

Two new deep-water alpheid shrimps from the Indo-West Pacific (Malacostraca: Decapoda: Caridea)

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Abstract. In the present study, two deep-water species of the caridean shrimp family Alpheidae are described from two localities in the Indo-West Pacific, each based on a single specimen. *Bannereus kebir* sp. nov. is described based on a female holotype collected at a depth of 230–243 m in the Kai Islands, Indonesia. The new species can be easily separated from the two congeners, *B. anomalus* Bruce, 1988 and *B. chani* Anker & Pachelle, 2020, by the presence of strap-like epipods on the first to third pereiopods. *Salmoneus profundus* sp. nov. is described based on an incomplete hermaphrodite holotype collected at a depth of 218–225 m near Hanover Island, Papua New Guinea. This species differs from all other species of *Salmoneus* Holthuis, 1955 by the shape and armature of the enlarged minor cheliped, the elongate walking legs, and the absence of a strap-like epipod on the fourth pereiopod. It also represents by far the deepest-known member of *Salmoneus*, since all other known species in this genus occur at depths shallower than 90 m.

Keywords. Decapod crustaceans; Alpheidae; Caridean shrimps; New taxa; Indonesia; Papua New Guinea.

INTRODUCTION

Alpheid shrimps are particularly well represented in shallow waters, with the vast majority of species recorded from depths less than 50 m (Anker *et al.*, 2006). Below 200 m, alpheids are much less common and mostly represented by species of the largest genus of the family, *Alpheus* Fabricius, 1798 (e.g., Hayashi & Nagata, 2000; Anker & Nizinski, 2011; Komai & Ohtomi, 2018; Anker, 2020a; De Grave *et al.*, 2020). However, a small Indo-West Pacific clade containing four genera, namely *Batella* Holthuis, 1955, *Bannereus* Bruce, 1988, *Vexillipar* Chace, 1988, and *Batellopsis* Ashrafi, Ďuriš & Anker, 2024, appears to be restricted to deep-water habitats, with possibly all of its members being associated with hexactinellid sponges (Bruce, 1988; Chace, 1988; De Grave, 2004; Anker & Pachelle, 2020; Ashrafi *et al.*, 2024). On the other hand, the currently third largest alpheid genus *Salmoneus* Holthuis, 1955 contains mainly shallow-water species found at depths less than 50 m (e.g., Anker & Marin, 2006; Anker, 2010a), with one incomplete specimen tentatively identified as “*S. ? jarli* (Holthuis, 1951)” dredged from a depth of 90 m (Holthuis & Gottlieb, 1958; Dworschak *et al.*, 2000).

In the present study, two new alpheid species are described, one in *Bannereus* and one

in *Salmoneus*, based on deep-water material collected during two expeditions organised by the Muséum National d’Histoire Naturelle, Paris, France (MNHN), the first in Indonesia in 1991, and the second in Papua New Guinea in 2014 (Crosnier *et al.*, 1997; Corbari *et al.*, 2020).

MATERIAL AND METHODS

The type specimens are deposited in the MNHN crustacean collection. Carapace length (cl, from the tip of the rostrum or rostral projection to the posterior margin of the carapace) is used as a standard measurement of the specimens.

Systematics

Alpheidae Rafinesque, 1815

Bannereus Bruce, 1988

Bannereus kebir sp. nov.

(Figs. 1–3)

Bannereus cf. *chani* – Chow *et al.*, 2021: 2903, fig. 3 (phylogenetic tree); Ashrafi *et al.*, 2024: 3, fig. 1 (phylogenetic tree), 4.

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Type material: Holotype: female (cl 4.2 mm), MNHN-IU-2010-4187, Indonesia, Kai Islands, east of northern point of Dullah Island, Expedition KARUBAR, sta. DW24, 05°32'S/132°51'E, depth: 230-243 m, 26.10.1991.

Description: Small-sized alpheid shrimp (holotype: cl 4.2 mm). Carapace glabrous; pterygostomial angle broadly rounded; cardiac notch deep (Fig. 1A, B, D). Rosstrum (Fig. 1C-E) reduced to small broad triangular lobe, projecting slightly beyond anterior margin of orbital hoods. Orbital hoods (Fig. 1C, D) partly open anteriorly, broadly rounded, unarmed. Each epistomial sclerite with short blunt process.

Pleon glabrous; pleura of first to fifth pleonite rounded posteroventrally (Fig. 1A, B); sixth pleonite with posterior margin bearing blunt projection; preanal plate broadly rounded. Telson (Fig. 1F, G) broad proximally, distinctly tapering distally, 1.4 times as long as maximal width, ratio proximal/distal width 3.1; dorsal surface with two pairs of small spiniform setae, both situated in posterior third, first pair at 0.7 telson length, second pair at 0.85 telson length; posterior margin straight, with several erect simple setae, six plumose setae and two pairs of stout spiniform setae, one at each angle, mesial stouter and about twice as long as lateral.

Eyes (Fig. 1C, E) completely covered dorsally and largely concealed laterally, except for small portion of cornea; cornea not particularly reduced, normally pigmented.

Antennular peduncle (Fig. 1C, D, H-J) relatively stout; stylocerite stubby, with rounded tip, latter not reaching distal margin of first article; ventromesial carina with anteriorly directed, sharp tooth; second article about 1.2 times as long as wide; third article slightly shorter than second; lateral antennular flagellum with fused portion composed of four subdivisions; accessory (free) ramus with six or so poorly demarcated subdivisions, groups of aesthetascs extending from second subdivision of fused portion to end of accessory ramus. Antenna (Fig. 1C, D, J) with basicerite relatively small, its distoventral margin bluntly projecting, not forming distinct tooth; scaphocerite reaching distal end of antennular peduncle, with small distolateral tooth, its tip exceeded by anterior margin of blade; carpocerite long, reaching way beyond scaphocerite and end of antennular peduncle; flagellum slender.

