

A revision of the genus *Arcania* Leach, 1817 (Crustacea: Decapoda: Leucosioidea)

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Galil, B.S. A revision of the genus *Arcania* Leach, 1817 (Crustacea: Decapoda: Leucosioidea). Zool. Med. Leiden 75 (11), 24.xii.2001: 169-206, figs 1-7— ISSN 0024-0672.

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Key words: Decapoda; Leucosioidea; *Arcania*; *Ixoides*; new species; Indo-Pacific.

A study of major collections led to a revision of the Indo-Pacific leucosioid genus *Arcania* Leach, 1817. *Ixoides cornutus* MacGilchrist, 1905 is recognized as belonging to the genus, and four new species are established: *A. echinata*, *A. foliolata*, *A. muricata* and *A. fungilifera*; in all, fifteen *Arcania* species are recognized. All species are described and illustrated, extended synonymies are given, and a key for their identification is provided.

Introduction

Leach (1817) established *Arcania* for *Cancer Erinaceus* Fabricius, 1787, and *Iphis* for *Cancer septemspinosus* Fabricius, 1787. Miers (1886), and subsequent authors, considered *Iphis* a junior synonym of *Arcania*. Paul'son (1875: 86) convinced that "the characterizations of the genera of the Leucosiadae are not satisfactory", held that *Arcania* "...in all probability is a heterogeneous genus" (1875: 87). Indeed, the unsettled leucosioid systematics allowed several species of some resemblance to be relegated to *Arcania*.

Arcania septemspinosa Bell, 1855 was considered oddly situated by Paul'son (1875). It was synonymized by Miers (1884) with *Arcania pulcherrima* Haswell, 1880. Serène & Lohavanijaya, (1973: 41) regarded *Ixa investigatoris* Chopra, 1933 as a synonym of *Arcania pulcherrima* Haswell, 1880, but maintained the species in *Ixa*, suggesting that "further observation could lead to the removal of the species into *Arcania*". Tan (1996) kept *pulcherrima* in *Ixa*.

Arcania gracilipes Bell, 1855 has been removed to another genus, distinguished from *Arcania* Leach, 1817 in having the basal antennular segment sealing the antennular fossa, the anterior margin of the efferent branchial channel medially fissured, the posterior margin of the carapace tridenticulate and segments 3-6 of the male abdomen fused and bearing a preapical tubercle (Galil, 2001).

Arcania orientalis Miers 1879 is also removed from *Arcania* as, according to Miers' description, the sixth abdominal segment of the male abdomen is fused with the preceding segments and bears a preapical tubercle.

A study of the extensive collections of the Nationaal Natuurhistorisch Museum, Leiden (NNM) (formerly Rijksmuseum van Natuurlijke Historie (RMNH)), Museum national d'Histoire naturelle, Paris (MNHN), National Museum of Natural History, Smithsonian Institution, Washington (USNM), The Natural History Museum, London (NHM), together with material made available by the Australian Museum, Sydney (AMS), National Taiwan Ocean University (NTOU), Queensland Museum, Brisbane (QM), South African Museum, Cape Town (SAM), Senckenberg Museum, Frankfurt (SMF), Western Australian Museum, Perth (WAM), Zoological Museum, Amsterdam

(ZMA), Zoological Museum, Copenhagen (ZMC), and the Zoological Museum, Moscow University (ZMMU), has enabled re-examination of many type specimens and much of the published material and led to a revision of the Indo-Pacific leucosoid genus *Arcania* Leach, 1817.

Ixoides cornutus MacGilchrist, 1905 is recognized as belonging to the genus, and four new species are established: *A. echinata*, *A. foliolata*, *A. muricata* and *A. fungilifera*; in all, sixteen *Arcania* species are recognized. All species are described and illustrated, extended synonymies are given, and a key for their identification is provided.

The abbreviation cl is used for carapace length along median line, excluding the intestinal spine.

Arcania Leach, 1817

Arcania Leach, 1817: 19; H. Milne Edwards, 1837: 133; Bell, 1855a: 366; Bell, 1855b: 309; Bell, 1855c: 20; A. Milne Edwards, 1874: 48; Miers, 1886: 299; Alcock, 1896: 262; Ihle, 1918: 262; Barnard, 1950: 375; Tyndale-Biscoe & George, 1962: 76; Tirmizi & Kazmi, 1988: 71.

Iphis Leach, 1817: 19; H. Milne Edwards, 1837: 138; Bell, 1855a: 367; Bell, 1855b: 311; Bell, 1855c: 22.

Ixoides MacGilchrist, 1905: 255.

Type species of *Arcania* - by monotypy, *Cancer Erinaceus* Fabricius, 1787 (Gender: feminine).

Type species of *Iphis* - by monotypy, *Cancer septemspinosa* Fabricius, 1787 (Gender: feminine).

Type species of *Ixoides* - by monotypy, *Ixoides cornutus* MacGilchrist, 1905 (Gender: masculine).

Diagnosis.— Carapace globose; rounded, pyriform or rhomboidal; regions indistinct. Dorsal surface of carapace granulate, spinulose, or tuberculate. Margins of carapace spinose, tuberculose, or denticulate, intestinal region bearing single spine or tubercle. Front prominent, bilobed, uptilted. Antennules obliquely folded. Antennae small, slender, basal segment lodged in orbital hiatus. Eyes small, outer orbital margin trifissured, inner margin cleft; infraorbital lobe spiniform, prominent, fused with bidentate anterior margin of efferent branchial channel.

Buccal frame narrowing anteriorly.

Third maxilliped exopod narrow, tapering distally, outer margin straight, inner margin slightly concave; endopod with subrectangular ischium, much longer than lacinate merus, in females endopod bearing vertical row of setae.

Chelipeds slender, elongate; fingers long, their interior margins finely ctenoid. Pereiopods slender, dactyli styliform.

Abdominal sulcus deep, nearly reaching buccal cavity. Male abdomen narrowly triangular, 3rd–5th segments fused; adult female abdomen greatly swollen, 4th–6th segments fused, telson lacinate.

First male pleopod slender, elongate, sinuous or straight; second pleopod short, curved, distally scoop-like.

Remarks.— Leach (1817) established *Arcania* for *Cancer Erinaceus* Fabricius, 1787 and *Iphis* for *Cancer septemspinus* Fabricius, 1787, describing the former as “Testa globosa spinosissima. Pedipalpi externi caule externo lineari apice interiore emarginato-truncato; interiore gradatim acuminato” and the latter as “Testa rotundato-rhomboidalis. Pedipalpi externi caule exteriori sublineari apicem versus sensim angustiore” (Leach, 1817: 19). Bell (1855b: 311) maintained that *Arcania* “is closely

allied to *Iphis*, from which it differs in the more globular form of the body, in the number and character of the spines with which it is armed, and in the form of the external foot-jaws". Miers (1880: 317) thought otherwise: "...the characters distinguishing the genera *Iphis* and *Arcania* are scarcely of generic value", and later (1886: 300): "The genus *Iphis*, which is retained as distinct from *Arcania*, both by Milne Edwards and Bell, differs merely in its slightly more rhomboidal carapace, and must, I think, be united with that genus". Miers treated both names as synonyms and chose *Arcania*, putting *Iphis* in its synonymy.

MacGilchrist (1905: 255) in describing *Ixoides cornutus* wrote "This genus agrees with *Arcania* and *Ixa*.... It is more closely allied to *Ixa*". At a glance, the robust lateral spine, obtuse intestinal spine and short cheliped fingers of that species are characteristic of *Ixa*. However, *Ixa* differs from *Ixoides Arcania* and in having a distinctly flattened carapace; prominent protuberances laterally on the sternal plate; a quadrate buccal frame; anterior margin of the efferent branchial channel with two broad lobes separated by a narrow notch and separated by a deep groove from the lower orbital margin. Whereas MacGilchrist (1905: 256) described *I. cornutus* as having a carapace "rhomboidal, not much broader than long"; and it lacks sternal protuberances, its buccal frame narrows anteriorly, and its anterior margin of the efferent branchial channel is fused with the lower orbital margin, it is recognized herein as belonging to *Arcania*.

Key to species of the genus *Arcania* Leach

- 1. Carapace rhomboidal; lateral spines stout, far longer than other marginal spines 2
- Carapace rounded, ovate or pyriform; lateral spines not longest marginal spines 5
- 2. Posterolateral margin of carapace medially set with upcurved spine 3
- Posterolateral margin of carapace medially lacking upcurved spine 4
- 3. Dorsal surface of carapace uniformly granulate; cheliped merus shorter than carapace *A. heptacantha*
- Dorsal surface of carapace with granulate ridge running to intestinal spine; cheliped merus longer than carapace *A. septemspinosa*
- 4. Infraorbital lobe incurved, reaching frontal eaves; cheliped fingers twice as long as palm, intestinal spine acuminate, posterior spines dorso-ventrally flattened
..... *A. gracilis*
- Infraorbital lobe not reaching frontal eaves; cheliped fingers half as long as palm, intestinal spine stump-like, posterior spines papillate *A. cornuta*
- 5. Carapace prominently spinose 6
- Carapace granulose or tuberculose 8
- 6. Cheliped bearing perliform granules; frontal margin a shallow arch *A. globata*
- Cheliped prominently spinose; frontal margin v-shaped 7
- 7. Lateral, posterolateral, posterior and intestinal spines secondarily spinose; first male pleopod straight, distally slender *A. erinacea*
- Lateral, posterolateral, posterior and intestinal spines smooth or minutely granulose; first male pleopod sigmoid, distally cone-like *A. echinata* spec. nov.
- 8. Carapace pyriform; cheliped carpus bearing knob on external margin 9
- Carapace rounded; cheliped carpus lacking knob on external margin 11

9. Posterolateral marginal spines of carapace prominent, posterior margin of carapace bispinose; cheliped merus two thirds as long as carapace *A. tuberculata*
 - Posterolateral marginal spines of carapace short, posterior margin of carapace bituberculate; cheliped merus less than half as long as carapace 10
10. Carapace bearing dorsally 14 granulate tubercles; exopod and endopod of third maxilliped uniformly granulose *A. sagamiensis*
 - Carapace bearing dorsally 16 fungiferous tubercles; exopod and endopod of third maxilliped with longitudinal row of contiguous fungiform granules.
 *A. fungilifera* spec. nov.
11. Marginal anterolateral spine distinct 12
 - Marginal anterolateral spine a granulate tubercle 13
12. Lateral margins of sixth abdominal segment convex; first male pleopod distally bent inwards *A. brevifrons*
 - Lateral margins of sixth abdominal segment straight; first male pleopod distally sigmoid *A. muricata* spec. nov.
 - Lateral margins of sixth abdominal segment straight; first male pleopod nearly straight *A. undecimspinosa*
13. Marginal subhepatic spine tuberculiform; posterolateral, intestinal spines short; first male pleopod distally curved distad *A. elongata*
 - Marginal subhepatic spine well defined; posterolateral, intestinal spines elongate; first male pleopod slightly sinuous, distally attenuate *A. novemspinosa*
 - Marginal subhepatic spine well defined; posterolateral, intestinal spines elongate; posterior spines foliolate, first male pleopod distally curved distad
 *A. foliolata* spec. nov.

Arcania brevifrons Chen, 1989

(fig. 1A, 4A)

Arcania undecimspinosa; Miers, 1884: 548; Devi et al., 1988: 25, fig. 8. [not *A. undecimspinosa* de Haan, 1841]

Arcania brevifrons Chen, 1989: 204, fig. 31f, 32 e-f, pl. 5 fig. 6; Zarenkov, 1994: 111.

Material.— **Fiji**: 2 ♀ ovigerous (25.1, 20.7 mm cl), 1 ♀ (28.8 mm cl), 2 juveniles, MNHN B27434, 17°16.1'S, 177°45.7'E, 143-173 m depth, MUSORSTOM 10, stn CP 1323, 7.viii.1998; 1 juvenile, MNHN Na 27436, 17°45.1'S, 177°13.7'E, 37 m depth, SUVA 2, stn CP 66, 21.x.1998; 1 ♀ (26.4 mm cl), MNHN B27435, 17°11'S, 178°46'E, 160-177 m, BORDAU 1, stn CP 1437, 2. iii.1999. **Philippines**: 1 ♂ (20 mm cl), MNHN B18079, 11°44.6'N 122°45.35'E, 44-40 m depth, MUSORSTOM 3, stn 141, 6.vi.1985; 1 ♂ juvenile (10 mm cl), 1 ♀ juvenile (11 mm cl) MNHN B18080. **Indonesia**: 9 juveniles, MNHN B17140, 01°07.8'S 117°18.7'E, 49 m depth, CORINDON stn CH 205, 30.x.1980; 1 ♀ juvenile, MNHN B17141, 01°06'S 117°45'E, 85 m depth, CORINDON stn CH 206, 30.x.1980; 1 ♂ (9.9 mm cl), MNHN B17142, 01°27'S 117°02'E, 51-54 m depth, CORINDON stn CH 295; 1 ♂ (21.8 mm cl), ZMA, Sumatra, Kotaradja, Uleeheue roads, 20-29 m depth, "Gier" Expedition 9, 11.vi.1908. **Seychelles**: 1 ♀ broken, NHM 1882.24, 7-22 m depth, "Alert", coll. Dr R.W. Coppinger, det. E.J. Miers as *A. undecimspinosa*; 1 ♀ (14.4 mm cl), MNHN B18994, 5°04.4'S 56°23.8'E, 33 m depth, REVES II stn 5, 4.ix.1980; 2 ♂ (16.3, 15.6 mm cl), MNHN B18982, 4°48.1'S 54°49.5'E, 50 m depth, REVES II stn 28, 9.ix.1980; 1 ♂ (16.0 mm cl), MNHN B18977, 4°03.8'S 55°59.5'E, 45-55 m depth, REVES II stn 47, 14.ix.1980; 1 ♂ (8.6 mm cl), MNHN B18987, 3°52.4'S 56°01.5'E, 55 m depth, REVES II stn 48, 15.ix.1980; 1 ♂ (16.5 mm cl), MNHN B18980, 3°53.2'S 55°09.1'E, 50 m depth, REVES II stn 54, 17.ix.1980; 1 ♀ ovigerous (19.1 mm cl),

MNHN B18972, 4°49.1'S 55°26.1'E, 58 m depth, REVES II stn 65, 20.ix.1980. **Madagascar:** 1 ♂ (17.8 mm cl), MNHN B18716, Mitsio Is., 26 m depth, vi.1959, coll. A. Crosnier; 1 juvenile, MNHN B18719, 46 m depth, "ORSTOM 1", 28.vii.1958, coll. A. Crosnier; 1 ♀ (18.6 mm cl), MNHN B18739, NW coast. SE Nosy Be, 0-1.8 m depth, ix-x.1960, ex. Acad. Nat. Sci. Philadelphia; 1 ♀ (22.0 mm cl), MNHN B18736, Nosy Iranja, "Vauban", 18.xi.1969, coll. A. Crosnier; 2 ♀ (11.7, 28.4 mm cl), MNHN B18472, 12°49.5'S 48°30'E, 55 m depth, 2.viii.1973, coll. A. Crosnier; 1 ♂ (18.1 mm cl), MNHN B18712, 13°13.6'S 48°25.2'E, 32 m depth, 2.viii.1973, coll. A. Crosnier; 1 ♂ (17.4 mm cl), 1 ♀ broken, MNHN B18470, 25°11.2'S 47°14.7'E, 85-90 m depth, stn 72, 3.iii.1973, coll. A. Crosnier; 1 ♂ (18.8 mm cl), MNHN B18754, 25°02.7'S 47°05.8'E, 65-70 m depth, stn 80, 4.iii.1973, coll. A. Crosnier; 1 ♀ (18.4 mm cl), MNHN B18725, West Coast. 17°13'S 43°21'E, 52 m depth, "FAO 60", stn 73/109, 26.ix.1973; 4 juveniles, MNHN B18724, Banc de Pracel, 55 m depth, "ORSTOM 1", vi.1959, coll. A. Crosnier. **Red Sea:** 1 ♂ (24.6 mm cl), RMNH D 48574, Gulf of Suez, 29°05'N 32°58'E, 58.5-60 m depth, 11.xi.1972, coll. Ch. Lewinsohn; 1 ♀ (19.6 mm cl), RMNH D 48575, Gulf of Aqaba, Elat, 40-45.7 m depth, 6.ix.1966.

Description.— Carapace globose, longitudinally ovate in male, nearly rounded in adult female, covered with even-sized spinules, regions indistinct. Frontal lobes triangular, squat, minutely granulate. Margins of carapace bearing eleven spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region. Anterolateral spine shortest; midlateral, posterolateral, intestinal spines upcurved, granulate; posterior spines somewhat dorso-ventrally flattened, granulate. Intestinal region somewhat inflated, demarked by shallow grooves.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe spinose. Thoracic sternites smooth or minutely granulate.

Cheliped merus in adult male longer than carapace, thickly set with conical granules, bearing tubercle proximally on posterior margin. Carpus minutely granulate on outer surface. Propodus dorso-ventrally flattened, thicker basally, fingers slender, more than half as long as chela. Pereiopodal meri granulate, prominently so on fifth pereopod; carpi, propodi minutely granulate on upper margin only; dactyls anteriorly setose.

In male, abdominal segments smooth or minutely granulate, basiolateral regions of fused segments inflated, lateral margins of sixth abdominal segment convex. Male first pleopod long, distally bent inwards at right angle, tip flattened.

Colour.— Carapace pink patterned with red irregular loops; cheliped merus red-orange, pereopods pale with merocarpal joint orange.

Remarks.— Chen (1989: 206) described *A. brevifrons* as "closely related to *Arcania undecimspinosa* de Haan", and differentiated them by the relative length of frontal teeth, cheliped palm, last two segments of male abdomen, and the shape of the first male pleopod. However, the first three characters vary intraspecifically. *A. brevifrons* is distinguished from *A. undecimspinosa* by the convex margins of the sixth abdominal segment, in addition to the shape of the first male pleopod.

Distribution.— Fiji, Philippines, Indonesia, Seychelles, Madagascar, Mozambique Channel; Red Sea; intertidal to 92 m depth.

Arcania cornuta (MacGilchrist, 1905) comb. nov.
(fig. 1B; 4B)

Ixoides cornutus MacGilchrist, 1905: 255; Alcock & MacGilchrist, 1905: pl. 73, fig. 2; Ihle, 1918: 314; André, 1931: 644; Gordon, 1931: 530, text-fig. 7; Chopra, 1934: 81; Sakai, 1937: 137, pl. 19, fig. 1-4;

Shen, 1940: 215; Stephensen, 1945: 74; lin, 1949: 14; Shen & Dai, 1964: 19, fig.; Sakai, 1965: 44, pl. 18, fig. 3; Takeda & Miyake, 1970: 227; Serène & Lohavanijaya, 1973: 39, pl. 5d; Sakai, 1976: 102, pl. 31, fig. 2, text-fig. 56a-b; Serène & Vadon, 1981: 120; Miyake, 1983: 65, pl. 22(1); Chen, 1989: 227, pl. 1(11), pl. 4(4), fig. 21a-c, Dai & Yang, 1991: 81, pl. 9(2), fig. 37A (2); Takeda, 1982b: 99, fig. 290; Huang, 1994: 579; Tan, 1996: 1033, fig. 3j-l, 4a,b; Ng et al., 2001: 9

Arcania spinixa Zarenkov, 1994: 111, pl. 10; not *Arcania spinixa* Zarenkov, 1994: fig. 8 γ.

