



***Leptathanas powelli* gen. nov., sp. nov, a new infaunal alpheid shrimp associated with upogebiid mudshrimps in Nigeria (Crustacea, Decapoda)**

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Abstract

A new alpheid shrimp genus and species is described from the Niger delta in Nigeria. *Leptathanas powelli* **gen. nov., sp. nov.** appears to be associated “commensally” with burrows of mudshrimps, *Upogebia furcata* (Aurivillius, 1898) (Thalassinidea, Upogebiidae). *Leptathanas* **gen. nov.** is superficially similar to *Leptalpheus* Williams, 1965, a genus composed exclusively of infaunal species. However, it is more closely related to a generic complex around *Athanas* Leach, 1814, and in particular to *Athanopsis* Coutière, 1896. The main diagnostic features of *Leptathanas* **gen. nov.** are the presence of an articulated plate on the sixth pleonite; the frontal margin of the carapace with a very short rostral projection and without orbital teeth; the asymmetrical and unequal chelipeds carried folded, with the propodus fitting in a ventral excavation of the merus; and the presence of stout cuspidate setae on the protopod of the uropod.

Key words: Crustacea, Decapoda, Caridea, Alpheidae, *Leptathanas*, new genus, new species, infaunal shrimp, Nigeria, West Africa, eastern Atlantic

Introduction

Alpheid shrimps represent one of the most diverse families of the order Decapoda, with over 600 species classified in 44 genera. However, as the steady stream of new genera described since 2000 (Anker & Iliffe, 2000; De Grave & Anker, 2000; Dworschak *et al.*, 2000; Xuân, 2001; Anker & Felder, 2005; Anker & Jeng, 2006, 2007; Anker, Poddoubtchenko & Jeng, 2006; Anker, Poddoubtchenko & Werthmann, 2006; Anker & Dworschak, 2007; Anker, 2007) highlights, the total biodiversity of this family is relatively unknown, even at the generic level. Remarkably, the vast majority of these new genera are not due to taxonomic reorganisation of already described species, but represent previously unknown lineages discovered in the field. Many of these new genera/species were collected from burrows of larger animals, such as Thalassinidea, Stomatopoda, or other Alpheidae.

The alpheid fauna of the eastern Atlantic Ocean is relatively species-poor, especially compared to that of the Indo-West Pacific and the western Atlantic; it currently comprises about 50 species in 10 genera (Holthuis, 1951; Crosnier & Forest, 1966; Dworschak *et al.*, 2000; Anker & Dworschak, 2004; Anker *et al.*, 2005; Anker & Ahyong, 2007a). The vast majority of these species were recorded from tropical latitudes, i.e., from Senegal and the Cape Verde Islands south to the Gulf of Guinea. Within the tropical eastern Atlantic, only a few alpheid genera/species were previously known as infaunal with other invertebrate taxa: *Salmeoneus caboverdensis* Dworschak, Anker & Abed-Navandi and *Deioneus sandizelli* Dworschak, Anker & Abed-Navandi, both associated with *Neocallichirus pachydactylus* (A. Milne Edwards) (Thalassinidea, Callianassidae) in Cape Verde (Dworschak *et al.*, 2000), and *Alpheus ribeiroae* Anker & Dworschak from burrows of an

unknown host, also from Cape Verde (Anker & Dworschak, 2004). Further collecting with specific tools, such as yabby pumps will doubtless result in more such discoveries.

Powell (1985) reported an undescribed species as “*Leptalpheus* **sp. nov.**” in an overview of the decapod crustaceans of the Niger delta in Nigeria, in which several other new but unnamed species were reported. The untimely death of C. B. Powell prevented the description of these new taxa, but fortunately the majority of his collection was donated to the Nationaal Natuurhistorisch Museum (Naturalis) in Leiden, The Netherlands (RMNH). Among these donations were several specimens labeled as “*Leptalpheus* **sp. nov.**” collected from burrows of upogebiid mudshrimps. These specimens indeed superficially resemble shrimps of the genus *Leptalpheus* Williams, 1965, which is presently not known from the eastern Atlantic (Anker, Vera Caripe & Lira, 2006). However, a closer inspection of these specimens revealed that first, they were not closely related to *Leptalpheus*, and second, could not be assigned to any other currently known alpheid genus. Therefore, a new genus is herewith established to accommodate the below described new species.

Abbreviations used in text are as following: P – pereopod, Mxp – maxilliped, CL – carapace length from the tip of the rostrum to the posterior margin of the carapace (in mm). The term “cuspidate setae” is here used for spiniform setae commonly referred to as “spines”.