Mouthparts typical for genus, as illustrated (Fig. 2A-F). Third maxilliped (Fig. 2G) pediform, moderately slender; coxa with strap-like epipod (mastigobranch) and dorsally slightly produced lateral plate; penultimate article about 0.4 length of antepenultimate article, 2.3 times as long as maximal width; ultimate article about 2.5 as long as penultimate article, strongly tapering distally, apex with two stout spiniform setae; exopod well developed, reaching end of antepenultimate article; arthrobranch small.

First pereiopods (= chelipeds) equal in size and symmetrical in shape (Figs. 1A, B, 3); coxa with strap-like epipod and at least one setobranch; ischium short; merus moderately swollen, about 1.8 times as long as maximal width, smooth, ventromesial margin with row of small

spiniform setae in distal third; carpus cup-shaped, with deep proximal constriction, distal margin with blunt lobes; chela enlarged, swollen, much longer than all other cheliped articles combined, smooth; palm twice as long as maximal width, ovate, subcylindrical, feebly compressed; fingers somewhat unequal, with dactylus longer than pollex and about 0.6 times as long as palm, fingertip strongly curved, blunt; cutting margin of pollex with two prominent subtriangular teeth on lateral edge and one such tooth on mesial edge, all teeth situated in proximal half or third of pollex, surface between edges and blade slightly excavated, blade with five smaller spaced teeth in proximal half, unarmed in distal half; cutting margin of dactylus shallowly excavated, with one subtriangular tooth on lateral edge and two subtriangular teeth on mesial edge, proximal much larger, all teeth situated in proximal third.

Second pereiopod (Fig. 2H, I) relatively short, stout; coxa with strap-like epipod and one setobranch; ischium and merus subequal in length; carpus composed of five subarticles with ratio approximately equal to 2 : 1 : 1 : 1 : 2.3; chela elongate, as long as carpus; palm cylindrical; fingers unequal, with dactylus 0.7 length of palm and slightly longer than pollex; pollex with simple tip, with subdistal transverse dense row of elongate microserrulate setae of about same length; dactylus apparently with bifid tip, with subdistal transverse dense row (or pair of two rows) of elongate microserrulate setae of about same length; both rows of microserrulate setae somewhat fan-shaped, almost completely obscuring distal portion of fingers.

Third pereiopod (Fig. 2J, K) stout, flattened; coxa with strap-like epipod and one setobranch; ischium slightly longer than distal width, armed with two small spiniform setae on ventrolateral surface; merus swollen, with broadly convex ventral and dorsal margins, about 2.5 times as long as ischium, 3.3 times as long as maximal width, armed with small spiniform seta at about 0.7 of article length; carpus half as wide as merus, less than half-length of merus, distoventrally with slender spiniform seta; propodus almost twice as long as carpus, ventral margin armed with numerous small spiniform setae, most of them inserted in pairs or triplets, distoventral margin adjacent to dactylar base with additional pair of spiniform setae; dactylus about 0.25 of propodus length, composed of two parts divided by faint suture, ventral margin of basal part with three minute triangular denticles, ventral margin of distal part with two strong, somewhat divergent unguis. Fourth pereiopod (Fig. 2L) similar to third pereiopod, however, shorter and more slender; coxa without strap-like epipod, with one setobranch; ischium armed with two slender spiniform setae on ventrolateral surface; merus armed with small spiniform seta at about 0.6 of article length; propodus and dactylus very similar to those of third pereiopod, including proportions and armature. Fifth pereiopod (Fig. 2M) smallest of walking legs; coxa without setobranch; ischium about five times as long as wide, unarmed; merus about twice as long as ischium, three times as long as maximal width, slightly swollen, unarmed; carpus 0.6 times length

