

Leucosiid Crabs of the Genus *Hiplyra* Galil, 2009 (Crustacea: Brachyura: Leucosiidae) from the Persian Gulf and Gulf of Oman, with Description of a New Species

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(Accepted September 26, 2011)

Reza Naderloo and Michael Apel (2012) Leucosiid crabs of the genus *Hiplyra* Galil, 2009 (Crustacea: Brachyura: Leucosiidae) from the Persian Gulf and Gulf of Oman, with description of a new species. *Zoological Studies* 51(2): 248-258. Four species of the leucosiid genus *Hiplyra* Galil, 2009, are reported here from the Persian Gulf and Gulf of Oman. A new species, *H. ramli* sp. nov. was collected along the coast of Fujairah (United Arab Emirates) in the western part of the Gulf of Oman. This new species differs from congeners in the shape of the male 1st gonopod, the morphology of the female gonopore, and the armature of the 6th segment of the male abdomen. *Hiplyra elegans* (Gravier 1920) is also recorded from the Iranian coast of the Gulf of Oman for the 1st time. Two species from the area, *H. variegata* (Rüppell, 1830) and *H. sagitta* Galil 2009, are included in this study, and a key is provided for the genus in the area. <http://zoolstud.sinica.edu.tw/Journals/51.2/248.pdf>

Key words: Brachyura, Leucosiidae, *Hiplyra*, Persian Gulf, Gulf of Oman.

Crabs of the family Leucosiidae are common faunal elements of littoral and sublittoral soft-sediment habitats in the Persian Gulf and Gulf of Oman. They are the most diverse of all brachyuran families (Stephensen 1946, Titgen 1982, Apel 2001). Apel (2001) listed 30 leucosiid species from the Persian Gulf plus 2 additional species only known from the Gulf of Oman and commented that records of 4 more species reported from the region are doubtful. Thus almost 1/6 of all brachyuran crab species of the Persian Gulf belong to the Leucosiidae (Apel 2001). Some additional new species were also described and recorded from the Persian Gulf in recent years, raising the number of leucosiid crabs in the region to 35 species (Naderloo and Sari 2005). Recently, Galil (2009) added 2 more species (*Hiplyra sagitta* Galil, 2009, and *Lyphira perplexa* Galil, 2009) when she revised

Philyra Leach, 1817. Therefore, the actual number of leucosiid species recorded from the Persian Gulf is currently 37. However, the leucosiid fauna of the Gulf of Oman remains poorly known, and only 11 species of this group have been recorded there (Nobili 1906, Stephensen 1946, Tan and Ng 1995, Apel 2001). By adding 2 recorded species herein, the number of known leucosiid species from the Gulf of Oman rises to 13.

Galil (2009), in her recent treatment of *Philyra*, divided the genus into 8 genera. Among those, *Hiplyra* Galil, 2009, comprises 6 species distributed in the Indo-West Pacific: *H. elegans* Gravier, 1920; *H. longimana* A. Milne Edwards, 1874; *H. michellinae* Galil, 2009; *H. platycheir* De Haan, 1841; *H. sagitta* Galil, 2009; and *H. variegata* (Rüppell, 1830). The genus is characterized by elongate adult chelipeds with the

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cutting edge of the movable finger entire and blade-shaped, the inner margin of the immovable finger fringed with dense setae, and segments 2-6 of the male abdomen triangular being fused with the lobate proximal margins (Galil 2009). Two species of this genus, *H. variegata* (recorded by Stephensen 1946) and *H. sagitta* (described by Galil (2009) from the Persian Gulf) were previously recorded from the Persian Gulf and adjacent waters. A reexamination of the material identified by Stephensen (1946) as *H. variegata*; however, revealed that specimens collected from the Gulf of Oman in Jask, differed from the descriptions and illustrations of *H. variegata* provided by Rüppell (1830) and Galil (2009). Those specimens are assigned here to *H. elegans*, which was previously known from Madagascar and Sri Lanka (Galil 2009). A new species is described from the east coast of the United Arab Emirates (UAE) in the Gulf of Oman. The number of species currently placed in the genus *Hiplyra* is now raised to 7, of which 4 occur in the Persian Gulf and Gulf of Oman.

Drawings were made using a camera lucida attached to a Leica MZ8 stereomicroscope (Leica, Germany). The following abbreviations were used: CL, carapace length; CB, carapace breadth; ML, length of merus of male cheliped; G1, 1st male gonopod; juv., juvenile; ovig., ovigerous; SMF, Senckenberg Museum, Frankfurt am Main; ZMK, Zoological Museum of Copenhagen.

SYSTEMATIC ACCOUNT

Hiplyra elegans (Gravier, 1920)

(Figs. 1, 2)

Philyra platychira Laurie 1906: 363.

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

Philyra variegata Stephensen 1946: 89-93 (not *Hiplyra variegata* (Rüppell, 1830) (part of the material from st. 73, Jask, Iran)).

Philyra elegans Galil 2009: 292-293, 315 (in key), fig. 7.

Type locality: Madagascar.

Material examined: Gulf of Oman, 5 ♂♂ (ZMK CRU929, CL = 9.90 mm, CB = 9.33 mm), tidal zone, St. 73, Jask, Gulf of Oman, 20 Apr. 1937, G. Thorson.

Additional material: 7 ♂♂, 1 ♀ (SMF 11119), Madagascar, Stumpf and Ebenau; 1 ♂, 1 ♀ (SMF 11118), Madagascar.

Diagnosis: Carapace about as long as wide; anterior margin of efferent channel straight,

separated from lateral granulated margin by deep U-shaped incision; somite 6 of male abdomen smooth, with no process, male telson elevated on lateral portion; G1 widened distally, with very small apical process subdistally, directed laterally; 1st somite of female abdomen not lobate; female gonopore with membranous oval process directed anteroposteriorly.

