An examination of the genus *Philyra* Leach, 1817 (Crustacea, Decapoda, Leucosiidae) with descriptions of seven new genera and six new species

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ABSTRACT
A study of the leucosiid genus *Philyra* Leach, 1817 led to realization that it is restricted to its type species, *P. globus* (Fabricius, 1775) and one new species, *P. samia* n. sp. Seven new genera are described: *Afrophila* n. gen. for *P. punctata* Bell, 1855; *Atlantolocia* for *P. laevidorsalis* Miers, 1881; *Atlantophila* n. gen. for *P. cristata* Miers, 1881; *Hiplyra* n. gen. for *P. variegata* (Rüppell, 1830), *P. platycheir* De Haan, 1841, *P. longimana* A. Milne Edwards, 1874, *P. variegata* var. *elegans* Gravier, 1920, and two new species, *H. michellinae* n. gen., n. sp. and *H. sagitta* n. gen., n. sp.; *Lyphira* n. gen. for *P. heterograna* Ortmann, 1892, and three new species, *L. natalensis* n. gen., n. sp., *L. perplexa* n. gen., n. sp., and *L. ovata* n. gen., n. sp.; *Pyrhila* n. gen. for *P. pisum* De Haan, 1841, *P. carinata* Bell, 1855, *P. biprotubera* Dai & Guan, 1986; and *Ryphila* n. gen. for *P. cancellus* (Herbst, 1783), and *P. verrucosa* Henderson, 1893. All genera are diagnosed and species are described or redescribed and illustrated, extended synonymies are given, and a key for their identification is provided.

KEY WORDS
Crustacea,
Decapoda,
Leucosiidae,
Philyra,
new genera,
new species.

RÉSUMÉ

Révision du genre Philyra *Leach, 1817 (Crustacea, Decapoda, Leucosiidae) et description de sept genres et six espèces nouveaux.*

L'étude des Leucosiidae du genre *Philyra* Leach, 1817, a amené à considérer qu'il est restreint à son espèce type, *P. globus* (Fabricius, 1775) et à une espèce nouvelle, *P. samia* n. sp. Sept genres nouveaux sont décrits : *Afrophila* n. gen. pour *P. punctata* Bell, 1855 ; *Atlantolocia* pour *P. laevidorsalis* Miers, 1881 ; *Atlantophila* n. gen. pour *P. cristata* Miers, 1881 ; *Hiplyra* n. gen. pour *P. variegata* (Rüppell, 1830), *P. platycheir* De Haan, 1841, *P. longimana* A. Milne Edwards, 1874, *P. variegata* var. *elegans* Gravier, 1920, et deux espèces nouvelles, *H. michellinae* n. gen., n. sp. et *H. sagitta* n. gen., n. sp. ; *Lyphira* n. gen. pour *P. heterograna* Ortmann, 1892, et trois espèces nouvelles, *L. natalensis* n. gen., n. sp., *L. perplexa* n. gen., n. sp., et *L. ovata* n. gen., n. sp. ; *Pyrhila* n. gen. pour *P. pisum* De Haan, 1841, *P. carinata* Bell, 1855, *P. biprotubera* Dai & Guan, 1986 ; et *Ryphila* n. gen. pour *P. cancellus* (Herbst, 1783), et *P. verrucosa* Henderson, 1893. Des dignoses des tous les genres sont données et chaque espèce est décrite ou redécrite et illustrée, les synonymies complètes sont données, et une clé d'identification est fournie.

MOTS CLÉS
Crustacea,
Decapoda,
Leucosiidae,
Philyra,
genres nouveaux,
espèces nouvelles.

INTRODUCTION

The genus *Philyra* Leach, 1817, was established for *Cancer cancellus* Herbst, 1783, and *Leucosia globosa* Fabricius, 1798. Leach (1817: 18) offered only a brief diagnosis of the genus: "Testa rotundata depressa; fronte clypeo breviore. Pedipalpi externi caule interiore acuminato; exteriore latissimo ovato". The early cursory or inaccurate descriptions and the convoluted leucosiid systematics allowed relegation of a miscellaneous assortment of leucosiid crabs to *Philyra*. Already Bell (1855b: 299) realized that "The character which has hitherto been considered as the essential one in this genus [*Philyra*], namely the extraordinary dilatation of the palp of the foot-jaws, varies greatly in degree in the different species now known […] This is another instance of the importance of taking into account the whole organization of the animal, instead of depending upon a single character of a single organ." Unfortunately, Bell's sage advice was not followed, and the genus "as it presently stands is heterogenous and in need of a revision" (Tan 1995: 470). With 45 species assigned to *Philyra* (Ng *et al.* 2008), it is one of the largest genera in the Leucosiidae, though "the generic status of many species […] still unclear" (Rahayu & Ng 2003: 1).

A study of the extensive collections of the Muséum national d'Histoire naturelle, Paris, together with other major collections (listed below) has enabled re-examination of many type specimens and much of the published material, and led to a reevaluation of *Philyra*. Only the type species, *Cancer globus* Fabricius, 1775, and one new species, are retained in the genus. Seven new genera are established for 13 species previously in *Philyra* s.l., and six new species. *Philyra* s.s. differs from the newly established genera by its subterminally alate apical process of the first male pleopod, and the following combination of characters: the external maxilliped exopod subquadrate; the first two abdominal segments transversely narrow, third to sixth segments fused, and lacking an abdominal denticle. Twenty-seven species presently included in *Philyra* are provisionally retained in the genus *sensu lato* pending further revision (Table 1). The generic positions of these species are uncertain as material was not available and the published descriptions and figures are not detailed enough to make definite decisions. They will need to be considered in subsequent studies. All genera are

diagnosed and species treated here are described or redescribed and illustrated, extended synonymies are given, and a key for their identification is provided.

MATERIAL

The material examined was borrowed from the following collections: Muséum national d'Histoire naturelle, Paris (MNHN), Museo Zoologico dell'Università di Firenze (MZUF); the Natural History Museum, London (NHM), Naturhistorisches Museum, Wien (NMW), the National Science Museum, Tokyo (NSMT), the Nationaal Natuurhistorisch Museum, Leiden (formerly Rijksmuseum van Natuurlijke Historie) (RMNH), the South African Museum, Cape Town (SAM), the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), Western Australian Museum, Perth (WAM), the Zoologisk Museum, Copenhagen (ZMK), and the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore.

ABBREVIATIONS

coll.	collector;
cl	carapace length;
Exp.	expedition;
id.	identified by;
I.	Island;
Is	Islands;
ISRSE	Israel South Red Sea Expedition;
juv.	juvenile;
ovig.	ovigerous;
pres.	presented by;
purch.	purchased;
stn	station.

SYSTEMATICS

Genus *Philyra* Leach, 1817 *s.s.*

TYPE SPECIES. — *Cancer globus* Fabricius, 1775: 401. Placed on Official List of Generic Names (ICZN 1964).

ETYMOLOGY. — In Greek mythology Philyra was the mother of the wise centaur Chiron, who brought up Achilles. Gender feminine.

TABLE 1. — Species herein provisionally retained in *Philyra* s.l., pending further revision.

Philyra adamsii Bell, 1855
Philyra alcocki Kemp, 1915
Philyra angularis Rathbun, 1924
Philyra bicornis Rahayu & Ng, 2003
Philyra concinnus Ghani & Tirmizi, 1955
Philyra corallicola Alcock, 1896
Philyra fuliginosa Targioni-Tozzetti, 1877
Philyra granigera Nobili, 1905
Philyra granulosa Ihle, 1918
Philyra iriomotensis Sakai, 1983
Philyra kanekoi Sakai, 1934
Philyra macrophthalma Bell, 1855
Philyra malefactrix (Kemp, 1915)
Philyra marginata A. Milne Edwards, 1873
Philyra misoagana Sakai, 1937
Philyra nishihirai Takeda & Nakasone, 1991
Philyra olivacea Rathbun, 1909
Philyra orbicularis (Bell, 1855)
Philyra rectangularis Miers, 1884
Philyra rudis Miers, 1884
Philyra sagittifera (Alcock, 1896)
Philyra scabra (Dai, Yang, Song & Chen, 1984)
Philyra sexangula Alcock, 1896
Philyra syndactyla Ortmann, 1892
Philyra taekoae Takeda, 1972
Philyra unidentata Stimpson, 1858
Philyra zhoushanensis Chen & Sun, 2002

DIAGNOSIS. — Carapace pear-shaped, globose; regions of carapace indistinct, save for slight indentation at branchio-cardiac grooves. Dorsal surface of carapace glabrous, punctate. Frontal region slightly produced, upcurved, laterally concave; frontal margin unidentate, deflexed. Basal antennular segment inserted in transverse antennular fossa. Antennae short, inserted between antennular fossa and orbit. Orbits small, upper orbital margin entire. Eyes retractable. Anterior margin of efferent branchial channel forms part of lower orbital margin, extending beyond frontal margin, epistome concave. External maxilliped exopod expanded, not quite reaching anterior margin; endopod subtriangular, bearing in female setose fringe lengthwise mesially; endopodal merus narrowing apically, longer than ischium along inner margin, apex invisible in dorsal view. Margins of carapace beaded, hepatic margin produced, posterior margin rounded. Epimeral margin closely beaded, not visible in dorsal view. Chelipeds subequal, elongate, longer in adult male than in female specimens. Cheliped merus subcylindrical, granulate. Fingers as long as propodus. Pereiopods slender, short. Pereiopodal meri subcylindrical, longer than carpi and propodi; upper and lower propodal margins carinate; dactyli nearly as long as carpi and propodi, lanceolate, terminating

in cornute tips. Male abdominal sulcus deep, nearly reaching buccal cavity. Male abdomen elongate, first 2 segments transversely narrow; third to sixth segments fused, medially concave proximally, lacking subterminal denticle, last suture line distinct; telson elongate, laciniate. Female abdomen with first and second segments narrow, transverse, thickened laterally; segments 3-6 fused, sutures invisible, greatly enlarged, shield-like; telson subtriangular. First male pleopod elongate, shaft dorsoventrally flattened; apical process subterminally bifurcate, cornute. Second male pleopod short, filiform, apex scoop-like.

Remarks

The name and identity of the type species of *Philyra* "has passed through a remarkable metamorphosis of several stages" (Holthuis 1962: 238). Fabricius (1775) named identically-diagnosed specimens collected "ad littora malabarica Dr. Koenig" first as *Cancer globus* (Fabricius 1775: 401), then as *C. globosus* (Fabricius 1787: 315; 1793: 441), and finally as *Leucosia globosa* (Fabricius 1798: 349). Bosc (1802: 238), while translating Fabricius' diagnosis, introduced yet another permutation, calling the species "*Leucosia globulosa*". Holthuis (1962: 238) proposed that "*Cancer globus* Fabricius, 1775, *Cancer globosus* Fabricius, 1787, and *Leucosia globulosa* Bosc, 1801-1802, are subjective synonyms of each other and the name *Cancer globus* has priority". Subsequently, *Cancer globus* Fabricius, 1775, was placed on the Official List of Generic Names as the "type species, by designation by Milne Edwards, 1837 (in Cuvier's Règne Anim. (ed. 3, Disciples ed.) 18: pl. 24, fig. 4)". The type material of *Cancer globus* consists of two specimens, a male and a female (Zimsen 1964), and as "Fabricius did not indicate any as the holotype (a term that he most likely, even did not know), both specimens are syntypes and a later author may define the identity of the species by selecting one of these as the "lectotype" (L. B. Holthuis, in letter, 6 April 2006). De Man (1888) was the first to describe Fabricius' syntypes. He noted differences in their size, form of chelipeds, and pattern of granulation, but considered them "attributable to the large size of the individual, for in its other characters the male perfectly agrees with the female." (de Man 1888: 203). As his own material was similar to the female syntype, de Man assigned it to *Philyra globosa*. Although he did not selected a lectotype, his identification clearly shows he considered the female syntype the type. A few years later, Alcock (1896: 245), who examined large numbers of Indian *Philyra* specimens, realized "that Fabricius' male is a species quite distinct from his female" and considered it "to be the species named by Milne Edwards […] *P. globulosa*."[the male specimen is in fact *Lyphira perplexa* n. sp.]. Alcock suggested applying "Milne Edwards name, *P. globulosa*, to Fabricius' male type, and to leave the name *P. globosa* in possession of Fabricius' female type". Alcock did not know that H. Milne Edwards' (1836-1844: pl. 24, fig. 4) *P. globulosa* is altogether another species, *L. heterograna* (Ortmann 1892) n. comb., differing from Fabricius' male syntype in the regular granulation of its carapacial margins, the form of the third maxilliped, and in lacking the prominent inner angle at the anterior margin of the efferent canals. Though Alcock seemed to favour a solution on that "delicate question of synonymy" that would not offend "the memory of the founder of modern carcinology", he was aware of its shortcomings. He then offered that "The only other alternative […] to make use of Dr. Henderson's name *P. polita* for Fabricius' female, and to let *P. globosa* stand for Fabricius' type." However, Alcock also did not select a lectotype. Fortunately, Holthuis (1962: 238) undid the knot when he did "definitely select from among Fabricius's two type specimens of *Cancer globus* the smaller (the female) specimen as the lectotype of that species; that specimen at the same time is the lectotype of *Cancer globosus* Fabricius, 1787, and of *Leucosia globulosa* Bosc, 1801-1802". Therefore, the identity of Milne Edwards' *P. globulosa* does not impact "the status of the name *globulosa*, it remains an objective synonym of *Cancer globus* Fabr., 1775." (L. B. Holthuis, in letter, 6 April 2006).

The genus *Philyra* s.s. differs from the newly established genera by its subterminally expanded apical process of the first male pleopod, and the following combination of characters: the external maxilliped exopod subquadrate; the two proximalmost abdominal segments transversely narrow, third to sixth segments fused and lacking abdominal denticle.

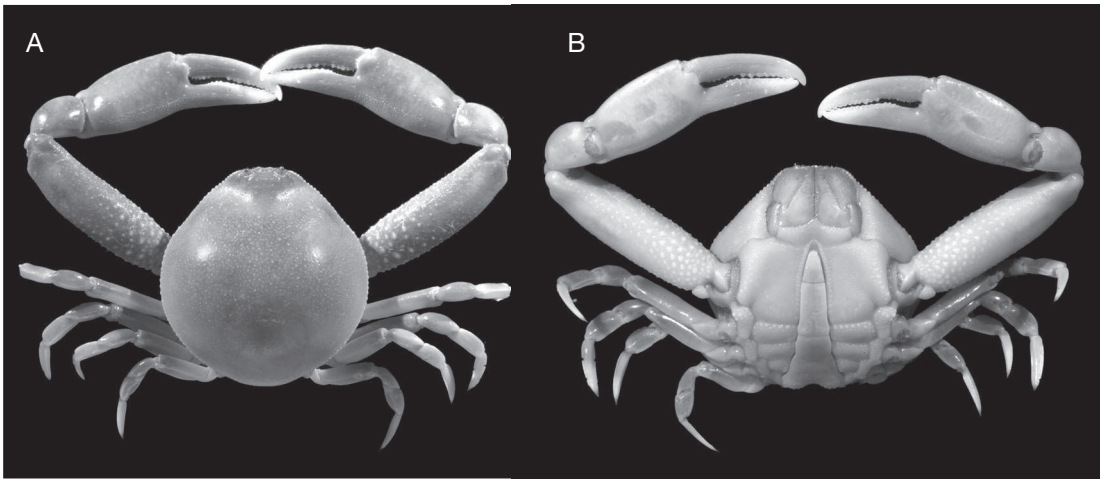

FIG. 1. — *Philyra globus* (Fabricius, 1775) n. comb., ♂ cl 18.8 mm (NHM 1999.6): **A**, dorsal view; **B**, ventral view.

Philyra globus (Fabricius, 1775)
(Figs 1; 2A)

Cancer globus Fabricius, 1775: 401 (p.p.).

Cancer porcellaneus Herbst, 1783: 92, pl. 2, fig. 18.

Cancer globosus – Fabricius 1793: 441 (p.p.).

Leucosia globosa – Fabricius 1798: 349 (p.p.).

Leucosia globulosa Bosc, 1802: 238; 1830: 289.

Philyra globosa – de Man 1888: 202. — Alcock 1896: 243. — Laurie 1906: 364. — Stephensen 1945: 83, fig. 12d-f. — Chhapgar 1957: 407, pl. 2k-m. — Deb 1998: 358.

Philyra polita Henderson, 1893: 401, pl. 38, figs 1-3.

Philyra globossa – Khan & Ahmad 1979: 74 (incorrect spelling).

Philyra porcellana – K. Sakai 1999: 18, pl. 7D.

Non *Philyra globulosa* H. Milne Edwards, 1837 (Milne Edwards 1836-1844): pl. 24, fig. 4, 4a, 4b; 1837: 132 (= *Philyra heterograna* Ortmann, 1892).

Non *Philyra globosa* – Barnard 1947: 373; 1950: 380, fig. 72f-h. — Kensley 1981: 39 (= *Philyra samia* n. sp.).

Non *Philyria globulosa* – Devi *et al.* 1988: 21, fig. 2 (incorrect spelling) (= *Ryphila cancellus* (Herbst, 1783)).

TYPE MATERIAL. — Lectotype: **India.** Malabar, coll. Dr J. G. Koenig, id. J. C. Fabricius as *Cancer globus* (labelled as Syntype 2, designated as lectotype by Holthuis [1962]), 1 ovig. ♀ cl 17.0 mm (ZMK CRU3997).

MATERIAL EXAMINED. — **India.** Madras, coll. J. R. Henderson, syntypes of *Philyra polita,* 4 ♂♂ cl 14.2-20.1 mm, 6 ♀♀ cl 16.3-17.8 mm (NHM 1892.7.15.389-398) (the ♂ cl 20.1 mm is here designated the lectotype and the remaining specimens are now considered to be paralectotypes). — Calcutta, Orissa coast, 5.X.1898, 1 ♂ cl 19.7 mm, 1 ♀ cl 15.9 mm, ex. Indian Museum, id. A. Alcock as *Philyra globosa* (ZMK CRU4256). — Madras, 1 ♂ cl 18.8 mm (NHM 1999.6). — Kasimedu Fish Landing, Madras, XI.2004, coll. Z. Jaafar, 1 ♂ cl 18.0 mm (ZRC).
Sri Lanka. Coll. W. A. Herdman, 2 ♀♀ cl 14.4, 14.5 mm (NHM 1907.5.22.62-64).
Andaman Sea. Mergui Archipelago, id. Prof. A. R. S. Anderson as *Philyra globosa*, 1 ♀ cl 15.2 mm, (RMNH).
Indian Ocean. Coll. C. von Hügel, 2 ♂♂ (NMW 19046).

DISTRIBUTION. — Indian Ocean: Persian Gulf, Pakistan, India, Sri Lanka, Mergui Archipelago.

DESCRIPTION

Dorsal surface of carapace minutely punctuate, bearing closely-spaced minute flattened granules. Front strongly deflexed anteriorly, frontal margin bearing triangular denticle medially. Circumference of carapace behind front evenly beaded. Anterior margin of epistome slightly arcuate, inner angles of afferent branchial canals slightly prominent. Margins of external maxillipeds minutely granulate,

exopod subquadrate, shovel-like. Pterygostomian region closely granulate. Anterolateral margin very slightly sinuous, posterolateral margin arcuate. Thoracic sternites granulate. Anterior margin of abdominal sulcus in male specimens beaded. Fused male abdominal segments 3-6 bearing granulate basal knobs separated by a concavity. Margins of fused abdominal segments in female beaded, granulate stripe proximally. Cheliped merus rugose, bearing perliform granules, increasingly smaller, sparser, distally. Carpus and propodus nearly smooth, but for granulate stripe on lower surface of latter. Fingers punctate; inner margins minutely denticulate. Lower margin of merus of last pereiopod minutely granulate; meri of pereiopods 1-3 bear line of increasingly minute granules along ventral margin; carpi and propodi smooth; upper margin of propodus of first pereiopod carinate, lower margin bicarinate in male, unicarinate in female specimens; propodi of pereiopods 2-4 unicarinate on upper, lower margins. Male first pleopod with sinuous apical process, bearing line of cirri distad, with subterminal alate and cirrate process, tip vermicular, curved interiorly.

Colour

"In spirit: smoky bluish brown above, the blue deepest on the carapace." (Alcock 1896: 244); "Sandy brown with bluish tinge" (Khan & Ahmad 1979: 74).