Taxonomy

Family Alpheidae Rafinesque, 1815

Leptathanas **gen. nov.**

Diagnosis: Carapace glabrous; branchiostegial margin without notch or ventral lip; cardiac notch well developed. Frontal margin with short, broadly triangular rostrum, without orbital teeth; rostral carina weak, reaching to middle of carapace. Pterygostomial angle rounded. Eyes concealed in dorsal and lateral views. Antennular peduncle robust; first segment without ventromesial tooth; stylocerite not appressed, distally acute; second segment as long as broad; lateral antennular flagellum with poorly developed accessory branch. Antenna with robust basicerite; carpocerite not over-reaching scaphocerite. Mouthparts typical for family; mandible with two-segmented palp; first maxilliped with expanded caridean lobe; second maxilliped with large epipod. Third maxilliped pediform; coxa with styliform lateral plate; tip of ultimate segment with cuspidate setae. First pereopods (chelipeds) asymmetrical in shape, unequal in size, not sexually dimorphic, carried folded with propodus flexed against merus; basis with rudimentary exopod; merus of major cheliped mesially excavated; carpus vase-shaped; chela simple, with ventrally crenulated palm; linea impressa and adhesive discs absent; cutting edges of fingers armed with teeth, finger tips simple. Second pereopod with five-segmented carpus, chelae simple. Third pereopod with unarmed ischium and merus; carpus with single distoventral cuspidate seta; propodus mesially with cuspidate setae; dactylus simple. Fifth pereopod with well developed setal brush on propodus. Second pleopod with appendix interna and appendix masculina in males, with appendix interna only in females. Telson with two pairs of dorsal and two pairs of distolateral cuspidate setae; posterior margin rounded; anal tubercles absent. Gill/exopod formula: 5 pleurobranches (P1-5), 0 arthrobranch, 0 podobranch, 2 lobe-shaped epipods (Mxp1-2), 4 mastigobranchs (strap-like epipods) (Mxp 3, P1-3), 4 sets of setobranchs (P1-4), 4 exopods (Mxp1-3, P1[rudimentary]).

Type species: *Leptathanas powelli* **sp. nov.**, by monotypy and present designation.

Etymology: The generic name is a combination of *Leptalpheus* Williams, 1965 and *Athanas* Leach, 1814 in reference to the morphological similarity of *Leptathanas* **gen. nov.** with *Leptalpheus* and relatedness to *Athanas* (see below). Gender is masculine.

Generic relationships: *Leptathanas* **gen. nov.** is superficially similar to *Leptalpheus*, e.g., by the general shape of the frontal margin, chelipeds (P1) and walking legs. However, *Leptathanas* **gen. nov.** can be distin-

guished from *Leptalpheus* by the absence of an arthrobranch at the base of Mxp3; the presence of a rudimentary exopod on the basis of P1; the absence of a mesioventral tooth on the first segment of the antennular peduncle; the absence of a deep incision and a mesial tooth on the uropodal diaeresis; the presence of cuspidate setae on the uropodal protopod; the presence of mastigobranchs on coxae of Mxp3 and P1-3 (vs. Mxp3 and P1-4 in *Leptalpheus*); the minor chela with short stout fingers (vs. long and slender in *Leptalpheus*); and the ultimate segment of the Mxp3 without distally thickened setae, but with cuspidate setae on the tip (vs. with dense, distally thickened setae and unarmed tip in *Leptalpheus*). All species of *Leptalpheus* and related genera (= leptalpheoid lineage or ALF clade in Anker *et al.*, 2006) possess a hyper-developed arthrobranch; a deep incision and a strong mesial tooth on the uropodal diaeresis; the ultimate segment of Mxp3 with dense rows of distally thickened setae and without apical cuspidate setae; and a minor chela with long slender fingers, usually with toothed cutting edges. The absence of these features in *Leptathanas* **gen. nov.** suggests that the new genus is not closely related to *Leptalpheus*.

On the other hand, several features of *Leptathanas* **gen. nov.**, such as the absence of an arthrobranch on Mxp3; the presence of a rudimentary exopod on P1; the presence of a cuspidate seta on the dorsal margin of the ischium of P1; and the absence of a mastigobranch on P4, are also present in members of the generic complex around *Athanas* Leach, 1814 (= athanoid lineage or clade AP in Anker *et al.*, 2006). Among these, *Athanopsis* Coutière, 1896 with five species all in the Indo-West Pacific (Anker & Ahyong, 2007b) appears to be morphologically closest to the new genus, especially in the general shape and size ratio of the major and minor chelipeds. For instance, the major cheliped in both genera is characterized by one or several cuspidate setae on the ischium; a distally broadened, ventrally excavated and laterally rugose merus; a tuberculate ridge on the ventral margin of the palm; and the cutting edges of the dactylus and pollex each armed with one or a few blunt teeth. However, *Leptathanas* **gen. nov.** can be easily separated from *Athanopsis* by the reduced rostrum (vs. well developed with rounded tip in *Athanopsis*); the absence of orbital teeth (present and usually well developed in *Athanopsis*); the absence of a mesioventral tooth on the first segment of the antennular peduncle; the five-segmented carpus of the P2; the absence of cuspidate setae on the ischium of P3; and finally, by the presence of a row of cuspidate setae on the uropodal protopod, a feature that appears to be unique within the family (A. Anker, pers. obs.). This last feature, in combination with other characters (see above) enables to separate *Leptathanas* **gen. nov.** from all other alpheid genera. The remarkable convergence between *Leptalpheus* from the leptalpheoid lineage and *Leptathanas* **gen. nov.** from the athanoid lineage may be explained by very similar infaunal life styles of these shrimps (see below).

