

Rhynchocinetes holthuisi, a new shrimp from the Gulf of Aqaba, northern Red Sea (Crustacea: Decapoda: Rhynchocinetidae)

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Okuno, J. *Rhynchocinetes holthuisi*, a new shrimp from the Gulf of Aqaba, northern Red Sea (Crustacea: Decapoda: Rhynchocinetidae).

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A new rhynchocinetid shrimp, *Rhynchocinetes holthuisi*, is described and illustrated on the basis of five males, one female and three ovigerous females from the Gulf of Aqaba, northern Red Sea. This species is readily distinguished from four closely related species with arthrobranches on the third maxilliped and the anterior two pereopods in combination of the length of the stylocerite, the forms of the antennal basicerite and the endopod of male first pleopod, and meral and dactylar spinulation of the ambulatory pereopods. It is considered to be an endemic species in the northern Red Sea.

Introduction

Shrimps of the genus *Rhynchocinetes* sensu stricto are widely distributed through the Indo-Pacific, and mainly inhabit warm temperate to tropical shallow rocky reefs. Recent taxonomic studies dealing with this genus include Tiefenbacher (1983), Okuno & Takeda (1992a, b), Okuno (1994, 1996, 1997) and Holthuis (1995). As the result of these studies twelve species are now recognized in the genus.

Thanks to the cooperation of Dr Lipke B. Holthuis, I could scrutinize several rhynchocinetid specimens collected from the Gulf of Aqaba, northern Red Sea, and found an undescribed *Rhynchocinetes* species among them. In the present paper the new species is described as *Rhynchocinetes holthuisi* and compared with the most closely related members of *Rhynchocinetes*.

The abbreviations used in the text are as follows: RMNH = Rijksmuseum van Natuurlijke Historie; NTM = Northern Territory Museum, Darwin; SAM = South Australian Museum, Adelaide; NSMT = National Science Museum, Tokyo; CBM = Natural History Museum and Institute, Chiba; CL = postorbital carapace length.

Systematic Account

Family Rhynchocinetidae Ortmann, 1890

Genus *Rhynchocinetes* H. Milne Edwards, 1837

Rhynchocinetes holthuisi spec. nov.

(figs 1-3, 4a-e)

Material.-- Holotype. Ovig. ♀ (RMNH D47456, 5.9 mm CL), Aqaba, Gulf of Aqaba, Jordan, 11.iv.1977. Paratypes. 1 ♂ (RMNH D47457, 9.6 mm CL), Dahab, Sinai coast of Gulf of Aqaba, Egypt, 12 m depth, 13.x.1968, L. Fishelson coll.; 1 ♂ (CBM-ZC 3440, 6.3 mm CL), Dahab, Sinai coast of Gulf of Aqaba, Egypt, 3 m depth, 10.x.1968, L. Fishelson coll.; 1 ovig. ♀ (RMNH D47458, 6.1 mm CL), south of Marsa Murach, opposite Solar Lake, Sinai coast of Gulf of Aqaba, 15.vii.1969; 1 ♂ (RMNH D47459, 6.1 mm CL), El Hamira Bay, Sinai coast of northern Gulf of Aqaba, Egypt, 21-23.vii.1969; 1 ovig. ♀ (RMNH D47460, 6.7 mm CL), Eilat, Gulf of Aqaba, Israel, 4-5 m depth, 20.ix.1970, D. Popper coll.; 2 ♂♂ and 1

♀ (RMNH D47461, 6.1-9.6 mm CL), Dahab, Sinai coast of Gulf of Aqaba, Egypt, 3 m depth, 10 .x.1968, L. Fishelson coll.

Diagnosis.— A typical rhynchocinetid shrimp of subcylindrical body form. Antennular peduncle with acute stylocerite reaching, or falling slightly short of level of midlength of antennular intermediate segment. Antennal basicerite with ventral margin entire. Third and fourth pereopods with propodi armed usually with four equidistant spines on outer surface. Dactyli of ambulatory pereopods armed with four accessory claws posterior to terminal largest claw.