Remarks

Fabricius' (1775: 401) description of *Cancer globus* ("Thorace laevi, subcrenato, cauda basi binodi, brachiis scabris […] Parvus, subglobosus, thorace undique crenato. Brachia scabra, manus filiformes.") may fit more than one species. Indeed, Fabricius' two syntypes belong to different species (see above). Alcock (1896: 243), who realized that, referred to *P. globosa* only "Fabricius' female type as re-described by De Man". His detailed description includes several characters that clearly identify his specimens, i.e. the medially acuminate deflexed front, carinate propodi, the two linear basal segments of the male abdomen, and lack of median denticle on the fused abdominal segments. The photograph of Herbst's specimen of *Cancer porcellaneus*, preserved in the Berlin Zoological Museum (ZMB Herbst 2194) (K. Sakai 1999: pl. 7D) is clearly that of *P. globus.* From the characters used by Henderson (1893: 401) to separate *P. polita* from *P. globosa* – presence of branchio-cardiac grooves and abdominal denticle, marginal carapacial granules of varying size and prominently granulate chelipeds – it is clear he confused the latter species with *Lyphira perplexa* n. sp. Examination of Henderson's (1893: pl. 38, figs 1-3) material and figures leaves no doubt as to the identity of his species. The present study agrees with Stephensen (1945: 83) that though the specimens collected in the Persian Gulf "are rather small and so do not agree with the characters [of *P. globosa*] […] the disagreements are so small, that they probably are due to the difference in size".

Philyra samia n. sp.
(Figs 2B; 3)

Philyra globosa – Barnard 1947: 373; 1950: 380, fig. 72f-h. — Kensley 1981: 39.

Type material. — Holotype: **South Africa.** Natal, off Tugela River mouth, 22 m, id. K. H. Barnard, 1 ♂ cl 21.6 mm (SAM A8335).
Paratypes: same data as holotype, 3 ♂♂ cl 14.6-16.1 mm, 2 ♀♀ cl 13.1, 17.8 mm (SAM A8335).

Etymology. — Named for the South African Museum (SAM), in recognition of its important role in the study and conservation of the South African marine biota. Gender feminine.

Distribution. — Known only from the type location, Natal, South Africa.

Description

Dorsal surface of carapace minutely punctuate, bearing closely-spaced minute granules on branchial, intestinal regions. Front strongly deflexed anteriorly, frontal margin bearing triangular denticle medially. Circumference of carapace behind front evenly beaded. Anterior margin of epistome straight, inner angles of afferent branchial canals slightly prominent. Margins of external maxillipeds minutely granulate, exopod subquadrate, shovel-like. Pterygostomian region closely granulate. Anterolateral margin very slightly sinuous, posterolateral margin arcuate.

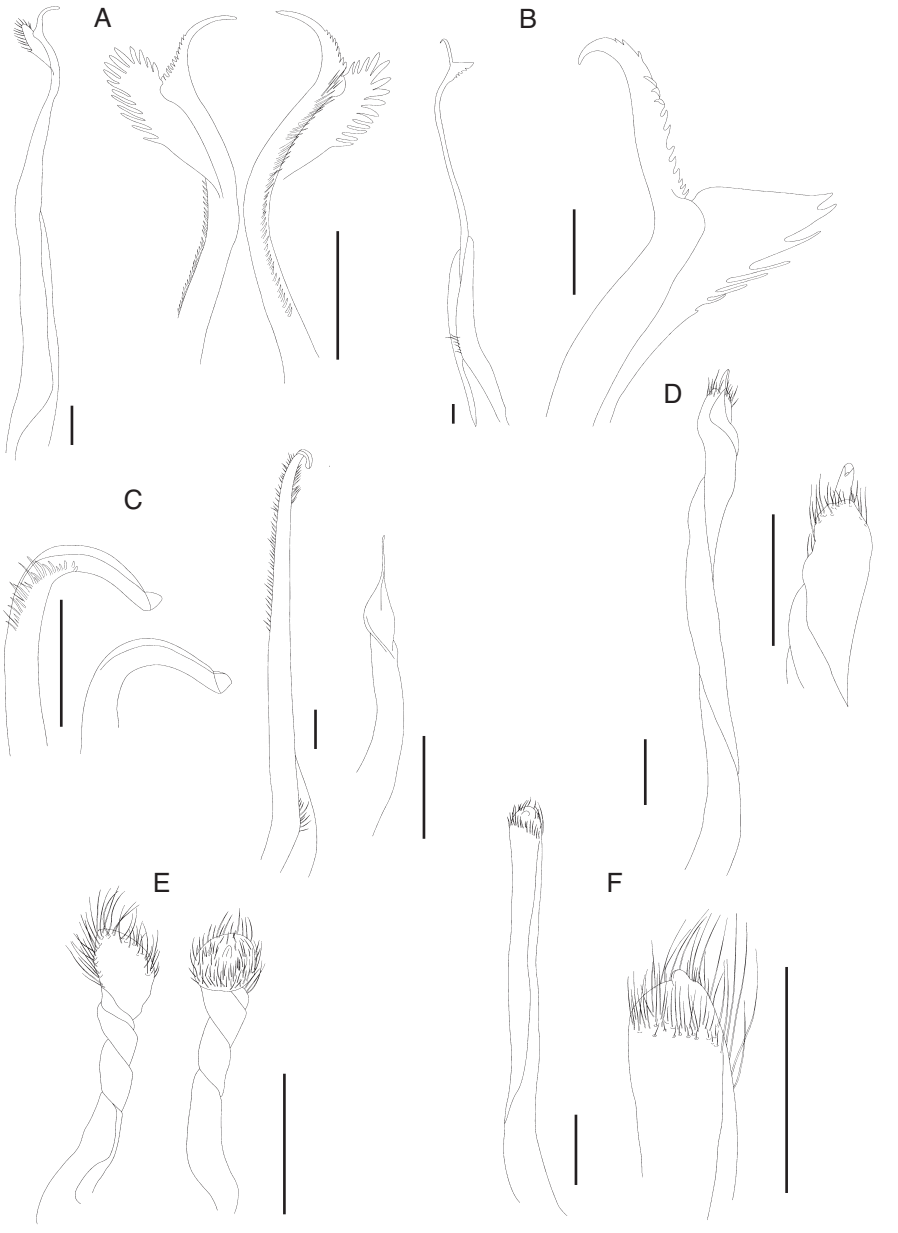

FIG. 2. — **A**, *Philyra globus* (Fabricius, 1775) n. comb., ♂ cl 18.8 mm (NHM 1999.6), first male pleopod, distal end of first male pleopod; **B**, *P. samia* n. sp., ♂ holotype, cl 21.6 mm, South Africa (SAM A8335), first male pleopod, distal end of first male pleopod; **C**, *Afrophila punctata* (Bell, 1855) n. comb., ♂ cl 20.1 mm, South Africa (USNM 252713), first male pleopod, distal end of first male pleopod, second male pleopod; **D**, *Atlantolocia laevidorsalis* (Miers, 1881) n. comb., ♂ lectotype cl 15.4 mm, Senegal, Gorée I. (NHM 1881.24), first male pleopod, distal end of first male pleopod; **E**, *Atlantophila cristata* (Miers, 1881) n. comb., ♂ lectotype cl 5.7 mm, Senegal, Gorée I. (NHM 1881.24), first male pleopod, dorsal and ventral views; **F**, *Hiplyra platycheir* (De Haan, 1841) n. comb., ♂ cl 15.5 mm, Japan (NSMT 9661), first male pleopod, distal end of first male pleopod. Scale bars: 1 mm.

Fig. 3. — *Philyra samia* n. sp., South Africa, ♂ holotype cl 21.6 mm, Natal, off Tugela River mouth (SAM A8335), dorsal carapace.

Thoracic sternites prominently granulate. Anterior margin of abdominal sulcus in male specimens beaded. Fused male abdominal segments 3-6 bearing granulate basal knobs separated by a concavity. Margins of fused abdominal segments in female beaded, first and second segments prominently granulate. Cheliped merus rugose, bearing perliform granules, increasingly smaller distally. Carpus and propodus nearly smooth in female specimens, lower margin of propodus prominently granulate in males. Fingers punctate; inner margins minutely denticulate. Lower margin of merus of last pereiopod minutely granulate; meri of pereiopods 1-3 bear line of increasingly minute granules along ventral margin; carpi and propodi smooth; upper margin of propodus of first pereiopod carinate, propodi of pereiopods unicarinate on upper, lower margins. Male first pleopod with apical process elongate, slightly curved distally, bearing line of cirri distad, subterminal alate and cirrate triangular process, distally curved vermicular tip.

Remarks

Barnard (1950: 381) may have sensed his specimens differed subtly from the typical form since he conceded that "strict identity with the Indian form can only be proved by examination of the first pleopod ♂". Indeed, comparison with Indian specimens of *P. globosa* has shown that the apical process of the pleopod of the South African specimen is longer, nearly straight, with triangular subterminal process; its carapace and chelipeds are more distinctly granulate, and the lower margin of first pereiopodal propodus unicarinate.

Genus *Afrophila* n. gen.

Type species. — *Philyra punctata* Bell, 1855.

Etymology. — *Afrophila* refers to the distribution of the type species, *Afrophila punctata* (Bell, 1855) n. comb., along the southern coast of Africa. Gender feminine.

Diagnosis. — Carapace subovate, globose; regions of carapace nearly indistinct. Dorsal surface of carapace punctate, minutely granulate. Frontal region slightly produced, medially indented; frontal margin medially denticulate. Antennular fossa not quite sealed by basal antennular segment. Antennae short, inserted between antennular fossa and orbit. Orbits small, rounded, upper orbital margin unisutured. Eyes retractable. Epistome bilobate. Anterior margin of efferent branchial channel forms part of lower orbital margin, continuous with crenulate subhepatic margin, projecting beyond frontal margin. External maxilliped exopod reniform, not quite reaching anterior margin; endopods ogive, bearing in female setose fringe lengthwise; endopodal ischium longer than subtriangular merus. Lateral and posterior margins of carapace closely beaded; Hepatic facet distinct, lower margin angulate. Epimeral margin meeting lateral margin at posterior margin, minutely beaded. Chelipeds subequal; longer, stockier in adult male than in female specimens. Cheliped merus subcylindrical, slightly swollen proximally on anterior margin, surface minutely granulate, granulate. Fingers as long as propodus. Pereiopods slender, short. Pereiopodal meri longer than carpi and propodi; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep, nearly reaching buccal cavity. First abdominal segment of male anvil-shaped; second segment transversely narrow, thickened laterally. Third to fifth abdominal segments fused. Proximal margin of sixth segment sinuous, lateral margin bearing distinct ridge proximally fitting into suture between sternal segments, lacking subterminal denticle, telson laciniate. Female abdomen with first two segments transversely narrow, yoke-shaped, segments three to six fused, greatly enlarged, shield-like. First male pleopod elongate, slender, sinuous, distally crook-shaped. Second male pleopod short, curved, apex scoop-like, acuminate.

Remarks

Though superficially resembling *Philyra* s.s., *Afrophila* n. gen. is distinguished by the distally crook-shaped

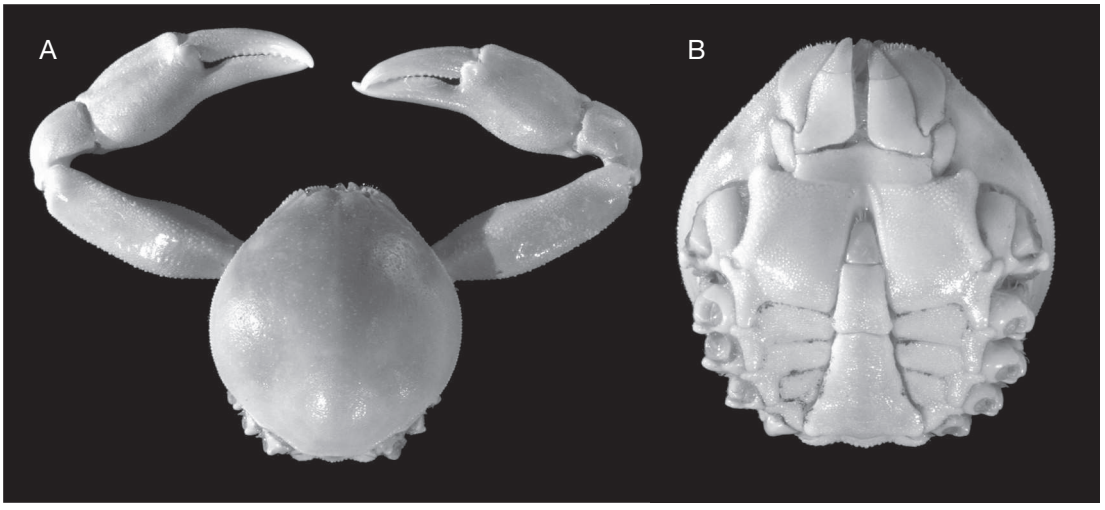

FIG. 4. — *Afrophila punctata* (Bell, 1855) n. comb., ♂ cl 20.1 mm, South Africa, between Mossel Bay and Algoa Bay (USNM 252713): **A**, dorsal view; **B**, ventral view.

male first pleopod that lacks the subterminal alate process of former genus, and the form of the male abdomen, with its trapezoid first segment and jointed sixth segment as opposed to the transversely narrow first segment and fused sixth segment in *Philyra* s.s.

Afrophila punctata (Bell, 1855) n. comb.
(Figs 2C; 4)

Philyra punctata Bell, 1855a: 365; 1855b: 301, pl. 33, fig. 2; 1855c: 15. — Stebbing 1902: 17; 1910: 336. — Doflein 1904: 45, pl. 15, fig. 1-4. — Balss 1921: 52. — Barnard 1950: 377, fig. 72 a-e. — Serène 1968: 46. — Kensley 1981: 39.

TYPE MATERIAL. — Lectotype: South Africa. Simon's Bay, 4-7 fms, HMS Rattlesnake, 8.III-10.IV.1847, coll. John Macgillivray, 1 ♂ c.l. 11.7 (NHM 1850.39). Same data, paralectotype, 1♂ c.l. 5.8 mm (NHM 1850.39).

MATERIAL EXAMINED. — **South Africa.** Between Port Elizabeth and Mossel Bay, 32 m, 15.II.1980, coll. B. Kensley, 1 ♂ cl 22.9 mm, 1 ovig. ♀ cl 13.6 mm (USNM 221770). — Between Mossel Bay and Algoa Bay, 32 m, 15.II.1980, coll. B. Kensley, 1 ♂ cl 20.1 mm, 1 ovig. ♀ cl 13.7 mm (USNM 252713). — Algoa Bay, 33°47'S, 26°04'E, 47 m, 23.V.1958, id. K. H. Barnard, 1 ♂ cl 15.6 mm, 1 ovig. ♀ cl 16.9 mm, 3 juvs (SAM A39551). — Kwelera Bay, 12 m, 7.I.1958, coll. S. Muller, id. W. Emmerson, 1 ♂ cl 16.3 mm, 1 ovig. ♀ cl 14.8 mm (SAM A45509). — Saldanha Bay, 2 juvs (SAM A11995); 1 ♂ cl 17.2 mm, 3 ♀♀ cl 11.5-12.2 mm (SAM A12148).

DISTRIBUTION. — Known only from the Cape Province (Saldanha Bay to Algoa Bay), South Africa.

DESCRIPTION

Dorsal surface of carapace minutely granulate, punctuate, punctae more prominent in female specimens. Branchio-cardiac grooves nearly effaced; intestinal region slightly tumescent. Frontal margin sinuous, medially with minute denticle. Circumference of carapace beaded; granules larger, more prominent on lower margin of hepatic facet. Anterior margin of epistome convex, medially notched. Anterior margins of efferent canals prominently denticulate, with distinct gap opposite external orbital angle. External maxillipeds minutely granulate. Dorsal margin of hepatic facet unmarked. Pterygostomian region, sternum, prominently granulate. Anterior margin of male abdominal sulcus prominently granulate. Cheliped granulate; merus triquetral in cross-section, fingers as long as palm, with inner margins evenly denticulate. Granulation in female specimens less prominent. Pereiopodal meri, carpi bearing granules ventrally; propodi dorsally and ventrally carinate. Second abdominal segment of

male transversely carinate, boldly granulate, fused male abdominal segments 3-5 granulate, lacking basal knobs laterally. Margins of fused abdominal segments in female minutely granulate. First male pleopod distally arched, tip rounded.

Colour

"Pinkish or salmon, usually (especially in juv.) a paler or white lozenge-shaped or cuneiform patch on gastric region, sometimes extending back on to cardiac and intestinal regions." (Barnard 1950: 378).

REMARKS

Bell (1855b: 301, 302, pl. 33) described *P. punctata* from material collected by HMS *Rattlesnake* in Simon's Bay, Cape of Good Hope, and presented to the British Museum (MacGillivray 1852). Bell did not designate a holotype or state the number of specimens examined, but indicated that one specimen was a male, "Abdomen (male) with the third" and the length of a specimen was 0.5 in. Bell (1855b: pl. 33, figs 2, 2a, 2b, 2c) also illustrated a female abdomen (fig. 2c).

Extant in the collections of the NHM are two dry specimens of *P. punctata* labeled Simon's Bay, S Africa dredged in 4 to 7 fathoms sand. Both specimens are males, one of which has a carapace length of 11.7 mm which is approximately 0.46 inches. This is considered to be the specimen described by Bell in his text. The other male is about 5.8 mm, and this is more like figure 2 in Bell (1855b: pl. 33, figs 2, 2a, 2b, 2c) in terms of appendage positioning than the male above, but in this instant may not be significant because all the Leucosiidae figures in the paper are similarly stylized. There is no female specimen in with this dry material deposited in the NHM. The larger male is designated here as the lectotype. The type status of the smaller male cannot be clarified reading from Bell's text.

Genus *Atlantolocia* n. gen.

TYPE SPECIES. — *Philyra laevidorsalis* Miers, 1881.

ETYMOLOGY. — *Atlantolocia* – referring to its affinity with *Seulocia* Galil, 2005, and the type species' distribution along the Atlantic coast of Africa. Gender feminine.

DIAGNOSIS. — Carapace subpentagonal, globose; regions of carapace indistinct. Dorsal surface of carapace glabrous, punctate. Frontal region slightly produced, upcurved, laterally concave. Antennular fossa transversely ovoid, antennules fold obliquely within fossa. Antennae short, inserted between antennular fossa and orbit. Orbits small, rounded, outer orbital margin unisutured. Eyes retractable. Anterior margin of efferent branchial channel forms part of lower orbital margin, visible in dorsal view. External maxilliped exopod laciniate, as wide as endopod; endopodal ischium longer than subtriangular merus, bearing in female setose fringe lengthwise. Lateral margin of carapace beaded from outer orbital angle to last pereiopod; anterolateral margin sinuous, posterolateral margin rounded. Epimeral margin closely beaded, posteriorly visible in dorsal view, continuous with granulate posterior margin. Posterior margin straight in male, rounded in female; deflexed posterior surface granulate. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus triquetral in cross-section, anterior, posterior margins tuberculate; spongy tomentum between tubercles proximally on dorsal surface. Carpus, propodus inflated; fingers longer than upper margin of palm. Pereiopods slender, short; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep, elongate, nearly reaching buccal cavity. First abdominal segment of male transversely narrow; second segment small, spindle-shaped. Third to sixth abdominal segments fused; twice constricted at the commissure of the fifth and sixth segments; telson laciniate. Female abdomen with first segment transversely narrow, yoke-like; second to sixth segments fused, greatly enlarged, shield-like; telson triangular. First male pleopod elongate, shaft stout, sinuous, coiled twice on itself, apical process digitate, cornute. Second male pleopod short, curved, apex scoop-like, acuminate.

REMARKS

Miers (1881: 265) distinguished the species "from most of the other species of *Philyra* by its smooth and somewhat polished carapace and shorter robust chelipeds", but due to the taxonomically confused state of *Philyra* and other leucosiid genera (Galil 2001a, b; 2003) did not recognize it as a distinct genus. *Atlantolocia* n. gen. differs from *Philyra* s.s. in having narrow external maxilliped exopods; small, spindle-shaped second abdominal segment; and first male pleopod shaft coiled twice on itself, with short, digitate apical process. Though superficially resembling *Seulocia* Galil, 2005, in its smooth, globose, subpentagonal carapace, *Atlantolocia* n. gen. is distinguished by its lack of thoracic sinus, the

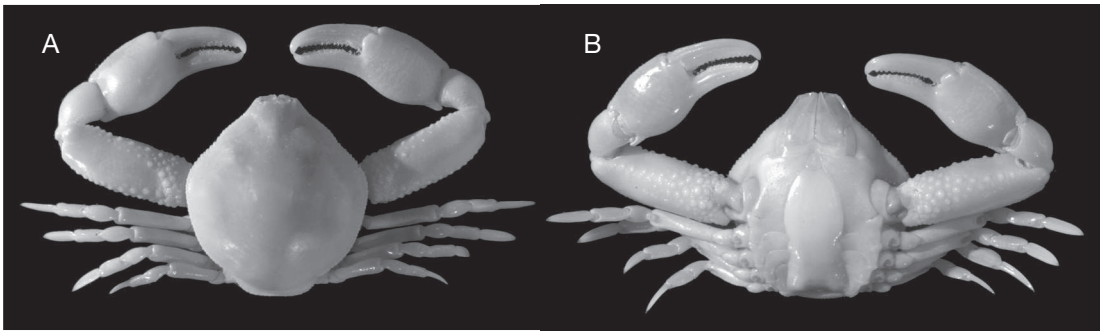

FIG. 5. — *Atlantolocia laevidorsalis* (Miers, 1881) n. comb., ♂ lectotype cl 15.4 mm, Senegal, Gorée I. (NHM 1881.24): **A**, dorsal view; **B**, ventral view.

segmentation of the female abdomen, and the shape of the male abdomen and pleopods.

