

Article

Not peer-reviewed version

The Six New Species of Genus *Pedetontus* Silvestri, 1911 (Microcoryphia: Machilidae) from Southern China

[Chen-Yang Shen](#), [Ting Yang](#), [Jie-Hong Ji](#), [Jia-Yong Zhang](#) *

Posted Date: 1 September 2025

doi: 10.20944/preprints202509.0014.v1

Keywords:

Microcoryphia; Archaeognatha; *Pedetontus*; China; taxonomy; morphology; COX1



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a Creative Commons CC BY 4.0 license, which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

The Six New Species of Genus *Pedetontus* Silvestri, 1911 (Microcoryphia: Machilidae) from Southern China

Chen-Yang Shen ¹, Ting Yang ¹, Jie-Hong Ji ¹ and Jia-Yong Zhang ^{1,2,*}

¹ College of Life Sciences, Zhejiang Normal University, Jinhua 321004, China

² Key Lab of Wildlife Biotechnology, Conservation and Utilization of Zhejiang Province, Zhejiang Normal University, Jinhua 321004, China

* Correspondence: zhang3599533@163.com

Simple Summary

Bristletails (Microcoryphia), due to their remote habitats and cryptic lifestyles, have long remained among the least studied insect groups. Research on these insects, which retain numerous ancestral morphological traits, is of significant importance for understanding the early origins and evolutionary pathways of insects. Through the examination of specimens collected in southern China, we identified six previously undescribed species within the genus *Pedetontus* Silvestri, 1911. Utilizing dissections and high-resolution imaging under a stereomicroscope, this study provides comprehensive color documentation of various morphological structures—greatly surpassing the quality and detail of earlier records, which were largely confined to monochromatic line drawings and incomplete color images.

Abstract

Bristletails (Microcoryphia) represent a relatively understudied group of class Insecta. These wingless hexapods, which retain numerous plesiomorphic structures, remain less well understood compared to most other insect lineages. Through detailed morphological examination of specimens collected from southern China, we describe six new species (*Pedetontus* (*Verhoeffilis*) *elegans* **sp. n.** from Zhejiang, *P. (V.) hezhouensis* **sp. n.**, *P. (V.) jinxiuensis* **sp. n.** and *P. (V.) nanningensis* **sp. n.** from Guangxi, *P. (V.) shenzhenensis* **sp. n.** and *P. (V.) xanthospilus* **sp. n.** from Guangdong) of subgenus *Verhoeffilis* Paclt, 1972, this subgenus distinguished from other members of the Petrobiinae by several diagnostic features: paired ocelli shoe-shaped (fusiform-shaped) and submedian; two pairs of retractile vesicles on abdominal segments II–V; parameres restricted to coxite IX; penis opening small and apical; male genitalia not exceeding coxite IX; ovipositor of primary type. The new species can be distinguished from known species and each other by the morphology of the compound eyes, maxilla, labial palps, legs, and genitalia, here, we provide detailed illustrations, tables, and descriptions. Furthermore, we sequenced the COX1 gene to construct a phylogenetic tree of Microcoryphia. This contribution increases the total number of reported *Pedetontus* species in China to seventeen.

Keywords: Microcoryphia; Archaeognatha; *Pedetontus*; China; taxonomy; morphology; COX1

1. Introduction

Insects represent the most widespread and adaptable group of animals on Earth, primarily due to their well-developed wings and diverse modes of metamorphosis. However, bristletails (Microcoryphia, also referred to as Archaeognatha) differ significantly from the majority of insects: they are wingless and thus unable to fly, and their juveniles and adults differ only in body size and sexual maturity—they moult throughout their entire lives [1,2]. With cryptic habitats and lifestyles, bristletails retain numerous plesiomorphic characteristics of ancestral insects, such as

monocondylous mandibles, abdominal appendages not fully reduced on each segment, and well-developed caudal filaments and cerci. As the sister group to all other extant insect lineages, bristletails hold significant value in understanding the evolutionary origins of insects [3,4]. Nevertheless, knowledge regarding bristletails remain limited compared to that of other insect groups. Many species have yet to be discovered, and numerous regions remain taxonomically unexplored or poorly understood, often described as "black holes" in entomological research [5].

Genus *Pedetontus* Silvestri, 1911 is classified under the family Machilidae, subfamily Petrobiinae, and has a distribution extending along North America, the Pacific coast of North Asia, East Asia, and Southeast Asia [6,7]. The genus can be distinguished from other genera based on the following characteristics: antennae scaled except for the flagellum; shoe-shaped (fusiform or dumbbell-shaped) ocelli located subinferior to the compound eyes; mandibles with four typical apical teeth; maxillary palps and all thoracic legs scaled; fore femora not swollen; meso- and metacoxae bearing styli; abdominal segments II–V or VI possessing two pairs of retractive vesicles; penis shorter than the coxite IX; parameres on coxite IX, coxite XIII without parameres; ovipositor primary type, without fossil claw.

Pedetontus was originally established as a subgenus of *Petrobius* Leach, 1809 by the distinguished Italian entomologist Filippo Silvestri in 1911, who described 18 new species [8–13]. Subsequently in 1936, Silvestri treated *Pedetontus* as a genus in his paper "Descrizione di alcuni Machilidae (Thysanura) della Cina". In 1972, *Pedetontus* was subdivided by Paclt (1972) into two subgenera: *Pedetontus sensu stricto* Silvestri, 1911 (= *Pedetontus s. str.* = *Pedetontus* (P.)) and *Verhoeffilis* Paclt, 1972. Subgenus *Pedetontus Verhoeffilis* is characterized by the presence of two pairs of retractile vesicles restricted to coxites II–V and posterior angles of abdominal sternites $\leq 90^\circ$. In contrast, the subgenus *Pedetontus s. str.* possesses retractile vesicles on coxites II–VI and exhibits obtuse posterior angles of sternites [14]. Following 1960, an additional 17 species were formally described by subsequent taxonomists [6,14–26]. The three Chinese *Pedetontus* species—*P. (Verhoeffilis) savioi*, *P. (V.) bianchii*, and *P. (V.) fukiensis*—were described by Silvestri [12]. In 1943, Silvestri described three more species: *P. (V.) formosanus*, *P. (V.) issikii*, and *P. (V.) sauterii* [13]. In 1965, the Japanese scholar Uchida described a new species, *P. (V.) uariensis*, based on specimens collected in Taiwan, China by the Japan Lepidoptera Society [22]. In 1991, Xue & Yin described *P. (V.) zhejiangensis* from Tianmu Mountain [24]. In 2008, based on specimens collected in Beijing, Zhang reported the complete mitochondrial genome sequence of *P. (V.) silvestrii*, the type locality of which is Korea [19,26]. Two years later, the new species *P. (V.) hainanensis* and *P. (V.) zhoui* were described from Hainan and Fujian, respectively [25]. To date, a total of 11 species of *Pedetontus* have been documented in China, along with a cumulative count of 35 extant species of bristletails reported nationwide [9,12,13,22,24,25,27–42].

Southern China is characterized by complex terrain, diverse climatic conditions, and abundant biological resources; however, research on bristletail groups remains comparatively limited. Through the dissection and morphological examination of bristletail specimens collected in southern China, this study has identified and formally described six new species of *Pedetontus*, and presents the first comprehensive set of detailed color photographs for species within this genus.

2. Materials and Methods

2.1. Specimen Collection and Morphological Examination

After capture, some specimens were immediately preserved in 70% ethanol for subsequent dissection and morphological examination, while the remaining individuals were reared on a diet of moss and algae. Following molting and the complete development of scales, whole-body images were captured. Specimens were dissected and observed using an Olympus SZX16 stereomicroscope (Olympus Corporation, Tokyo, Japan) and a Novel N-117M microscope (Novel Corporation, Ningbo, China). Morphological structures were mounted on temporary slide and imaged with an Olympus DP73 camera (Olympus Corporation, Tokyo, Japan). The resulting images were post-processed and

assembled into figure plates using Affinity Photo 2 (Serif Ltd., Europe, available from: <https://affinity.serif.com/zh-cn/> (accessed 12 December 2023)).

2.2. DNA Extraction, PCR, DNA Sequencing and Phylogenetic Tree.

The muscle tissue dissected and isolated from the examined specimens was utilized for DNA extraction. Total genomic DNA extraction was conducted using the Ezup Column Animal Genomic DNA Purification Kit (Sangon Biotech Company, Shanghai, China), following the manufacturer’s standard operating procedures.

This study utilized Sanger sequencing to obtain COX1 gene sequences. Following DNA extraction, the COX1 gene was amplified using universal primers LCO1490 (5'-GGTCAACAAATCATAAAGATATTGG-3') and HCO2198 (5'-TAAACTTCAGGGTGACCAAAAATCA-3')[43].Eleven PCR products were submitted to Zhejiang Youkang Biotechnology Co., Ltd. for Sanger sequencing. The concatenated maximum matrix was subjected to best-fit model selection through PartitionFinder 2.2.1 [44] in Python, which identified "GTR+I+G" as the optimal evolutionary model.

Phylogenetic construction was performed using 41 COX1 sequences, including 11 newly sequenced COX1 genes from this study and 30 Microcoryphia COX1 sequences (comprised of Meinertellidae and Machilidae) downloaded from NCBI [27,36,42,45–51]. *Nesomachilis australica* (AY793551) from Meinertellidae served as the outgroup[52]. Detailed COX1 accession numbers are provided in Table S1. Bayesian Inference (BI) tree was constructed using MrBayes 3.2 [53] with 10 million generations of Markov chain Monte Carlo (MCMC) simulations, sampling every 1000 generations (25% initial samples discarded as burn-in). Final phylogenetic tree was visualized and refined using ChiPlot [54] (<https://www.chiplot.online>, accessed on 26 June 2025).

3. Results

3.1. Taxonomy

- Family *Machilidae* Lubbock, 1873
- Subfamily *Petrobiinae* Kaplin 1985
- Genus *Pedetontus* Silvestri, 1911
- Subgenus *Pedetontus* (*Verhoeffilis*) Paclt, 1972
- Type species: *Petrobius* (*Pedetontus*) *calcaratus* (Silvestri, 1911)

Subgeneric diagnosis. Flagellum of antenna devoided of scales, maxilla, legs provided of scales. Paired ocelli shoe-shaped (dumbbell-shaped), submedian, relatively close each other. Mandibles typical, with four apical teeth. Thorax normal. Coxal stylets on midlegs and hindlegs. Forelegs of male not swollen, without sensory fields. Two pairs of retractile vesicles on the abdominal segments II–V. Paramera restricted to the IXth. Penis opening little, apical. Male genitalia not exceeding IXth coxites. Ovipositor of the primary type.

Distribution. Russia Primorskii Territory, East Asia, Southeast Asia.

3.2. Keys

- Key to subgenre of *Pedetontus* worldwide
 - 1. Retractable vesicles restricted to coxites II–V, posterior angles of abdominal sternites $\leq 90^\circ$ *Pedetontus* (*Verhoeffilis*) Paclt, 1972
 - Retractable vesicles on coxites II–VI, posterior angles of abdominal sternites obtuse...*Pedetontus sensu stricto* Silvestri, 1911
- Key to known species of *Pedetontus* in China
 - 2. Eye length to width ratio > 0.9 2
 - Eye length to width ratio < 0.9 9
 - 3. Tarsus with transparent needle-shaped setae..... 3

- Tarsus without transparent needle-shaped setae..... 7

4. Ratio of distance between inner margins of paired ocelli to combined width- of eyes < 0.1.....*P. (Verhoeffilis) silvestrii* Mendes, 1991

- Ratio of distance between inner margins of paired ocelli to combined width- of eyes > 0.1..... 4

5. Ultimate article of maxillary palp (palp VII) longer than penultimate article (palp VI)*P. (V.) formosanus* Silvestri 1943

- Ultimate article of maxillary palp (palp VII) as long as or shorter than penultimate article (palp VII) 5

6. Labial palp of male without long hair-like setae *P. (V.) savioi* Silvestri 1936

- Labial palp of male with long hair-like setae..... 6

7. Parameres 1+8 articulated..... *P. (V.) zhejiangensis* Xue & Yin 1991

- Parameres 1+7 articulated.....*P. (V.) elegans* Shen, Yang, Ji & Zhang sp. n.

8. Labial palp of male with long hair-like setae
.....
.....*P. (V.) zhoui* Yu, Zhang & Zhang 2010

- Labial palp of male without long hair-like setae 8

9. Labial palp of male modified, laterally expanded *P. (V.) issikii* Silvestri 1943

- Labial palp of male not modified, clavate*P. (V.) bianchii* Silvestri 1936

10. Ratio of distance between inner margins of paired ocelli to combined width- of eyes < 0.1*P. (V.) uraiensis* Uchida 1965

- Ratio of distance between inner margins of paired ocelli to combined width of eyes > 0.1 10

11. Tarsus with transparent needle-shaped setae..... *P. (V.) fukiensis* Silvestri 1936

- Tarsus without transparent needle-shaped setae..... 11

12. Ovipositor exceeding stylus IX (including supporting spines) 12

- Ovipositor not exceeding stylus IX (including supporting spines) 14

13. Parameres 1+6 articulated.....*P. (V.) hainanensis* Yu, Zhang & Zhang 2010

- Parameres more than 1+6 articulated..... 13

14. Parameres 1+7 articulated..... *P. (V.) nanmingensis* Shen, Yang, Ji & Zhang sp. n.

- Parameres 1+8 articulated..... *P. (V.) hezhouensis* Shen, Yang, Ji & Zhang sp. n.

15. Ultimate articles of labial palps (article III) of female clavate, not modified, compound eyes yellowish green
.....
.....*P. (V.) shenzhenensis* Shen, Yang, Ji & Zhang sp. n.

- Ultimate articles of labial palps (article III) of female modified, expanded laterally, compound eyes brown..... 15

16. Ultimate articles of labial palps (article III) of female with more than 30 sensory cones at its apex*P. (V.) xanthospilus* Shen, Yang, Ji & Zhang sp. n.

- Ultimate articles of labial palps (article III) of female without sensory cones at its apex.....*P. (V.) jinxiuensis* Shen, Yang, Ji & Zhang sp. n.

3.3. Description

Pedetontus (Verhoeffilis) elegans Shen, Yang, Ji & Zhang sp. n. (Figures 1.1–1.6)
ZooBank: urn:lsid:zoobank.org:act:98F98919-E673-4C0A-8FE7-11CCCD2AF8BE

Type specimens & type locality. ♂ – holotype (in 70% ethanol); 3♂4♀ – paratypes (in 70% ethanol). Fengya Valley, Pan'an County, Jinhua City, Zhejiang Province, China (29°04'45"N 120°37'39"E, 542m), in leaf litter and on rocks near signal station (Figure 1.1), 17.VII.2024, coll. Jia-Yong Zhang, Chen-Yang Shen, Zhi-Qiang Guo, Jie-Hong Ji. All type specimens deposited in the Animal Herbarium, Zhejiang Normal University, Jinhua, Chi



Figure 1.1. *Pedetontus (Verhoeffilis) elegans* Shen, Yang, Ji & Zhang sp. n. (A) *P. (V.) elegans* sp. n. in situ. (B) Ditto. (C) Habitat.

Description. Male body length 10.4–11.2 mm, female 11.9 mm. Body covered with scales, light brown, with several white longitudinal stripes, black markings, and a few green markings; caudal filament and cerci with several well-developed white annulate setae. Antennae and median caudal filament approximately 1.6 times body length; lateral cerci length approximately two-thirds of body length (Figures 1.1A, B, 1.2A, 1.5A).

Head. Compound eyes well-developed, strongly convex, bright yellowish-green (Figures 1.2D–G, 1.5B, C). Ratios of eye length to width, contact line length to eye length given in Table 1. Paired ocelli subinferior to compound eyes, reddish-brown, dumbbell-shaped. Ratios of ocellus length to width, distance between inner margins of ocelli to combined width of eyes given in Table 1. Vertex straight, with deep chestnut markings. Frons convex, bearing fine setae, without long bristles. Genae bearing black setae. Clypeus and labrum bearing transparent long setae (Figures 1.2D,E, 1.5B,C).

Table 1. Ratio of compound eyes and ocelli of *Pedetontus* new species.

Ratio	Eye length to width	Eye contact line length to eye length	Ocellus length to width	Distance between inner margins of ocelli to combined width of eyes
<i>P. (V.) elegans</i> sp. n.	1.01–1.09	0.59–0.71	0.30–0.33	0.19–0.22

<i>P. (V.) hezhouensis</i> sp. n.	0.79–0.84	0.32–0.39	0.35–0.43	0.18
<i>P. (V.) jinxiuensis</i> sp. n.	0.81–0.85	0.20–0.25	0.33–0.36	0.15–0.16
<i>P. (V.) nanningensis</i> sp. n.	0.82–0.84	0.31–0.37	0.38–0.40	0.10–0.15
<i>P. (V.) shenzhenensis</i> sp. n.	0.84	0.41	0.40	0.19
<i>P. (V.) xanthospilus</i> sp. n.	0.83–0.84	0.27–0.28	0.36	0.21–0.22



Figure 1.2. *Pedetontus (Verhoeffilis) elegans* Shen, Yang, Ji & Zhang sp. n., holotype, male. **(A)** Habitus, lateral view. **(B)** Antenna. **(C)** Terminal chain of flagellum. **(D)** Head, frontal view. **(E)** Ditto, lateral view. **(F, G)** Compound eyes & paired ocelli. Scale bars: 500 µm.

Antennae scaled except on flagellum; flagellum extremely long, with dark annulations and well-developed annulate setae; terminal chains divided into 21–22 segments. Scape length-to-width ratio 2.2–2.33 (Figure 1.2B).

Mandibles typical, apex with four distal teeth (Figure 1.3D).

Maxilla basal segment with one processus basalis and one inner protuberance (Figure 1.3F). Male maxillary palp articles III–VII with well-developed long brush-like setae ventrally; female with long brush-like setae only on article 2. Ultimate article of maxillary palp subequal in length to penultimate article (Figures 1.3E, 1.5D,E). Maxillary palp articles V–VII bearing transparent spines dorsally (Figures 1.3E 1.5E), numbers given in Table 2.

Labial palp third article not modified, clavate, apex bearing sensory cone setae, numbers given in Table 2. Male labial palp II and III bearing long hair-like setae; female lacking these (Figures 1.3G,H, 1.5F,G).

Table 2. Numbers of transparent spines on dorsal surfaces of maxillary palps & sensory cones on apex of labial palp III of *Pedetontus* new species.

Species		Number of dorsal transparent spines on maxillary palps			Sensory cones on apex of labial palp
		V	VI	VII	III
<i>P. (V.) elegans</i> sp. n.	Male	1–4	6–14	7–14	25–31
	Female	2–3	10–16	10–14	23–26
<i>P. (V.) hezhouensis</i> sp. n.	Male	2	7	6–7	50
	Female	4–5	11–15	11–13	35–39
<i>P. (V.) jinxiuensis</i> sp. n.	Male	0–1	11–12	8–9	0–43
	Female	4	12	15	0
<i>P. (V.) nanningensis</i> sp. n.	Male	3	12	9–11	46–50
	Female	6–7	16	15–16	36–40
<i>P. (V.) shenzhenensis</i> sp. n.	Male	N/A	N/A	N/A	N/A
	Female	5–6	16–17	13	36–45
<i>P. (V.) xanthospilus</i> sp. n.	Male	0–2	10	12–14	55–58
	Female	2–3	12–14	11–12	36–38

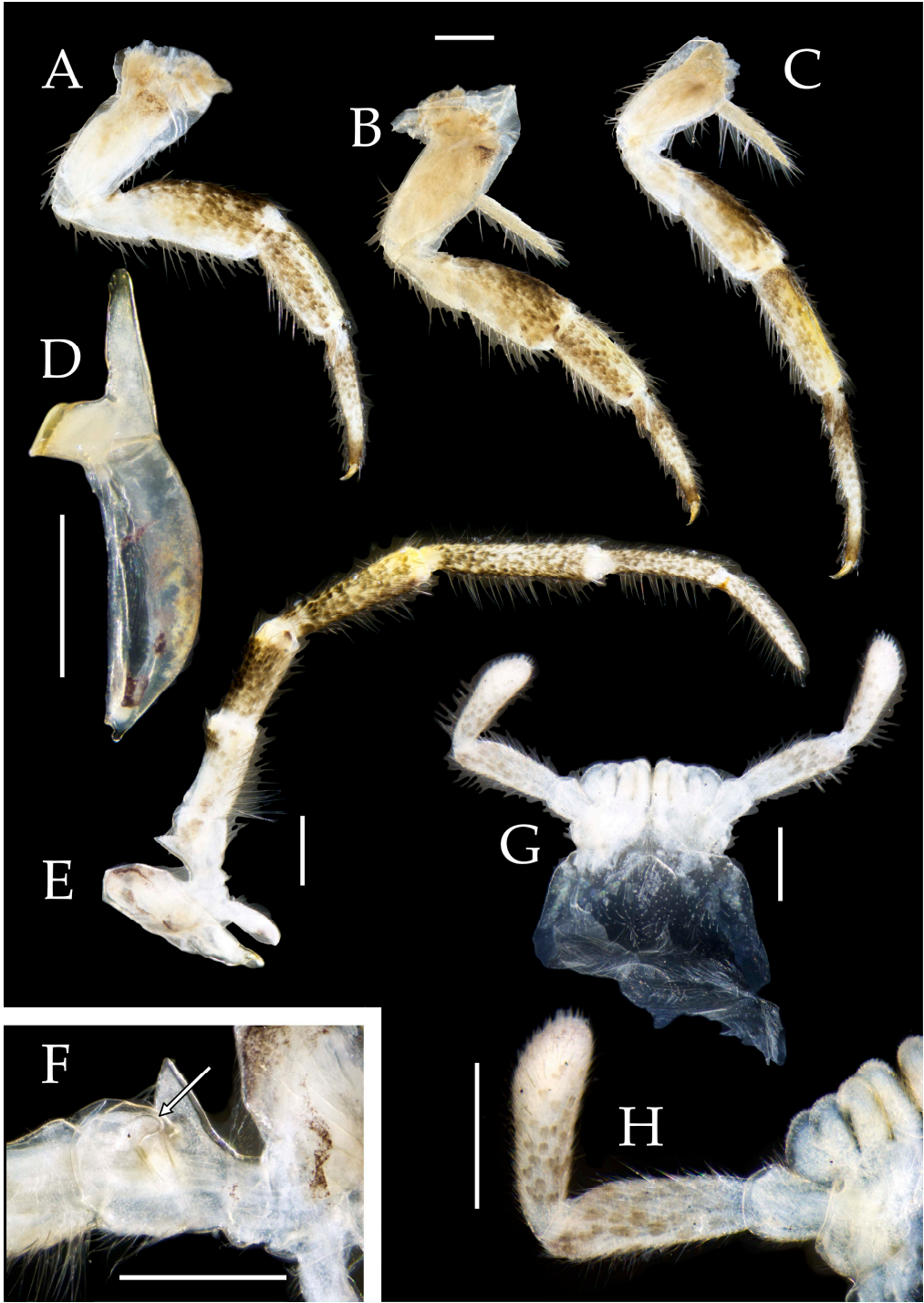


Figure 1.3. *Pedetontus (Verhoeffilis) elegans* Shen, Yang, Ji & Zhang sp. n., holotype, male. **(A–C)** Foreleg, midleg & hindleg. **(D)** Mandible. **(E)** Maxilla. **(F)** Maxillary inner protuberance. **(G)** Labium. **(H)** Labial palp. Scale bars: 500 μm.

