Zootaxa 5051 (1): 487–505
https://www.mapress.com/j/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5051.1.19
http://zoobank.org/urn:lsid:zoobank.org:pub:A607CB5B-51E7-45FD-9104-980175BBB163

A new species of *Helmutkunzia* Wells & Rao, 1976 from an intertidal sandy beach in Xiamen, China and proposal of *Pseudobalucopsylla* gen. nov. (Copepoda, Harpacticoida, Miraciidae)

FANGHONG MU[1] & RONY HUYS[2,3]
[1]*College of Marine Life Sciences, Ocean University of China, 5 Yushan Road, Qingdao 266003, Shandong Province, China.*
[2]*Department of Life Sciences, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.*
r.huys@nhm.ac.uk; https://orcid.org/0000-0002-6172-9271
[3] *Corresponding author. fanghongmu@ouc.edu.cn; https://orcid.org/0000-0003-2411-7003*

Abstract

A new species of the genus *Helmutkunzia* Wells & Rao, 1976 (Miraciidae) is described from specimens collected from an intertidal sandy beach in Xiamen, Fujian Province, China. *Helmutkunzia xiamenensis* **sp. nov.** differs from its two congeners by the length/width ratio of the female P5 exopod, the number or length of the setae on the sexually dimorphic P2 endopod in the male and the relative length of the spines on the endopodal lobe of the male P5. The Chinese species is morphologically closest to *H. variabilis* Wells & Rao, 1987 from the Andaman and Nicobar island chain. Females of both species can readily be differentiated by the relative length of the P5 exopod while males can be differentiated by the length of the armature elements on P2 enp-2 and the endopodal lobe of P5. The genus *Balucopsylla* Rao, 1972 is reviewed, resulting in the proposal of *Pseudobalucopsylla* **gen. nov.** to accommodate the type species *Balucopsylla triarticulata* Wells & Rao, 1987 and three new Indo-Pacific species previously identified with it: *P. obscura* **sp. nov.** from the Andaman Islands, *P. costaricensis* **sp. nov.** from the Pacific coast of Costa Rica and *P. mielkei* **sp. nov.** from the Galápagos archipelago. A key to species of *Pseudobalucopsylla* **sp. nov.** is provided.

Key words: China, Copepoda, Harpacticoida, identification key, intertidal, variability

Introduction

Wells & Rao (1976) proposed the genus *Helmutkunzia* in the family Miraciidae (formerly Diosaccidae) to accommodate a single species which had originally been placed in *Actopsyllus* Wells, 1967. The type species of *Helmutkunzia*, *Actopsyllus hartmannorum* Kunz, 1971, described from a sandy beach in Angola (Kunz 1971), was considered to represent an evolutionary missing link between the genera *Balucopsylla* Rao, 1972 and *Eoschizopera* Wells & Rao, 1976. Since its proposal in 1976 the genus *Helmutkunzia* (subfamily Diosaccinae) has seen the addition of only one species, *H. variabilis* Wells & Rao, 1987, which was based on material collected from the Andaman and Nicobar Islands (Wells & Rao 1987). The species was subsequently reported from seagrass patches (Jayabarathi *et al.* 2012, 2015) and *Avicennia marina* pneumatophores (Pongener *et al.* 2018) in South Andaman. An as yet undescribed species of *Helmutkunzia* was reported from New Zealand by Webber *et al.* (2010). During a survey of Dadeji Beach of Xiamen along the southern coast of China in the East China Sea, a new species of the genus was identified and is described below. The related genus *Balucopsylla* is reviewed, resulting in the proposal of a new genus and three new species.

Material and methods

Gravelly sand samples were collected in July 2010 in the intertidal zone of Dadeji Beach, Xiamen, China (24°26’30” N, 118°4’12” E). The sediment samples were collected to a depth of 20 cm using PVC tube cores with an inner

Accepted by E. Suárez-Morales: 29 Apr. 2021; published: 12 Oct. 2021

diameter of 2.4 cm and were subsequently fixed in 10% formalin. Harpacticoids were extracted by decantation over a 31 μm sieve. Specimens were sorted and preserved in 4% formalin.

Before dissection, the habitus was drawn from whole specimens temporarily mounted in lactophenol. Specimens were dissected in lactic acid, and the parts individually mounted in lactophenol under coverslips, which were subsequently sealed with transparent neutral balsam. All drawings were prepared using a camera lucida mounted on an Olympus BX51 differential interference contrast microscope. The terminology of the body and appendage morphology follows that of Huys & Boxshall (1991) and Huys *et al.* (1996). Abbreviations used in the text and figures are *A1*, antennule; *A2*, antenna; *ae*, aesthetasc; *P1–P6*, first to sixth thoracic legs; *exp*, exopod; *enp*, endopod; *exp(enp)-1(-2,-3)*, the proximal (middle, distal) segment of a ramus; *benp*, baseoendopod. Body length was measured from the anterior margin of the cephalic shield to the posterior margin of the anal somite. Scale bars in all illustrations are in μm. The type material is deposited in the Laboratory of Marine Benthos, Ocean University of China, Qingdao (OUCBL).

Systematics

Order Harpacticoida Sars, 1903

Family Miraciidae Dana, 1846

Subfamily Diosaccinae Sars, 1906

Genus *Helmutkunzia* Wells & Rao, 1976

Type species. *Actopsyllus hartmannorum* Kunz, 1971 = *Helmutkunzia hartmannorum* (Kunz, 1971) [by original designation].

Other species. *Helmutkunzia variabilis* Wells & Rao, 1987; *H. xiamenensis* **sp. nov.**

Diagnosis. Miraciidae. Diosaccinae. Body linear. Original segmentation of ♀ genital double-somite marked by dorsolateral chitinized internal ridges. Cephalothorax and pedigerous somites with plain hyaline frill, genital double-somite and abdominal somites 2–3 (in ♀) or abdominal somites 1–3 (in ♂) with finely semi-incised subulate frill. Anal operculum weakly developed. Caudal ramus slightly longer than wide; with seven setae; seta I minute; seta II long and setiform, proximal half inflated (especially in♀); seta III long and setiform, setae IV–V well developed, with weakly developed fracture planes; seta VI short and setiform; seta VII arising from biarticulate socle.

Rostrum elongate, narrow and pointed. Antennule ♀ 8-segmented, slender, segment 2 longest, segments 5–7 small, last four segments combined about 2/5 of combined length of proximal four; with aesthetasc on segments 4 and 8. Antennule ♂ haplocer, 10-segmented, with geniculation between segments 7 and 8. Antenna with unarmed basis; proximal endopodal segment with abexopodal pinnate seta; exopod 3-segmented, exp-1 with pinnate seta, exp-2 very small and unarmed, exp-3 with naked lateral seta and 1–2 elements apically. Mandibular palp biramous; basis with three setae; bases of apical setae of endopod confluent, forming pseudosegment; exopod 2- or indistinctly 3-segmented, exp-1 (or when partially subdivided) with two lateral setae, exp-2 with three apical elements, two of which confluent at base. Maxillulary basis with 4–7 elements; endopod and exopod fused to basis, with 2–4 and two setae, respectively. Maxilla with three endites on syncoxa; endopod 1-segmented, with 4–7 setae. Maxilliped subchelate, syncoxa with 2–4 setae; basis with 1(?)–2 setae; endopod an elongate segment with minutely pinnate claw and 2–3 accessory setae.

P1 with 3-segmented rami. Exp-1 and -2 without inner seta, exp-3 with two outer spines and two geniculate apical setae. Endopod longer than exopod; enp-1 elongate, with inner subdistal seta; enp-2 with inner seta; enp-3 with one spine, one geniculate seta and one short naked or bipinnate seta. Basis ♂ modified; anterior surface with long, bent chitinous projection near outer margin; inner basal spine unipinnate.

P2–P4 with 3-segmented rami; endopod extending beyond (P2–P3) or to (P4) distal margin of exp-3. Apical spinous projections on P2–P4 enp-3 of moderate size. P2 endopod ♂ modified; enp-1 with or without inner seta; enp-2 elongate, drawn out into apical spinous projection, with 1–2 inner setae. P3 exp-3 with anterior tube-pore. Armature pattern as follows:

	Exopod	Endopod
P1	0.0.022	1.1.021
P2	0.1.022	0–1.1.021
P3	0.1.022	1.1.0–121
P4	0.1.122	1.1.0–121

P5 ♀ exopod typically with five setae; endopodal lobe apical margin with 2–3 setae, inner margin with two spiniform elements. P5 ♂ exopod with 4–5 setae; endopodal lobes medially fused, well developed, with two spiniform elements.

Genital field ♀ with paired gonopores each closed off by vestigial P6 bearing three setae, innermost of which longest and naked. P6 ♂ represented by asymmetrical opercula each bearing three naked setae, middle one longest.

Paired egg-sacs.

Helmutkunzia xiamenensis sp. nov.