Additional material. **Fiji Is:** 2 juveniles, MNHN Na 27439, MUSORSTOM 10, stn CP 1320, 17°16.8'S 177°53.6'E, 290-300 m depth, 6.viii.1998; 2 ♂ (31.1, 21.4 mm cl), 8 juveniles, MNHN Na 27437, MUSORSTOM 10, stn CP 1323, Bligh Water, 17°16.1'S 177°45.7'E, 143-173 m depth, 7.viii.1998; 2 ♀ (38.7, 28.4 mm cl), 3 juveniles, MNHN Na 27527, MUSORSTOM 10, stn CP 1328, Bligh Water, 17°16.8'S 177°50.4'E, 248-277 m depth, 7.viii.1998; 1 ♂ (30.0 mm cl), 1 ♀ (29.2 mm cl), MNHN Na 27440, BORDAU 1, stn CP 1402, 16°38'S 179°36'E, 260-279 m depth, 25.ii.1999; 1 ♂ (32.7 mm cl), 1 juvenile, MNHN Na 27438, BORDAU 1, stn CP 1403, 16°40'S 179°36'E, 220-224 m depth, 25.ii.1999. **Vanuatu:** 2 juveniles, MNHN, MUSORSTOM 8, stn CP 1118, 15°08.73'S, 166°53.37'E, 191-248 m, 9.x.1994. **Philippines:** 1 juvenile, MNHN B18138, MUSORSTOM, stn 71, 14°09.3'N, 120°26.7'E, 174-204 m depth, 28.iii.1976; 1 carapace, MNHN B18855, MUSORSTOM, stn 72, 14°11.8'N, 120°28.7'E, 127-122 m depth, 28.iii.1976; 2 juveniles, MNHN B18137, same data. **Vietnam:** 1 ♂ (26.3 mm cl), MNHN B17540, Varella, 145 m depth, 30.ix.1925, coll. A. Krempf; 1 juvenile, MNHN B9846, 12.x.1971; 1 ♀ ovigerous (31.2 mm cl), MNHN B9845, 12.x.1971. **Madagascar:** 1 ♂ (33.6 mm cl), MNHN B18599, 15°21'S, 46°06'E, 180-200 m depth; 1 juvenile, MNHN B18600, 15°20'S, 46°11.5'E, 170-175 m depth, 19.i.1975. **Mozambique Channel:** 1 ♂ (29.1 mm cl), ZMMU Ma5242, "Vitiáz" stn 2634, 86-92 m depth, 25.xi.1988; Holotype of *Arcania spinixa* Zarenkov, 1994. Data as above: 1 ♂ (25.5 mm cl), ZMMU Ma5242; paratype of *Arcania spinixa* Zarenkov, 1994.

Description.— Carapace rhomboidal, very minutely granulate, granules somewhat larger on gastric region. Frontal lobes triangular, anteriorly granulate. Hepatic margin of carapace mammiform, medially tuberculate, forming right angle with inflated epibranchial margin. Lateral spine long, robust, basally ringed with perliiform granules, acute or rounded. Posterolateral margin oblique. Intestinal region swollen, laterally defined by deep grooves; intestinal spine a short stump. Posterior spines papillate, basally ringed with perliiform granules.

Teeth on anterior margin of efferent branchial channel obtuse, outer denticle larger, infraorbital lobe stocky, granulate. Third maxilliped exopod not reaching anteriorly as far as endopod; endopod merus basally swollen.

Chelipeds slender, long; in adult male merus longer than carapace, minutely granulate, bearing tubercle proximally on posterior margin. Cheliped carpus, propodus smooth; propodus dorso-ventrally flattened, thicker basally, fingers filiform, half as long as upper margin of palm.

Pereiopods filiform, subcylindrical, smooth, dactyls closely setose anteriorly.

In male, lateral margins of sixth abdominal segment straight, perpendicular; basio-lateral regions of fused segment indistinctly inflated. Male first pleopod slightly sinuous.

Colour.— Carapace and cheliped merus yolk-yellow; cheliped fingers, pereiopods tinged pale violet.

Remarks.— *A. cornuta* is readily distinguished from its closest cogener, *A. gracilis*, in having short, stump-like intestinal spine; papillate posterior spines; infraorbital lobe not reaching frontal eaves; apex of third maxilliped exopod not reaching as far forward as endopod merus; and much shorter cheliped fingers.

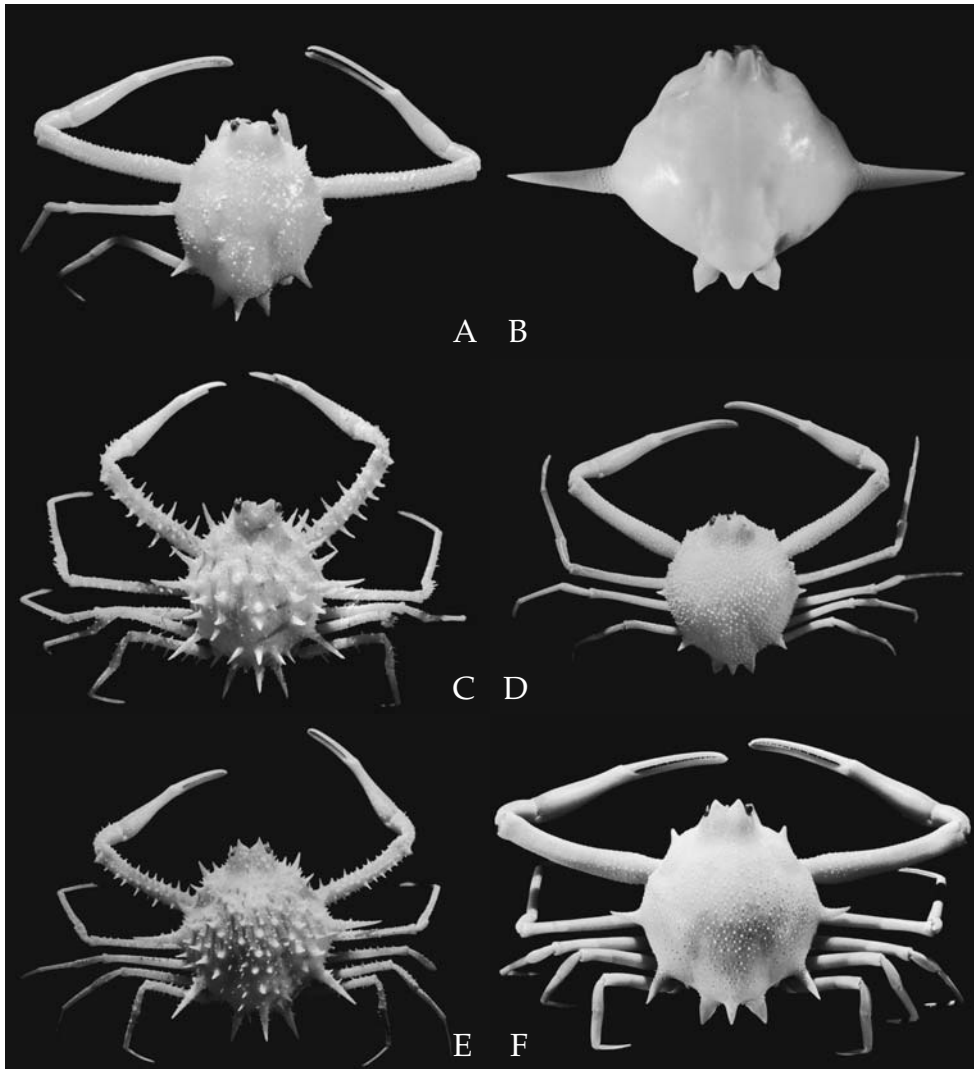


Fig. 1. A, *Arcania brevifrons* Chen, 1989, 1 ♂, 16.3 mm (MNHN B18982); B, *Arcania cornuta* (MacGilchrist, 1905) comb. nov., 1 ♂, 29.1 mm (ZMMU Ma5242); C, *Arcania echinata* spec. nov., 1 ♂, 13.8 mm cl (WAM c24381), Holotype; D, *Arcania elongata* Yokoya, 1933, 1 ♂, 19 mm cl, (MNHN B27450); E, *Arcania erinacea* (Fabricius, 1787), 1 ♀ ovigerous, 14.9 mm cl, (USNM 273764); F, *Arcania foliolata* spec. nov., 1 ♂, 22.0 mm (AMS p5963).

MacGilchrist (1905: 255) and Alcock & MacGilchrist (1905: pl. 73, fig. 2, 2b) were mistaken in describing and depicting “The fingers are two thirds the length of the palm”; in the adult, male and female, they are half as long as the upper margin of the palm.

Examination of Zarenkov’s specimens revealed that their first pleopod differ from those figured (Zarenkov, 1994, fig. 8 ♂), and resemble fig. 8 ♀; the figures might have been erroneously transposed.

Distribution.— Fiji Is., New Caledonia, Japan, China, Philippines, Vietnam, Persian Gulf, Madagascar, Mozambique Channel, 86-300 m depth.

Arcania echinata spec. nov.
(fig. 1C; 4C)

Arcania erinacea; Romimohtarto, 1967: 11, pl. 2, fig. c. [not *A. erinacea* (Fabricius, 1787)].

Holotype.— **Australia**: 1 ♂ (13.8 mm cl), WAM c24381, Abbot Pt., 200 km S Townsville, vi.1984, coll. J. Ottaway. Paratypes. **Australia**: 1 ♂ (10.8 mm cl), QM w17401, Queensland, Gulf of Carpentaria, 12°30.4'S 140°42.1'E, 60 m depth, 4.xii.1991. **Singapore**: 1 ♀ ovigerous, (17.4 mm cl), NHM, 82 m depth, 27.vi.1956; 1 ♀ (12.6 mm cl), USNM, 902, coll. E. Deschamps. **Eastern Seas**: 1 ♀ (17.1 mm cl), NHM 1847.21, "Samarang", coll. A. Adams [preserved dry].

Description.— Carapace globose, prominently spinose, spines as long as subhepatic marginal spine. Frontal lobes triangular, closely set anteriorly with flat-topped granules, anterior margin ogival. Margins of carapace bearing eleven granulate spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region. Subhepatic, anterolateral spines subequal, shorter than lateral, posterolateral, posterior, intestinal spines. Posterior margin spinulose. Hepatic, intestinal regions faintly demarcated by shallow grooves.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe spinose. Thoracic sternites granulose, anterior sternite with conical granules.

Cheliped merus four fifths as long as carapace; dorsally spinulose, ventrally granulose anterior and posterior margins prominently pectinate. Carpus with three rows of spinules on outer surface. Propodus somewhat inflated basally, fingers slender, half as long as palm. Pereiopodal meri prominently spinose on upper, lower margins. Upper margin of carpi, propodi spinulate. Dactyls setose.

Male abdomen granulose, lateral margins of sixth segment somewhat convex, basio-lateral regions of fused segment indistinctly inflated. Male first pleopod long, sigmoid, distally thickened, cone-like.

Remarks.— *A. echinata* differs from the closely allied *A. erinacea* in having long dorsal spines on the carapace; lateral, posterolateral, posterior and intestinal spines smooth or minutely granulose rather than secondarily spinose; and the first male pleopod sigmoid rather than straight.

Distribution.— Known from the type series, Australia and Singapore, and an older specimen from the "Eastern Seas"; 60-82 m depth.

Etymology.— From *echinus* L., hedgehog, for the rounded, spinose carapace.

Arcania elongata Yokoya, 1933
(fig. 1D; 4D)

Arcania undecimspinosa var. *elongata* Yokoya, 1933: 133, fig. 47; Sakai, 1937: 124, fig. 15b, 16; Sakai, 1965: 40, fig. 6b, pl. 16, fig. 2; Sakai, 1976: 91, pl. 28, fig. 2; Serène, 1968: 45; Miyake, 1983: 65, pl. 22, fig. 2. *Arcania elongata*; Campbell, 1971: 41; Dai & Yang, 1991: 74, pl. 8, fig. 2, fig. 34.1; Huang, 1994: 579; Tan, 1996: 1024, fig. 2k-o; Ng et al., 2001: 9. not *Arcania elongata*; Tan, 1996, fig. 1b [= *A. novemspinosa* (Lichtenstein, 1816)].

Material.— **New Caledonia**: 1 ♀ (13.0 mm cl), MNHN B18423, 30 m depth, 19.iv.1984, coll. B. Richer de Forges; 1 ♀ ovigerous (24.5 mm cl), MNHN B21346, 24 m depth, 26.viii.1984, coll. B. Richer de Forges; 1 ♂ (18.1 mm cl), MNHN B21276, 21°58.3'S 166°01.0'E, 7 m depth, stn 1, 6.xi.1984, coll. B. Richer de Forges; 1 ♂ (19.6 mm cl), MNHN B18428, 19°49.4'S 163°46.3'E, 36 m depth, stn 7, 14.vi.1985, coll. B. Richer de Forges; 1 ♀ (22.0 mm cl), MNHN B 21203, 19°40.2'S 163°47.2'E, 42 m depth, stn 13, 15.vi.1985, coll. B. Richer de Forges; 1 ♂ (24.0 mm cl), MNHN B21200, 19°34.0'S 163°37.7'E, 43–49 m depth, stn 42, 22.vi.1985, coll. B. Richer de Forges; 1 ♀ ovigerous (21.4 mm cl) MNHN B18430, 22°14.2'S 166°19.7'E, 21 m, stn 44, v.1984, coll. B. Richer de Forges; 1 ♂ (21.6 mm cl), MNHN B21202, 19°46.5'S 163°47.4'E, 38 m depth, stn 44, 23.vi.1985, coll. B. Richer de Forges; 1 ♂ (11.1 mm cl), MNHN B27441, 22°30'S, 166°28'E, 33 m depth, stn 80, viii.1984, coll. B. Richer de Forges; 1 ♀ (10.9 mm cl), MNHN B27442, 22°28.6'S 166°32'E, 21 m depth, stn 85, viii.1984, coll. B. Richer de Forges; 1 juvenile, MNHN B21172, 22°25'S 166°35'E, 27 m depth, stn 86, viii.1984, coll. B. Richer de Forges; 1 ♂ (14.7 mm cl), 4 juveniles, MNHN B27443, 22°23'S 166°48'E, 32 m depth, stn 113, viii.1984, coll. B. Richer de Forges; 1 ♀ ovigerous (19.7 mm cl), MNHN B21194, 22°28'S 166°46'E, 20 m depth, stn 119, viii.1984, coll. B. Richer de Forges; 1 ♀ (22.1 mm cl), MNHN B21189, 22°34'S 166°36'E, 15 m depth, stn 157, viii.1984, coll. B. Richer de Forges; 1 ♂ (11.3 mm cl), MNHN B21169, 21°58'S 166°01'E, 20 m depth, stn 193, ix.1984, coll. B. Richer de Forges; 1 ♀ (12.7 mm cl), MNHN B19147, 22°22.1'S 166°22.9'E, 16 m depth, stn 253, x.1984, coll. B. Richer de Forges; 2 ♂ (12.1, 11.7 mm cl), MNHN B27444, 22°42'S 166°54'E, 45 m depth, stn 348, coll. B. Richer de Forges; 1 ♀ (17.8 mm cl), MNHN B27445, 20°20.3'S 164°35.6'E, 23 m depth, stn 890, 14.i.1987; 1 ♀ (11.4 mm cl), MNHN B27446, 20°10.1'S 162°51.6'E, 25 m depth, stn 1015, 3.iv.1988; 1 ♂ (10.5 mm cl), MNHN B27447, 19°56'S 163°52.2'E, 28 m depth, stn 1066, 23.x.1989; 1 ♀ (15.5 mm cl), MNHN B27448, 9°55.8'S 163°52.8'E, 28 m depth, stn 1067, 23.x.1989; 2 ♂ (10.0, 13.4 mm cl), 3 ♀ (10.5–14.1 mm cl), MNHN B27449, 19°59.1'S 163°52.5'E, 30 m depth, stn 1069, 28.x.1989; 1 ♂ (19 mm cl), MNHN B27450, 19°57.90'S 163°42.9'E, 34 m depth, stn 1081, 24.x.1989; 1 ♂ (8.7 mm cl), MNHN B27451, 19°25.2'S 163°40.7'E, 53 m depth, stn 1141, 27.x.1989; 1 ♂ (12.4 mm cl), MNHN B27452, 19°09.3'S 163°15.9'E, 48 m depth, stn 1155, 30.x.1989. **Australia**: 1 ♀ ovigerous (20.9 mm cl), QM w 3357, NE Queensland, 26°30'S 153°13'E, 48 m depth, 26.vii.1968, det. B.M. Campbell; 1 ♀ (24.4 mm cl), QM w12810, 18°48.1'S 147°28.0'E, 7.xii.1985; 1 ♂ (18.8 mm cl), WAM 178-64, Southport, 51 m depth, 5.ii.1963; 1 ♂ (18.1 mm cl), AMS P53410, New South Wales, E Clarence River, 29°25'S 153°35'E, 73 m depth, 31.v.1995; 1 ♂ (20.1 mm cl), 1 ♀ (23.0 mm cl), AMS P53402, E Clarence River, 29°30'S 153°32'E, 71 m depth, 7.ix.1990; 1 ♀ ovigerous (19.6 mm cl), 1 ♀ (18.7 mm cl), AMS P53409, E Clarence River, 29°31'S 153°26'E, 53 m depth, 14.xi.1995; 1 ♂ (19.0 mm cl), AMS P41774, NE Brunswick Heads, 28°24'S 153°40'E, 55 m depth, 12.xi.1991; 1 ♂ (18.0 mm cl), AMS P53408, E Evans Head, 29°17'S 153°31'E, 53 m depth, 28.xi.1995. **Japan**: 3 ♂ (22.6–26.0 mm cl), 7 ♀ (13.0–28.8 mm cl), SMF 15098, Shikoku, Tosa Bay, near Mimase, 60–70 m depth, 23.x.1979; 1 ♀ (28.5 mm cl), SMF 22553, 30.vii.1983, coll. K. Sakai. **Taiwan**: 1 ♀ ovigerous (25.0 mm cl), Tai-Shi, 4.vi.1986; 1 ♂ (25.2 mm cl), NTOU, Tai-Shi, 2.xi.1998; 1 ♂ (19.7 mm cl), NTOU, Tai-Shi, 1.iv.1989; 2 ♂ (21.0, 18.7 mm cl), NTOU, Tai-Shi, 11.ix.1990. **Philippines**: 1 ♀ (29.3 mm cl), USNM, Luzon, Limbancauayan I., 11°49.55'N 124°28.05'E, 91.5 m depth, 'Albatross', stn 5210, 17.iv.1908; 1 ♂ (24.4 mm cl), 1 ♀ ovigerous (30.0 mm cl), USNM 65427, S Fernando Pt., 16°30.36'N 120°11.06'E, 82 m depth, 'Albatross', stn 5442, 10.v.1909, det. C.G.S. Tan; 1 ♂ damaged, USNM 65346, Malavatuan I., 13°49.15'N 120°14.45'E, 33 m depth, 'Albatross', stn 5276, 17.vii.1908, det. C.G.S. Tan. **South China Sea**: 1 ♂ (20.9 mm cl), USNM, 21°52'N 115°51'E, 113.5 m depth, 'Albatross', stn 5309, 4.xi.1908, det. C.G.S. Tan.