Thorax. Thorax normal. Foreleg femur not expanded, without sensory field; mid- and hindlegs with coxal styli. Coxae, trochanters, femora, and tibiae with long bristles ventrally; tarsi and hind tibiae bearing transparent needle-shaped setae ventrally, numbers given in Table 3. Tibiae bearing black setae dorsally. Pretarsal claw structure normal (Figures 1.3A–C, 1.6A–D).

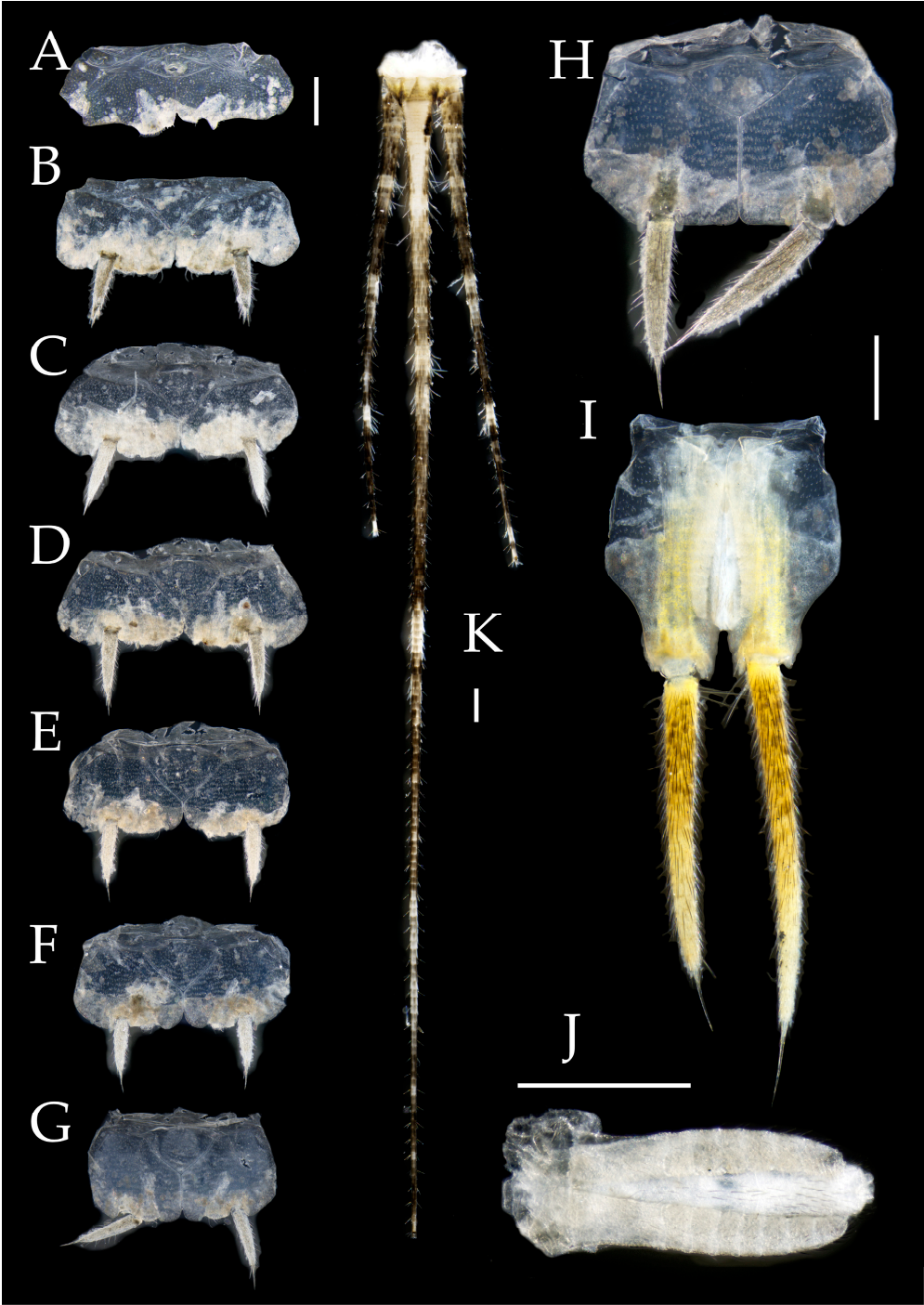


Figure 1.4. *Pedetontus (Verhoeffilis) elegans* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A–I) Abdominal sternites and coxites I–IX. (J) Penis & parameres. (K) Caudal filament & cerci. Scale bars: 500 μm.

Abdomen. Abdominal coxites I, VI, and VII with one pair of retractile vesicles; coxites II–V with two pairs of retractile vesicles (Figures 1.4A–G, 1.6E–F). Female coxite VII with inner lobes fused and extending posteriorly (Figure 1.6F). Angles of posterior angles of abdominal sternites given in Table 4. Ratios of styli length to coxites length on abdominal segment V, styli length to supporting spines length, and basal width to length of sternites given in Table 5. Coxite IX with 2–4+2–4 transparent macrochaetae internally (Figures 1.4I, 1.6H). Caudal filament laterally and cerci internally bearing deciduous long setae and supporting spines (Figure 1.4K).

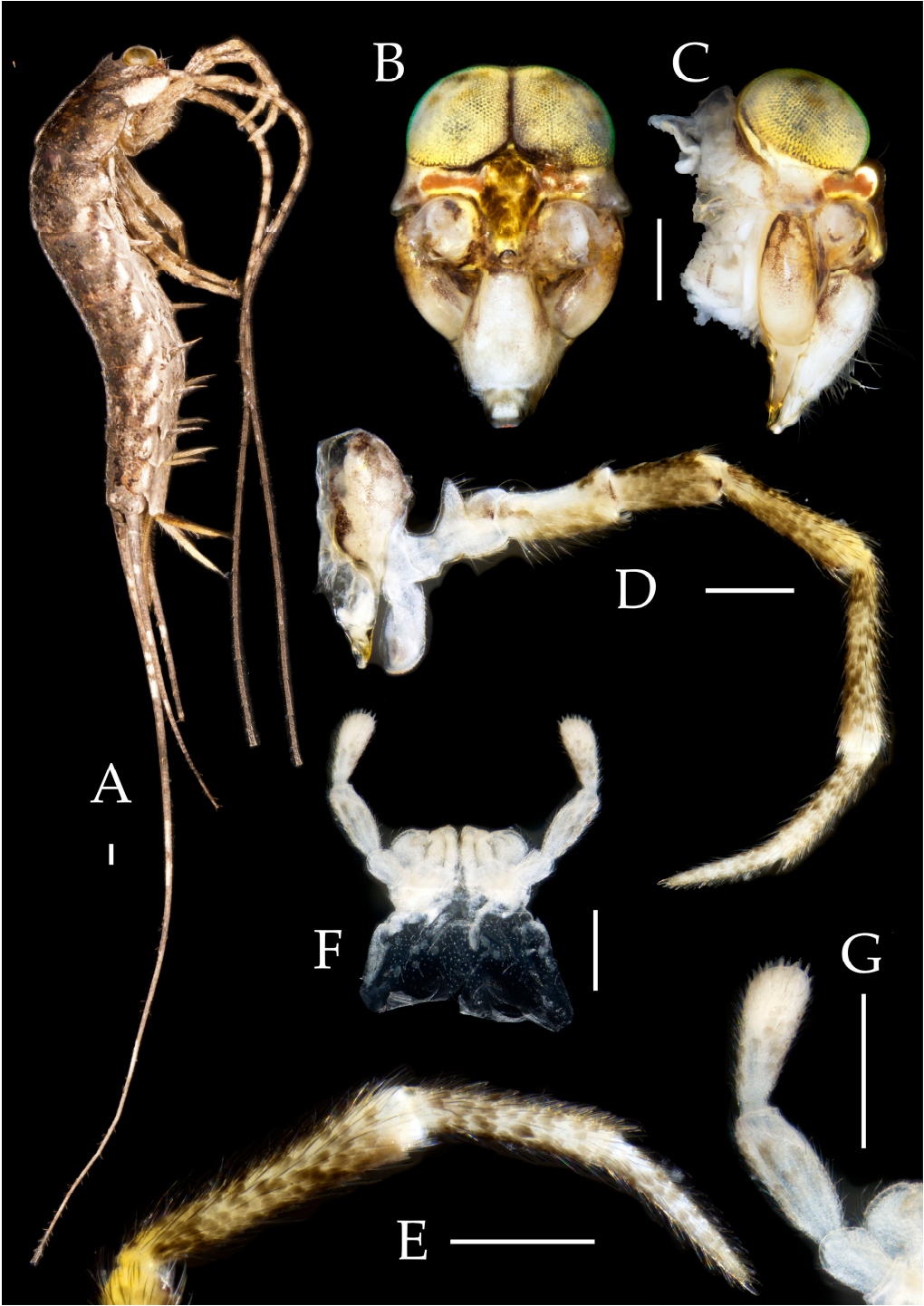


Figure 1.5. *Pedetontus (Verhoeffilis) elegans* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A) Habitus, lateral view. (B) Head, frontal view. (C) Ditto, lateral view. (D) Maxilla. (E) Maxillary palp article V–VII. (F) Labium. (G) Labium palp. Scale bars: 500 μm.

Coxite VIII without parameres. Coxite IX with penis and parameres (Figure 1.4I–J). Penis bearing black setae, opening apically, surpassing parameres; parameres 1+7 segmented (Figure 1.4J). Ovipositor of primary type, surpassing styli (including supporting spines) of coxite IX (Figure 1.6G,H). Number of segments of anterior gonapophyses and posterior gonapophyses given in Table 6.

Table 3. Number of needle-shaped setae on ventral surfaces of legs, *Pedetontus (Verhoeffilis) elegans* sp. n.

Legs			Number of needle-shaped setae on ventral surfaces
Foreleg		Femur	0
		Tibia	0
		Tarsomere I	2
	Tarsi	Tarsomere II	5
		Tarsomere III	0
Midleg		Femur	0
		Tibia	0
		Tarsomere I	3
	Tarsi	Tarsomere II	6
		Tarsomere III	1
Hindleg		Femur	0
		Tibia	4
		Tarsomere I	3
	Tarsi	Tarsomere II	10
		Tarsomere III	

Table 4. Angles of posterior angles (°) of abdominal sternites of *Pedetontus* new species.

Species	Urosternite I	Urosternite II	Urosternite III	Urosternite IV	Urosternite V	Urosternite VI	Urosternite VII	Urosternite VIII (male)
<i>P. elegans</i> (V.) sp. n.	129–138	78–92	88–93	92–94	86–95	74–92	99–113	123
<i>P. hezhouensis</i> (V.) sp. n.	129–131	78–87	78–83	82–83	81–84	91–96	89–100	91
<i>P. jinxiuensis</i> (V.) sp. n.	129–141	68–76	75–77	79–82	75–84	79–95	79–97	95
<i>P. nanningensis</i> (V.) sp. n.	123–129	67–88	68–82	78–86	83–88	79–88	80–101	84
<i>P. shenzhenensis</i> (V.) sp. n.	140	80	73	77	77	77	81	N/A
<i>P. xanthospilus</i> (V.) sp. n.	123–129	76–83	73–80	78–80	84–86	82 - 83	83 - 89	80

Table 5. Ratios of styli length to coxites length on abdominal segment V, styli length to supporting spines length, and basal width to length of sternite.

Ratio	Styli (without supporting spines) length to coxites length of abdominal segment V	Styli (without supporting spines) length to supporting spines length of abdominal segment V	Basal width to length of sternite of abdominal segment V
<i>P. (V.) elegans</i> sp. n.	0.58–0.64	0.40–0.43	1.33–1.34
<i>P. (V.) hezhouensis</i> sp. n.	0.42–0.48	0.53–0.58	1.08–1.24

<i>P. (V.) jinxiuensis</i> sp. n.	0.37–0.43	0.65–0.71	1.18–1.21
<i>P. (V.) nanningensis</i> sp. n.	0.43	0.52	1.06–1.36
<i>P. (V.) shenzhenensis</i> sp. n.	0.47	0.60	1.20
<i>P. (V.) xanthospilus</i> sp. n.	0.38–0.41	0.55–0.68	1.19–1.25

Table 6. Number of segments of anterior gonapophyses and posterior gonapophyses of *Pedetontus* new species.

Species	Number of segments of anterior gonapophyses	Number of segments of posterior gonapophyses
<i>P. (V.) elegans</i> sp. n.	56–59	58–63
<i>P. (V.) hezhouensis</i> sp. n.	60–67	53–55
<i>P. (V.) jinxiuensis</i> sp. n.	60	56–58
<i>P. (V.) nanningensis</i> sp. n.	59	50–55
<i>P. (V.) shenzhenensis</i> sp. n.	42–54	48–49
<i>P. (V.) xanthospilus</i> sp. n.	50–51	49

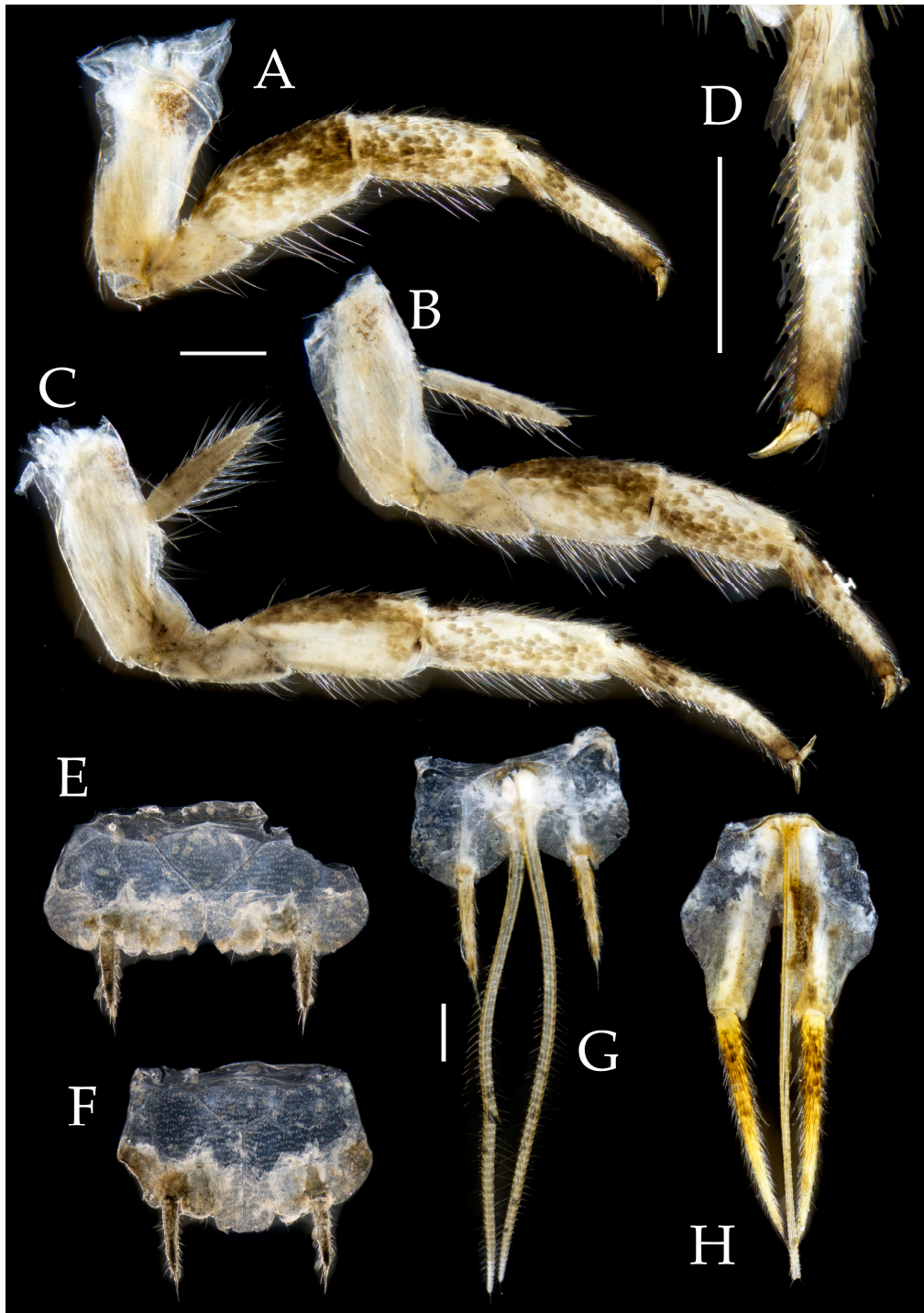


Figure 1.6. *Pedetontus (Verhoeffilis) elegans* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A–C) Foreleg, midleg & hindleg. (D) Foreleg tarsus. (E–H) Abdominal sternites and coxites V, VII–IX. Scale bars: 500 μ m.

Differential diagnosis. *Pedetontus (Verhoeffilis) elegans* sp. n. is most striking due to its extremely large compound eyes and the well-developed ultimate article of the maxillary palp – subequal in length to the penultimate article. *P. (V.) formosanus* Silvestri, 1943, which also has large eyes and slender maxillary palps, is morphologically the closest species, but the two can be distinguished by the shape of the lateral ocelli and the length of the article IV of maxillary palp. When viewed laterally from the front, the lateral ocelli of *P. (V.) elegans* sp. n. are constricted medially, presenting a dumbbell shape, whereas those of *P. (V.) formosanus* are almost clavate. The maxillary palp IV of *P. (V.) elegans* sp. n. is subequal in length to palp V, while that of *P. (V.) formosanus* is distinctly shorter than the palp V. *P. (V.) diversicornis* Silvestri, 1943 is also similar to *P. (V.) elegans* sp. n. Key distinguishing characters are antennae and penis length: the former has antennae shorter than the body and a penis

subequal in length to the parameres, while the latter has antennae much longer than the body and a penis longer than the parameres.

Etymology. The specific epithet “elegans” (Latin adjective meaning “slender” or “graceful”) refers to the species’ slender antennae, elegant markings, and fascinating green eyes. The Chinese name for *P. (V.) elegans* sp. n. is 秀丽跳蚱.

Distribution. Zhejiang Province, China.

Pedetontus (Verhoeffilis) hezhouensis Shen, Yang, Ji & Zhang sp. n. (Figures 2.1–2.6)

Zoobank: urn:lsid:zoobank.org:act:7B7D8D89-1579-40FA-A1EB-04C3B6DEB877

Type Specimens & Type Locality. Holotype, 1♀ (in 70% ethanol), Paratypes: 1♂6♀ (in 70% ethanol), Huangyao Town, Hezhou City, Guangxi Zhuang Autonomous Region, China (24°14'N 111°13'E), 18.XII.2024, collected by Jia-Yong Zhang. All type specimens deposited in the Animal Herbarium, Zhejiang Normal University, Jinhua, China.

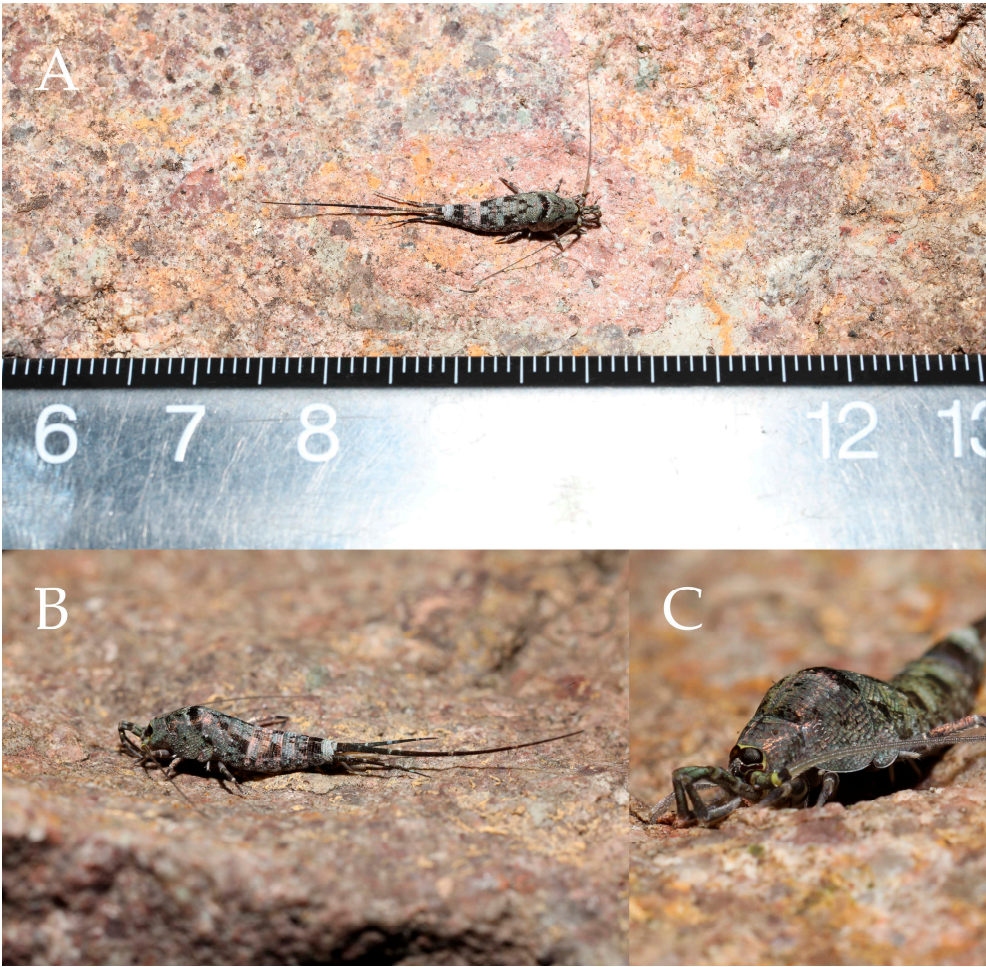


Figure 2.1. *Pedetontus (Verhoeffilis) hezhouensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A–C) Dorsal, lateral and anterolateral view.