Description.— Carapace (fig. 1) covered with fine transverse striae, armed with two acute teeth on dorsal median carina, anterior tooth just behind rostral articulation, posterior tooth feebly articulated with carapace; supraorbital spine acute, slightly longer than spines on dorsal median carina, directed anteriorly; antennal spine acute, supported by a feeble carina, directed anteriorly; pterygostomian spine small, distinct. Rostrum (fig. 2a) articulated with carapace, 1.18-1.27 times as long as carapace; dorsal margin armed with two teeth on basal half of rostrum, and with 4-6 small teeth subterminally; ventral margin armed with 12-13 teeth.

Abdominal somites (fig. 1) covered with fine striae; first three somites with pleura marginally rounded; pleura of fourth and fifth somites with distinct posteroventral teeth; sixth somite 0.50-0.64 times as long as carapace, with acute posteroventral spine, with strongly hooked anal spine between bases of uropods. Telson (fig. 2b) 0.59-0.69 times as long as carapace, 0.97-1.23 times as long as sixth abdominal somite, armed dorsally with three pairs of spines; midpoint of posterior margin triangularly produced, with three pairs of spines, median pair longest.

Eye well developed, with large, globular cornea; stalk much more slender than cornea.

Antennular peduncle (fig. 4a) falling slightly short of midlength of rostrum; stylocerite long, reaching, or falling slightly short of level of midlength of antennular intermediate segment; proximal segment with distolateral spine falling slightly short of distal margin of antennular intermediate segment, ventrally with acute spine at mesial margin; thickened part of upper antennular flagellum overreaching rostral apex.

Antenna with scaphocerite (fig. 2c) 0.83-0.95 times as long as carapace, 3.64-4.67 times as long as maximum width, distolateral spine acute, distinctly overreaching end of lamella; antennal carpocerite reaching proximal fourth of length of scaphocerite; basicerite (fig. 4b) with acute anterolateral spine and with rounded protrusion just above spine, ventral margin entire.

Mandible (fig. 3a) with robust three-segmented palp, distal segment rounded, with dense setae marginally; incisor process well developed, armed with over six distinct marginal teeth; molar process obliquely truncate distally, with finely ridged distal end.

First maxilla (fig. 3b) with slender, feebly bilobed palp, lower lobe armed distally with a long stout seta; proximal endite distinct, rounded, with numerous marginal setae; distal endite distally truncated, armed with eleven stout spines and dense setae on mesial margin.

Second maxilla (fig. 3c) with well developed tapering palp; proximal endite slightly truncate; distal endite bilobed, upper lobe rather broader than lower lobe; scaphognathite large, overreaching level of tip of palp, anterior lobe with feebly