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(Figs. 1–4)

Type locality. Dadeji Beach, Xiamen, China (24°26’30” N, 118°4’12” E).

Material examined. Holotype: adult ♀ dissected on ten slides (OUCBL reg. no. 2019.025). Paratypes: adult ♂ dissected on eleven slides (OUCBL reg. no. 2019.026), four ♀♀ and ten ♂♂ preserved in 4% formalin (OUCBL reg. nos 2019.027–040). All paratypes were collected from the type locality by Dr Er Hua on 24 July 2010.

Description of female. Total body length 400–440 μm (mean = 413 μm, *n* = 5) (excluding caudal rami).

Body linear, cylindrical, widest at posterior margin of cephalothorax, slightly tapering posteriorly, without clear distinction between prosome and urosome (Fig. 1A–B). All somites except for penultimate one furnished with sensillae as figured. All somites with distinct integumental pores. All somites except anal one with well developed hyaline frills; those of cephalothorax and pedigerous somites plain, those of genital double-somite and abdominal somites finely incised (Fig. 1A–C). Spinular ornamentation lacking on all somites except for anal somite bearing coarse spinules laterally and ventrally around posterior margin (Fig. 1B–D). Genital double-somite (Fig. 1A–B) completely fused; original segmentation marked laterally by transverse sub-cuticular ribs. Genital field (Fig. 1E) with moderately sized midventral copulatory pore and paired gonopores, each covered by vestigial P6 bearing three elements, innermost one longest and smooth, middle one shortest and smooth, outermost minutely bipinnate and slightly longer than middle one. Seminal receptacles paired. Anal somite with unornamented anal operculum concealed under incised hyaline frill of penultimate somite (Fig. 1C).

Caudal rami (Fig. 1C–D) slightly longer than broad, length/width ratio about 1.1; dorsal surface with transverse oblique row of spinules in proximal half; seta I (anterolateral accessory seta) minute and naked, located ventral to seta II; seta II (anterolateral seta) long, proximal half inflated; seta III (posteroventral seta) located near outer distal corner, long, slender and smooth; seta IV (outer terminal seta) and seta V (inner terminal seta) well developed, with weakly developed fracture planes; seta IV pinnate, seta V smooth; seta VI (terminal accessory seta) arising from inner distal corner, long and smooth; seta VII (dorsal seta) tri-articulated at base, smooth. Integumental pores present dorsally (two) and ventrally (one).

Rostrum (Fig. 1A) defined at base, elongate, triangular, reaching to about middle of second antennulary segment, with one pair of subapical sensilla.

Antennule (Fig. 2A–B) 8-segmented; all segments without ornamentation; segment 2 largest, segments 5–7 small; segment 4 with long aesthetasc (75 μm). Acrothek consisting of short aesthetasc and two basally fused setae. Setal formula as follows: 1-[1 pinnate], 2-[8 + 2 pinnate], 3-[8], 4–[3 + (1 + ae)], 5–[2], 6-[3 + 1 pinnate], 7-[4], 8-[5 + acrothek].

Antenna (Fig. 2C). Coxa well developed, with row of setules. Basis clearly defined from proximal endopodal segment, with few setules near distal corner. Exopod 3-segmented; proximal segment elongate, with seta at outer distal corner; middle segment short, unarmed; distal segment with one lateral and two terminal setae, one of which

stronger than the other. Endopod 2-segmented, proximal segment with pinnate seta and row of strong spinules along abexopodal margin; distal segment with two rows of strong spinules on outer margin, row of smaller spinules on inner margin and on ventral surface; lateral armature consisting of two spines; apical armature consisting of one pinnate spine and four geniculate setae, outermost of which pinnate around geniculation and fused basally to slender naked seta.

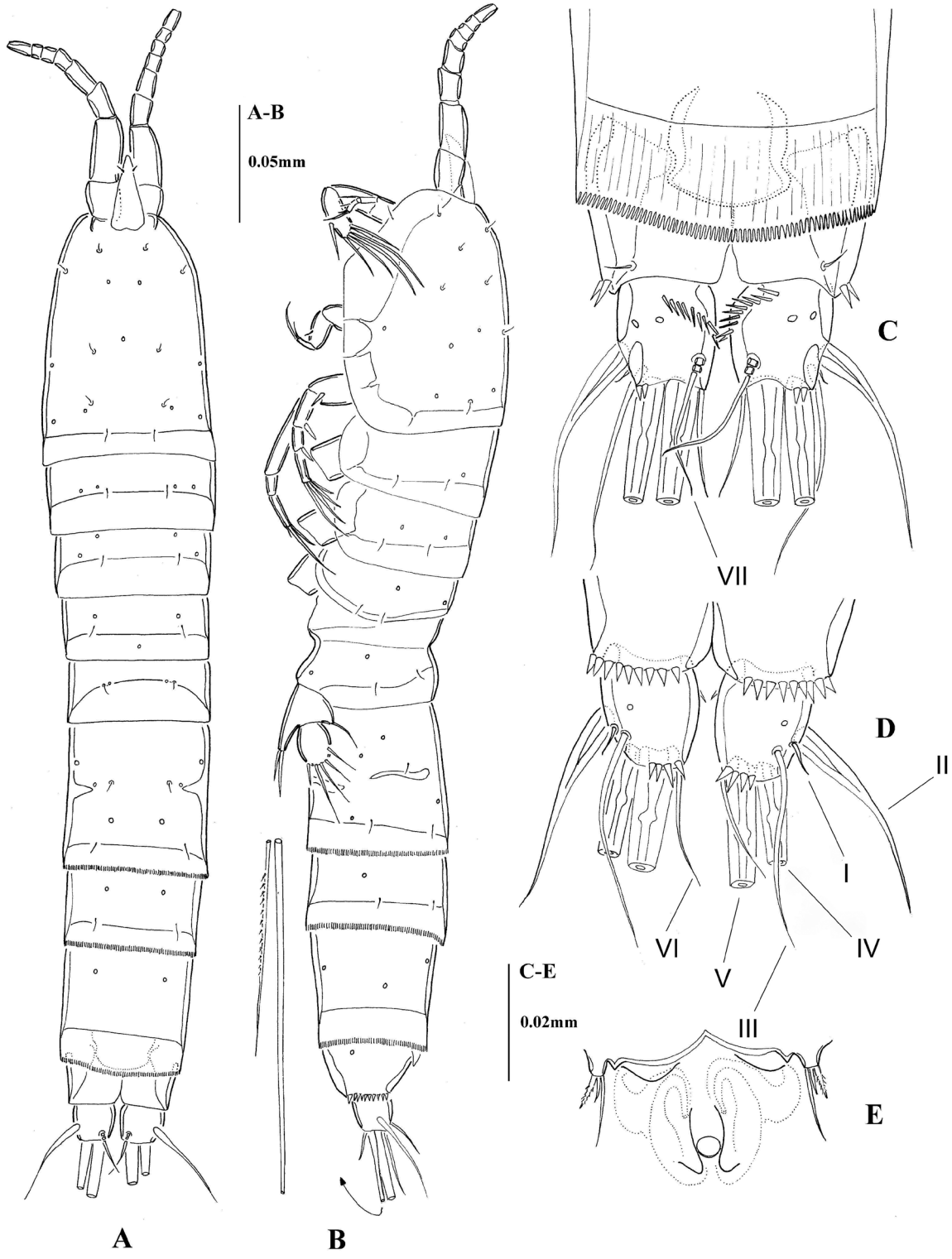

FIGURE 1. *Helmutkunzia xiamenensis* **sp. nov.** (♀): A, habitus, dorsal; (B) habitus, lateral; (C) posterior part of penultimate somite, anal somite and caudal rami, dorsal; (D) posterior part of anal somite and caudal rami, ventral; (E) genital field, ventral.

