fig. 27 A) with basis shorter than 1/2 of maxilliped, its process reaching half of merus; carpus evidently shorter than propodus; dactylus as long as its claws. Pereopod 1 (Fig. 27 B), basis 1/3 of entire pereopod; carpus as long as propodus; dactylus shorter than its claw. Pereopod 3 (Fig. 27 D), basis longer than 1/3 of entire pereopod; carpus longer than propodus; short dactylar claw. Pereopod 4 (Fig. 27 E), basis 1/3 of entire pereopod, carpus a little longer than propodus. Body length: 1.11 mm.

Remarks: I also provide more detailed illustrations of the body and of the uropod which correspond to Calman's description (Figs 26 A , B, 27 G).

Schizotrema sakaii Gamo, 1964 (Fig. 28)

Material: 2 females, 1 immature male, stat. MAS-2; 12 females, 1 immature male, stat. MAS-6.

Description: I complete the original description (Gamo, 1964). Mandible (Fig. 28 A), pars incisiva and lacinia mobilis like in *S. depressum*, 5 setae between lacinia mobilis and pars molaris; pars molaris with tooth-like tubercle on anterior margin. Maxilla 1 (Fig. 28 B), protopod with 10 spines, strong endite with 4 simple setae, palp longer than protopod, with 2 unequal filaments. Maxilla 2 (Fig. 28 C) with 2 unequal endites and a smaller protopod than in *S. depressum*. Maxilliped 1 (Fig. 28 D), basis with 3 setulated spines on outer margin, its endite with tooth-like spine, short setae and 2 hook-like spines; 5 bifid flattened spines, one trifid spine longer and one fork-like long spine interspersed with 2 parallel rows of simple setae on outer margin of carpus; almost square propodus with setules on inner margin and long plumose seta on its inner distal corner; almost rectangular dactylus with a toothed frontal margin. Maxilliped 2 (Fig. 28 E), basis with long plumose seta; bulky merus shorter than carpus; propodus with 2 serrate strong spines; dactylus with simple claw.