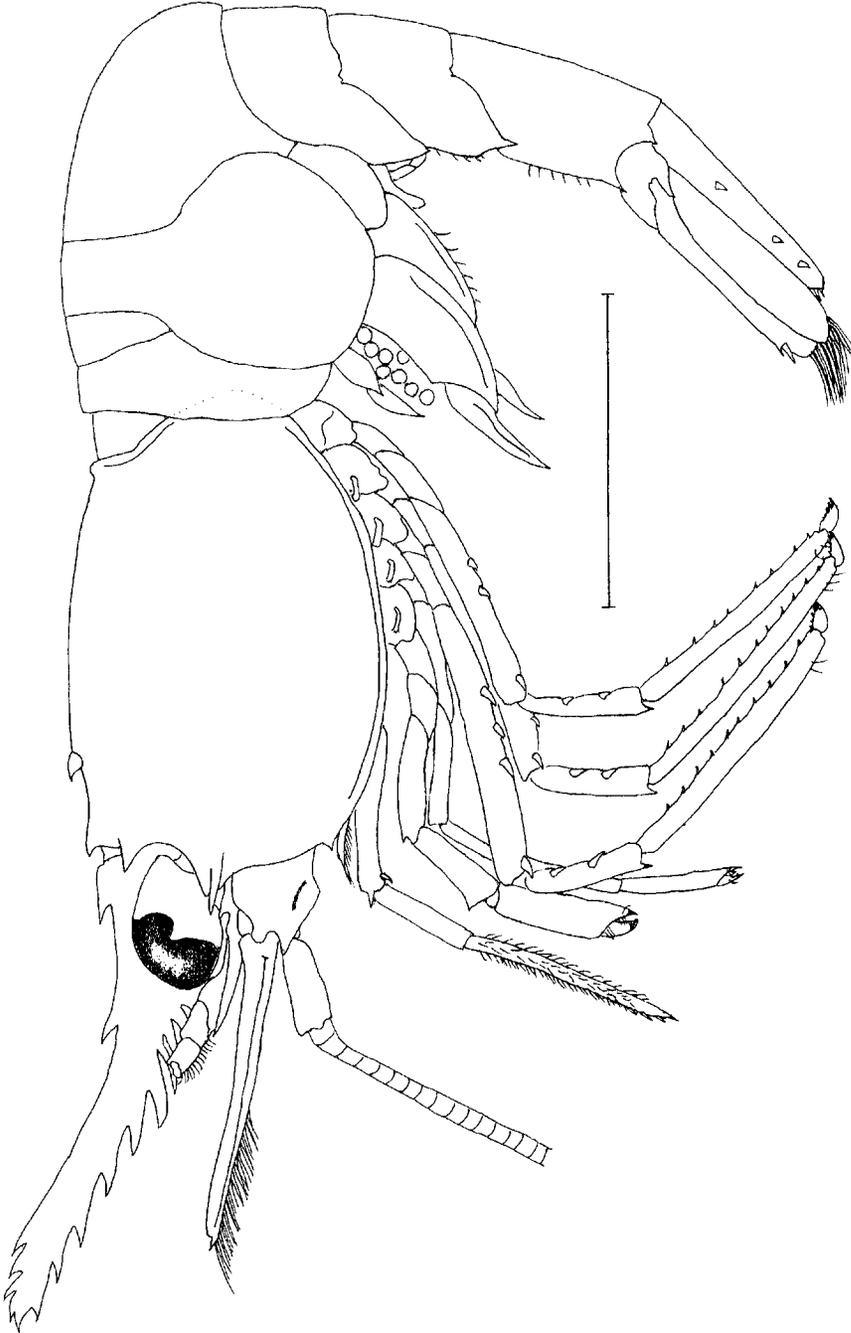


Fig. 1. *Rhynchocinetes holthuisi* spec. nov., holotype (RMNH D47456, 5.9 mm CL), scale line 5 mm.

square distal end, posterior lobe tapering, mesial margin convex.

First maxilliped (fig. 3d) with endites distinctly separate, distal endite concave marginally, distinctly larger than proximal endite; palp long, apparently two-segmented; exopod with long flagellum, caridean lobe distinct.

Second maxilliped (fig. 3e) with developed podobranch; epipod rounded distally; exopod well developed, tapering; dactylar segment with truncate distal margin; propodal segment with external margin rounded, mesial margin expanded.

Third maxilliped (fig. 3f) falling slightly short of tip of scaphocerite; exopod reaching level of distal fourth of antepenultimate segment, tapering, with dense long setae; ultimate segment with 6-7 spines terminally, 0.61-0.76 times as long as carapace, 1.74-2.22 times as long as penultimate segment; penultimate segment 0.29-0.37 times as long as carapace.

Branchial formula as shown in Table 1.

First pereopod (fig. 2d) chelate, moderately robust, falling slightly short of mid-length of scaphocerite; chela 0.41-0.55 times as long as carapace, 1.40-2.17 times as long as carpus, tips of both fingers with dark terminal claws; carpus 0.25-0.32 times as long as carapace, usually with acute spine at distal end of dorsal margin, but some males with bifid or tridentate spine (fig. 2e).

Second pereopod (fig. 2f) chelate, more slender than first pereopod, reaching distal third of length of scaphocerite; chela 0.36-0.40 times as long as carapace; carpus entire, 0.56-0.66 times as long as carapace, 1.55-1.74 times as long as chela.