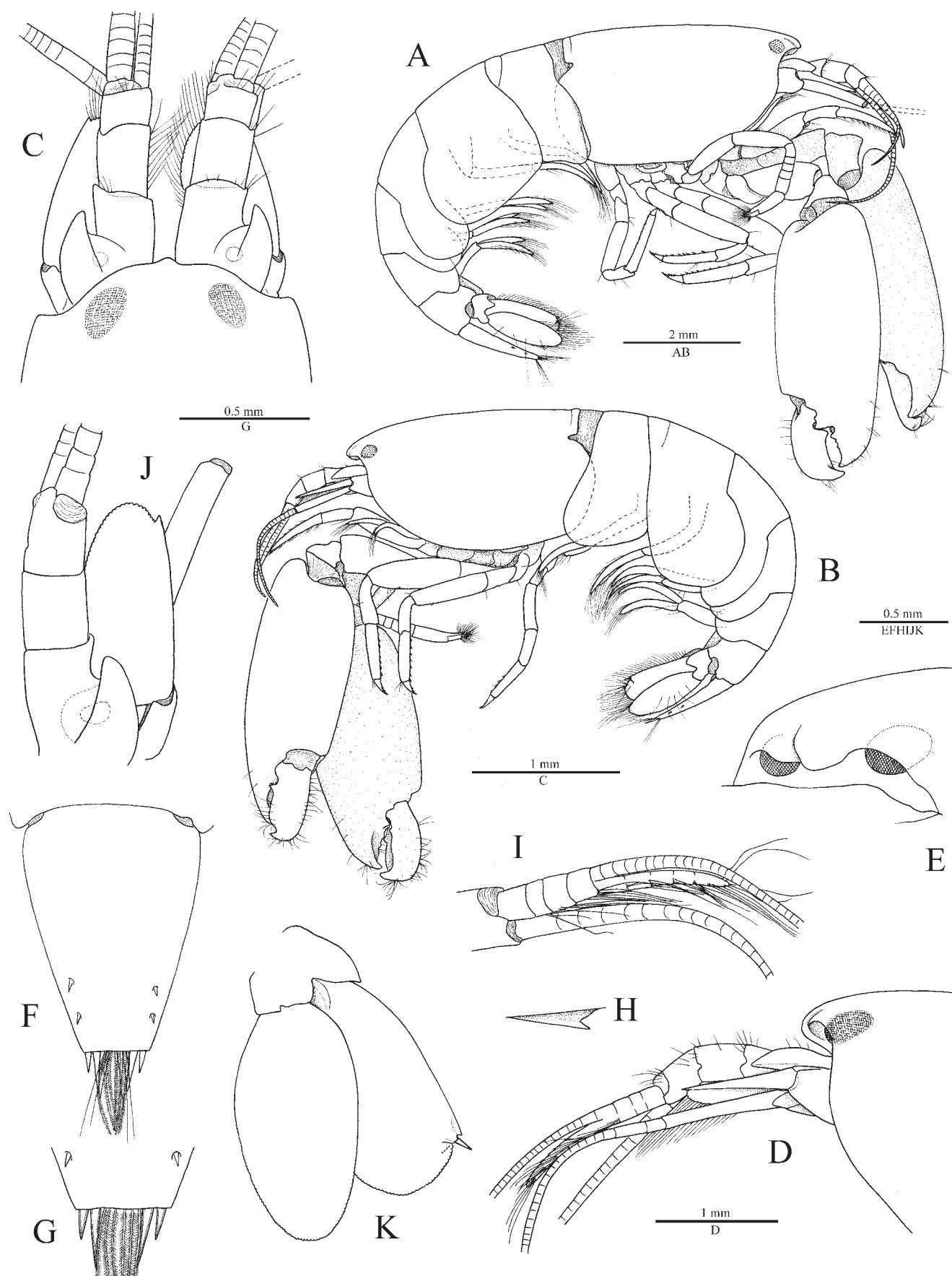


Figure 1. *Bannereus kebir* sp. nov., holotype, female (cl 4.2 mm), Kai Islands, Indonesia, MNHN-IU-2010-4187; (A) habitus, lateral (right); (B) same, lateral (left); (C) frontal region, dorsal; (D) same, lateral; (E) rostro-orbital region of carapace and eyes, anterolateral; (F) telson, dorsal; (G) same, posterior region (dorsal simple setae omitted); (H) ventromesial tooth on first article of antennular peduncle, lateral; (I) antennular flagella, lateral; (J) antennule and antenna, dorsal (setae omitted); (K) uropod, dorsal (setae omitted).

of merus, unarmed distally; propodus 1.6 times as long as carpus, ventromesial margin with three widely spaced spiniform setae, distoventral margin adjacent to dactylar base with one additional spiniform seta; propodal

grooming brush composed of five transverse rows of microserrulate setae extending from about 0.4 to 0.9 of article length; dactylus about 0.2 times propodus length, similar to that of third and fourth pereiopod.