Description. Male body length 7.9 mm, female 7.6–8.9 mm. Body covered with grayish-green scales; posterior part of mesonotum with a dark arched marking; tergites of subsequent segments bearing variously sized paired black spots. Caudal filament and cerci with white annulations. Antennae slightly longer than body length; caudal filament nearly 1.5 times body length; cerci longer than half of body length (Figure 2.1A,B).

Head. Compound eyes small, smooth, dark-colored, with indistinct yellow markings internally (Figures 2.1C, 2.2C–F, 2.5B,C); ratios of eye length to width and contact line length to eye length given in Table 1. Paired ocelli subinferior to compound eyes, black (fading to dark gray when preserved in

70% ethanol), with white borders, shoe-shaped. Ratios of ocellus length to width and distance between inner margins of ocelli to combined width of eyes given in Table 1. Vertex without markings. Frons smooth, with long transparent bristles, covered with scales. Genae without setae. Clypeus and labrum with transparent bristles (Figures 2.2C–E, 2.5B,C).

Antennae scaled except on flagellum; flagellum without annulations, bearing well-developed annulate setae; terminal chain divided into 10–13 segments. Scape length-to-width ratio 1.73–1.84 (Figure 2.2B).

Mandibles typical, apex with four distal teeth (Figure 2.3D).

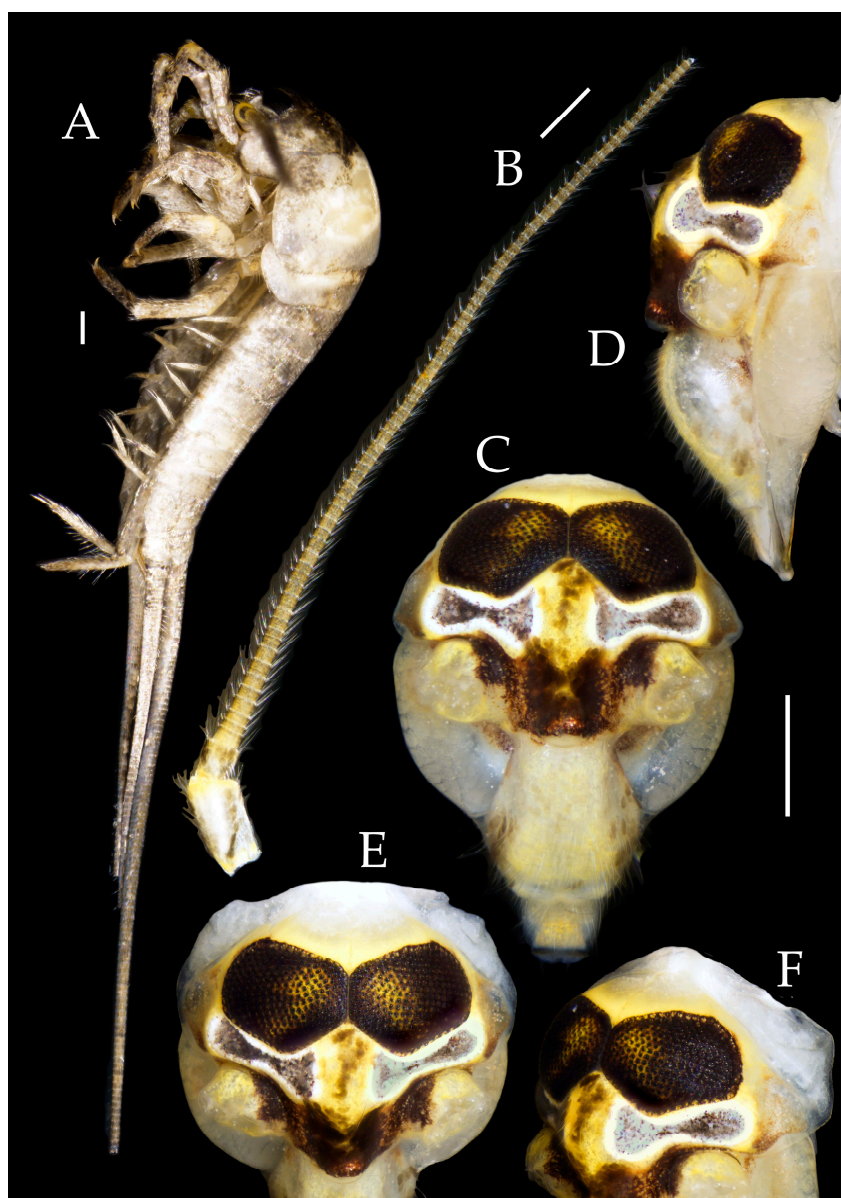


Figure 2.2. *Pedetontus (Verhoeffilis) hezhouensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A) Habitus, lateral view. (B) Antenna. (C) Head, frontal view. (D) Ditto, lateral view. (E, F) Compound eyes & paired ocelli Scale bars: 500 μ m.

Maxillary palp I with one processus basalis and one inner protuberance (Figures 2.3E, F, 2.5E). Male maxillary palp articles II–VII with well-developed short brush-like setae ventrally; female without. Ratio of ultimate article to penultimate article length 0.57–0.62 (Figures 2.3E, 2.5E,F). Dorsal surface of maxillary palp articles V–VII with transparent spines (Figures 2.3E, 2.5E,F); numbers given in Table 2.

Male labial palp yellow, third segment modified, laterally expanded, apex with sensory cones; numbers given in Table 2; ultimate article of female less swollen, clavate. Labial palp without long hair-like setae (Figures 2.3G,H, 2.5G,H).

Hypopharynx structure typical (Figure 2.3I)

Thorax. Thorax normal. Foreleg femur not expanded, without sensory field; mid- and hind legs with coxal styli. Ventral surface of legs with long bristles, without needle-shaped setae. Pretarsal claw structure normal (Figures 2.3A–C, 2.6A–C).

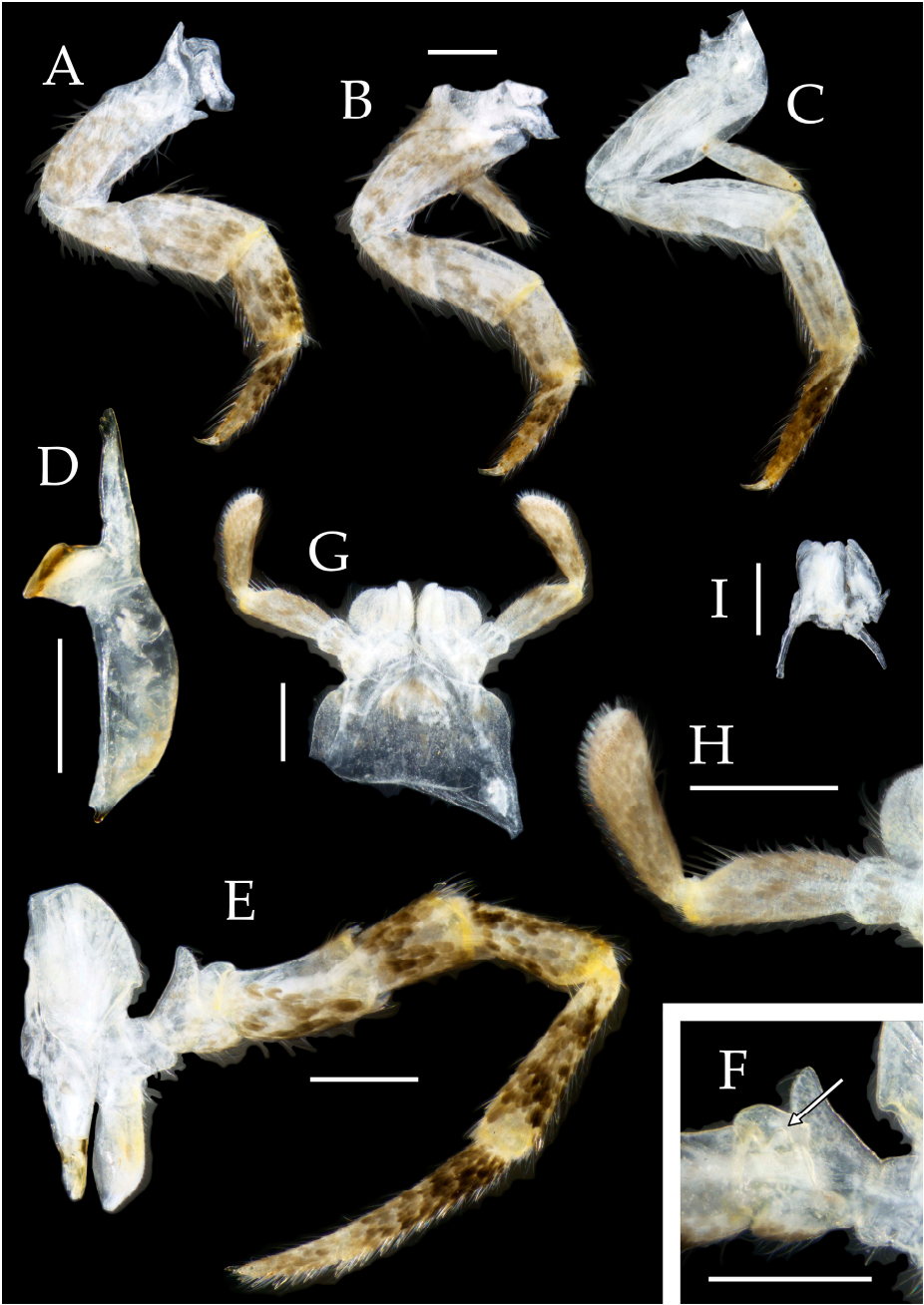


Figure 2.3. *Pedetontus (Verhoeffilis) hezhouensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A–C) Foreleg, midleg & hindleg. (D) Mandible. (E) Maxilla. (F) Maxillary inner protuberance. (G) Labium. (H) Labial palp. (I) Hypopharynx. Scale bars: 500 μ m.

Abdomen. Abdominal coxites I, VI, and VII with one pair of retractile vesicles; coxites II–V with two pairs of retractile vesicles (Figures 2.4A–G, 2.6D,E); inner lobes of female coxite VII fused and posteriorly extended (Figure 2.4G). Ratios of styli length to coxites length on abdominal segment V,

styli length to supporting spines length, and basal width to length of sternites given in Table 5. Coxite IX medially with 4–8+4–8 transparent macrochaetae (Figures 2.4I, 2.6G). Caudal filament laterally and cerci medially with deciduous long hairs and supporting spines (Figure 2.4J).

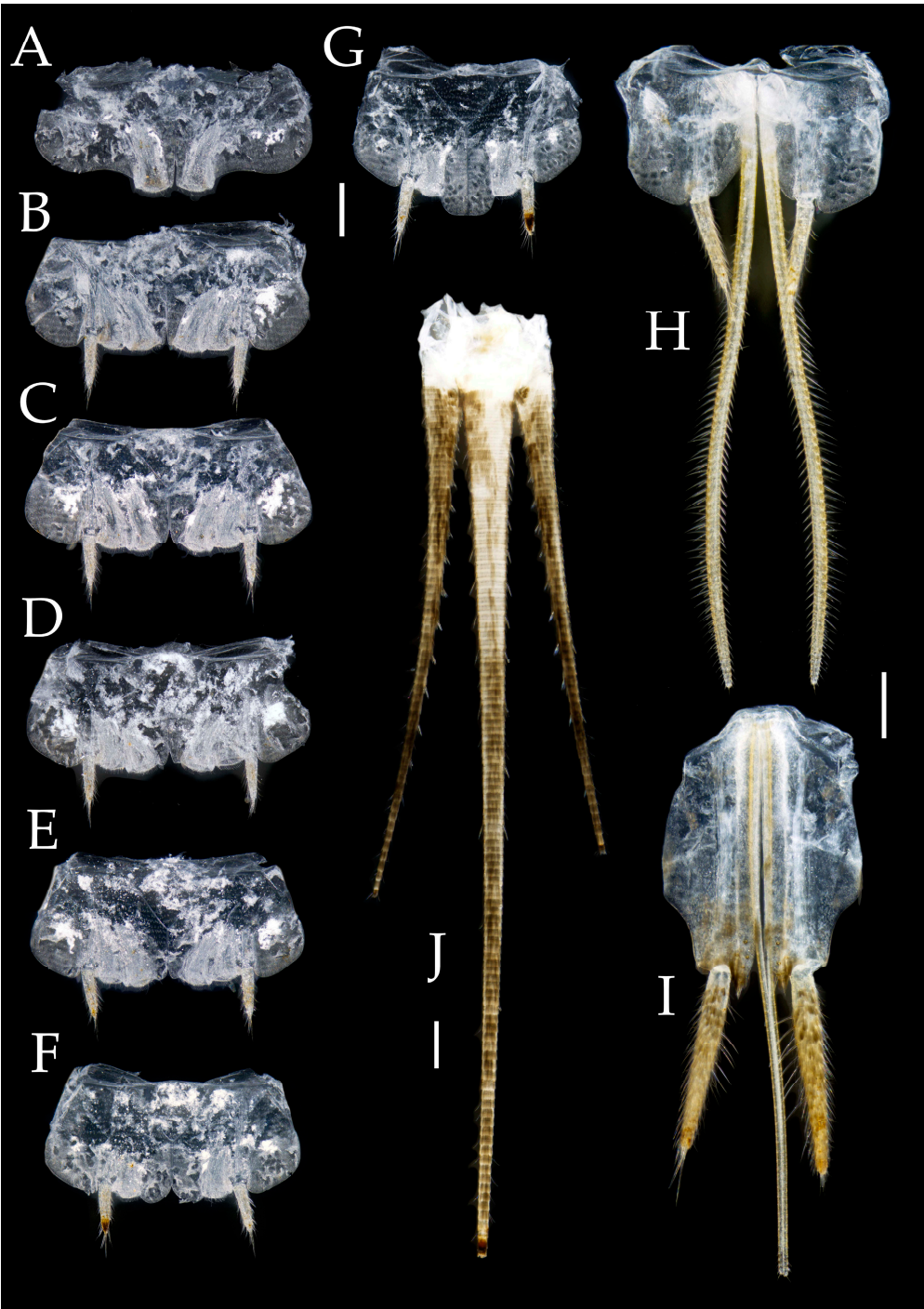


Figure 2.4. *Pedetontus (Verhoeffilis) hezhouensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A–I) Abdominal sternites and coxites I–IX. (J) Caudal filament & cerci. Scale bars: 500 μm.

Coxite VIII without parameres, coxite IX with penis and parameres (Figure 2.6F,G). Penis opening apically, slightly shorter than parameres; parameres 1+8 segmented (Figure 2.6H). Ovipositor of primary type, surpassing styli (including supporting spines) of coxite IX (Figure 2.4H,I). Number of segments of anterior gonapophyses and posterior gonapophyses given in Table 6.

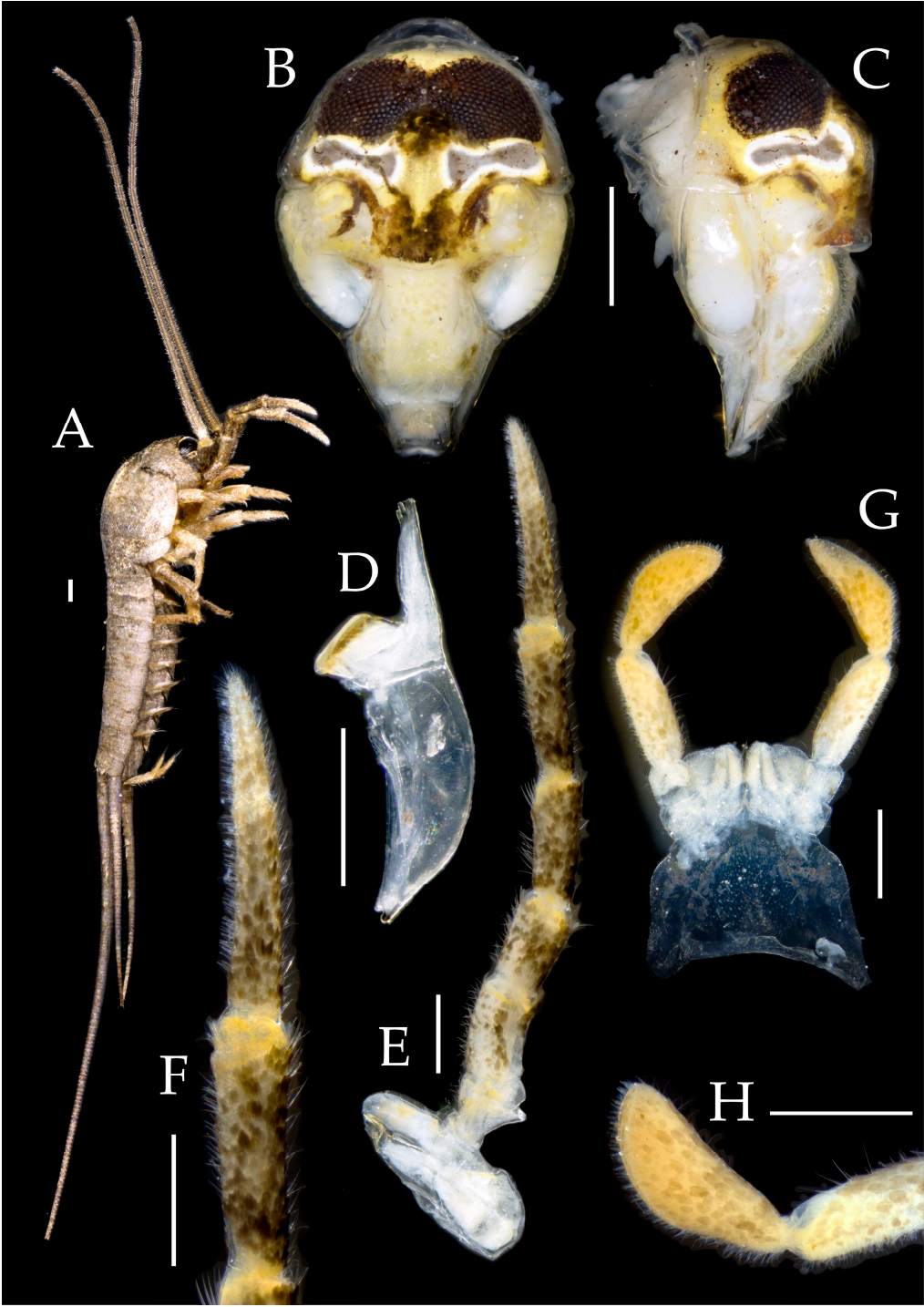


Figure 2.5. *Pedetontus (Verhoeffilis) hezhouensis* Shen, Yang, Ji & Zhang sp. n., paratype, male. (A) Habitus, lateral view. (B) Head, frontal view. (C) Ditto, lateral view. (D) Mandible. (E) Maxilla. (F) Maxillary palp article V–VII. (G) Labium. (H) Labium palp. Scale bars: 500 μm.

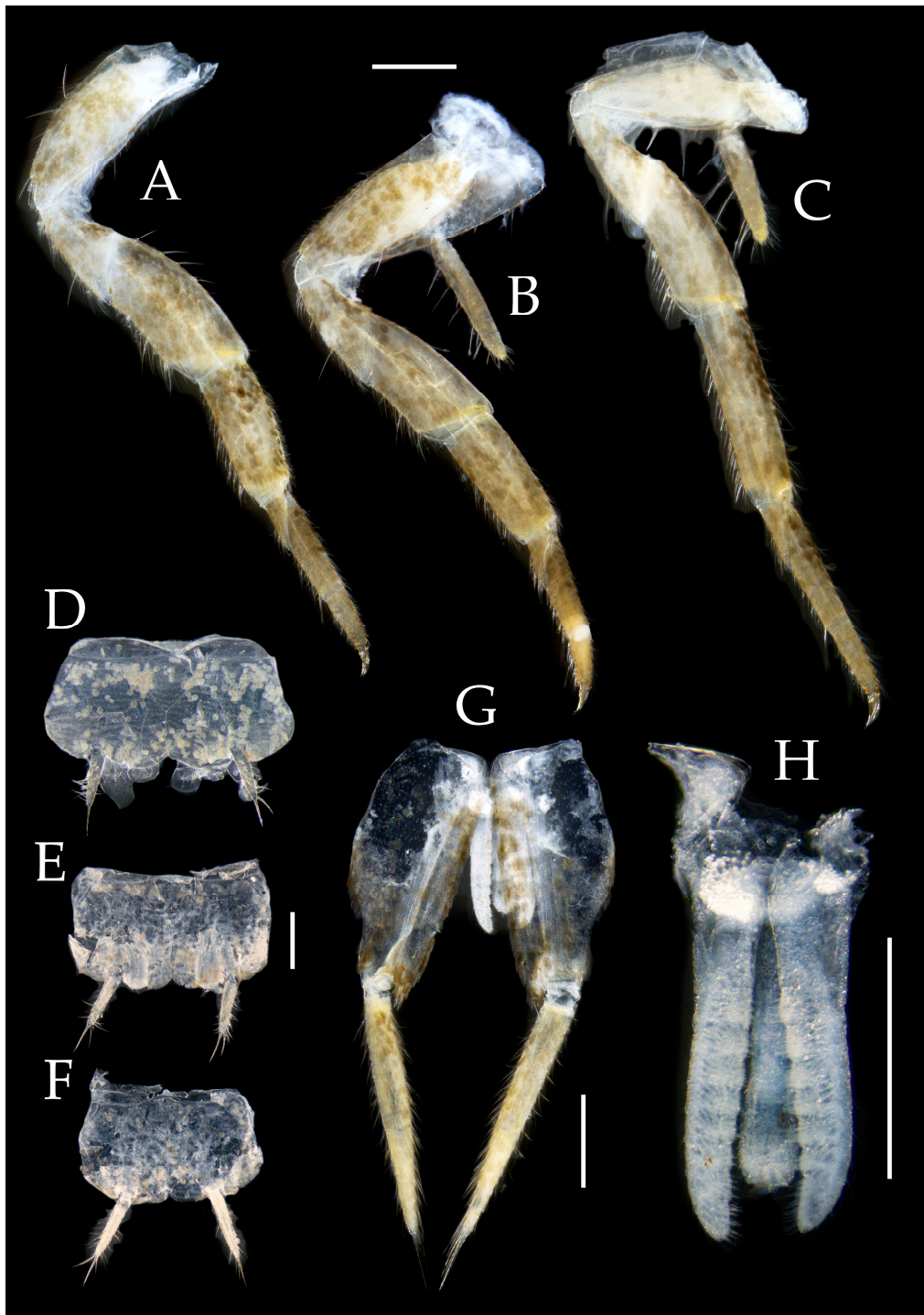


Figure 2.6. *Pedetontus (Verhoeffilis) hezhouensis* Shen, Yang, Ji & Zhang sp. n., paratype, male. (A–C) Foreleg, midleg & hindleg. (D–G) Abdominal sternites and coxites V, VII–IX. (H) Penis & parameres. Scale bars: 500 μm.