Atlantolocia laevidorsalis (Miers, 1881) n. comb. (Figs 2D; 5)

Philyra laevidorsalis Miers, 1881: 264, pl. 15.2; 1886: 321. — A. Milne Edwards & Bouvier 1900: 58, pl. 13, figs 14, 15. — Rathbun 1900: 298. — Bouvier 1906: 199. — Balss 1921: 52. — Monod 1933: 487; 1956: 141, figs 169-176. — Capart 1951: 47, fig. 13. — Rossignol 1957: 77; 1962: 115. — Longhurst 1958: 87. — Buchanan 1958: 20. — Gauld 1960: 69. — Forest & Guinot 1966: 56. — Manning & Holthuis 1981: 66.

TYPE MATERIAL. — Syntypes: **Senegal.** Gorée I., purch. Hermann Maltzan, 1 ♂ cl 15.4 mm, 2 ovig. ♀♀ cl 13.1, 14.4 mm, 3 juvs (NHM 1881.24) (the ♂ cl 15.4 mm is here designated the lectotype and the remaining specimens are now considered to be paralectotypes).

MATERIAL EXAMINED. — **West Africa.** Guinean Trawling Survey, *La Rafale*, stn 8, 15 m, 31.III.1964, 12 ♂♂ cl 8.3-12.5 mm, 5 ovig. ♀♀ cl 7.6- 10.8 mm (MNHN B.24228).
Mauritania. V.1923, coll. T. Monod, 5 ♂♂ cl 13.4-13.9 mm (MNHN).
Congo. *Atlantide* Exp., 7°19'S, 12°40'E, 47 m, 16.III.1946, 9 ♂♂ cl 11.0-14.4 mm, 2 ovig. ♀♀ cl 10.3, 11.8 mm (ZMK CRU 4265). — 7°02'N, 11°42'W, 13 m, 27.X.1956, pres. A. R. Longhurst, 1 ♂ cl 11.4 mm, 2 ovig. ♀ cl 7.8, 12.2 mm (NHM 1957.5.26.178-180). — Off Kipundji, 22-25 m, 25-26.VIII.1965, 5 ♂♂ cl 9.1-14.9 mm, 2 ovig. ♀♀ cl 10.9, 12.2 mm, (MNHN B.17018).
Senegal. 1907, coll. A. Gruvel, id. E. L. Bouvier, 1 ♀ cl 14.0 mm (MNHN B.17022). — Between Gorée and M'bao, 8.V.1952, 10 m, coll. I. Marche-Marchad, id. T. Monod, 2 specimens (MNHN B.17031). — M'bao, 7.XII.1952, id. T. Monod, 1 ♂ cl 8.7 mm (MNHN B.17034). — Cap Rouge, 14.IV.1909, coll. A. Gruvel, id. E. L. Bouvier, 4 ♂♂ cl 11.6-12.6 mm, 1 ♀ cl 11.9 mm (MNHN B.17035).
Ivory Coast. Grand Bassam, I.1910, coll. A. Gruvel, id. E.L. Bouvier, 1 ovig. ♀ cl 9.4 mm (MNHN B.17021). — *Calypso*, Golfe de Guinée Exp., 1956, 20-25 m, 1 ♀ cl 11.2 mm (MNHN B.17030).
Guinea. *Calypso*, Golfe de Guinée Exp., 1956, 18-30 m, 1 ♂ cl 7.2 mm, 1 ovig. ♀ cl 7.5 mm (MNHN B.17029).
Republic of Benin. II.1910, 20 m, coll. A. Gruvel, id. E. L. Bouvier, 4 ♂♂ cl 12.5-13.8 mm, 2 ovig. ♀♀ cl 10.8, 11.0 mm (MNHN B.17036).
Cape Verde Is. *Talisman*, 1883, 1 ♂ cl 13.1 mm, 1 ovig. ♀ cl 11.4 mm (MNHN B.17023).
São Tomé & Príncipe. Príncipe I., 1956, 10-12 m, *Calypso*, Golfe de Guinée Exp., 1 ♀ cl 7.4 mm (MNHN B.17038).

DISTRIBUTION. — West coast of Africa, from Cap Blanc, Mauritania, to Angola; Cape Verde Is, Príncipe I.

DESCRIPTION

Dorsal surface of carapace finely, sparsely punctate anteriorly. Front truncate, anterior margin of efferent branchial channel visible in dorsal view, anterior margin horizontal, medially with triangular denticle. Anterior margin of efferent channel straight, continuing into minutely beaded lateral margin. Margin of epibranchial angle of carapace more prominentely milled than antero- and posterolateral margin. Epimeral surface smooth. Deflexed surface of posterior margin granulate. Sternum smooth. Anterior margin of abdominal sulcus nearly smooth. Fused male abdominal segments 3-6 lacking latero-basal knobs, median denticle. Fused abdominal

segments in female smooth. Cheliped merus 1.25 as long as carapace in male, perliform, prominent granules on its anterior, posterior margins, as well as proximally on upper surface. Row of granules on inner angle of carpus. Palm laterally convex, its upper margin bearing a single line of granules, lower margin rounded, minutely granulate, dactylar inner margins denticulate. Pereiopodal meri bearing granulate line on ventral margin and proximally on dorsal margin; propodi dorsally and ventrally carinate. First male pleopod shaft sinuous, distally setose; apical process spatulate.

Colour

"Uniforme gris brunâtre, plus claire sur la face inférieure; telson blanc ivoire." (Capart 1951: 47).

Genus *Atlantophila* n. gen.

TYPE SPECIES. — *Philyra cristata* Miers, 1881.

ETYMOLOGY. — *Atlantophila* – referring to the type species' distribution along the Atlantic coast of Africa. Gender feminine.

DIAGNOSIS. — Carapace suborbicular, regions of carapace indistinct, margins cristate, lamellate. Dorsal surface of carapace glabrous. Frontal region squat, upcurved, laterally concave. Antennular fossa transversely ovoid, antennules fold obliquely within fossa. Antennae short, inserted between antennular fossa and orbit. Orbits small, rounded, outer orbital margin unisutured. Eyes retractable. Anterior margin of efferent branchial channel forms part of lower orbital margin, visible in dorsal view. External maxilliped exopod laciniate/lingulate, slightly wider than endopod; endopodal ischium slightly shorter than subtriangular merus, lacking in female setose fringe lengthwise. Epimeral margin minutely beaded, continuous with cristate posterior margin; deflexed posterior surface granulate. Chelipeds subequal, robust, longer in adult male than in female specimens. Cheliped merus triquetral in cross-section, margins granulate. Carpus, propodus carinate; fingers shorter than upper margin of palm. Pereiopods slender, short; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep, nearly reaching buccal cavity. First abdominal segment of male transversely narrow. Second to sixth abdominal segments fused; bearing a minute denticle subdistally; telson triangular. Female abdomen with first segment transversely narrow, yoke-like; second to six segments fused, greatly enlarged, shield-like; telson triangular. First male pleopod elongate, shaft stout, sinuous, coiled on itself, apical process digitate, cornute, enclosed in setose muff. Second male pleopod short, curved, apex acuminate.

REMARKS

Miers (1881: 264) doubted the placement of the species when he commented "I refer the species to the genus *Philyra*; but it may not improbably be found to constitute the type of a distinct genus intermediate between *Philyra* and *Onychomorpha*. It differs from all other species of the genus […] in the marginal crest or rim of the carapace, and in the form of the male postabdomen." Although superficially resembling *Onychomorpha* Stimpson, 1858, in general body shape, with its lamellate carapacial margins and highly carinate palms, *Atlantophila* n. gen. is distinguished by the expanded anterior margins of efferent branchial channels,visible in dorsal view; the expanded, shelf-like posterior margin; the segmentation of male and female abdomen; and the form of the male pleopods. The coiled shaft and the distally setose muff enveloping the apical process of the male pleopod of *Atlantophila* n. gen. is somewhat similar to that of *Leucosia* Weber, 1795, and *Soceulia* Galil, 2006 (Galil 2003, 2006).

Atlantophila cristata (Miers, 1881) n. comb. (Figs 2E; 6)

Philyra cristata Miers, 1881: 263, pl. 15 fig. 1; 1886: 321. — Rathbun 1900: 298. — Balss 1921: 53. — Monod 1956: 144, figs 177-183. — Longhurst 1958: 87. — Rossignol 1962: 115. — Forest & Guinot 1966: 56. — Manning & Holthuis 1981: 66.

TYPE MATERIAL. — Syntypes: **Senegal.** Gorée I., purch. Hermann Maltzan, 2 ♂♂ cl 4.3, 5.7 mm, 1 ovig. ♀ cl 6.0 mm (NHM 1881.24) (the ♂ cl 5.7 mm is here designated as the lectotype and the remaining specimens are now considered to be paralectotypes).

MATERIAL EXAMINED. — **Senegal.** Dakar, 7.5-9.5 m, 8.IV.1952, coll. G. Thorson , 1 ♂ cl 5.1 mm, 1 ♀ cl 6.2 mm (ZMK 4254). — Joal, 10-11 m, 20.II.1953, 2 ♂♂ cl 5.2, 5.5 mm (MNHN B.17000). — *Calypso*, Gulf of Guinea, 1956, 5 m, 1 ovig. ♀ cl 4.8 mm (MNHN B.16997). — Between Tamara and Île de Corail, 16.III.1953, 12 m, coll. J. Forest, id. T. Monod, 2 ♂♂ cl 4.8, 5.5 mm, 6 ovig. ♀♀ cl 4.5-5.1 mm (MNHN B.16998).
Guinea. Iles de Los, nr Roume I., 1910, 10 m, coll.

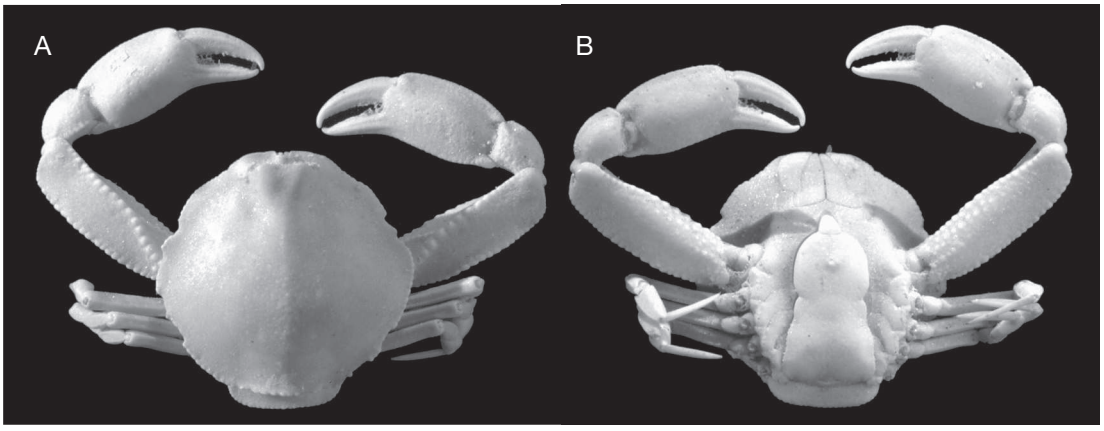

FIG. 6. — *Atlantophila cristata* (Miers, 1881) n. comb., ♂ lectotype cl 5.7 mm, Senegal, Gorée I. (NHM 1881.24): **A**, dorsal view; **B**, ventral view.

A. Gruvel, id. E. L. Bouvier, 1 ♂ cl 4.2 mm (MNHN B.16999). — Guinean Trawling Survey, *La Rafale* stn 12, 15 m, 3.IV.1964, 1 ♂ cl 5.2 mm, 1 ovig. ♀ cl 6.3 mm, 1 juv. (MNHN B.24246).
São Tomé I. *Calypso*, 1956, 4 m, 1 ♂ cl 4.2 mm (MNHN B.17001). — *Calypso*, 1956, 0-2 m, 1 ♀ cl 4.3 mm (MNHN 17002). — Guinean Trawling Survey, *La Rafale*, Benin Bight, 4°57'N, 2°44'W, 5.X.1963, 20 m, 1 ovig. ♀ cl 5.9 mm (MNHN B.17005). — Guinean Trawling Survey, *La Rafale*, Benin Bight, 5°06'N, 3°22'W, 7.X.1963, 20 m, 1 ovig. ♀ cl 5.8 mm (MNHN B.17006).

DISTRIBUTION. — West Africa, from Senegal to Congo (Manning & Holthuis 1981: 66).

DESCRIPTION
Dorsal surface of carapace finely punctate anteriorly. Front truncate, nearly horizontal, straight. Anterior margin of efferent channel entire, straight, continuing into milled, lamellate, upcurved crest surrounding the carapace. Margin of epibranchial angle of carapace more prominently milled than antero- and posterolateral margin. Sternum smooth. Margin of posterior marginal crest milled, straight, visible in dorsal view. Anterior margin of abdominal sulcus minutely granulate. Fused male abdominal segments 2-6 lacking laterobasal knobs; median denticle distally. Margins of fused abdominal segments in female punctate. Cheliped merus with cristate, milled margins. Carpus with row of granules on inner lower and upper margins. Palm laterally convex, its upper and lower margins carinate, milled; fingers with outer margins carinate, inner margins denticulate, setose. Pereiopodal meri bearing two granulate lines on ventral and dorsal margins; carpi dorsally carinate, propodi dorsally and ventrally carinate. First male pleopod shaft coiled thrice on itself; apical process digitate, surrounded by rounded setose muff.

Colour
"Moins gris-plombé [than in *A. laevidorsalis*], parfois plus ou moins orangé, les pinces rose saumon." (Monod 1956: 146).

Genus *Hiplyra* n. gen.

TYPE SPECIES. — *Philyra platycheir* De Haan, 1841.

ETYMOLOGY. — *Hiplyra* is an anagram of *Philyra* Leach, 1817. Gender feminine.

DIAGNOSIS. — Carapace suborbiculate, convex; regions of carapace indistinct, save for branchio-cardiac grooves. Dorsal surface of carapace punctate, variably granulate. Frontal region produced; frontal margin deflexed, medially bearing triangular denticle. Antennular fossa transversely oval, sealed by basal antennular segment. Antennae short, inserted between antennular fossa and orbit. Orbits small, rounded, upper orbital margin unisutured. Eyes retractable. Anterior margin of efferent branchial channel prominently incised, sinuous, continuous with beaded subhepatic margin, projecting beyond frontal margin. External maxilliped exopod as wide as endopodal ischium;

FIG. 7. — *Hiplyra elegans* (Gravier, 1920) n. comb., ♂ cl 16.2 mm, Madagascar, Baie d'Ambaro (MNHN B.18690), dorsal view.

endopodal ischium as long as subtriangular merus, bearing in female setose fringe lengthwise. Lateral and posterior margins of carapace beaded; Hepatic facet well defined, lower margin arcuate. Epimeral margin reaching posterior surface of carapace, closely beaded. Chelipeds subequal, elongate, longer in adult male than in female specimens. Chela elongate, laterally flattened; dactyl with inner margin entire, blade-like, inner margin of pollex thickly fringed with setae. Pereiopods slender, short. Pereiopodal meri longer than carpi and propodi; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep. First abdominal segment of male transversely narrow, medially excavate, yoke-like. Second to sixth abdominal segments fused; proximal margin of fused segment with median lobe, lateral margin bearing three indistinct ridges fitting into sutures between sternal segments; suture between fifth and sixth segments distinct; lacking subterminal denticle; telson elongate, subtriangular. Female abdomen with first two segments transversely narrow, yoke-like; segments three to six fused, greatly enlarged, shield-like; telson laciniate. First male pleopod elongate, shaft wide, dorsoventrally flattened, tip setose; apical process minute. Second male pleopod short, slender, apex scoop-like.

REMARKS

Considered "[e]asily distinguished by the peculiar finger and thumb of cheliped" (Barnard 1950: 383), the species possessing this character (*H. elegans* n. comb., *H. longimana* n. comb., *H. michellinae* n. sp., *H. platycheir* n. comb., *H. sagitta* n. sp., *H. variegata* n. comb.) were often confused with each other. Although some authors discerned subtle but distinct characters that set these species apart, others lumped them together (Tirmizi & Kazmi 1988; Davie 2002). *Hiplyra* n. gen. differs from *Philyra* Leach, 1817 (emend.), *Lyphira* n. gen., *Ryphila* n. gen., and *Pyrhila* n. gen., in having the inner margin of the cheliped dactyl entire, blade-like, inner margin of pollex thickly fringed with setae, and fused male abdominal segments 2-6, with lobate proximal margin.

Hiplyra elegans (Gravier, 1920) n. comb. (Fig. 7)

Philyra platychira – Laurie 1906: 363.

Philyra variegata var. *elegans* Gravier, 1920: 379, figs 1-7.

TYPE MATERIAL. — Holotype: **Madagascar.** Diego Suarez, 1919, coll. R. Decary, 1 ♂ cl 16.8 mm (MNHN B.17550).
Paratype, *idem*, 1 ♀ cl 13.1 mm (MNHN B.17550).

MATERIAL EXAMINED. — **Madagascar.** Tulear, coll. G. Petit, id. H. Balss as *P. platychira*, 1 ♂ cl 12.8 mm, 1 ovig. ♀ cl 10.4 mm (MNHN B.17554). — Nosy-be, intertidal, XII.1958, coll. J. Millot, 1 ♂ cl 13.9 mm (MNHN B.18341). — Baie d'Ambaro, coll. R. Plante, 2 ♂♂ cl 16.1, 16.2 mm, 1 ovig. ♀ cl 12.1 mm (MNHN B.18690). — Nosy-be, intertidal, XII.1958, 3 ♂♂ cl 12.4-15.1 mm (MNHN B.18752). — Tulear, 4 m, 7.III.1964, preserved dry, 1 ovig. ♀ cl 17.6 mm (MNHN). — Nosy-be, 3 ♂♂ 5.7-6.7 mm, 11 ♀♀ cl 5.8-10.1 mm (MNHN B.18496). — Nosy-be, intertidal, coll. A. Crosnier, 1 ♂ cl 10.2 mm, 3 ovig. ♀♀ cl 7.7-8.0 mm (MNHN B.18497). — Nosy-be, intertidal, 24.VIII.1972, coll. A. Crosnier, 1 ♂ cl 9.3 mm, 1 ovig. ♀ cl 9.7 mm (MNHN B.18519). — Nosy-be, 1 ♂ cl 10.0 mm (MNHN B.18520). — Nosy-be, intertidal, I.1959, coll. Macnae, 2 ♂♂ cl 8.1, 8.7 mm (MNHN B.18518). — Tulear, coll. B. Thomassin, 1 ♂ cl 8.7 mm (MNHN 18513). — Nosy-be, 1 ♂ cl 9.7 mm (MNHN B.18520).
Sri Lanka. Gulf of Manaar, coll. W. A. Herdman, 5 ♂♂ cl 12.0-15.4 mm (NHM 1907.5.22.52-53).

DISTRIBUTION. — Known from Madagascar, Sri Lanka.

DESCRIPTION

Dorsal surface of carapace minutely punctate anteriorly; branchial, gastric regions prominently granulate. Frontal region distinctly narrowed, produced. Hepatic region slightly tumescent. Branchio-cardiac grooves distinct. Front with shallow median cleavage. Anterior margin of epistome medially notched. Anterior margin of efferent channel slightly sinuous, separated from beaded lateral margin by deep tear-shaped incision, lateral margin nearly reaching as far forward as anterior

margin. Upper margin of subhepatic facet only medially granulate, lower margin boldly granulate throughout. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Epimeral surface minutely granulate; epimeral margin minutely beaded. Sternal plates prominently granulate anteriorly, swollen laterally. Anterior margin of abdominal sulcus prominently granulate. Fused male abdominal segments 2-6 bearing proximally granulate basal knobs; telson proximally swollen, slightly concave medially. First abdominal segment in female distinctly trilobate, lobes separated by deep fissures; margins of fused abdominal segments in female minutely granulate. Cheliped merus slender, nearly as long as carapace in male; its surface minutely granulate, bearing perliform granules anteriorly. Lower margin of propodus granulate, line of minute granules on inner lower surface, upper margin minutely granulate. Dactyl shorter than upper margin of propodus, sickle-shaped, its inner margin smooth. Pollex with two nearly effaced subterminal denticles. Lower margin of first and second pereiopodal meri bearing line of granules. Male first pleopod with minute apical process.