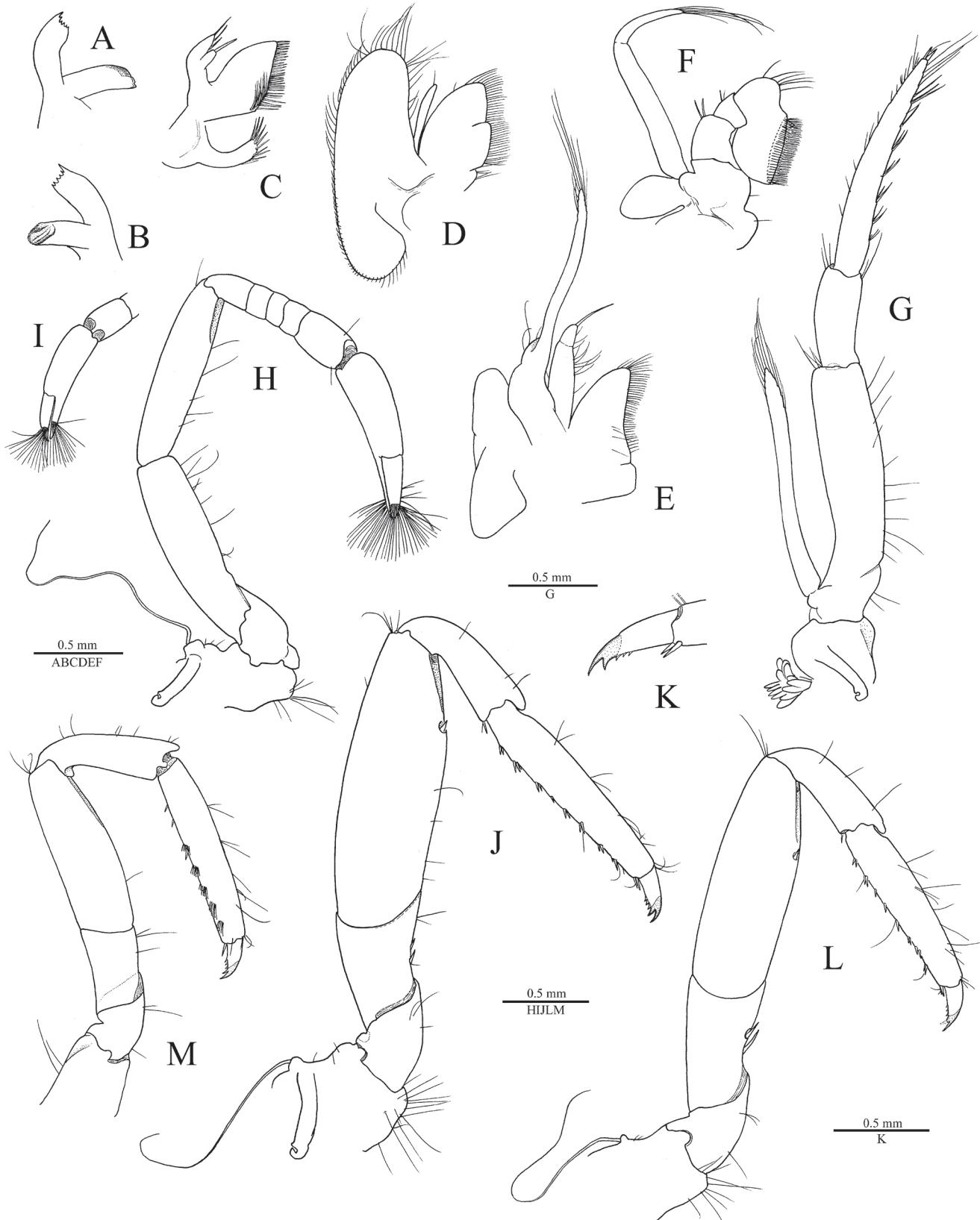


Figure 2. *Bannereus kebir* sp. nov., holotype, female (cl 4.2 mm), Kai Islands, Indonesia, MNHN-IU-2010-4187; (A) mandible, lateral; (B) same, mesial; (C) maxillule, lateral; (D) maxilla, lateral; (E) first maxilliped, lateral; (F) second maxilliped, lateral; (G) third maxilliped, lateral; (H) second pereiopod, lateral; (I) same, distal portion of carpus and chela, mesial; (J) third pereiopod, lateral; (K) same, dactylus, mesial; (L) fourth pereiopod, lateral; (M) fifth pereiopod, lateral.

Second pleopod with appendix interna; male characters currently unknown. Uropod (Fig. 1K) with lateral lobe of protopod distally bluntly produced; exopod broad, with convex lateral margin, and with small blunt distolateral tooth adja-

cent to well-developed but slender spiniform seta; diaeresis reduced, distinct only laterally close to spiniform seta; endopod as long as exopod, ovate, without diagnostic features.

Colour in life unknown.

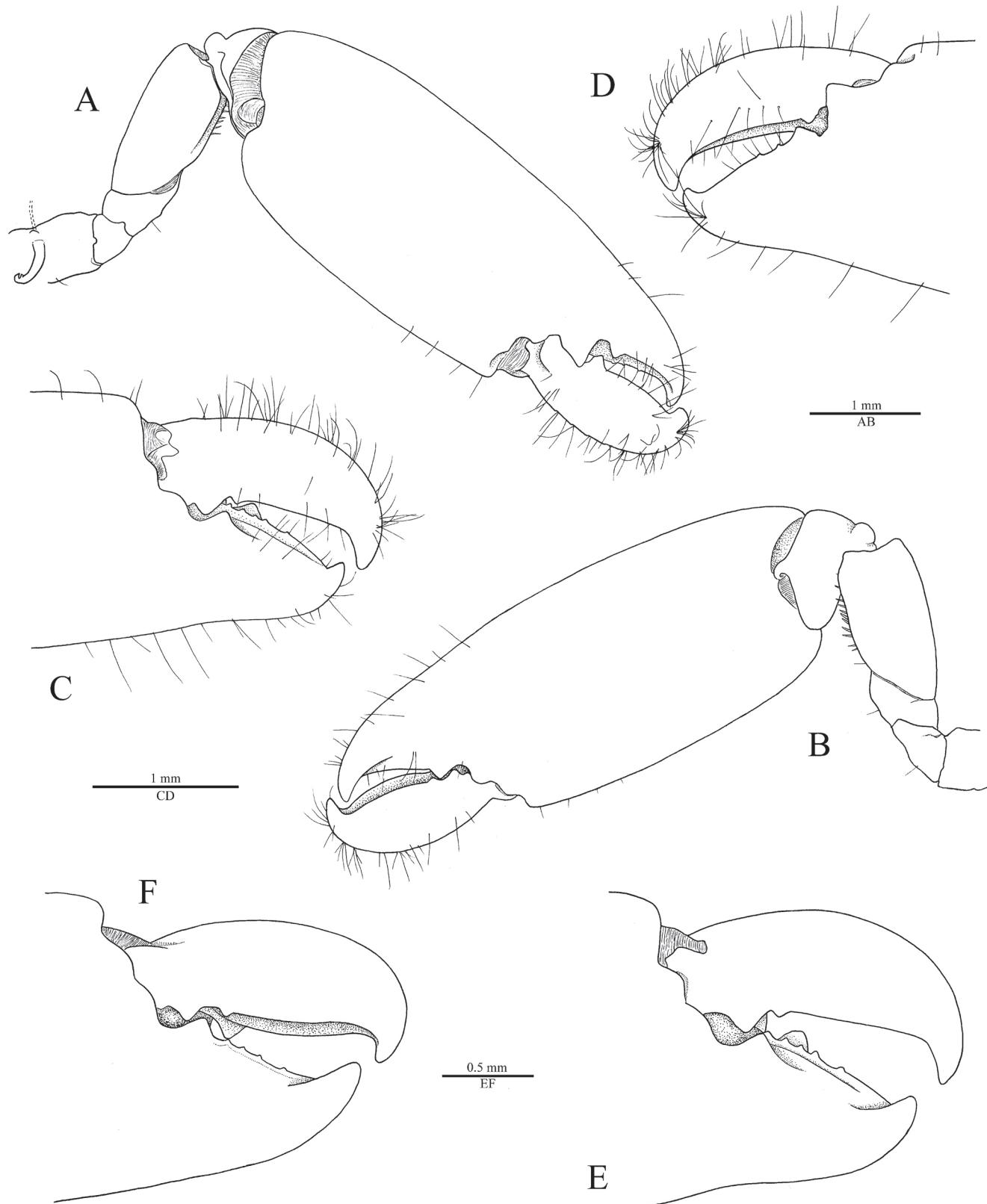


Figure 3. *Bannereus kebir* sp. nov., holotype, female (cl 4.2 mm), Kai Islands, Indonesia, MNHN-IU-2010-4187; (A) right cheliped, lateral; (B) same, mesial; (C) same, distal portion of chela, mesial; (D) same, distal portion of chela, lateral; (E) same, chela fingers, ventromesial (setae omitted); (F) same, chela fingers, mesial (setae omitted).