***Leptathanas powelli* sp. nov.**

Figs. 1–5

Leptalpheus sp. Powell, 1985: 236

Material examined: Holotype: ovigerous female (cl 3.2 mm), Nigeria, Niger delta, Eagle Island, Bonny River system, leg. C.B. Powell, 20 September 1979, from burrows of *Upogebia furcata* (RMNH D52026). Paratypes: 13 specimens, males and females (cl 1.8–3.4 mm), from same lot/locality (RMNH D49914); 5 specimens from same lot/locality (OUMNH 2008-02-001).

Derivation of name: Named after the collector of the type series, C. B. Powell (1943–1998), in recognition of his considerable field collecting skills and his advancement of our knowledge of Nigerian Decapoda (see Williamson, 2003).

Description: Body moderately elongate (Fig. 1A), not compressed laterally, glabrous. Orbital teeth absent, pterygostomial angle rounded, branchiostegal margin sparsely furnished with setae, cardiac notch well developed (Fig. 1D). Frontal margin with shallow, triangular rostrum (Fig. 1B, C), rostral carina weakly

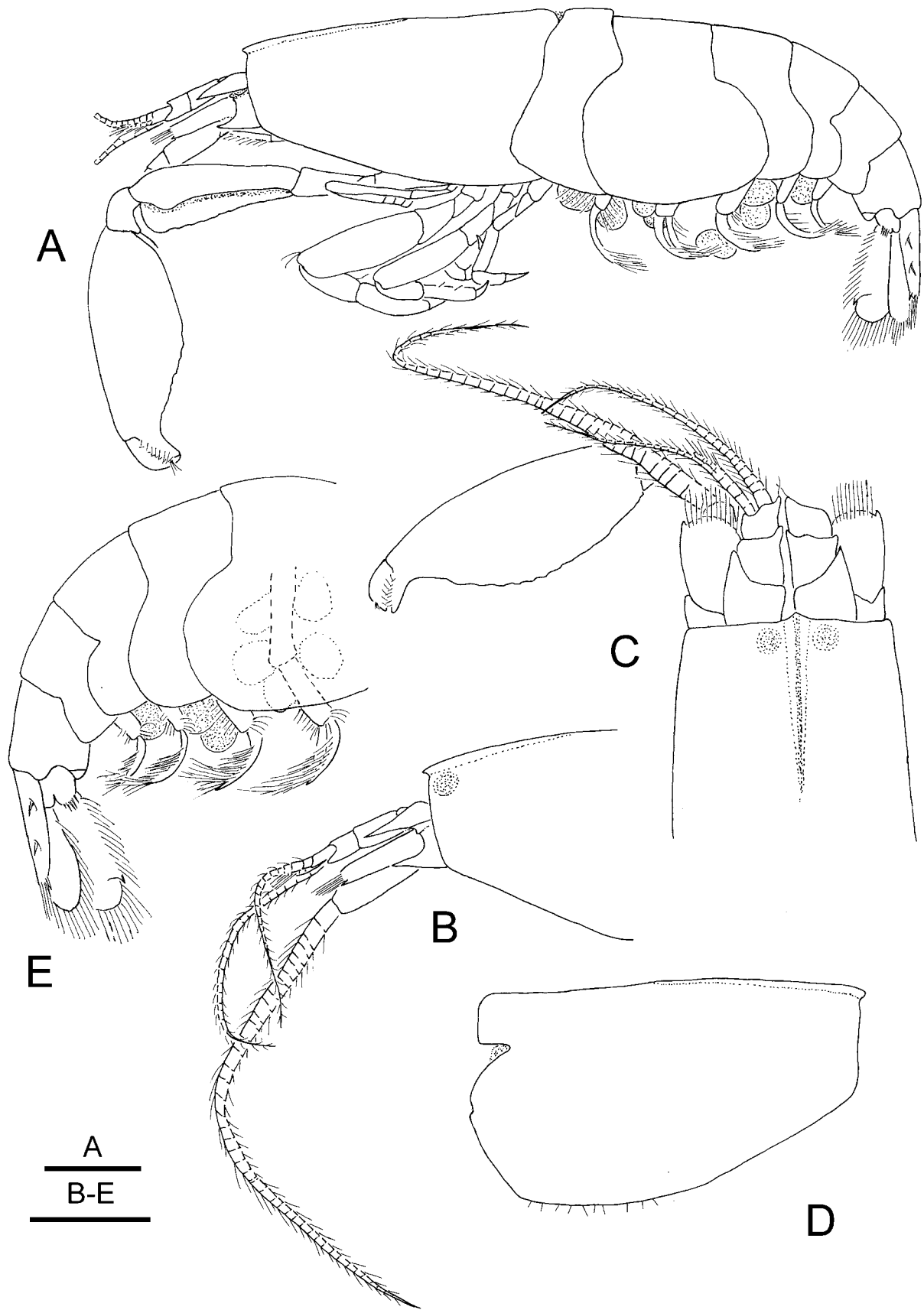


FIGURE 1. *Leptathanas powelli* gen. nov., sp. nov. Holotype ovigerous female (cl 3.2 mm, RMNH D00000). A: habitus, lateral view; B: frontal region, lateral view; C: frontal region, dorsal view; D: carapace, lateral view; E: pleon, lateral view. Scale bars: 1 mm.

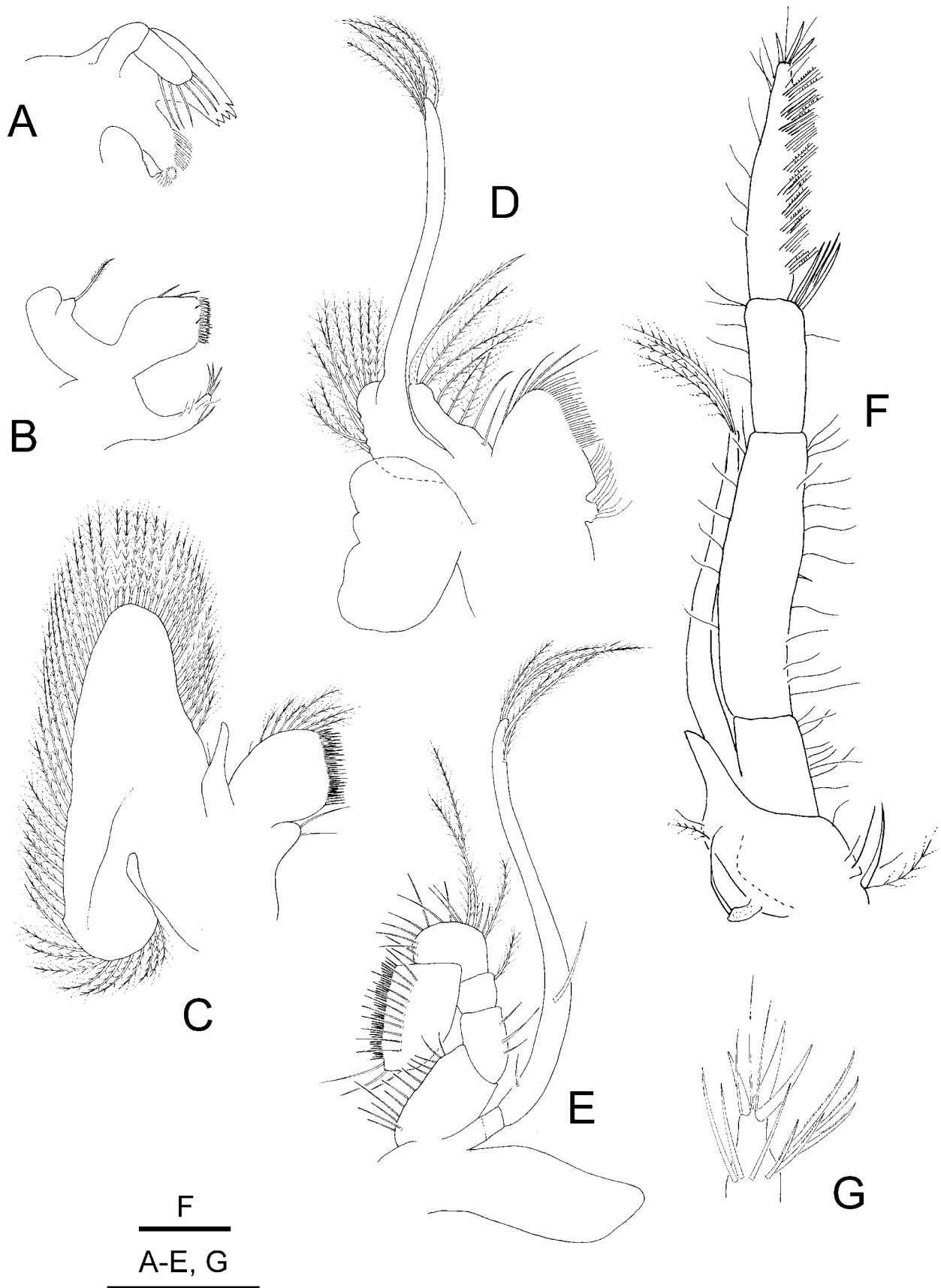


FIGURE 2. *Leptathanas powelli* **gen. nov., sp. nov.** Paratype ovigerous female (cl 4.0 mm, RMNH D49914-1). A; mandible, mesial view; B: maxillule, lateral view; C: maxilla, lateral view; D; first maxilliped, lateral view; E; second maxilliped, lateral view; F: third maxilliped, lateral view; G: same, tip of ultimate segment. Scale bars: 0.5 mm.