Differential diagnosis. *Pedetontus (Verhoeffilis) hezhouensis* sp. n. is morphologically most similar to *P. (V.) sauterii* Silvestri, 1943 from Taiwan, China. They differ primarily in the length of the contact line of the eyes: in the former, the ratio of this structure's length to the length of the eye is < 0.4 , while in the latter it is > 0.4 .

Etymology. The species is named after its type locality, Hezhou City. The Chinese name for *P. (Verhoeffilis) hezhouensis* sp. n. is 贺州跳蛎.

Distribution. Hezhou City, Guangxi Zhuang Autonomous Region, China.

Pedetontus (Verhoeffilis) jinxiuensis Shen, Yang, Ji & Zhang sp. n. (Figures 3.1–3.6)

Zoobank: urn:lsid:zoobank.org:act:4C21B2F2-5BD0-4D46-BD78-7A78A941DCA0

Type Specimens & Type Locality. Holotype, 1♂ (in 70% ethanol), Paratypes: 15♂2♀ (in 70% ethanol), China, Guangxi Zhuang Autonomous Region, Jinxiu County, Dayao Mountain (24°6'4.88"N, 110°9'37.69"E, 947m), 1.V.2023, collected by Wen-Yong Feng. All type specimens deposited in the Animal Herbarium, Zhejiang Normal University, Jinhua, China.

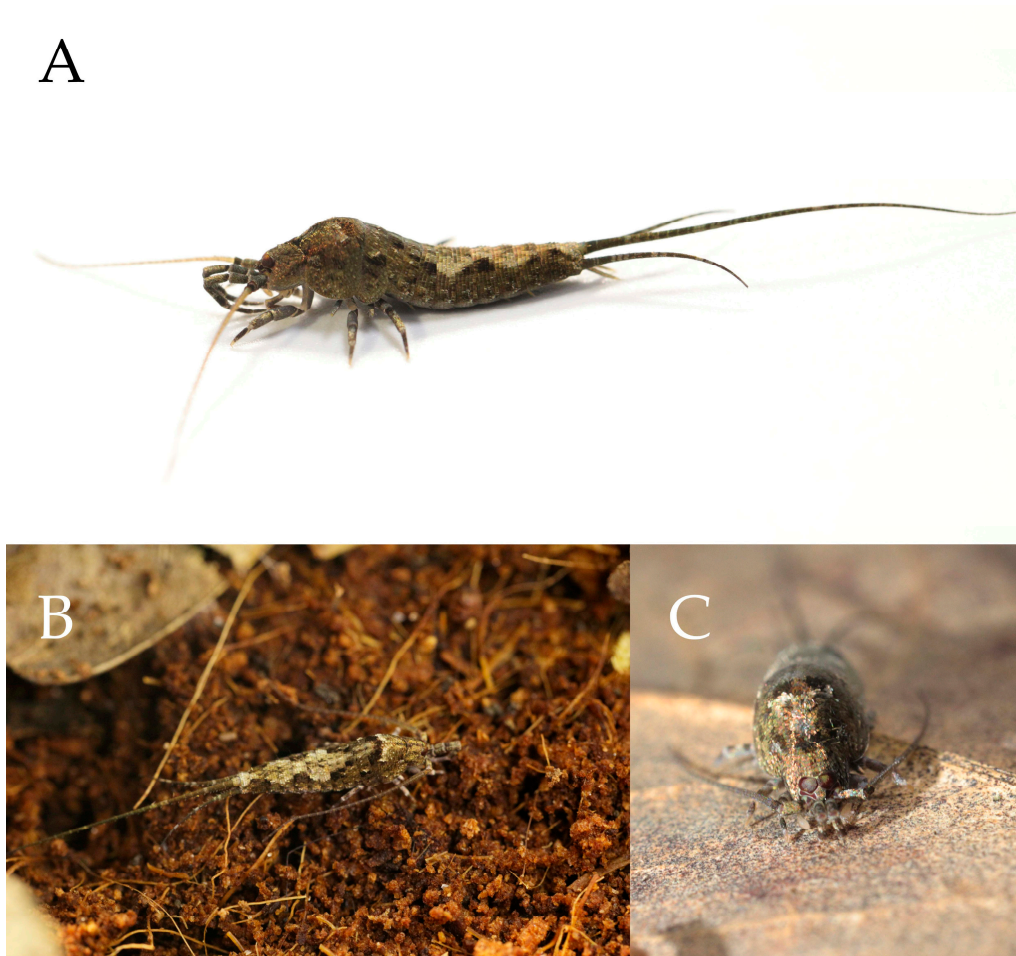


Figure 3.1. *Pedetontus (Verhoeffilis) jinxiuensis* Shen, Yang, Ji & Zhang sp. n. (A–C) Lateral, dorsal and anterior view.

Description. Male body length 11.2 mm, female 9.7 mm. Body covered with dark brown scales; mesonotum with an arched dark marking; subsequent nota bearing paired dark patches; abdominal nota patterned with three longitudinal pale diamond-shaped markings. Antennae equal to or slightly longer than body length; caudal filament nearly 1.5 times body length; cerci about half as long as body length (Figure 3.1A,B).

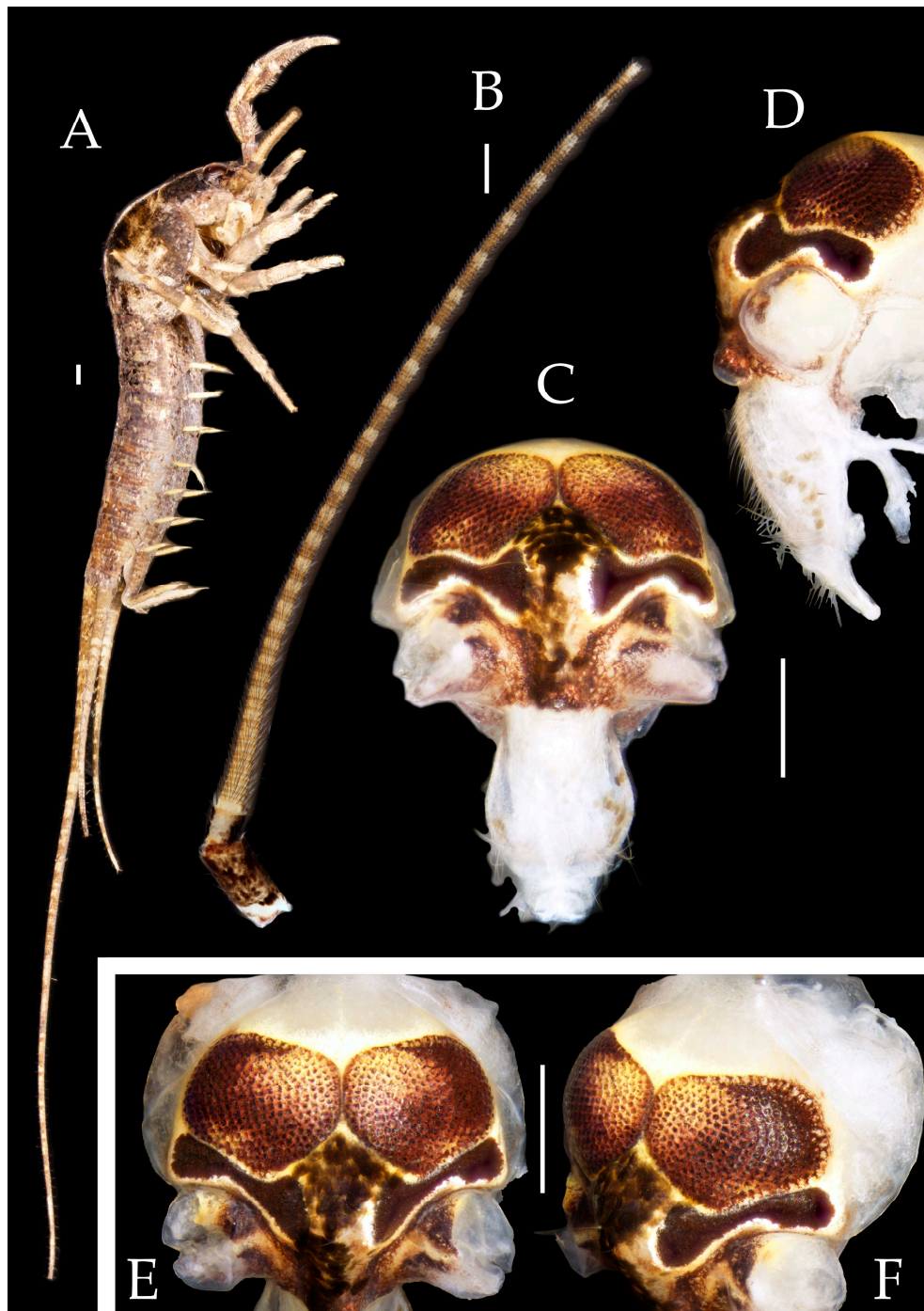


Figure 3.2. *Pedetontus (Verhoeffilis) jinxiuensis* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A) Habitus, lateral view. (B) Antenna. (C) Head, frontal view. (D) Ditto, lateral view. (E, F) Compound eyes & paired ocelli. Scale bars: 500 μ m.

Head. Compound eyes smooth, deep reddish-brown, with indistinct yellow blotches (Figures 3.2C–F, 3.5B,C); ratios of eye length to width and contact line length to eye length given in Table 1. Ocelli dark brown with white borders, dumbbell-shaped. Ratios of ocellus length to width and distance between inner margins of ocelli to combined width of eyes given in Table 1. Vertex without markings. Frons convex, with long transparent bristles, scaled. Genae without setae. Clypeus and labrum with transparent bristles (Figures 3.2C–F, 3.5B,C).

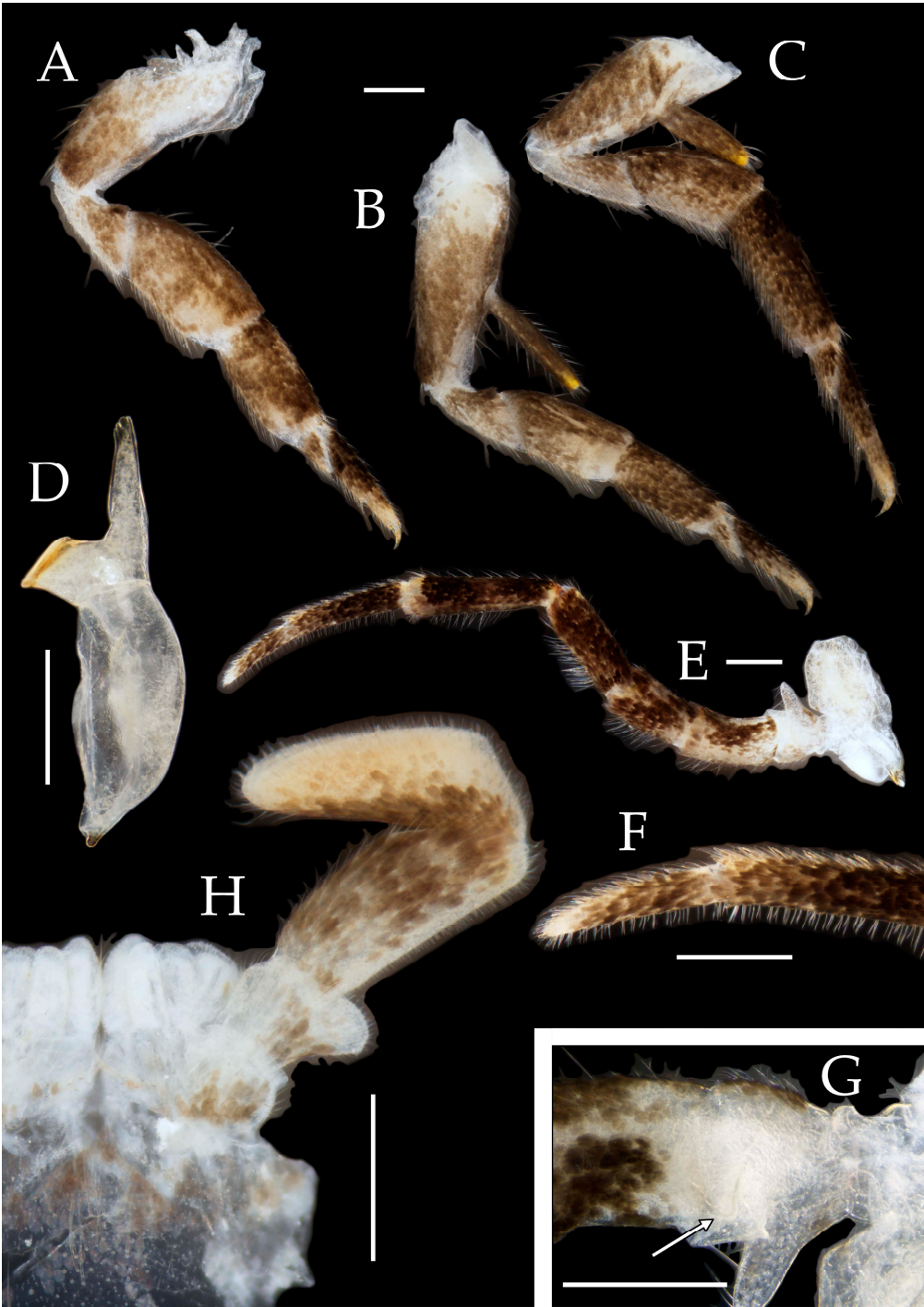


Figure 3.3. *Pedetontus (Verhoeffilis) jinxiuensis* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A–C) Foreleg, midleg & hindleg. (D) Mandible. (E) Maxilla. (F) Maxillary palp article VI & VII. (G) Maxillary inner protuberance. (H) Labium. Scale bars: 500 μm.

Antennae scaled except on flagellum; flagellum with pale annulations, bearing well-developed annulate setae; terminal chain divided into 8–10 segments. Scape length-to-width ratio 1.86–1.91 (Figure 3.2B).

Mandibles typical, apex with four distal teeth (Figure 3.3D).

Maxillary palp I with one processus basalis and one inner protuberance (Figures 3.3E, G, 3.5D). Male maxillary palp articles II–VII with well-developed short brush-like setae ventrally; female without. Ratio of ultimate article to penultimate article length 0.69–0.85. Dorsal surface of maxillary palp articles V–VII with transparent spines (Figures 3.3E,F, 3.5D); numbers given in Table 2.

Labial palp third segment modified, extremely laterally expanded, apex with sensory cones; numbers given in Table 2; ultimate article of female less swollen, apex without sensory cones. Labial palp without long hair-like setae (Figures 3.3H, 3.5F,G).

Hypopharynx structure typical (Figure 3.5E).

Thorax. Thorax normal. Foreleg femur not expanded, without sensory field; mid- and hind legs with coxal styli, apex of coxal styli yellow. Ventral surface of legs with long bristles, without needle-shaped setae. Pretarsal claw structure normal (Figures 3.3A–C, 3.6A–C).



Figure 3.4. *Pedetontus (Verhoeffilis) jinxiuensis* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A–I) Abdominal sternites and coxites I–IX. (J) Penis & parameres. Scale bars: 500 μ m.

Abdomen. Abdominal coxites I, VI, and VII with one pair of retractile vesicles; coxites II–V with two pairs of retractile vesicles; coxites I–IX each with a pair of yellow styli (Figures 3.4A–I, 3.6D–G);

inner lobes of female coxite VII fused and posteriorly extended (Figure 3.6E). Ratios of styli length to coxites length on abdominal segment V, styli length to supporting spines length, and basal width to length of sternites given in Table 5. Coxite IX medially with 3–4+3–4 transparent macrochaetae (Figures 3.4I, 3.6G). Caudal filament laterally and cerci medially with deciduous long hairs and supporting spines (Figure 3.1B).



Figure 3.5. *Pedetontus (Verhoeffilis) jinxiuensis* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A) Habitus, lateral view. (B) Head, frontal view. (C) Ditto, lateral view. (D) Maxilla. (E) Hypopharynx. (F) Labium. (G) Labium palp. Scale bars: 500 μ m.

Coxite VIII without parameres. Coxite IX with penis and parameres (Figure 3.4I, J). Penis opening apically, slightly shorter than parameres; parameres 1+7 segmented (Figure 3.4J). Ovipositor

of primary type, surpassing styli (including supporting spines) of coxite IX (Figure 3.6G). Number of segments of anterior gonapophyses and posterior gonapophyses given in Table 6.

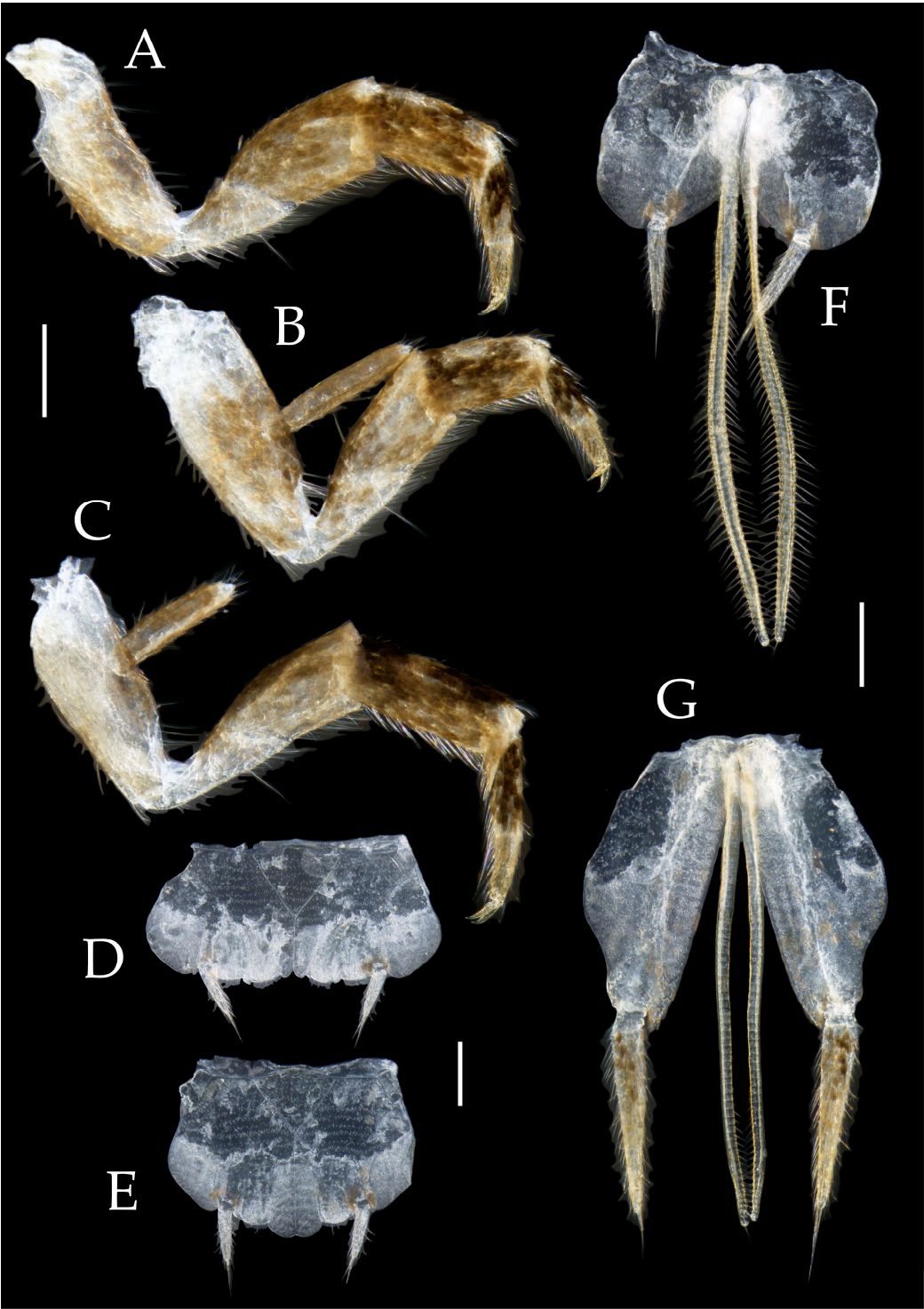


Figure 3.6. *Pedetontus (Verhoeffilis) jinxiuensis* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A–C) Foreleg, midleg & hindleg. (D–G) Abdominal sternites and coxites V, VII–IX. Scale bars: 500 μm.

Differential diagnosis. *Pedetontus (Verhoeffilis) jinxiuensis* sp. n. is morphologically very similar to *P. (V.) xanthospilus* sp. n. from Zhaoqing, Guangdong Province, but can be distinguished by the form of the labial palps: the former has a highly modified ultimate article (width significantly greater than length), with the anterolateral part of article I in males also laterally expanded. Additionally, the apex of the female ultimate article lacks sensory cones—an extremely rare feature. In contrast, although the labial palps of *P. (V.) xanthospilus* sp. n. are also swollen, they are far less modified than

in *P. (V.) jinxiuensis* sp. n., article I lacks specialization, and both sexes possess sensory cones at the apex of the ultimate article.

