

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

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A study of major collections led to a revision of the Indo-Pacific leucosiid 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 septemspinus* 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 leucosiid 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, 3<sup>rd</sup>–5<sup>th</sup> segments fused; adult female abdomen greatly swollen, 4<sup>th</sup>–6<sup>th</sup> 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 septemspinosa* 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, Ulecheue 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, pereiopods pale with merocarpal joint orange.

**Remarks.**— Chen (1989: 206) described *A. brevifrons* as "closely related to *Arcania undecimspinos* 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. undecimspinos* 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; Iin, 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  $\gamma$ .

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  $\delta$  (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  $\varnothing$  (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  $\delta$  (30.0 mm cl), 1  $\varnothing$  (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  $\delta$  (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  $\delta$  (26.3 mm cl), MNHN B17540, Varella, 145 m depth, 30.ix.1925, coll. A. Krempf; 1 juvenile, MNHN B9846, 12.x.1971; 1  $\varnothing$  ovigerous (31.2 mm cl), MNHN B9845, 12.x.1971. **Madagascar:** 1  $\delta$  (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  $\delta$  (29.1 mm cl), ZMMU Ma5242, "Vitiaz" stn 2634, 86-92 m depth, 25.xi.1988; Holotype of *Arcania spinixa* Zarenkov, 1994. Data as above: 1  $\delta$  (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 perli-form 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 perli-form 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 congener, *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.