Redescription: Carapace (Fig. 2A) about as long as wide, very slightly longer (CL/CB = 1.05), distinctly convex; dorsal surface finely punctate medially, laterally, and posteriorly; carapace regions weakly defined, grooves delimiting cardiac and intestinal regions distinct; branchiocardiac grooves shallow; frontal region nearly smooth, slightly depressed immediately behind frontal ridge. Front nearly as wide as posterior margin of carapace, produced, slightly extended medially; shallow furrow extending posteriorly in frontal region. Upper orbital margin finely granular, deep fissure occurring laterally, short setae along inner margin of upper orbital margin. Epibranchial margin moderately swollen, with small granules; anterolateral margin with large granules, becoming smaller posteriorly; posterolateral margin regularly granular, granules continuing to posterior margin, small granules below posterior margin. Anterior margin of efferent channel straight, separated from lateral granulated margin by deep U-shaped incision. Subhepatic and pterygostomial regions minutely granular.

Ischium of 3rd maxilliped distinctly longer than merus, about 1.5-times merus length, outer surface faintly granular; merus elongated-triangular, outer surface weakly granular, large granules on distal margin; exopod large, wider distally, outer surface smooth, margins minutely serrate. Thoracic sternal plates granular, granules larger anteriorly; anterior margin of abdominal sulcus regularly with large granules.

Male chelipeds (Figs. 1A, 2A) long; merus long, very slightly shorter than carapace breadth (mean ML/CB = 0.95); upper surface proximally granular, anterior margin with large granules, becoming larger medially; anterior surface with small granules; posterior margin with small granules, becoming larger proximally. Anterior lower and upper margins of carpus minutely granular. Manus long, with smooth upper surface, row of small granules on lower portion of inner surface extending from proximal part almost to base of fingers; lower margin granular, upper margin faintly serrate. Movable finger distinctly shorter than manus, about 2/3 of manus length,

arched, cutting edge blade-shaped; immovable finger shorter than movable finger, curved gently downward; cutting edge with small teeth along edge, 2 distal ones large-triangular; short dense setae along cutting edge of immovable finger, shorter distally; short setae along round process of distal margin of manus on articulation to movable finger.

Male abdomen (Fig. 1B) elongated-triangular; segments 2-5 completely fused, proximal margin of fused somites 2-5 with large granules, medial depression proximally, lateral margins with small

granules; somite 6 firmly merged with fused segments 2-5, not freely movable; lateral margin sharply diverging proximally, gently converging distally along most of its length, outer surface smooth, with no process; telson elongated-triangular, distinctly shorter than somite 6, with 2 elevations basally on lateral portion, margins smooth.

G1 (Fig. 1C, D) curved laterally in proximal 1/3 (Fig. 1D); apical portion wide; small apical process subdistal, directed laterally; long setae around apical process; sperm channel curving on

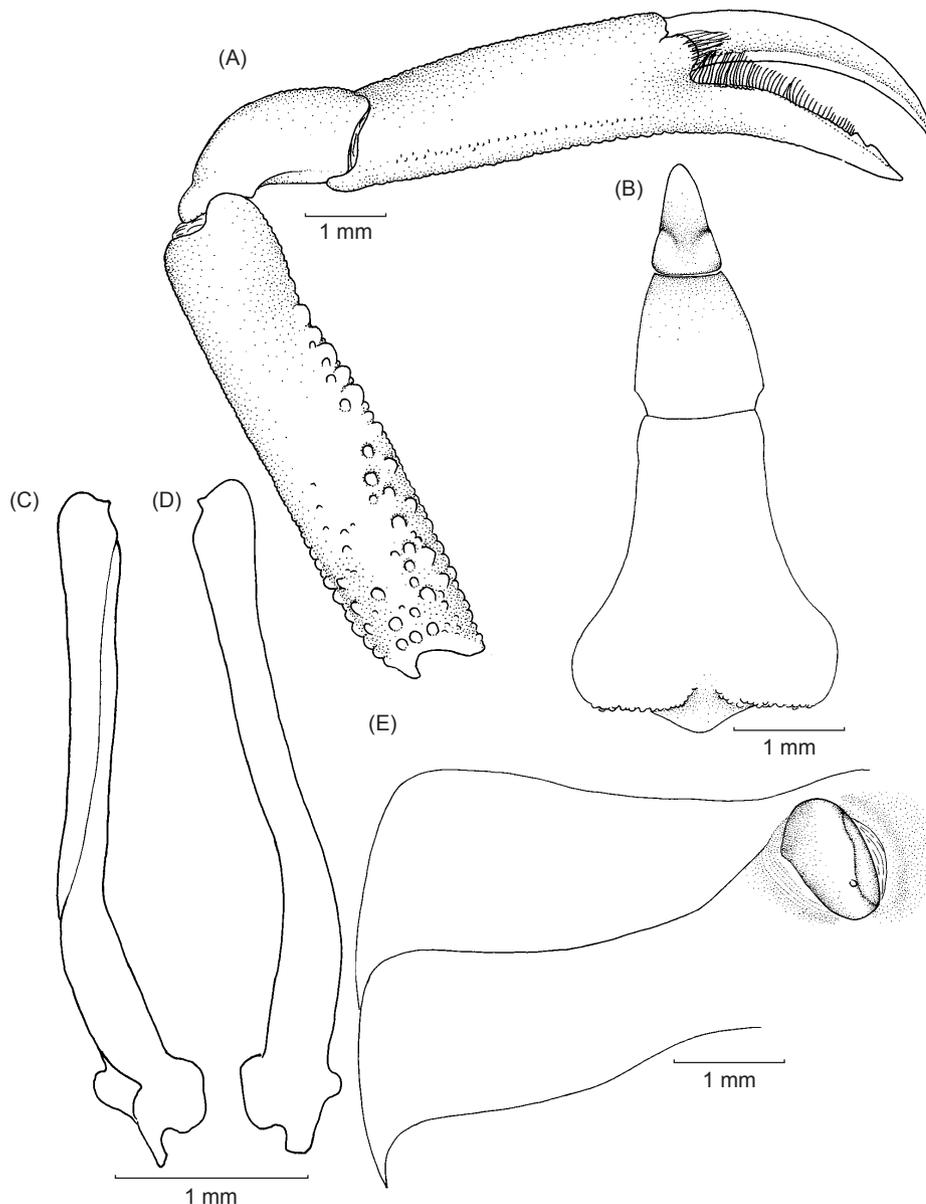


Fig. 1. *Hiplyra elegans* (Gravier, 1920). Male holotype (ZMK CRU929) (A-D); female paratype (SMF 11119) (E). (A) cheliped of male (left), upper surface; (B) male abdomen; (C) G1 (right) dorsal surface; (D) G1 (right), ventral surface; (E) female gonopore (right).

dorsal surface.