Etymology. The species is named after its type locality, Jinxiu County. The Chinese name for *P. (V.) jinxiuensis* is 金秀跳蚬.

Distribution. Jinxiu County, Guangxi Zhuang Autonomous Region, China.

Pedetontus (Verhoeffilis) nanningensis Shen, Yang, Ji & Zhang sp. n. (Figures 4.1–4.6)

Zoobank: urn:lsid:zoobank.org:act:4D83A441-4098-4384-B529-75E5B3D303A4

Type Specimens & Type Locality. Holotype, 1♂ (in 70% ethanol), Paratypes: 4♂ 6♀ (in 70% ethanol), collected from Jiangnan District, Nanning City, Guangxi Zhuang Autonomous Region, China, 18 II.2025, by Jia-Yong Zhang. All type specimens deposited in the Animal Herbarium, Zhejiang Normal University, Jinhua, China.

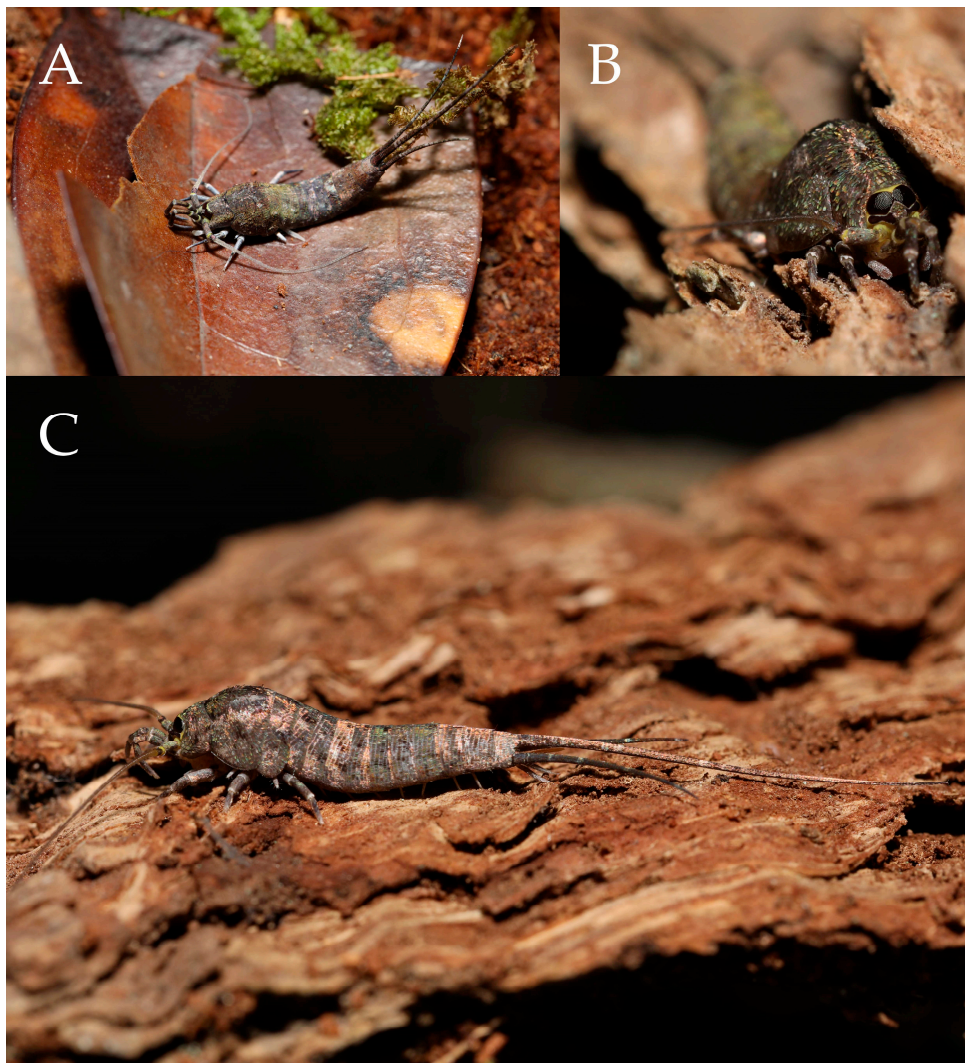


Figure 4.1. *Pedetontus (Verhoeffilis) nanningensis* Shen, Yang, Ji & Zhang sp. n. (A–C) Dorsal, anterolateral and lateral view.

Description. Male body length 10.6 mm, female 11.6 mm. Body covered with grayish-green scales. Antennae slightly shorter than body length; caudal filament slightly longer than body length; cerci about three-quarters as long as body length (Figure 4.1A, C).

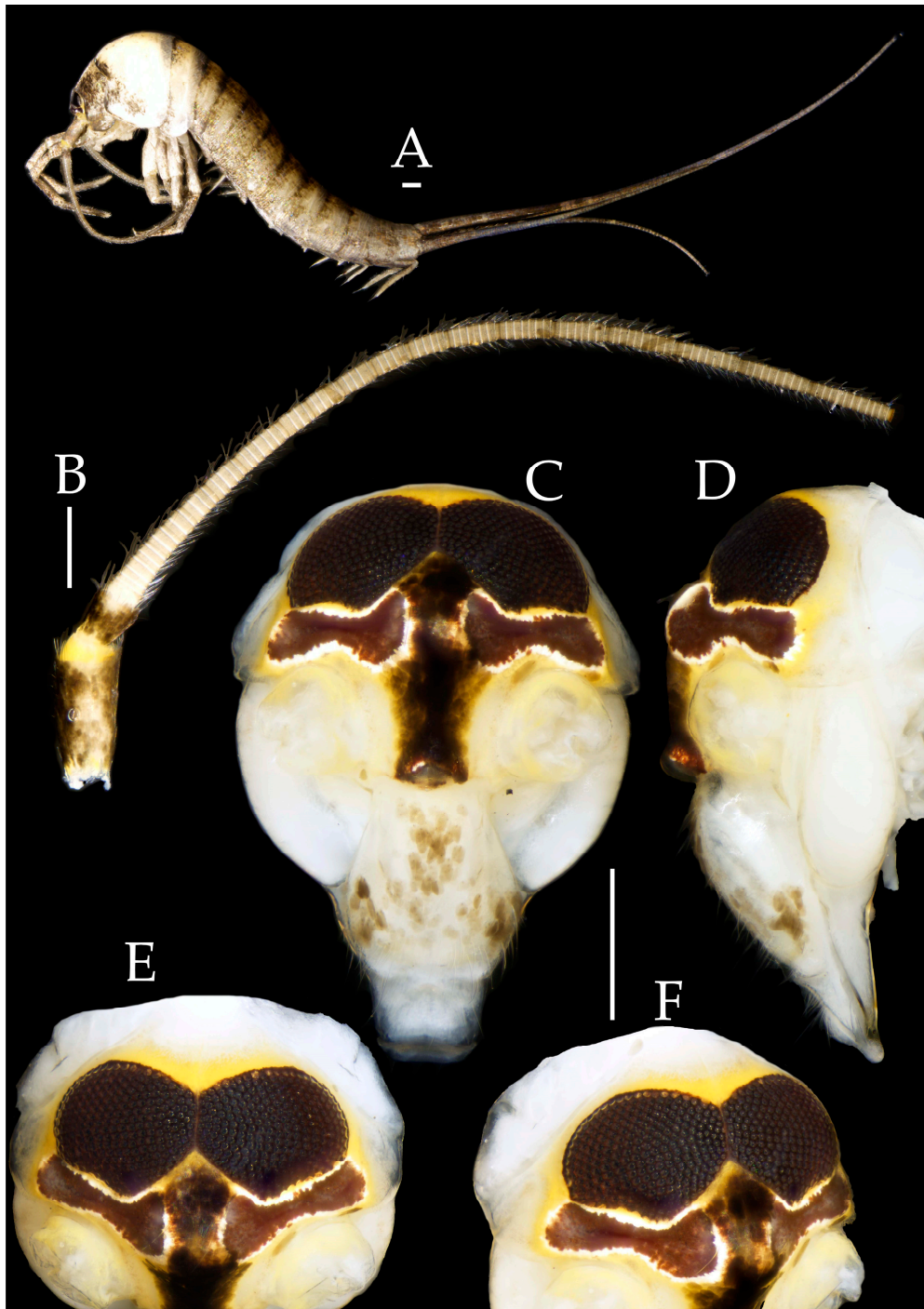


Figure 4.2. *Pedetontus (Verhoeffilis) nanningensis* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A) Habitus, lateral view. (B) Antenna. (C) Head, frontal view. (D) Ditto, lateral view. (E, F) Compound eyes & paired ocelli. Scale bars: 500 μ m.

Head. Compound eyes smooth, black, without markings (Figures 4.1B, 4.2C–F, 4.5C); ratios of eye length to width and contact line length to eye length given in Table 1. Ocelli dark brown with white borders, dumbbell-shaped. Ratios of ocellus length to width and distance between inner margins of ocelli to combined width of eyes given in Table 1. Vertex without markings. Frons convex, with long transparent bristles, scaled. Genae without bristles. Clypeus and labrum with transparent bristles (Figures 4.2C–F, 4.5C).

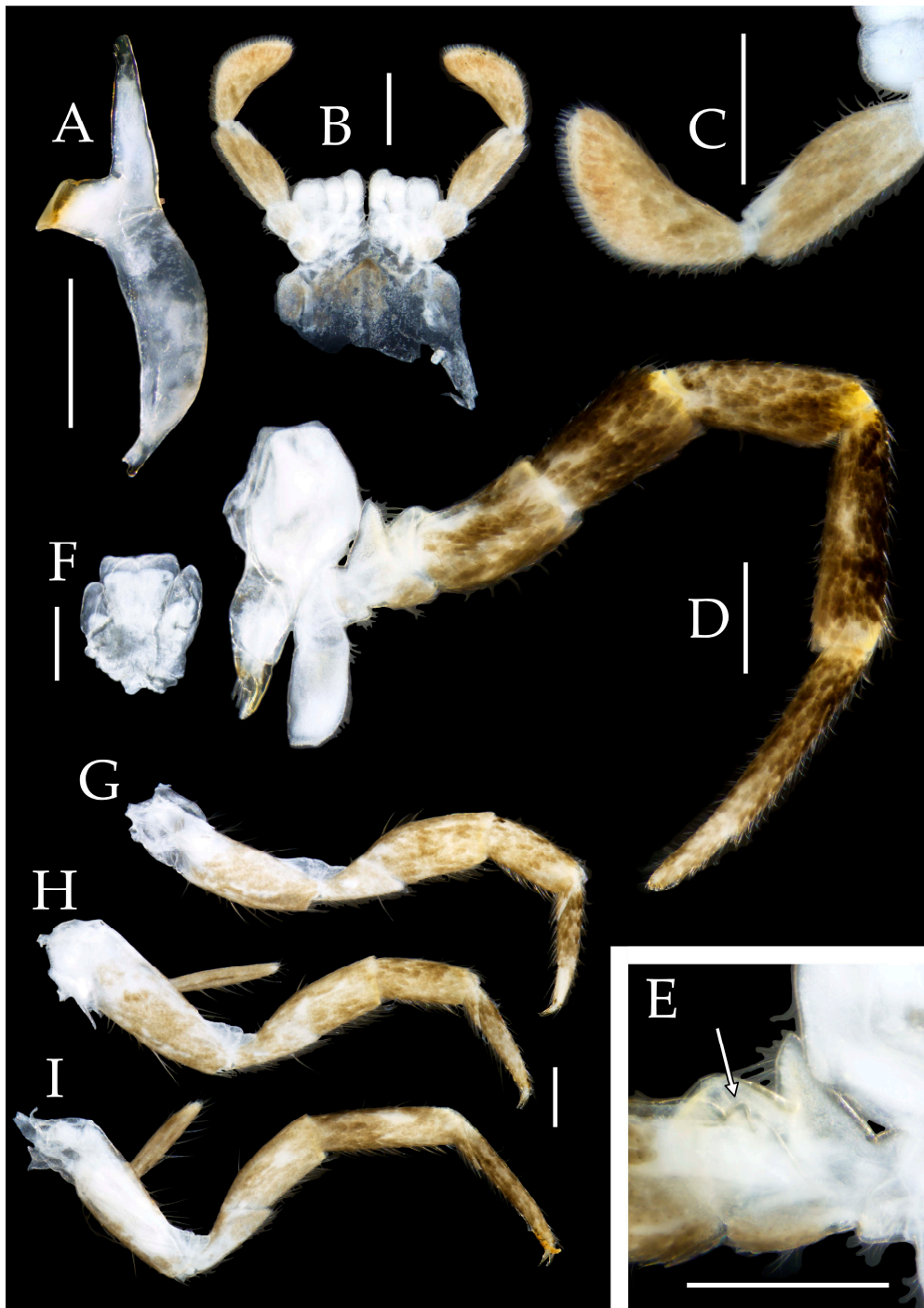


Figure 4.3. *Pedetontus (Verhoeffilis) nanningensis* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A) Mandible (B) Labium. (C) Labial palp (D) Maxilla. (E) Maxillary inner protuberance. (F) Hypopharynx. (G–I) Foreleg, midleg & hindleg. Scale bars: 500 µm.

Antennae scaled except on flagellum; flagellum almost without dark annulations, bearing well-developed annulate setae; terminal chain divided into 14 segments. Scape length-to-width ratio 1.97–2.11 (Figures 4.2B, 4.5B).

Mandibles typical, apex with four distal teeth (Figure 4.3D).

Maxillary palp I with one processus basalis and one inner protuberance (Figures 4.3D, E, 4.6C). Maxillary palp articles without short brush-like setae ventrally. Ratio of ultimate article to penultimate article length 0.45–0.52. Dorsal surface of maxillary palp articles V–VII with transparent spines (Figures 4.3D, 4.6C); numbers given in Table 2.

Hypopharynx structure typical (Figure 4.3F).

Male labial palp third segment modified, laterally expanded, apex with sensory cones; numbers given in Table 2; ultimate article of female almost unswollen, clavate. Labial palp without long hair-like setae (Figures 4.3B, C, 4.6A,B).

Thorax. Thorax normal. Foreleg without sensory field or coxal styli; mid- and hind legs with coxal styli. Ventral surface of legs with long bristles, without needle-shaped setae. Pretarsal claw structure normal (Figures 4.3G–I, 4.5D–F).

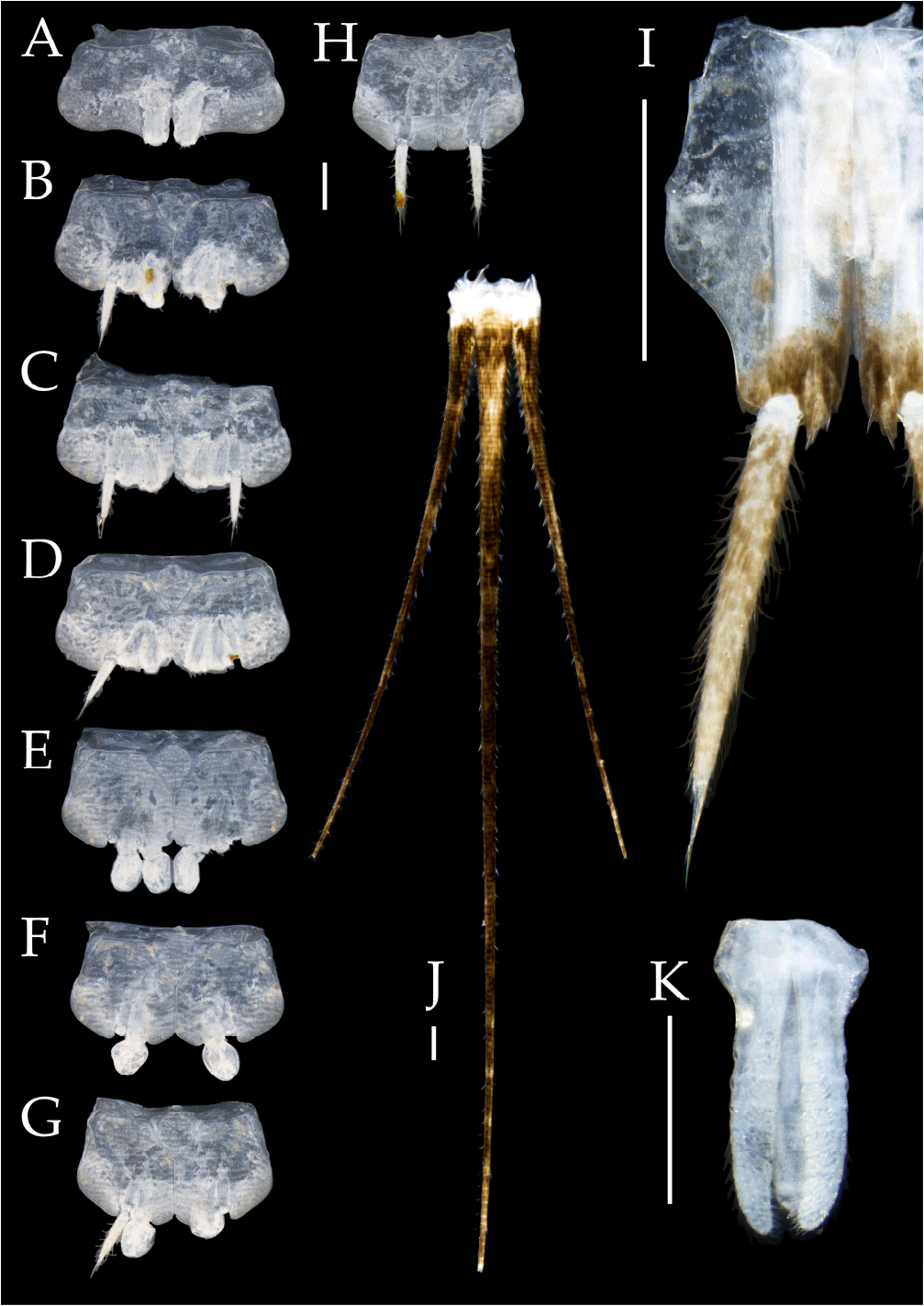


Figure 4.4. *Pedetontus (Verhoeffilis) nanningensis* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A–I) Abdominal sternites and coxites I–IX. (J) Caudal filament & cerci. (K) Penis & parameres. Scale bars: 500 μ m.

Abdomen. Abdominal coxites I, VI, and VII with one pair of retractile vesicles; coxites II–V with two pairs of retractile vesicles (Figures 4.4A–G, 4.6D,E); inner lobes of female coxite VII fused and posteriorly extended (Figure 4.6E). Ratios of styli length to coxites length on abdominal segment V,

styli length to supporting spines length, and basal width to length of sternites given in Table 5. Coxite IX medially with 6+6 transparent macrochaetae (Figures 4.4I, 4.6G). Caudal filament laterally and cerci medially with deciduous long hairs and supporting spines (Figure 4.4J).

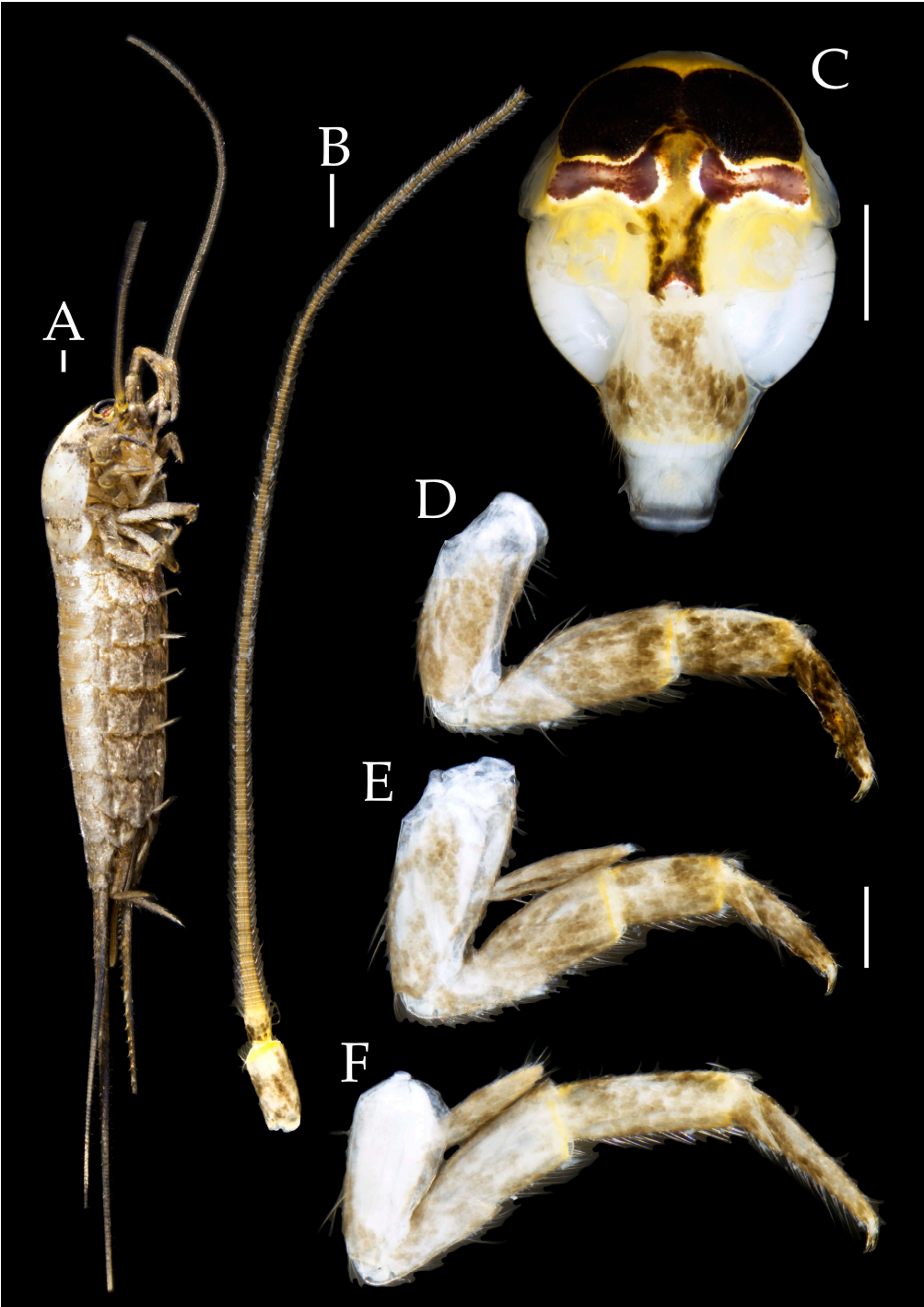


Figure 4.5. *Pedetontus (Verhoeffilis) nanningensis* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A) Habitus, lateral view. (B) Antenna. (C) Head, frontal view. (D–F) Foreleg, midleg & hindleg. Scale bars: 500 µm.