REMARKS

Gravier (1920: 382) compared his specimens with *H. variegata* n. comb. specimens collected by F. P. Jousseaume and H. Coutière (see following) and though finding "une grande analogie" between them, listed several differences. Yet, having just two specimens on hand, he thought it prudent to describe it as "une variété nouvelle de la *Philyra variegata* (Rüppell)". Indeed, *H. elegans* n. comb. resembles *H. variegata* n. comb. in its urn-shaped carapace and granulate hepatic tumescence, but it is readily distinguished by its larger size, indistinct subterminal denticles on pollex, distinctly trilobate first abdominal segment in female specimens and proximally swollen telson in males.

Hiplyra longimana
(A. Milne Edwards, 1874) n. comb.
(Fig. 8A, B)

Philyra longimana A. Milne Edwards, 1874: 43, pl. 2 fig. 4.

Philyra platycheira – McNeill & Ward 1930: 368, fig. 1.

Philyra platychira – Tyndale-Biscoe & George 1962: 75, fig. 4.9.

Philyra platycheir – Davie 2002: 274.

TYPE MATERIAL. — Holotype: **New Caledonia.** Coll. E. Marie, 1 ♂ cl 9.9 mm (MNHN 200).

MATERIAL EXAMINED. — **New Caledonia.** Grand Récif sud, stn 407, 22°40'S, 167°23'E, 24 m, 23.I.1985, coll. B. Richer de Forges, 13 ♂♂ cl 9.1-17.0 mm, 16 ♀♀ 9.1-11.1 mm (MNHN B21183).
Australia. NW Australia, coll. Mrs B. Grey, 2 ♂♂ cl 16.5 mm, 1 damaged (NHM 1931.5.15.44-45). — Queensland, Horseshoe Bay, Magnetic I., Townsville, 2 m, V.1973, id. R.W. George, 4 ♂♂ cl 12.5-15.2 mm, 1 ♀ cl 12.5 mm, 1 ovig. ♀ cl 11.3 mm (WAM C38270). — Cockburn Sound, Western Australia, 4.VII.1975, coll. J. Scott, 5 ♂♂ cl 9.7-16.9 mm, 5 ♀♀ cl 11.2-13.2 mm (WAM C38271).

DISTRIBUTION. — New Caledonia, Australia.

DESCRIPTION

Dorsal surface of carapace minutely granulate anteriorly; branchial, gastric regions prominently granulate. Hepatic, intestinal regions tumescent. Branchio-cardiac grooves deeply cut. Front with shallow median cleavage. Anterior margin of epistome medially notched. Anterior margin of efferent channel straight, separated from beaded lateral margin by deep incision, lateral margin nearly reaching as far forward as anterior margin. Upper and lower margins of subhepatic facet beaded. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Epimeral surface minutely granulate; epimeral margin minutely beaded. Sternal plates prominently granulate anteriorly. Anterior margin of abdominal sulcus prominently granulate. Fused male abdominal segments 2-6 bearing proximally granulate basal knobs; telson not proximally swollen. Cheliped merus nearly as long as carapace in male, slender; its surface minutely granulate, bearing perliform granules anteriorly. Lower margin of propodus granulate; granulate line proximally on interior surface; upper margin minutely granulate. Dactyl shorter than upper margin of propodus, sickle-shaped. Pollex bearing two nearly effaced

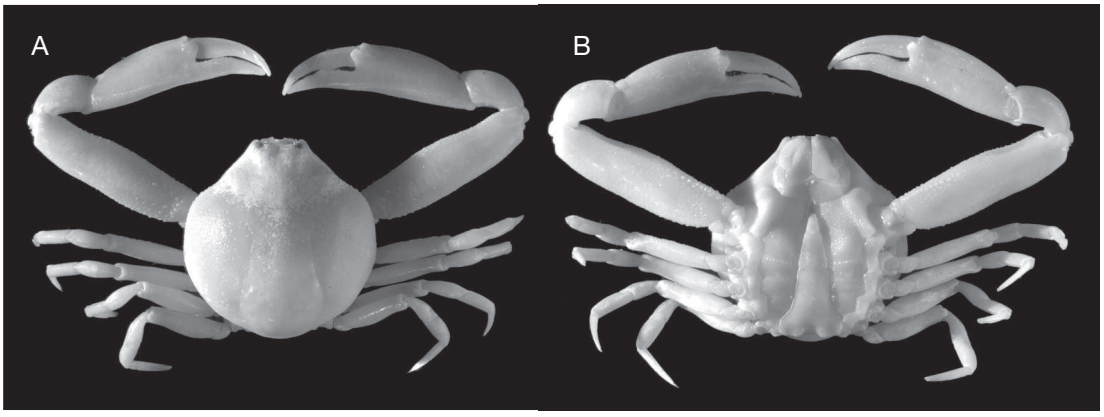

Fig. 8. — *Hiplyra longimana* (A. Milne Edwards, 1874) n. comb., ♂ cl 17.0 mm, New Caledonia, Grand Récif sud, stn 407, 22°40'S, 167°23'E (MNHN B.21183): **A**, dorsal view; **B**, ventral view.

denticles distally. Male first pleopod with minute apical process.

Remarks

Alphonse Milne Edwards (1874: 43) noted that his New Caledonian specimens, though similar to De Haan's Japanese *Philyra platycheir*, differ in having their anterolateral margin "moins échancrés en arrière de la région gastrique, par son front plus avancé et par les fines granulations qui couvrent les parties saillantes de la carapace". In addition, *H. longimana* n. comb. differs from *H. platycheir* n. comb. in the form of the lateral margin of its efferent channel, in its granulate upper margin of subhepatic facet, shorter cheliped dactyl, and in lacking the triangular blade distally on its pollex.

Hiplyra michellinae n. sp.
(Fig. 9)

Philyra platychira – Barnard 1947: 374; 1950: 382, fig. 72j. — Kensley 1981: 39.

Type material. — Holotype: **South Africa.** Off Natal, Ulmars River, 29°56.8'S, 31°02.1'E, 35 m, 10.VII.1985, id. M. Van der Merwe as *P. globosa*, 1 ♂ cl 13.5 mm (SAM A44501).
Paratypes: same data , 1 ♂ cl 13.4 mm (SAM A44501). — Off Natal, 29°50.5'S, 31°04'E, 20 m, 13.VII.1959, id. K. H. Barnard as *P. globosa*, 2 ♂♂ cl 14.3, 12.4 mm (SAM A43213). — Id. K. H. Barnard as *P. platychira*, 2 ♂♂ cl 15.5, 13.4 mm, 5 ovig. ♀♀ cl 11.8-12.2 mm (SAM A477). — Off Natal, 29°53.6'S, 31°04.6'E, 38 m, 16.V.1958, id. K. H. Barnard as *P. platychira*, 2 ♂♂ cl 13.6, 13.2 mm (SAM A39544).

Etymology. — Named in honour of Michelle Van der Merwe, of the South African Museum.

Distribution. — Known only from Natal, South Africa.

Description

Dorsal surface of carapace anteriorly punctuate, minutely granulate, closely granulate on branchial, and intestinal regions. Frontal region only slightly produced. Hepatic region slightly tumescent. Branchio-cardiac grooves shallow. Front produced, slightly cleaved. Anterior margin of efferent channel slightly concave, separated from minutely beaded lateral margin by tear-shaped incision, lateral margin nearly reaching as far forward as anterior margin. Upper, lower margins of subhepatic facet granulate, granules on lower margin larger. Lateral margin of carapace posterior to subhepatic facet closely beaded, granules smaller posteriorly. Epimeral surface minutely granulate; epimeral margin minutely beaded. Sternal plates raised laterally. Anterior margin of abdominal sulcus prominently granulate. Abdomen in male granulate basally, distal margin raised, medially lobate. First abdominal segment in female distinctly trilobate, lobes separated by deep fissures; margins of fused abdominal segments in female minutely granulate.

Cheliped merus 0.8 as long as carapace in male; its surface granulate, largest granules on anterior margin. Upper surface of propodus minutely granulate, lower margin bearing line of granules interiorly. Dactyl as long as upper margin of propodus, sickle-shaped, its inner margin carinate, smooth. Pollex bearing two triangular denticles distally. Male first pleopod with short apical process.

REMARKS

Hiplyra michellinae n. sp. differs from its congeners in having a rounded lobe distally on the male abdomen.

FIG. 9. — *Hiplyra michellinae* n. sp., ♂ holotype cl 13.5 mm, South Africa, off Natal, Ulmars River, 29°56.8'S, 31°02.1'E (SAM A44501); dorsal view.

Hiplyra platycheir (De Haan, 1841) n. comb.
(Figs 2F; 10)

Philyra platycheir De Haan, 1841: 132, pl. 33 fig. 6. — Herklots 1861: 27. — Yamaguchi & Baba 1993: 325. — Fransen *et al.* 1997: 89. — Ng *et al.* 2001: 10 (includes more references for Taiwan fauna).

Philyra platycheira – Stimpson 1858: 160; 1907: 154. — Gee 1925: 161. — T. Sakai 1934: 285, text fig. 3; 1935: 64, pl. 12, fig. 3, text fig. 25; 1937: 156, pl. 15, fig. 6; 1965: 48, pl. 20, fig. 1. — Lin 1949: 15. — Miyake 1961a: 15; 1961b: 171. — Miyake *et al.* 1962: 127. — Takeda 1978: 33; 1982: 100, fig. 294; 1987: 11. — Shen & Dai 1964: 30, fig.

Philyra platychira T. Sakai, 1976: 109, pl. 32, fig. 4, text fig. 59a. — Takeda 1979: 153. — Hill 1982: 199, pl. 3b. — Dai *et al.* 1986: 77, fig. 38, pl. 9.5. — Dai & Yang 1991: 84, fig. 38, pl. 9.5. — Chen & Sun 2002: 378, fig. 168, pl. 15.3.

TYPE MATERIAL. — **Japan.** 1823-1834, coll. P. F. von Siebold & H. Bürger, 2 ♂♂ cl 14.3, 9.0 mm, 2 ♀♀ cl 13.4, 12.2 mm, lectotype (selected by Yamaguchi & Baba [1993: 325]) (RMNH D793) (the ♂ cl 14.3 mm was designated as the lectotype and the remaining specimens are considered to be paralectotypes).

MATERIAL EXAMINED. — **Japan.** Mimase, Shikoku, 17.V.1979, coll. K. Sakai & L. B. Holthuis, 9 ♂♂ cl 13.4-18.9 mm, 1 ovig. ♀ cl 16.7 mm (RMNH D32767). — Oshima passage, 25-40 m, 29.VI.1970, coll. Kagoshima University, id. M. Takeda, 4 ♂♂ cl 12.3-15.5 mm, 2 ♀♀ cl 14.8, 14.9 mm (NSMT 9661). — Between Shiraki-Zaki and Otsu-Zaki, 50 m, 4.VIII.1988, coll. and id. M. Takeda, 2 ♂♂ cl 11.4, 9.7 mm (NSMT 9666). — Off Doren, Oshima passage, 40 m, 8.VIII.1988, coll. and id. M. Takeda, 2 ♂♂ cl 10.4, 11.0 mm, 2 ♀♀ cl 11.7, 12.7 mm (NSMT 9667).

DISTRIBUTION. — Japan, China, Taiwan.

DESCRIPTION

Dorsal surface of carapace minutely punctuate anteriorly, closely granulate on branchial regions, minutely granulate on intestinal region. Frontal region only slightly produced. Hepatic region very slightly tumescent, punctate, not granulate. Lower margin of subhepatic facet granulate. Branchiocardiac grooves distinct. Front produced, shallow median cleavage. Anterior margin of epistome medially notched. Anterior margin of efferent channel separated from minutely beaded lateral margin by deep incision, lateral margin not reaching as far forward as anterior margin of efferent channel. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Epimeral surface minutely granulate; epimeral margin minutely beaded. Sternal plates minutely granulate anteriorly. Anterior margin of abdominal sulcus prominently granulate. Fused male abdominal segments 2-6 bearing posteriorly granulate basal knobs. Margins of fused abdominal segments in female minutely granulate. Cheliped merus 0.8 as long as carapace in male, its surface minutely granulate, with perliform granules anteriorly. Lower margin of propodus with line of granulates, upper margin minutely granulate. Dactyl sickle-shaped, longer than upper margin of propodus. Pollex bearing a triangular blade distally. Male first pleopod with minute apical process.

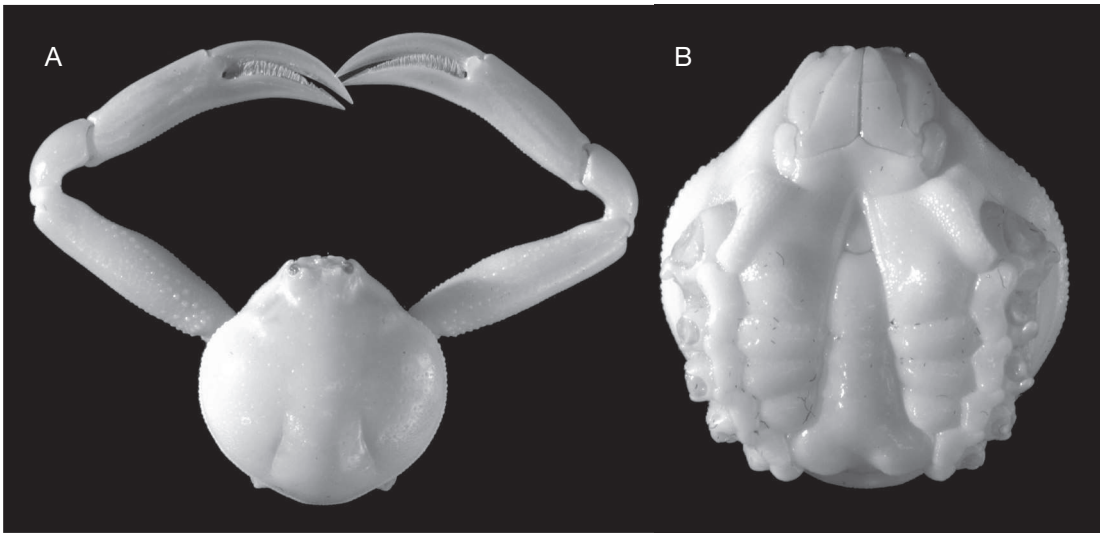

FIG. 10. — *Hiplyra platycheir* (De Haan, 1841) n. comb., ♂ cl 15.5 mm, Japan, Oshima passage (NSMT 9661): **A**, dorsal view; **B**, ventral view.

REMARKS

De Haan's (1841: pl. 33 fig. 6) drawing had sufficient details for accurate identification of *H. platycheir* n. comb.: the slightly produced frontal region, the oblique anterolateral margin lacking the granulate hepatic tumescence and the long, curved cheliped dactyl. Additional characters that set the species apart from it congeners are the triangular blade distally on its pollex and the form of the lateral margin of its efferent channel.

Ng *et al.* (2001: 10) cited several Chinese and Taiwanese authors whose publications I was unable to obtain but these records are regarded as *H. platycheir* n. comb. for the moment.

Hiplyra sagitta n. sp.
(Figs 11; 12A)

Philyra platychira – Alcock 1896: 242.

Philyra platycheir – Tirmizi & Kazmi 1988: 100, fig. 29.

TYPE MATERIAL. — Holotype: **Persian Gulf.** Boushir, 7 m, 18.III.1937, coll. G. Thorson, 1 ♂ cl 13.9 mm (ZMK 4263).
Paratypes: same data, 1 ♂ cl 13.3 mm, 1 ovig. ♀ cl 12.1 mm (ZMK 4263).

Kuwait. 29°11'N 48°29'E, 12.5-16 m, 20.III-17.V.1972, coll. H. Motoh, 1 ♂ cl 16.0 mm cl, 1 ovig. ♀ cl 17.2 mm (NSMT 4500).
Andamans. 1 ♂ cl 14.9 mm, pres. University College Dundee (NHM 1955.5.3.27).

ETYMOLOGY. — From the Latin *sagitta*, arrow, for the arrow-shaped trough distally on the male fused abdominal segments.

DISTRIBUTION. — Known from the Persian Gulf, India and the Andaman Sea.

DESCRIPTION

Dorsal surface of carapace anteriorly punctuate, finely granulate, minutely granulate on branchial, gastric, cardiac and intestinal regions. Hepatic region slightly tumescent. Branchio-cardiac grooves shallow. Front produced, with shallow median cleavage. Anterior margin of efferent channel straight, separated from minutely beaded lateral margin by triangular incision, lateral margin nearly reaching as far forward as anterior margin. Upper, lower margins of subhepatic facet granulate, granules anteriorly on upper margin nearly effaced. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Epimeral surface minutely granulate; epimeral margin

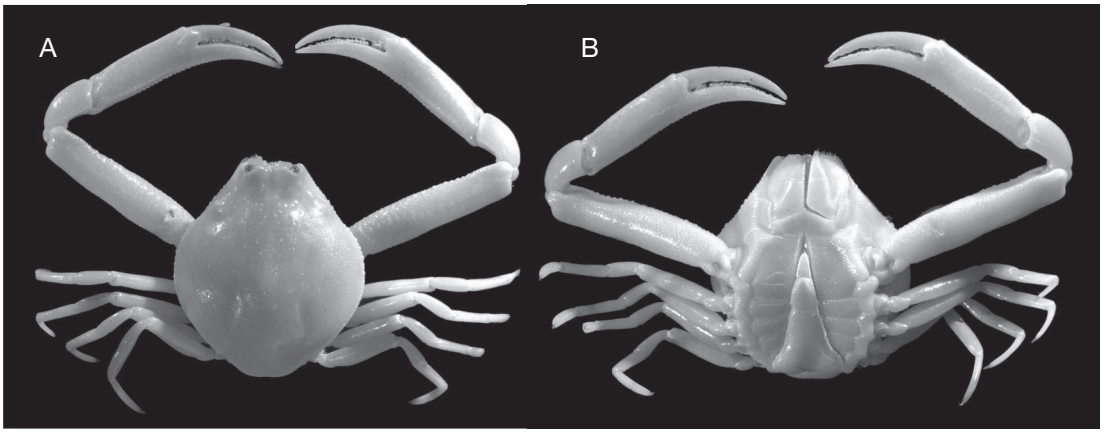

FIG. 11. — *Hiplyra sagitta* n. sp., holotype, ♂ cl 13.9 mm, Persian Gulf, Boushir (ZMK 4263): **A**, dorsal view; **B**, ventral view.

minutely beaded. Sternum delicately granulate anteriorly. Anterior margin of abdominal sulcus prominently granulate. Margins of fused male abdominal segments 2-6 distally carinate. Margins of fused abdominal segments in female minutely granulate. Cheliped merus 0.85 as long as carapace in male; its surface minutely granulate, anteriorly granulate. Upper surface of propodus minutely granulate, lower margin bearing line of prominent granules, line of granules proximally on inner lower margin. Dactyl shorter than upper margin of propodus, sickle-shaped, its inner margin smooth. Pollex bearing two triangular denticles distally. Male first pleopod with short apical process.

REMARKS

Hiplyra sagitta n. sp. differs from its congeners in having anterior margin of efferent channel separated from lateral margin by triangular incision, and the margins of the fused male abdominal segments 2-6 distally carinate, forming an arrow-shaped groove. Alcock (1896: 242, 243) mentions in his description both the "edge of the epistome deeply cleft just below the eye" and the "sixth tergum demarcated by a deep groove", but since he lacked comparative material he assumed his specimens were indistinct from De Haan's Japanese *H. platycheir* n. comb. Tirmizi & Kazmi (1988: fig. 29b, b') drawings accurately depict the triangular groove distally on the fused abdominal segments of the male.

Hiplyra variegata (Rüppell, 1830) n. comb. (Fig. 13)

Myra variegata Rüppell, 1830: 17, pl. 4.4.

Philyra platycheira – Paulson 1875: 83, pl. 10, fig. 3. — Alcock 1896: 242 (the specimens from the Persian Gulf).

Philyra variegata – Nobili 1906: 169. — Laurie 1915: 410. — Balss 1915: 14. — Stephensen 1945: 89, figs 15f-k, 16. — Serène 1968: 46.

Philyra platychira – Balss 1915: 14.

TYPE MATERIAL. — Syntypes: **Egypt.** Tor, Sinai Peninsula, among corals, id. E. Rüppell as *Myra variegata* (SMF 11121).