Description.— Carapace globose, longitudinally ovate in male, nearly rounded in adult female, thickly set with anteriorly curved spinules, regions nearly indistinct. Frontal lobes triangular, minutely granulate. Margins of carapace bearing nine spines: one spine each on subhepatic, midlateral, posterolateral and posterior margins, single spine on intestinal region. Anterolateral margin bearing medially between subhepatic, midlateral spines a granulate tubercle, indistinct in adults. Subhepatic, midlateral, posterolateral, intestinal spines short, upcurved, granulate; posterior spines dorso-

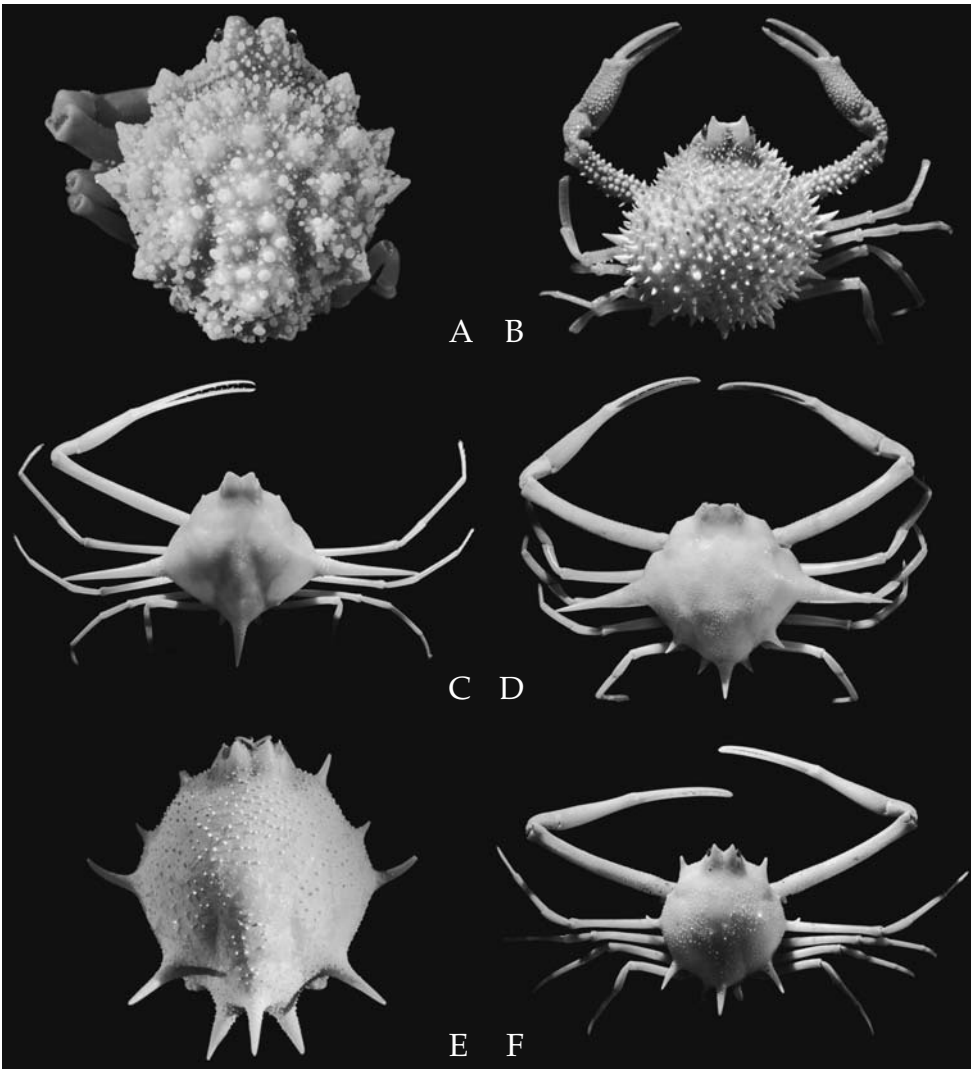


Fig. 2. A, *Arcania fungilifera* spec. nov., 1 ♀, 12.0 mm cl, (WAM 282-60), Holotype; B, *Arcania globata* Stimpson, 1858, 1 ♀, 11.9 mm cl, (USNM 13713); C, *Arcania gracilis* (Henderson, 1893), 1 ♂, 14.2 mm cl, (MNHN B18394); D, *Arcania heptacantha* de Man, 1907, 1 ♂, 22.2 mm cl, (SMF 13210); E, *Arcania muricata* spec. nov., 1 ♂, 22.3 mm cl, (MNHN B13451); F, *Arcania novemspinosa* (Lichtenstein, 1816), 1 ♂, 21.2 mm cl, (USNM).

ventrally flattened, prominently granulate. Intestinal regions somewhat inflated, demarcated by shallow grooves.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe conical. Thoracic sternites prominently granulate.

Cheliped merus nearly as long as carapace, thickly set with conical granules; small tubercle proximally on lower margin. Carpus, propodus minutely granulate, propodus dorso-ventrally flattened, thicker basally, fingers slender, longer than palm.

Pereiopodal meri granulate, prominently so on fifth pereiopod; carpi, propodi minutely granulate, subcylindrical.

Male, abdomen granulate, basio-lateral regions of fused segments inflated, lateral margins of sixth abdominal segment slightly convex. Male first pleopod sigmoid, tip bilobed, funnel-shaped.

Remarks.— *A. elongata* differs from *A. brevifrons*, *A. muricata* spec. nov., and *A. undecimspinosa* in having an indistinct, tuberculiform, anterolateral spine. It differs from *A. novemspinosa* in having the subhepatic spine tuberculiform rather than prominent, the posterolateral and intestinal spines short rather than long, and the first male pleopod distally angled rather than slightly sinuous.

A photograph of *A. novemspinosa* erroneously replaced that of *A. elongata* in the paper by Tan (1996: 1025, fig. 1b).

Distribution.— New Caledonia, Australia, Japan, Philippines, China, South China Sea; 7-113 m depth.

Arcania erinacea (Fabricius, 1787)

(fig. 1E; 5A)

Cancer Erinaceus Fabricius, 1787: 325; Fabricius, 1793: 460; Herbst, 1792: 258, pl. 20, fig. 111; Latreille, 1817: 20; Zimsen, 1964: 647.

Leucosia erinaceus; Fabricius, 1798: 352; Latreille, 1802: 119; Latreille, 1817: 20; Lichtenstein, 1816: 145; Bosc, 1830: 288.

Arcania erinaceus; Leach, 1817: 24; Desmarest, 1825: 170, pl. 28, fig. a; H. Milne Edwards, 1837a, pl. 24, fig. 2; H. Milne Edwards, 1837b: 134; H. Milne Edwards, 1838: 415; White, 1847: 50; Bell, 1855a: 367; Bell, 1855b: 309; Bell, 1855c: 20; Herklots, 1861: 28; Alcock, 1896: 268; Lanchester, 1900: 766; Laurie, 1906: 366; Ihle, 1918: 313; Chopra, 1934: 45; Sakai, 1937:126; Sakai, 1976: 92, textfig. 49; Dawydoff, 1952:138; Serène, 1968: 45; Zarenkov, 1969: 22; Devi et al., 1988: 23, fig. 5; Huang, 1989: 307, fig. 269; 1994: 579; Dai & Yang, 1991: 75, pl. 8, fig. 3, fig. 34.2; Fransen et al., 1997: 87.

Arcania crinaceus; Naiyanetr, 1998: 58. [erroneous spelling].

Arcania erinacea; K. Sakai, 1999:16, pl. 6c.

not *Arcania erinaceus*; Tirmizi & Kasmi, 1986: 72, fig. 20 [= *A. undecimspinosa* de Haan, 1841].

Material.— **China**: 1 ♀ ovigerous (23.6 mm cl), 1 ♂ (21.5 mm cl), USNM 57769, Tsimei, vi.1923. **Thailand**: 1 ♀ ovigerous (14.9 mm cl), USNM 273764, 07°55.22'N 98°49.45'E, 13-18 m depth, 14.ii.1966. **Singapore**: 1 ♂ (11.7 mm cl), NHM 1900.10.22.348, 7 m depth, coll. Bedford & Lanchester. **Sri Lanka**: 2 ♂ (17.6, 12.5 mm cl), NHM 1907.5.22.77-78, Gulf of Manaar, Coll. W.A. Herdman. **India**: 1 ♂ (18.3 mm cl), MNHN 10770, Pondicherry, coll. J.B.L.C.T. Leschenault; 2 ♂, 2 ♀, ZMC, Tranquebar, coll. H. Krøyer, 11.iv.1850. **Indian Ocean**: 1 ♂ (12.0 mm cl), 1 ♀ (15.7 mm cl), RMNH D 43181, Coll. L. Spengler; 1 ♀ (17.4 mm cl), NHM 90b, syntype (?) of *Cancer erinaceus* Fabricius, 1798. det. by Leach as *A. erinaceus*; 1 ♂ (16.1 mm cl), 1 ♀ (18.2 mm cl), NHM, Sir Joseph Bank's collection [preserved dry]. **Oman**: 2 ♂ (10.7, 8.0 mm cl), 1 ♀ (8.9 mm cl), 1 ♀ ovigerous (11.5 mm cl), RMNH D 47947, Batinah coast, off Seeb, 30-40 m depth, iii.1997, coll. R.G. Moolenbeek.

Description.— Carapace globose, regions indistinct, thickly set with spines of uneven size. Frontal lobes triangular, closely set anteriorly with flat-topped granules, anterior margin ogival. Margins of carapace bearing eleven spines, longer, more robust than dorsal spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region. Subhepatic, anterolateral spines shorter, granulate; lateral, posterolateral, posterior, intestinal

spines secondarily spinulose. Posterior margin spinose. Hepatic, intestinal regions faintly demarcated by shallow grooves.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe spinose. Thoracic sternites granulose.

Cheliped merus four fifths as long as carapace; dorsally spinose, ventrally granulose, anterior, posterior margins prominently pectinate. Carpus with three rows of spinules on outer surface. Propodus thicker basally, fingers slender, shorter than palm. Pereiopodal meri spinose on upper, lower margins, prominently so on second and fifth pereiopods. Carpi, propodi minutely spinulate; dactyls setose on upper margin.

Male abdomen granulose, lateral margins of sixth segment somewhat convex, basio-lateral regions of fused segment indistinctly inflated. Male first pleopod nearly straight.

Colour.— “Carapace, chelate legs and pereiopods pink” (Devi et al., 1988: 23).

Remarks.— Fabricius’ (1793: 460) description of *Cancer Erinaceus* is succinct and sufficient: “thorace ovato spinosisimo; spinis marginalibus longioribus dentatis, brachiis aculeatis, manibus filiformibus.” *A. erinacea* differs from its congeners in having lateral, posterolateral, posterior and intestinal spines secondarily spinulose.

Distribution.— Japan, China, Thailand, Singapore, Sri Lanka, India, Pakistan, Indian Ocean, Oman; 7-85 m depth.

Arcania foliolata spec. nov.
(fig. 1F, 5B)

Holotype.— **Australia:** 1 ♂ (23.1 mm cl), AMS p8451, Northern Territory, Sir Edward Pellew Group, 15°33'S 136°47'E, coll. Dr K. Hudson. Paratypes.— 1 ♂ (22.0 mm cl), AMS p5963, Queensland, Bowen Harbour, Port Denison, 20°11'S 148°15'E, coll. E.H. Rainford, 1 broken, AMS p5964, Queensland, Bowen Harbour, Port Denison, 20°11'S 148°15'E, coll. E.H. Rainford, 1 ♂ (19.8 mm cl), AMS p6936, Queensland, Fields Reef, Bowen Harbour, Port Denison, 20°01'S 148°15'E, low tide, coll. E.H. Rainford, 1 ♀ (28.6 mm cl), AMS p6937, Queensland, Fields Reef, Bowen Harbour, Port Denison, 20°01'S 148°15'E, low tide, coll. E.H. Rainford, 1 ♂ (28.6 mm cl), QM w2938, SE Sandy I., 27°32.30'S 153°19.40'E, 4.5 m depth, 6.x.1967, det. B.Campbell as *A. novemspinosa*, 1 ♂ (19.5 mm cl), WAM 180-64, Shark Bay, ix.1963, 1 ♂ (14.2 mm cl), AMS P9919, Western Australia, between Broome, Walla, 14 m depth, 1930, coll. R. Boume, Paratype.

Description.— Carapace globose; rounded; regions indistinct, Intestinal region slightly inflated, demarcated by shallow grooves. Dorsal surface of carapace covered with granules of uneven size. Margins of carapace bearing nine spines: one spine each on subhepatic, midlateral, posterolateral and posterior margins, single spine on intestinal region. Subhepatic spine short, blunt, straight; midlateral, posterolateral, intestinal spines long, upcurved, granulate; posterior spines dorso-ventrally flattened, foliolate. Medially between subhepatic, midlateral spines granulate tubercle.

Front prominent, bilobed, uptilted; frontal lobes triangular, closely set anteriorly with flat-topped granules. Antennules obliquely folded. Antennae small, slender, basal segment lodged in orbital hiatus. Eyes small, outer orbital margin trifissured, inner margin cleft; infraorbital lobe spiniform, prominent, fused with bidentate anterior margin of efferent branchial channel. Buccal frame narrowing anteriorly. Third

maxilliped exopod narrow, tapering distally, outer margin straight, inner margin slightly concave; endopod with subrectangular ischium, much longer than lacinate merus, in females endopod bearing vertical row of setae.

Chelipeds slender, elongate; merus in male nearly as long as carapace, granulate, granules larger proximally, proximal meral tubercle prominent. Carpus, propodus minutely granulate, propodus dorso-ventrally flattened, thicker basally, fingers slender, longer than palm. Pereiopodal meri, carpi, propodi minutely granulate; dactyli styliform, dactylar margins setose.

Thoracic sternites granulate. Lateral margins of sixth abdominal segment slightly convex. First male pleopod slender, elongate, sinuous, distally curved distad; second pleopod short, curved, distally scoop-like.

Remarks.— *A. foliolata* spec. nov. is distinguished from *A. undecimspinosa* and *A. novemspinosa* in possessing foliate posterior marginal spines on the carapace, and the first male pleopod distally curved distad, rather than straight. In addition, *A. foliolata* spec. nov. differs from *A. undecimspinosa* in having a tubercle rather than an anterolateral marginal spine on carapace.

Distribution.—Australia, intertidal to 14 m.

Etymology.—*folium* L., leaf, for the leaf-like posterior marginal spines on carapace.

Arcania fungilifera spec. nov.

(fig. 2A)

Arcania tuberculata; Tyndale-Biscoe & George, 1962: 76 [not *A. tuberculata* Bell, 1855].

Holotype.— **Australia:** 1 ♀ (12.0 mm cl), WAM 282-60, near Perth, Cottesloe, 1931, coll. L. Glauert, det. M. Tyndale-Biscoe as *A. tuberculata*.

Description.— Carapace globose, pyriform, regions indistinct, dorsum set with fungiform granules, sixteen fungiferous tubercles medially. Frontal lobes obtuse, closely set with flattened granules on outer margin. Margins of carapace bearing eleven subequal triangular denticles: one denticle each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single denticle on intestinal region; denticles set with fungiform granules, smaller, closer-set distally. Cardiac, intestinal regions faintly demarcated by shallow grooves, cardiac region bearing conical tubercle set with fungiform granules. Hepatic tubercle conical, more prominent than subhepatic denticle.

Outer denticle on anterior margin of efferent branchial channel triangular, larger than inner subquadrate denticle; infraorbital lobe closely set with granules. Exopod and endopod of third maxilliped each with longitudinal row of contiguous fungiform granules. Thoracic sternites granulate.

Cheliped merus less than half as long as carapace, set with perliform granules proximally on outer margin, distally on inner margin. Carpus with prominent ridge medially on upper margin. Fingers bearing minutely granulate longitudinal costae. Pereiopodal dactyls minutely granulate, setose.

Female abdomen bearing perliform granules.

Remarks.— *A. fungilifera* differs from the closely allied *A. sagamiensis* in bearing fungiform rather than squat granules on the carapace; 16 rather than 14 tubercles

medially on the dorsal surface of carapace; the exopod and endopod of the third maxilliped with a longitudinal row of contiguous fungiform granules rather than being uniformly granulose.

Tyndale-Biscoe & George (1962: 76) described the "composite spines" and the "dumbbell-shaped spines" covering the carapace. However they considered their "heavily tuberculated" specimen within the "natural morphological variation within *A. tuberculata*", overlooking the lack of prominent posterolateral carapacial spines, bispinose posterior margin, and the shorter cheliped merus characteristic of *A. tuberculata*.

Etymology.— From *fungus* L., mushroom, for the fungiform granules on the carapace.

Arcania globata Stimpson, 1858
(fig. 2B; 5C)

Arcania globata Stimpson, 1858: 160; Stimpson, 1907:156, pl. 18, fig. 9; Miers, 1879: 44; Miers, 1886: 299; Ortmann, 1892: 77; de Man, 1907: 400, pl. 31, fig. 11-13; Ihle, 1918: 313; Balss, 1922: 132; Gee, 1925: 160; Yokoya, 1933: 134; Sakai, 1934: 288; Sakai, 1935: 57, pl. 10, fig. 3; Sakai, 1937: 125, fig. 17; Sakai, 1965: 41, pl. 16, fig. 4; Sakai, 1976: 92, textfig. 48; Shen, 1937: 282, textfig. 3a, b; Miyake, 1961a: 14; Miyake, 1961b: 170; Miyake et al., 1962: 126; Shen & Dai, 1964: 19, fig; Serène, 1968: 45; Takeda & Miyake, 1970: 224; Takeda, 1973a: 31, fig. 3d; Takeda, 1973c: 12; Takeda, 1979:153; Takeda, 1985: 122, fig.; Takeda, 1987: 10; Kim, 1973: 297, pl. 76, fig. 61, textfig. 92; Yamaguchi et al., 1976: 34, Huang, 1989: 306, fig. 268.

not *Arcania globata*; Tan, 1996: 1027, fig. 1c [= *A. ltuberculata*, Bell, 1855].