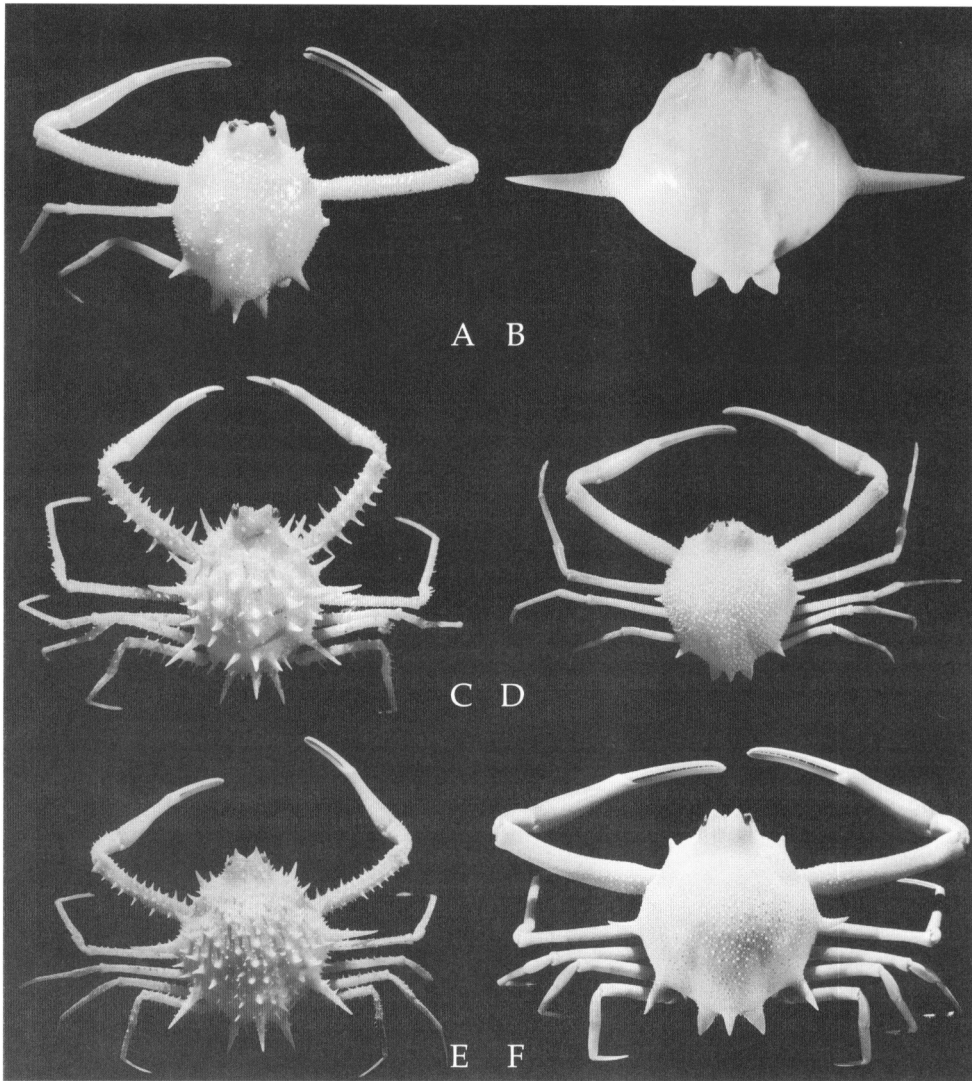


Fig. 1. A, *Arcania brevifrons* Chen, 1989, 1 ♂, 16.3 mm (MNHN B18982); B, *Arcania cornuta* (MacGilchrist, 1905) comb. nov., 1 ♂, 29.1 mm (ZMMU Ma5242); C, *Arcania echinata* spec. nov., 1 ♂, 13.8 mm cl (WAM c24381), Holotype; D, *Arcania elongata* Yokoya, 1933, 1 ♂, 19 mm cl, (MNHN B27450); E, *Arcania 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 Ж), and resemble fig. 8 И; 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 erinaceus*; 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), NIIM, 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), MNIIN 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), MNIIN 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), MNIIN 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), MNIIN B27451, 19°25.2'S 163°40.7'E, 53 m depth, stn 1141, 27.x.1989; 1 ♂ (12.4 mm cl), MNIIN 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, Limbancauyan 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, Malavatuau 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-