MATERIAL EXAMINED. — **Red Sea.** Gulf of Suez, pres. R. McAndrew, 3 ovig. ♀♀ cl 6.4-6.6 mm (NHM 1869.49). — 1847, coll. Comte de Paris, labelled *Philyra regalis*, 1 ♂ cl 10.7 mm, 1 ovig. ♀ cl 10.0 mm (MNHN 205). — Dry collection; 23.XI.1997, 1 ♂ cl 9.6 mm (NMW 19054). — Ghuleifaka, 20.XII.1897, "Pola", 1 ovig. ♀ (NMW 19055). — Perim, 3. XII.1897, "Pola", 2 ovig. ♀♀ (NMW 19056).
Israel. Eilat, V.1955, coll. H. Steinitz, 1 ♂ cl 8.9 mm (RMNH D14973).
Egypt. Sharem el Naga, 33 km S of Hurghada, coll. J. Goud & W. Van Dongen, 1 ovig. ♀ cl 8.8 mm (RMNH D38548). — Sinai, Shurat el Mankata, 15.IX.1967, coll. L. Fishelson, 3 ♂♂ cl 6.2-8.3 mm (RMNH D24866). — Sinai, Ras Muhamad, 17.IX.1967, coll. L. Fishelson, 11 ♂♂ cl 9.0-10.6 mm, 11 ovig. ♀♀ cl 8.0-9.4 mm (RMNH D24861).
Eritrea. Cundabilu I., Dahlak Archipelago, on sand,

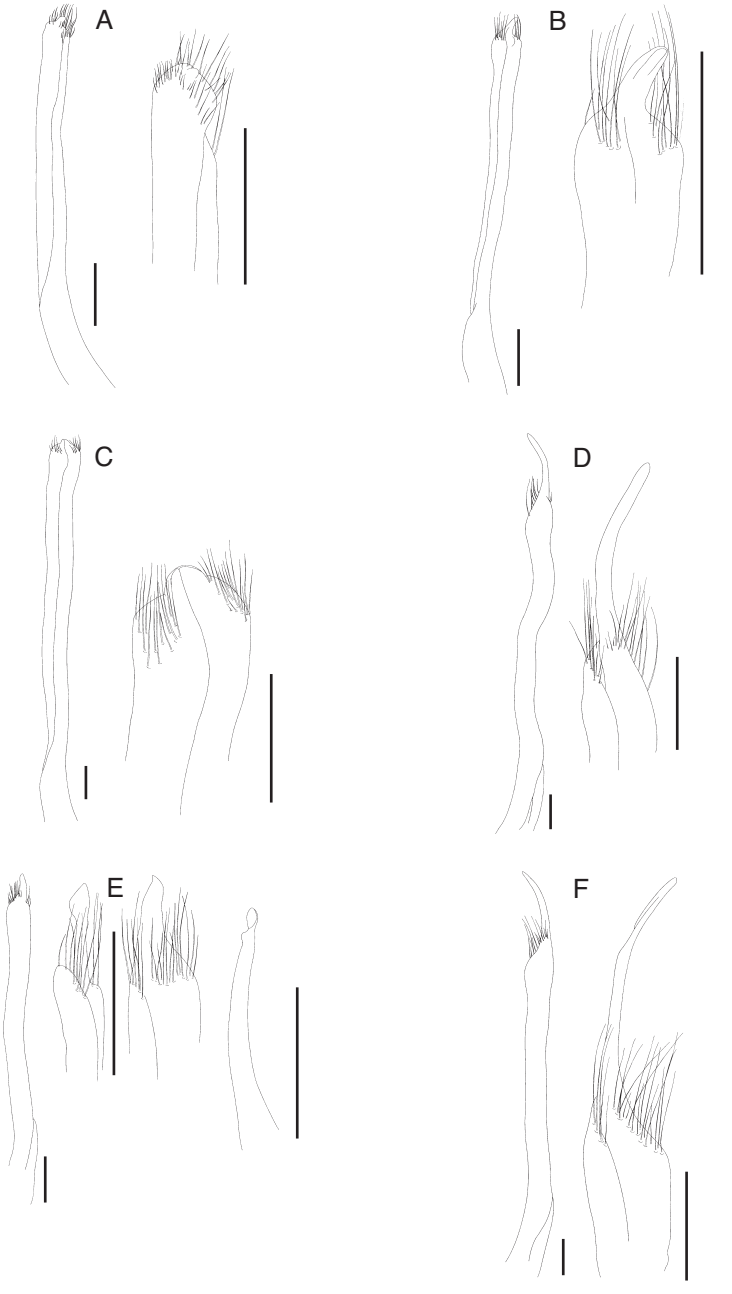

FIG. 12. — **A**-**D**, first male pleopod, distal end of first male pleopod; **A**, *Hiplyra sagitta* n. sp., ♂ holotype cl 13.9 mm, Persian Gulf (ZMK 4263); **B**, *Lyphira heterograna* (Ortmann, 1892) n. comb., ♂ cl 15.1 mm, Indonesia (NHM 1900.10.22.340-45); **C**, *Lyphira perplexa* n. sp., ♂ cl 27.9 mm, India (USNM 337607); **D**, *Pyrhila pisum* (De Haan, 1841) n. comb., ♂ cl 22.6 mm, Japan (USNM 18865); **E**, *Pyrhila carinata* (Bell, 1855) n. comb., ♂ cl 13.2 mm, China (NHM 1874.2), first male pleopod, dorsal and ventral views; **F**, *Pyrhila biprotubera* (Dai & Guan, 1986) n. comb., ♂ cl 20.5 mm, Vietnam (Chiba Inst. 5841), first male pleopod, distal end of first male pleopod, second male pleopod. Scale bars: 1 mm.

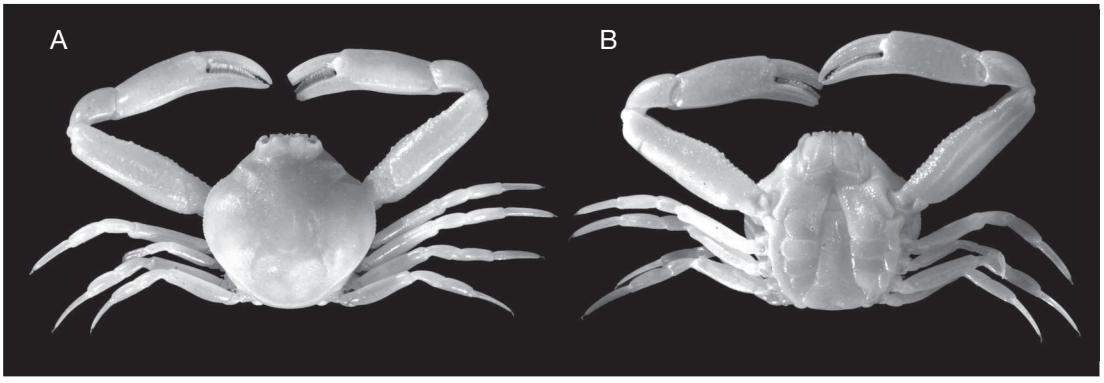

FIG. 13. — *Hiplyra variegata* (Rüppell, 1830) n. comb., ♂ cl 9.6 mm, Red Sea (NMW 19054): **A**, dorsal view; **B**, ventral view.

0-1 m, 14.III.1962, coll. ISRSE, 5 ♂♂ cl 7.3-9.7 mm, 7 ♀♀ cl 7.7-8.6 mm (RMNH D24863). — Museri I., Dahlak Archipelago, on sand, 26.X.1965, coll. ISRSE, 1 ♂ cl 8.7 mm (RMNH D24865). — Enteraia I., Dahlak Archipelago, among *Cystoseira*, 0-1 m depth, 26.III.1962, coll. ISRSE, 1 ♂ cl 6.9 mm, 1 ovig. ♀ cl 7.9 mm (RMNH D24867).

Aden. 1897, coll. F. P. Jousseaume, id. G. Nobili, 1 ♂ cl 8.8 mm, 6 ♀♀ cl 6.1-6.6 mm (MNHN 17046).

Djibouti. 1897, coll. H. Coutière, id. G. Nobili, 6 ♂♂ cl 6.6-12.0 mm, 3 ♀♀ cl 7.9-10 mm (MNHN 17044). — Obock, 1897, coll. F. P. Jousseaume, id. G. Nobili, 6 ♂♂ cl 6.1-8.3 mm, 22 ♀♀ cl 5.5-8.4 mm (MNHN 17043). — 1904, coll. C. Gravier, id. G. Nobili, 1 ovig. ♀ cl 10.9 mm (MNHN 17045).

Kenya. Mombasa, coll. H. Copley, 1 ♂ cl 8.8 mm (NHM 1955.6.22.49).

DISTRIBUTION. — Known from the Red Sea, the East African coast to Mombasa, Kenya, and the Persian Gulf.

DESCRIPTION

Dorsal surface of carapace minutely granulate anteriorly, somewhat larger granules along posterolateral margins. Hepatic region distinctly tumescent. Branchio-cardiac grooves shallow. Front squat, with median cleavage. Anterior margin of epistome medially notched. Anterior margin of efferent channel sinuous, separated from minutely beaded lateral margin by U-shaped incision, lateral margin nearly reaching as far forward as anterior margin. Upper margin of subhepatic facet medially with granulate tubercle, lower margin beaded. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Epimeral surface smooth; epimeral margin minutely beaded. Sternal plates minutely granulate anteriorly, swollen laterally. Anterior margin of abdominal sulcus prominently granulate. Fused male abdominal segments 2-6 bearing nearly smooth basal knobs; telson not proximally swollen. First abdominal segments in female trilobate, lobes separated by indentations; fused abdominal segments in female smooth. Cheliped merus nearly as long as carapace in male; its surface minutely granulate, with perliform granules anteriorly. Lower margin of propodus minutely granulate, upper margin minutely granulate. Dactyl longer than upper margin of propodus, sickle-shaped, its inner margin smooth. Pollex bearing two triangular denticles distally. Male first pleopod with minute apical process.

REMARKS

Neither Rüppell's description, nor his drawing are accurate, but Nobili (1906: 169) who examined the specimens, agreed with Alcock's (1896: 243) observations that "The Persian Gulf specimens [have] the immobile finger denticulate beyond the line of hair." Indeed, *H. variegata* n. comb. differs from its congeners in its smaller size, marbelized colour pattern dorsally on the carapace, and in having two triangular denticles distally on the pollex.

Colour

"Blassgelblich, auf dem Rückenschild […] labyrinthartigen braunen Linien marmoriert" [carapace pale yellowish […] marbled with reticulate brown lines] (Rüppell 1830: 18). "The cephalothorax is

light in colour; on some of the specimens there are irregular brown lines, which form a reticulate pattern on the cephalothorax and on the chelipeds." (Paulson 1875: 83); "the dorsal surface much mottled with green and brown" (Alcock 1896: 243).

Genus *Lyphira* n. gen.

TYPE SPECIES. — *Philyra heterograna* Ortmann, 1892.

ETYMOLOGY. — *Lyphira* is an anagram of *Philyra* Leach, 1817. Gender feminine.

DIAGNOSIS. — Carapace suborbiculate; regions of carapace indistinct, save for branchio-cardiac grooves. Dorsal surface of carapace glabrous, variably granulate. Frontal region slightly produced, upcurved, laterally concave; frontal margin horizontal, imperceptibly bilobate. Antennular fossa transversely oval. Antennae short, inserted between antennular fossa and orbit. Orbits small, upper orbital margin unisutured, external angle prominent. Eyes retractable. Anterior margin of efferent branchial channel forms part of lower orbital margin, extending slightly beyond frontal margin, epistome concave. External maxilliped exopod expanded, ovate, not quite reaching anterior margin; endopod subtriangular, bearing in female setose fringe lengthwise mesially; endopodal merus narrow, nearly as long as ischium along inner margin, apex visible in dorsal view. Margins of carapace granulate, anterolateral margins sinuous, hepatic margin produced, posterior margin rounded. Epimeral margin closely beaded, invisible in dorsal view. Chelipeds subequal, elongate, longer in adult male than in female specimens. Cheliped merus subcylindrical, granulate. Chela robust, fingers at least as long as propodus, inner margin bearing a dentiform tubercle in male, evenly denticulated in female. Pereiopods slender, short. Pereiopodal meri subcylindrical, longer than carpi and propodi; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep, nearly reaching buccal cavity. First abdominal segment of male transversely narrow, yoke-shaped; second to sixth segments fused, last suture line distinct, medially concave proximally, bearing denticle subterminally; telson elongate, laciniate. Female abdomen with first and second segments transversely narrow, yoke-shaped; segments 3-6 fused, greatly enlarged, shield-like, telson subtriangular. First male pleopod elongate, shaft dorsoventrally flattened, tip setose; apical process short, cornute. Second male pleopod short, filiform, apex scoop-like.

REMARKS

Lyphira n. gen. differs from *Philyra* Leach, 1817 (emendato) in having an ovate external maxilliped exopod; first abdominal segment of the male transversely narrow, second to sixth abdominal segments fused, bearing subterminal denticle; and the first male pleopod bearing a short, apical process.

Lyphira heterograna (Ortmann, 1892) n. comb. (Figs 12B; 14)

Philyra globulosa – H. Milne Edwards 1837 (Milne Edwards 1836-1844), pl. 24, fig. 4; 1837: 132.

Philyra heterograna Ortmann, 1892: 582, pl. 26, fig. 17. — Balss 1922: 128. — T. Sakai 1937: 158, text fig. 33. — Uchida 1949: 717, fig. 2075. — Miyake 1961b: 171. — Miyake *et al.* 1962: 127. — T. Sakai 1965: 48; 1976: 111, pl. 32, fig. 3, text fig. 63a. — Serène 1968: 46. — Takeda & Miyake 1970: 230. — Kim 1973: 306, pl. 77, fig. 67a, b, text fig. 99. — Takeda 1982: 101, fig. 297. — Dai *et al.* 1986: 78, fig. 39.2, pl. 9.7. — Chen 1987: fig. 2. — Dai & Yang 1991: 86, fig. 39.2, pl. 9.7. — K. Sakai 1999: 18, fig. 1b, pl. 7C. — Ng *et al.* 2001: 9, fig. 3a (additional references for Taiwan). — Chen & Sun 2002: 379, text fig. 169, pl. 14.4. — Takeda *et al.* 2006: 191.

Philyra globosa – Lanchester 1900: 764 (p.p.).

Philyra peitahoensis Shen, 1932: 18, pl. 1.1-2, text figs 10-12, 16b. — Serène 1968: 46.

Philyra anatum – Rathbun 1910: 312.

Philyra acutidens Chen, 1987: 195, fig. 1. — Chen & Sun 2002: 381, text fig. 170, pl. 15.1.

TYPE MATERIAL. — Syntypes: **Japan.** Tokyo Bay, 1880-1881, id. Ortmann, 1 ♂ cl 12.2 mm, 5 ♀♀ cl 10.8-17.0 mm (Musée zoologique, Strasbourg, reg. no. 658). — Same data, 4 ♂♂ cl 18.4-20.0 mm (Musée zoologique, Strasbourg, reg. no. 149) (the ♂ cl 12.2 mm is here designated the lectotype and the remaining specimens are now considered to be paralectotypes).

MATERIAL EXAMINED. —**Thailand.** Koh Chang, 1900, 6-10 m, coll. Th. Mortensen, id. M. J. Rathbun as *Philyra anatum*, 3 juvs (ZMK CRU4264).
Malaysia. Malacca, 1-2 m, coll. F. P. Bedford & W. F. Lanchester, 4 ♂♂ cl 12.7-15.1 mm, 2 ovig. ♀♀ cl 11.4, 14.9 mm (NHM 1900.10.22.340-45). — Pontian, 1992, 1 ♂ cl 10.6 mm (ZRC 1999.0798).
Philippines. Panglao, 15 m, 1955-56, 5 ♂♂ cl 8.9-12.7 mm, 2 ♀♀ cl 11.4, 11.2, 12.8 mm (ZRC 1985.90-96).
East China Sea. 32°00'N, 127°30'E, 25 m, 24.X.1959, coll. Cheng, 1 ♂ cl 14.4 mm (ZRC 1999.0013). — V.1878,

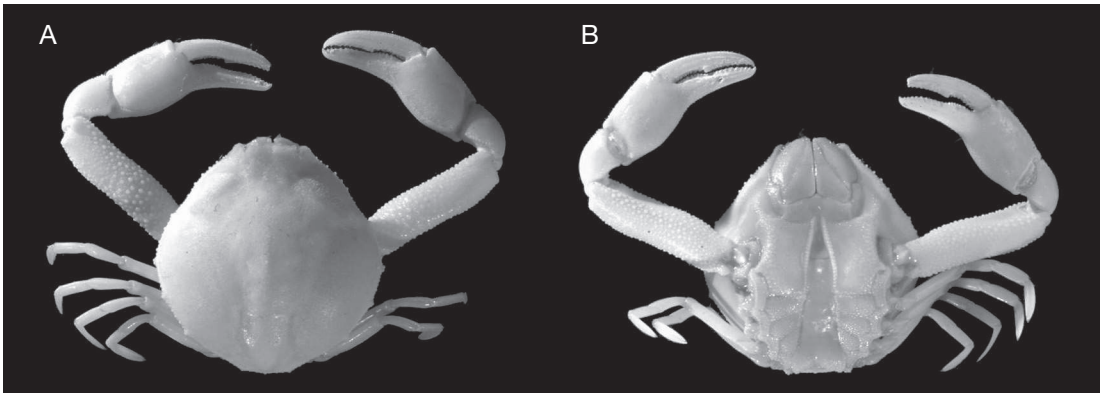

FIG. 14. — *Lyphira heterograna* (Ortmann, 1892) n. comb., ♂ cl 15.1 mm, Indonesia (NHM 1900.10.22.340-45): **A**, dorsal view; **B**, ventral view.

coll. Branchi, 1 ♂ cl 15.2 mm (MZUF 2723). — Chusan I., 18-25 m, coll. P. Basset-Smith, 2 ♂♂ cl 14.2, 14.3 mm, 2 ♀♀ cl 13.7, 11.7 mm, (NHM 1892.12.15.31-43). — Peitaiho, coll. C. J. Shen, 2 ♂♂ cl 9.3, 9.3 mm (NHM 1930.11.14.5-6).

Japan. Tokyo fish market, 2 ♂♂ cl 14.5, 15.5 mm, 3 ♀♀ cl 13.5-14.9 mm (NSMT 3564). — Mikawa-Ishiki, Aichi prefecture, 9.XI.1962, 1 ♀ cl 15.3 mm (NSMT 3613). — XII.1957, 1 ♀ cl 13.3 mm (NSMT 8463). — 1 ♀ cl 13.0 mm (NSMT 3627).

DISTRIBUTION. — Japan, Taiwan, China, Malaysia, Indonesia, Philippines, East China Sea.

DESCRIPTION

Dorsal surface of carapace bearing closely-spaced minute granules, hepatic, branchial and intestinal regions bear slightly larger, more prominent granules; hepatic, intestinal regions slightly tumescent. Frontal margin minutely granulate. Circumference of carapace behind front beaded, granules variable in size. Anterior margin of epistome slightly arcuate, inner angles of afferent branchial canals not prominent. External maxillipeds minutely granulate, exognath paddle-shaped. Pterygostomian region prominently granulate. Anterolateral margin slightly sinuous, posterolateral margin arcuate. Thoracic sternites granulate. Anterior margin of abdominal sulcus in male specimens prominently granulate, granules lozenge-shaped. Fused male abdominal segments 2-6 granulate basio-laterally. Margins of fused abdominal segments in female granulate, prominently granulate areas basally. Cheliped merus covered with perliform granules, interspaced with smaller granules. Carpus with row of granules on inner margin; patch of minute granules distally on upper margin. Propodus lenticular, minutely granulate, upper and lower surfaces bearing larger, more prominent granules. Fingers fluted, granulate, granulation most prominent proximally on outer margins; inner margin of dactyl bearing prominent denticle medially. Merus of last pereiopod bearing line of pearliform granules ventrally; meri of pereiopods 1-3 bear line of increasingly minute granules along ventral margin; carpi and propodi smooth. Male first pleopod with digitate apical process.

Colour

"In alcohol, carapace avellaneous to light cinnamon drab, tip of dactylus dark brown." (Shen 1932: 21).

REMARKS

Shen's (1932) description and drawings of *Philyra peitahoensis* correspond to *Lyphira heterograna* n. comb. Already Sakai (1937: 160) found it "in all probability synonymous" with the latter species. Comparing *P. peitahoensis* to *P. tuberculosa* Stimpson, 1858 (in fact to *Lyphira perplexa* n. sp. see below), Shen (1932: 22) wrote "This new species is apparently different […] by its smaller size, its angle of branchial channel not triangularly pointed […], its different shape of male appendage." Indeed, *L. heterograna* n. comb. differs from *L. perplexa* n. sp. in its smaller body size, its short inner angles of afferent branchial canals,

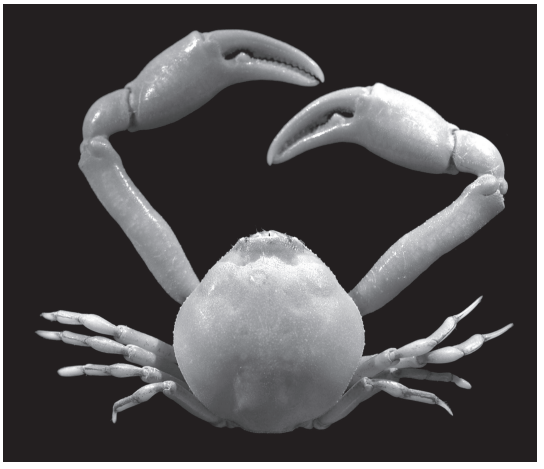

FIG. 15. — *Lyphira natalensis* n. sp., ♂ holotype cl 13.7 mm, South Africa (SAM A39543), dorsal view.

first pereiopodal meri lacking line of pearliform granules ventrally, and digitate apical process of first male pleopod. Chen's (1987: fig. 1) *P. acutidens* is an immature specimens of *L. heterograna* n. comb., as the drawing of the first male pleopod demonstrates.