Material.— **Korea Straits:** 1 ♀ (7.6 mm cl), NHM 1878.11, 34°8'N 126°24'E, 44 m depth, det. E.J. Miers as *A. globata*. **Japan:** 1 ♀ (11.9 mm cl), USNM 13713, 1880?, coll. F.C. Dale; 1 ♂ (8.1 mm cl), NHM 1907.4.27.11, Inland Sea, 14 m depth, det. J. G. de Man as *A. globata*; 1 ♂ (8.1 mm cl), USNM 21399, Kyushu I., Mogi, 18.vi.1881; 1 ♂ (9.8 mm cl), SMF 15111, 34°2.5'N 133°14.6'E, Honshu I., nr Fukuyama, 10.vi.1979, coll. N. Wasaki. **South China Sea:** 1 ♀, ZMC cru3659, 24°22'N 119°11'E, 58 m, iv.1897. **Eastern Seas:** 1 ♂ 9.5 mm (NHM 1847.21) [preserved dry].

Description.— Carapace globose, rounded, regions indistinct, thickly set with anteriorly curved spines. Frontal lobes closely set anteriorly with flat-topped granules, anterior margin concave. Margins of carapace bearing eleven subequal, upcurved, closely granulate spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region; midlateral, posterolateral somewhat longer than rest. Intestinal region faintly demarcated by shallow grooves.

Outer margin of efferent branchial channel inflated, closely set with flattened granules, outer denticle larger than inner denticle, infraorbital lobe bulbous, prominently granulose. Thoracic sternites set with perliform granules.

Cheliped merus two thirds as long as carapace; dorsally and ventrally set with perliform granules, granules on anterior, posterior margins acuminate, spinulose. Carpus and propodus set with smaller perliform granules. Fingers bearing minutely granulate longitudinal costae. Pereiopodal meri, carpi, propodi minutely granulate; dactyls closely setose anteriorly.

Male abdomen set with perliform granules, lateral margins of sixth segment straight, basio-lateral regions of fused segment indistinctly inflated. Male first

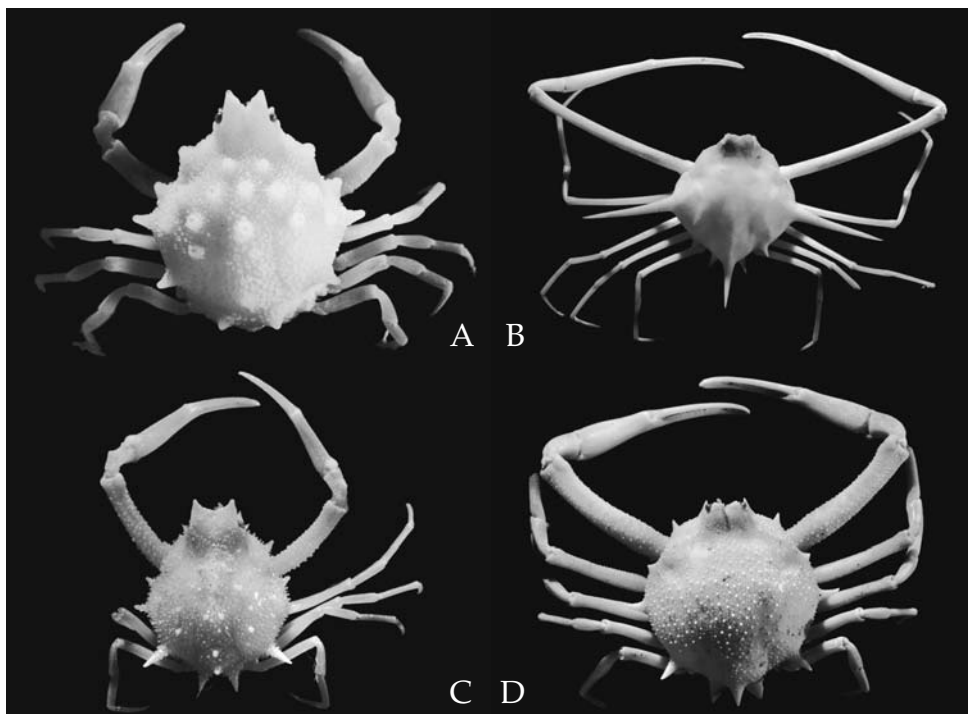


Fig. 3. A, *Arcania sagamiensis* Sakai, 1969, 1 ♀, 11.5 mm cl, (USNM); B, *Arcania septemspinosa* (Fabricius, 1787), 1 ♂, 16.6 mm cl, (USNM 65367); C, *Arcania tuberculata* Bell, 1855, 1 ♂, 5.8 mm cl, (MNHN B27482); D, *Arcania undecimspinosa* de Haan, 1841, 1 ♂, 26.6 mm cl, (USNM 57711).

pleopod nearly straight, tip slightly funnel-shaped.

Colour.—“This pretty little crab has the front and a median band on the upper surface of the carapace white, the median band being half as broad as the front; adjacent to the band the upper surface is orange, but this colour gradually becomes paler laterally. The spines are also of a pale orange-colour, but those that stand on the band are white. The lower surface is uncoloured, but the sternum is marked anteriorly, on each side of the abdominal groove, with a triangular orange-coloured fleck, between that groove and the base of the chelipeds. The latter are pale reddish above; the proximal extremity of the merus is white, like the tips of the fingers. The ambulatory legs are uncoloured, but carpus and merus are partly reddish.” (de Man, 1907: 401).

Remarks.— *A. globata* is easily separated from other dorsally spinose *Arcania* spp.- *A. erinacea* and *A. echinata* spec. nov.- by its arched frontal margin, perliform granules on the cheliped, and its simple, funnel-tipped first male pleopod.

On examination, Tan’s specimen described as *A. globata* (1996: 1027, fig. 1c), proved to be *A. tuberculata*, Bell, 1855.

Distribution.— Korea, Japan, South China Sea to Hong Kong; 14-150 m depth.

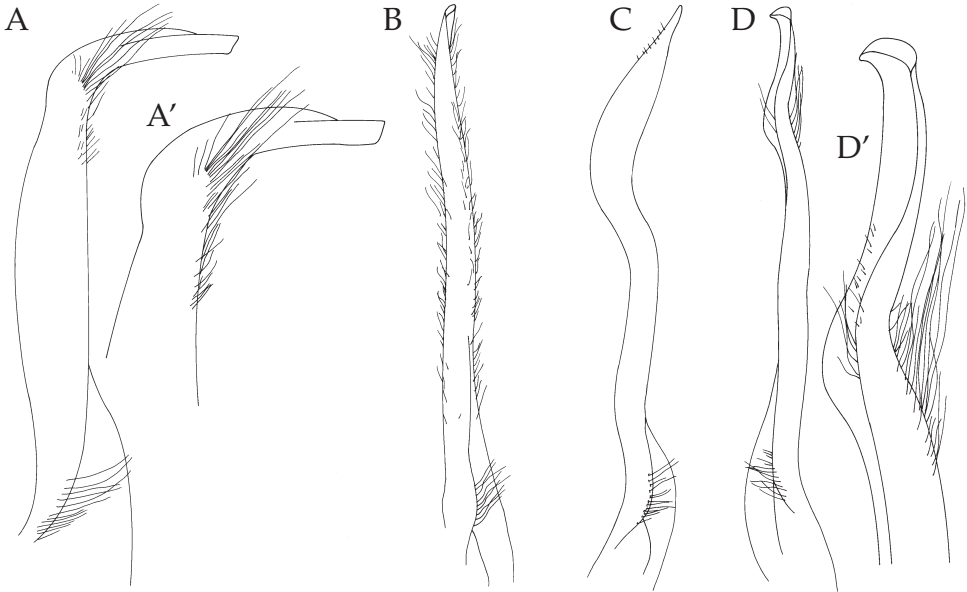


Fig. 4. First male pleopod. A, *Arcania brevifrons* Chen, 1989, 16.3 mm cl, (MNHN B18982); B, *Arcania cornuta* (MacGilchrist, 1905) comb. nov., 1 ♂, 29.1 mm (ZMMU Ma5242); C, *Arcania echinata* spec. nov., 13.8 mm cl (WAM c24381), holotype; D, *Arcania elongata* Yokoya, 1933, 19 mm cl, (MNHN B27450).

Arcania gracilis (Henderson, 1893)
(fig. 2C; 5D)

Arcania septemspinosa var. *gracilis* Henderson, 1893: 403.

Arcania quinquespinosa Alcock & Anderson, 1894: 206; Alcock & Anderson, 1896, pl. 24, fig. 6; Alcock, 1896: 266; Borradaile, 1903: 439, pl. 22, fig. 2; Laurie, 1906: 366; Balss, 1915: 16; Balss, 1922: 132; Ihle, 1918: 266; Sakai, 1937: 128, text-fig. 19; Sakai, 1965: 41, pl. 16, fig. 5; Sakai, 1976: 95, pl. 28, fig. 3; Stephensen, 1945: 72, text-fig. 7d-e; Lin, 1949: 14; Shen & Dai, 1964: 18; Serène, 1968: 45; Gurjanova & Chang, 1972: 157; Serène & Vadon, 1981: 120, 124; Devi et al., 1982: 24, fig. 6; Miyake, 1983: 61, pl. 21, fig. 1; Chen, 1989: 208, pl. 1 fig. 7; Jones, 1990: 188; Huang, 1989: 308, fig. 271; Huang, 1994: 579; Dai & Yang, 1991: 71, pl. 7, fig. 6, fig. 32.1; Tan, 1996: 1028, fig. 2b-e, 7fNg et al., 2001: 9.

Arcania quinquespinosa; Zarenkov, 1969: 23 [erroneous spelling].

Arcania gracilis; Takeda 1973a: 31; Takeda, 1973b: 89, pl. 2b; Takeda, 1979: 153.

Material.— **Fiji**: 57 ♂ (8.4-14.6 mm cl), 32 ♀ ovigerous (11.8- 17.2 mm cl), 12 ♀ (7.4-10.6 mm cl), MNHN Na27547, Bligh Water, 17°16.1'S 177°45.7'E, 143-173 m depth, MUSORSOM 10, stn CP 1323, 7.viii.1998; 3 ♂ (10.8-11.5 mm cl), 2 ♀ ovigerous (13.1, 12.4 mm cl), 2 juveniles, MNHN Na 27549, Bligh Water, 17°17.4'S 177°47.0'E, 102-104 m depth, MUSORSOM 10, stn CP 1324, 7.viii.1998; 14 ♂ (7.9-13.5 mm cl), 10 ♀ (10.4-10.9 mm cl), MNHN Na 27542, Viti Levu, 18°12.4'S 178°33.0'E, 144-150 m depth, MUSORSOM 10, stn CP 1363, 15.viii.1998; 11 ♂ (8.3-12.2 mm cl), 5 ♀ (7.8-15.2 mm cl), MNHN Na 27548, Viti Levu, 18°12.4'S 178°33.1'E, 149-168 m depth, MUSORSOM 10, stn CP 1366, 15.viii.1998; 9 ♂ (7.9-12.3 mm cl), 2 ♀ ovigerous (11.8, 12.3 mm cl), 6 ♀ (10.0-14.0 mm cl), MNHN Na 27545, Viti Levu, 18°12.3'S 178°33.1'E, 113-123 m depth, MUSORSOM 10, stn CP 1370, 16.viii.1998; 15 ♂ (7.4-12.0 mm cl), 12 ♀ (7.9-14.3 mm cl), MNHN Na 27543, Viti Levu, 18°12.4'S 178°32.8'E, 135-151 m depth, MUSORSOM 10, stn CP 1371, 16.viii.1998; 2 ♂ (11.4, 10.0 mm cl), MNHN Na 27528, Viti Levu lagoon, 17°51.6'S 177°13.3'E, 35 m depth, SUVA 2, stn CP 45, 19.x.1998; 1 ♂ (11.8 mm cl), 1 ♀ ovigerous (13.1

mm cl), 1 ♀ (11.0 mm cl), MNHN Na 27546, Viti Levu lagoon, 17°53.5'S 177°13.6'E, 25 m depth, SUVA 2, stn CP 47, 19.x.1998; 1 ♀ (15.8 mm cl), MNHN Na 27541, 17°13.2'S 178°48.0'E, 97-104 m depth, BORDAU 1, stn CP 1438, 3.iii.1999; 2 ♂ (11.3, 11.4 mm cl), MNHN Na 27544, 18°25.5'S, 178°05.7'E, 44-45 m, SUVA 4, stn CP 18, 25.ix.1999. **Vanuatu:** 1 ♂ (9.0 mm cl), MNHN B27453, 15°36.58'S 167°16.32'E, 182-215 m depth, MUSORSOM 8, stn CP 1086, 5.x.1994; 1 ♀ ovigerous (11.7 mm cl), MNHN B27454, 15°08.73'S 166°53.37'E, MUSORSOM 8, stn CP 1118, 191-248 m depth, 9.x.1994. **New Caledonia:** 1 ♂ (11.2 mm cl), MNHN B21283, Grand Recif Sud, 22°06.9'S 166°06.4'E, stn 174, 45 m depth, ix.1984, coll. Richer de Forges; 1 ♀ ovigerous (13.6 mm cl), MNHN B21282, 22°44.4'S 166°43.9'E, stn 307, 37 m depth, xi.1984, coll. Richer de Forges; 1 ♂ (14.2 mm cl), 1 ♀ ovigerous (15.8 mm cl), MNHN B18394, 22°35.3'S 166°54'E, stn 316, 68 m depth; 1 ♀ (15.1 mm cl), MNHN B27455, 22°34'S 167°06'E, stn 376, 75-76 m depth, xi.1984, coll. Richer de Forges; 1 ♂ (15.7 mm cl), MNHN B21246, 22°28.8'S 167°04.7'E, stn 232, 77 m depth, 1.x.1985; 1 ♀ (12.2 mm cl), MNHM B18204, 22°12.8'S 167°00.5'E, stn 606, 46-48 m depth, 5.viii.1986; 1 juvenile, MNHN B18253, 22°01.7'S 166°52.7'E, stn 622, 67 m depth, 6.viii.1986; 2 ♂ (11.1, 10.8 mm cl), MNHM B18203, 21°55.6'S 166°48.2'E, stn 633, 50 m depth, 6.viii.1986; 1 ♂ (8.4 mm cl), MNHN B18257, locality data as above; 1 ♂ (10 mm cl), MNHN B18258, 21°53'S 166°43'E, stn 641, 50-52 m depth, 7.viii.1986; 1 ♀ (7.3 mm cl), MNHN B18256, 21°28.3'S 166°07.1'E, stn 701, 36-39 m depth, 10.viii.1986; 1 ♀ (12.1 mm cl), MNHM B18267, 21°19.7'S 165°53.5'E, stn 729, 42-45 m depth, 12.viii.1986; 1 ♀ (7.6 mm cl), 1 ♀ damaged, MNHM B18268, 22°13.9'S 167°02.8'E, stn 742, 77-78 m depth, 13.viii.1986; 1 ♀ (11.6 mm cl), MNHM B18266, 22°13.6'S 167°03.2'E, stn 744, 76-81 m depth, 13.viii.1986; 1 ♂ (7.6 mm cl), MNHM B18254, 22°13.6'S 167°02.8'E, stn 745, 78-80 m depth, 13.viii.1986; 1 damaged, MNHM B18255, 22°13.5'S 167°02'E, stn 743, 72-80 m depth, 13.viii.1986; 1 juvenile, MNHN B27456, 21°16.5'S, 165°47.3E, stn 752, 46 m depth, 7.01.1987; 1 ♀ ovigerous (13.3 mm cl), MNHN B27457, 21°15.6'S 165.40.6E, stn 766, 26 m depth, 8.i.1987; 1 juvenile, MNHN B27458, 21°11.15'S 165°38.3'E, stn 774, 42 m depth, 8.i.1987; 3 ♂ (10.1-10.7 mm), 1 ♀ ovigerous (11.6 mm cl), 1 broken, MNHN, 20°49.8'S 165°17.7'E, stn 833, 52-70 m depth, 11.i.1987; 1 juvenile, MNHN B27459, 20°38.55'S 164°46.2'E, stn 873, 27 m depth, 13.i.1987; 1 ♂ (12.7 mm cl), MNHN B27460, 21°17.31'S, 165°57.40'E, stn DW653, 190-207 m depth, 12.iii.1993; 1 ♀ (9.3 mm cl), MNHN B27461, BATHUS 1, stn CP 667, 205-212 m depth, 14.iii.1993; 1 ♂ (12.1 mm cl), MNHN B27462, 20°48.24'S 165°20.50'E, BATHUS 1, stn DW672, 347-366 m depth, 14.iii.1993; 2 ♂ (7.7, 7.6 mm cl), 1 ♀ (8.7 mm cl), MNHN B27463, 20°48.03'S 165°17.98'E, BATHUS 1, stn CP 680, 86-92 m depth, 15.iii.1993; 1 ♀ ovigerous (16.0 mm cl), MNHN B18399, 19°46.5'S 163°47.4'E, VAUBAN, stn 44, 38 m depth, 23.vi.1985; 1 ♂ (11.2 mm cl), 2 juveniles, MNHN B27464, 20°48.9'S 165°19.3'E, Expedition Montrouzier, Passe de Touho, 103-110 m depth, 20.ix.1993. **Australia:** 1 ♀ (15.9 mm cl), QM w9897, 17°1.5'S 146°19'E, 50 m depth, x.1979; 1 ♀ (12.6 mm cl), WAM c8650, 25°31'S 112°29'E, NW Dirk Hartog I., 130 m depth, 9.x.1963; 1 ♂ (11.2 mm cl), WAM c8651, 27°40'S 113°20'E, NW Bluff Point, 131 m depth, 10.x.1963; 1 ♀ ovigerous (12.5 mm cl), WAM 172-64, 33°40'S 114°28'E, NW Cape Naturaliste, 137 m depth, 7.viii.1963. **Indonesia:** 1 ♂ (8.5 mm cl), MNHN B9653, coll. R. Serène; 1 ♀ ovigerous (16.0 mm cl), ZMA, 3°27'S 117°36'E, 'Siboga', stn 77, 59 m depth; 1 ♀ ovigerous (12.4 mm cl), ZMA, 'Siboga', stn 313, Danar Besar, Saleh Bay, 36 m depth; 2 ♂ (11.0, 10.4 mm cl), MNHN B17139, 01°06'S 117°45'E, Makassar Strait, CORINDON, stn. CH 206, 85 m depth; 1 ♀ ovigerous (11.9 mm cl), ZMC cru3652, 7°29'S 113°24'E, 60 m depth, coll. Th. Mortensen, 12.iv.1929; 1 ♂ (11.3 mm cl), ZMC cru3654, 5°40'S, 106°21'E, Java, 35 m depth, 28.vii.1922; 1 ♀ (11.7 mm cl), ZMC cru3653, 5°51'S, 106°22'E, Java, 35 m depth, 26.vii.1922; 1 ♀ ovigerous (11.5 mm cl), ZMC cru3655, 6°38'S, 105°21'E, Sunda Strait, 35 m depth, 30.vii.1922; 1 ♀ (11.9 mm cl), 1 juvenile, ZMC cru3657, 1°25'S, 117°05'E, Makassar, 'Galathea', stn 451, 50-60 m depth, 23.viii.1951; 1 juvenile, ZMC cru3658, 5°32'S, 112°41'E, Java Sea, 'Galathea', stn 455, 66 m depth, 26.viii.1951; 1 ♀ ovigerous (13.9 mm cl), USNM 65334, 4°31.40'S 122°49.42'E, Buton Strait, Sulawesi, Tikola Peninsula, 'Albatross', stn 5642, 68 m depth, 14.xii.1909. **Philippines:** 1 ♀ (14.2 mm cl), MNHN B18153, 13°46'N 120°23.8'E, MUSORSTOM, stn. 45, 100-180 m depth, 24.iii.1976; 1 ♂ (9.8 mm cl), 1 ♀ ovigerous (11.7 mm cl), MNHN B18152, 14°15'N 120°31.2'E, MUSORSTOM, stn 73, 76-70 m depth, 28.iii.1976; 1 ♂ (11.6 mm cl), 1 ♀ (12.3 mm cl), MNHN B18034, 11°45'N 122°45'E, MUSORSTOM 3, stn CP141, 40-44 m depth, 6.vi.1985; 1 ♂ (14.7 mm cl), USNM 65335, 9°43'N 125°48.15'E, Mindanao, Nagubat I., 'Albatross', stn 5235, 80 m depth, 9.v.1908; 1 ♂ (11.0 mm cl), 1 ♀ ovigerous (11.0 mm cl), USNM, Cabaleta I., Quezon, 33-58.5 m depth, 21-25.iv.1959, colls F.G.Dayrit &