GenBank accession numbers: 16S rRNA gene: MZ661678; 12S rRNA gene: MZ661582 (see also Ashrafi *et al.*, 2024).

Etymology: The new species is named after the author's friend and colleague, Rachid Kebir, technician in the crustacean laboratory of MNHN, for his help reconditioning and relabelling thousands of shrimp specimens over the years; used as a noun in apposition.

Distribution: Presently known only from the type locality in the Kai Islands, Indonesia.

Ecology: Largely unknown, except for the depth range (230–243 m), at which the holotype specimen was collected.

Remarks: The new species evidently belongs to the genus *Bannereus*, based on the diagnostic features of the frontal margin of the carapace and pereiopods, including the very characteristic armature on the chela fingers (Bruce, 1988). Prior to the present study, *Bannereus* included only two formally described species, the type species, *B. anomalus* Bruce, 1988 from the Coral Sea off southern Great Barrier Reef and waters around New Caledonia, and *B. chani* Anker & Pachelle, 2020 from Taiwan (Bruce, 1988; Anker & Pachelle, 2020). The herein described *B. kebir sp. nov.*, which was reported under "*B. cf. chani*" in recent phylogenetic analyses by Chow *et al.* (2021) and Ashrafi *et al.* (2024) represents the third species of this rare genus.

Bannereus kebir sp. nov. can be separated from both *B. anomalus* and *B. chani* by the presence of a strap-like epipod (= mastigobranch) on the coxae of the first, second and third pereiopods (Figs. 2H, J, 3A), and their respective setobranchs. In the female holotype of *B. anomalus*, there are no strap-like epipods at all, whereas in the male specimen tentatively assigned to the same species by Bruce (1988), but not designated as paratype, the third maxilliped has a strap-like epipod below the coxal lateral plate. In the holotype and only specimen known of *B. chani*, a strap-like epipod is present on the coxa of the third maxilliped (Anker & Pachelle, 2020), as in the male of *B. anomalus* of Bruce (1988). Within the hexactinellid-associated alpheid clade *sensu* Ashrafi *et al.* (2024), an almost complete set of strap-like epipods (on the coxae of the third maxilliped and first to third pereiopods) is also present in the monotypic *Vexillipar* and *Batellopsis*, whereas these structures are lacking in all three species of *Batella* (cf. Chace, 1988; De Grave, 2004; Ashrafi *et al.*, 2022, 2024).

Bannereus kebir sp. nov. differs from *B. anomalus* by the chelipeds being equal in size and symmetrical in shape, which could be a generic novelty for *Bannereus*. The chelipeds are strongly unequal and somewhat asymmetrical in the female holotype of *B. anomalus* (cf. Bruce, 1988: figs. 1, 4A–F), whereas the male specimen only has its (presumably) minor cheliped (cf. *idem.*: fig. 4G–I). The holotype of *B. chani* has only one cheliped, too, which appears to be a major cheliped (Anker & Pachelle, 2020:

fig. 2), based on its size and overall similarity with the major cheliped of the holotype of *B. anomalus*. In addition, Anker & Pachelle (2020) hypothesised that Bruce's (1988) male specimen could well belong to *B. chani*, in which case, the chelipeds of this species would be unequal and slightly asymmetrical. However, the possibility that in *B. chani*, the chelipeds are equal and symmetrical cannot be completely discarded at this stage.

Other differences between *B. kebir sp. nov.* and *B. anomalus* include the presence of spiniform setae on the merus of the chelipeds in the new species *vs.* their absence in *B. anomalus*; and between *B. kebir sp. nov.* and *B. chani*, in the more distal position of spiniform setae on the meri of the third and fourth pereiopods, and the noticeably shorter first subarticle of the second pereiopod carpus (cf. Fig. 2H, J, L; Anker & Pachelle, 2020: figs. 1I, 3A, C). As some of these differences involve features known to be relatively variable in alpheid shrimps, more specimens are needed to confirm their validity. Nevertheless, the three species of *Bannereus* were found to be significantly divergent in DNA and beyond any doubts represent distinct biological species (Ashrafi *et al.*, 2024: fig. 1, *B. kebir sp. nov.* under "*B. cf. chani*").

***Salmoneus* Holthuis, 1955**
***Salmoneus profundus* sp. nov.**
(Figs. 4, 5)

Type material: Holotype: non-ovigerous hermaphrodite (cl 4.5 mm), MNHN-IU-2015-1059, Papua New Guinea, west of New Hanover Island, Expedition KAVIENG 2014, sta. DW4494, 02°26'S/149°55'E, depth: 218–225 m, 06.09.2014.

Description: Small-sized alpheid shrimp (holotype: cl 4.5 mm). Carapace glabrous, without thick erect setae; anterolateral suture not distinct; pterygostomial angle broadly rounded; cardiac notch deep. Rostrum (Fig. 4A–C) broad in proximal half, with convex lateral margins, much narrower in distal half, about as long as wide (measured between orbital notches), slightly descending in lateral view; tip acute (apical point broken), with minute ventral subdistal tooth, almost reaching mid-length of second article of antennular peduncle; rostral carina not distinct; post-rostral tubercle absent. Orbital teeth (Fig. 4A, B) well developed, sharp, about 0.2 of rostrum length, slightly turned mesially, extending well beyond eyes; orbital notches between base of rostrum and orbital teeth deep, narrowly U-shaped. Each epistomial sclerite with short blunt process.

Pleon largely glabrous; pleura of first to fourth pleonite rounded or rounded-angular posteroventrally, that of fifth pleonite (Fig. 4D) produced in small subacute tooth; sixth pleonite (Fig. 4D) not particularly elongate, posterior margin with subacute projection, posteroventral angle with subtle suture; preanal plate broadly rounded. Telson heavily damaged (Fig. 4E), subrectangular, distinctly tapering distally; dorsal surface probably with two pairs of spiniform setae, both situated in pos-

terior half, first pair at about 0.65 telson length; configuration of posterior margin and its spiniform setae unknown.