Lyphira natalensis n. sp
(Fig. 15)

Philyra globulosa – Barnard 1947: 374, 1950: 383, fig. 72k-n. — Kensley 1981: 39.

TYPE MATERIAL. — Holotype: **South Africa.** Off Natal, between Durban and St. Lucia, 3-20 m, V.1948, id. K. H. Barnard as *P. globulosa*, 1 ♂ cl 13.7 mm (SAM A39543).
Paratypes: same data, 1 ♂ cl 13.2 mm, 1 ♀ cl 12.2 mm (SAM A39543). — Off Natal, 1 ♂ cl 16.7 mm (SAM A15284). — Off Natal, II.1989, coll. T. Forbes, id. W. Emmerson as *P. globosa*, 1 ♂ cl 14.8 mm (SAM A45404).

ETYMOLOGY. — After the type location, Natal province, South Africa.

DISTRIBUTION. — Known only from the type locality, Natal, South Africa.

DESCRIPTION
Dorsal surface of carapace bearing closely-spaced minute granules; hepatic, branchial and intestinal regions bear slightly larger, perliform granules; intestinal region slightly tumescent. Frontal margin minutely granulate. Circumference of carapace behind front irregularly beaded, granules variable in size. Anterior margin of epistome medially notched, emargination bound by prominent inner angles of afferent branchial canals. External maxillipeds minutely granulate, exopod narrowly oval. Pterygostomian region prominently granulate. Anterolateral margin sinuous, posterolateral margin arcuate. Thoracic sternites granulate. Anterior margin of abdominal sulcus in both male and female specimens prominently granulate. Fused male abdominal segments 2-6 in male bearing granulate basal knobs separated by concavity; subterminal denticle bent posteriorly. Margins of fused abdominal segments in female granulate, prominently granulate areas laterobasally. Cheliped merus longer than carapace in adult male; granulate, granules decreasing in size distally. Carpus with row of granules on inner margin; patch of minute granules distally on upper margin. Propodus lenticular, minutely granulate. Fingers fluted, minutely granulate; inner margin of pollex bearing large triangular dentiform tubercle proximally. Granulation in female specimens less prominent. Merus of first pereiopod bearing line of granules ventrally; meri of pereiopods 2-4 bear stripe of minute granules along ventral margin; carpi and propodi smooth. Male first pleopod with apical process flattened, squat, distally rounded.

REMARKS
Barnard (1950: 383, 384, fig. 72l) noted the narrower shape of the external maxilliped exopod in the South African specimens, as well as the lesser granulation of carapace and chelipeds. Indeed, both characters, and the proportionally longer chelipeds in adult males, easily separate *L. natalensis* n. sp. from its congeners.

Lyphira ovata n. sp.
(Fig. 16)

TYPE MATERIAL. — Holotype: **Sri Lanka.** Ngombo-Ethukala, 1979, coll. Magnus, 1 ♂ cl 18.3 mm (NMW 19040).

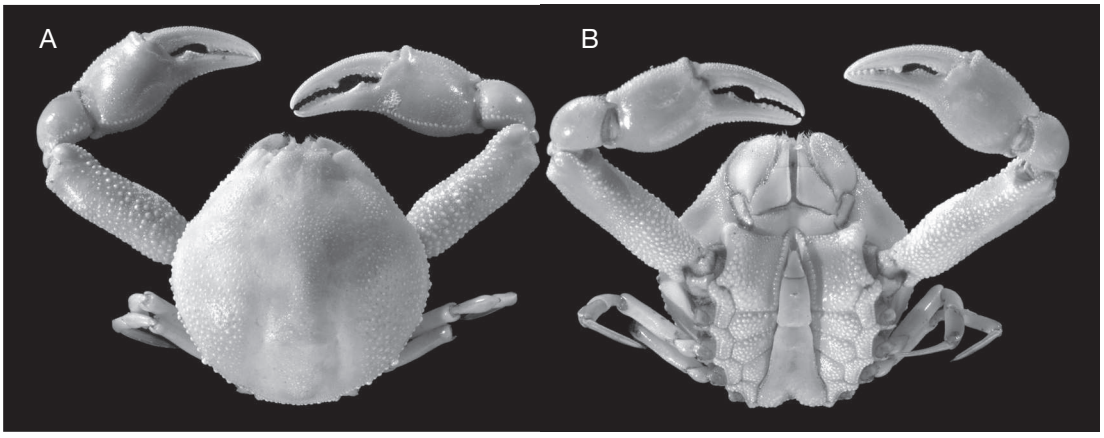

FIG. 16. — *Lyphira ovata* n. sp., ♂ holotype cl 18.3 mm, Sri Lanka (NMW 19040): **A**, dorsal view; **B**, ventral view.

DISTRIBUTION. — Known only from the type locality (Sri Lanka).

ETYMOLOGY. — From Latin, *ovatus*, egg-shaped – for the ovate exognath of the external maxillipeds.

DESCRIPTION

Dorsal surface of carapace minutely rugose, hepatic, branchial, cardiac and intestinal regions bear slightly larger, perliform granules; hepatic, intestinal regions slightly tumescent. Frontal margin minutely granulate. Circumference of carapace behind front beaded, granules variable in size. Anterior margin of epistome slightly arcuate, inner angles of afferent branchial canals acuminate, prominent. External maxillipeds minutely granulate, exognath ovate. Pterygostomian region prominently granulate. Anterolateral margin slightly sinuous, posterolateral margin arcuate. Thoracic sternites granulate. Anterior margin of abdominal sulcus in male specimens prominently granulate. Fused male abdominal segments 2-6 granulate basally. Cheliped merus covered with closely spaced perliform granules of variable sizes save for distal upper and lower surfaces. Carpus with row of granules on inner margin; patch of minute granules distally on upper margin. Propodus lenticular, minutely rugose, upper and lower surfaces bearing larger granules, line of perliform granules on lower inner margin. Fingers fluted, minutely granulate, several lines of small perliform granules extend to tips outer margins; inner margin of dactyl bearing prominent denticle medially, inner margin of pollex bearing prominent denticle proximally. Pereiopodal meri bear strip of minute granules ventrally; carpi and meri smooth. Male first pleopod with apical process digitate, squat.

REMARKS

Lyphira ovata n. sp. differs from its congeners in possessing widely ovate third maxilliped exopod. Additionally, it differs from *L. perplexa* n. sp. in its tubular, rather than spatulate apical process of the male first pleopod; from *L. heterograna* n. comb. in its bolder carapacial granulation, acuminate inner angles of afferent branchial canals, and lenticular chela; and from *L. natalensis* n. sp. in its markedly shorter chelipeds.

Lyphira perplexa n. sp.
(Figs 12C; 17)

Cancer globus Fabricius, 1775: 401 (p.p.).

Cancer anatum Herbst, 1783: 93, pl. 2, fig. 19 (p.p.).

Cancer globosus Fabricius, 1787: 315; 1793: 441 (p.p.).

Leucosia globosa Fabricius, 1798: 349 (p.p.).

Philyra globosa – de Man 1888: 203 (p.p.).

Philyra globulosa – Alcock 1896: 245. — Chopra 1934: 38. — Stephensen 1945: 77, figs 10, 11a-l. — Tirmizi & Kazmi 1988: 98, fig. 28. — Deb 1998: 358.

Philyra globus –Tan 1995: 475, fig. 3a, c.

Philyra heterograna – K. Sakai 1999: 18, pl. 7c.

TYPE MATERIAL. — Holotype: **India.** Malabar, coll. Dr J. G. Koenig, 1 ♂ cl 29.4 mm (ZMK CRU3996), id. J. C. Fabricius as *Cancer globus* [labelled as Syntype 1].
Paratypes: **India.** Madras, coll. J. R. Henderson, 2 ♂♂ cl 26.4, 28.3 mm, 18 ovig. ♀♀ cl 19.4-23.8 mm, 4 ♀♀ cl 20.7-22.2 mm (NHM 1892.7.15.358-67).
Indian Ocean. Exp. *La Bonite*, coll. F. Eydoux, 1 ♂ cl 19.2 mm, 1 ♀ cl 20.9 mm (MNHN 4146). — Exp. *La Bonite*, coll. M. C. Gaudichaud, 1 ♂ cl 18.2 mm (MNHN 204).

MATERIAL EXAMINED. — **Persian Gulf.** Boushir Is., 13 m, 11.III.1937, coll. G. Thorson, 1 ♂ cl 16.8 mm (ZMK CRU4246). — Kharg I., 25-30 m, 4.III.1937, coll. G. Thorson, 1 ♂ cl 13.5 mm (ZMK CRU4247). — Boushir Is., 7 m, 18.III.1937, coll. G. Thorson, 2 juvs, (ZMK CRU4248). — Boushir I., 7.5 m, 23.III.1937, coll. G. Thorson, 1 juv. (ZMK CRU4250).
Kuwait. 29°11'N, 48°29'E, 29.III.1972, coll. H. Motoh, 5 ♂♂ cl 16.4-24.5 mm, 1 ovig. ♀ cl 17.9 mm cl, 1 ♀ cl 14.2 mm (NSMT 4475). — Khoral Sabiya, X.1982, 1 ♂ cl 10.2 mm (NHM 1999.2).
Pakistan. Karachi, 1 ♂ juv. cl 14.6 mm, 1 ovig. ♀ cl 17.3 mm (NHM 1906.5.29.71-72).
India. Ganges Delta, ex. Indian Museum, 3 ♂♂ cl 27.0-27.8 mm, 2 ovig. ♀♀ cl 20.0-22.0 mm (USNM 42756). — Madras, 3.II.1979, 1 ♂ cl 27.9 mm (USNM 337607). — Tranquebar, 16-24.III.2001, colls N. K. Ng & A. S. Fernando, 4 ♂♂ cl 25.7-27.2 mm, 2 ovig. ♀♀ cl 21.6-22.1 mm, 1 ♀ cl 21.8 mm (ZRC 2001.0904).

ETYMOLOGY. — From Latin, *perplexus*, puzzling – for the confused history of the species.

DISTRIBUTION. — Persian Gulf, Gulf of Oman, Pakistan, India, Anadaman Is.

DESCRIPTION

Dorsal surface of carapace bearing closely-spaced granules, hepatic, branchial and intestinal regions bear slightly larger, perliform granules; intestinal region slightly tumescent. Frontal margin minutely granulate. Circumference of carapace behind front irregularly beaded, granules variable in size. Anterior margin of epistome medially notched, emargination bound by prominent inner angles of afferent branchial canals. External maxillipeds minutely granulate, exognath paddle-shaped. Pterygostomian region prominently granulate. Anterolateral margin sinuous, posterolateral margin arcuate. Thoracic sternites prominently granulate. Anterior margin of abdominal sulcus in both male and female specimens prominently granulate. Fused male abdominal segments 2-6 bearing granulate basal knobs separated by concavity. Margins of fused abdominal segments in female granulate, prominently granulate areas basally. Cheliped merus granulate; most prominent granules basally on anterior and posterior surfaces, and on dorsal surface, decreasing in size distally. Carpus with row of granules on inner margin; patch of minute granules distally on upper margin. Upper and lower surfaces of propodus, as well as lower inner surface bearing conical granules. Fingers fluted, granulate, granulation most prominent proximally on outer margins; inner margin of pollex bearing triangular dentiform tubercle proximally. Granulation in female specimens less prominent. Merus of first pereiopod bearing line of perliform granules ventrally; meri of pereiopods 2-4 bear elongate patch of minute granules along ventral margin; carpi and propodi smooth. Male first pleopod with apical process flattened, squat, distally rounded.

Colour

"Grayish fawn with bluish tinge." (Tirmizi & Kazmi 1988: 100).

REMARKS

Fabricius' (1775) male syntype of *Cancer globus* differs from the female syntype, and has been long recognized as a different species. Herbst (1783) described and illustrated the species as *Cancer anatum*, after Rumphius' (1705: pl. 10 fig. A) "Cancellus Anatum Primus". However, Rumphius' drawing depicts a species conspicuously different from Herbst' actual specimen (Zoologisches Museum der Humboldt Universität, Berlin, Herbst 0686-1). Alcock (1896) synonymized (with doubt) *C. anatum* Herbst, 1783 with *P. globulosa* H. Milne Edwards, 1837 (pl. 24, fig. 4), when in fact the species depicted is *L. heterograna* n. comb. (see above). In any case, Holthuis (1959: 107) proposed Rumphius' (1705) drawing as "the holotype of *Cancer anatum* Herbst (1783), so that the name of the species is *Leucosia anatum*".

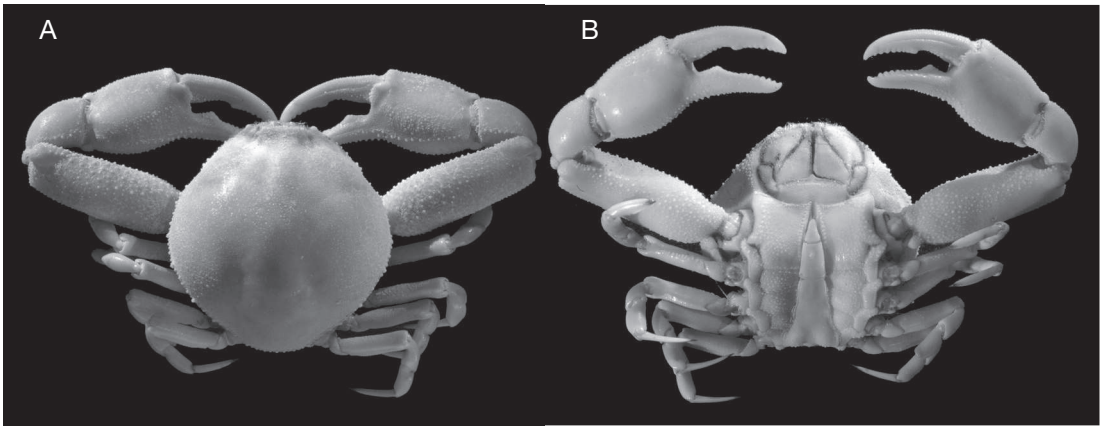

FIG. 17. — *Lyphira perplexa* n. sp., ♂ cl 27.9 mm, India (USNM 337607): **A**, dorsal view; **B**, ventral view.

Many authors followed Alcock (1896: 245) who thought the male syntype "appears to be the species named by Milne Edwards – and named probably with foresight – *P. globulosa*". However, Holthuis (1962) who chose the female specimen as the lectotype of *Cancer globus* Fabricius, 1775, proposed *C. globosus* Fabricius, 1787 (and therefore also *globulosa*) as its subjective synonym (see above).

In the interests of resolving confused identities and stabilizing the nomenclature I hereby designate the male specimen identified by Fabricius (1775: 401) as *C. globus* and deposited at the Zoologisk Museum, Copenhagen (ZMK CRU3996) as the holotype of *Lyphira perplexa* n. sp.

Genus *Pyrhila* n. gen.

TYPE SPECIES. — *Philyra pisum* De Haan, 1841.

ETYMOLOGY. — *Pyrhila* is an anagram of *Philyra*. Gender feminine.

DIAGNOSIS. — Carapace suborbiculate, globose; regions of carapace indistinct, save for branchio-cardiac grooves. Dorsal surface of carapace variably granulate. Frontal region slightly produced, medially grooved. Antennular fossa transversely oval, sealed by basal antennular segment. Antennae short, inserted between antennular fossa and orbit. Orbits small, rounded, upper orbital margin unisutured. Eyes retractable. Anterior margin of efferent branchial channel sinuous, projecting beyond frontal margin, separated from crenulate subhepatic margin by deep fissure. External maxilliped exopod as wide as endopod; endopodal ischium longer than subtriangular merus, bearing in female setose fringe lengthwise. Hepatic facet well defined, lower margin prominently angular. Lateral and posterior margins of carapace irregularly beaded. Epimeral margin meeting lateral margin at posterior margin, closely beaded. Chelipeds subequal, longer, stockier in adult male than in female specimens. Cheliped merus subcylindrical, slightly swollen proximally on anterior margin, surface minutely granulate, granulate. Fingers as long as propodus. Pereiopods slender, short. Pereiopodal meri longer than carpi and propodi; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep, nearly reaching buccal cavity. First abdominal segment of male transversely narrow, medially excavate, yoke-like. Second to sixth abdominal segments fused; proximal margin with median lobe, lateral margin bearing three indistinct ridges fitting into sutures between sternal segments; lacking subterminal denticle; telson elongate, laciniate. Female abdomen with first two segments transversely narrow, medially excavate, segments three to six fused, greatly enlarged, shield-like. First male pleopod elongate, shaft wide, dorsoventrally flattened, tip setose; apical process nearly tubular, elongate. Second male pleopod short, slender, apex scoop-like.

REMARKS

Pyrhila n. gen. differs from *Philyra* Leach, 1817 (emend.) and *Ryphila* n. gen., in possessing a well-defined hepatic facet, a single transverse segment proximally on the male abdomen rather than two, and in having a tubular apical process on first male pleopod, rather than subterminally alate or filiform

FIG. 18. — *Pyrhila biprotubera* (Dai & Guan, 1986) n. comb., ♂ cl 20.5 mm, Vietnam (Chiba Inst. 5841), dorsal view.

process. *Pyrhila* n. gen. shares with *Lyphira* n. gen., and *Hiplyra* n. gen. the single jointed proximal male abdominal segment, but differs from both in the shape of the apical process on first male pleopod. In addition, it differs from *Lyphira* n. gen. in lacking the subterminal denticle on the fused male abdominal segments, and from *Hiplyra* n. gen. in lacking the thick fringe of setae on the pollex.

Pyrhila biprotubera (Dai & Guan, 1986) n. comb. (Figs 12F; 18)

Philyra biprotubera Dai & Guan, 1986: 148, figs 1-8. — Dai & Yang 1991: 90, fig. 41A. — Chen & Sun 2002: 398, fig. 179.

TYPE MATERIAL. — Holotype: **China.** Xiang-zhou, 22°17'N, 113°34'E, VII.1980, 1 ♂ (GD 908314 [Guan & Dai collection]); same data, paratype 1 ♀ (GD 908315) [deposited in the Institute of zoology, Academia Sinica].
East China Sea. 32°00'N, 127°30'E, 24.X.1959, 25 m, coll. Cheng, 1 ♂ c.l. 14.4 mm (ZRC 1999.0013).

MATERIAL EXAMINED. — **Vietnam.** Cam River, intertidal, XI.1995, coll. T. Kosuge, 2 ♂♂ cl 20.5, 18.5 mm, 1 ovig. ♀ cl 13.5 mm (Chiba Institue 5841).

DISTRIBUTION. — China, Vietnam.

DESCRIPTION

Dorsal surface of carapace minutely granulate, bearing patches of small granules on branchial, gastric and intestinal regions. Hepatic, intestinal regions slightly tumescent. Branchio-cardiac grooves shallow. Front with shallow median indentation. Anterior margin of efferent channel sinuous, outer angle fissured. Upper, lower margins of subhepatic facet granulate, granules on lower margin larger. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Posterior margin with dorsoventrally flattened denticles laterally in male, arcuate with prominent lateral angles in female. Epimeral surface smooth; epimeral margin minutely beaded. Outer margin of external maxilliped endopod minutely granulate, exopod distally granulate, punctate. Margins of sternal plates minutely granulate. Margin of abdominal sulcus prominently granulate anteriorly. Fused male abdominal segments 2-6 granulate basally. Fused abdominal segments in female with granulate stripe basally. Cheliped merus half as long as carapace in male; its dorsal surface minutely granulate, anterior and posterior surfaces minutely granulate. Carpus with granules on inner and upper margins. Upper and lower surfaces of propodus granulate, arcuate strip of granules medially on inner margin. Fingers fluted, granulate, granulation most prominent proximally on outer margins; inner margins denticulate. Lower margin of pereiopodal meri finely granulate, propodi dorsally and ventrally carinate, lower margin of first pereiopodal propodus in adult males boldly granulate. Male first pleopod with apical process filiform, arcuate, bent distad.