J.E. Norton. **China:** 1 ♂ (14.6 mm cl), 1 ♀ ovigerous (16.2 mm cl), SMF 13209, 6.iv.1960, coll. H. Chen. **Taiwan:** 1 ♀ (18.1 mm cl), NTOU, Toag Kung, 29.x.1988. **Hong Kong:** 1 ♀ damaged, 1 ♀ ovigerous (16.3 mm cl), USNM 65336, 21°42'N 114°50'E, 'Albatross', stn 5302, 69 m depth, 9.viii.1908; 1 ♀ ovigerous (17.0 mm cl), USNM 65337, 21°44'N 114°48'E, 'Albatross', stn 5303, 62 m depth, 9.viii.1908; 1 ♂ (12.8 mm cl), USNM 65338, 21°40'N 114°47'E, 'Albatross', stn 5304, 62 m depth, viii.1908. **South China Sea:** 1 juvenile, NHM 1893.11.3.166, Macclesfield bank, 82-86 m depth. **Singapore:** 1 ♂ (11.4 mm cl), ZMC cru3656, 4.vi.1903. **India:** 1 ♂ (10.2 mm cl), 1 ♀ (12.1 mm cl), USNM 42680, ex Indian Museum 1806-7, off Ganjam, 'Investigator', stn 90, 51-55 m depth; 1 ♂ (9.8 mm cl), NHM 1884.34, Gulf of Martaban, coll. E.W. Oates, det. J.R. Henderson, as *Arcania septemspinosa* var *gracilis*. **Madagascar:** 2 ♀ ovigerous (16.7, 16.4 mm cl), MNHN B18594, coll. A. Crosnier; 1 ♂ (14.9 mm cl), MNHN B19733, 15°20'S 46°11.5'E, 'Vauban', stn 130, 170-175 m depth, 19.i.1975; 1 ♀ ovigerous (15.5 mm cl), MNHN B19727; 2 ♂ (12.2, 12.3 mm cl), MNHN B18598, Mitsio Is., 46 m depth, 28.vii.1958, coll. A. Crosnier; 1 juvenile, MNHN B18595, 60 m depth, ii.1960, coll. A. Crosnier; 4 juveniles, MNHN B18596, Banc de Pracel, 65 m depth, 06.1959, coll. A. Crosnier; 1 ♂ (10.7 mm cl), 1 ♀ (11.8 mm cl), 2 juveniles, MNHN B18597, 55 m depth, vi.1959, coll. A. Crosnier. **Oman:** 2 ♂ (8.8, 10.7 mm cl), 2 ♀ ovigerous (12.4, 11.6 mm cl), NHM 99.7.17.12-13, coll. Jayakar. **Red Sea:** 2 ♀ ovigerous (12.3, 11.3 mm cl), E58/47 RMNH D 27702, Sinai Peninsula, off Sebel Ahair, 60 m, 8.ii.1958, coll. O.H. Oren. **Eastern Seas:** 2 ♀ (10.8, 11.0 mm cl), NHM 47.21, [preserved dry].

Description.— Carapace very minutely granulate. Frontal lobes triangular, anteriorly granulate. Hepatic margin of carapace mammiform, medially tuberculate; epi-branchial margin inflated. Lateral spine long, robust, basally ringed with perliiform granules. Posterolateral margin oblique, medially set with flattened, granulate tubercle. Spine on intestinal region shorter than lateral spine, robust, horizontal, basally ringed with perliiform granules. Posterior spines flattened, short.

Teeth on anterior margin of efferent branchial channel obtuse, outer denticle much larger, infraorbital lobe curved distad, joined to frontal eaves.

Chelipeds slender, long; merus in adult male longer than carapace, minutely granulate, bearing tubercle proximally on posterior margin. Cheliped carpus, propodus smooth; propodus dorso-ventrally flattened, thicker basally, fingers slender, twice as long as upper margin of palm. Pereiopods filiform, subcylindrical, smooth, dactyls closely setose anteriorly.

In male, lateral margins of sixth abdominal segment straight, perpendicular; basio-lateral regions of fused segment indistinctly inflated. Male first pleopod slightly sinuous, tip bent distad.

Colour.— "cardiac region shows as a large bright red milk-white-edged ocellus. The rest of the carapace is delicate pink" (Alcock, 1896: 266). "The carapace in life is yellowish vermilion with several reddish spots on the anterior surface and with a large reddish ocellus, which is circumferenced with milk-white, on the cardiac region" (Sakai, 1937: 128).

Remarks.— *A. gracilis* is readily distinguished from *A. septemspinosa* and *A. heptacantha*, in that "The spines at the postero-lateral margin of the carapace are represented merely by rudiments" (Henderson, 1893: 403), in its triangular frontal lobes, prominently curved infraorbital lobe, and much longer fingers. In addition, in live or freshly preserved specimens, the cardiac region bears a bright red spot. *A. gracilis* differs from its closest congener, *A. cornuta* in its acuminate intestinal spine and flattened posterior denticles.

Examination of the Martaban specimen, described by Henderson (1893: 403) as

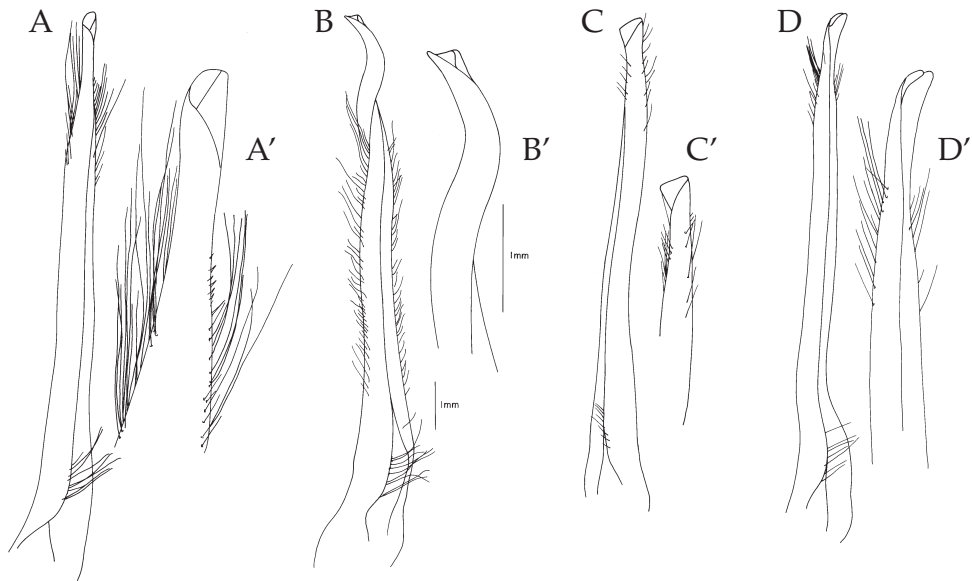


Fig. 5. First male pleopod. A, *Arcania erinacea* (Fabricius, 1787), 21.5 mm cl, (USNM 57769); B, *Arcania foliolata* spec. nov., 22.0 mm cl, (AMS p5963), C, *Arcania globata* Stimpson, 1858, 9.8 mm cl, (SMF 15111); D, *Arcania gracilis* (Henderson, 1893), 14.7 mm cl, (USNM 65335).

A. septemspinosa var *gracilis*, leaves no doubt that it is identical to *A. quinquespinosa* Alcock & Anderson, 1894. Indeed, Alcock (1896) had already synonymised them, albeit with a question mark.

Distribution.— Vanuatu, New Caledonia, Australia, Indonesia, Philippines, Japan, China, Singapore, India, Sri Lanka, Laccadives, Persian Gulf, Madagascar, Red Sea; 21-366 m depth.

Arcania heptacantha de Man, 1907
(fig. 2D, 6A)

Cancer septemspinus; Herbst, 1792: 259, pl. 20, fig. 112 [not *A. septemspinosa* (Fabricius, 1787)].

Iphis heptacantha de Haan in Herklots, 1861: 27 [nomen nudum].

Iphis septemspinosa; Stimpson, 1858: 161; 1907: 157 [not *A. septemspinosa* (Fabricius, 1787)].

Arcania heptacantha de Man, 1907: 398, pl. 31, fig. 8-10; Ihle, 1918: 313; Balss, 1922: 131; Sakai, 1934: 288; Sakai, 1935: 58, text-fig. 18; Sakai, 1937: 126, text-fig. 18; Sakai, 1965: 41, pl. 16, fig. 6; Sakai, 1976: 94, textfig. 51; Lin, 1949: 14; Uchida, 1949: 721, fig. 2085; Miyake, 1961a: 14; Miyake, 1961b: 170; Miyake et al., 1962: 126; Chang, 1963: 2; Shen & Dai, 1964: 18, fig; Serène, 1968: 45; Zarenkov, 1969: 22, fig. 7.2; Yamaguchi et al., 1976: 34; Hill, 1982: 201, pl. 4c; Takeda, 1982b: 97, fig. 285; Takeda, 1985: 122, fig.; Takeda, 1987: 10; Miyake, 1983: 60, pl. 20, fig. 5; Huang, 1989: 307, fig. 270; Huang, 1994: 579; Dai & Yang, 1991: 77, pl. 7, fig. 7, textfig. 32.2; Yang & Dai, 1994: 128, fig 4; Fransen et al., 1997: 87; Ng et al., 2001: 9.

Arcania septemspinosa; Rathbun, 1902: 30; K. Sakai, 1999: 16, pl. 6d [not *A. septemspinosa* (Fabricius, 1787)].

Arcania siamensis; Rathbun, 1910: 314 (part).

not *Arcania* (?) *heptacantha*; Campbell, 1971: 40, pl. 3B [= *A. septemspinosa* (Fabricius, 1787)].

not *Arcania heptacantha*; Serène & Vadon, 1981: 124 [= *A. septemspinosa* (Fabricius, 1787)].

Material.— **Japan:** 1 ♂ (14.3 mm cl), SMF 15106, Shikoku I., Tosa Bay nr. Mimase, 60-70 m depth, 23.x.1979, coll. M. Türkay; 1 ♂ (21.6 mm cl), SMF 22552, ix.1979, coll. K. Sakai; 4 juveniles, NHM 1907.4.27.8-10, Inland Sea; 3 ♂ (8.5-21.2 mm cl), 2 ♀ (19.7, 21.5 mm cl), USNM 26281, Honshu I., Kii, 1900, coll. Jordan & Snyder; 1 ♀ (14.7 mm cl), NHM 1884.31, 14.5-18 m depth. **China:** 1 ♂ (19.0 mm cl), NHM 79-32, [preserved dry], Canton, coll. Dr Cantor; 2 ♂ (20.2, 25.7 mm cl), 1 ♀ (23.3 mm cl), 1 ♀ ovigerous (23.5 mm cl), USNM 57770, Tsimei, vi.1923; 1 ♂ (23.3 mm cl), USNM 59154, Yenting, Chekiang Prov., 18.07.1923; 1 ♂ (22.2 mm cl), 1 ♀ (24.9 mm cl), SMF 13210, Nanhai, 7.xi.1959, coll. Chen. **Taiwan:** 1 ♀ (29.2 mm cl), NTOU, Tai-Shi, 10.iii.1985; 1 ♂ (22.1 mm cl), NTOU, Keelung, 6.x.1985. **Hong Kong:** 1 ♂ (16.6 mm cl), USNM 65367, 'Albatross', stn 5302, 70 m depth, 9.viii.1909; 1 ♂ (22.2 mm cl), 1 ♀ (21.5 mm cl), NHM 1930.12.3.59-60, coll. Barney; 1 ♀ (18.2 mm cl), 2 juveniles, NHM 1884.31, 'Challenger', 18 m depth. **Singapore:** 1 ♂ (14.5 mm cl), USNM 32992, coll. E. Deschamps, det. M.J. Rathbun as *A. siamensis*; 1 ♀ (14.9 mm cl), ZMA, x.1927; 1 juvenile, ZMA, Pisang I., S. Malacca Strait, 10-15 m depth, i.1934, coll. M.W.F. Tweedy. **Locality unknown:** 1 ♀ (21.1 mm cl), RMNH D 42112, [preserved dry].

Description.— Carapace granulate, bearing pinnate setae. Frontal lobes subquadrate, separated by slight notch, minutely granulate anteriorly, setose. Subhepatic margin mammillate, medially bearing small tubercle; anterolateral margin sinuous, closely granulate. Lateral spine robust, slightly upcurved, of varying length, granulate throughout, granules smaller distally. Posterolateral margin medially set with short, upcurved, granulate spine. Intestinal spine upcurved, granulate. Posterior spines dorso-ventrally flattened, granulate.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe spinose.

Chelipeds slender, long, granulate, granules larger basally. Cheliped merus not quite as long as carapace. Carpus, propodus minutely granulate; fingers slender, as long as palm. Pereiopods filiform; meri basally granulate, lower margin of propodi, dactyls medially carinate.

In male, lateral margins of sixth abdominal segment straight, basio-lateral regions of fused segment inflated. Male first pleopod sinuous, slender distally.

Colour.— "pale pinkish, with ends of legs and cheliped hands and fingers white" (Hill, 1982: 201).

Remarks.— *A. heptacantha* is distinguished from *A. septemspinosa* in having the dorsal surface of the carapace uniformly granulate and the cheliped merus shorter than the carapace, whereas *A. septemspinosa* bears a granulate ridge running medially from the intestinal spine and has the cheliped merus longer than the carapace.

A. heptacantha seems to have been a manuscript name by de Haan, "a description of which seems not to have appeared" (de Man, 1907: 398), published as *nomen nudum* by Herklots (1861: 27). de Man (1907: 399, pl. 31, fig. 8-10) published the first description, noting however "Whether this species differs from *Arc. septemspinosa* (Fabr.), Leach, by other characters than the shorter spines, is difficult to say". So that Campbell (1971: 40) felt that "Published figures and descriptions demonstrate some confusion as to the relative status of *A. heptacantha* and *A. septemspinosa* (Fabricius)." Examination of one of Campbell's (1971) *A. (?) heptacantha* specimens proved it to be *A. septemspinosa*. Rathbun (1910: 314) included in *A. siamensis* specimens of both *A. septemspinosa* and *A. heptacantha*.

Distribution.— Japan, China, Taiwan, Hong Kong, Singapore; 10-150 m depth.

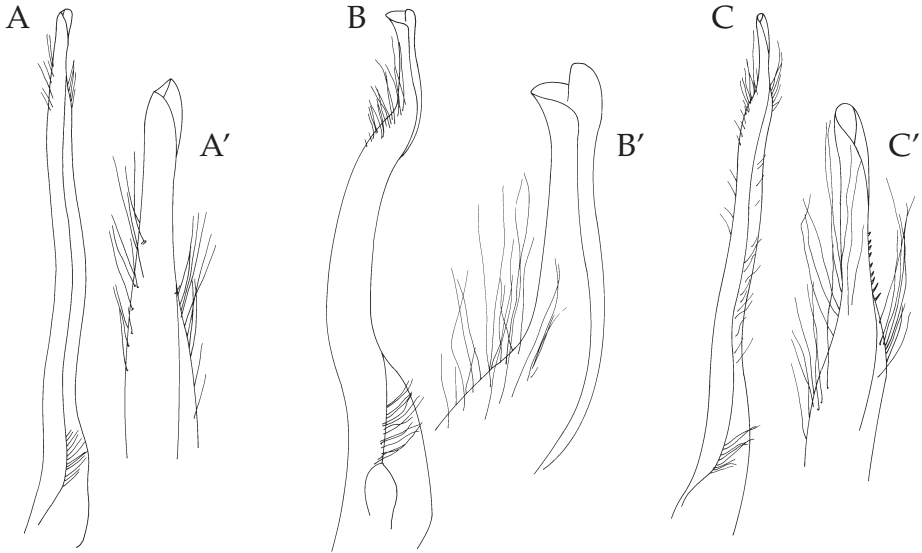


Fig. 6. First male pleopod. A, *Arcania heptacantha* de Man, 1907, 22.2 mm cl, (SMF 13210); B, *Arcania muricata* spec. nov., 22.3 mm cl, (MNHN B13451); C, *Arcania novemspinosa* (Lichtenstein, 1816), 21.2 mm cl, (USNM).

Arcania muricata spec. nov.
(fig. 2E; 6B)

Arcania undecimspinosa André, 1931: 642 [not *A. undecimspinosa* de Haan, 1841].