Female gonopore (Fig. 1E) on inner anterior edge of sternite 5, nearly round; large membranous oval process directed anteroposteriorly. First somite of female abdomen not distinctly trilobate, with granular distal margin.

Remarks: Stephensen (1946) listed substantial material from the Persian Gulf and Gulf of Oman under the name *Philyra variegata* (Rüppell, 1830). We had the opportunity to reexamine most of Stephensen's (1946) material, compared it with Rüppell's type material of *H. variegata* from the Red Sea, and found that some specimens were not *H. variegata* but *H. elegans* instead. *Hiplyra elegans* is distinguished from *H. variegata* by the carapace shape, morphology of the G1, the form of the male abdomen, and the gonopore structure of females. The carapace of *H. elegans* is slightly longer than wide (mean CL/CB = 1.05), while the carapace of *H. variegata* is as long as wide, and even in large specimens is only slightly wider than long. The apical process of G1 in *H. elegans* is very small, subdistal, and directed laterally (Fig. 1D), while in *H. variegata*, the small apical process is completely distal and directed ventrally (Fig. 7A).

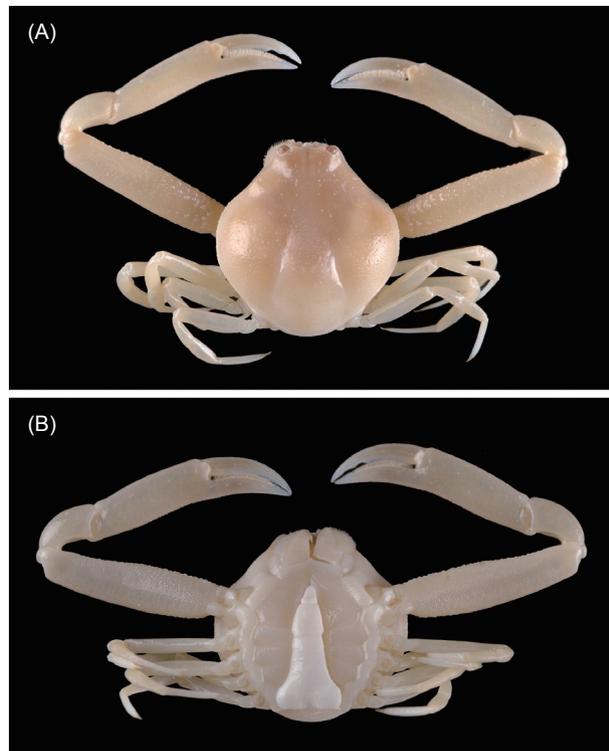


Fig. 2. *Hiplyra elegans* (Gravier, 1920). Male holotype, CL = 9.90 mm, CB = 9.33 mm (ZMK CRU929). (A) dorsal surface; (B) ventral surface.

For the male abdomen, the telson in *H. elegans* has 2 distinct elevations proximally on the lateral portions (Fig. 1D), while that of *H. variegata* is smooth, with no elevation (Fig. 7C). In addition, these 2 species have distinct morphologies of the female gonopore allowing females of these congeners to readily be distinguished. While *H. elegans* has a distinct oval membranous process which is directed anteroposteriorly (Fig. 1E), the female gonopore of *H. variegata* has a large opening (Fig. 7D) on the inner side of a prominent elevation. As Galil (2009) discussed, the 1st somite of the female abdomen of *H. variegata* is distinctly trilobate, while this somite is simple in females of *H. elegans*. It must be noted that drawings provided by Stephensen (1946: 88, fig. 15F-K) clearly depict *H. variegata*, in particular, the male abdomen which shows a smooth telson lacking any elevation.

Distribution: Madagascar, Gulf of Oman, Sri Lanka.

***Hiplyra ramli* sp. nov.**

(Figs. 3, 4)

Type locality: Al Aqah, Fujairah, east coast of UAE, Gulf of Oman.

Material examined: Holotype 1 ♂ (SMF 38466, CL = 7.4 mm, CB = 6.8 mm), Al Aqah, near Sandy Beach Hotel, Fujairah, UAE, Gulf of Oman, 25°30'N, 56°22'E, sandy substrate, under stones and corals, 3-4 m depth, 4 July 1995, M. Apel.

Paratypes: 6 ♂♂, 9 ♀♀ (4 ovig.) (SMF 38467), same data as for holotype.

Diagnosis: Carapace slightly longer than wide; anterior margin of efferent channel nearly straight, separated from lateral granulated margin by deep U-shaped incision; somite 6 of male abdomen with triangular arrow-shaped process on distal portion; telson wide-triangular, swollen on basal portion; G1 distally widened, with small apical process directed dorsally; female gonopore obliquely directed anterodorsally, small membranous oval process on outer margin of opening.

Description: Carapace (Fig. 4A) slightly longer than wide (CL/CB = 1.1), distinctly convex; dorsal surface finely punctate medially, laterally, and posteriorly; carapace regions weakly defined, distinct grooves delimiting cardiac and intestinal regions; branchiocardiac grooves shallow; frontal region nearly smooth, slightly depressed immediately behind frontal ridge. Front slightly shorter than posterior margin of carapace, produced, slightly extended medially; shallow

furrow extending to rear in frontal region. Upper orbital margin finely granular, deep fissure present laterally.