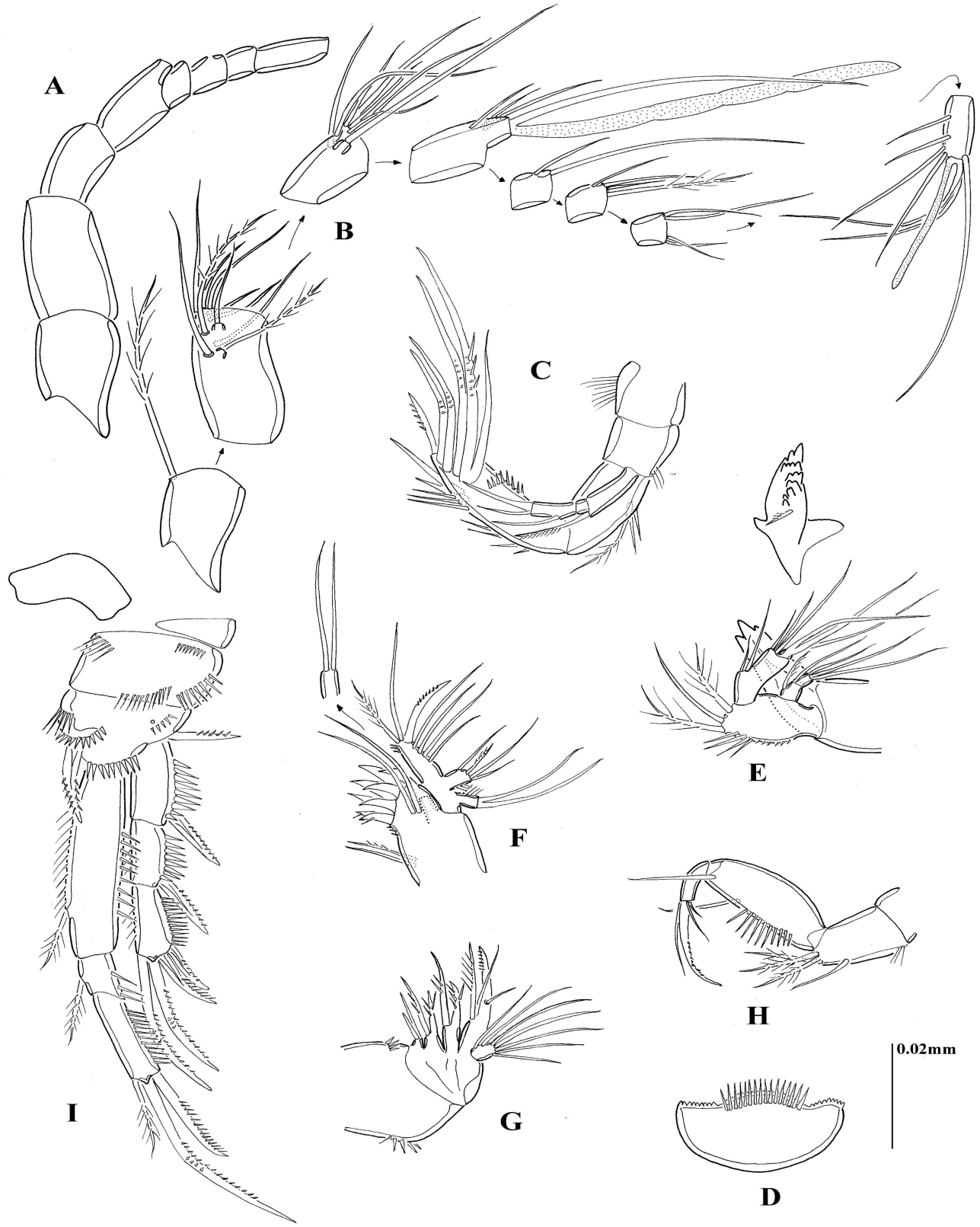

FIGURE 2. *Helmutkunzia xiamenensis* **sp. nov.** (♀): (A) antennule (armature omitted); (B) antennule (disarticulated) showing armature; (C) antenna; (D) labrum; (E) mandible (gnathobase shown in inset); (F) maxillule (coxal endite shown in inset); (G) maxilla; (H) maxilliped; (I) P1, anterior.

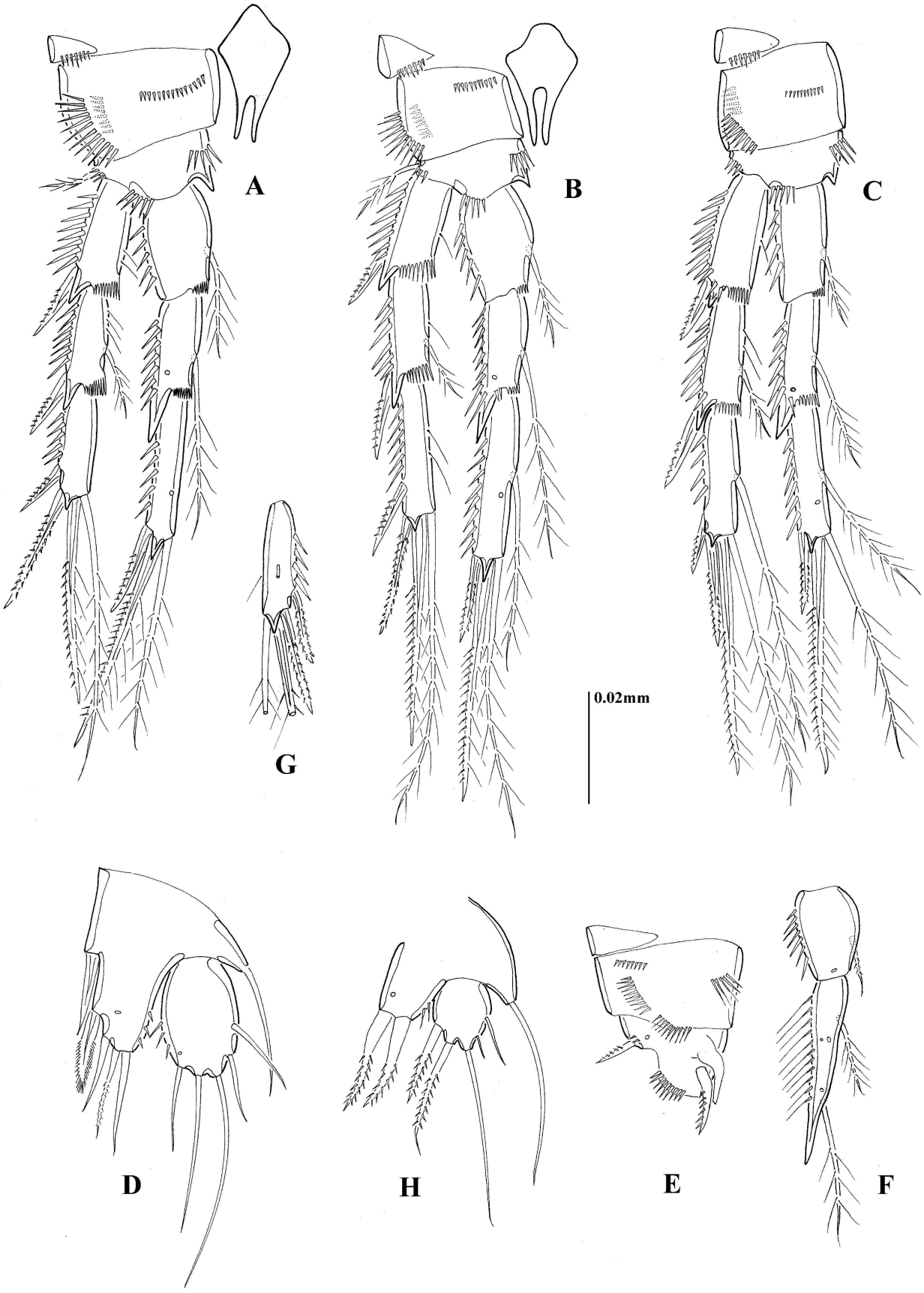

FIGURE 3. *Helmutkunzia xiamenensis* **sp. nov.** (♀: A–D) (♂: E–H): (A) P2, anterior; (B) P3, anterior; (C) P4, anterior (intercoxal sclerite and outer basal seta not shown); (D) P5, anterior; (E) P1 protopod, anterior; (F) P2 endopod, anterior; (G) P3 exp-3, anterior; (H) P5, anterior.