Eyes (Fig. 4A, B) almost completely covered dorsally, somewhat exposed laterally; cornea not particularly reduced, normally pigmented; anterodorsal margin rounded.

Antennular peduncle (Fig. 4A, B) moderately stout; stylocerite slender, with acute tip, latter reaching mid-length of second article; ventromesial carina with anteriorly directed, sharp tooth (visible in Fig. 4B); second article about 1.2 times as long as wide; third article slightly shorter than second; lateral antennular flagellum with

fused portion composed of three subdivisions; accessory (free) ramus with six or so poorly demarcated subdivisions, distally with some groups of aesthetascs. Antenna (Fig. 4A, B) with basicerite moderately large, armed with sharp distoventral tooth; scaphocerite not reaching distal end of antennular peduncle, with small distolateral tooth, its tip greatly exceeded by anterior margin of blade; carpocerite very short, not reaching half-length of scaphocerite; flagellum missing.

Mouthparts not dissected, typical for genus in external view. Third maxilliped (Fig. 5A, B) pediform, slender; coxa with strap-like epipod (mastigobranch) and round-

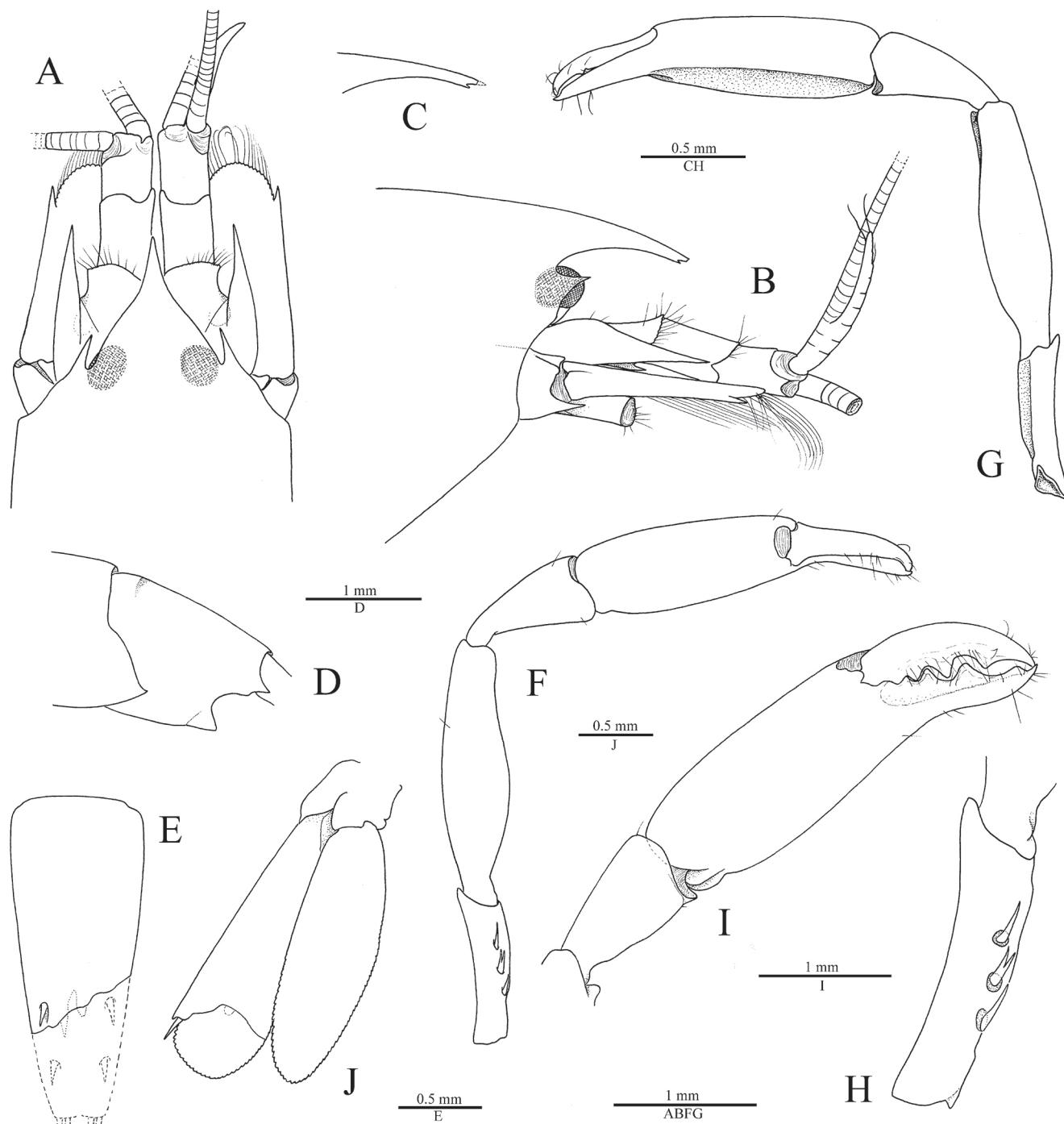


Figure 4. *Salmoneus profundus* sp. nov., holotype, non-ovigerous hermaphrodite (cl 4.5 mm), west of New Hanover Island, Papua New Guinea, MNHN-IU-2015-1059; (A) frontal region, dorsal; (B) same, lateral; (C) rostrum, lateral; (D) posterior pleonites, lateral; (E) telson, dorsal (damaged); (F) right (minor?) cheliped, lateral; (G) same, mesial; (H) same, ischium, lateral; (I) same, carpus and chela, lateral; (J) uropod, dorsal.

ed lateral plate; penultimate article about 0.4 length of antepenultimate article, more than four times as long as distal width; ultimate article about twice as long as penultimate article, strongly tapering distally, apex in form of subacute corneous point, without spiniform setae; exopod well developed, however, not reaching end of antepenultimate article; arthrobranch well developed.