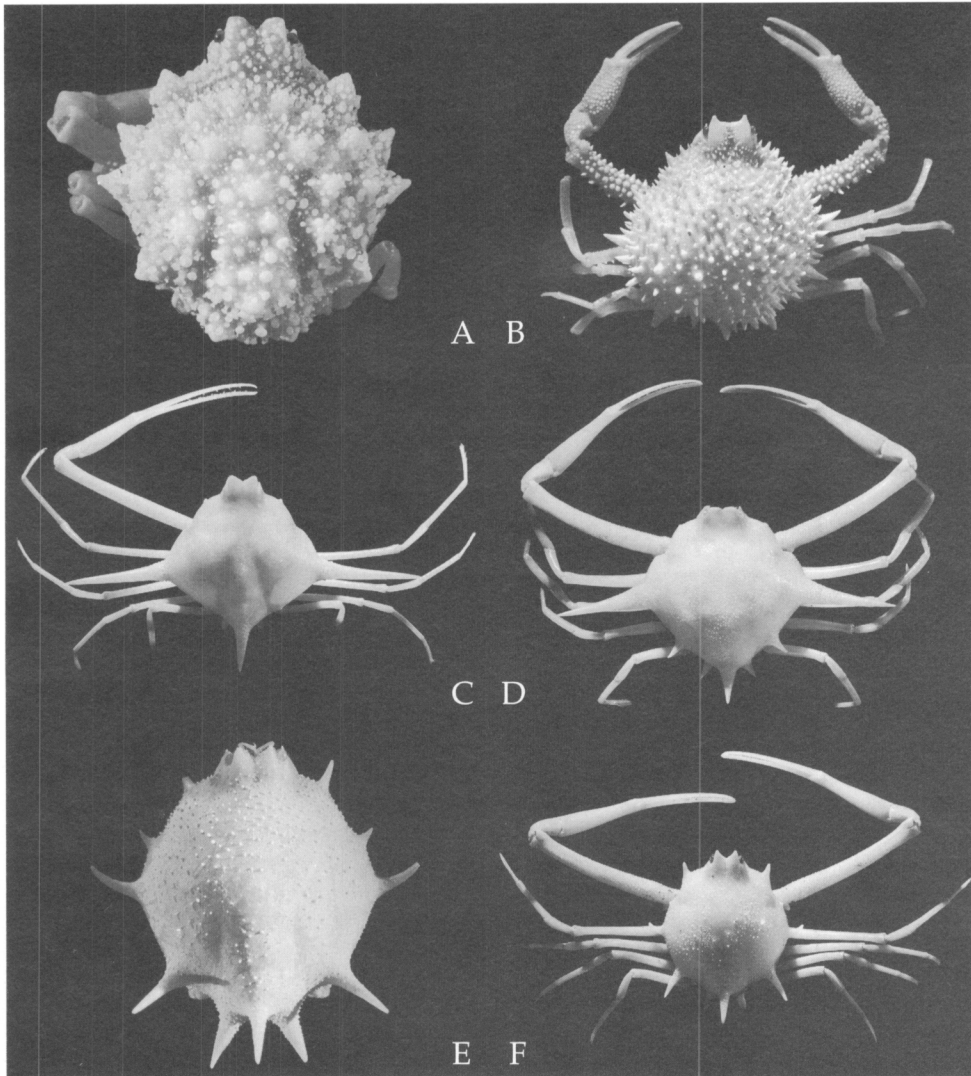


Fig. 2. A, *Arcania fungilifera* spec. nov., 1 ♀, 12.0 mm cl, (WAM 282-60), Holotype; B, *Arcania globata* Stimpson, 1858, 1 ♀, 11.9 mm cl, (USNM 13713); C, *Arcania gracilis* (Henderson, 1893), 1 ♂, 14.2 mm cl, (MNHN B18394); D, *Arcania heptacantha* de Man, 1907, 1 ♂, 22.2 mm cl, (SMF 13210); E, *Arcania 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, demarked 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 erinaceus*; 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 spinosissimo; 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. tuberculata*, Bell, 1855].

Material.— **Korea Straits:** 1 ♀ (7.6 mm cl), NHM 1878.11, 34°8'N 126°24'E, 44 m depth, det. F.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 perliiform granules.