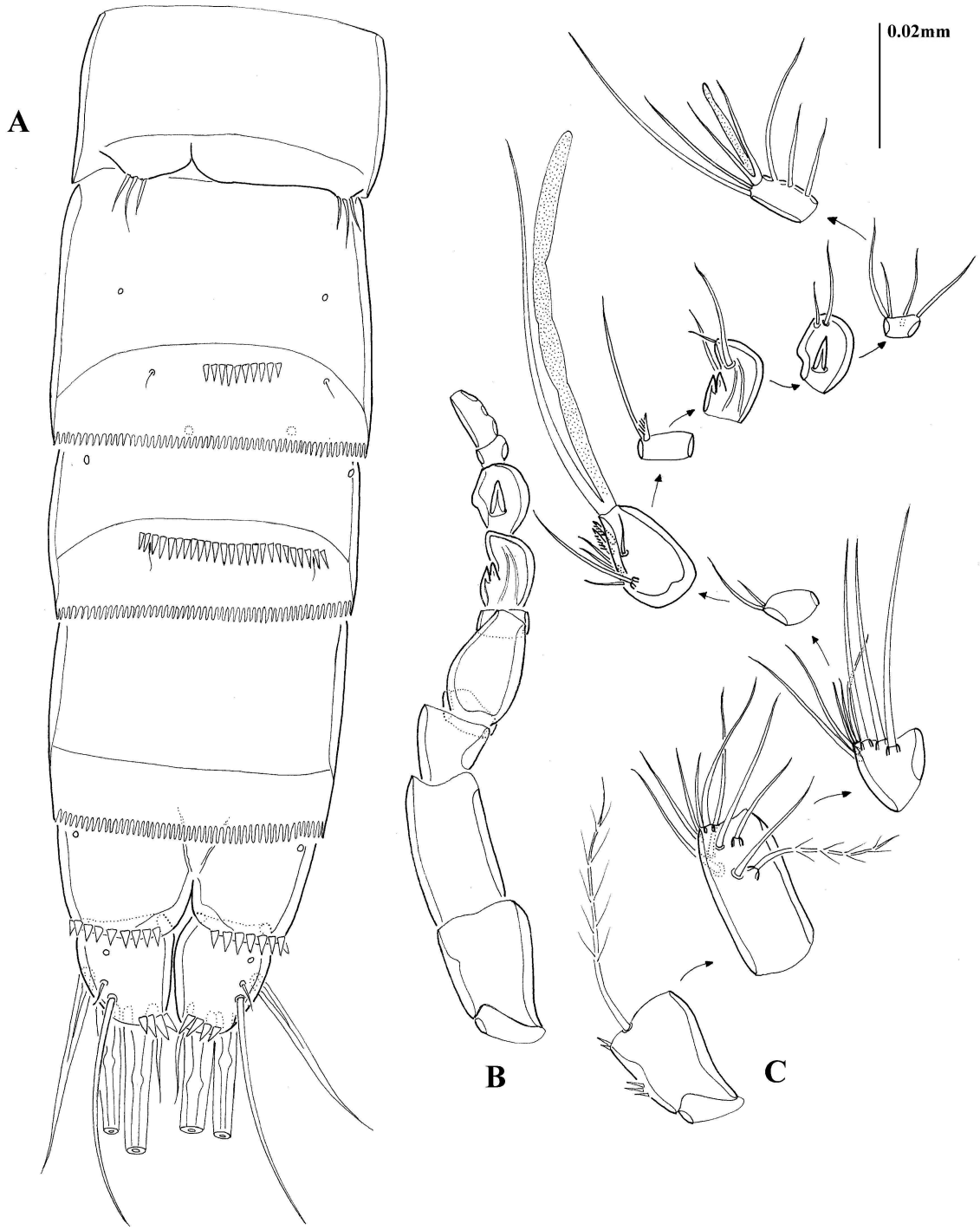

FIGURE 4. *Helmutkunzia xiamenensis* **sp. nov.** (♂): (A) urosome (excluding P5-bearing somite), ventral; (B) antennule (armature omitted); (C) antennule (disarticulated) showing armature.

Labrum (Fig. 2D). Free margin with two lateral rows of small teeth and one median row of spinules.

Mandible (Fig. 2E). Gnathobase with series of unicuspidate or multicuspidate teeth, with one pinnate seta at dorsal corner. Basis elongate, with one smooth and two plumose setae on inner distal margin; ornamentation along inner margin consisting of short spinules medially and long spinules distally. Exopod 2-segmented; exp-1 wider than exp-2, inner margin with pinnate proximal seta and smooth distal one; exp-2 with three setae, longest two fused at base. Endopod 1-segmented; inner margin with two proximal and three subdistal setae; apex with three apical setae sharing a common base.

Maxillule (Fig. 2F). Praecoxal arthrite with eight spines around distal margin and two setae on anterior surface; inner margin with one pinnate and one smooth seta and few spinules. Coxal endite short; with two smooth setae apically. Basis elongate; endites not discrete; with four smooth setae along outer margin and three elements apically (one pinnate seta, one smooth seta and one curved, unipinnate spine); with few spinules near distal inner corner. Rami not defined at base. Exopod with two confluent smooth setae apically and with setules along inner margin. Endopod with row of setules along outer margin and four setae apically (one pinnate, three smooth).

Maxilla (Fig. 2G). Syncoxa with spinules along inner and outer margins; with three endites; proximal endite with two short, smooth setae; middle and distal endites each with one basally fused and one articulating spine, all elements unipinnate. Allobasis produced into slightly curved unipinnate claw; with one pinnate and two smooth accessory setae. Endopod discrete, 1-segmented, with seven setae.

Maxilliped (Fig. 2H). Syncoxa with one smooth and three pinnate setae; with few spinules near proximal inner corner. Basis with one row of long spinules and two naked setae on palmar margin. Endopod an elongate segment bearing a terminal, unipinnate claw and three smooth accessory setae.

P1 (Fig. 2I). Intercoxal sclerite small, without ornamentation. Praecoxa triangular. Anterior surface of coxa with three rows of long spinules and one row of small spinules. Basis with rows of spinules along inner and distal margins and near bases of inner and outer pinnate spines. Exopod 3-segmented; each segment with a row of strong spinules along outer margin; exp-2 with a row of setules along inner margin; exp-3 with a row of setules along inner margin, and with two geniculate, pinnate, distal setae and two pinnate outer spines. Endopod 3-segmented; enp-1 about 1.3 times longer than enp-2 and enp-3 combined, almost reaching to distal margin of exp-3, with row of spinules along outer margin, row of setules along inner margin and plumose inner seta in distal quarter; enp-2 short, with plumose inner seta and several spinules along outer margin; enp-3 about twice as long as enp-2, with row of spinules along outer margin and one plumose seta, one geniculate pinnate seta and one pinnate spine apically.

P2–P4 (Fig. 3A–C). Intercoxal sclerites well developed, deeply incised along ventral margin, without ornamentation. Praecoxae triangular, with row of spinules distally. Coxae with one row of large spinules and one transverse row of smaller ones on anterior surface; posterior surface with row of small spinules near outer margin. Bases with plumose outer seta and with inner distal corner forming small spinous projection, with spinules along inner and distal margins and near base of outer seta. Rami 3-segmented, endopod slightly longer than exopod in P2–P3, nearly equal in length in P4. All segments with row of strong spinules along outer margin, sparse long setules present along inner margin of P2–P4 exp-1, P2–P4 exp-2 and P3 exp-3. P2–P4 enp-2 and enp-3 with pore on anterior surface. All segments of exopod and endopod, except for enp-1, with spiniform extension at outer distal corner or distal margin (exp-3 and enp-3), particularly pronounced on enp-2. Setal formula of swimming legs as follows:

	Exopod	Endopod
P1	0.0.022	1.1.021
P2	0.1.022	1.1.021
P3	0.1.022	1.1.121
P4	0.1.122	1.1.121

P5 (Fig. 3D). Baseoendopods not fused medially; rami distinct. Endopodal lobe ¾ length of exopod, with few small spinules along outer margin and one pore on anterior surface; with five elements, inner margin with two spines (proximal one smooth, distal one bipinnate) and one naked seta, distal margin with minutely bipinnate, inner seta and naked outer seta. Exopod ovoid, about 1.5 times as long as maximum width, with few spinules along inner margin and small pore on anterior surface; with five slender smooth setae, middle one longest, innermost one and outer two short, less than half the length of middle one.

Description of male. Total body length 300–370 µm (mean = 337 µm, n = 11) (excluding caudal rami). Similar to female except for urosomal segmentation and ornamentation, antennule, P1 basis, P2 endopod, P3 exp-3, P5 and caudal ramus. Genital and first abdominal somites (urosomite-2 and -3) not fused (Fig. 4A). Sixth legs asymmetrical with each member represented by a plate with three smooth setae, middle one longest (Fig. 4A).

Caudal ramus (Fig. 4A) as in female except for seta II being less inflated in its proximal half.

Somitic ornamention (Fig. 4A) as in female except for urosomite-3 and -4 each displaying a midventral row of spinules.

Antennule (Fig. 4B–C) haplocer, 10-segmented; segments 4 and 6 small, partly concealed by proximal and

distal portions of swollen segment 5 (in ventral aspect). Geniculation between segments 7 and 8. Segments 5–8 with modified elements; with aesthetasc on segments 5 and 10. Armature formula as follows: 1-[1 pinnate], 2-[9 + 1 pinnate], 3-[8], 4–[2], 5-[5 + 2 pinnate + (1 + ae)], 6-[1 + 1 pinnate], 7-[3 + 2 modified], 8-[2 + 1 modified], 9-[4], 10-[5 + (2 + ae)].

P1 basis (Fig. 3E) anterior surface with long, bent chitinous projection near outer margin, with minutely dentate apex; inner basal spine unipinnate.

P2 endopod (Fig. 3F) modified, 2-segmented. Enp-1 as in ♀ except for inner seta being shorter and with pore on anterior surface. Enp-2 elongate, drawn out into apical spinous projection; outer margin with long fine setules; anterior surface with three small pores; inner margin with two plumose setae, proximal one shorter than distal one.

P3 as in ♀ except for small, slender tube-pore on anterior surface of exp-3 (Fig. 3G).

P5 (Fig. 3H). Baseoendopods fused medially; endopodal lobe with two stout, bipinnate spines apically; with few spinules along outer margin and pore on anterior surface. Exopod discrete, extending beyond distal margin of endopodal lobe, about 1.2 times as long as broad; with five elements, inner two setae bipinnate, apical seta smooth and longest, and outer two setae smooth and short.