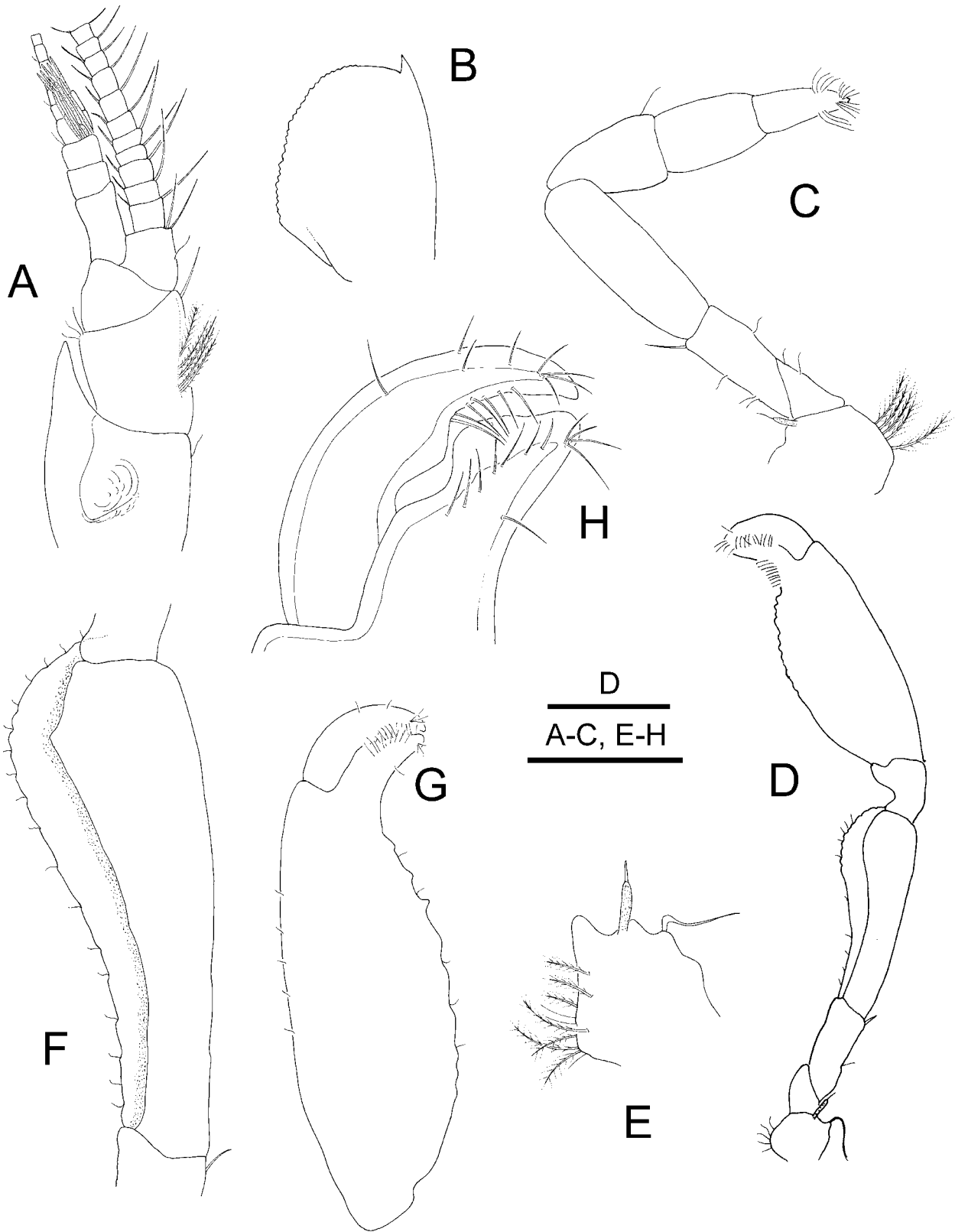


FIGURE 3. *Leptathanas powelli* gen. nov., sp. nov. Paratype ovigerous female (cl 3.0 mm, RMNH D49914-2). A: antennule, dorsal view; B: scaphocerite, dorsal view; C: left (minor) cheliped, mesial view; D: right (major) cheliped, mesial view; E: same, detail of coxa; F: same, detail of merus; G: same, chela in lateral view; H: same, fingers. Scale bars: 1 mm (D), 0.5 mm (A-C, E-G), 0.25 mm (H).