Epibranchial margin with small granules; anterolateral margin with large granules anteriorly, becoming smaller posteriorly; posterolateral margin finely granular, granules continuing to posterior margin, small granules below posterior margin. Anterior margin of efferent channel nearly straight, separated from lateral granulated margin by deep U-shaped incision. Subhepatic and pterygostomial

regions minutely granular.

Ischium of 3rd maxilliped slightly longer than merus, outer surface nearly smooth, distal margin minutely granular; merus long-triangular, outer surface finely granular, granules larger distally on outer surface; exopod large, wider distally, outer surface smooth, margins minutely serrate. Abdominal sternums granular, granules larger anteriorly; anterior margin of abdominal sulcus granular.

Male chelipeds (Figs. 3A, 4A) with moderately

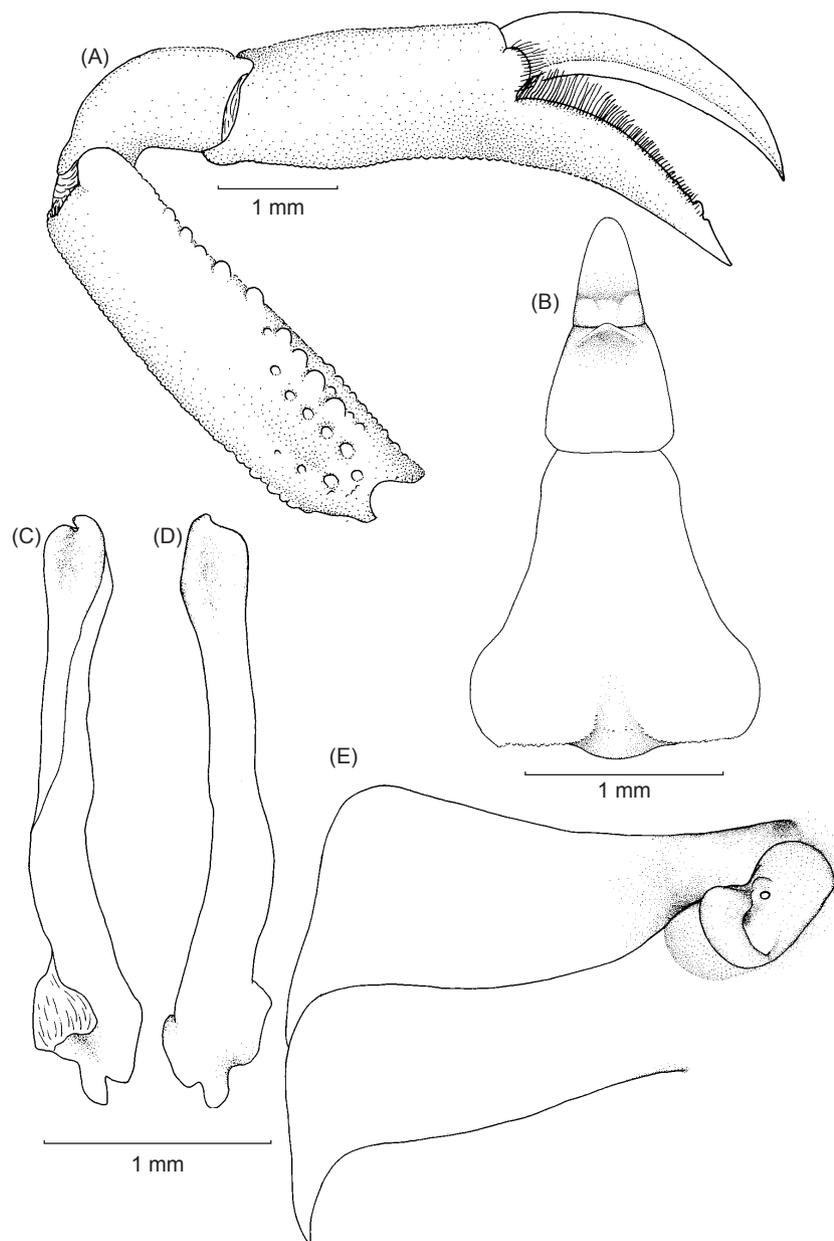


Fig. 3. *Hiplyra ramli* sp. nov. Male holotype (SMF 38466) (A-D); female paratype (SMF 38466) (E). (A) cheliped of male (left), upper surface; (B) male abdomen; (C) G1 (right) dorsal surface; (D) G1 (right), ventral surface; (E) female gonopore (right).

long merus, distinctly shorter than carapace breadth (mean ML/CB = 0.72); upper surface granular proximally; anterior margin with large granules, granules becoming larger medially; posterior margin with small granules, proximally moderately larger. Anterior lower and upper margins of carpus minutely granular. Upper surface of manus smooth, faint row of very small granules on lower portion, extending parallel to lower margin in proximal 1/2; lower margin granular; upper margin faintly serrate. Movable finger slightly shorter than manus, arched medially, cutting edge blade-shaped; immovable finger shorter than movable finger, curved gently downward; cutting edge with small triangular teeth distally, 2 or 3 distal ones larger; short dense setae along cutting edge of immovable finger, shorter distally; short setae along round process of distal margin of manus on articulation to movable finger.

Male abdomen (Figs. 3B, 4B) long-triangular, scarcely granular; somites 2-5 completely fused, fused somites proximally with large granules, medially with depression, lateral margins

proximally with small granules; somite 6 firmly merged to fused somites 2-5, not freely movable; lateral margin sharply diverging proximally, gently converging distally along most of its length, prominent elevated arrow-shaped process distally on outer surface; telson elongate-triangular, slightly shorter than somite 6, with 2 processes at basis of lateral portion, margins smooth.