Coxite VIII without parameres. Coxite IX with penis and parameres (Figure 4.4H, I). Penis opening apically, slightly shorter than parameres; parameres 1+7 segmented (Figure 4.4K). Ovipositor of primary type, narrowly exceeding styli (including supporting spines) of coxite IX (Figure 4.6F, G). Number of segments of anterior gonapophyses and posterior gonapophyses given in Table 6.

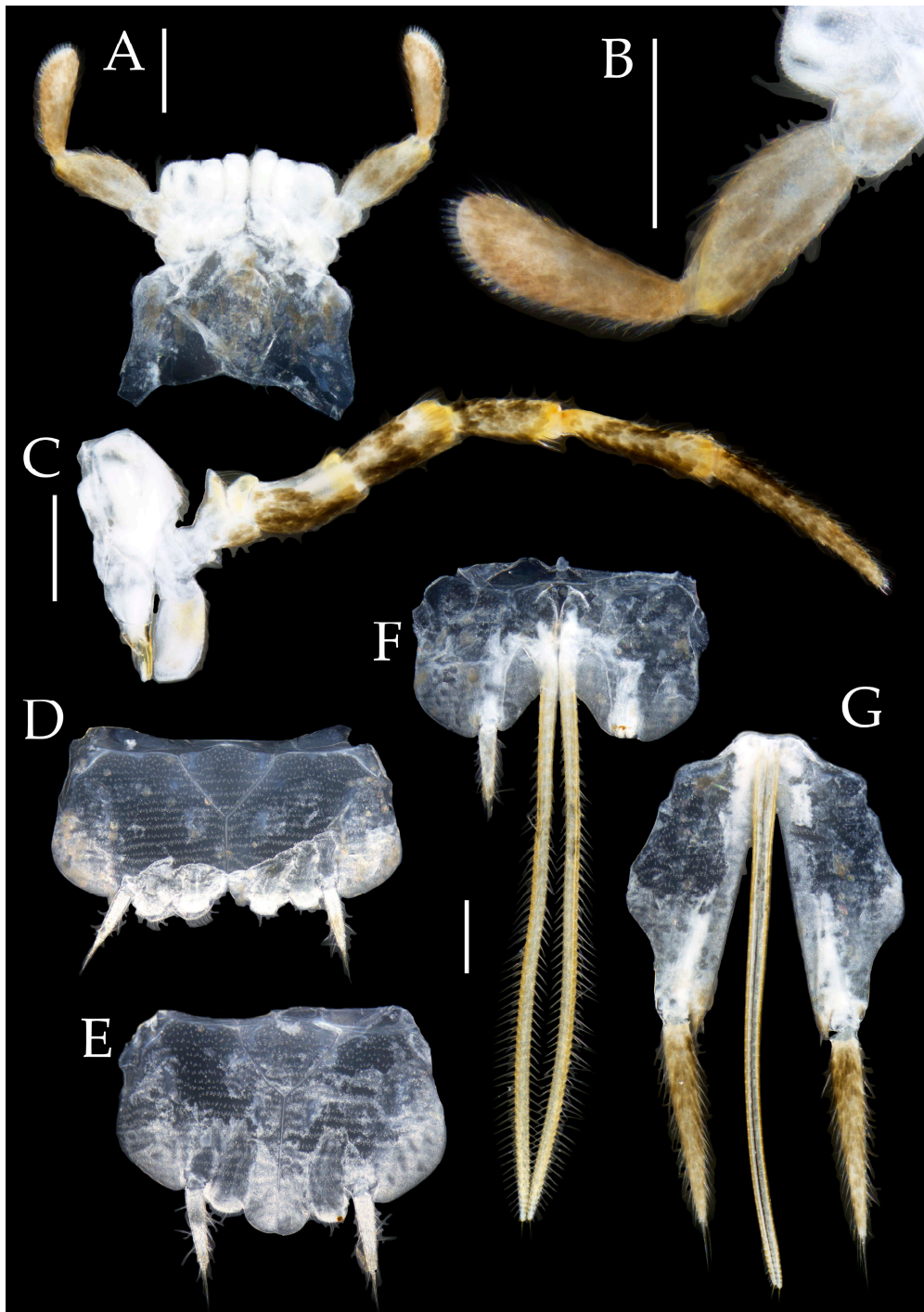


Figure 4.6. *Pedetontus (Verhoeffilis) nanningensis* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A) Labium. (B) Labial palp. (C) Maxilla. (D–G) Abdominal sternites and coxites V, VII–IX. Scale bars: 500 μ m.

Differential diagnosis. *Pedetontus (Verhoeffilis) nanningensis* sp. n. is morphologically most similar to *P. (V.) gershneri* Allen, 1995 from Arkansas, USA. They can be distinguished by the maxillary palps: the former lacks brush-like setae ventrally on the male maxillary palps, whereas the latter possesses brush-like setae ventrally on articles V–VII. Additionally, the ultimate article of the maxillary palp in *P. (V.) nanningensis* sp. n. is only half the length of the penultimate article, while in *P. (V.) gershneri* it exceeds three-quarters the length of the penultimate article.

Etymology. The species is named after its type locality, Nanning City. The Chinese name for *P. (V.) nanningensis* sp. n. is 南宁跳蛎.

Distribution. Guangxi Zhuang Autonomous Region, China.

Pedetontus shenzhenensis Shen, Yang, Ji & Zhang sp. n. (Figures 5.1–5.3)

Zoobank: urn:lsid:zoobank.org:act:D809BC47-4BED-4B63-993D-31267071EE31

Type Specimens & Type Locality. Holotype, 1♀ (in 70% ethanol), Paratype, 1♀ collected from Yangtai Mountain, Shenzhen City, Guangdong Province, China (22°39'57"N 113°58'29"E, 129m), 3.IV.2023, by Yong-Ying Ruan All type specimens deposited in the Animal Herbarium, Zhejiang Normal University, Jinhua, China.

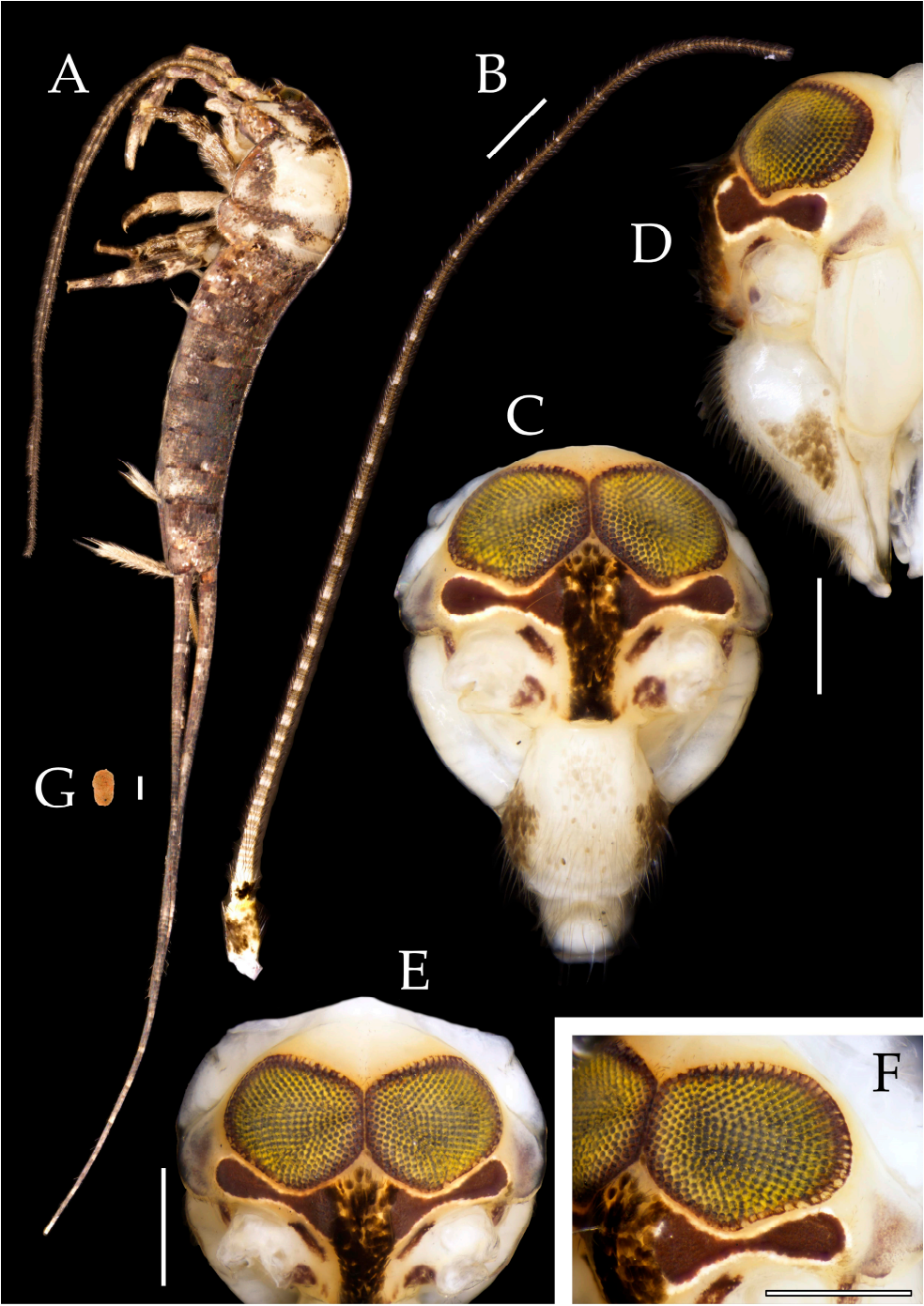


Figure 5.1. *Pedetontus (Verhoeffilis) shenzhenensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A) Habitus, lateral view. (B) Antenna. (C) Head, frontal view. (D) Ditto, lateral view. (E, F) Compound eyes & paired ocelli. (G) Excrement. Scale bars: 500 µm.

Description. Female 11.2 mm. Body covered with brown scales (in 70% ethanol). Antennae longer than body length; caudal filament approximately 1.5 times body length; cerci slightly shorter than body length (Figure 5.1A).

Head. Compound eyes smooth, yellowish-green with maroon borders (Figure 5.1C–F); ratios of eye length to width and contact line length to eye length given in Table 1. Ocelli dark brown with white borders, dumbbell-shaped. Ratios of ocellus length to width and distance between inner margins of ocelli to combined width of eyes given in Table 1. Vertex without markings, bearing minute black setae arranged longitudinally. Frons convex, with long transparent bristles and minute black setae, scaled. Genae with black setae near compound eyes. Clypeus and labrum with transparent setae (Figure 5.1C–F).

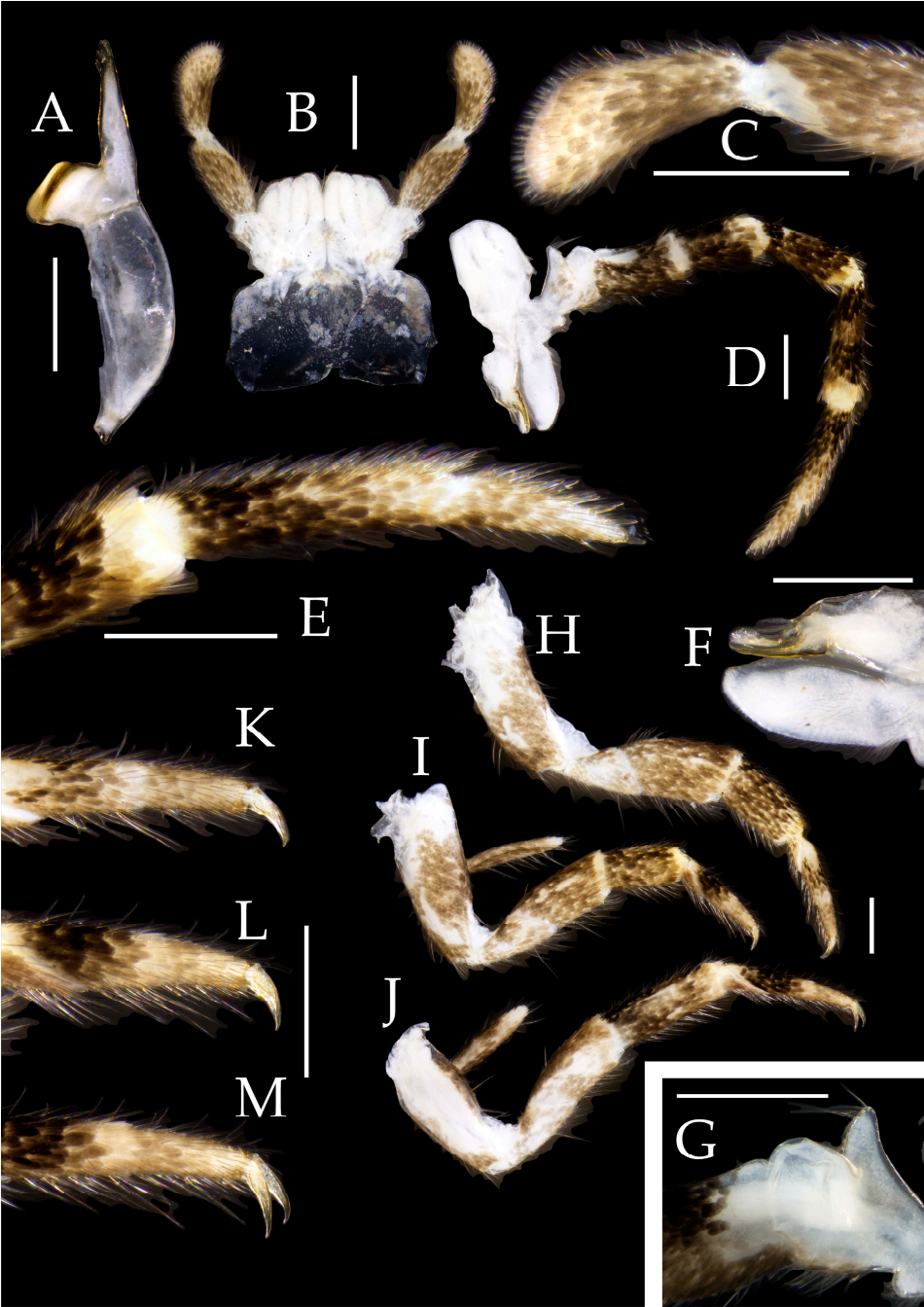


Figure 5.2. *Pedetontus (Verhoeffilis) shenzhenensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A) Mandible. (B) Labium. (C) Labial palp. (D) Maxilla. (E) Maxillary palp article VI & VII. (F) Lacinia & galea. (G) Maxillary inner protuberance. (G) Labium. (H–J) Foreleg, midleg & hindleg. (K–M) Foreclaw, midclaw & hindclaw. Scale bars: 500 μ m.

Antennae scaled except on flagellum; flagellum with distinct pale annulations, bearing well-developed annulate setae; terminal chain divided into 10 segments. Scape length-to-width ratio 1.90 (Figure 5.1B).

Mandibles typical, apex with four distal teeth (Figure 5.2A).

Maxillary palp I with one processus basalis and one inner protuberance (Figure 5.2D, G). Maxillary palp articles without short brush-like setae ventrally. Ratio of ultimate article to penultimate article length 0.62. Dorsal surface of maxillary palp articles V–VII with transparent spines (Figure 5.2D, E); numbers given in Table 2.

Labial palp third segment slightly swollen apically, with sensory cones; numbers given in Table 2. Labial palp without long hair-like setae (Figure 5.2B, C).

Thorax. Thorax normal. Foreleg without sensory field or coxal styli; mid- and hind legs with coxal styli. Ventral surface of legs with long bristles, without needle-shaped setae. Pretarsal claw structure normal (Figure 5.2H–M).

Abdomen. Abdominal coxites I, VI, and VII with one pair of retractile vesicles; coxites II–V with two pairs of retractile vesicles (Figure 5.3A–G); inner lobes of female coxite VII fused and posteriorly extended (Figure 5.3G). Ratios of styli length to coxites length on abdominal segment V, styli length to supporting spines length, and basal width to length of sternites given in Table 5. Coxite IX medially with 4–5+4–5 transparent macrochaetae (Figure 5.3I). Caudal filament laterally and cerci medially with deciduous long hairs and supporting spines (Figure 5.3J).

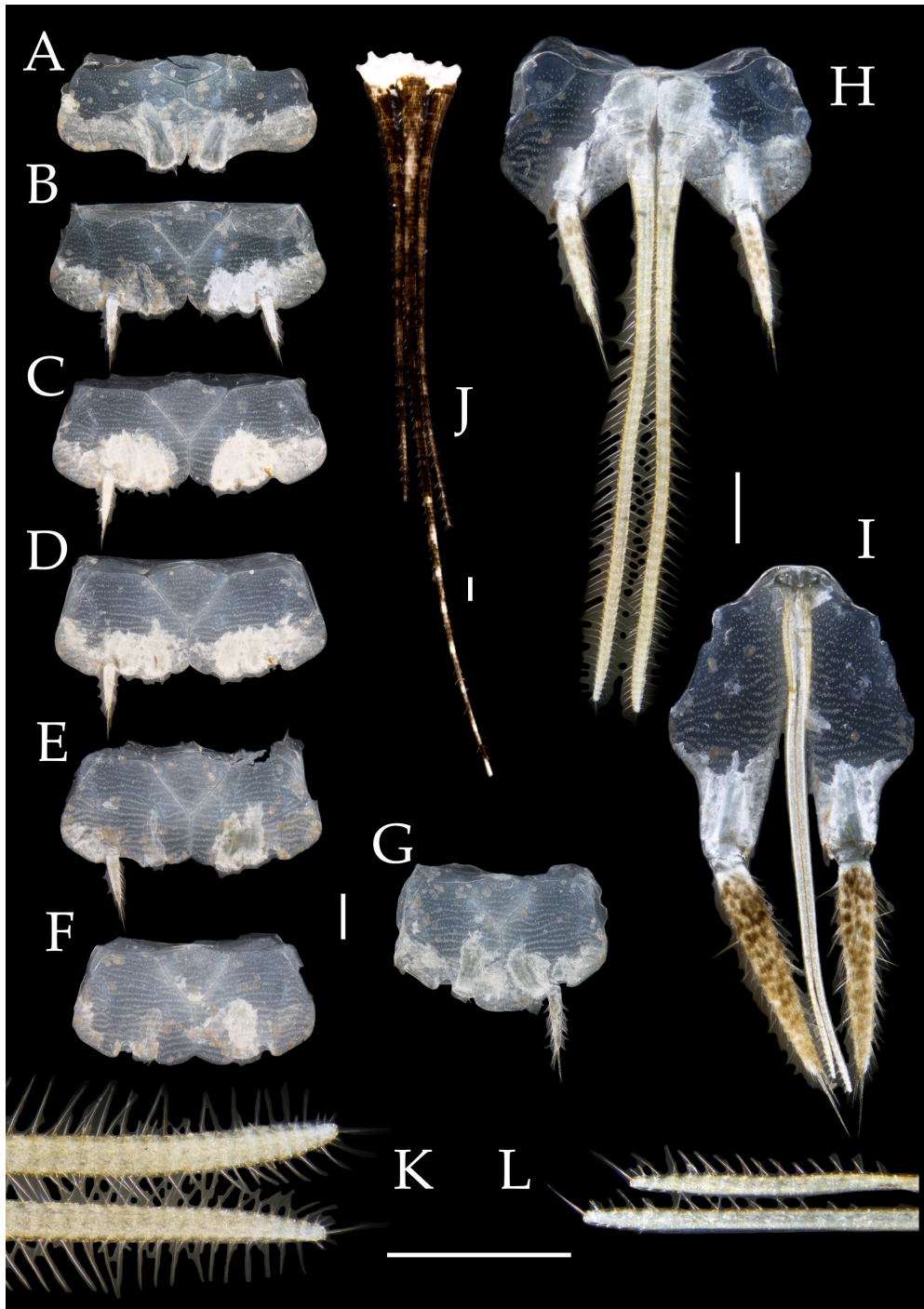


Figure 5.3. *Pedetontus (Verhoeffilis) shenzhenensis* Shen, Yang, Ji & Zhang sp. n., holotype, female. (A–I) Abdominal sternites and coxites I–IX. (J) Caudal filament & cerci. (K) Apex of anterior gonapophyses. (L) Apex of posterior gonapophyses. Scale bars: 500 μ m.

Ovipositor of primary type, slightly shorter than styli (including supporting spines) of coxite IX (Figure 5.3H, I). Number of segments of anterior gonapophyses and posterior gonapophyses given in Table 6.

Differential Diagnosis. *Pedetontus (Verhoeffilis) shenzhenensis* sp. n. is morphologically closest to *P. (V.) bianchii* Silvestri, 1936 from Hong Kong. The abdominal segment IX provides a key distinction: in *P. (V.) shenzhengensis* sp. n., the styli (including supporting spines) of coxite IX are longer than coxite IX itself, while the posterior gonapophyses are slightly shorter than these styli. Conversely, in *P. (V.) bianchii*, the styli (including supporting spines) of coxite IX are shorter than coxite IX, and the posterior gonapophyses exceed their length. Additionally, the scape of *P. (V.)*

shenzhenensis sp. n. is slender than that of *P. (V.) bianchii*, with length-to-width ratios of 1.90 and 1.42, respectively.

Etymology. The species is named after its type locality, Shenzhen City. The Chinese name for *P. (V.) shenzhenensis* sp. n. is 深圳跳蚱.

Distribution. Guangdong Province, China.