Etymology. The species is named after its type locality, Xiamen, along the south coast of China.

Variability. The P2 enp-3 of one female specimen displayed only one inner seta on one side.

Discussion

The type species*, H. hartmannorum*, can readily be differentiated from its two Indo-Pacific congeners by the following suite of characters (Table 1): (a) P1 enp-3 three times as long as enp-2 (twice), (b) P2 enp-1 without inner seta (with), (c) P3 enp-3 without inner seta (with), (d) P5 exopod ♀ 2.4 times as long as maximum width (at most twice); (e) P5 endopodal lobe ♀ with four elements (five); (f) P5 exopod ♂ with four elements (typically five), and (g) P5 endopodal lobe ♂ inner spine longest (outer spine longest or spines subequal in length). The original description by Kunz (1971) provides no information on the mouthparts and differences in the number of armature elements on the mandible, maxillule, maxilla and maxilliped between *H. variabilis* and *H. xiamenensis* **sp. nov.** (with the latter often displaying additional setae; Table 1) are probably attributable to deficiencies in Wells & Rao's (1987) illustrations of the former species. Hence the observed discrepancies (Table 1) should be treated with caution pending a redescription of *H. variabilis*. Similarly, Kunz's (1971) observations of only one apical element on the distal segment of the antennary exopod and only one inner seta on the distal segment of the male P2 endopod require confirmation. Finally, there is some uncertainty regarding the armature of the antennary basis in the genus. Kunz (1971) describes and illustrates only the antennary exopod of *H. hartmannorum*, Wells & Rao (1987) show but do not describe a long spinular structure on the antennary basis of *H. variabilis* which can either be interpreted as ornamentation or a genuine armature element, and according to our observations the basis displays only a few setules near the abexopodal corner in *H. xiamenensis* **sp. nov.**

Helmutkunzia xiamenensis **sp. nov.** is morphologically closest to *H. variabilis*, showing many similarities in the female antennulary segmentation, antennary exopod, armature formula of P1–P4, shape of the chitinous projection on the male P1 basis, and morphology of the male P2 endopod and caudal rami. Females of both species can be distinguished by the relative length of the P5 exopod, being twice as long as the maximum width in *H. variabilis* but only 2.5 times in *H. xiamenensis* **sp. nov.** Males of *H. variabilis* differ from those of the Chinese species in the length of the armature elements on P2 enp-2 (proximal inner seta longest *vs* distal inner one longest) and P5 endopodal lobe (outer spine clearly longest *vs* both spines subequal in size). Wells & Rao (1987: 118) described the mandibular exopod as "… a single segment with six setae…" and the endopod as "… of two clearly defined segments but with traces of subdivision in the proximal segment…". As confirmed by their illustration (Fig. 99j) it is obvious that the mandibular rami were inadvertently transposed in the text description. The exopod consists of two well defined segments in *H. xiamenensis* **sp. nov.**, showing no additional traces of subdivision (Fig. 2E). Wells & Rao (Fig. 99j) also showed four elements on the mandibular basis but it is conceivable that the proximal naked one represents one of the long spinules observed in that position in *H. xiamenensis* **sp. nov.** (Fig. 2E). They also reported variability and right-left asymmetry in the armature of the female P5 of *H. variabilis*, occasionally displaying either four (both rami) or six (endopodal lobe) instead of five elements; no such variability was observed in the new species.

TABLE 1. Morphological comparison of *Helmutkunzia* species. L/W = length *vs* maximum width; * indicates differences that are probably based on observational errors.

Character/species	*hartmannorum*	*variabilis*	*xiamenensis* **sp. nov.**
Body length ♀ (in µm)	390	370–390	400–440[1]
Body length ♂ (in µm)	340	340	300–370[1]
A1 ♀ second segment – L/W ratio	3.4	2	2
A2 exp-3 – number of setae	1 lateral + 1 apical	1 lateral + 2 apical	1 lateral + 2 apical
Mandible exp – segmentation	?	indistinctly 3-segmented	2-segmented
Maxillule basis – number of elements*	?	4	7
Maxillule enp – number of setae*	?	2	4
Maxilla allobasis – number of setae*	?	1	3
Maxilla enp – number of setae*	?	4	7
Maxilliped syncoxa – number of setae*	?	2	4
Maxilliped basis – number of setae*	?	1	2
Maxilliped enp – number of accessory setae*	?	2	3
P1 armature – exp / enp	0:0:022 / 1:1:021	0:0:022 / 1:1:021	0:0:022 / 1:1:021
P2 armature – exp / enp	0:1:022 / 0:1:021	0:1:022 / 1:1:021	0:1:022 / 1:1:021
P3 armature – exp / enp	0:1:022 / 1:1:021	0:1:022 / 1:1:121	0:1:022 / 1:1:121
P4 armature – exp / enp	0:1:122 / 1:1:021	0:1:122 / 1:1:121	0:1:122 / 1:1:121
P1 enp-1/entire exp length ratio	0.77	0.85	0.88
P1 enp-3/enp-2 length ratio	3	2	2
P2 ♂ enp-1 – number of inner setae	0	1	1
P2 ♂ enp-2 – number of inner setae	1	2 (proximal one longest)	2 (distal one longest)
P3 ♂ exp-3 – tube-pore	?	?	present
P5 ♀ exp – L/W ratio	2.4	2	1.5
P5 ♀ exp – number of setae	5	5[2]	5
P5 ♀ benp – number of setae	4	5[3]	5
P5 ♂ exp – number of setae	4	5	5
P5 ♂ benp – relative length of spines	inner one longest	outer one longest	subequal

[1] excluding caudal rami.

[2] Wells & Rao (1987: Fig. 102c–d) occasionally observed specimens with only four elements (one of the inner setae being absent).

[3] Aberrant specimens with either four or six elements were observed by Wells & Rao (1987: Fig. 102b–d).

Gee & Fleeger (1990) reviewed the sexual dimorphism on leg 3 in the Miraciidae and confirmed its previously unnoticed presence in various genera in the subfamily Diosaccinae. In males the distal segment of the exopod displays a pore on the anterior surface which can either be simple and slit-like or be expressed as a conspicuous tube-pore. Gee & Fleeger (1990) observed such sexually dimorphic pores in *Amphiascus* Sars, 1905, *Schizopera* Sars, 1905, *Amphiascopsis* Gurney, 1927, *Amphiascoides* Nicholls, 1941, *Bulbamphiascus* Lang, 1944, *Haloschizopera* Lang, 1944, *Paramphiascella* Lang, 1944, *Pseudamphiascopsis* Lang, 1944, *Rhyncholagena* Lang, 1944, *Typhlamphiascus* Lang, 1944 and *Sarsamphiascus* Huys, 2009. They also confirmed the presence of a slit-like pore in various species of *Robertgurneya* Apostolov & Marinov, 1988, including *R. spinulosa* (Sars, 1911) which was sub-

sequently fixed as the type and only species of *Robertgurneyella* Gómez, 2020, however, some recent descriptions seem to indicate that this character may not be expressed in all members of the genus (*e.g.* Gómez 2020). Mielke (1992, 1995) and Bouck & Thistle (2004) have since reported its presence in species of *Eoschizopera* Wells & Rao, 1976 and *Protopsammotopa* Geddes, 1968, respectively. Karanovic & Ranga Reddy (2004) observed a sexually dimorphic simple pore in the type species of *Neomiscegenus* Karanovic & Ranga Reddy, 2004, similar to the one that was observed in *Helmutkunzia* (this study).

Gee & Fleeger (1990) documented considerable intergeneric variation in the position of the pore and in the dimensions and ornamentation of the hyaline tube. Contrary to other miraciid species that display an anterior (tube-)pore on the male P3 exp-3, members of *Schizopera* and *Eoschizopera* show a large hyaline structure which appears to be more rigid and lack an opening at its tip. In many (but not all) descriptions it is illustrated as an articulating spiniform structure that originates from the inner margin of the segment rather than arising from a pore on the anterior surface. Probably for these reasons Lang (1965: 323) considered the hyaline projection a modified seta and used this character to define the generic boundaries of *Schizopera*. Most subsequent authors (*e.g.* Wells & Rao 1976; Mielke 1992, 1995; Karanovic 2004) regarded it as a unique and the most significant apomorphy that defines the monophylum [*Schizopera* + *Eoschizopera*] (irrespective of whether the two genera were considered as distinct or not). Although Gee & Fleeger (1990) claimed that the "hyaline spine" does "… not appear to be entirely homologous …" with the tube-pore recorded in other miraciid genera, SEM observations by Karanovic & Cooper (2012) unequivocally demonstrated that they are positional homologues, the "hyaline spine" being a large, proximally inflated tube-pore, which exhibits a minute apical opening and is not discrete at its base.