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

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

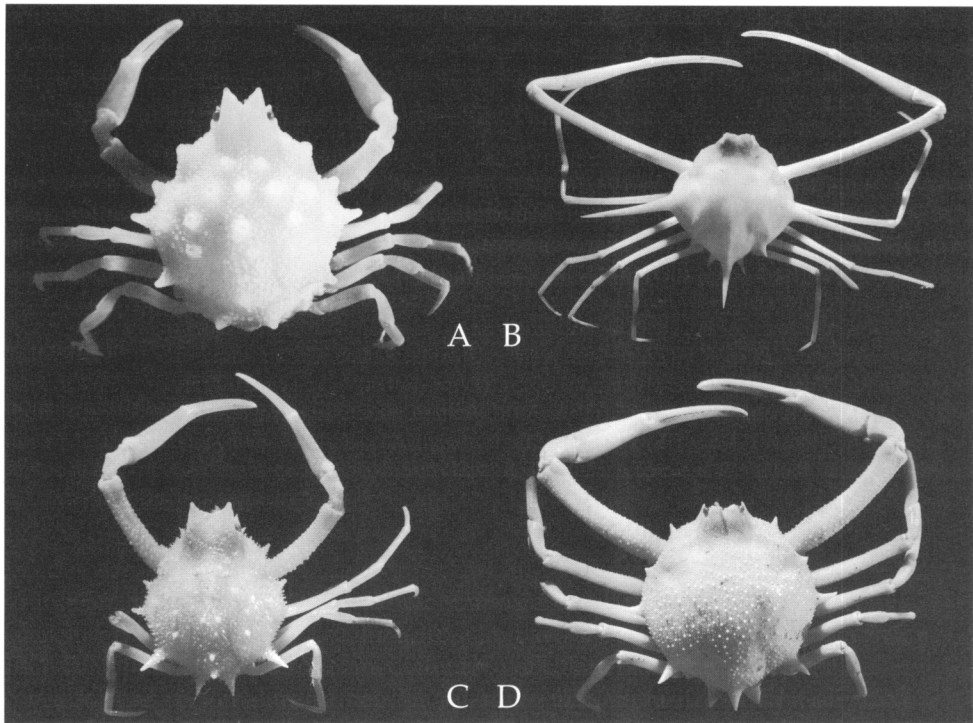


Fig. 3. A, *Arcania sagamiensis* Sakai, 1969, 1 ♀, 11.5 mm cl, (USNM); B, *Arcania septemspinosa* (Fabricius, 1787), 1 ♂, 16.6 mm cl, (USNM 65367); C, *Arcania tuberculata* Bell, 1855, 1 ♂, 5.8 mm cl, (MNHN B27482); D, *Arcania undecimspinosa* de Haan, 1841, 1 ♂, 26.6 mm cl, (USNM 57711).

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.

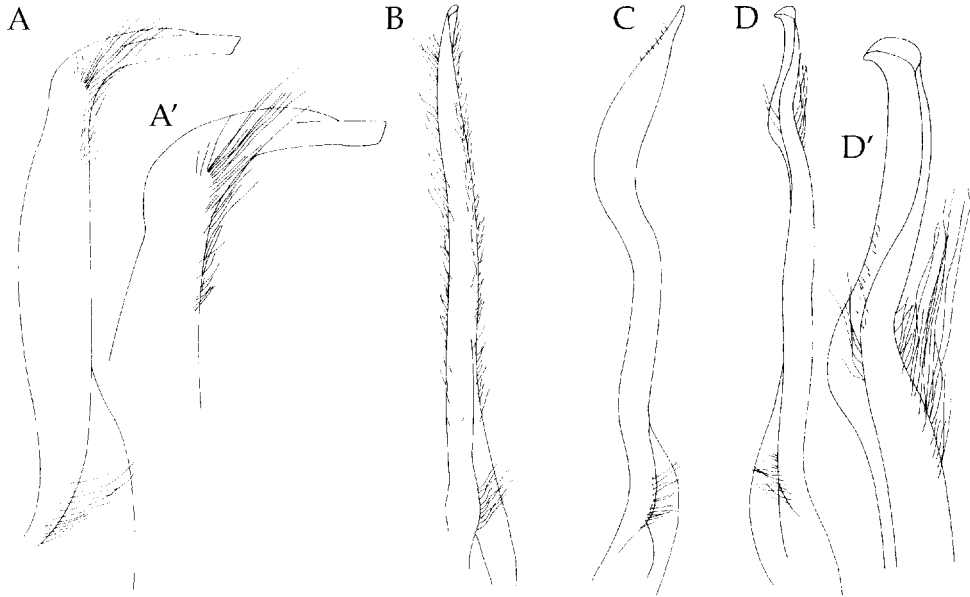


Fig. 4. First male pleopod. A, *Arcania brevifrons* Chen, 1989, 16.3 mm cl, (MNHN B18982); B, *Arcania cornuta* (MacGilchrist, 1905) comb. nov., 1 ♂, 29.1 mm (ZMMU Ma5242); C, *Arcania echinata* spec. nov., 13.8 mm cl (WAM c24381), holotype; D, *Arcania elongata* Yokoya, 1933, 19 mm cl, (MNHN B27450).

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

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

*Arcania quinquispinosa* 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 quinquispinosa*; 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 I, 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), MNIIN 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), MNIIM 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, MNIIN 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), MNIIN 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 periform granules. Posterolateral margin oblique, medially set with flattened, granulate tubercle. Spine on intestinal region shorter than lateral spine, robust, horizontal, basally ringed with periform 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