Remarks: This genus seems to be more related to

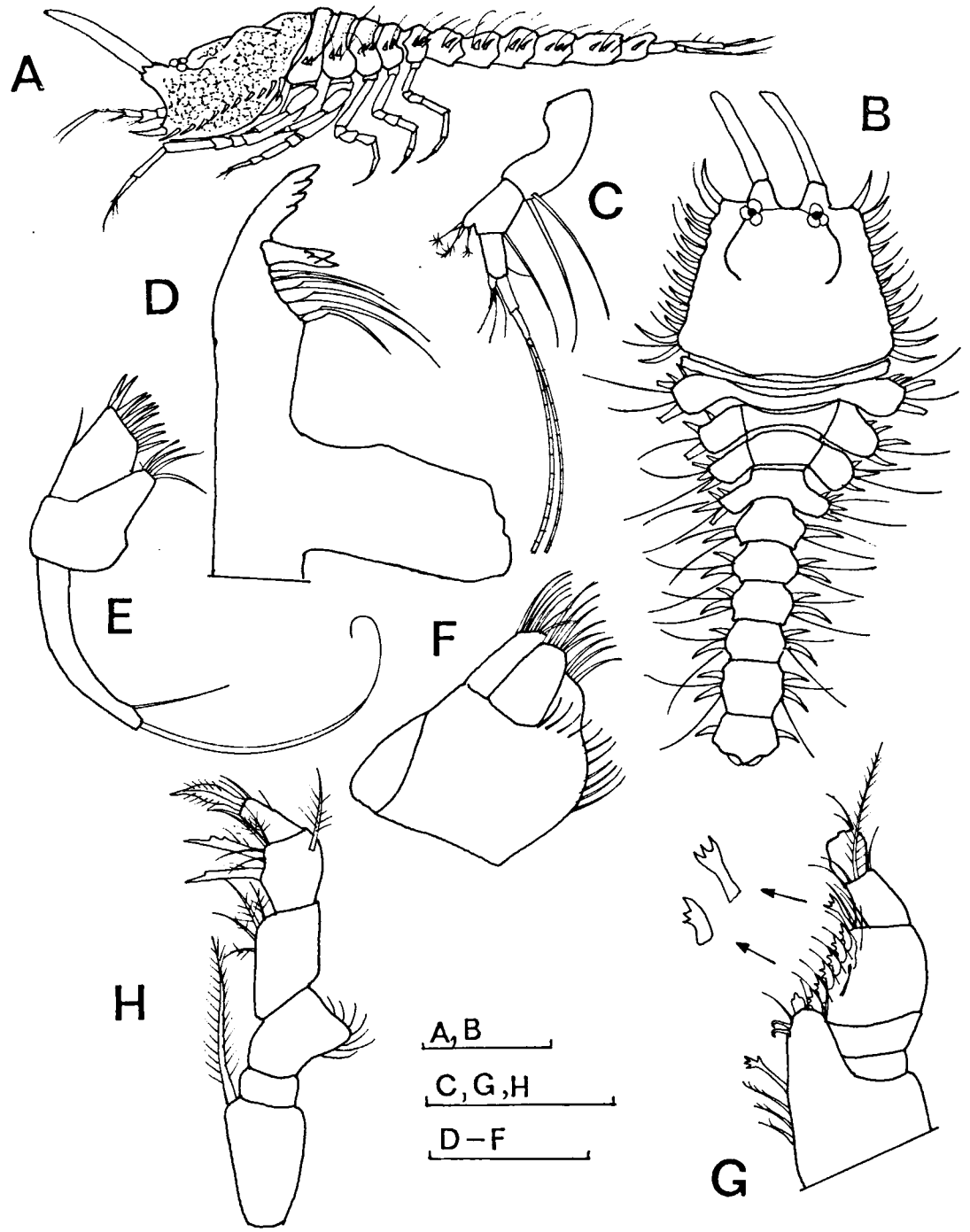

Fig. 26. *Schizotrema depressum* Calman, 1911. female. A: body, lateral view; B: body, dorsal view; C: antenna 1; D: mandible; E: maxilla 1; F: maxilla 2; G: maxilliped 1; H: maxilliped 2. Scale bars (in mm): A, B: 0.3; C, G, H: 0.1; D- F: 0.05.

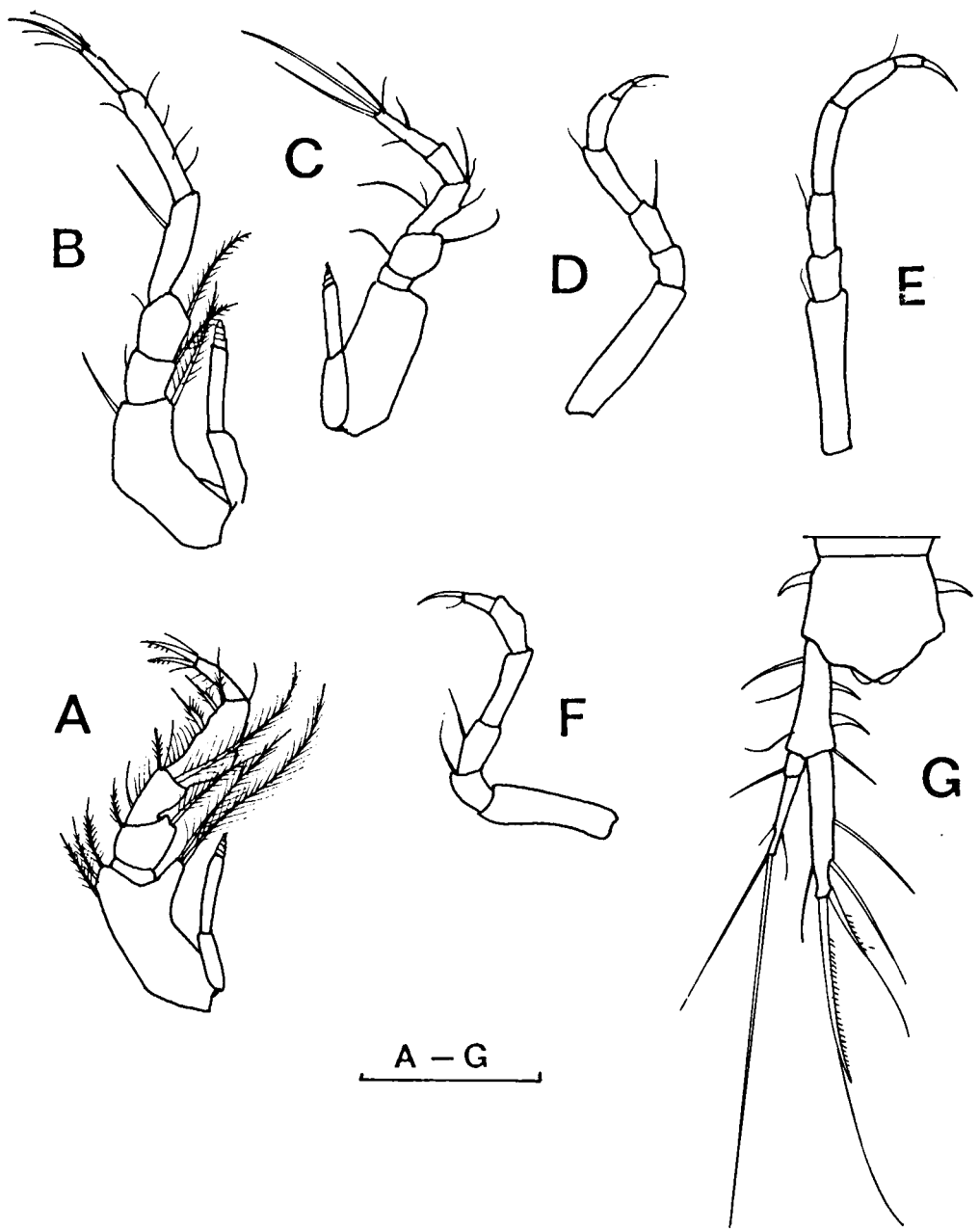

Fig. 27. *Schizotrema depressum* Calman, 1911, female. A: maxilliped 3; B: pereopod 1; C: pereopod 2; D: pereopod 3; E: pereopod 4; F: pereopod 5; G: uropod. Scale bar (in mm): A- G: 0.15.