Third pereopod overreaching distal end of scaphocerite by lengths of distal fourth of propodus and dactylus; ischium with a spine; merus (fig. 4c) 0.78-0.90 times as long as carapace, 2.11-2.28 times as long as carpus, with four (rarely five) almost equidistant spines; carpus 0.36-0.43 times as long as carapace, with two spines on outer surface; propodus 0.72-0.83 times as long as carapace, 1.80-2.08 times as long as carpus, with over ten short spinules on flexor margin; dactylus (fig. 4d) with four accessory claws posterior to terminal largest claw, decreasing in size proximally.

Fourth pereopod overreaching tip of scaphocerite by length of dactylus, spinulation resembling that of third pereopod; merus 0.73-0.84 times as long as carapace, 1.87-2.09 times as long as carpus; carpus 0.36-0.43 times as long as carapace; propodus 0.71-0.81 times as long as carapace, 1.79-2.05 times as long as carpus.

Fifth pereopod reaching level of tip of scaphocerite; spinulation of ischium, carpus, propodus and dactylus resembling those of third and fourth pereopods; merus 0.61-0.78 times as long as carapace, 1.64-2.00 times as long as carpus, with 2-5 (usually

Table 1. Branchial formula in *Rhynchocinetes holthuisi* spec. nov.

	maxillipeds			pereipods				
	I	II	III	I	II	III	IV	V
Pleurobranchs	-	-	-	1	1	1	1	1
Arthrobranchs	-	-	2	1	1	-	-	-
Podobranchs	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	-	-	-	-	-