Only right first pereiopod (= presumably minor cheliped) present (Fig. 4F-I); coxa with strap-like epipod and at least two setobranchs; ischium with three strong spiniform setae, middle one bifid, on ventrolateral surface; merus about 3.5 times as long as maximal width, smooth, ventral margin strongly convex; carpus constricted proximally, much wider distally, distal margin with blunt lobes; chela moderately enlarged, not particularly swollen, about as long as merus and ischium combined, smooth; palm twice as long as maximal width, about as long as merus, subcylindrical; fingers about 0.7 length of palm, subequal in length, slightly twisted, fingertip moderately curved; cutting edges of pollex and dactylus each with three large subtriangular teeth, large gape (hiatus) present distally.

Second and third pereiopod unknown (both pairs missing in holotype). Fourth pereiopod (Fig. 5C) elongate, slender; coxa without strap-like epipod, with two setobranchs only; ischium about 6.5 times as long as

wide, armed with one small spiniform seta on ventrolateral surface; merus with straight ventral and dorsal margins, about 1.5 times as long as ischium, 9.1 times as long as maximal width; carpus half as wide as merus, about 0.9 length of merus, distoventrally with slender spiniform seta; propodus subequal to carpus in length, ventral margin armed with five small, widely spaced spiniform setae, distoventral margin adjacent to dactylar base with one pair of much longer spiniform setae; dactylus about 0.35 of propodus length, moderately slender, simple, conical, gently curved. Fifth pereiopod (Fig. 5D, E) longer than fourth pereiopod, similarly elongate and slender; coxa without setobranchs; ischium about five times as long as wide, unarmed; merus about 2.2 times as long as ischium, almost 11 times as long as wide; carpus 0.7 times width and 1.2 times length of merus; propodus 1.1 times as long as carpus, ventromesial margin with four small, widely spaced spiniform setae, distoventral margin adjacent to dactylar base with one additional spiniform seta; propodal grooming brush composed of at least eight transverse rows of curved microserrulate setae extending from about 0.6 of article length to its distal end; dactylus about 0.25 times propodus length, similar to that of fourth pereiopod.

Second pleopod with appendix masculina significantly longer than appendix interna (Fig. 5F), not exceed-

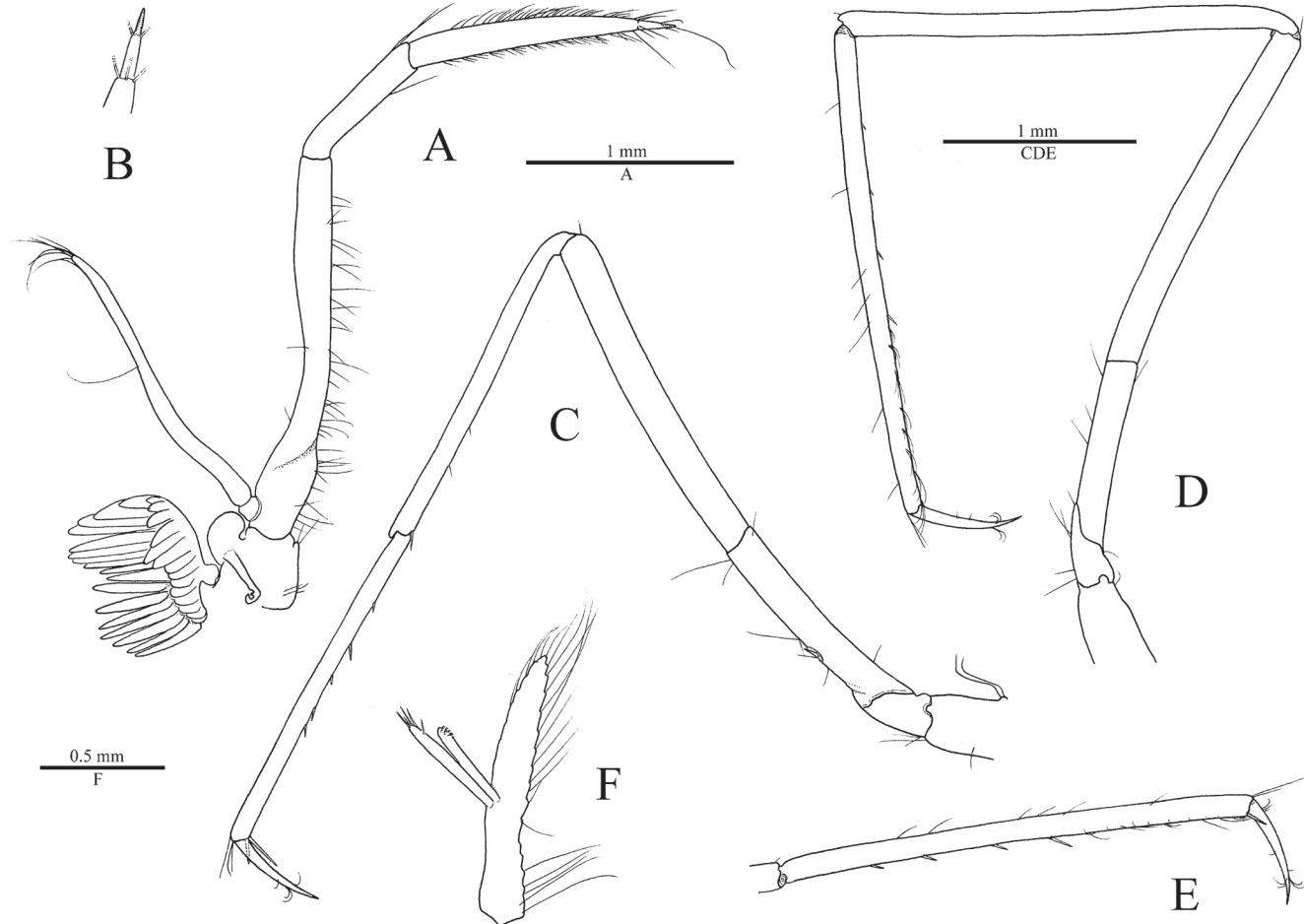


Figure 5. *Salmoneus profundus* sp. nov., holotype, non-ovigerous hermaphrodite (cl 4.5 mm), west of New Hanover Island, Papua New Guinea, MNHN-IU-2015-1059; (A) third maxilliped, lateral; (B) same, tip of ultimate article, dorsomesial; (C) fourth pereiopod, lateral; (D) fifth pereiopod, lateral; (E) same, propodus and dactylus, mesial; (F) endopod of second pleopod, anterior.