Holotype.— **Arafura Sea**: 1 ♂ (17.8 mm cl), QM w19599, 11°21'S 133°27'E, 27.4 m depth, 29.x.1989. Paratypes.— **Australia**: 1 ♂ (21.2 mm cl), AMS P13367, Northern Territory, Chambers Bay, 12°13'S 131°35'E, 38 m depth, 7.xi.1959, coll. A.A. Racek. **Vietnam**: 1 ♀ (29.2 mm cl), MNHN Na 27550, 'de Lanessan', 1930; 2 ♂ (17.4, 22.3 mm cl), MNHN B13451, Gulf of Tonkin, 'de Lanessan', 1930.

Description.— Carapace globose, longitudinally ovate, set with prominent granules, regions nearly indistinct. Frontal lobes triangular, granulate. Margins of carapace bearing eleven granulate spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region. Subhepatic spine straight. Anterolateral spine smallest. Midlateral spine long, prominently upcurved. Posterolateral, intestinal spines subequal, upcurved. Posterior spines as long as intestinal spine, dorso-ventrally flattened. Hepatic, intestinal regions indistinctly inflated, demarcated by shallow grooves, conical.

Outer denticle on anterior margin of efferent branchial channel denticle larger than inner denticle, infraorbital lobe spinose. Thoracic sternites granulate, margin of abdominal sulcus close-set with perliform granules.

Cheliped merus as long as carapace, thickly set with conical granules; tubercle proximally on lower margin prominent. Carpus, propodus minutely granulate; propodus dorso-ventrally flattened, thicker basally, fingers slender, longer than palm. Pereiopodal meri, carpi, propodi minutely spinulate; propodi subcylindrical.

In male, abdomen granulate, basio-lateral regions of fused segments inflated; lateral margins of sixth abdominal segment convex. Male first pleopod sigmoid, tip involute.

Remarks.— *A. muricata* differs from *A. novemspinosa* and *A. elongata* in having the marginal anterolateral spine distinct rather than tuberculiform. *A. muricata* differs from *A. brevifrons* and *A. undecimspinosa* in having the first male pleopod distally sigmoid.

Distribution.— Known only from the type series – Arafura Sea, Australia, Vietnam.

Etymology.— From *muricatus* L. spiny like a Murex shell, for the long, upcurved spines that adorn its carapace posteriorly.

Arcania novemspinosa (Lichtenstein, 1816)
(fig. 2F; 6C)

Leucosia novemspinosa Lichtenstein, 1816: 143.

Iphis novemspinosa White, 1847: 51; White, 1861, pl. 2; Adams & White, 1849: 56, pl. 13, fig. 1.

Arcania novemspinosa; Bell, 1855a: 367; Bell, 1855b: 309; Bell, 1855c: 21; Herklots, 1861: 28; Haswell, 1880: 58; Haswell, 1882: 131; de Man, 1887: 392; Alcock, 1896: 267; Ihle, 1918: 265; Estampador, 1937: 513; Buitendijk, 1939: 229; Lin, 1949: 14; Tyndale-Biscoe & George, 1962: 76; Serène, 1968: 45; Jones, 1990: 188; Huang, 1994: 579; Tan, 1996: 1027, fig. 2p-r; Naiyanetr, 1998: 58.

Arcania novemspinosa var. *aspera* Miers, 1880: 317; Miers, 1886: 299; Alcock & Anderson, 1894: 203; Ihle, 1918: 313; Serène, 1968: 45.

Arcania elongata; Tan, 1996, fig. 1b [not *A. elongata* Yokoya, 1933].

not *Arcania novemspinosa*; Campbell & Stephenson, 1970: 250, fig. 13; Hill, 1982: 201, pl. 4d; Dai & Yang, 1991: 74, fig. 33.2-3 [= *A. undecimspinosa* de Haan, 1841].

Holotype.— **Malaysia:** 1 ♀ ovigerous (24.4 mm cl), NHM 1880.6, Holotype of *Arcania novemspinosa* var. *aspera* Miers, 1880.

Additional material.— **Australia:** 1 ♂ (17.0 mm cl), AMS P16660, 19°08'S 146°50'E, Magnetic Island, Horseshoe Bay, iv.1967, coll. C. Wilson. **Papua New Guinea:** 1 ♀ (28.9 mm cl), AMS P15632, Mouth of Sepik River, 03°50'S 144°34'E, 18 m depth, ix.1963, coll. R. Eginton. **Taiwan Straits:** 1 ♂ (25.2 mm cl), MNHN 10764, Pescadores Is., 1903, coll. A. Milne Edwards. **Indonesia:** 1 ♀ (23.1 mm cl), SMF 68, Mollucas, Amboina, vii-ix.1885, coll. Dr J. Brock, det. J.G. de Man; 1 ♀ (18.4 mm cl), ZMC cru3651, 6°38'S, 105°21'E, Sunda Strait, 35 m depth, 30.vii.1922; 1 ♂ (18.0 mm cl), 1 juvenile, RMNH D 4207, Timor, near Koepang, 'Snellius' Expedition, 2.xii.1929, det. A.M. Buitendijk; 1 ♂ (21.3 mm cl), ZMA, Great Kei Island, 'Siboga' Expedition, stn 261, 27 m depth. **Philippines:** 1 ♂ (17.8 mm cl), NHM 729, Mindoro Island, coll. H. Cumings, det. A. White as *Iphis novemspinosa*, [preserved dry]; 2 ♂ (12.4, 14.4 mm cl), USNM 234264, Zambales prov., Nasasa Bay, 9-33 m depth, 30.i-8.ii.1960, colls F.G. Dayrit & J.E. Norton; 1 ♂ (21.2 mm cl), USNM, Mariveles, Luzon, coll. A.M. Reese; 1 ♂ (16.3 mm cl), WAM c10501, Sulu Archipelago, Tawitawi Group, 16.5-31 m depth, 29.ii.1964, coll. B.R. Wilson. **Singapore:** 1 ♂ (19.8 mm cl), ZMA, off Changi, 15 m depth, 2.ii.1926; 1 ♀ (16.3 mm cl), ZMA, Siglap, vii.1934. **Thailand:** 1 ♂ (19.8 mm cl), 1 ♀ (27.7 mm cl), 1 ♀ ovigerous (25.6 mm cl), 1 juvenile, RMNH D 36625, between Naklua and Si Racha, Chonburi Prov., 18-25.xi.1980, coll. A.C.J. Burgers & L.B. Holthuis; 2 ♂ (15.5, 16.9 mm cl), 3 ♀ (11.7-24.1 mm cl), RMNH D 38675, Chonburi Prov., Naklua, 10 m depth, 9.i.1991, coll. A.C.J. Burgers & L.B. Holthuis; 1 ♂ (19.4 mm cl), RMNH D 42488, Chonburi Prov., Naklua, N. of Pattaya, 10-35 m depth, 15-19.i.1993, coll. A.C.J. Burgers & L.B. Holthuis; 2 ♀ (17.6, 19.7 mm cl), RMNH D 42044, Chonburi Prov., Naklua, 30 m depth, 28.i.1992, coll. A.C.J. Burgers & L.B. Holthuis; 1 ♀ ovigerous (22.8 mm cl), RMNH D 37331, Chonburi Prov., between Si Racha and Pattaya, 28-30.xii.1987, coll. A.C.J. Burgers & L.B. Holthuis; 1 ♂ (19.4 mm cl), 2 ♀ (23.7, 24.1 mm cl), 2 ♀ ovigerous (22.8, 24.9 mm cl), RMNH D 37578, Chonburi Prov., between Si Racha and Pattaya, 0-40 m depth, 3-5.xi.1988, coll. A.C.J. Burgers & L.B. Holthuis; 22 ♂ (11.3-22.9 mm cl), 20 ♀ (13.7-30.2 mm cl), 5 ♀ ovigerous (21.4-30.3 mm cl), RMNH D 37969, between Si Racha and Pattaya, 10-40 m depth, 24.xii.1989-24.i.1990, coll. A.C.J. Burgers & L.B.

Holthuis; 1 ♂ (15.6 mm cl), RMNH D 37550, Rayong Prov., Sattahip, 0-40 m depth, 16.xii.1988, coll. A.C.J. Burgers & L.B. Holthuis; 1 ♀ ovigerous (25.0 mm cl), USNM 273770, 07°53.09'N 98°50.07'E, 16-20 m depth, 15.ii.1966.

Description.— Carapace globose, longitudinally ovate in male, nearly rounded in adult female, set with anteriorly curved spinules of uneven size, regions indistinct. Frontal lobes triangular, closely set anteriorly with flat-topped granules. Margins of carapace bearing nine granulate spines: one spine each on subhepatic, midlateral, posterolateral and posterior margins, single spine on intestinal region. Anterolateral margin bearing granulate tubercle medially between subhepatic and midlateral spines, indistinct in adults. Subhepatic spine prominent, pointing anteriorly; midlateral spine upcurved; posterolateral, intestinal spines long, upcurved, longer in adult males than in females; posterior spines dorso-ventrally flattened. Hepatic, intestinal regions indistinctly inflated, demarcated by shallow grooves.

Outer denticle on anterior margin of efferent branchial channel denticle larger than inner denticle, infraorbital lobe spinose. Thoracic sternites granulate.

Cheliped merus in adult male longer than carapace, thickly set with conical granules, proximal tubercle on lower margin prominent. Carpus and propodus minutely granulate; propodus thickened basally; fingers longer than palm. Pereiopodal meri, carpi, and propodi minutely granulate.

In male, abdomen granulate, basio-lateral regions of fused segments inflated, lateral margins of sixth abdominal segment straight. Male first pleopod sinuous, tip attenuate.

Colour.— “spirit material: uniform pale pink, fingers white” (Tyndale-Biscoe & George, 1962: 76).

Remarks.— Lichtenstein’s (1816: 143) description of *Leucosia novemspinosa* is all too brief: “testa ovata scabra, margine spinulis novem, tribus posticis majoribus”.

Miers (1880: 317) distinguished his *Arcania novemspinosa* var. *aspera* “in the broader and much more closely granulated carapace, and the relatively shorter spines of the posterior and posterolateral margins”. Examination of the holotype (NHM 1880.6) proved it to be *A. novemspinosa*.

Bell (1855b: 309) found *A. novemspinosa* “resemblance to *A. undecim-spinosa* of de Haan is very close. In fact it scarcely differs excepting in the number of spines”. Alcock (1896: 268) reiterated “it seems doubtful whether *A. 9-spinosa* is really distinct from *A. 11-spinosa*”.

Tan (1996: 1027) believes “A direct comparison of the types will probably show both species to be synonymous”. *A. novemspinosa* is easily distinguished from *A. undecimspinosa* in having the anterolateral spine greatly reduced or indistinct; the posterolateral, intestinal spines prominent, longer than posterior spines; and the cheliped merus in adult male longer than the carapace.

Distribution.— Australia, Taiwan Str., Indonesia, Philippines, Malaysia, Singapore, Thailand, Andamans; 9-40 m depth.

Arcania sagamiensis Sakai, 1969
(fig. 3A, 7A)

Arcania sagamiensis Sakai, 1969: 247, textfig 1a, a'; Sakai, 1976: 93, textfig. 50a, b; Dai & Yang, 1991: 75, pl. 8, fig. 4, textfig. 35; Huang, 1994: 579.

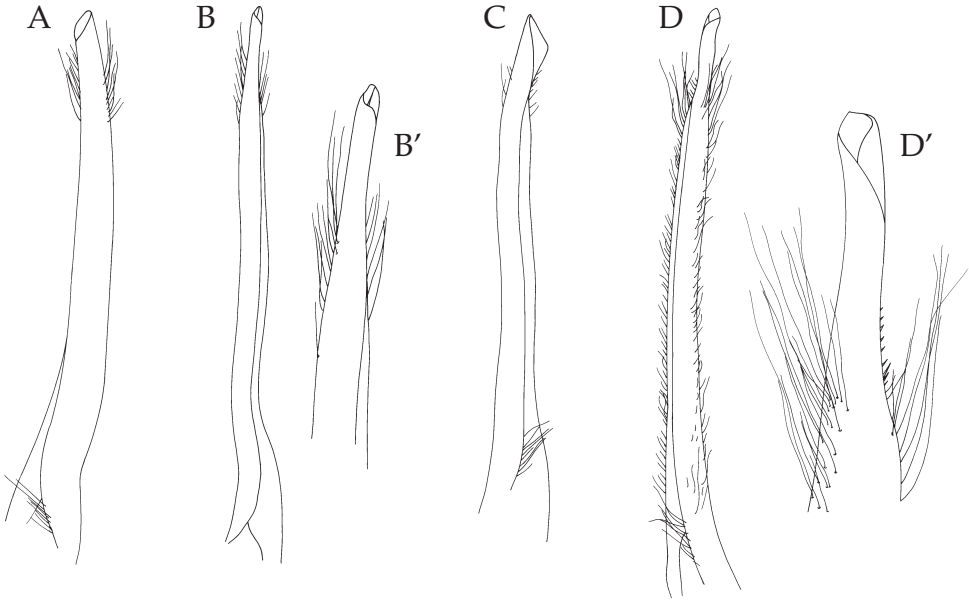


Fig. 7. First male pleopod. A, *Arcania sagamiensis* Sakai, 1969, 10.1 mm cl, (USNM 125881); B, *Arcania septemspinoso* (Fabricius, 1787), 16.2 mm cl, (USNM 65366); C, *Arcania tuberculata* Bell, 1855, 7.4 mm cl, (MNHN B27488); D, *Arcania undecimspinoso* de Haan, 1841, 26.6 mm cl, (USNM 57711).

Holotype.— **Japan:** 1 ♂ (10.1 mm cl), USNM 125881, Honshu Island, Sagami Bay, intertidal, coll. T. Sakai. Additional material.— **Western Samoa:** 1 ♀ (9.4 mm cl), ZMC ex. Museum Godeffroy, Upolu, coll. S. Wroblewsky. **Fiji Is:** 1 ♀ (11.5 mm cl), USNM, Ongea Levu, 5.5-9 m depth, 10.iv.1938, coll. F.E. Lewis.

Description.— Carapace globose, pyriform, regions indistinct, set with squat granules, fourteen granulate tubercles medially. Front produced, frontal lobes triangular, closely set with flattened granules. Margins of carapace bearing eleven granulate denticles: one denticle each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single denticle on intestinal region; midlateral and posterolateral denticles longest, upcurved. Hepatic and intestinal regions faintly demarcated by shallow grooves, hepatic tubercle conical, more prominent than subhepatic denticle.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe pine-cone like, closely set with granules. Thoracic sternites granulate.

Cheliped merus less than half as long as carapace, set with perliform granules. Carpus and propodus minutely granulose; carpus with prominent ridge medially on upper margin. Fingers bearing minutely granulate longitudinal costae. Pereiopods minutely granulate.

Male abdomen granulate, lateral margins of sixth segment straight, basal-lateral regions indistinctly inflated. Male first pleopod straight.

Remarks.— *A. sagamiensis* differs from the closely allied *A. fungilifera* in having 14 granulate tubercles dorsally on the carapace rather than 16 fungiferous tubercles, and a uniformly granulose exopod and endopod of the third maxilliped rather than

with a longitudinal row of contiguous fungiform granules.

Distribution.— Western Samoa, Fiji, Japan, China (Hainan Is.); intertidal to 9 m depth.

Arcania septemspinosa (Fabricius, 1787)
(fig. 3B, 7B)

Cancer septemspinus Fabricius, 1787: 325; Fabricius, 1793: 462; Zimsen, 1964: 647.

Leucosia septemspinosa; Fabricius, 1798: 351; Latreille, 1802: 119; Lichtenstein, 1816: 143; Bosc, 1830: 288; H. Milne Edwards, 1838: 413; Zimsen, 1964: 647.

Iphis septemspinosa; Leach, 1817: 25; Desmarest, 1825: 170; H. Milne Edwards, 1837b: 139; White, 1847: 51; H. Milne Edwards, 1849: 79, pl. 25, fig. 4; Bell, 1855a: 367; Bell, 1855b: 311; Bell, 1855c: 22; Miers, 1880: 317; Sluiter, 1881: 159, fig. 1; Serène, 1937: 77.

Iphis longipes Dana, 1852: 396, pl. 25, fig. 4; Bell, 1855b: 312; Bell, 1855c: 22.

Arcania septemspinosa; Miers, 1886: 300; Alcock, 1896: 265; Annandale & Lloyd, 1908: pl. 5, fig. 6; Rathbun, 1910: 314; Stebbing, 1910: 337; Balss, 1915: 15; Laurie, 1915: 410; Laurie, 1922: 132; Ihle, 1918: 265; Gee, 1925: 160; Kellogg, 1928: 353; Chopra, 1934: 43, textfig. 5; Suvatti, 1937: 56; Suvatti, 1950: 147; Stephensen, 1945: 73; fig. 7f; Barnard, 1950: 375, fig. 71 f, g; Dawydoff, 1952: 138; Chhapgar, 1957: 10, pl. 3a-c; Serène, 1968: 45; Kensley, 1981: 38; Tirmizi & Kasmi, 1986: 72, fig. 21; Devi et al., 1988: 25, fig. 7; Chen, 1989: 206, fig. 9, pl. 2 fig. 6; Dai & Yang, 1991: 71, pl. 7, fig. 8, fig. 32.3; Huang, 1994: 579; Zarenkov, 1994: 111; Tan, 1996: 1029, fig. 2a, 1d; Naiyanetr, 1998: 58; Ng et al., 2001: 9, pl. 2, fig a, h.

Arcania siamensis Rathbun, 1909: 108; Rathbun, 1910: 314, pl. 1, fig. 2 (part); Ihle, 1918: 313; Suvatti, 1937: 56; Suvatti, 1950: 147; Dawydoff, 1952: 138.

Arcania longipes; Ihle, 1918: 313; Serène, 1968: 45.

Arcania (?) *heptacantha*; Campbell, 1971: 40, pl. 3B.

Arcania heptacantha; Serène & Vadon, 1981: 124; Naiyanetr, 1998: 58.

not *Arcania septemspinosa*; White, 1847: 50; Bell, 1855a: 367; Bell, 1855b: 310, pl. 34, fig. 7; Bell, 1855c: 21 [= *Ixa pulcherrima* Haswell, 1880].

not *Iphis septemspinosa*; Stimpson, 1858: 161; Stimpson, 1907: 157 [= *A. heptacantha* de Man, 1907].

not *Arcania septemspinosa*; Rathbun, 1902: 30 [= *A. heptacantha* de Man, 1907].