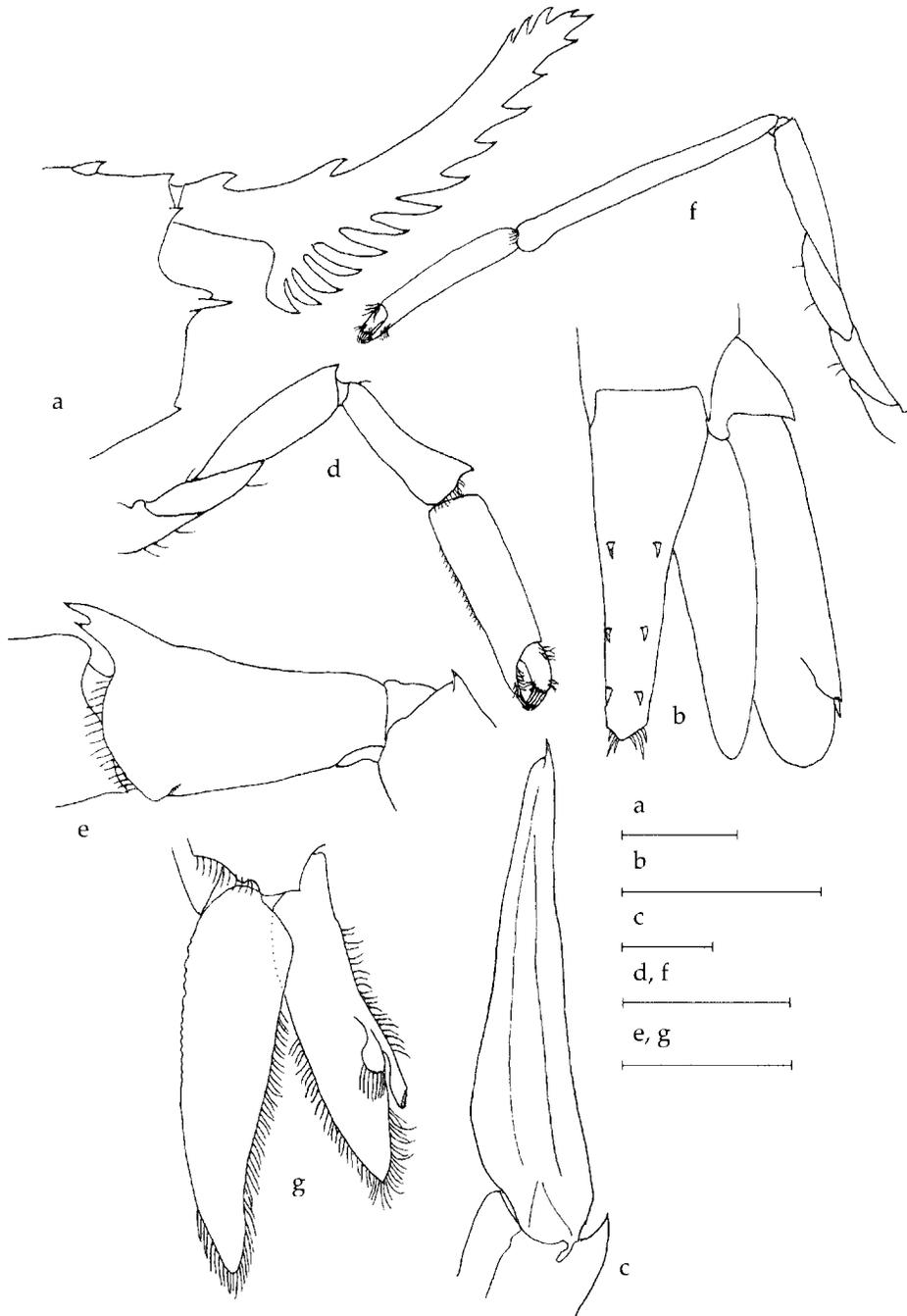


Fig. 2. *Rhynchocinetes holthuisi* spec. nov. a-d, f, holotype (RMNH D 47456, 5.9 mm CL), e, g, ♂ paratype (RMNH D 47457, 9.6 mm CL). a, anterior part of carapace with rostrum; b, telson and right uropod, dorsal aspect; c, right scaphocerite, dorsal aspect; d, right first pereiopod; e, carpus of left first pereiopod; f, left second pereiopod; g, right second pleopod. Scale line a, b, d, f = 2 mm; c, e, g = 1 mm.