G1 (Fig. 3C, D) slightly curved laterally, narrowing medially; apical portion expanded, with long setae on lateral margin, relatively short setae on mesial margin; small apical process directed dorsally; sperm channel curved on dorsal surface.

Female gonopore (Fig. 3E) on inner anterior edge of sternite 5, obliquely directed anterodorsally; small membranous oval process on outer margin of opening.

Remarks: *Hiplyra ramli* sp. nov. is a relatively small-sized species, which is morphologically closest to *H. sagitta* and *H. elegans*. With regard to the lengths of the carapace and male chelipeds, the new species; however, is clearly distinct from *H. elegans* and more closely allied to *H. sagitta*. *Hiplyra elegans* has a slightly wider carapace (CL/CB = 1.05), while this ratio in the 2 other species is 1.1. The relatively long adult chelipeds of *H. elegans* with a long merus (ML/CB = 0.95) distinguishes *H. elegans* from *H. ramli* sp. nov., which has only moderately long chelipeds (ML/CB = 0.72). There are 3 further distinct differences between the new species and all other congeners. The male abdomen of *H. ramli* sp. nov. has a wide triangular process on the distal portion of segment 6 (Fig. 3B), while this process in *H. sagitta* is distinctly elongate and arrow-shaped, with a distinct groove (Fig. 5C), and the male abdominal somite 6 of *H. elegans* is completely smooth, with no process (Fig. 1B). *Hiplyra ramli* sp. nov. has a telson with 2 proximal elevations which are very similar to those of *H. elegans* and clearly distinct from the narrow and smooth telson of *H. sagitta*. G1 of the new species is characterized by having a small distally broadened apical process which is directed dorsally, while in the 2 other species, the apical process is directed laterally (Fig. 3C, D).

Furthermore, the distinctive form of the female gonopore easily distinguishes this species from its congeners (see "Remarks" for *H. elegans*).

It should be noted that the available specimens of the new species revealed that the chelipeds of males are slightly longer than those of females, with the ratio of ML/CB in males ranging 0.64-0.77 ($n = 10$), while this ratio was 0.56-0.64

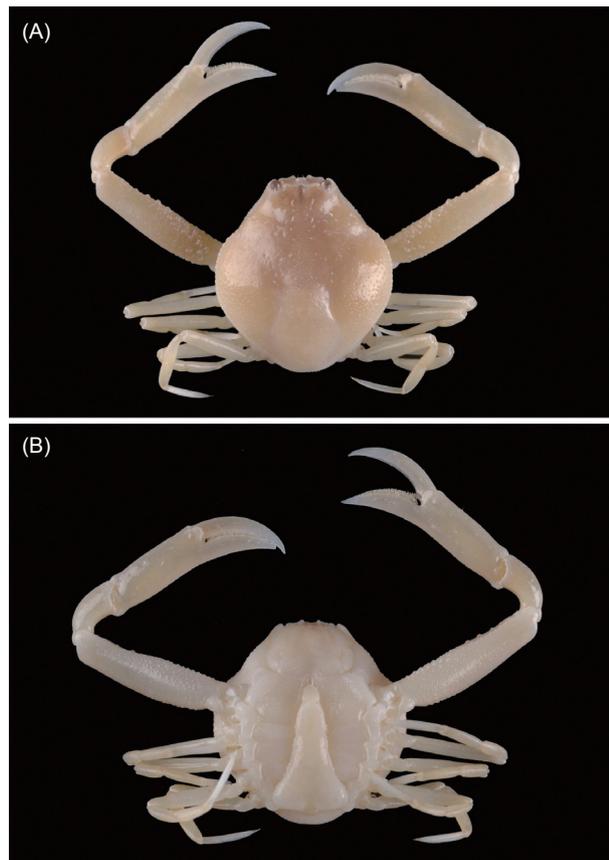


Fig. 4. *Hiplyra ramli* sp. nov. male holotype, CL = 7.4. CB = 6.8 (SMF 38466). (A) dorsal surface; (B) ventral surface.

($n = 13$) in females.

Distribution: Presently only known from the Gulf of Oman coast of the UAE (Fujairah).

Etymology: The species is named after the Arabic word "raml" for sand, since it was collected in sandy substrate. The name is used as a noun in apposition.

***Hiplyra sagitta* Galil, 2009**

(Figs. 5, 6)

Philyra platychira Alcock 1896: 242.

Philyra platycheir Tirmizi and Kazmi 1986: 100, fig. 29.

Philyra variegata Stephensen 1946: 89-93 (not *Hiplyra variegata* (Rüppell 1830) (part of the material from st. 27, near Bushehr, Persian Gulf)).

Hiplyra sagitta Galil 2009: 296-297, 315 (in key), figs. 11, 12A.

Type locality: Near Bushehr, Persian Gulf, Iran.

Material examined: Persian Gulf: 2 ♂♂ (CL = 9.68, 16.04 mm, CB = 9.45, 14.56 mm) (ZMK CRU880), St. 32, 7.5 m, N of Kharg I., G. Thorson, 23 Mar. 1937; 1 ♂ (CL = 16.67 mm, CB = 15.12 mm), 3 ♀♀ (CL = 15.42-19.07 mm, CB = 14.09-17.66 mm) (SMF 38392), 22 m, Kuwait, 28°53'N, 48°24'E, trawl, 24 Apr. 1995, F. Krupp; 2 ♀♀ (CL = 15.55, 17.00 mm, CB = 14.23, 16.13 mm) (SMF 38393), 13-17 m, Kuwait, 29°10'N, 48°28'E, trawl, 23 Apr. 1995, F. Krupp.