Material.— **Fiji**: 1 ♀ (19.6 mm cl), AMS P12047, Mouth of Labasa River; 15 ♀ (9.7-21.8 mm cl), 7 ♀ ovigerous (15.2-22.9 mm cl), 10 ♀ (10.0-21.7 mm cl), MNHN Na 27552, Viti Levu lagoon, SUVA 2, stn CP 57, 17°43.4'S 177°22.8'E, 17 m depth, 20.x.1998; 1 ♀ (12.0 mm cl), MNHN Na 27551, Viti Levu lagoon, SUVA 2, stn CP 67, 17°44.1'S 177°18.3'E, 28 m depth, 21.x.1998; 5 ♂ (11.7-19.6 mm cl), 3 ♀ (13.9-19.8 mm cl), 4 ♀ ovigerous (17.9-20.5 mm cl), MNHN Na 27553, Viti Levu lagoon, SUVA 2, stn CP 69, 17°48.4'S 177°19.3'E, 17 m depth, 21.x.1998; 1 ♀ (21.5 mm cl), MNHN Na 27555, Viti Levu lagoon, SUVA 2, stn CP 80, 17°38.0'S 177°19.7'E, 36 m depth, 22.x.1998; 9 ♀ (9.9-22.7 mm cl), 1 ♀ ovigerous (19.8 m cl), 3 juveniles, MNHN Na 27554, Viti Levu lagoon, SUVA 2, stn CP 84, 17°39.9'S 177°22.2'E, 22 m depth, 22.x.1998. **Australia**: 1 ♀ (14.1 mm cl), QM w3359, Queensland, 26°30'S 153°15'E, 48 m depth, 26.vii.1968, coll. A.J. Bruce; 1 ♀ ovigerous (15.4 mm cl), QM w17392, Gulf of Carpentaria, 13°02.6'S 139°12.1'E, 56 m depth, 28.xi.1990; 3 ♂ (10.2-13.1 mm cl), 1 ♀ ovigerous (17.1 mm cl), WAM c8660, New Year I, 55 m depth, xi.1962, coll. W. Goode. **Indonesia**: 1 ♂ (14.8 mm cl), 1 juvenile, ZMC cru3645, Java Sea, 5°53'S 107°02'E, 27 m depth, 8.viii.1922; 1 ♂ (14.3 mm cl), 1 ♀ (10.3 mm cl), ZMC cru3647, Java Sea, 6°0'S 106°47'E, 22 m depth, 7.viii.1922; 1 ♂ (17.2 mm cl), ZMC cru3644, Sunda strait, 5°55'S 105°31'E, 38 m depth, 11.vii.1922; 1 ♂ (16.5 mm cl), 2 juveniles, ZMC cru3646, Sunda strait, 6°22'S 105°44'E, 30 m depth, 29.vii.1922; 1 ♀ ovigerous (15.4 mm cl), RMNH D 3133, Poeloe Weh, N. Sumatra, v.1923, coll. A. P. Buitendijk; 1 ♀ (19.1 mm cl), NHM 1880.6, Celebes, Macassar, Sulawesi; 1 juvenile, 1 ♀ (16.9 mm cl), ZMA, Java, 'Siboga' Expedition, stn 4, 7°42'S 114°12.6'E, 9 m depth; 1 ♂ (11.5 mm cl), ZMA, Badjo Bay, west coast of Flores, 'Siboga' Expedition, stn 50, 40 m depth, 16-18.iv.1899. **Malaysia**: 2 ♂ (12.2, 18.6 mm cl), RMNH D 48573, Batu Maung,

Penang, 5°17'N 100°17'E, 30 m depth, 16.i.1983, colls L.B. Holthuis & W.T. Meng. **Philippines:** 1 ♀ (17.7 mm cl), USNM 65347, Corregidor Light, off Luzon, 14°24'30"N 120°33'40"E, 'Albatross' stn 5107, 51 m depth, 9.i.1908; 1 ♂ (13.8 mm cl), USNM 65349, Mariquitdaquit I., off Leyte, 'Albatross' stn 5204, 11°04'18"N 125°05'30"E, 27 m depth, 11.iv.1908; 1 ♂ (13.8 mm cl), USNM 65349, Taratara I., 11°45'53"N 124°42'50"E, 'Albatross' stn 5208, 47 m depth, 14.iv.1908; 1 ♂ (16.2 mm cl), USNM 65366; 2 ♂ (17.2, 17.3 mm cl), 1 ♀ (18.4 mm cl), 1 ♀ ovigerous (18.3 mm cl), USNM, Taratara Island, 11°45'25"N 124°48'05"E, 'Albatross' stn 5209, 37 m depth, 14.iv.1908; 1 ♂ (14.9 mm cl), USNM 65368, Luzon, S. Fernando Pt., 16°30'36"N 120°11'06"E, 'Albatross' stn 5442, 82 m depth, 10.v.1909; 1 ♀ ovigerous (18.2 mm cl), USNM 322873, Nouongcasto, Balayan Bay, 146-157 m depth, 25.vi.1966; 1 ♀ (9.8 mm cl), WAM 226-70, Sulu Sea, off Sandarkan, Berhala Channel, 3.iii.1964, coll. B.R. Wilson; 1 ♀ ovigerous (20.1 mm cl), MNHN B18856, 14°02.8'N 120°18.8'E, MUSORSTOM, stn 2, 187-182 m depth, 19.iii.1976. **South China Sea:** 1 ♂ (16.5 mm cl), USNM 65367, off Hong Kong, 21°42'N 114°50'E, 'Albatross', stn 5302, 70 m depth, 9.viii.1909. **Vietnam:** 1 ♂ (21.5 mm cl), MNHN B9277, coll. R. Serène. **Gulf of Thailand:** 1 ♀ damaged, 1 ♀ ovigerous (15.8 mm cl), USNM 39664, S. Koh Krit, 31-37 m depth, 28.i.1900, coll. Th. Mortensen; 1 ♂ (16.0 mm cl), 1 ♀ (12.2 mm cl), USNM 39665, S. Koh Samit, 37 m depth, 31.i.1900, coll. Th. Mortensen; 1 ♀ ovigerous (15.4 mm cl), USNM 134197, SW Ko Tao I., 9.xi.1957. **India:** 1 ♀ ovigerous (17.2 mm cl), MNHN B20030, Pondicherry, det. Lucas as *Iphis septemspinosa*; 2 juveniles, NHM 1890.1.31.8.9, Bay of Bengal; 1 ♂ (18.1 mm cl), NHM 1892.7.15.400, Madras, coll. J.R. Henderson; 1 ♂ (19.4 mm cl), 5 ♀ (17.2-19.9 mm cl), 2 ♀ ovigerous (18.7, 19.0 mm cl), 13 juveniles, ZMC, Bay of Bengal, 20°51'N 87°58'E, 'Galathea', stn 305, 43-52 m depth, 26.iv.1951. **Madagascar:** 1 ♂ (14.8 mm cl), 1 juvenile, ZMC cru3643, Bay at Cape Diego, 'Galathea' stn 225, 6-8 m depth, 3.iii.1951; 1 juvenile, MNHN B18735, Tuléar, coll. B. Thomassin; 1 ♀ (16.1 mm cl), MNHN B18601, between Majunga and Narendry Bay, 7-40 m depth, 15.iv.1970; 3 ♂ (7.5-11.8 mm cl), 4 ♀ (12.5-13.0 mm cl), MNHN B18602, Mitsio Is., 46 m depth, 28.vii.1958, coll. A. Crosnier; 1 ♂ (13.0 mm cl), MNHN B 18604, 16°16'S 44°02'E, "FAO 60", stn 73/115, 36 m depth; 1 ♀ ovigerous (18.1 mm), MNHN B18335, 'ORSTOM 1', NE Mitsio Is., 46 m depth, 28.vii.1958, coll. A. Crosnier; 2 ♂ (9.6, 9.3 mm cl), 1 ♀ ovigerous (11.0 mm cl), MNHN B18603, Banc de Pracel, 65 m depth, vi.1959, coll. A. Crosnier. **South Africa.** 4 ♂ (12.4 – 13.1 mm cl), 1 ♀ (13.2 mm cl), 1 ♀ ovigerous (13.6 mm cl), 1 damaged, SAM; 1 ♂ (10.1 mm cl), 1 ♀ (10.2 mm cl), SAM, 23°19'S 43°34'E, 82 m depth, 6.viii.1964. **Gulf of Aden:** 1 ♂ (9.5 mm cl), MNHN B13437, Djibouti, 1897, coll. F. P. Jousseau; 2 juveniles, MNHN B13438, Obock, 1897, coll. F. P. Jousseau.

Description.— Carapace set with minute flattened granules. Frontal lobes subquadrate, separated by slight notch, minutely granulate anteriorly, setose. Subhepatic margin mammillate, medially bearing small tubercle; anterolateral margin sinuous, closely granulate. Lateral spine robust, slightly upcurved, two thirds as long as carapace, granulate throughout, granules smaller distally. Posterolateral margin medially set with short, upcurved, granulate spine. Intestinal spine long, upcurved, granulate. Posterior spines slender, dorso-ventrally flattened, granulate. Closely granulate ridge, half as long as carapace, running medially from intestinal spine; shorter, less prominent ridges running from posterolateral, and lateral spines.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe spinose.

Chelipeds slender, long, granulate, granules larger basally. Cheliped merus in male up to 1.4 as long as carapace. Carpus and propodus minutely granulate; fingers slender, as long as palm. Pereiopods filiform; smooth, subcylindrical.

In male, lateral margins of sixth abdominal segment straight, basio-lateral regions of fused segment inflated. Male first pleopod slightly sinuous, slender distally.

Colour.— "streaky and patchy red" (Alcock, 1896: 265).

Remarks.— *A. septemspinosa* differs from *A. heptacantha* in having a granulate

ridge, half as long as the carapace, running on the dorsal surface of the carapace to the intestinal spine; and the cheliped merus longer than the carapace. The distinguishing characters suggested by Chen (1989: 208) are inaccurate.

Fabricius' description of *Cancer septemspinosus* (1793: 462) - "thorace utrinque spina elongata acutissima, postice quinque spinoso, chelis filiformibus"- fits both *A. septemspinosa* and *A. heptacantha*. However, in Herbst's drawing (1792: 259, pl. 20, fig. 112) the mid-dorsal granulate ridge can be discerned as well as the relative lengths of the marginal spines and the cheliped merus. Dana's specimen of *Iphis longipes* (1852: 396, pl. 25, fig. 4) is lost, however his drawing depicts clearly the obtuse frontal lobes, the marginal posterolateral spines and the elongate cheliped characteristic of *A. septemspinosa*.

Distribution.— Fiji, Australia, Indonesia, Philippines, Vietnam, Gulf of Thailand, India, Madagascar, Mozambique Channel, South Africa, Persian Gulf, Gulf of Aden, Red Sea; 7-182 m depth.

Arcania tuberculata Bell, 1855

(fig. 3C, 7C)

Arcania tuberculata Bell, 1855a: 367; Bell, 1855b: 310, pl. 34, fig. 8; Bell, 1855c: 21; Alcock, 1896: 268; Borradaile, 1903: 438; Laurie, 1906: 366; Lenz, 1910: 545; Ihle, 1918: 264; Sankarankutty, 1962:154; Serène, 1968: 45.

Arcania laevimana White, 1847: 50 (nom. nud.); Bell, 1855a: 367; Bell, 1855b: 310, pl. 34, fig. 10; Bell, 1855c: 22; A. Milne Edwards, 1874: 48, pl. 3, fig. 4; Alcock & Anderson, 1894: 203; Ihle, 1918: 264.

Arcania loevimana Serène, 1968: 45 [erroneous spelling].

Arcania globata; Tan, 1996: 1027, fig. 1c.

not *Arcania tuberculata*; Tyndale-Biscoe & George, 1962: 76 [= *A. fungilifera* spec. nov.].

Holotype of *A. tuberculata*.— 1 ♂ (9.4 mm cl), NHM, Borneo, 44 m depth [preserved dry].

Holotype of *A. laevimana*.— 1 ♀ (8.8 mm), NHM 721, Philippines, Corregidor Island, coll. H. Cum-
ing [preserved dry].

Additional materia.— **New Caledonia**: 3 specimens, preserved dry, MNHN B3982, coll. B. Balansa, ex. coll. A. Milne Edwards; 2 ♂ (6.2, 6.1 mm cl), MNHN B27465, 22°19.9'S 166°20.4'E, stn 10, 15 m depth, v.1984; 1 ♂ (7.0 mm cl), MNHN B21135, 22°26'S 166°27.4'E, stn 66, 15 m depth, viii.1984; 1 ♀ (7.3 mm cl), MNHN B21170, 22°31'S 166°30'E, stn 83, 22 m depth, viii.1984; 1 ♀ (6.3 mm cl), MNHN B19222, 22°31'S 166°46'E, stn 127, 55 m depth, viii.1984; 2 ♀ (6.0, 7.0 mm cl), MNHN B21225, 22°30'S 166°47'E, stn 128, 52 m depth, viii.1984; 1 ♀ (7.5 mm cl), MNHN B19216, 22°17'S 166°24'E, stn 261, 19 m depth, xi.1984; 1 ♂ (7.8 mm cl), MNHN B21181, 22°44'S 166°44'E, stn 306, 38 m depth, xi.1984; 1 ♂ (6.5 mm cl), MNHN B21187, 22°31.4'S 167°05.2'E, stn 358, 50 m depth, xi.1984; 1 ♀ (7.9 mm cl), MNHN B21224, 22°30'S 167°09'E, stn 374, 70-72 m depth, 21.i.1985; 1 ♀ ovigerous (8.2 mm cl), MNHN B19203, 22°32'S 167°08'E, stn 375, 67-71 m depth, 21.i.1985; 1 ♀ ovigerous (7.5 mm cl), MNHN B27466, 22°36'S 167°10E, stn 385, 75 m depth, 22.i.1985; 1 ♂ (5.9 mm cl), MNHN B21186, 22°33'S 167°17'E, stn 402, 40 m depth, 23.i.1985; 1 ♀ ovigerous (7.8 mm cl), MNHN B19197, 22°37'S 167°16'E, stn 414, 60 m depth, 24.i.1985; 1 ♂ (6.2 mm cl), 1 ♀ (6.2 mm cl), MNHN B18426, 18°26.4'S 163°09.7'E, stn 468, 40 m depth, 1.iii.1985; 1 ♀ ovigerous (6.6 mm cl), 1 juvenile, MNHN B21192, 18°28'S 163°07'E, stn 471, 42 m depth, 1.iii.1985; 1 ♀ ovigerous (6.8 mm cl), 1 juvenile, MNHN B21165, 18°26'S 163°05'E, stn 472, 48 m depth, 1.iii.1985; 1 ♀ ovigerous (8.3 mm cl), MNHN B18422, 18°57'S, 163°32'E, stn 481, 33 m depth, 02.iii.1985; 1 ♀ ovigerous (7.5 mm cl), MNHN B27467, 19°11.2'S 163°24.9'E, stn 535, 45 m depth, 6.iii.1985; 2 ♂ juveniles, 1 ♀ ovigerous (6.9 mm cl), 1 ♀ juvenile, MNHN B27468, 19°06'S 163°16'E, stn 540, 40 m depth, 6.xi.1985; 1 ♀ ovigerous (7.8 mm cl), MNHN B18303, 22°17.9'S 167°04.4'E, stn 600, 62-65 m depth, 5.viii.1986; 1 ♂ (5.6 mm cl), MNHN

B18306, 22°01'S 166°50.5'E, stn 623, 32-40 m depth, 6.viii.1986; 1 ♂ (5.8 mm cl), 1 ♀ ovigerous (6.0 mm cl), MNHN B18301, 21°57.9'S 166°52.5'E, stn 626, 47-48 m depth, 6.viii.1986; 1 juvenile, MNHN B18304, 21°57.3'S 166°49.6'E, stn 632, 44-45 m depth, 6.viii.1986; 1 juvenile, MNHN B18299, 21°54.2'S 166°42.2'E, stn 642, 47-44 m depth, 7.viii.1986; 1 ♂ (6.2 mm cl), MNHN B18305, 21°30.2'S 166°05.9'E, stn 700, 45 m depth, 10.viii.1986; 1 ♂ (7.3 mm cl), MNHN B18216, 21°24.0'S 166°02.5'E, stn 710, 30-31 m depth, 10.viii.1986; 1 ♂ (5.2 mm cl), MNHN B18302, 21°22.6'S 166°00.7'E, stn 713, 34-35 m depth, 11.viii.1986; 1 juvenile, MNHN B18300, 21°18.7'S 165°53.5'E, stn 729, 42-45 m depth, 12.viii.1986; 1 ♂ (6.8 mm cl), MNHN B27469, 21°0.0'S 165°29.3E, stn 801, 29 m depth, 9.i.1987; 1 ♀ ovigerous (6.9 mm cl), MNHN B27470, 21°52.6'S 165°25.4'E, stn 816, 31 m depth, 10.i.1987; 1 ♂ (5.4 mm cl), MNHN B27471, 20°28.8'S 164°47.5'E, stn 881, 27 m depth, 13.i.1987; 1 ♀ ovigerous (6.4 mm cl), MNHN B27472, 20°44.9'S 164°14.9'E, stn DW933, 90-100 m depth, 27.iv.1988; 1 ♀ ovigerous (8.5 mm cl), MNHN B27473, 20°43'S 164°16.8'E, stn DW934, 10 m depth, 27.iv.1988; 1 ♀ (9.1 mm cl), MNHN B27474, 20°32.2'S 164°08.8'E, stn DW948, 16 m depth, 28.iv.1988; 1 ♂ (5.6 mm cl), MNHN B27475, 20°20.3'S 163°57.9'E, stn DW 985, 15-17 m depth, 30.iv.1988; 2 juveniles, MNHN B27476, 20°08.9'S 163°57.2'E, stn DW1010, 16 m depth, 3.iv.1988; 1 ♂ (7.4 mm cl), MNHN B27488, 20°08.7'S 163°58.4'E, stn DW1014, 22-23 m depth, 3.iv.1988; 1 ♂ (5.7 mm cl), MNHN B27477, 20°06.7'S 163°48.6'E, stn DW1025, 25-28 m depth, 3.04.1988; 1 ♀ ovigerous (7.3 mm cl), MNHN B27478, 19°51.7'S 163°42.5'E, stn DW1097, 34 m depth, 24.x.1989; 1 ♀ (8.4 mm cl), MNHN B27479, 19°31.3'S 113°34.6'E, stn DW1134, 40 m depth, 20.x.1989; 1 ♀ ovigerous (6.1 mm cl), MNHN B27480, 19°23.9'S 163°14.7'E, stn DW 1181, 45 m depth, 31.x.1989; 1 ♀ (9.7 mm cl), MNHN B27481, Maitre Island, 6 m depth, 24.iii.1993, coll. P. Bouchet; 1 ♂ (5.8 mm cl), 1 ♀ (6.1 mm cl), MNHN B27482, Touho Bank, 20°44.20'S 165°14'E, 51-59 m depth, 15.ix.1993; 1 ♂ (8.0 mm cl), MNHN B27480, 22°37.79'S 167°09.71'E, BATHUS 2, stn DW 714, 124 m depth, 10.v.1993. **Chesterfield-Bellona Plateau:** 1 ♀ (6.2 mm cl), MNHN B21266, 20°48.93'S 158°30.21'E, 'CHALCAL 1', stn D 45, 50 m depth, 12-31.vii.1984; 1 ♂ (7.3 mm cl), 1 ♀ ovigerous (8.6 mm cl), MNHN B21265, 21°42.40'S 159°29'E, 'CHALCAL 1', stn D 61, 50 m depth, 12-31.vii.1984. **Chesterfield Islands:** 1 ♀ ovigerous (8.4 mm cl), MNHN B27484, 19°11.96'S 159°58.84'E, 'Corail 2', stn DW 82, 62 m depth, 25.viii.1988; 1 juvenile, MNHN B27485, 19°08.99'S 158°26.24'E, 'Corail 2', stn DW 101, 37 m depth, 27.viii.1988; 1 ♂ (5.3 mm cl), MNHN B27486, 19°9.0'S 158°49.10'E, 'Corail 2', stn DW 108, 68 m depth, 27.viii.1988; 2 ♂ (6.0, 7.1 mm cl), MNHN B27487, 19°28'S 158°24.33'E, 'Corail 2', stn DW 125, 54 m depth, 29.viii.1988. **Indonesia:** 1 ♂ (6.3 mm cl), ZMA, 1°42.5'S 130°47.5'E, 'Siboga' Expedition, stn.164, 32 m depth, 20.viii.1899, det. Ihle as *A. laevimana*; 1 ♂ (4.6 mm cl), 2 ♀ (5.7, 7.4 mm cl), ZMA, Haingsisi, Samau I., SW of Timor, 'Siboga' Expedition, stn 303, 36 m depth, 3.ii.1900, det. Ihle as *A. laevimana*; 1 ♂ (8.2 mm cl), ZMA, Solor Str., off Kampong Menanga, 10°27.9'S 123°28.7'E, 'Siboga' Expedition, stn 305, 113 m depth, 8.ii.1900, det. Ihle as *A. laevimana*; 1 ♂ (5.8 mm cl), ZMC cru3660, Celebes [=Sulawesi], Makassar, 35 m depth, 27.vi.1922. **Philippines:** 1 ♂ (7.7 mm cl), SMF 50, Parawan Island, Taliban near Bohol, 1876, coll. C. Semper; 1 ♀ ovigerous (8.8 mm cl), 1 ♀ (7.7 mm cl), SMF 49, Pandaman Island, 1876, coll. C. Semper; 2 ♀ (7.1, 12.5 mm cl), SMF 48, Pandaman Island, 1876, coll. C. Semper; 1 ♀ (10.8 mm cl), USNM 134196, Sulu Archipelago, 06°09'S, 120°58' E, 'Albatross' stn 5141, 53 m depth, 15.ii.1908. **South China Sea:** 1 ♂ (6.3 mm cl), ZMA, Horsburgh lighthouse, iv.1934, coll. M.W.F. Tweedie, det. Ihle as *A. laevimana*. **Sri Lanka:** 1 ♀ ovigerous (10.0 mm cl), NHM 1907.5.22.79, Gulf of Manaar, coll. W.A. Herdman; 1 ♀ ovigerous (9.3 mm cl), NHM 1934.1.16.53, coll. Miss Herdman. **Seychelles Islands:** 1 ♀ ovigerous (8.3 mm cl), MNHN B18999, 4°37.4'S 54°20.7'E, 'REVES II', stn 31, 50 m depth, 9.ix.1980; 1 ♂ (8.0 mm cl), MNHN B18995, 3°56.1'S 55°40.5'E, 'REVES II', stn 50, 45-50 m depth, 15.ix.1980. **Madagascar:** 1 ♀ (8.2 mm cl), MNHN B18733, Fort Dauphin; 1 ♂ (5.9 mm cl), MNHN B18753, Nosy Iranja, 25 m depth, 28.vi.1965, coll. R. Plante.