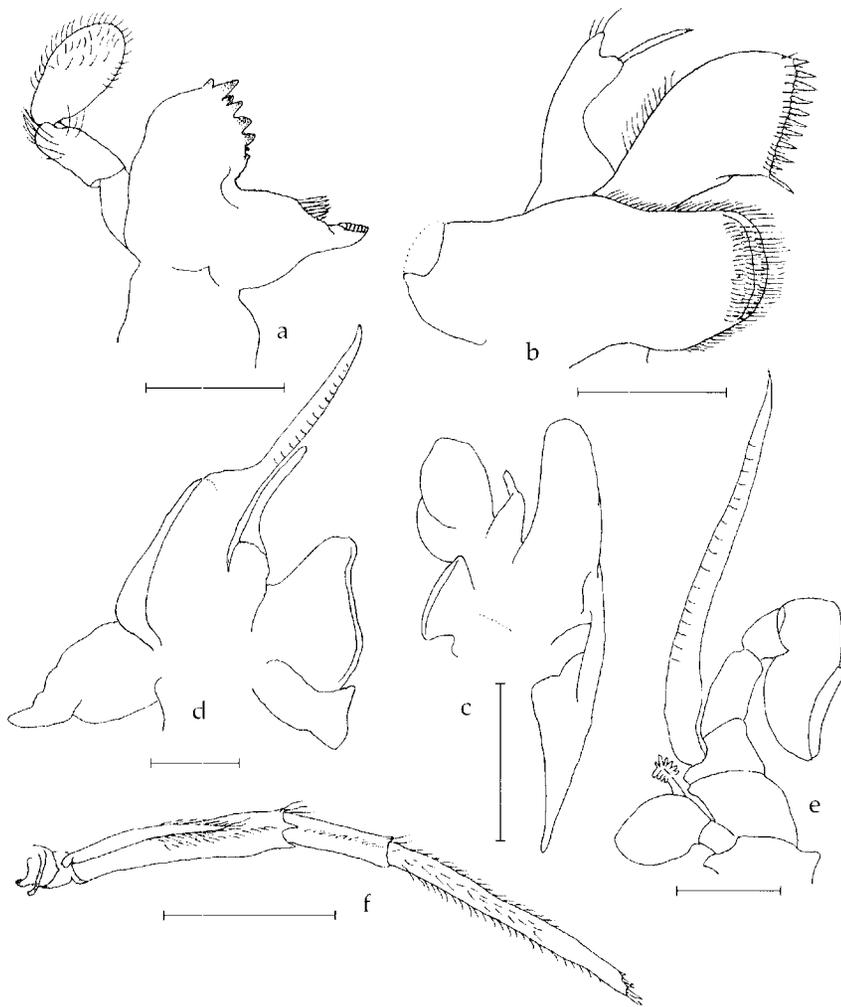


Fig. 3. *Rhynchocinetes holthuysi* spec. nov., ♂ paratype (RMNH D 47457, 9.6 mm CL). a, right mandible; b, right first maxilla; c, right second maxilla; d, right first maxilliped; e, right second maxilliped; f, right third maxilliped. c-e, setae omitted. Scale line a, b, d, e = 1 mm; c = 2mm; f = 5mm.

3) almost equidistant spines; carpus 0.34-0.43 times as long as carapace; propodus 0.67-0.78 times as long as carapace, 1.65-2.00 times as long as carpus.

Endopod of male first pleopod (fig. 4e) with distal end pointed; appendix interna well developed, at midlength of mesial margin, distal end of appendix with dense cincinnuli; outer margin entire, without lobe.

Endopod of male second pleopod (fig. 2g) with appendices masculina and interna at distal two fifths of mesial margin; appendix masculina broad, with distal margin rounded, fringed with dense setae; appendix interna considerably more slender and shorter than appendix masculina, with dense cincinnuli at distal end.

Uropodal exopod and endopod (fig. 2b) slightly overreaching distal end of telson,

exopod with fixed and movable spines at distal fifth of outer margin, former considerably shorter than latter.

Coloration.— No data available.

Distribution.— Known only from the coasts of the Gulf of Aqaba, northern Red Sea, at the depths of 3-12 m.