Gee & Fleeger (1990) commented on the usefulness of the sexually dimorphic pore in reconstructing phylogenetic relationships between the various lineages in the Miraciidae and in the Diosaccinae in particular. Unfortunately, the character has not received the attention it deserves in many descriptions and does not even feature in a recent phylogenetic revision of the Thalestridimorpha (Willen 2000). Bouck & Thistle (2004) confirmed its absence in *Actopsyllus* while Mielke (1997) does not make any mention of a sexually dimorphic pore in his description of *Balucopsylla ? triarticulata* Wells & Rao, 1987 suggesting that it is absent in this genus as well. Contemporary descriptions of species belonging to *Psammotopa* Pennak, 1942 (Mielke 1990), *Amonardia* Lang, 1944 (Song *et al.* 2007) and *Metamphiascopsis* Lang, 1944 (Ohtsuka & Iwasaki 1998) failed to reveal its presence in the males of these genera, however, it is not clear whether the presence of pores on the male P3 was properly documented. Within the Miraciinae the presence or absence of pore sexual dimorphism remains to be confirmed in the following genera: *Pseudodiosaccus* Scott, 1906, *Tydemanella* Scott, 1909, *Diosaccopsis* Brian, 1925, *Ialysus* Brian, 1927, *Parialysus* Nicholls, 1941, *Antiboreodiosaccus* Lang, 1944, *Dactylopodamphiascopsis* Lang, 1944, *Pararobertsonia* Lang, 1944, *Pseudodiosaccopsis* Lang, 1944, *Pholenota* Vervoort, 1964, *Paramphiascoides* Wells, 1967, *Schizoperoides* Por, 1968, *Miscegenus* Wells, Hicks & Coull, 1982 and *Monardius* Huys, 2009.

Notes on *Balucopsylla* Rao, 1972

Rao (1972) proposed the genus *Balucopsylla* for its type and only species, *B. similis* Rao, 1972, from a sandy beach in Visakhapatnam (formerly known as Waltair) in Andhra Pradesh, India. Rao suggested that his new taxon was most closely related to a group of other genera that exhibit reduced leg armature, including *Schizopera*, *Goffinella* Wilson, 1932, *Psammotopa* and *Protopsammotopa*. Justification for its distinct generic status was primarily based on the 3-segmented condition of the P1 endopod in conjunction with the absence of sexual dimorphism on the P2 endopod; this combination is not displayed by any of the genera mentioned above (P1 endopod 2-segmented in *Goffinella*, *Psammotopa*, *Protopsammotopa*; P2 endopod ♂ modified in *Schizopera* and *Protopsammotopa*). Wells & Rao (1976) further expanded this genus group by including *Actopsyllus*, *Schizoperoides* and their newly proposed genus *Eoschizopera*, stating that in this lineage the shared reduced leg setation, with at most two outer spines on P2–P4 exp-3, appears to be congruent with the similarity in female genital field morphology. They recognized an evolutionary series *Eoschizopera – Helmutkunzia – Balucopsylla* in which the latter represented the most morphologically reduced taxon. The next record of the genus is the one by Wells (1978) who reported *Balucopsylla* sp. from the intertidal zone of Moce island, Fiji but this species remained undescribed. Wells & Rao (1987) subsequently added a second species, *B. triarticulata* Wells & Rao, 1987, from the Andaman and Nicobar island chain, which appeared more primitive than the type species in the segmentation of the antennary exopod, yet displayed a more

reduced armature on the endopods of P2 and P3. Despite these differences Wells & Rao (1987) considered both species congeneric based on their shared absence of sexual dimorphism in the P2 endopod. Their claim that the 3-segmented antennary exopod in *B. triarticulata* reinforces their previously suggested close relationship between *Helmutkunzia* and *Balucopsylla* (Wells & Rao 1976) is futile since it is based on a plesiomorphic character state. Morphological comparison of the type species, *B. similis*, with *B. triarticulata* and related forms subsequently reported by Mielke (1994, 1997), reveals significant differences warranting a subdivision of the genus *Balucopsylla*. The generic concept of the latter is here restricted to accommodate *B. similis* as the type and only species while the remaining members are assigned to *Pseudobalucopsylla* **gen. nov.** (see below)

Genus *Balucopsylla* Rao, 1972

Type species. *Balucopsylla similis* Rao, 1972 [by original designation].

Other species. None.

Diagnosis. Miraciidae. Diosaccinae. Body linear. Original segmentation of ♀ genital double-somite marked by dorsolateral chitinized internal ridges. Cephalothorax and all somites with plain hyaline frill and without surface ornamentation. Anal operculum present; pseudoperculum absent. Caudal ramus slightly longer than wide; with seven setae; seta I vestigial (or possibly absent); seta II long and setiform; seta III short and spiniform; seta IV distinctly shorter then seta V, without fracture plane; seta V well developed, with distinct fracture plane; seta VI short and setiform; seta VII arising from biarticulate socle.

Rostrum elongate, narrow and pointed. Antennule ♀ 8-segmented, slender, segment 2 longest, segments 5–7 small, last four segments combined only about one quarter of combined length of proximal four; with aesthetasc on segments 4 and 8. Antennule ♂ subchirocer, 9- or 10-segmented. Antenna with unarmed basis and proximal endopod segment; exopod 2-segmented, exp-1 with lateral seta, exp-2 with naked lateral seta and spiniform element apically. Mandibular palp biramous; basis with two setae; apical setae of endopod not forming pseudosegment; exopod minute, 1-segmented, with two short elements. Maxillulary exopod defined at base, with two setae; condition of endopod and basis unconfirmed. Maxilla with three endites on syncoxa; endopod 1-segmented. Maxilliped subchelate, syncoxa unarmed; basis with one seta (?); endopod an elongate segment with minutely pinnate claw and one accessory seta.

P1 with 3-segmented rami. Exp-1 and -2 without inner seta, exp-3 with two outer spines and two geniculate apical setae. Endopod longer than exopod; enp-1 elongate, with inner seta; enp-2 with inner seta; enp-3 with one spine, one geniculate seta and one minute seta. Inner margin of ♂ basis not modified; inner spine enlarged and curved.

P2–P4 with 3-segmented rami; endopod longer than (P2–P3) or about same length as (P4) exopod. Apical spinous projections on P2–P4 enp-3 long and slender. P2 endopod ♂ not modified. Armature pattern as follows:

	Exopod	Endopod
P1	0.0.022	1.1.021
P2	0.1.022	0.1.121
P3	0.1.022	1.1.121
P4	0.1.122	1.1.021

P5 ♀ exopod elongate, with five setae; endopodal lobe apical margin with two setae, inner margin with two setiform elements. P5 ♂ exopod with five setae; baseoendopods not medially fused, endopodal lobes weakly developed, each with two setiform elements apically.

Genital field ♀ with paired gonopores each closed off by vestigial P6 bearing two setae, inner one very long and naked. P6 ♂ represented by symmetrical opercula each bearing three naked setae, middle one longest.

Paired egg-sacs.

Notes. *Balucopsylla* differs from *Pseudobalucopsylla* **gen. nov.** in the following aspects: (a) hyaline frills of all body somites plain (*vs* genital double-somite and abdominal somites 2–3 in ♀ and abdominal somites 1–3 in ♂ with finely semi-incised subulate frill), (b) caudal ramus seta I vestigial or possibly absent (*vs* very well developed, almost as long as seta II and displaced to midventral position), (c) caudal ramus seta IV much shorter than seta V, without fracture plane (*vs* well developed with distinct fracture plane); (d) antennule ♂ subchirocer, aesthetasc-bear-

ing segment distinctly swollen (*vs* haplocer), (e) antennary exopod 2-segmented (*vs* 3-segmented), (f) mandibular basis with two setae (*vs* three), (g) mandibular exopod minute, 1-segmented, with two setae (*vs* well developed, 2-segmented, with 4–5 setae), (h) apical setae of mandibular endopod discrete at base (*vs* confluent at base, forming minute pseudosegment), (i) maxillipedal syncoxa unarmed (*vs* with 2–3 setae), (j) P1 basis not modified in ♂ (*vs* inner margin heavily chitinized and with large unguiform projection in ♂), (k) apical spinous projections on P2–P4 enp-3 long and slender (*vs* small or of moderate size and not slender), (l) P2–P3 enp-3 with inner seta (*vs* without inner seta), (m) inner margin of P5 endopodal lobe ♀ with two naked setiform elements (*vs* with massive, pectinate or smooth, proximal spine and bipinnate, spiniform or setiform, distal element), (n) baseoendopods not medially fused (*vs* fused medially, forming common plate), and (o) P6 ♀ with two elements (*vs* with three elements).