REMARKS

Dai & Guan's (1986: 148, figs 1-8) drawings and photographs illustrate the characters that help differentiate *P. biprotubera* n. comb. from its congeners: the finely granulate carapace, the dorsoventrally flattened denticles on carapacial posterior margin of the male, and the slimmer, more elongate apical process of the male first pleopod.

Pyrhila carinata (Bell, 1855) n. comb. (Figs 12E; 19)

Philyra carinata Bell, 1855a: 365; 1855b: 302, pl. 33, fig. 4; 1855c:16. — T. Sakai 1937: 162; 1976: 113. — Shen 1940: 78. — Shen & Dai 1964: 33, fig. — Serène 1968: 46. — Dai *et al.* 1986: 77, pl. 9.6, fig. 39.1. — Dai &

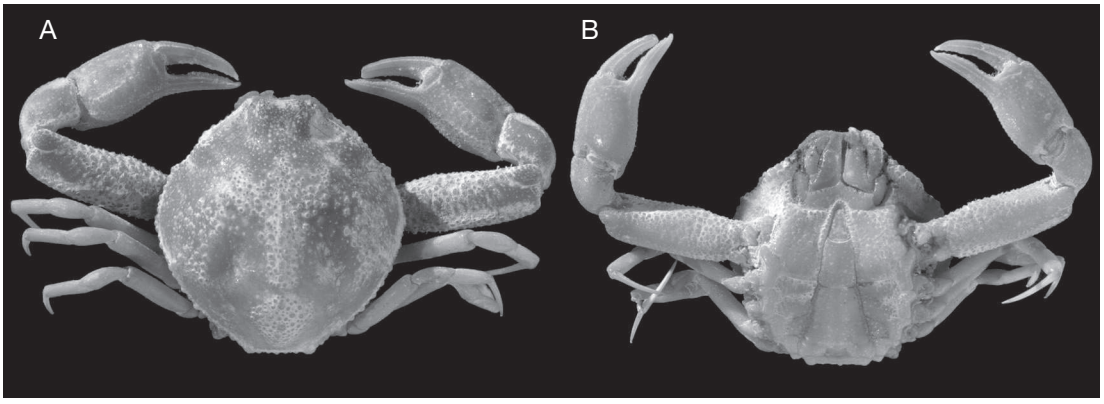

FIG. 19. — *Pyrhila carinata* (Bell, 1855) n. comb., ♂ cl 13.2 mm, China (NHM 1874.2): **A**, dorsal view; **B**, ventral view.

Yang 1991: 85, pl. 9.6, fig. 39.1. — Chen & Sun 2002: 389, fig. 174.

Philyra tuberculosa Stimpson, 1858: 160; 1907: 153, pl. 18, fig. 5. — Serène 1968: 46.

Philyra yangmataoensis Shen, 1932: 27, text fig. 15, 16c, pl. 1.3. — Serène 1968: 46. — Kim 1973: 310, pl. 78, fig. 70, text fig. 102.

Philyra yangmataoensis forma *chefooensis* Shen, 1932: 28, text fig. 16d, 17, pl. 1.4.

Philyra carinata chefooensis – Shen 1937: 285.

TYPE MATERIAL. — Holotype: **Borneo.** 1 ♂ cl 15.1 mm (NHM 1847.21).

MATERIAL EXAMINED. — **China.** Chefoo, purch. Swinhoe, 1 ♂ cl 13.2 mm, 1 ovig. ♀ cl 16.7 mm (NHM 1874.2). — Amoy, VII.1925, coll. C. F. Wang, 1 ♂ cl 17.8 mm (MNHN 17048). — 27.XI.1927, 1 ♂ cl 16.4 mm, 1 ♀ cl 15.4 mm (MNHN 17047). — Tsimei, tide pools, VI.1923, id. M. J. Rathbun as *P. tuberculosa*, 1 ♂ cl 19.2 mm (USNM 57768). — Kiaochow, pres. C. J. Shen, 1 ♂ cl 12.9 mm, 2 ♀ ♀ cl 9.8, 10.2 mm (NHM 1935.3.19.135-136). — 1 ovig. ♀ cl 16.1 mm (Fuchian Institute of Biological Studies 151545).

DISTRIBUTION. — Korea, China, Borneo I.

DESCRIPTION

Dorsal surface of carapace minutely granulate, granulate, bearing perliform granules on branchial, gastric, cardiac and intestinal regions; a line of prominent granules medially on cardiac, intestinal regions. Hepatic region slightly tumescent. Branchio-cardiac grooves shallow. Front with shallow median indentation. Anterior margin of epistome medially notched; anterior margin of efferent channel bilobed, outer lobe fissured. Upper, lower margins of subhepatic facet granulate, granules on lower margin larger. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Posterior margin straight in male, arcuate in female. Epimeral surface smooth; epimeral margin minutely beaded. Margins of external maxillipeds minutely granulate, exopod with line of prominent granules medially. Sternum boldly granulate. Anterior margin of abdominal sulcus prominently granulate. Fused male abdominal segments 2-6 bearing boldly granulate basal knobs. Fused abdominal segments in female with granulate strip basally. Cheliped merus 0.6 as long as carapace in male; its surface granulate but for an elongate dorsal strip. Carpus with strip of granules on inner and upper margins. Upper and lower surfaces of propodus granulate, arcuate strip of perliform granules medially on inner margin. Fingers fluted, granulate, granulation most prominent proximally on outer margins; inner margins denticulate. Granulation in female specimens less prominent. Pereiopodal propodi indistinctly carinate dorsally and ventrally. Male first pleopod with short, spatulate apical process.

Colour

"In life: yellowish-gray." (Stimpson 1907: 154).

Remarks

Bell's (1855b: 302, pl. 33, fig. 4), description and drawing, though not entirely accurate, highlight the essential characters that distinguish the species: the bold granulation on carapace and chelipeds and its "nearly straight, slightly grooved" frontal margin. Stimpson's (1907: pl. 18, fig. 5) illustration of the type female of *P. tuberculosa* is easily recognizable as *P. carinata* n. comb. Shen (1932: 27) listed the characters distinguishing *P. yangmataoensis* from *P. pisum*: "[c]oarse granulated patches on its branchial, gastrical and cardiacal regions and with a prominent granulated median line […] line of coarse granules […] on exognath […] [m]erus of cheliped and sternum closely tuberculated […] [a] short horny spatulate tip at apex of its male appendage". He then went on and described a juvenile specimen as *P. yangmataoensis* forma *chefooensis* (Shen 1932). On comparing *P. yangmataoensis* with Bell's type of *P. carinata*, Shen (1937: 285) acknowledged they "were practically identical in most aspects. The former, therefore should be regarded as a synonym to the latter", but failed to realize that his forma *chefooensis* is but a juvenile of *P. carinata* n. comb. It was left to Chen & Sun (2002) to synonymize it with *P. carinata* n. comb.

Pyrhila pisum (De Haan, 1841) n. comb. (Figs 12D; 20)

Philyra pisum De Haan, 1841: 131, pl. 33 fig. 7. — Bell 1855a: 365; 1855b: 300; 1855c: 15. — Herklots 1861: 27. — Targione-Tozzetti 1877: 197, pl. 12.2. — Walker 1887: 111. — Ives 1891: 216. — Ortmann 1892: 582, pl. 26, fig. 16. — Doflein 1902: 654. — Parisi 1914: 294. — Balss 1922: 129. — Gee 1925: 161. — Kellogg 1928: 353. — T. Sakai 1934: 285; 1935: 63, pl. 12, fig. 2; 1937: 163, pl. 15, fig. 8; 1965: 49, pl. 19, fig. 6. — Shen 1932: 22, text fig. 13, 14, 16a, pl. 1.5-8; 1940: 78. — Uchida 1949: 717, fig. 2074. — Lin 1949: 15. — Miyake 1961a: 15; 1961b: 171. — Miyake *et al.* 1962: 127. — Park 1964: 16. — Shen & Dai 1964: 32. — Serène 1968: 46. — Kim 1973: 308, pl. 14, fig. 69, text fig. 101. — Yamaguchi *et al.* 1976: 34. — Takeda 1982: 101, fig. 296; 1987: 10; 1989: 140. — Hill 1982: 199, pl. 3a. — Dai *et al.* 1986: 80, pl. 10.1, fig. 41.2. — Dai & Yang 1991: 88, pl. 10.1, fig. 41.2. — Yamaguchi 1993: 587. — Fransen *et al.* 1997: 89. — Ng *et al.* 2001: 9. — Chen & Sun 2002: 387, text fig. 173, pl. 15.8.

Type material. — **Japan.** coll. H. Bürger, 7 ♂♂ cl 13.7-17.6 mm, cl 3 ♀♀ 14.4-16.7 mm (RMNH D797) (the ♂ cl 17.6 mm was designated as the lectotype by Yamaguchi & Baba [1993: 322] and the remaining specimens are considered to be paralectotypes).

Material examined. — **Japan.** 1877, 1 ♂, 1 ovig. ♀ (NMW 19043). — 1876, 2 ♂♂, 1 ovig. ♀ (NMW 19044). — Ariake Bay, Kyushu, 8.IX.1968, coll. T. Sakai & L. B. Holthuis, 2 ♂♂ cl 17.2, 20.1 mm (RMNH D25905). — Marsushima, Amakusa Archipelago, Kyushu, 3.VIII.1975, coll. T. Yamaguchi, 3 ♂♂ cl 15.8-18.8 mm, 2 ovig. ♀♀ cl 17.5, 18.0 mm (RMNH D41933). — Yokohama, 24.V.1917, coll. P. Buitendijk, 1 ♂ cl 22.2 mm (RMNH D50038). — Ex. Leiden, type series, 3 spec. damaged (MNHN 17040). — Ex. Leiden, type series, 1877, 2 ♂♂ cl 17.2, 17.4 mm, 1 ovig. ♀ cl 17.5 mm, 3 juvs (NMW 19043). — Tokyo Bay, 1881, coll. L. Döderlein, 1 ♂ cl 20.3 mm, 1 ♀ cl 20.3 mm (NHM). — 1883-1898, id. E. L. Bouvier, 6 ♂♂ cl 11.8-19.1 mm, 1 ovig. ♀ cl 13.8 mm (MNHN 16982). — Miyagi Prefecture, IX.1912, id. M. J. Rathbun, 1 ♂ cl 16.3 mm, 1 ♀ cl 18.0 mm (USNM 54494). — Sagami Bay, pres. T. Sakai, 2 ♂♂ cl 18.8, 23.2 mm (NHM 1961.6.5.34-35). — Tsushima, 4 ♂♂ cl 15.2-17.2 mm, 1 ovig. ♀ cl 15.4 mm (NHM 1955.3.31.17). — Atami Province, 1 ♂ cl 22.6 mm (USNM 18865). — Higo, 7 ♂♂ cl 14.8-22.4 mm, 6 ovig. ♀♀ cl 17.7-20.6 mm (USNM 45862). — 1 ♂ cl 18.9 mm, 1 ovig. ♀ cl 17.5 mm (NSMT-Cr 3620). — 1 ♂ cl 23.6 mm (NSMT-Cr 3834). — Tokyo Bay, 7.IV.1992, coll. M. Takeda, 1 ♂ cl 20.0 mm (ZRC 1995.548). — Ariake Sea, IV.1973, coll. Y. Koyama, 2 ♂♂ cl 15.9, 20.9 mm (NSMT-Cr 4845). — Kumanoura, Tanegashima, 10.VI.1975, 12 ♂♂ cl 10.4-15.3 mm, 4 ♀♀ cl 13.1-16.8 mm (NSMT-Cr 5200). — Kensai, 27.V.1999, 18 ♂♂ cl 14.1-20.3 mm, 8 ovig. ♀♀ cl 17.3-19.9 mm (NSMT-Cr 6058). — 4 ♂♂ cl 16.8- 19.8 mm, 2 ovig. ♀♀ cl 16.9-18.1 mm (NSMT-Cr 6165). — 2 ♂♂ cl 17.4, 18.2 mm, 1 ovig. ♀ cl 16.9 mm (NHM 1904.6.22.9-11).

China. Peitaiho, Peichihli Bay, 4.VI.1929, coll. C. J. Shen, 1 ♂ cl 23.2 mm, 1 ♀ cl 23.6 mm (USNM 99349).

Taiwan. Kagi, Tainan, VIII.1918, 2 ♂♂ cl 19.5, 20.2 mm, 2 ovig. ♀♀ cl 19.6- 20.8 mm (USNM 55381). — Canton?, coll. M. Dabry, preserved dry, 2 ♂♂ cl 15.2, 13.1 mm (MNHN D 202).

South Korea. Kang-Wha, intertidal, 6.IX.1989, coll. C. Swennen, 4 ♂♂ cl 21.1-25.7 mm, 2 ovig. ♀♀ cl 20.8, 21.7 mm (RMNH D39231). — Asan Bay, intertidal, 9.IX.1989, coll. C. Swennen, 2 ♂♂ cl 23.7, 23.8 mm, 1 ♀ cl 18.5 mm (RMNH D39232).

Distribution. — Japan, Korea, China, Taiwan.

Description

Dorsal surface of carapace minutely granulate, bearing perliform granules on branchial, gastric

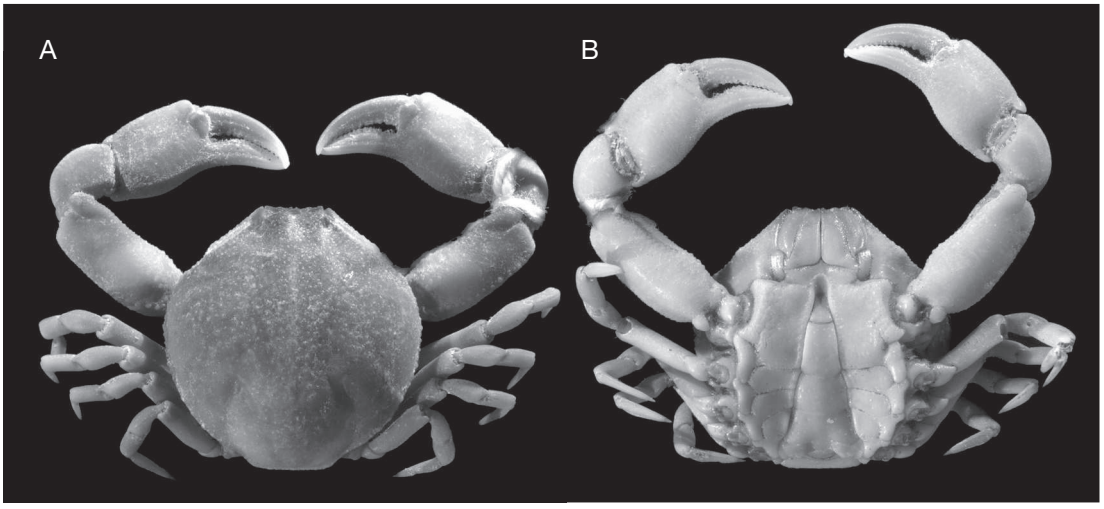

FIG. 20. — *Pyrhila pisum* (De Haan, 1841) n. comb., ♂ cl 22.6 mm, Japan (USNM 18865): **A**, dorsal view; **B**, ventral view.

regions, and several aggregates of granules medially on mesogastric region. Hepatic region slightly tumescent. Branchio-cardiac grooves shallow. Front medially grooved. Anterior margin of epistome medially notched; anterior margin of efferent channel concave. Upper, lower margins of subhepatic facet granulate, granules on lower margin larger. Lateral margin of carapace posteriorly to subhepatic facet closely beaded, granules smaller posteriorly. Posterior margin straight in male, arcuate in female. Epimeral surface smooth; epimeral margin minutely beaded. Margins of external maxillipeds minutely granulate, exopod distally granulate, punctate. Sternum minutely granulate. Anterior margin of abdominal sulcus prominently granulate. Fused male abdominal segments 2-6 bearing granulate basal knobs laterally. Margins of fused abdominal segments in female granulate, prominently granulate areas basally. Cheliped merus 0.6 as long as carapace in male; its dorsal surface minutely granulate, anterior and posterior surfaces bearing perliform granules, diminishing in size posteriorly. Carpus with strip of granules on inner and upper margins. Upper and lower surfaces of propodus granulate, arcuate strip of granules medially on inner margin. Fingers fluted, granulate, granulation most prominent proximally on outer margins; inner margins denticulate. Granulation in female specimens less prominent. Pereiopodal propodi dorsally and ventrally carinate, first pereiopodal propodus with two minutely granulate carinae. Male first pleopod sinuous; apical process filiform, arcuate, bent distad.

Colour

"[G]rigio-plumbeo di sopra, grigio-violaceo chiaro nelle parti inferiori e nelle zampe posteriori. Estremità delle dita della mano, tarsi anco più chiari." (Targione-Tozzetti 1877: 198). "Surface of carapace dark olive gray to dark grayish olive, ventral surface vinaceous buff to avellaneous. Punctiform depressions on carapace gray or colourless." (Shen 1932: 25).

REMARKS

Ng *et al.* (2001: 9) cited Japanese, Chinese and Taiwanese authors whose publications I was unable to obtain.

Genus *Ryphila* n. gen.

TYPE SPECIES. — *Cancer cancellus* Herbst, 1783.

ETYMOLOGY. — *Ryphila* is an anagram of *Philyra* Leach, 1817. Gender feminine.

DIAGNOSIS. — Carapace discoidal, regions of carapace indistinct. Dorsal surface of carapace punctate, variably granulate. Frontal region slightly produced, medially grooved; frontal margin medially denticulate. Antennular fossa sealed by basal antennular segment. Antennae short, inserted between antennular fossa and orbit. Orbits small, rounded, upper orbital margin unisutured. Eyes retractable. Epistome continuous with expanded, crenulate subhepatic margin, projecting beyond frontal margin. Anterior margin of efferent branchial channel forms part of lower orbital margin, extending beyond frontal margin, epistome lingulate. External maxilliped exopod reniform, not quite reaching anterior margin; endopods ogive, bearing in female setose fringe lengthwise; endopodal merus shorter than ischium along inner margin, apex invisible in dorsal view. Lateral and posterior margins of carapace beaded. Hepatic facet distinct. Epimeral margin closely beaded, invisible in dorsal view, row of granules continuing on posterior surface. Chelipeds subequal, elongate, longer in adult male than in female specimens. Cheliped merus subcylindrical, bearing rows of perliform tubercles on upper and inner surfaces. Fingers as long as propodus. Pereiopods slender, short. Pereiopodal meri subcylindrical, longer than carpi and propodi; upper and lower propodal margins carinate; dactyli longer than propodi, lanceolate, terminating in cornute tips. Male abdominal sulcus deep, nearly reaching buccal cavity. Male first and second abdominal segments transverse, narrow, swollen laterally, third to sixth segments fused, suture lines indistinct, lateral margin bearing three indistinct ridges fitting into sutures between sternal segments; medially dented proximally, lacking subterminal denticle; telson elongate, laciniate. Female abdomen with first two segments transversely narrow, segments three to six fused, greatly enlarged, shield-like, telson discoidal. First male pleopod elongate, shaft wide, dorsoventrally flattened, tip setose; apical process filiform, elongate. Second male pleopod short, slender, apex scoop-like.

REMARKS

Ryphila n. gen. differs from *Philyra* Leach, 1817 (emendato) and the other genera discussed above, in having the epistome and the lower margin of the hepatic facet projecting beyond the front; the reniform external maxilliped exopod and the squat endopodal merus; the narrow, laterally swollen first and second abdominal segments of the male; and the elongate, filiform apical process of the first male pleopod.

Ryphila cancellus (Herbst, 1783) n. comb.
(Figs 21A; 22)

Cancer cancellus Herbst, 1783: 94, pl. 2, fig. 20.

Leucosia scabriuscula Fabricius, 1798: 349. — Lichtenstein 1816: 142. — Latreille 1802: 116. — Bosc 1802: 237; 1830: 288. — Zimsen 1964: 651.

Philyra scabriuscula – Leach 1817: 22. — Desmarest 1825: 167. — H. Milne Edwards 1837: 132, pl. 20, figs 9, 10. — White 1847: 47. — Bell 1855a: 365; 1855b: 299; 1855c: 14. — Herklots 1861: 27. — Heller 1865: 70. — Hilgendorf 1869: 110. — Lenz & Richters 1881: 425. — De Man 1881: 126; 1888: 201. — Müller 1890: 473. — Henderson 1893: 399. — Alcock 1896: 239. — Nobili 1903: 17; 1906: 168. — Lenz 1910: 545. — Laurie 1915: 410. — Gravely 1927: 8, pl. 20, fig. 16; 1941: 79, fig. 26, 5-7. — André 1931: 643. — Chopra & Das 1937: 388. — Stephensen 1945: 88, fig. 15c-e. — Barnard 1947: 374; 1950: 381, fig. 72i. — Tyndale-Biscoe & George 1962: 74, fig. 4.6. — Serène 1968: 46. — Kensley 1981: 39. — Tirmizi & Kazmi 1988: 106, fig. 31. — Davie 2002: 274.