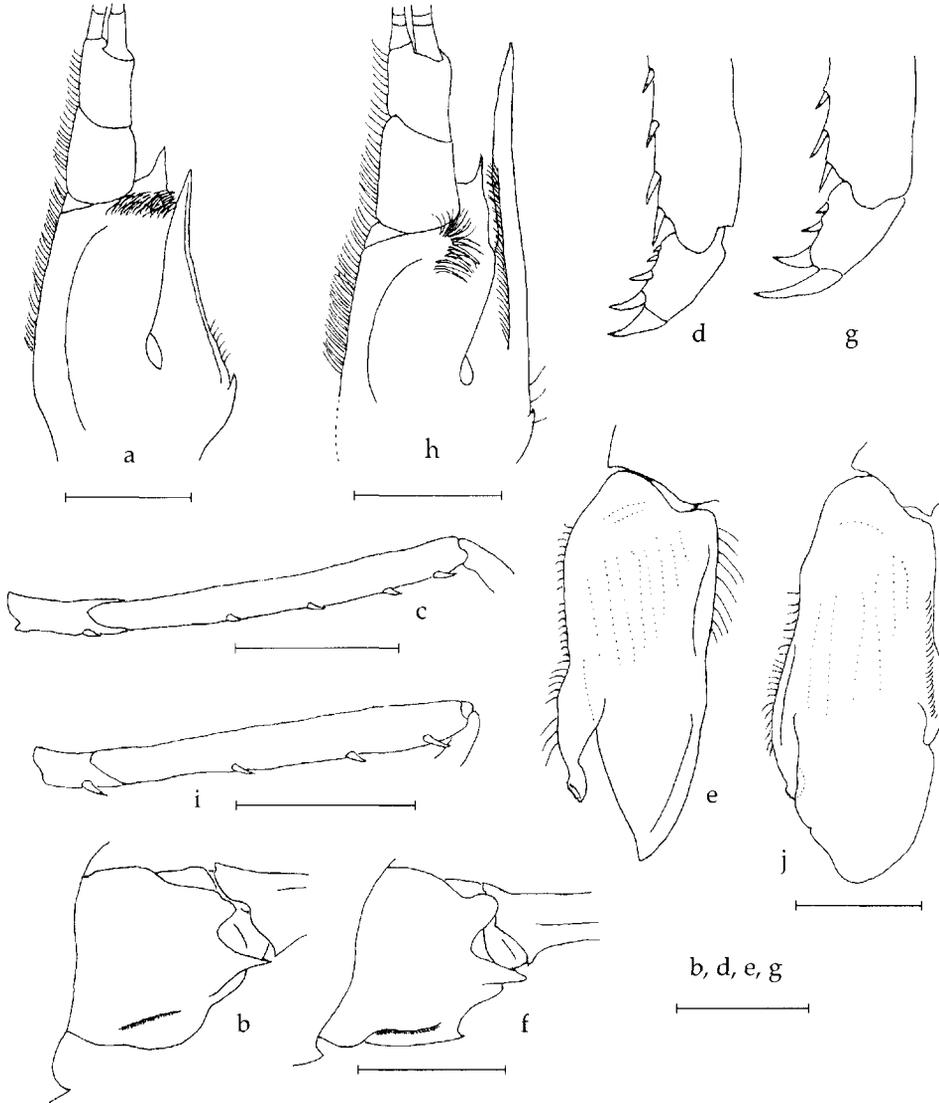


Fig. 4. Comparisons of the diagnoses. a-d, *Rhynchocinetes holthuisi* spec. nov., holotype (RMNH D47456, 5.9 mm CL); e, *R. holthuisi* spec. nov., ♂ paratype (RMNH D47457, 9.6 mm CL); f, *R. australis*, ♂ (NTM. Cr. 006934, 9.1 mm CL); g, *R. conspicuocellus*, ♂ (CBM-ZC 3134, 5.6 mm CL); h, *R. kuiteri*, ♂ (SAM C5603, 16.4 mm CL); i, j, *R. uritai*, ♂ (CBM-ZC 3133, 7.4 mm CL). a & h, right antennular peduncle; b & f, right antennal basicerite; c & i, ischium and merus of right third pereiopod; d & g, dactylus of right third pereiopod; e & j, ♂ endopod of right first pleopod. Scale line a, b, e, j = 1 mm; c, f = 2 mm; d, g = 0.5 mm; h, i = 3 mm.

Etymology.— *Rhynchocinetes holthuisi* is named in honour of Dr Lipke B. Holthuis.

Remarks.— Except for two tropical species *Rhynchocinetes durbanensis* Gordon, 1936, and *R. brucei* Okuno, 1994, the distributional range of the temperate and subtropical rhynchocinetids is limited (Okuno 1996). *Rhynchocinetes holthuisi* is considered as being endemic to the northern Red Sea. This new species is closely related to *R. australis* Hale, 1941, *R. conspicio-cellus* Okuno et Takeda, 1992, *R. kuiteri* Tiefenbacher, 1983 and *R. uritai* Kubo, 1942. The characters shared by these species are the presence of arthrobranchs on the third maxilliped and anterior two pereopods, and a distinct supraorbital spine. None of these related species is known to occur in the northern Red Sea (Okuno, 1996). A comparison of *R. holthuisi* with these species is given below.

Rhynchocinetes australis is known from southern Australian waters. Hale (1941) described it as a new species on the basis of the absence of an arthrobranch on the third pereopod and the outer margin of the endopod of the male first pleopod being entire, without lobe. I examined additional specimens of this species from several localities in south-eastern Australia. In addition to the diagnosis established by Hale (1941), I was able to confirm that *R. australis* can be differentiated from the other congeners in the antennal basicerite being armed ventrally with an acute (rarely bifid) spine (fig. 4f), and Dr Wolfgang Zeidler kindly informed me about the presence of this spine in the holotype. It also differs from *R. holthuisi* in the stylocerite reaching level of distal third of the antennular distal segment.