Pedetontus (Verhoeffilis) xanthospilus Shen, Yang, Ji & Zhang sp. n. (Figures 6.1–6.6)

Zoobank: urn:lsid:zoobank.org:act:8C07BFC0-2BB3-4053-A2AB-23B08DA13180

Type Specimens & Type Locality. Holotype, 1♂ (in 70% ethanol), Paratypes: 11♂7♀ (in 70% ethanol), China, Guangdong Province, Zhaoqing City, Duanzhou District, Beiling Mountain Forest Park (23°09'N 112°30'E), from rocks along a stream, 20.XI.2024–3.I.2025, collected by Han-sheng Ou. All type specimens deposited in the Animal Herbarium, Zhejiang Normal University, Jinhua, China.



Figure 6.1. *Pedetontus (Verhoeffilis) xanthospilus* Shen, Yang, Ji & Zhang sp. n. (A) The captured *P. (V.) xanthospilus* sp. n., arrow indicates a mite. (B) Ditto. (C) In situ. (D) Habitat.

Description. Male body length 10.2 mm, female 9.2 mm. Body covered with dark brown scales; nota with a pale longitudinal stripe extending from the pronotum to the base of the caudal filament, terminating in two large and one small diamond-shaped markings. Antennae slightly shorter than body length; caudal filament slightly longer than body length; cerci about half as long as body length (Figures 6.1A–C, 6.2A, 6.5A).

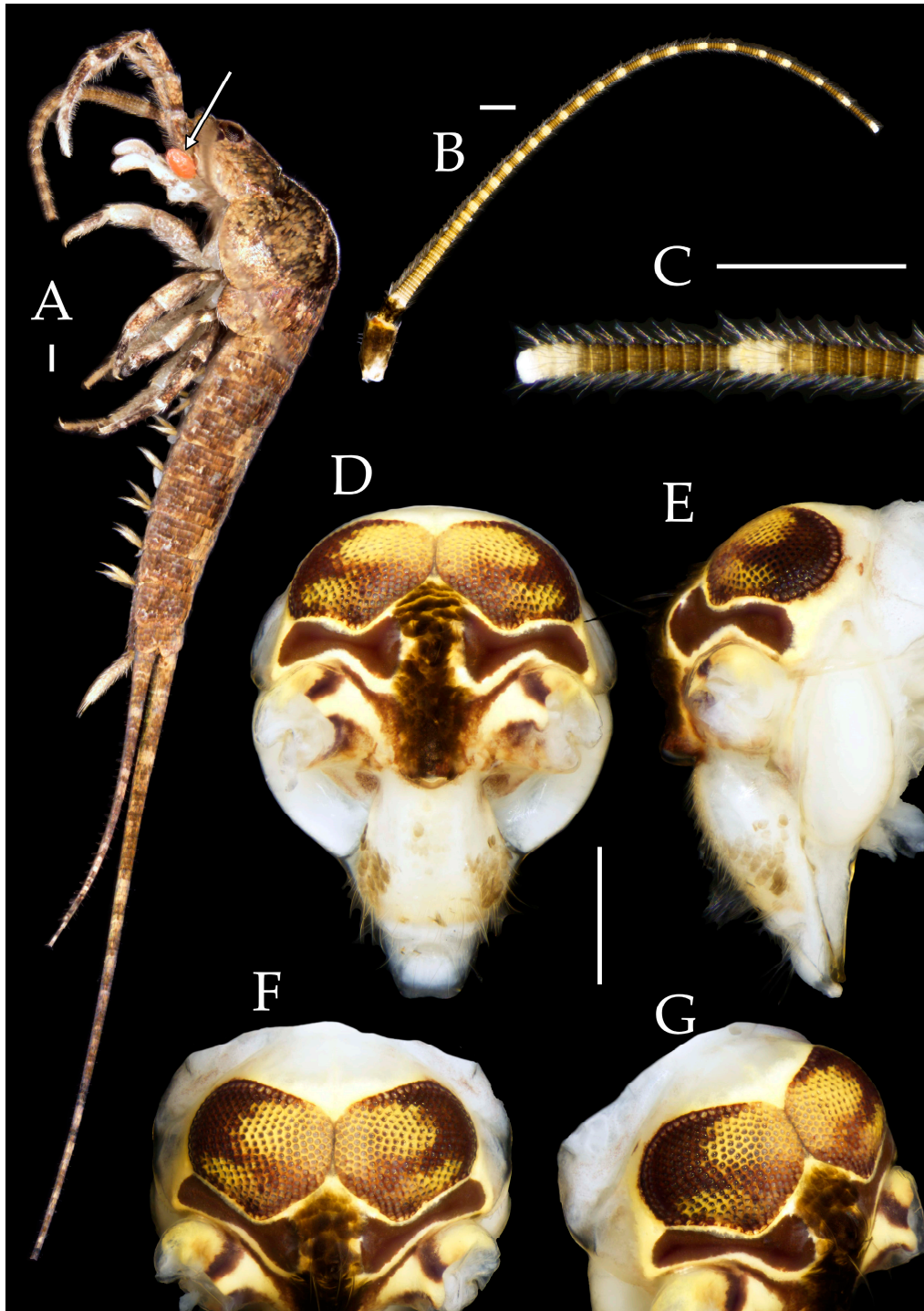


Figure 6.2. *Pedetontus (Verhoeffilis) xanthospilus* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A) Habitus, lateral view, arrow indicates a mite attached to the maxilla. (B) Antenna. (C) Terminal chain of flagellum. (D) Head, frontal view. (E) Ditto, lateral view. (F, G) Compound eyes & paired ocelli. Scale bars: 500 μ m.

Head. Compound eyes smooth, dark brown, with a large bright yellow blotch internally and a smaller one inferiorly (Figures 6.2D–G, 6.5B); ratios of eye length to width and contact line length to

eye length given in Table 1. Ocelli dark brown, dumbbell-shaped. Ratios of ocellus length to width and distance between inner margins of ocelli to combined width of eyes given in Table 1. Vertex without markings or setae. Frons convex, with long transparent bristles, scaled. Genae without markings or setae. Clypeus and labrum with transparent setae (Figures 6.2D–G, 6.5B).



Figure 6.3. *Pedetontus (Verhoeffilis) xanthospilus* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A) Mandible. (B) Labium. (C) Labial palp. (D) Maxilla. (E) Maxillary palp article V–VII. (F) Maxillary inner protuberance. (G–I) Foreleg, midleg & hindleg. Scale bars: 500 μ m.

Antennae scaled except on flagellum; flagellum with distinct pale annulations, bearing well-developed annulate setae; terminal chain divided into 11–12 segments. Scape length-to-width ratio 1.74–1.91 (Figure 6.2B).

Mandibles typical, apex with four distal teeth (Figure 6.3A).

Maxillary palp I with one processus basalis and one inner protuberance (Figures 6.3D, F, 6.5E). Maxillary palp articles II–VII with brush-like setae ventrally, setae on articles IV–V longer than others. Ratio of ultimate article to penultimate article length 0.45–0.52. Dorsal surface of maxillary palp articles V–VII with transparent spines (Figures 6.3D, 6.5E); numbers given in Table 2.

Male labial palp third segment modified, laterally expanded, apex with sensory cones; numbers given in Table 2; ultimate article of female almost unswollen, clavate. Labial palp without long hair-like setae (Figures 6.3B,C, 6.5D).

Thorax. Thorax normal. Foreleg without sensory field or coxal styli; mid- and hind legs with coxal styli, apex of coxal styli bright yellow. Ventral surface of legs with long bristles, without needle-shaped setae. Pretarsal claw structure normal (Figures 6.3G–I, 6.6A–C).

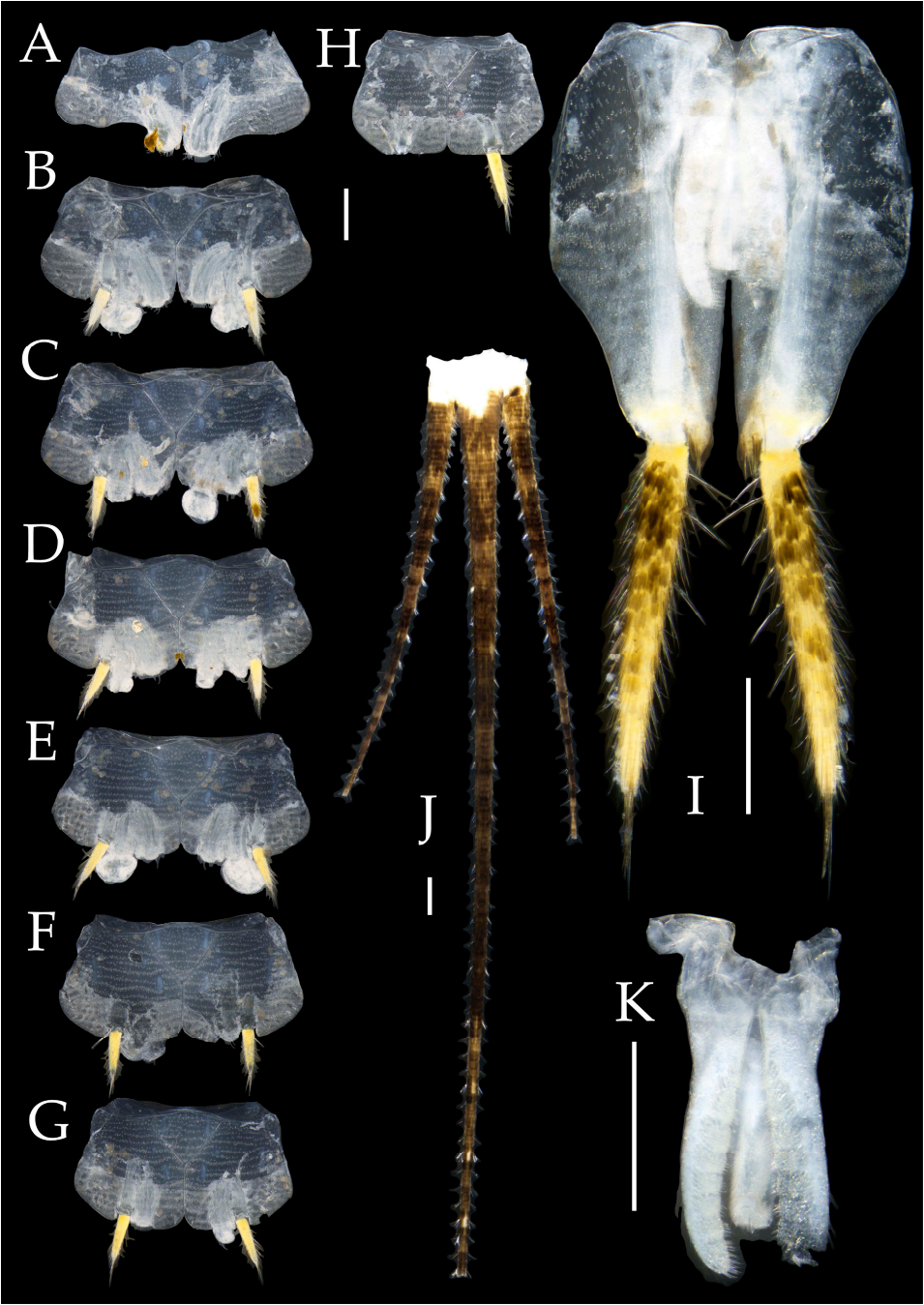


Figure 6.4. *Pedetontus (Verhoeffilis) xanthospilus* Shen, Yang, Ji & Zhang sp. n., holotype, male. (A–I) Abdominal sternites and coxites I–IX. (J) Caudal filament & cerci. (K) Penis & paramere. Scale bars: 500 μm.

Abdomen. Abdominal coxites I, VI, and VII with one pair of retractile vesicles; coxites II–V with two pairs of retractile vesicles; coxites I–IX each with a pair of yellow styli (Figures 6.4A–I, 6.6D–G); inner lobes of female coxite VII fused and posteriorly extended (Figure 6.6E). Ratios of styli length to coxites length on abdominal segment V, styli length to supporting spines length, and basal width to length of sternites given in Table 5. Coxite IX medially with 4–5+4–5 transparent macrochaetae (Figures 6.4I, 6.6G). Caudal filament laterally and cerci medially with deciduous long hairs and supporting spines (Figure 6.4J).

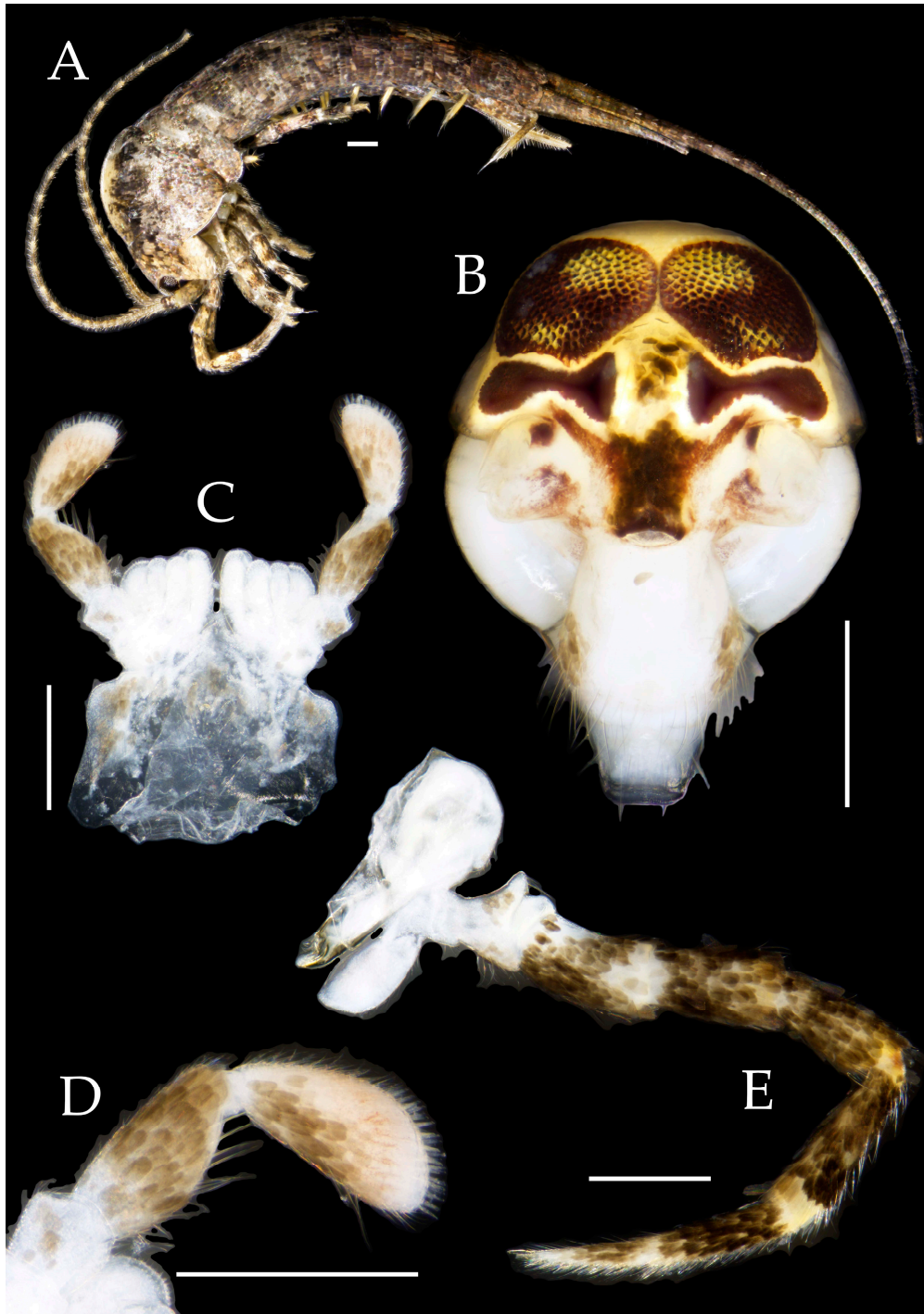


Figure 6.5. *Pedetontus (Verhoeffilis) xanthospilus* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A) Habitus, lateral view. (B) Head, frontal view. (C) Labium. (D) Labial palp. (E) Maxilla. Scale bars: 500 μ m.

Coxite VIII without parameres. Coxite IX with penis and parameres (Figure 6.4I, K). Penis opening apically, shorter than parameres; parameres 1+7 segmented (Figure 6.4K). Ovipositor of

primary type, not exceeding styli (including supporting spines) of coxite IX (Figure 6.6F, G). Number of segments of anterior gonapophyses and posterior gonapophyses given in Table 6.

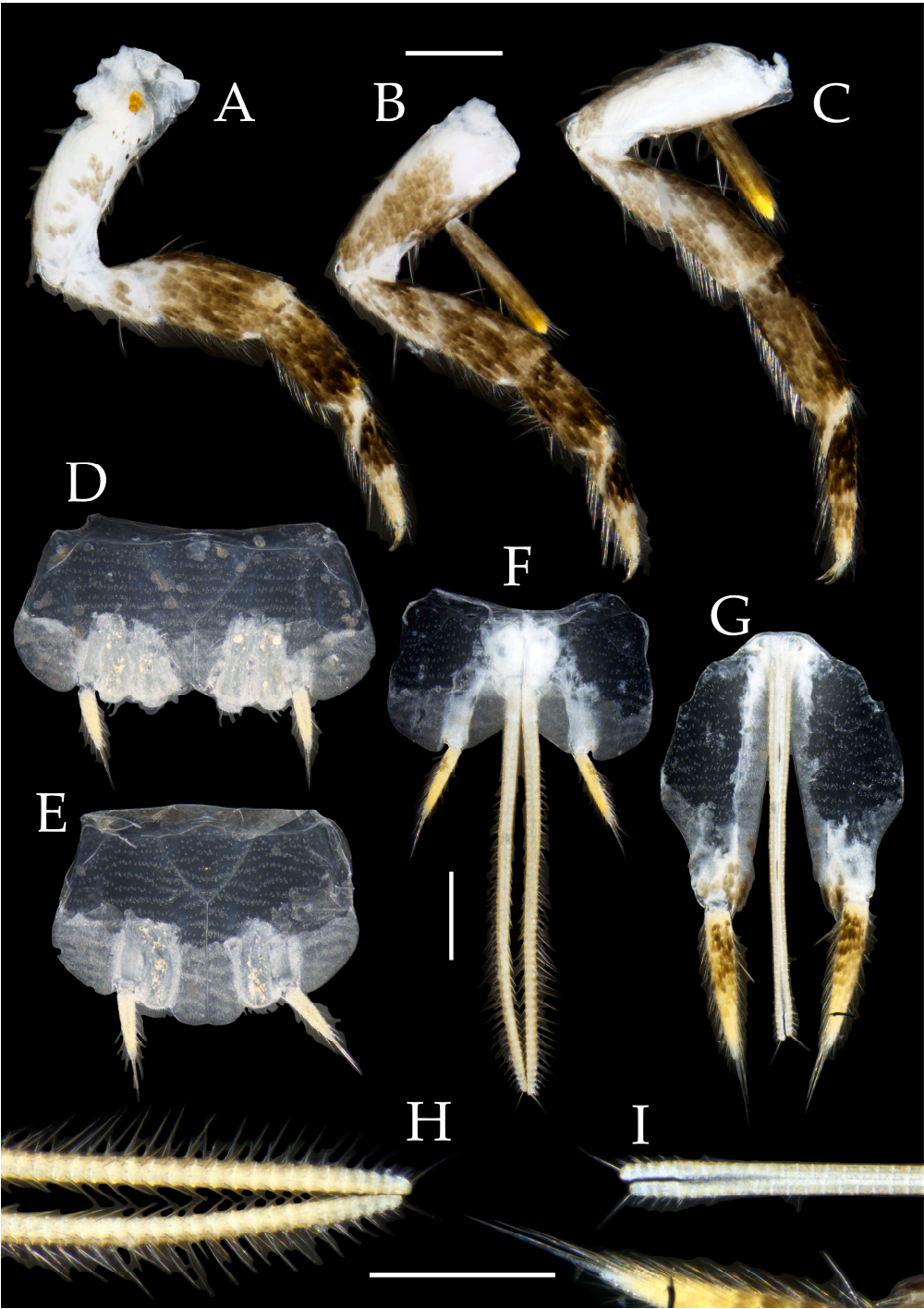


Figure 6.6. *Pedetontus (Verhoeffilis) xanthospilus* Shen, Yang, Ji & Zhang sp. n., paratype, female. (A–C) Foreleg, midleg & hindleg. (D–G) Abdominal sternites and coxites V, VII–IX. (H) Apex of anterior gonapophyses. (I) Apex of posterior gonapophyses. Scale bars: 500 μ m.

Differential Diagnosis. See corresponding section of *Pedetontus (Verhoeffilis) jinxiuensis* sp. n.

Etymology. The specific epithet "xanthospilus" is a Latinized adjective derived from: Greek xanthos (ξανθός), meaning "yellow", Greek spilos (σπίλος), meaning "blotch" or "stain". It refers to the species' conspicuous yellow blotches on the compound eyes, a defining diagnostic trait that distinguishes this taxon from congeners. The Chinese name for *P. (V.) xanthospilus* sp. n. is 黄斑跳蛎.

Distribution. Guangdong Province, China.

3.4. Phylogenetic Tree of Machilidae Based on COX1

Based on the phylogenetic tree, Machilinae is a paraphyletic group, also the monophyly of Petrobiinae is refuted by the inclusion of *Petrobius brevistylis* within Machilinae, but the monophyly of the *Pedetontus* group is supported (*Pedetontus* + *Pedetontinus*). Within the genus *Pedetontus*, *P. (V.) nanningensis* sp. n. occupies the basal position, *P. (V.) elegans* sp. n. and *P. (V.) zhejiangensis* form a sister clade, while *P. (V.) xanthospilus* sp. n. and *P. (V.) jinxiuensis* sp. n. constitute another sister clade.