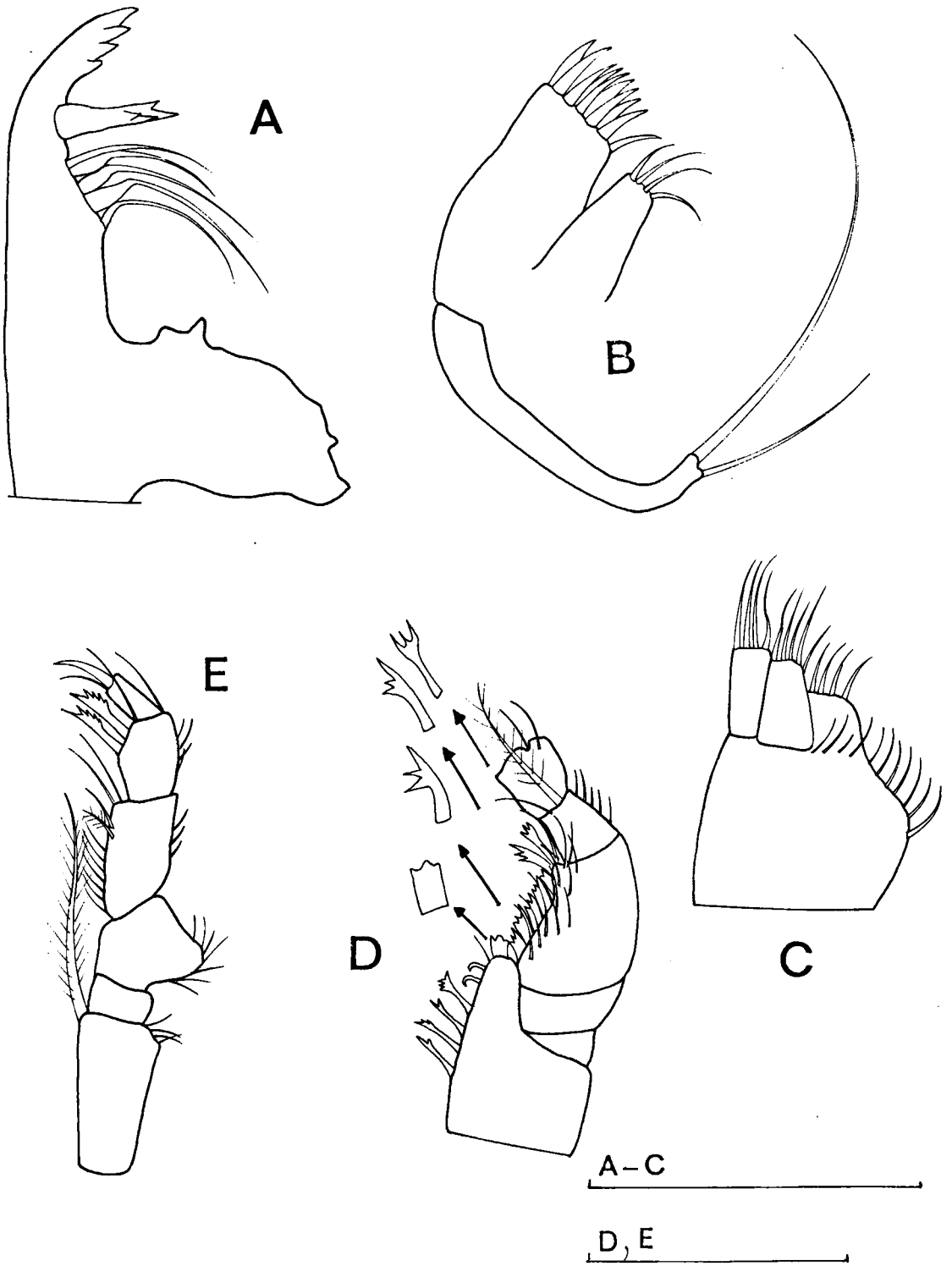

Fig. 28. *Schizotrema sakaii* Gamo, 1964, female. A; mandible; B: maxilla 1; C: maxilla 2; D: maxilliped 1; E: maxilliped 2. Scale bar (in mm): A- E: 0.1.

Nannastacus (and maybe with *Cumella*) than *Scherocumella* (which maxillula has one filament like *Campylaspis*, but the protopod of which does not have simple spines). The lacinia mobilis from *Schizotrema* and *Scherocumella* has 4 teeth. It seems that from the studied genera of Cumacea from Malaysia, *Nannastacus*, *Scherocumella* and *Schizotrema* have a common origin and are more related to *Cumella* than to *Campylaspis*. Further studies, more detailed descriptions of known species from these genera may certify my suppositions.

KEY TO THE SPECIES OF *SCHIZOTREMA* FROM THE MALAYAN WATERS

1 - Large spatulated spines on carapace and pereon ..... *sakaii* Gamo, 1964
Acute spines on carapace and pereon .... *depressum* Calman, 1911

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