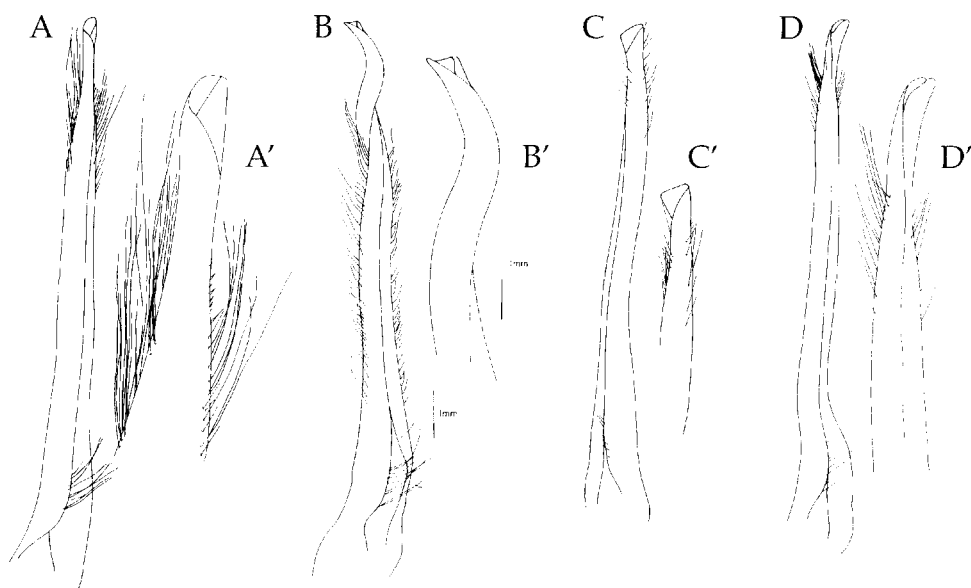


Fig. 5. First male pleopod. A, *Arcania crinacea* (Fabricius, 1787), 21.5 mm cl, (USNM 57769); B, *Arcania foliolata* spec. nov., 22.0 mm cl, (AMS p5963); C, *Arcania globata* Stimpson, 1858, 9.8 mm cl, (SMF 15111); D, *Arcania gracilis* (Henderson, 1893), 14.7 mm cl, (USNM 65335).

*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 septemspinosus*; 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; Franssen 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), NIIM 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.

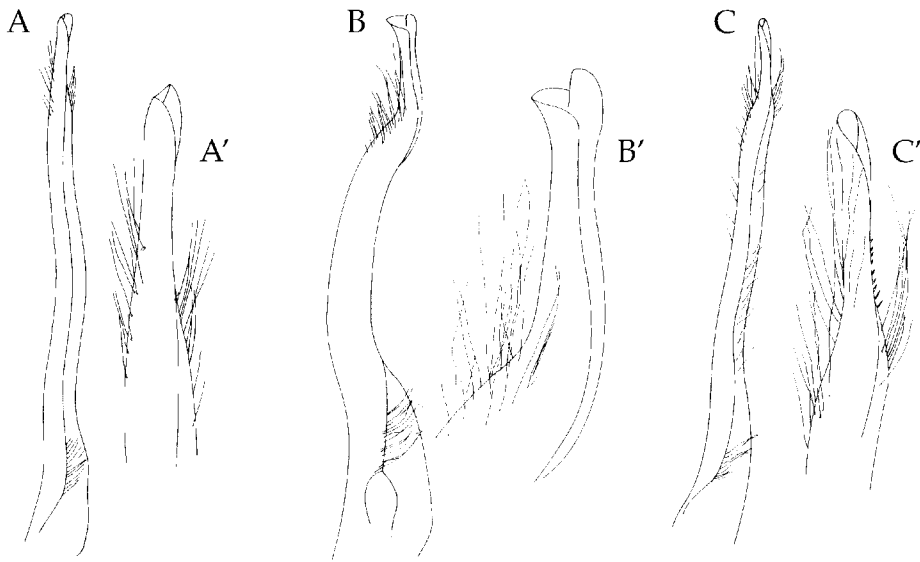


Fig. 6. First male pleopod. A, *Arcania heptacantha* de Man, 1907, 22.2 mm cl, (SMF 13210); B, *Arcania muricata* spec. nov., 22.3 mm cl, (MNHN B13451); C, *Arcania undecimspinosa* (Lichtenstein, 1816), 21.2 mm cl, (USNM).

*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.