Philyra punctata – Barnard 1926: 120.

Philyra corallicola – Chhapgar 1957: 408, fig. 8n.

Philyria globulosa – Devi *et al.* 1988: 21, fig. 2.

Philyra cancella – K. Sakai 1999: 17, pl. 7B.

Not *Philyra scabriuscula* – Targione-Tozzetti 1877: 196, pl. 12.1 (= *Philyra pisum* De Haan, 1841).

TYPE MATERIAL. — Lectotype: 1 ♀ cl 9.7 mm (Museum für Naturkunde, Berlin, Herbst 2197); paralectotype: 1 ♂ cl 10.5 mm (Museum für Naturkunde, Berlin, Herbst 2197).

MATERIAL EXAMINED. — **Saudi Arabia.** 10.IV.1970, 1 ♂ cl 13.0 mm (NHM 1974.392).
Gulf of Aden. Obock, 1897, coll. Dr F. P. Jousseaume, id. G. Nobili, 1 juv. cl 8.0 mm (MNHN B.17015). **Gulf of Oman.** Barkoh, 25.XII.1929, coll. V.H.W. Dowson, 1 ♂ cl 12.0 mm (NHM 1931.5.27.2). — Muscat, X-XI.1896, coll. M. Maindron, 1 ♀ cl 11.8 mm (MNHN B.19137).
Persian Gulf. Ajman, 15.VIII.1972, coll. D. Gallagher, 1 ♂ cl 14.0 mm, 1 ovig. ♀ cl 10.7 mm (NHM 1973.465).
Madagascar. 1909, id. H. Balss, 2 ovig. ♀♀ cl 11.2, 11.6 mm (MNHN B.17011). — Near Nosy-be, 1 ovig. ♀ cl 11.0 mm (MNHN B.18659). — 1931, coll. R. Decary, 35 ♂♂ cl 9.3-13.1 mm, 11 ♀♀ cl 9.3-11.5 mm (MNHN B.18689). — 1930, coll. R. Decary, 1♂ cl 14.3 mm (MNHN B.18328).
Mozambique. Chinde, Zambesi estuary, 1912, id. K. H. Barnard as *Philyra scabriuscula*, 1 ♂ cl 9.2 mm, 1 ovig. ♀ cl 9.1 mm (SAM A2199).
Pakistan. NW of Karachi, 3.IV.1986, 1 ♂ cl 9.3 mm, 13 ♀♀ cl 8.0-10.2 mm (USNM 205959). — Karachi, II.1973, coll. G. Pilleri, 2 ♀♀ cl 9.1, 9.7 mm (NHM 1999.3).

India. 1 ♂ cl 10.1 mm (ZMK CRU 4648). — Coll. I. K. Daldorff, holotype of *Leucosia scabriuscula* Fabricius, 1798, 1 ovig. ♀ cl 10.5 mm (ZMK CRU 4648). — Coll. I. K. Daldorff, paratype of *Leucosia scabriuscula* Fabricius, 1798, 1 ♂ cl 9.7 mm (ZMK CRU 4650). — Coll. I. K. Daldorff, 2 ♂♂ cl 10.9, 10.2 mm, 1 ovig. ♀ cl 10.4 mm (MNHN B.206); 1 ♂ cl 9.1 mm, 2 ovig. ♀♀ 10.2, 8.8 mm (MNHN B.207). — Madras, 1857-1859, "Novara" Exp., 7 ♂♂, 1 ♀ (NMW 19048); 2 ♂♂, 1 ♀ (NMW 19049). — Madras, coll. J. R. Henderson, 18 ♂♂ cl 10.4-13.7 mm, 6 ovig. ♀♀ cl 9.9-11.9 mm (NHM 1892.7.15.368-77). — Pamban, coll. J. R. Henderson, 20 ♂♂ cl 9.5-13.6 mm, 20 ovig. ♀♀ cl 8.5-12.9 mm (NHM 1892.7.16.378-87). — Pamban, IV.1889, 3.6 m, coll. K. Fristedt, 1 ♂ cl 11.2 mm (MZUF 2722). — Gopalpur, 16.III.1930, 2 ♂♂ cl 9.8, 10.2 mm, 2 ovig. ♀♀ cl 8.7, 10.1 mm (NHM 1999.4). — Madras, 27.II.1926, purch. Winkworth, 7 ♂♂ cl 10.3-13.2 mm, 2 ovig. ♀♀ cl 9.8, 10.2 mm (NHM 1956.1.14.5-13). — Puri, 15.III.1929, 4 ♂♂ cl 9.0-11.3 mm, 4 ♀♀ cl 7.9-10.4 mm (NHM 1999.7). — Maharashtra, Ratnagiri Beach, 18.II.1980, coll. P. Noël, 2 ♂♂ cl 12.6, 11.5 mm, 2 ovig. ♀♀ cl 11.5, 11.0 mm (MNHN B.16981). — S. Chennai, Parangipettai, I-II.2000, colls S. M. Rafi, A. Khan, 1 ♂ cl 12.0 mm (ZRC 2000.2248). — Goa, near Panjim Beach, 16.II.2005, coll. J. Van der Kamp, 22 ♂♂ cl 9.8-13.9 mm, 10 ovig. ♀♀ cl 9.4-12.0 mm (RMNH D.51541).

Sri Lanka. Galle, purch. Dr W. Ondaatje, 4 ovig. ♀♀ cl 9.5-10.6 mm (NHM 1882.19). — Mt. Lavinia, 16.XI.1928, 5 ♂♂ cl 9.6-12.1 mm, 1 ovig. ♀ cl 10.1 mm (NHM). — Belligam, 1929, 10 ♂♂, 18 ♀♀ (NMW 19059). — 1929, 2 ♂♂ (NMW 19058).

Burma. Rangoon, VI.1865, coll. W. Theobald, ex Museum of Comparative Zoology, Harvard University, 6457, 1 ♂ cl 11.9 mm (USNM 23176). — Rangoon, II.1866, coll. W. Theobald, 1 ♂ cl 11.9 mm (USNM 101996).

Borneo. Coll. T. R. R. Stebbing, 1 ♂ cl 9.2 mm (NHM 1928.12.1.212).

Sumatra. Ex. Leiden Museum, Atjeh, 1880, coll. Walraven, 1 ♂ cl 14.6 mm, 2 ovig. ♀♀ cl 11.7, 12.2 mm (MNHN B.17013).

Australia. Sorrento Beach, I.1952, coll. W.H. Butler, id. M. Tyndale-Biscoe, 1 ♂ cl 15.0 mm (WAM C6762). — Near Sorrento Beach, I.1951, coll. W. H. Butler, id. M. Tyndale-Biscoe, 2 ♂♂ cl 13.9, 14.9 mm, 2 ovig. ♀♀ cl 14.0, 15.0 mm (WAM C6763/66).

DISTRIBUTION. — East Africa, from Red Sea to Mozambique, Madagascar, Persian Gulf, Pakistan, India, Mergui Archipelago, Malay Archipelago, Burma, Thailand, Borneo, Sumatra, Australia.

DESCRIPTION

Dorsal surface of carapace bearing closely-spaced perliform granules on branchial, cardial and intestinal regions, along branchio-cardiac grooves, and medially on gastric region. Branchio-cardiac grooves shallow. Lateral frontal lobes rounded, minutely granulate. Anterior margin of epistome medially notched, subhepatic margin prominently crenulate; subhepatic facet granulate. Tumescent outer orbital angle followed by perliform granules and obsoletely granulate protuberance. Anterolateral granules on margin of carapace larger than granules on posterolateral and posterior margins. Epimeral surface smooth; epimeral margin minutely beaded, granules increasing in size on posterior margin. Endognath of external maxillipeds indistinctly punctate laterally, exognath reniform, punctate. Pterygostomian region prominently granulate. Fourth thoracic sternite in male with a granulate region anterolaterally, anterior margins of thoracic sternites granulate; anterior margin of abdominal sulcus granulate. Fused male abdominal segments 3-6 basally granulate. First and second abdominal segments in female laterally granulate, fused abdominal segments granulate basio-laterally. Cheliped merus 1.3 as long as carapace in male, 0.8 as long in female; its dorsal surface with parallel rows of perliform granules, decreasing in size distally; anterior and posterior surfaces with rows of perliform granules, diminishing in size posteriorly. Carpus with row of minute granules on inner margin; patch of minute granules distally on upper margin. Upper and lower

FIG. 21. — **A**, *Ryphila cancellus* (Herbst, 1783) n. comb., ♂ cl 11.2 mm, India (MZUF 2722), first male pleopod, distal end of first male pleopod; **B**, *Ryphila verrucosa* (Henderson, 1893) n. comb., ♂ holotype cl 8.9 mm, India (NHM 1892.7.15.399), first male pleopod, distal end of first male pleopod. Scale bars: 1 mm.

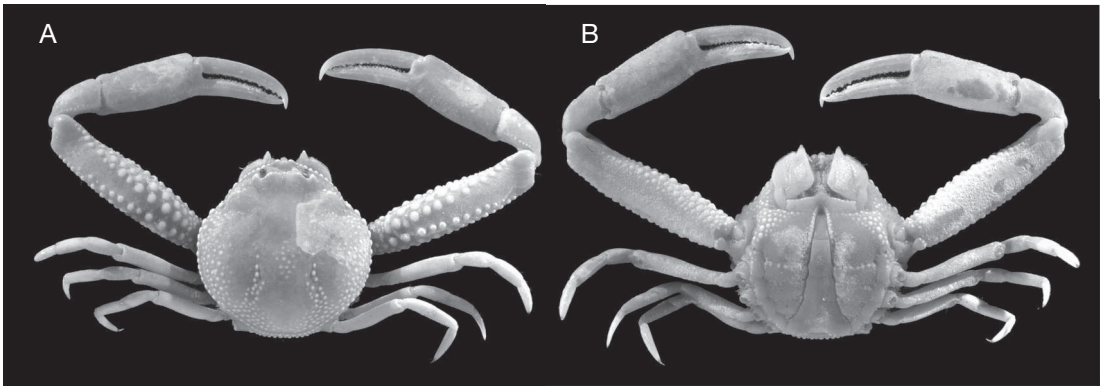

FIG. 22. — *Ryphila cancellus* (Herbst, 1783) n. comb., ♂ cl 11.2 mm, India (MZUF 2722): **A**, dorsal view; **B**, ventral view.

surfaces of propodus minutely granulate, granulation extending to fingers; inner margins of dactyl, pollex serrulate, serrulation more prominent distally. Pereiopodal meri bear single minutely granulate line ventrally; propodi dorsally and ventrally carinate. Male first pleopod with apical process filiform, needle-like, nearly as long as shaft.

Colour

"The upper surface of the carapace and the anterior legs are of a more or less dark cinerous gray, the hands being marbled with a lighter rose-colour; the under surface of the carapace, like the ambulatory legs, except the white tarsi, are of a pale rose colour. The granules are all white." (de Man 1881: 128). "The body is dull brown to grey with greenish mottling on the lateral areas; ovig. females were mottled green all over […] The appendages were banded with green." (Tirmizi & Kazmi 1988: 108).

REMARKS

Leach (1817: 22) recognized that *Cancer cancellus* Herbst, 1783, is identical with *Leucosia scabriuscula* Fabricius, 1798.

Ryphila verrucosa (Henderson, 1893) n. comb.
(Figs 21B; 23A, B)

Philyra verrucosa Henderson, 1893: 399, pl. 37, figs 10-12. — Alcock 1896: 240. — Serène 1968: 46. — Tirmizi & Ghani 1992: 69, fig. 1.

TYPE MATERIAL. — Holotype: **India.** Madras, coll. J. R. Henderson, 1 ♂ cl 8.9 mm (NHM 1892.7.15.399).

DESCRIPTION

Dorsal surface of carapace, excluding frontal region, bearing closely-spaced perliform granules, granules larger medially; postgastric region bearing prominent oval granule; branchio-cardiac grooves deep. Lateral frontal lobes rounded, horizontally furrowed, minutely granulate. Anterior margin of epistome produced. Dorsal margin of subhepatic facet consisting of line of rounded granules extending posteriorly from granulate outer orbital angle; ventral margin consisting of conic granules. Subhepatic facet granulate. Lateral granules on margin of carapace smaller than granules on anterolateral and posterolateral margins. Epimeral surface minutely granulate, epimeral margin minutely beaded, granules increasing in size on posterior margin. External maxillipeds granulate; exognath greatly distended. Pterygostomian region prominently granulate. Entire surface of thoracic sternites in male covered with perliform granules. Fused male abdominal segments 3-6 bearing granulate band basally. Cheliped merus 0.8 as long as carapace in male; its dorsal surface with several rows of perliform granules, coalescing distally; anterior and posterior surfaces with closely disposed rows of perliform granules. Carpus with row of minute granules on inner margin; patch of minute granules distally on upper margin. Upper margin of propodus with two parallel rows of granules; lower margin

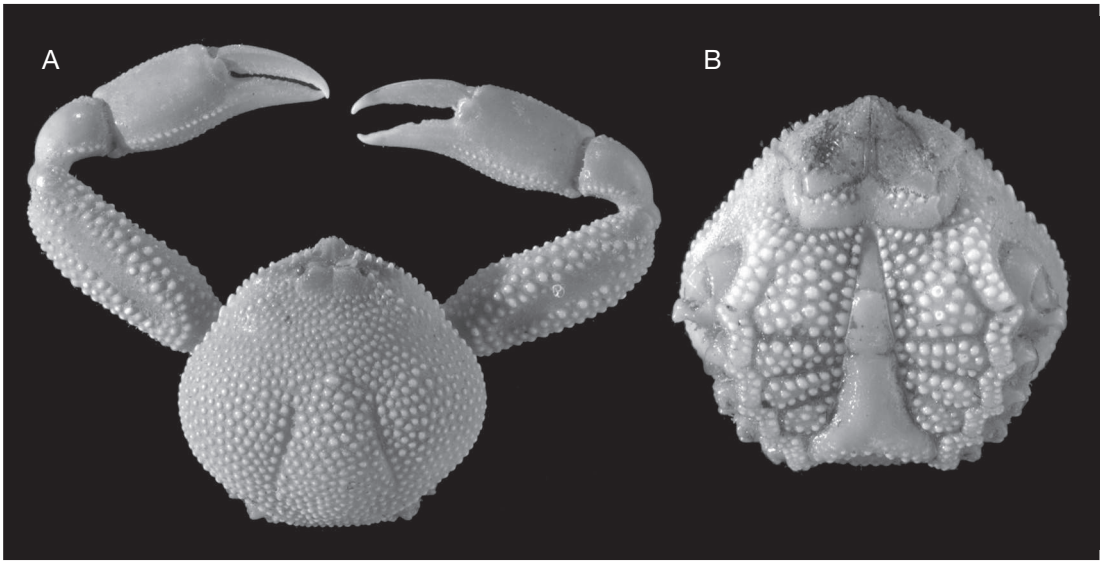

FIG. 23. — *Ryphila verrucosa* (Henderson, 1893) n. comb., ♂ holotype cl 8.9 mm, India (NHM 1892.7.15.399): **A**, dorsal view; **B**, ventral view.

minutely granulate, bearing row of slightly larger granules on inner margin. Pereiopodal meri bear single minutely granulate line ventrally. Male first pleopod with apical process filiform, sinuous, nearly as long as shaft.

Colour

"Brownish" (Henderson 1893: 400); "dorsum blue-black, with a coppery tinge which is most marked in the chelipeds" (Alcock 1896: 241, "in spirit").

REMARKS

Ryphila verrucosa n. comb. is distinguished from *R. cancellus* n. comb. in its nearly entirely granulose dorsal surface of carapace and thoracic sternites; the conic granules on ventral margin of subhepatic facet; produced epistome; dilate, granulate exognath of external maxillipeds; pronounced, smooth branchiocardiac grooves; shorter, thicker cheliped meri bearing more numerous granules; lack of hepatic lobe; and sinuous, thicker apical process on first male pleopod.

KEY TO SPECIES OF *PHILYRA* LEACH, 1817, AND GENERA AND SPECIES FORMERLY INCLUDED THEREIN

1. Two proximalmost abdominal segments of male articulate 2
— Only first abdominal segment of male articulate 7

2. Third-5th abdominal segments of male fused, 6th segment articulate; first male pleopod distally crook-shaped ..... *Afrophila punctata* n. comb.
— Third-6th abdominal segments of male fused; first male pleopod otherwise 3

3. Two proximalmost abdominal segments of male alike; shaft of first male pleopod plain, uncoiled 4
— First abdominal segment of male transversely narrow, second segment spindle-shaped; shaft of first male pleopod coiled twice on itself, apical process digitate .... *Atlantolocia laevidorsalis* n. comb.

4. Carapace pear-shaped, globose; epistome and lower margin of hepatic facet not projecting; external maxiliped exopod subquadrate; two proximalmost abdominal segments of male transversely narrow; apical process of first male pleopod subterminally alate ... *Philyra* 5
— Carapace discoidal; epistome and lower margin of hepatic facet projecting in advance of front; external maxiliped exopod reniform; two proximalmost abdominal segments of male laterally swollen; apical process of first male pleopod slim, tubular ..... *Ryphila* n. gen. 6

5. Carapace and chelipeds finely granulate; lower margin of first pereiopodal propodus in male bicarinate; lateral and distal margins of alate process of first male pleopod cirrate ..... *P. globus*
— Carapace and chelipeds prominently granulate; lower margin of first pereiopodal propodus in male unicarinate; lateral margin of alate process of first male pleopod cirrate .... *P. samia* n. sp.

6. Dorsal surface of carapace anteriorly not granulate; cheliped merus 1.3 as long as carapace in male; apical process of fiest male pleopod filiform ..... *R. cancellus* n. comb.
— Dorsal surface of carapace entirely granulate; cheliped merus 0.8 as long as carapace in male; apical process of first male pleopod slender tubule ..... *R. verrucosa* n. comb.

7. First abdominal segment of male transversely narrow; shaft of first male pleopod coiled thrice on itself, apical process digitate enveloped in setose muff .... *Atlantophila cristata* n. comb.
— First abdominal segment of male transversely yoke-shaped; first male pleopod plain, uncoiled 8

8. Second-6th abdominal segments of male bearing abdominal denticle ... *Lyphira* n. gen. 9
— Second-6th abdominal segments of male lacking abdominal denticle 12

9. Apical process of male first pleopod digitate, tubular 10
— Apical process of male first pleopold flattened, squat 11

10. Outer maxiliped exopod expanded, ovate; inner angles of afferent branchial canals produced; prominent carapacial granulation ..... *Lyphira ovata* n. sp.
— Outer maxiliped exopod narrow lozenge; inner angles of afferent branchial canals not produced; carapace bearing minute granulation dorsally ... *Lyphira heterograna* n. comb.

11. Cheliped merus longer than carapace in male ..... *Lyphira natalensis* n. sp.
— Cheliped merus shorter than carapace in male ..... *Lyphira perplexa* n. sp.

12. Apical process of first male pleopod tubular; cheliped merus shorter than carapace in male; lacking thick fringe of setae on pollex ..... *Pyrhila* n. gen. 13
— Apical process of first male pleopod minute; cheliped merus longer than carapace in male; thick fringe of setae on inner margin of pollex ..... *Hiplyra* n. gen. 15

13. Male carapacial posterior margin bearing dorsoventrally flattened denticles laterally .... *Pyrhila biprotubera* n. comb.
— Male carapacial posterior margin lacking dorsoventrally flattened denticles laterally ... 14

14. Dorsal surface of carapace bearing line of prominent granules medially; outer maxilliped exopod bearing line of prominent granules vertically; apical process of male first pleopold spatulate ..... *Pyrhila carinata* n. comb.
— Dorsal surface of carapace bearing aggregates of granules medially; outer maxilliped exopod distally granulate; apical process of male first pleopold filiform, bent distad .... *Pyrhila pisum* n. comb.

15. Distal margins of fused male abdominal segments 2-6 carinate .... *Hiplyra sagitta* n. sp.
— Distal margins of fused male abdominal segments 2-6 not carinate 16

16. Distal margin of fused abdominal segment in male bearing perpendicular rounded lobe ..... *Hiplyra michellinae* n. sp.
— Distal margin of fused male abdominal segments plain 17

17. Hepatic margin punctuate, pollex bearing triangular blade distally .... *Hiplyra platycheir* n. comb.
— Hepatic margin granulate, pollex bearing 2 triangular denticles distally 18

18. Male telson proximally swollen, slightly concave medially ..... *Hiplyra elegans* n. comb.
— Male telson plain 19

19. Hepatic region distinctly tumescent; branchio-cardiac grooves shallow; epimeral surface smooth ..... *Hiplyra variegata* n. comb.
— Hepatic region slightly tumescent; branchio-cardiac grooves deeply-cut; epimeral surface minutely granulate ..... *Hiplyra longimana* n. comb.

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