Rhynchocinetes conspicio-cellus is known only from southern Japanese waters, and differs from *R. holthuisi* in the ambulatory dactyli armed mesially with three accessory claws posterior to terminal claw (fig. 4g). This character also separates *R. conspicio-cellus* from *R. uritai*, which has the dactyli armed with four mesial accessory claws. Okuno & Takeda (1992a) recognized that the distinctions between *R. conspicio-cellus* and *R. uritai* appear in the form of the endopod of male first pleopod and the relationship of rostral-scaplocerite length.

Rhynchocinetes kuiteri is known from south-eastern Australian waters, and differs from *R. holthuisi* in the stylocerite overreaching the distal end of the antennular distal segment (fig. 4h) and the presence of a distinct or indistinct lobe at the midlength of outer margin of male first pleopodal endopod.

Rhynchocinetes uritai is known from southern Japanese and Korean waters and common in subtidal depths in central Japan. It differs from *R. holthuisi* in the meral spinulation of the third and fourth pereopods, armed usually with three equidistant spines (fig. 4i) and by the endopod of male first pleopod having a distinct lobe at the outer margin, and with distal end rounded (fig. 4j).

As pointed out in the recent papers on Rhynchocinetidae listed in the introduction, the coloration in life is one of the best diagnostic characters in this family. Unfortunately, all the type specimens of *R. holthuisi* had lost their colour pattern.

Resembling the other congeners, one of the male paratypes of *R. holthuisi* (RMNH D47461, 9.6 mm CL) presents marked sexual dimorphism in the form of the third maxilliped and first pereopod; the ultimate segment of the maxilliped is considerably elongated, the tip is armed only with single dark horny claw, and the length is 2.12 times as long as carapace and 5.49 times as long as penultimate segment; the first pereopod overreaches tip of scaplocerite by the length of the dactylus. Three male paratypes (RMNH D 47457 and D 47461) have the carpus of the first pereopod armed

with the bifid or tridentate dorsodistal spine (fig. 2e). This character can be recognized as one of the sexual dimorphisms appearing only in the mature male.

Comparative material

- R. australis*: 2 ♂♂ (NTM Cr. 006932, 8.3 & 6.7 mm CL), Pt Turton, Jetty, South Australia, 12.xii.1989; 1 ♂ & 1 ovig. ♀ (NTM Cr. 006934, 9.1 & 8.9 mm CL), Edithburgh, Jetty, South Australia, 10.xii.1989; 1 ovig. ♀ (NTM Cr. 006935, 7.9 mm CL), 1 ♂ (NTM Cr. 006936, 6.4 mm CL) & 1 ovig. ♀ (NTM Cr. 00694., 7.1 mm CL), Second Valley, South Australia, 16.xii.1989; 2 ovig. ♀♀ (SAM C5602, 13.8 & 11.9 mm CL), Bathurst Channel, Port Davey, Tasmania, 2.iv.1993.
- R. conspiciocellus*: 1 ♂ (CBM-ZC 3134, 5.6 mm CL), Hachijo-jima Island, Izu Islands, Japan, 28.viii.1996; 1 ♂ (NSMT-Cr 2190, 11.7 mm CL), Okinawa Island, Ryukyu Islands, Japan, 23.v.1993.
- R. kuiteri*: 1 ♂ (SAM C5603, 16.4 mm CL), Bathurst Channel, Port Davey, Tasmania, 2.iv.1993.
- R. uritai*: 2 ♂♂ & 1 ovig. ♀ (CBM-ZC 3133, 7.4-9.6 mm CL), Katsuura, Boso Peninsula, Honshu, Japan, 15.vii.1996; 1 ♂ & 1 ♀ (NSMT-Cr 10961, 6.4 & 8.5 mm CL), Numazu, Izu Peninsula, Honshu, Japan, 31.xii.1990.

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