Diagnosis: Carapace (Fig. 6A) slightly longer than wide (CL/CB = 1.1); dorsal surface finely punctate medially, laterally, and posteriorly. Anterior margin of efferent channel straight,

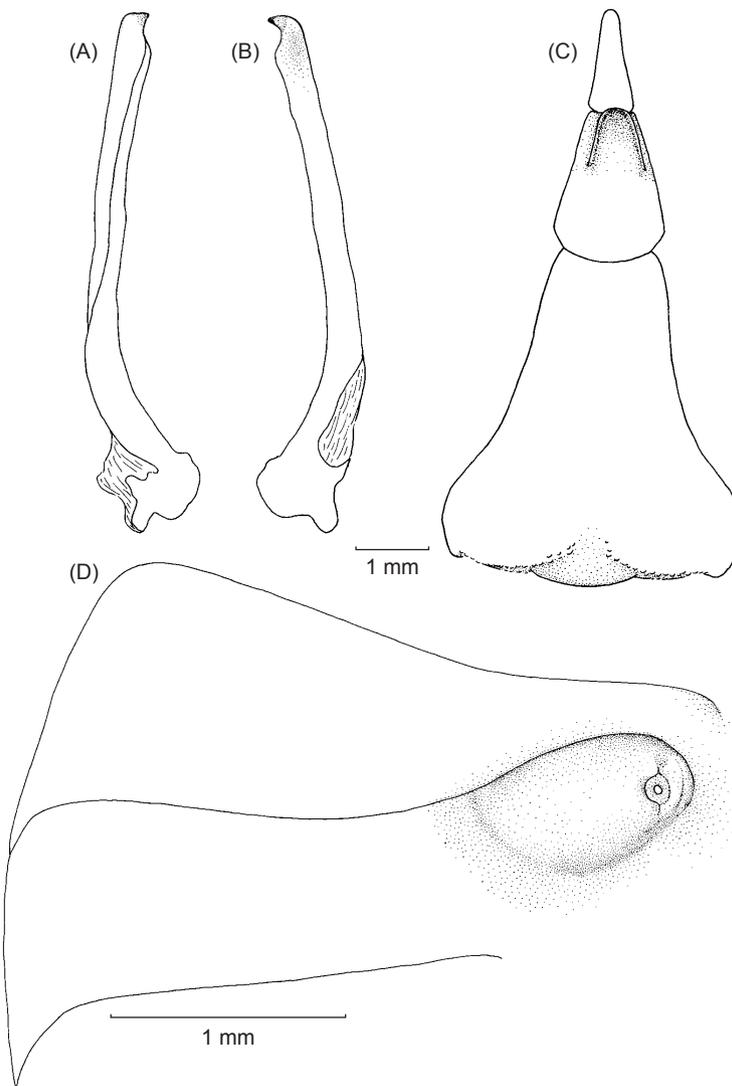


Fig. 5. *Hiplyra sagitta* Galil, 2009. Male (ZMK CRU880) (A-C); female (SMF 38393) (D). (A) G1 (right) dorsal surface; (B) G1 (right), ventral surface; (C) male abdomen; (D) female gonopore (right).

separated from lateral granulated margin by somewhat wide U-shaped incision. Ischium of 3rd maxilliped slightly longer than merus, about 1.2-times merus length. Male abdomen (Figs. 5C, 6B) elongate-triangular; segment 6 with long arrow-shaped process, telson narrow and smooth. Male chelipeds (Fig. 6) moderately long; movable finger about as long as manus, or slightly shorter. Immobile finger with small denticles along cutting edge, 2 large triangular teeth subdistally, cutting edge with dense short setae. G1 (Fig. 5A, B) long, narrow, with moderately large apical process, directed laterally. Female gonopore (Fig. 5D) small, on inner side of large elevation.

Remarks: *Hiplyra sagitta* was recently described from Bushehr in the Persian Gulf by Galil (2009). She mentioned that *H. sagitta* differs from its congeners by having a triangular incision which separates the anterior margin of the efferent channel from the lateral granulated margin (Galil 2009: 297), while this incision is narrow and U-shaped in the 3 other species she examined.

Another distinct character mentioned by Galil (2009) is the particular arrow-shaped process on the distal part of male abdominal somite 6 which

is absent in all other known congeners except for the newly described *H. ramli* sp. nov. In the latter, the process; however, is distinct from that of *H. sagitta* in its short and triangular form (Fig. 3B). Apart from the 2 discriminative characters presented by Galil (2009), we add the feature of the distinctive apical part of G1 and the structure of the female gonopore, which separate *H. sagitta* from other congeners treated here (discussed under “Remarks” of the new species, *H. ramli* sp. nov.).

The holotype and paratypes described by Galil (2009) are from Stephensen’s (1946) material examined under *H. variegata* from Bushehr in the Persian Gulf.

Hiplyra sagitta is one of the largest species in the genus with the largest male found at Kharg I. in the Persian Gulf (CL = 16.04 mm, CB = 14.56 mm) and the largest female recorded from Kuwait in the Persian Gulf (CL = 19.07 mm, CB = 17.66 mm).

Distribution: Persian Gulf, India, Andaman Sea.

***Hiplyra variegata* (Rüppell, 1830)** (Figs. 7, 8)

Myra variegata Rüppell 1830: 17, pl. 4-4.

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

Philyra variegata Nobili 1906: 169. Laurie 1915: 410. Balss 1915: 14. Stephensen 1946: 89, figs. 15f-k, 16. Serène 1968: 46. Guinot 1967: 249 (in list). Titgen 1982: 248 (in list).

Philyra platychira Balss 1915: 14.

Hiplyra variegata Galil 2009: 287-299, 315 (in key), fig. 13.

Type locality: Red Sea, Egypt.