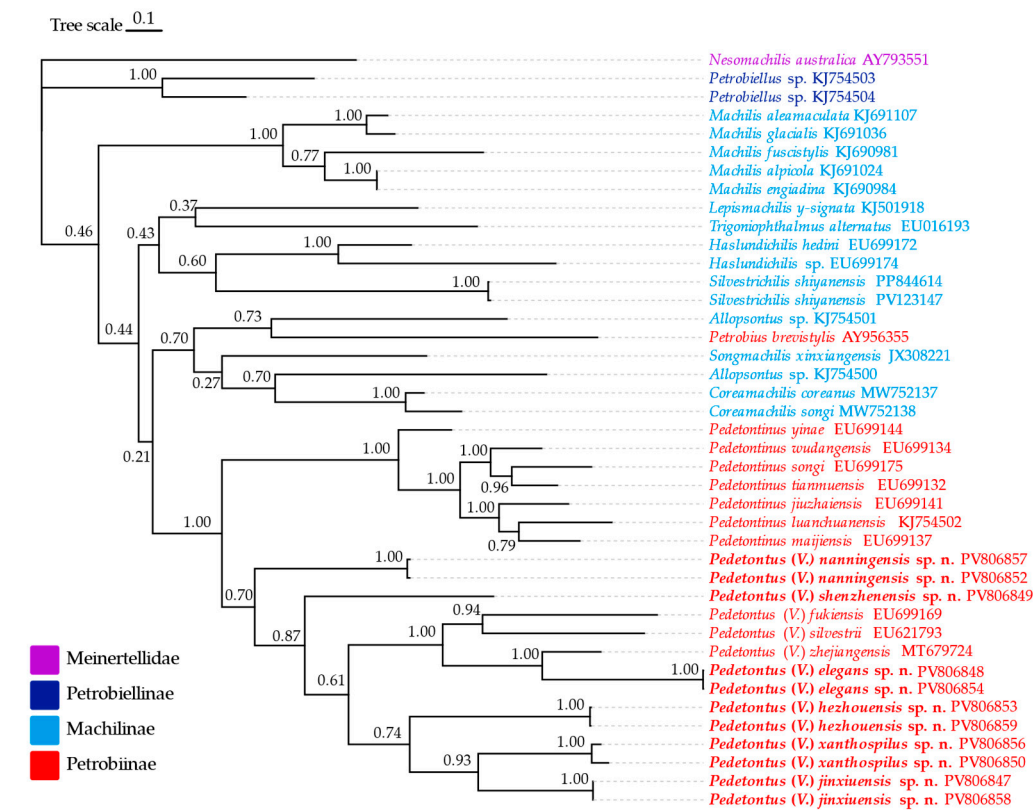


Figure 7. Bayesian inference phylogenetic tree based on a tandem dataset of 41 COX1 genes. Posterior probabilities are shown at the nodes.

4. Discussion

Based on morphological observations and COX1 gene analysis, this study reports six new species of genus *Pedetontus* from southern China: *P. (V.) elegans* sp. n. from Zhejiang Province; *P. (V.) shenzhenensis* sp. n. and *P. (V.) xanthospilus* sp. n. from Guangdong Province; *P. (V.) nanningensis* sp. n., *P. (V.) hezhouensis* sp. n., and *P. (V.) jinxiuensis* sp. n. from Guangxi Zhuang Autonomous Region. All these species belong to the subgenus *Verhoeffilis*, which is characterized by the presence of two pairs of retractile vesicles restricted to coxites II–V and posterior angles of abdominal sternites $\leq 90^\circ$. *P. (V.) elegans* sp. n. and *P. (V.) zhejiangensis* form a sister clade, both species originate from Zhejiang Province and share some morphological similarities, but they can be distinguished by the following characteristics: The compound eyes of *P. (V.) zhejiangensis* are reddish-brown, while those of *P. elegans* sp. n. are yellowish-green. *P. (V.) zhejiangensis* lacks stout setae on the frons, whereas *P. (V.) elegans* sp. n. possesses well-developed stout setae. The male labial palps of *P. (V.) zhejiangensis* bear a few long filamentous setae laterally, which are absent in *P. (V.) elegans* sp. n. The ultimate segment of the maxillary palps is distinctly shorter than the penultimate segment in *P. (V.) zhejiangensis*, whereas in *P. (V.) elegans* sp. n., the ultimate and penultimate segments are equal in length. The parameres of *P. (V.) zhejiangensis* exhibit 1+8 segmentation, and the penis is shorter than the parameres; in contrast, *P. (V.) elegans* sp. n. has 1+7 segmented parameres, and the penis is longer than the parameres.

The subgenus *Verhoeffilis* is believed to have originated in the southeastern Palaearctic Realm. Its northeastward migration led to the emergence of the American *s. stricto* subgenus, whereas its southward dispersal resulted in the current Indo-Malayan *Pedetontus* species [6]. Southern China is situated at the transitional zone between the Palaearctic and Oriental Realms. Among the new species described, *P. (V.) elegans* sp. n. (Zhejiang) exhibits morphological traits most consistent with the Palaearctic fauna: Compound eyes longer than wide; ventral surfaces of thoracic legs bearing subspine-form setae. In contrast, the remaining five species (from Guangdong and Guangxi) possess compound eyes that are wider than long and lack subspine-form setae on thoracic legs. Phylogenetic analysis indicates that *P. (V.) elegans* sp. n. is closely related to the Palaearctic species *P. silvestrii*.

P. (V.) xanthospilus sp. n. and *P. (V.) jinxiuensis* sp. n. form sister clades on the phylogenetic tree and exhibit morphological similarities. However, the genetic distance based on COX1 sequences and differences in the labial palpal provide evidence that they represent distinct species. These observations suggest the subgenus is undergoing a process of divergence.

Petrobius brevistylis is clustered within the *Allopsontus* group—an unexpected placement that highlighting its taxonomic distinctness. This is consistent with its possession of non-segmented parameres and a penis that is significantly longer than the coxite IX, in contrast to most Petrobiinae species, which typically exhibit segmented parameres and a penis shorter than the coxite IX [55]. The genus *Allopsontus* appears to be non-monophyletic according to the phylogenetic tree, potentially due to the presence of seven morphologically distinct subgenera distributed across Northwest China, Central Asia, Mongolia, and the southern Himalayas. Key morphological differences include differences include variations in ocellar shape/position, the number of coxal vesicles, and penis morphology[56], suggesting a lack of monophyly that warrants further investigation through molecular and detailed morphological study.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org. S1: Information about samples used in this study and their NCBI GenBank accession numbers.

Author Contributions: Conceptualization, C.-Y.S., T.Y. and J.-Y.Z.; methodology, C.-Y.S. and J.-Y.Z.; software, C.-Y.S. and T.Y.; validation, C.-Y.S. and J.-Y.Z.; formal analysis, C.-Y.S., T.Y. and J.-Y.Z.; investigation, C.-Y.S., J.-H.J. and J.-Y.Z.; resources, C.-Y.S., J.-H.J. and J.-Y.Z.; data curation, C.-Y.S. and T.Y.; writing—original draft preparation, C.-Y.S. and T.Y.; writing—review and editing, C.-Y.S., T.Y., J.-H.J. and J.-Y.Z.; visualization, C.-Y.S. and T.Y.; supervision, J.-Y.Z.; project administration, J.-Y.Z.; All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the Natural Science Foundation of Zhejiang Province (LY23C040002) and by the Natural Science Foundation of China (32470475).

Data Availability Statement: Supporting data for this study are available from the National Center for Biotechnology Information (<https://www.ncbi.nlm.nih.gov>) (accessed on 10 June 2025). The GenBank numbers, see Figure 7, Table S1.

Acknowledgments: We are deeply in debt to Zhi-Qiang Guo, Yong-Ying Ruan, Han-Sheng Qu, Wen-Yong Feng and the Institute of Zoology of the Guangdong Academy of Sciences for their assistance in sample collection during this study. Additionally, the authors express their gratitude to Hui-Yuan Wu for assistance in constructing the phylogenetic trees. Finally, special thanks are extended to Professor Shodo Mtow of Meijo University for generously providing literature, which significantly facilitated our study on the genus *Pedetontus* and other bristletail species.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Bach de Roca, C.; Baltanas, R.M.; Gaju Ricart, M. Orden Microcoryphia. *Ibero Diversidad Entomológica* **2015**, *38*, 1–12.

2. Sturm, H.; Machida, R. Archaeognatha. In *Handbook of Zoology*; Walter de Gruyter: Berlin, New York, 2001; Vol. 4.
3. Yanoviak, S.P.; Kaspari, M.; Dudley, R. Gliding Hexapods and the Origins of Insect Aerial Behaviour. *Biol. Lett.* **2009**, *5*, 510–512. <https://doi.org/10.1098/rsbl.2009.0029>.
4. Grimaldi, D.A.; Engel, M.S. *Evolution of the Insects*; Repr.; Cambridge Univ. Press: Cambridge, 2006; ISBN 978-0-521-82149-0.
5. Mendes, L.F. Taxonomy of Zygentoma and Microcoryphia: Historical Overview, Present Status and Goals for the New Millennium. *Pedobiologia* **2002**, *46*, 225–233.
6. Kaplin, V.G. A New Species of the Bristletail Genus *Pedetontus* Silv. (Thysanura, Machilidae) from Thailand. *Entomol. Rev.* **2013**, *93*, 887–892. <https://doi.org/10.1134/s0013873813070105>.
7. Mendes, L.F. *An Annotated List of Generic and Specific Names of Machilidae (Microcoryphia, Insecta) with Identification Keys for the Genera and Geographical Notes*; Ministerio do Planeamento e da Administração do Território, Secretaria de Estado da Ciência e Tecnologia, Instituto de Investigação Científica Tropical: Lisbon, 1990; Vol. 155;.
8. Silvestri, F. Quelques Formes Nouvelles de La Famille Des Machilides. *Annales des Sciences Naturelles (Zool)*(9) **1907**, *6*, 361–370.
9. Silvestri, F. Note sui Machilidae. III. Descrizione di un nuovo genere e di sei nuove specie. *Redia (Firenze)* **1906**, *3*, 325–335.
10. Silvestri, F. Machilidae (Thysanura). Entomologische Ergebnisse der schwedischen Kamtchatka-Expedition 1920-1922. *Arkiv för Zoologi* **1925**, *17*, 1–5.
11. Silvestri, F. Contributo Alla Conoscenza Dei Machilidae Dell’America Settentrionale. *Bolletino del Laboratorio de Zoologia Generale e Agraria della R. Scuola Superiore d’Agricoltura in Portici* **1911**, *5*, 324–350.
12. Silvestri, F. Descrizione Di Alcuni Machilidae (Thysanura) Della Cina. *Notes d’Entomologie Chinoise* **1936**, *3*, 103–115.
13. Silvestri, F. Contributto Alla Conoscenza Dei Machilidae (Insecta, Thysanura) Del Giappone. *Bolletino del Laboratorio di Zoologia generale i agraria di Portici* **1943**, *32*, 283–306.
14. Sturm, H. Possibilities and Problems of Morphological Taxonomy Shown by North American Representatives of the Subgenus *Pedetontus* s. str. and *Petridiobius Canadensis* (Archaeognatha, Machilidae, Petrobiinae). *Deutsche Entomologische Zeitschrift* **2001**, *48*, 3–21.
15. Allen, R.T. *Pedetontus Gershneri*, a New Species of Machilidae from the Interior Highlands of North America (Insecta: Microcoryphia). *Entomological News* **1995**, *106*, 195–198.
16. Kaplin, V.G. New species of bristletails (Microcoryphia, Machilidae) from the Kuril Islands and Primorsky Kari. *Txonomy of Insects of Far East* **1980**, 3–9.
17. Lee, B.H.; Choe, G.H. Two New Species of Microcoryphia (Insecta) from Korea. *The Korean journal of systematic zoology* **1992**, *8*, 19–34.
18. Machida, R. A New Species of the Genus *Pedetontus* from Japan (Insecta, Thysanura). *Annotationes zoologicae Japonenses* **1980**, *53*, 220–225.
19. Mendes, L.F. Sur Quelques Microcoryphia de l’Asie Orientale: Notes et Descriptions (Insecta; Apterygota). *Nouvelle revue d’entomologie* **1981**, *11*, 15–28.
20. Mendes, L. New Contribution towards the Knowledge of the Northern Korean Thysanurans (Microcoryphia and Zygentoma: Insecta). *Garcia Orta* **1991**, *18*, 67–78.
21. Uchida, H. Two Species of *Pedetontus* from Amami-o-Sima (Thysanura: Machilidae). *The entomological society of Japan* **1960**, *28*, 247–250.
22. Uchida, H. *Pedetontus* from Formosa (Thysanura: Machilidae). *Special Bulletin of Lepidopterological Society of Japan* **1965**, *1*, 249–252.
23. Wygodzinsky, P.W. Survey of the Microcoryphia (Insecta) of the Northeastern United States and Adjacent Provinces of Canada.
24. Xue, L.Z.; Yin, W.Y. Two new species of bristletail from the Tianmu Mountain (Microcoryphia, Machilidae). *Contributions from Shanghai Institute of Entomology* **1991**, *10*, 77–86.
25. Yu, D.N.; Zhang, W.W.; Zhang, J.Y. Two New Species of the Genus *Pedetontus* (Microcoryphia, Machilidae) from China. *Acta Zootaxonomica Sinica* **2010**, *35*, 444–450.

26. Kaplin, V.G. НОВЫЕ ВИДЫ ЩЕТИНОХВОСТОК РОДА *PEDETONTUS* SILVESTRI, 1911 (MICROCORYPHIA, MACHILIDAE) С ДАЛЬНЕГО ВОСТОКА. *ЗООЛОГИЧЕСКИЙ ЖУРНАЛ* **2025**, *104*, 36–46. <https://doi.org/10.31857/S0044513425060034>.
27. Zhang, J.Y.; Song, D.X.; Zhou, K.Y. The Complete Mitochondrial Genome of the Bristletail *Pedetontus Silvestrii* (Archaeognatha: Machilidae) and an Examination of Mitochondrial Gene Variability within Four Bristletails. *Annals of the Entomological Society of America* **2008**, *101*, 1131–1136. <https://doi.org/10.1603/0013-8746-101.6.1131>.
28. Chen, H.Y.; Yu, D.N.; Zhang, J.Y. A new species of the genus *Pedetontinus* (Microcoryphia, Machilidae) from China. *Acta Zootaxonomica Sinica* **2011**, *036*, 36–39.
29. Deng, K.Z.; Zhang, J.Y.; Yu, D.N. A New Species of the Genus *Haslundichilis* (Microcoryphia, Machilidae) from China and Redescription of *Haslundichilis Hedini* (Silvestri). *Acta Zootaxonomica Sinica* **2011**, *36*, 882–887.
30. Huang, F.S.; Song, Z.S.; Liang, A.P. A New Bristletail Species of the Genus *Allopsontus* Silvestri (Microcoryphia: Machilidae) from Shaanxi, China. *Oriental Insects* **2006**, *40*, 267–272. <https://doi.org/10.1080/00305316.2006.10417479>.
31. Kaplin, V.G. Description of a New Species of the Bristletail Genus *Pedetontinus* Silv. (Thysanura, Machilidae) from China with a Review of Species of This Genus. *Entomol. Rev.* **2015**, *95*, 73–86. <https://doi.org/10.1134/s0013873815010091>.
32. Kaplin, V.G. A New Species of the Genus *Allopsontus* Silv. (Microcoryphia, Machilidae) from Northwestern China. *Entomological Review* **2016**, *96*, 126–131. <https://doi.org/10.1134/S0013873816010140>.
33. Kaplin, V.G. A New Species of Bristletails of the Genus *Silvestrichilis* Wygodzinsky, 1950 (Archaeognatha: Machilidae) from South China. *Far East. entomol.* **2019**, *23*–28. <https://doi.org/10.25221/fee.376.3>.
34. Li, P.; Yu, D.N.; Zhang, J.Y. A New Species of the Genus *Pedetontinus* (Microcoryphia, Machilidae) from China. *Acta Zootaxonomica Sinica* **2012**, *37*, 740–746.
35. Mendes, L.F.; Gaju-Ricart, M.; Bach de Roca, C.; Molero-Baltanás, R. On Some Silvestri Species of Machilidae (Microcoryphia, Insecta) Which Types Are in the Muséum National d'Histoire Naturelle, Paris. *Pedobiologia* **2000**, *44*, 268–284. [https://doi.org/10.1078/S0031-4056\(04\)70047-5](https://doi.org/10.1078/S0031-4056(04)70047-5).
36. Shen, C.Y.; Wang, L.Y.; Wu, H.Y.; Zhang, J.Y. A New Species of *Silvestrichilis* Wygodzinsky, 1950 (Insecta: Microcoryphia) from Wudang Mountain, Hubei, China, with the Description of Both Sexes. *Zootaxa* **2025**, *5621*, 437–452. <https://doi.org/10.11646/zootaxa.5621.4.3>.
37. Silvestri, F. Schwedisch-chinesische wissenschaftliche Expedition nach den nordwestlichen Provinzen Chinas (38. Thysanura, Machilidae). *Arkiv for Zoologi* **1934**, *27*, 1–7.
38. Song, Z.S.; Huang, F.S.; Liang, A.P. *Machilontus* (s. str.) *Medogensis* Song & Huang, Sp. n. from Tibet, the Northernmost Record of the Genus *Machilontus* Silvestri, 1912 and the First Record of the Family Meinertellidae (Insecta: Microcoryphia: Machiloidea) in China. *Zootaxa* **2011**, *2822*, 61–68.
39. Zhang, J.Y. A new record genus and species of Machilinae from China (Microcoryphia: Machilidae). *Jiangxi Plant Protection* **2010**, *33*, 57–59.
40. Zhang, J.Y.; Li, T. A New Bristletail Species of the Genus *Pedetontinus* (Microcoryphia, Machilidae) from China. *Acta Zootaxonomica Sinica* **2009**, *34*, 203–206.
41. Zhang, J.Y.; Song, D.X.; Zhou, K.Y. A new species of the genus *Pedetontinus* (Microcoryphia, Machilidae) from China. *Acta Zootaxonomica Sinica* **2005**, *30*, 549–554.
42. Zhang, J.Y.; Zhou, K.Y. Descriptions of One New Genus and Six New Species of Machilidae (Insecta: Archaeognatha) from China: Morphological and Molecular Data. *Journal of Natural History* **2011**, *45*, 1131–1164. <https://doi.org/10.1080/00222933.2011.552801>.
43. Folmer, O.; Black, M.; Hoeh, W.; Lutz, R.; Vrijenhoek, R. DNA Primers for Amplification of Mitochondrial Cytochrome c Oxidase Subunit I from Diverse Metazoan Invertebrates. *Mol. Mar. Biol. Biotechnol. Molecular Marine Biology and Biotechnology* **1994**, *3*, 294–299.
44. Lanfear, R.; Calcott, B.; Ho, S.Y.W.; Guindon, S. PartitionFinder: Combined Selection of Partitioning Schemes and Substitution Models for Phylogenetic Analyses. *Mol. Biol. Evol.* **2012**, *29*, 1695–1701.

45. Guan, J.Y.; Shen, S.Q.; Zhang, Z.Y.; Xu, X.D.; Storey, K.B.; Yu, D.N.; Zhang, J.Y. Comparative Mitogenomes of Two *Coreamachilis* Species (Microcoryphia: Machilidae) along with Phylogenetic Analyses of Microcoryphia. *Insects* **2021**, *12*, 795.
46. Gassner, M.; Dejacó, T.; Schönswetter, P.; Marec, F.; Arthofer, W.; Schlick-Steiner, B.C.; Steiner, F.M. Extensive Variation in Chromosome Number and Genome Size in Sexual and Parthenogenetic Species of the Jumping-Bristletail Genus *Machilis* (Archaeognatha). *Ecology and Evolution* **2014**, *4*, 4093–4105.
47. Shen, S.Q.; Cai, Y.Y.; Xu, K.K.; Chen, Q.P.; Cao, S.S.; Yu, D.N.; Zhang, J.Y. The Complete Mitochondrial Genome of *Pedetontus Zhejiangensis* (Microcoryphia: Machilidae) and Its Phylogeny. *Mitochondrial DNA Part B* **2020**, *5*, 3143–3145.
48. He, K.; Zhang, J.Y.; Deng, K.Z.; Chen, Z. The Complete Mitochondrial Genome of the Bristletail *Songmachilis Xinxiangensis* (Archaeognatha: Machilidae). *Mitochondrial DNA* **2013**, *24*, 99–101.
49. Ma, Y.; He, K.; Yu, P.P.; Yu, D.N.; Cheng, X.F.; Zhang, J.Y. The Complete Mitochondrial Genomes of Three Bristletails (Insecta: Archaeognatha): The Paraphyly of Machilidae and Insights into Archaeognathan Phylogeny. *PLoS One* **2015**, *10*, e0117669.
50. Podsiadlowski, L. The Mitochondrial Genome of the Bristletail *Petrobius Brevistylis* (Archaeognatha: Machilidae). *Insect Molecular Biology* **2006**, *15*, 253–258.
51. Carapelli, A.; Liò, P.; Nardi, F.; Van der Wath, E.; Frati, F. Phylogenetic Analysis of Mitochondrial Protein Coding Genes Confirms the Reciprocal Paraphyly of Hexapoda and Crustacea. *BMC evolutionary biology* **2007**, *7*, S8.
52. Cameron, S.L.; Miller, K.B.; D’Haese, C.A.; Whiting, M.F.; Barker, S.C. Mitochondrial Genome Data Alone Are Not Enough to Unambiguously Resolve the Relationships of Entognatha, Insecta and Crustacea Sensu Lato (Arthropoda). *Cladistics* **2004**, *20*, 534–557.
53. Ronquist, F.; Teslenko, M.; Van Der Mark, P.; Ayres, D.L.; Darling, A.; Höhna, S.; Larget, B.; Liu, L.; Suchard, M.A.; Huelsenbeck, J.P. MrBayes 3.2: Efficient Bayesian Phylogenetic Inference and Model Choice across a Large Model Space. *Systematic biology* **2012**, *61*, 539–542.
54. Xie, J.; Chen, Y.R.; Cai, G.J.; Cai, R.L.; Hu, Z.; Wang, H. Tree Visualization By One Table (tvBOT): A Web Application for Visualizing, Modifying and Annotating Phylogenetic Trees. *Nucleic acids research* **2023**, *51*, W587–W592.
55. Kaplin, V.G. On the Fauna of Bristletails of the Genera *Petrobius* and *Trigoniophthalmus* (Thysanura, Machilidae) from the Caucasus. *Entmol. Rev.* **2010**, *90*, 387–404. <https://doi.org/10.1134/s0013873810030061>.
56. Kaplin, V.G. On the Fauna of the Bristletail Family Machilidae (Thysanura) of the Caucasus and Southern Kazakhstan. *Entmol. Rev.* **2012**, *92*, 951–965. <https://doi.org/10.1134/s0013873812090011>.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.