Some of Rao's (1972) observations require confirmation while others are undoubtedly wrong. For example, it is unclear whether caudal ramus seta I is genuinely absent or vestigial; his lateral view (Fig. 2C) definitely confirms that it is not developed to the same extent as in members of *Pseudobalucopsylla* **gen. nov.** The male antennule was figured as 8-segmented and described as chirocer. It is conceivable that the minute fourth and sixth segments were overlooked; the presence of three segments distal to the geniculation in conjunction with the swollen aesthetasc-bearing segment indicate that it is of the subchirocer type. The extremely reduced maxillulary palp shows only a bisetose exopod and two setiform elements around its apex; it is likely that the endopod and some of the basal elements were overlooked. Rao's illustration of the maxilla is almost certainly inaccurate, showing only one element on each of the syncoxal endites (instead of a 2,2,3 pattern) and an allobasis with "… five unguiform spines". Re-examination will probably reveal that some of these "spines" belong to (the proximal segment of) the endopod which was depicted by Rao as a minute bisetose segment. The unarmed condition of the syncoxa and the presence of only one palmar seta on the basis (the proximal one is missing) of the maxilliped also require confirmation.

Balucopsylla similis has only been reported once since its original discovery in Visakhapatnam in Andhra Pradesh. Rao (1989) recorded it further north in the Bay of Bengal, in Puri and the Bahuda estuary, in Odisha (formerly Orissa) State; he gave a body length range of 560–580 μm but did not specify the sex.

Genus *Pseudobalucopsylla* gen. nov.

urn:lsid:zoobank.org:act:C9253A32-7370-4D9D-9986-DF1035D221C0

Type species. *Balucopsylla triarticulata* Wells & Rao, 1987 = *Pseudobalucopsylla triarticulata* (Wells & Rao, 1987) **comb. nov.** [by original designation].

Other species. *Pseudobalucopsylla obscura* **sp. nov.**, *P. costaricensis* **sp. nov.**, *P. mielkei* **sp. nov.**

Diagnosis. Miraciidae. Diosaccinae. Body linear. Original segmentation of ♀ genital double-somite marked by dorsolateral chitinized internal ridges. Cephalothorax and pedigerous somites with plain hyaline frill, genital double-somite and abdominal somites 2–3 (in ♀) or abdominal somites 1–3 (in ♂) with finely semi-incised subulate frill. Anal operculum absent; dorsal hyaline frill of penultimate segment forming weak pseudoperculum. Caudal ramus slightly longer than wide; with seven setae; seta I very well developed, almost as long as seta II and displaced to midventral position; seta II long and setiform; seta III short and spiniform (occasionally showing slight sexual dimorphism in size), setae IV–V well developed, with distinct fracture planes; seta VI short and setiform; seta VII arising from biarticulate socle.

Rostrum elongate, narrow and pointed. Antennule ♀ 8-segmented, slender, segment 2 longest, segments 5–7 small, last four segments combined only about one quarter of combined length of proximal four; with aesthetasc on segments 4 and 8. Antennule ♂ haplocer, 9- or 10-segmented. Basis and proximal endopodal segment of antenna unarmed; exopod 3-segmented, exp-1 with pinnate seta, exp-2 very small and unarmed, exp-3 with naked lateral seta and bipinnate spiniform element apically. Mandibular palp biramous; basis with three setae; apical setae of endopod with confluent bases, forming pseudosegment; exopod 2-segmented, exp-1 with pinnate/plumose seta, exp-2 with 3–4 elements. Maxillulary endopod and exopod with three and two setae, respectively; exopod defined or fused at base. Maxilla with three endites on syncoxa; endopod represented by 1–2 segments. Maxilliped subchelate, syncoxa with 2–3 setae; basis with two setae; endopod an elongate segment with minutely pinnate claw and 1–2 accessory setae.

P1 with 3-segmented rami. Exp-1 and -2 without inner seta, exp-3 with two outer spines and two geniculate

apical setae. Endopod longer than exopod; enp-1 elongate, with inner subdistal seta; enp-2 with inner seta; enp-3 with one spine, one geniculate seta and one minute seta. Basis ♂ modified; inner margin heavily chitinized and with large unguiform projection; inner spine very stout and curved, displaced medially.

P2–P4 with 3-segmented rami; endopod longer (P2–P3) or shorter (P4) than exopod. Apical spinous projections on P2–P4 enp-3 of moderate size. P2 endopod ♂ not modified. Armature pattern as follows:

	Exopod	Endopod
P1	0.0.022	1.1.021
P2	0.1.022	0.1.021
P3	0.1.022	1.1.021
P4	0.1.122	1.1.021

P5 ♀ exopod with five setae; endopodal lobe apical margin with two setae, inner margin with massive, pectinate or smooth, proximal spine and bipinnate, spiniform or setiform, distal element. P5 ♂ exopod with five setae; baseoendopods medially fused, endopodal lobes weakly developed, each with large biserrate inner spine and small, smooth or minutely bipinnate, outer seta.

Genital field ♀ with paired gonopores each closed off by vestigial P6 bearing three setae, innermost of which very long and naked. P6 ♂ represented by symmetrical opercula each bearing three naked setae, middle one longest.

Paired egg-sacs.

Etymology. The generic name is derived from the Greek prefix ψευδής, meaning false, and *Balucopsylla*, referring to the incorrect original generic placement of its type species.

Pseudobalucopsylla triarticulata (Wells & Rao, 1987) comb. nov.

Balucopsylla triarticulata Wells & Rao, 1987

There is good reason to believe that Wells & Rao's (1987) material represents an amalgam of two morphologically distinct species. Considerable variability was recorded in the body length of both sexes with the size distribution being distinctly bimodal. The majority of females were in the range 460–480 μm but about 20% measured between 560 and 600 μm. Most males measured between 450 and 480 μm but a few were in the range 560–580 μm. Most females and all males belonging to their respective larger size classes co-occurred in one sampling locality (their station X) on South Andaman while smaller males and females were found to be widespread in the Andaman and Nicobar archipelagos. In addition to size variation, two distinct morphs were also observed in the female P5. In small females the exopod is oval and short, being about 1.5 times as long as the maximum width, and the inner seta is slender and naked; the pectinate spine of the endopodal lobe is only marginally set on the posterior surface and the inner apical seta is about three times the length of the inner apical one. In the majority of large females the exopod is longer, being about 1.85 times as long as the maximum width, has a straight inner margin and a convex outer margin and its inner seta is bulbous in its proximal half, tapering to a fine bipinnate lash; the pectinate spine of the endopodal lobe is more massive and clearly originating on the posterior surface while the inner apical seta is only about twice the size of the outer apical one. Females of this type also have a longer and less bulbous caudal ramus seta III. No dimorphism in P5 structure or caudal ramus morphology was observed between small and large males. Based on the observed concordance between body size, female P5 morphology and caudal ramus structure, the two morphs are here accorded separate specific status, with *P. triarticulata* **comb. nov.** being restricted to the small morph and the larger morph representing a new species, *P. obscura* **sp. nov.** Mielke (1994, 1997) provisionally assigned specimens from the Galápagos Archipelago and the Pacific coast of Costa Rica to *B. triarticulata*; both Pacific "populations" are here treated as distinct species (see below). Species in the genus are primarily distinguished by differences in P5 morphology.

Differential diagnosis. *Pseudobalucopsylla*. Body length 460–480 μm (♀), 450–480 μm (♂). Rostrum reaching to about first third of second antennulary segment. Distal segment of mandibular exopod with flattened blunt spine laterally; apical margin with bipinnate spine and naked seta. P1 exopod about 1.3 times length of enp-1. P4 enp-1 inner seta naked and short, not reaching to distal margin of enp-2. P5 exopod ♀ oval, 1.5 times as long as

maximum width; innermost element setiform and naked (or possibly minutely bipinnate). P5 endopodal lobe ♀ extending to middle of exopod; outer distal element naked, about one-third length of inner bipinnate one; distal inner element setiform and plumose; proximal inner spine unipectinate and marginally set on posterior surface of endopodal lobe. P5 exopod ♂ distal inner seta (= 2nd from inner margin) slightly longer than proximal inner seta; endopodal lobe ♂ extending to about middle of exopod. Caudal ramus seta III short and bulbous; sexual dimorphism in size not recorded.

Original description. Wells & Rao (1987): 120–123; Figs 103, 104a–e, g–k.

Type locality. Andaman and Nicobar Islands, Middle Andaman Island, Rangat Bay 12°89'40" N, 92°57'18" E (station III in Wells & Rao 1987: 3); medium sand with large amounts of fine shell gravel and rich in detritus; sand mostly siliceous but with some coralline debris, mean grain size 300–500 µm; sea water temperature 29–30 °C, salinity 33‰; from 5–30 cm below the surface near the half-tide level.