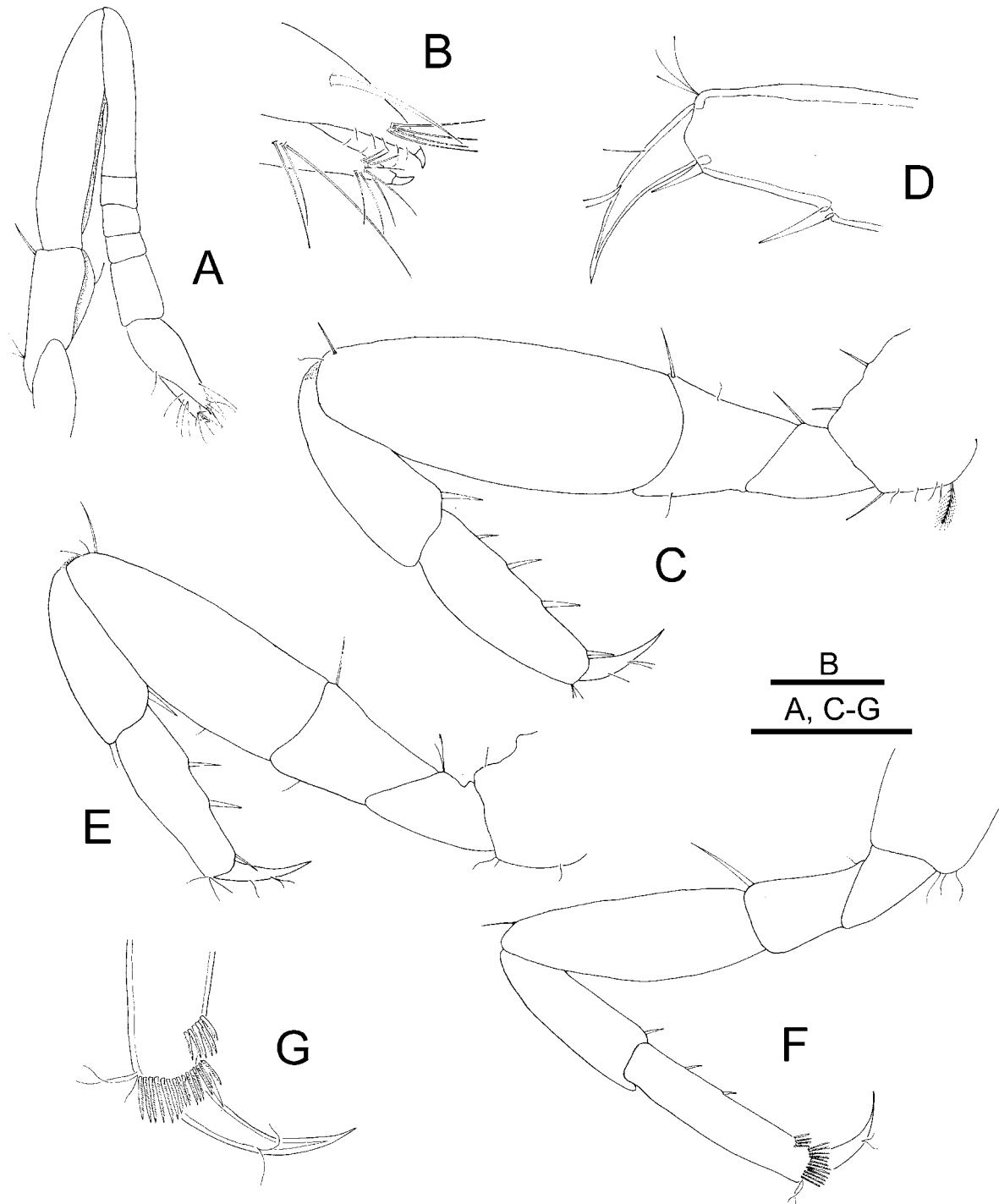


FIGURE 4. *Leptathanas powelli* **gen. nov., sp. nov.** Paratype ovigerous female (cl 3.0 mm, RMNH D49914-2). A: second pereiopod, mesial view; B: same, tip of chela; C: third pereiopod, mesial view; D: same, distal propodus and dactylus; E: fourth pereiopod, mesial view; F: fifth pereiopod, mesial view; G: same, distal propodus and dactylus. Scale bars: 1 mm (B), 0.5 mm (A, C, E–F), 0.25 mm (D, G).

developed, extending to mid-length of carapace. Eyes concealed in dorsal or lateral view (Fig. 1B, C), without anterior projections, cornea well developed. Ocellar beak not conspicuous. Epistomial sclerite unarmed.

Pleura of first through to fourth abdominal somites rounded, those of fifth and sixth somites somewhat angular (Fig. 1E); sixth somite with subtriangular articulated plate at posteroventral angle.