Description.— Carapace globose, pyriform, regions indistinct, bearing small acute or flattened granules, few larger, acute or claviform tubercles. Frontal lobes triangular, closely granulate. Margins of carapace bearing eleven granulate spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region; subhepatic, anterolateral, and midlateral spines

subequal, posterolateral longest, upcurved. Hepatic and intestinal regions faintly demarcated by shallow grooves.

Outer margin of efferent branchial channel margin inflated anteriorly, closely set with flattened granules, outer denticle larger than inner denticle, infraorbital lobe bulbiform, closely set with flattened granules. Thoracic sternites set with perliiform granules.

Cheliped merus two thirds as long as carapace, prominently granulate. Carpus and propodus minutely granulose; carpus with prominent knob medially on upper margin. Fingers bearing minutely granulate longitudinal costae. Pereiopodal meri, carpi, and propodi minutely granulate; dactyls closely setose anteriorly.

Male abdomen granulate, lateral margins of sixth segment straight, basio-lateral regions indistinctly inflated. Male first pleopod straight, tip funnel-shaped.

Colour.— Carapace and chelipeds light brown to light orange, posterolateral and posterior spines paler; light-coloured band running from frontal region to cardiac region; pereopods whitish.

Remarks.— *A. tuberculata* differs from other pyriform *Arcania* species, *A. sagamien-sis* and *A. fungilifera* spec. nov., in having prominent posterolateral marginal spines, bispinose posterior margin of the carapace, and the cheliped merus two thirds as long as the carapace.

Bell (1855b: 310, pl. 34, figs 8,10) illustrated *A. tuberculata* and *A. laeovimana* as covered with claviform tubercles - the latter differing from *tuberculata* in having "simple" marginal spines. In fact, examination of Bell's type specimen (NHM 721) showed the posterior marginal spines granulate, as in *A. Milne Edwards'* (1874: pl. 3, fig. 4) illustration of *A. laeovimana*. Alcock (1896: 268) synonymized *laeovimana* with *tuberculata*.

In Tan's photograph (1996: fig. 1c), the knobbed cheliped carpus and deeply notched front identify the specimen as *A. tuberculata*.

Distribution.— New Caledonia, Australia, Indonesia, Philippines, South China Sea, Andamans, Sri Lanka, Maldives, Seychelles, Madagascar; 10-124 m depth.

Arcania undecimspinosa de Haan, 1841
(fig. 3D, 7D)

Arcania undecimspinosa de Haan, 1841: 135, pl. 33, fig. 8; Bell, 1855a: 367; Bell, 1855b: 309; Bell, 1855c: 21; Herklots, 1861: 28; Walker, 1887: 111; Ives, 1891: 216; Ortmann, 1892: 577; Henderson, 1893: 404; Alcock, 1896: 266; Rathbun, 1902: 30; Rathbun, 1910: 314; Parisi, 1914: 296; Ihle, 1918: 265; Balss, 1922: 132; Shen, 1931: 107, pl. 10 fig. 1; Yokoya, 1933: 132; Sakai, 1934: 288; Sakai, 1935: 58, pl. 10, fig. 1; Sakai, 1937: 123, fig. 15a, pl. 14, fig. 2; Shen, 1937: 284; Estampador, 1937: 514; Serène, 1937: 77; Suvatti, 1937: 55; Lin, 1949: 14; Uchida, 1949: 720, fig. 2084; Suvatti, 1950: 147; Dawydoff, 1952: 138; Utinomi, 1956: 72, pl. 36, fig. 7; Miyake, 1961a: 14; Miyake, 1961b: 170; Miyake et al., 1962: 126; Sankarankutty, 1962: 155; Chang, 1963: 2; Park, 1964: 16; Shen & Dai, 1964: 19, fig. 1; Utinomi, 1964: 72, pl. 36, fig. 7; Sakai, 1965: 40, text-fig. 6a, pl. 16, fig. 3; Romimohtarto, 1967: 11, pl. 2, fig. b; Serène: 1968: 45; Zarenkov, 1969: 23; Holthuis & Sakai, 1970: 119, pl. 11, fig. 2; Takeda & Miyake, 1970: 223; Campbell, 1971: 41; Gurjanova & Chang, 1972: 156; Kim, 1973: 295, 611, pl. 11, fig. 60, textfig. 91; Yamaguchi et al., 1976: 34; Sakai, 1976: 91, pl. 28, fig. 1; Kensley, 1978: 250; Takeda, 1979: 153; Kensley, 1981: 38; Takeda, 1982a: 18; Takeda, 1982b: 97, fig. 284; Miyake, 1983: 60, pl. 20, fig. 6; Takeda, 1985: 122, fig.; Takeda, 1987: 10; Serène & Vadon, 1981: 119, 124; Tirmizi & Kazmi, 1986: 76, fig. 22; Chen, 1989: 204, fig. 8, pl. 2 fig. 4; Huang, 1989: 305, fig. 267; Jones, 1990: 188; Dai & Yang, 1991: 73, pl. 8, fig. 1, fig. 33.1; Yamaguchi & Baba, 1993: 318, fig. 101;

Huang, 1994: 579; Zarenkov, 1994: 111; Fransén et al., 1997: 87; Naiyanetr, 1998: 58; Ng et al., 2001: 9.

Arcania granulosa Miers, 1877: 240, pl. 38, fig. 29; Miers, 1879: 44; Haswell, 1880: 58; Haswell, 1882: 131 [= *A. undecimspinosa* fide Miers, 1879: 44].

Arcania novemspinosa; Campbell & Stephenson, 1970: 250, fig. 13; Hill, 1982: 201, pl. 4d; Dai & Yang, 1991, fig. 33.3.

Arcania erinaceus; Tirmizi & Kasmi, 1986: 72, fig. 20.

not *Arcania undecimspinosa*; Miers, 1884: 548 [= *A. brevifrons* Chen, 1989].

not *Arcania undecimspinosa* André, 1931:642 [= *A. muricata* spec. nov.].

Lectotype and paralectotypes of *A. undecimspinosa*.— **Japan**: 5 specimens, RMNH D 790, 1825-1834, coll. H. Bürger; 1 ♂ (16.2 mm cl), 4 ♀ (15.6-20.9 mm cl), RMNH D 42114, same data as above; 1 ♂ (18.7 mm cl), RMNH D 42115, 1823-1829, coll. P.F. von Siebold. Lectotype and paralectotypes of *A. undecimspinosa* de Haan selected by Yamaguchi & Baba (1993: 318).

Holotype of *A. granulosa*.— 1 juvenile, NHM 52.71, Australia, Queensland, Moreton Bay, [preserved dry].

Additional material.— **Marquesas Islands**: 1 ♂ (17.0 mm cl), 4 juveniles, MNHN B27489, Hiva Oa Island, 9°44.5'S 138°50.9'W, MUSORSTOM 9, stn DW 1218, 125-135 m depth, 30.viii.1997; 2 juveniles, MNHN B27490, 9°42'S 139°03'W, MUSORSTOM 9, stn DW 1235, 105-285 m depth, 31.viii.1997. **Loyalty Islands**: 1 ♀ (24.5 mm cl, parasitized), MNHN B27491, 20°47.32'S 167°04.60'E, MUSORSTOM 6, stn DW 392, 340 m depth, 13.ii.1989. **Australia**: 1 ♀ (25.9 mm cl), QM w3346, Queensland, Bowen, ii.1934, coll. J. MacGregor; 1 ♀ ovigerous (23.0 mm cl), QM w17030, off Tully Heads, 18°00.1'S 147°01.3'E, 224-228 m depth, 9.i.1986; 1 ♀ ovigerous (22.9 mm cl), QM w17029, 18°01.7'S 147°01.7'E, 220 m depth, 17.i.1986; 2 ♂ (15.5, 19.5 mm cl), 1 ♀ (23.4 mm cl), AMS P15384, off Cape Moreton, 36 m depth, ix.1966, coll. J.M. Thomson; 1 ♀ damaged, QM w3647, Moreton Bay, 27.xi.1942; 1 ♂ (17.3 mm cl), 1 ♀ (23.9 mm cl), AMS P48883, E. Swains Reef, 21°43.23'S 152°57.06'E, 179 m depth, 10.ix.1995, colls J.K. Lowry & K. Dempsey. **Japan**: 1 ♂ (17.6 mm cl), MNHN B13452, 1909; 1 ♀ (11.6 mm cl), USNM 18873; 1 ♂ (15.9 mm cl), NHM 1906.2.2.1; 2 ♀ (15.9, 24.3 mm cl), ZMC cru3642, Kyushu Island, Nagasaki, 1.vii.1911, coll. J. Jordan; 1 ♀ ovigerous (24.0 mm cl), USNM 63676, Kyushu Island, Misaki, 1930, det. M.J. Rathbun; 1 ♂ (18.8 mm cl), 1 ♀ (19.3 mm cl), 1 ♀ ovigerous (17.8 mm cl), USNM 26280, Kyushu Island, Nagasaki, Hizen, 1900; 1 ♀ ovigerous (17.8 mm cl), USNM 45833, Kyushu Island, Nagasaki; 2 ♂ (20.0, 24.0 mm cl), 2 ♀ (25.7, 26.9 mm cl), NNM D41930, Kyushu Island, Amakusa Archipelago, Tomioka, 60-70 m depth, viii.1983, coll. K. Harada; 1 ♂ (17.7 mm cl), NHM 1961.6.5.33, Tosa Bay, iv.1961, coll. K. Sakai; 1 ♂ (11.8 mm cl), USNM, Honshu Island, off Seno Umi, 'Albatross' stn 3702, 57-74 m depth, 7.v.1900; 1 ♀ (18.1 mm cl), USNM 134198, Honshu Island, off Nome Saki, 'Albatross' stn 3725, 24 m depth, 15.v.1900; 2 ♀ (16.8, 21.4 mm cl), SMF 22566, Honshu Island, Kii Peninsula, Tanabe, 3-4.x.1988, coll. K. Sakai; 1 ♂ (19.3 mm cl), 4 ♀ (14.8-24.3 mm cl), SMF 22575, Shikoku Island, Tosa Bay, 90 m depth, 10.v.1990. **China**: 2 ♂ (20.7, 26.6 mm cl), 1 ♀ (27.9 mm cl), 1 ♀ damaged, USNM 57711, Tsimei, vi.1923; 1 ♀ ovigerous (28.8 mm cl), NHM 1933.3.19.134, Amoy, coll. C.J. Shen; 1 ♀ (22.9 mm cl), MNHN 160, Canton, coll. M. Barby. **Taiwan**: 1 ♀ ovigerous (25.3 mm cl), NTOU, Tai Shi, 3.ii.1983. **Philippines**: 1 ♂ (22.8 mm cl), MNHN B18142, 14°02.2'N 120°17.7'E, MUSORSTOM, stn 32, 193-184 m depth, 23.iii.1976; 1 ♀ (8.0 mm cl), MNHN B18145, 14°02.2'N 120°18.1'E, MUSORSTOM, stn 61, 202-184 m depth, 27.iii.1976; 1 ♂ (11.0 mm cl), MNHN B18147, 13°45'N 120°37'E, MUSORSTOM 2, stn CP 80, 178-205 m depth date; 1 ♂ (12.0 mm cl), MNHN B18038, 14°00'N 120°18'E, MUSORSTOM 3, stn CP 86, 187-192 m depth, 31.v.1985; 5 ♀ (12.8-17.8 mm cl), MNHN B18042, 14°00'N 120°18'E, MUSORSTOM 3, stn CP 96, 190-194 m depth; 1.vi.1985; 1 ♂ (18.7 mm cl), 1 ♀ (13.0 mm cl), USNM 322873, Batangas, Balayan Bay, 220-420 m depth 19.vii.1966. **South Africa**: 1 ♂ (16.8 mm cl), 1 ♀ (17.0 mm cl), 2 juveniles, SAM, 29°35'S 31°38'E, 150 m depth, 9.ix.1964; 1 ♀ (23.2 mm cl), NHM 1883.1a; 1 ♂, ZMC, Durban, 22.viii.1929, coll. Th. Mortensen; 1 ♂ (15.5 mm cl), ZMC, Durban, 27.viii.1929, coll. Th. Mortensen.

Description.— Carapace globose, longitudinally ovate in male, nearly rounded in adult female, regions nearly indistinct, covered with spinules of uneven size. Frontal lobes triangular, closely set anteriorly with flat-topped granules. Margins of carapace bearing eleven spines: one spine each on subhepatic, anterolateral, midlateral, posterolateral and posterior margins, single spine on intestinal region. Anterolateral spine shortest; midlateral, posterolateral, and intestinal spines squat, upcurved, granulate; posterior spines dorso-ventrally flattened, granulate. Hepatic and intestinal regions somewhat inflated, demarcated by shallow grooves.

Outer denticle on anterior margin of efferent branchial channel larger than inner denticle, infraorbital lobe conical. Thoracic sternites prominently granulate.

Cheliped merus in male four fifths as long as carapace, thickly set with conical granules, proximal meral tubercle indistinct. Carpus and propodus minutely granulate, propodus dorso-ventrally flattened, thicker basally, fingers slender, longer than palm. Pereiopodal meri, carpi and propodi minutely granulate; dactylar margins setose.

Male abdomen prominently granulate, basio-lateral regions of fused segments inflated, lateral margins of sixth abdominal segment slightly convex. Male first pleopod sinuous, distally attenuate.

Colour.— “Dorsally the carapace is brownish with many small yellow dots, ventrally it is yellowish white. The legs also are yellowish white.” (Holthuis & Sakai, 1970: 119, after Bürger).

Remarks.— *A. undecimspinosa* differs from *A. novemspinosa* and *A. elongata* in having a distinct marginal anterolateral spine. *A. undecimspinosa* differs from *A. brevifrons* in having the lateral margins of the male sixth abdominal segment straight rather than convex, and the first male pleopod nearly straight rather than distally bent. It differs from *A. muricata* spec. nov. in having shorter midlateral, posterolateral and posterior spines, and the first male pleopod straight rather than distally sigmoid.

The short, subequal spines depicted by Hill (1982, pl. 4d), and Dai & Yang (1991, fig. 33.3), clearly identify their specimens as *A. undecimspinosa*.

Distribution.— Marquesas Islands, Loyalty Islands, Australia, Japan, Korea, China, Hong Kong, Taiwan, Philippines, India, Andamans, Seychelles, Mascarene Basin, South Africa; 14-420 m depth.

Acknowledgements

I am grateful to P. Berents, T.-Y. Chan, P. Clark, A. Crosnier, P. Davie, D. Eibye-Jacobsen, C. H. J. M. Fransen, D. Guinot, M. Hewitt, L. B. Holthuis, M. van der Merwe, D. Platvoet, V. Spiridonov and M. Türkay for entrusting me with valuable material from their collections. I am thankful to Prof. L.B. Holthuis for his helpful review. Special thanks to the librarians of the American Museum of Natural History, New York. A Shoob took the photographs. I am deeply indebted to Alain Crosnier for his generous hospitality.

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Received: xii.2000

Accepted: vi.2001

Edited: C.H.J.M. Franssen