Material examined: Lectotype 1 ♂ (CL = 7.66 mm, CB = 7.73 mm) (SMF 11121), among corals, Sinai Peninsula, Egypt, id. E. Rüppell, 1827. Paralectotype: 9 ♂♂, 4 ♀♀ (SMF 11121), data same as for lectotype. Persian Gulf: 2 ♂♂ (CL = 6.05, 10.10 mm, CB = 5.68, 9.24 mm) (ZMK CRU886), 56 m, sandy clay, 13 nautical miles W of outermost light-buoy at Bushehr, Bushehr, G. Thorson, 13 Mar. 1937; 27 ♂♂, 11 ♀♀ (SMF 38462), sandy, 6 m depth, S of Rams, UAE, 25°50'N, 55°00'E, 11 July 1995, M. Apel; 1 ♂, 2 ♀♀ (ovig.) (SMF 38463), sandy, 0-6 m depth, N coast of As Sham, Ras al Khaymah, UAE, 26°02'N, 55°05'E, 10 July 1995, M. Apel. Red Sea: 1 ♀ (ovig.) (SMF 38464), mangroves, Umm al Gamar I., Egypt, 27°22'N, 33°55'E, 13 Sept. 1994.

Diagnosis: Carapace (Fig. 8A) as long as wide, slightly wider than long; dorsal surface

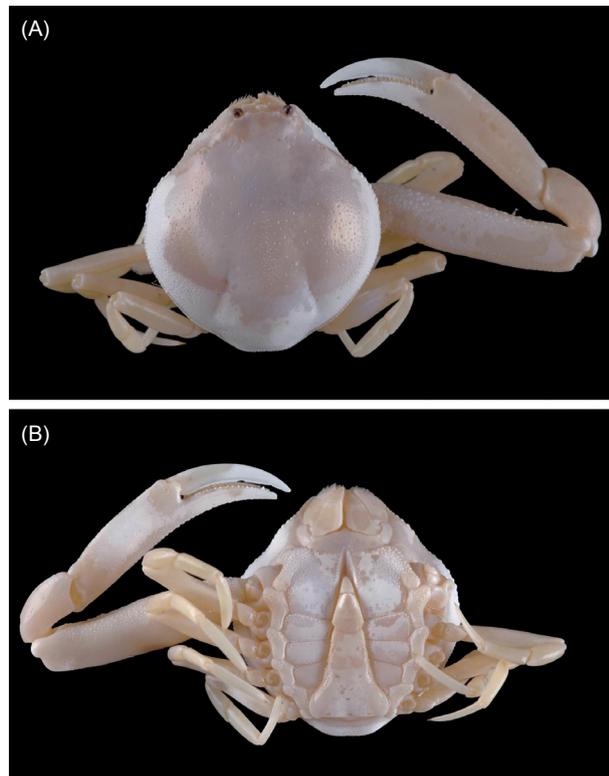


Fig. 6. *Hiplyra sagitta* Galil, 2009, male, CL = 16.79, CB = 15.13 mm (SMF 38392). (A) dorsal surface; (B) ventral surface.

finely granular laterally and posteriorly. Anterior margin of efferent channel straight, separated from lateral granulated margin by narrow U-shaped incision. Ischium of 3rd maxilliped distinctly longer than merus, about 1.5-times merus length. Male abdomen (Figs. 7C, 8B) elongate-triangular; segment 6 and telson completely smooth, with no process or elevation. Male cheliped (Fig. 8A) moderately long; movable finger about 1.5-times manus length. Immobile finger with small denticles along cutting edge, 2 large triangular teeth subdistally, cutting edge densely covered with short setae. G1 (Fig. 7A, B) long, narrow; small

apical process distally, directed ventrally. Female gonopore (Fig. 7D) on oval transverse elevation, with large opening directed anteroposteriorly.

Remarks: This small-size species was briefly described and illustrated by Rüppell (1830) from the Red Sea. Galil (2009) redescribed the species by examining the type material and mentioned that the original description and illustration of the species were not correct, as Rüppell (1830) did not mention the minutely dentate row beyond the setae along the cutting edge of the immobile finger. This character; however, was mentioned by Alcock (1896: 243), who examined material from the

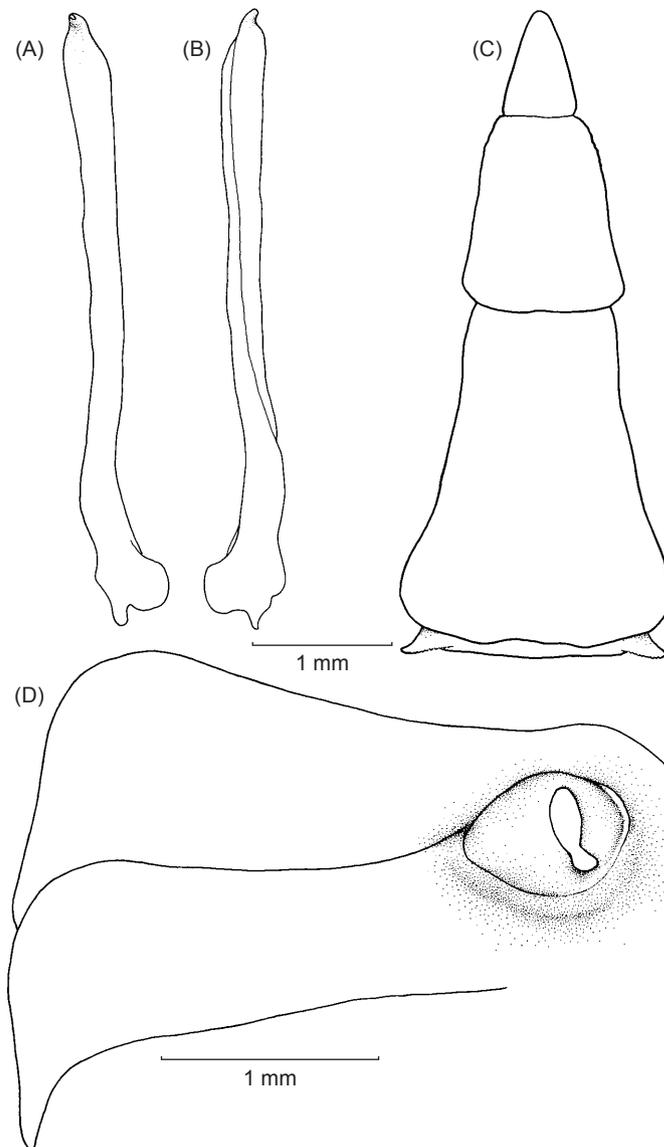


Fig. 7. *Hiplyra variegata* (Rüppell, 1830). Male paratype (SMF 11121) (A-C); paratype (SMF 11121) (D). (A) G1 (right), ventral surface; (B) G1 (right), dorsal surface; (C) male abdomen; (D) female gonopore (right).