Antennular peduncle moderately stout (Fig 1C, 3A), second segment shorter than first; stylocerite reaching to mesial margin of second segment, distally acute; lateral flagellum biramous, accessory branch reduced,

consisting of two segments furnished with groups of aesthetascs (Fig 3A). Antenna with basicerite stout, armed with strong ventrolateral tooth; scaphocerite (Fig. 3B) short, square, anterior margin of blade convex, not extending beyond distolateral tooth; carpuccerite robust, exceeding to distal margin of scaphocerite.

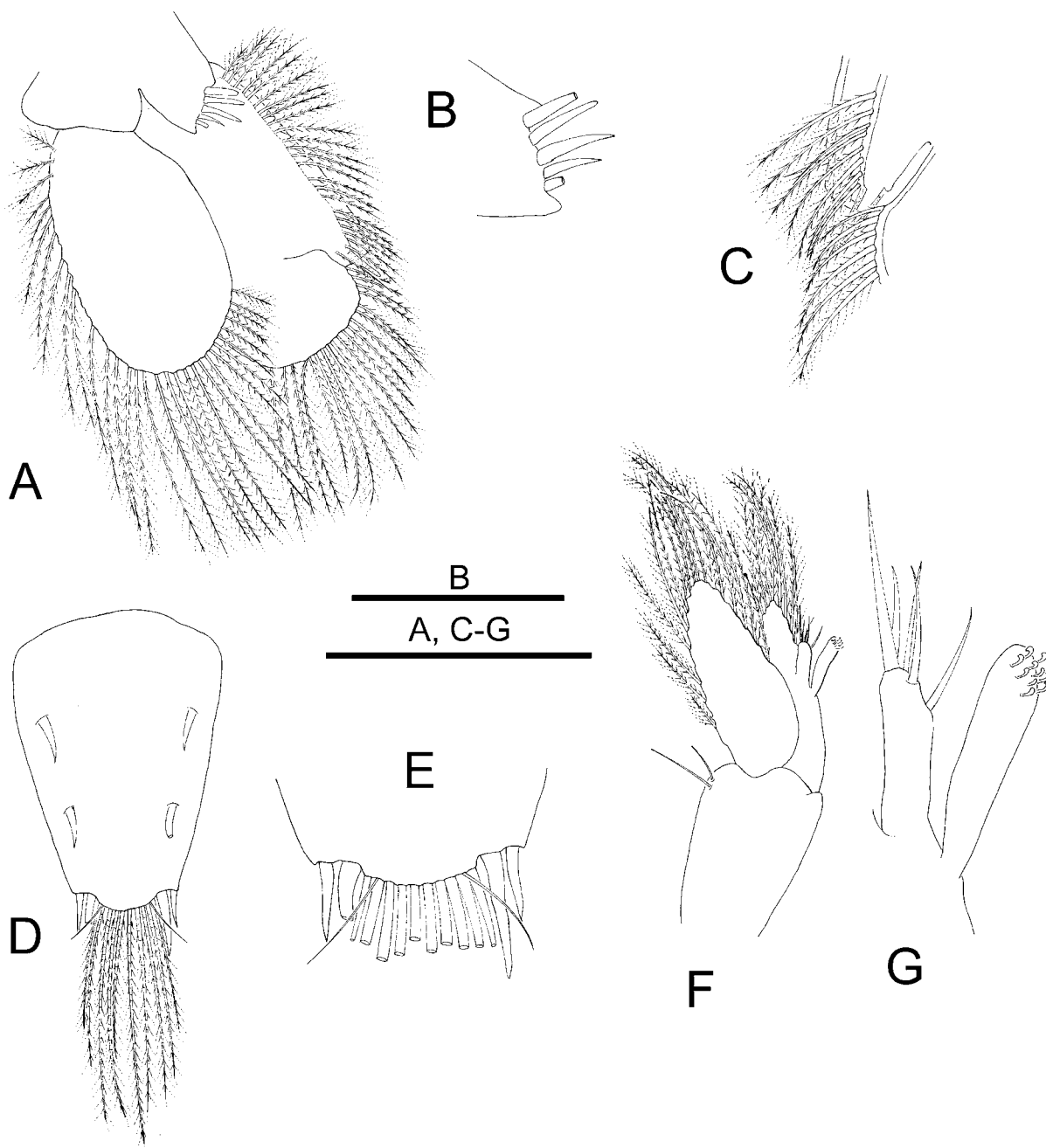


FIGURE 5. *Leptathanas powelli* **gen. nov., sp. nov.** Paratype ovigerous female (cl 3.0 mm, RMNH D49914-2). A: uropod, dorsal view; B: same, protopod; C: same, lateral portion of diaeresis; D: telson, dorsal view; E: same, detail of posterior margin. Paratype male (cl 2.25 mm, RMNH D49914-3). F: second pleopod, mesial view; G: same, appendix interna and masculina. Scale bars: 0.5 mm (A, C, E-F), 0.25 mm (D, G), 0.1 mm (B).