ing distal margin of endopod. Uropod (Fig. 4J) with lateral lobe of protopod distally produced as acute tooth; exopod narrow, with small blunt distolateral tooth adjacent to slender spiniform seta; diaeresis present as uneven line, with small rounded lateral lobe; endopod shorter and slightly narrower than exopod, elongate-ovate, without diagnostic features.

Colour in life unknown.

GenBank accession numbers: Will be provided as part of a comprehensive worldwide phylogeny of *Salmoneus* and related genera (Ashrafi *et al.*, accepted).

Etymology: The new species name (*profundus*, Latin word for deep) refers to the fact that it represents the deepest-known member of the genus (see below); used as an adjective.

Distribution: Presently known only from the type locality west of New Hanover Island, Papua New Guinea.

Ecology: Largely unknown, except for the depth range (218–225 m), at which the holotype specimen was collected.

Remarks: The holotype of *S. profundus* **sp. nov.** is incomplete, having a damaged telson and missing most of its thoracic appendages, including the left (presumably major) cheliped, and both pairs of the second and third pereiopods. However, some diagnostic features on the enlarged right (presumably minor) cheliped (Fig. 4F–I) and the general proportions of the unusually elongate and slender fourth and fifth pereiopods (Fig. 5C, D), combined with the absence of a strap-like epipod (= mastigobranch) on the fourth pereiopod (Fig. 5C), allow to separate the new species from all other species hitherto described in the genus.

Within *Salmoneus*, the following species have a greatly enlarged and/or elongate minor cheliped, also called "subminor cheliped" (Anker, 2003, 2010a): *S. jarli* Holthuis, 1951; *S. sketi* Fransen, 1991; *S. caboverdensis* Dworschak, Anker & Abed-Navandi, 2000; *S. erasimorum* Dworschak, Anker & Abed-Navandi, 2000; *S. seticheles* Anker, 2003; *S. brucei* Komai, 2009; *S. degravei* Anker, 2010; *S. paulayi* Anker, 2011; *S. komaii* Anker, 2011; *S. poupini* Anker, 2011; *S. yoyo* Anker, Firdaus & Pratama, 2014; *S. durisi* Anker & Ashrafi, 2019; and *S. spiridonovi* Marin, 2021 (Holthuis, 1951; Fransen, 1991; Dworschak *et al.*, 2000; Anker, 2003, 2010a, 2011, 2022; Komai, 2009; Anker *et al.*, 2014; Anker & Ashrafi, 2019; Marin, 2021). Among all these taxa, the minor chelipeds of *S. sketi*, *S. caboverdensis*, *S. seticheles* (in subminor condition), *S. brucei*, *S. paulayi*, *S. komaii*, *S. poupini*, *S. yoyo*, *S. durisi*, and *S. spiridonovi* differ from that of the new species in several characteristics (general shape, armature of the finger cutting edges or carpus, presence of setal fringes, etc.) (cf. Fransen, 1991; Dworschak *et al.*, 2000; Anker, 2003, 2010a, 2011, Komai, 2009; Anker *et al.*, 2014; Anker & Ashrafi, 2019; Marin, 2021). The morphologically heterogenous material assigned to *S. poupini* by Anker (2011, 2022) likely rep-

resents more than one species and is currently under study. The minor cheliped of *S. erasimorum* is remarkably similar to that of *S. profundus* **sp. nov.**; however, this eastern Atlantic shallow-water species can be easily separated from the new species by the very different shape of the frontal margin of the carapace (cf. Dworschak *et al.*, 2000; D'Udekem d'Acoz *et al.*, 2022). The somewhat abnormal condition of the larger cheliped of the holotype of *S. jarli* may be due to a regeneration process (Anker, 2020b). Nevertheless, *S. jarli* differs from *S. profundus* **sp. nov.** by the carapace having a pronounced and posteriorly far-reaching carina, and the relative proportions of the articles of the walking legs (cf. Holthuis, 1951).

The presence of three very strong spiniform setae (one of them bifid) on the ischium of the minor cheliped in the holotype of *S. profundus* **sp. nov.** (Fig. 4H) is noteworthy. In all other species of *Salmoneus*, in which the cheliped ischia are armed with spiniform seta(e), their typical number is one or two, although three spiniform setae are sometimes present on the ischia of the second or third pereiopods (examples in Fransen, 1991; Dworschak *et al.*, 2000; Anker, 2010a). In the holotype of the species originally described as *S. armatus* Anker, 2010 and later tentatively transferred to *Triacanthoneus* Anker, 2010b, three spiniform setae are present on the ischium of the major cheliped, however, two of them are very small (Anker, 2010a).

Salmoneus profundus **sp. nov.** currently represents by far the deepest record for the genus *Salmoneus*, with all other species found between the intertidal and 32 m (De Man, 1911), exceptionally 90 m (Holthuis & Gottlieb, 1958). The elongate and slender walking legs of *S. profundus* **sp. nov.** (Fig. 5C, D), as expected for a deep-water shrimp, represent another important diagnostic feature of the new species. Few other species of *Salmoneus* have similarly long and slender walking legs; among them are the cave-dwelling *S. sketi* and *S. antricola* Komai, Yamada & Yunokawa, 2015, and *S. hispaniolensis* Anker, 2010, all three with very different minor chelipeds and frontal margins (cf. Fransen, 1991; Anker, 2010a; Komai *et al.*, 2015).

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