Persian Gulf and by Nobili (1906) who studied the type material of *H. variegata* (Rüppell 1830). Such an indentation was seen in the material examined in the present paper. Galil (2009) recorded 2 other characters as discriminative for distinguishing the species from its congeners, including a marbled color pattern of the carapace and 2 triangular teeth distally on the cutting edge of the immovable finger.

We found 3 additional morphological characters which we believe are even more significant and readily distinguish it from all other congeners treated here. *Hiplyra variegata* has a unique G1 structure and female gonopore, and its male abdomen is completely smooth with no elevation or process on the 6th male abdominal somite or telson (Fig. 7A-D). Detailed discussions on the differences between *H. variegata* and its congeners are presented under “Remarks” of the former species.

Distribution: Kenya, Red Sea, Gulf of Aden, Persian Gulf, Gulf of Oman.

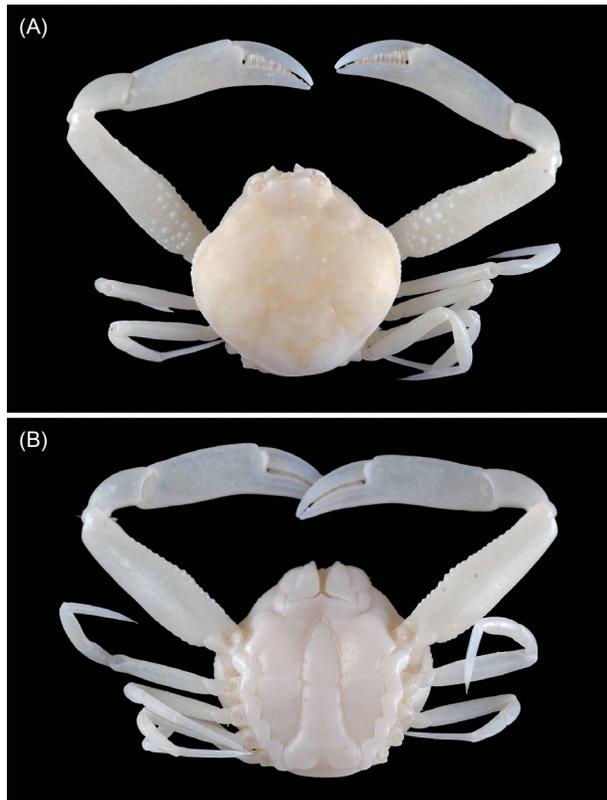


Fig. 8. *Hiplyra variegata* (Rüppell, 1830), male lectotype, CL = 7.66, CB = 7.73 mm (SMF 11121). (A) dorsal surface; (B) ventral surface.

DISCUSSION

The genus *Hiplyra* Galil, 2009, was recently separated from *Philyra* Leach, 1817, using the following characters: apical process of G1 minute, the presence of a thick fringe of setae on the inner margin of the movable finger, and the cheliped merus being longer than the carapace in males (Galil 2009: 314). The 1st 2 characters clearly distinguish *Hiplyra* from *Philyra*. The 3rd character is rather confusing as in all known species of *Hiplyra*, even the type species, *H. platycheir* (De Haan, 1841), the merus is actually clearly shorter than the carapace.

Hiplyra currently includes 7 species, which are primarily distinguished from each other using the morphology of the carapace and male abdomen (Galil 2009). Apart from these 2 characters, 2 more-important discriminative characters including G1 and the female gonopore were found to be useful here to separate closely related species. The morphology of the female gonopore allows females of the different Persian Gulf species to be distinguished and will probably work for other taxa as well. The 4 species discussed in the present study are morphologically close and all are found in sandy substrates of the shallow subtidal zone.

Hiplyra variegata and *H. elegans* have patchy distributions in the western Indian Ocean which could be largely due to the lack of extensive sampling, particularly in the subtidal zone. We believe that the recently described species, *H. sagitta* Galil, 2009, and *H. ramli* sp. nov. will be found further westwards when further surveys are done in those regions.

Key to the genus *Hiplyra* known from the Persian Gulf and Gulf of Oman

1. Somite 6 of male abdomen with elevated arrow-shaped process 2
 Somite 6 of male abdomen smooth, without a process 3
2. Somite 6 of male abdomen with long arrow-shaped process, creating distinct groove; telson narrow, smooth, with no elevation; G1 distally narrow, with relatively large apical process directed laterally *Hiplyra sagitta*
3. Somite 6 of male abdomen with triangular arrow-shaped process on distal portion; telson wide-triangular, swollen on basal portion; G1 distally widened, with small apical process directed dorsally *Hiplyra ramli* sp. nov.
4. Male telson elevated on lateral portion; G1 widened distally, with very small apical process subdistally, directed laterally; 1st somite of female abdomen not lobate
 *Hiplyra elegans*
 - Male telson completely smooth; G1 narrowing distally, apical process located distally, directed ventrally; 1st somite of female abdomen trilobate *Hiplyra variegata*

Acknowledgments: We are grateful to J. Olesen (ZMK) for kindly providing us with the valuable brachyuran material collected from the “Danish Scientific Expedition in Iran” conducted in 1937/38. We are indebted to Prof. M. Türkay (SMF) for his support as supervisor of both authors, and to Deutscher Akademischer Austausch Dienst (DAAD) for financial support in the form of a PhD scholarship to R. Naderloo. Furthermore, we are grateful to J.A. Khan and the team of the Arabian Seas Expedition who gave great support to one of the authors (M. Apel) during a survey of the UAE coastline in 1995.

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