Mouthparts fairly typical for family. Mandible (Fig. 2A) with two-segmented palp; molar process as illustrated; incisor process with five subtriangular teeth, second ventral tooth largest. Maxillule (Fig. 2B) with bilobed palp, dorsal lobe without setae, ventral lobe with single plumose seta; ventral endite with pappose setae. Maxilla (Fig. 2C) with moderately broad scaphognathite; endopod small, unsegmented; dorsal endite not subdivided. First maxilliped (Fig. 2D) with moderately expanded caridean lobe on exopod; endopod not

segmented, terminally with single robust plumose seta, laterally with several less robust plumose setae; epipod large, ear-shaped, slightly subdivided. Second maxilliped (Fig. 2E) not particularly modified, with elongate epipod. Third maxilliped (Fig. 2F) pediform, moderately slender; lateral plate acutely produced; penultimate segment about 2.5 times as long as wide; tip of ultimate segment tapered, with three cuspidate setae on apex (Fig. 2G); arthrobranch absent.

First pereopods unequal in size, asymmetrical in shape (Fig. 3C, D), carried flexed when not in use. Major cheliped (Figs. 3D–H) robust; basis with minute exopod (Fig. 3E); coxa, basis and ischium unarmed; merus about 2.5 times as long as wide, mesially excavated (Fig. 3F), lateral margin distinctly crenulated (Fig. 3G); carpus vase-shaped; chela robust, ventral margin of palm crenulated (Fig. 3E); linea impressa and adhesive discs absent; fingers about 0.35 times length of palm, cutting edges of pollex and dactylus each with large tooth fitting in a hiatus on opposed margin (Fig. 3H), finger tips blunt, broad. Minor cheliped (Fig. 3C) much weaker than major cheliped; basis with minute exopod (Fig. 3C); coxa, basis and ischium unarmed, merus about 2.7 times as long as wide, carpus slightly longer than propodus; fingers about as long as palm, with broad tips.

Second pereopod (Fig. 4A) relatively short, stout; ischium shorter than merus, mesially somewhat excavated; merus mesially depressed; carpus with five segments, segment length ratio approximately: ; chela simple, fingers as long as palm, tips conical, without additional teeth (Fig. 4B). Third pereopod (Figs. 4C) relatively stout; basis with slender cuspidate seta disto-dorsally; ischium unarmed ventrally, with slender cuspidate seta disto-dorsally; merus unarmed, about 3.5 times as long as ischium; carpus about 0.6 times as long as merus, with one ventrolateral cuspidate seta disto-ventrally; propodus subequal to carpus in length, with three ventral cuspidate setae and one disto-ventral cuspidate seta proximal to dactylus (Fig. 4D); dactylus simple, subconical, curved, about 0.5 times as long as propodus. Fourth pereopod (Fig. 4E) similar to third pereopod, with fewer ventral cuspidate setae on propodus. Fifth pereopod (Fig. 4F) more gracile than third and fourth; propodus with two ventral cuspidate setae; setal brush well developed (Fig. 4G), with two rows of thick pappose setae; dactylus slender, curved, slightly more than 0.6 times length of propodus.

Male second pleopod (Fig. 5F) with appendix masculina shorter than appendix interna, furnished with five distal and subdistal simple setae (Fig. 5G); female second pleopod with appendix interna only.

Uropods slightly longer than telson (Fig. 1E); lateral lobe of protopod distally concave, furnished with five-six stout cuspidate setae; endopod and exopod subequal in length, latter with incomplete diaeresis; distolateral spine submarginal (Fig. 5C). Telson broad, approximately 0.7 times as wide as long, tapering distally; dorsal surface with two pairs of cuspidate setae, distant from lateral margin, anterior pair situated at about 0.25 of telson length, posterior pair at about 0.65 of telson length; posterior margin (Fig. 5E) somewhat convex, each posterolateral angle with pair of cuspidate setae, mesial ones about twice as long as lateral ones; central portion of posterior margin between cuspidate setae with 10–12 plumose setae (Fig. 5E); anal tubercles absent.

Ecology: All specimens of *L. powelli* **sp. nov.** were collected from burrows of the mudshrimp *Upogebia furcata* (Aurivillius, 1898) (Thalassinidea, Upogebiidae) from high and medium salinity mangrove creeks in the Bonny River system of the Niger delta. The general morphology of *L. powelli* **sp. nov.** also suggests that this shrimp may indeed be an infaunal “commensal” inhabitant of upogebiid burrows. At least two species of the presumably closely related genus *Athanopsis* (see above) are known to be associated with echinurans (see Anker *et al.* 2005 for review). This hypothesis is also reinforced by the fact that the non-related but morphologically very similar shrimps of the genus *Leptalpheus* are infaunal associates of various thalassinideans (e.g., Anker *et al.*, 2006b).

Distribution: Presently known only from the Niger delta in Nigeria, West Africa. Powell (1985) provides no further details of this species’ possible wider distribution, beyond noting its occurrence in brackish water in the Niger delta.

Taxonomic relationships: See under generic discussion.

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