Notes. It is likely that Wells & Rao (1987: Fig. 104a) overlooked the small subdistal inner seta on P1 enp-3. Their illustration of the caudal ramus does not show the elongate seta I, presumably because it was figured in dorsal aspect (compare with Mielke 1997: Fig. 22C, E). The male antennule was described as "sub-chirocerate" but is clearly of the haplocer type and probably 9- or 10-segmented (the U-shaped segment 4 and possibly segment 6 were overlooked). The species appears to be widely distributed throughout the Andaman and Nicobar Islands (Wells & Rao 1987). In the absence of morphological evidence, it is impossible to confirm the authenticity of the additional records from Little Andaman by Rao (1993) and South Andaman by Jayabarathi *et al.* (2012).

Pseudobalucopsylla obscura sp. nov.

urn:lsid:zoobank.org:act:3343FEE0-2CF8-4B04-8DFD-067C04BF2890

Balucopsylla triarticulata Wells & Rao, 1987 [partim]

Differential diagnosis. *Pseudobalucopsylla*. Body length 560–600 µm (♀), 560–580 µm (♂). Condition of rostrum, mandibular exopod and P1–P4 not documented. P5 exopod ♀ with straight inner margin and convex outer margin, 1.85 times as long as maximum width; innermost element basally swollen and bipinnate in distal half. P5 endopodal lobe ♀ extending beyond middle of exopod; outer distal element naked, about half length of inner bipinnate one; distal inner element setiform and plumose; proximal inner spine unipectinate, massive and originating on posterior surface of endopodal lobe. P5 exopod ♂ distal inner seta (= 2nd from inner margin) slightly longer than proximal inner seta; endopodal lobe ♂ extending to about middle of exopod. Caudal ramus seta III longer and less bulbous than in type species; sexual dimorphism in size not recorded.

Type material. The specimen illustrated by Wells & Rao (1987) in their Fig. 104f is here designated as the holotype of *P. obscura* **sp. nov.** (ICZN Arts 16.4 and 72.5.6).

Type locality. Andaman and Nicobar Islands, South Andaman Island, Chiriatapu, 11°29'06" N, 92°46'12" E (station X in Wells & Rao 1987: 3); medium to coarse sand with very little detritus; sand siliceous and angular to subangular, mean grain size 300–600 µm; sea water temperature 27–29°C; salinity 34.4‰; from surface to 30 cm deep between low and half-tide levels.

Etymology. The species name is derived from the Latin *obscurus*, meaning covered, obscure, and refers to its discovery among the *Balucopsylla triarticulata* material examined by Wells & Rao (1987).

Pseudobalucopsylla costaricensis sp. nov.

urn:lsid:zoobank.org:act:F7FA7534-3C9C-4600-8D49-3FC0E842172C

Balucopsylla triarticulata Wells & Rao, 1987 *sensu* Mielke (1994: 56–57, Fig. 1)

Differential diagnosis. *Pseudobalucopsylla*. Body length 360–550 µm (♀), 380–480 µm (♂). Rostrum, mandibular exopod and P4 not documented. P5 exopod ♀ rectangular, inner and outer margins virtually straight, 2.5 times as long as maximum width; innermost element setiform and minutely bipinnate. P5 endopodal lobe ♀ extending be-

yond middle of exopod; both distal elements setiform and plumose, inner one 1.3 times length of outer one; distal inner element spiniform and bipinnate; proximal inner spine unipectinate, massive and originating on posterior surface of endopodal lobe. P5 exopod ♂ distal inner seta (= 2nd from inner margin) 3.6 times length of proximal inner seta; endopodal lobe ♂ extending beyond middle of exopod. Caudal ramus seta III unconfirmed; sexual dimorphism in size not recorded.

Type material. The female specimen illustrated by Mielke (1994) in his Fig. 1A–C is here designated as the holotype of *P. costaricensis* **sp. nov.** (ICZN Arts 16.4 and 72.5.6).

Type locality. Costa Rica, Pacific coast, Gulf of Nicoya, Punta Morales; sandy beach, white and coarse sand with high detritus content; surface water temperature above 25°C; salinity about 32‰; mean tidal range 2.3 m.

Etymology. The specific epithet refers to Costa Rica where the type locality is situated.

Notes. Mielke (1994) reported variability in the relative length of P1 enp-1. Specimens with a long endopod (with enp-1 extending beyond the distal margin of exp-3) usually have an inner seta on P2–P4 enp-3. As Mielke suggested himself this may be indicative of the presence of two species in his samples.

Pseudobalucopsylla mielkei sp. nov.

urn:lsid:zoobank.org:act:F464DE15-6814-460B-A0EC-E2DF1A1B7126

Balucopsylla ? triarticulata Wells & Rao, 1987 *sensu* Mielke (1997: 146–150; Figs. 20–22)

Differential diagnosis. *Pseudobalucopsylla*. Body length unknown. Rostrum reaching to about middle of second antennulary segment. Distal segment of mandibular exopod with one plumose and three naked setae. P1 exopod about as long as enp-1. P4 enp-1 inner seta plumose in proximal half and bipinnate in distal half, reaching beyond distal margin of enp-2. P5 exopod ♀ oval, twice as long as maximum width; innermost element setiform and minutely bipinnate. P5 endopodal lobe ♀ not extending to middle of exopod; inner distal element bipinnate, about 1.5 times length of outer bipinnate one; distal inner element spiniform and bipinnate; proximal inner spine unipectinate and marginally set on posterior surface of endopodal lobe. P5 exopod ♂ distal inner seta (= 2nd from inner margin) 2.5 times length of proximal inner seta; endopodal lobe ♂ extending to about middle of exopod. Caudal ramus seta III spiniform and bulbous; sexually dimorphic, being larger in ♂.

Type material. The female specimen illustrated by Mielke (1997: Fig. 20; 21–B, D; 22A–C) is here designated as the holotype of *P. mielkei* **sp. nov.** (ICZN Arts 16.4 and 72.5.6).

Type locality. Ecuador, Galápagos Archipelago, sandy beach. Although the species was recorded from eight different islands the type locality cannot be specified further since Mielke (1997) did not disclose the origin of the female specimen(s) depicted in his Figs. 20–22.

Etymology. The species is dedicated to Wolfgang Mielke, formerly at the II. Zoologisches Institut und Museum der Universität Göttingen, in recognition of his numerous contributions to the harpacticoid fauna of the Galápagos, the type region of the new species.

Notes. According to Mielke's (1997: Fig. 20F) illustration the maxillipedal endopod is 2-segmented; in reality the small proximal "segment" is probably a membranous insert connecting the endopod to the basis. Considerable variability was reported in the relative length of swimming leg setae and some aberrant specimens showed supernumerary setae (*e.g.* on P4 enp-2) or lacked particular setae (*e.g.* on P5 exopod ♂). Although some individuals share the 021 pattern on P2–P4 enp-3 with other members of the genus, the majority show an additional inner seta (121) on all endopods; Occasionally, the 121 condition was only observed in P2 or both patterns were exhibited in the same leg pair (left–right asymmetry). The species is so far known only from the Galápagos Archipelago where it is widely distributed in sandy beaches of most islands including Baltra, Barrington, Fernandina, Hood, Isabela, San Cristobál, Santa Cruz and Tower (Mielke 1997, 2003).

Key to species of *Pseudobalucopsylla* gen. nov.

1. P5 exopod ♀ oval, 1.5 times as long as maximum width; inner distal element of P5 endopodal lobe ♀ about three times length of outer one. . . . . .*P. triarticulata* (Wells & Rao, 1987) **comb. nov.**

– P5 exopod ♀ at least 1.8 times as long as maximum width; inner distal element of P5 endopodal lobe ♀ at most twice length of inner one . . . . . .2.

2. P5 exopod ♀ less than twice as long as maximum width; innermost element markedy swollen in proximal half; P5 exopod ♂ distal inner seta (= 2nd from inner margin) slightly longer than proximal inner seta . . . . . *P. obscura* **sp. nov.**

– P5 exopod ♀ at least twice as long as maximum width; innermost element setiform and not markedly swollen at base; P5 exopod ♂ distal inner seta (= 2nd from inner margin) at least twice longer than proximal inner seta . . . . . .3.

3. P5 exopod ♀ rectangular, with virtually straight inner and outer margins, about 2.5 times as long as maximum width; P5 endopodal lobe ♀ extending beyond middle of exopod; P5 exopod ♂ distal inner seta (= 2nd from inner margin) 3.6 times length of proximal inner seta; P5 endopodal lobe ♂ extending beyond middle of exopod . . . . . *P. costaricensis* **sp. nov.**

– P5 exopod ♀ oval, with convex inner and outer margins, about twice as long as maximum width; P5 endopodal lobe ♀ not extending to middle of exopod; P5 exopod ♂ distal inner seta (= 2nd from inner margin) 2.5 times length of proximal inner seta; P5 endopodal lobe ♂ extending to about middle of exopod . . . . . *P. mielkei* **sp. nov.**

Acknowledgements

The present work was funded jointly by the National Science Foundation of China (grant numbers 41576153, 41976100) and the Fundamental Research Funds for the Central Universities (grant number 201964024). Dr Er Hua is acknowledged for collecting the specimens.

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