



## Taxonomic revision of the genus *Penia* Laporte (Coleoptera, Elateridae, Dendrometrinae) from Taiwan

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### Abstract

The genus *Penia* Laporte, 1838 (tribe Dimini Candèze, 1863, subfamily Dendrometrinae Gistel, 1848) has three known endemic species from Taiwan. However, little is still known about these species and their important features, including genitalia. Here, the taxonomy of Taiwanese *Penia* is revised and eight species are confirmed: *Penia alishanensis* sp. nov., *P. babai* Kishii, 1994, *P. elongata* sp. nov., *P. inopinata* sp. nov., *P. pulla* sp. nov., *P. smetanai* Schimmel, 1996, *P. takasago* Kishii, 1997, and *P. tsou* sp. nov. The paratype of *P. takasago* is a different species and the species is described as *P. inopinata*. Three species have elongated bodies (*P. alishanensis*, *P. elongata*, and *P. smetanai*), whereas the other five have broad bodies. The eight species are distinguished from each other by the sizes of the eyes and apical maxillary palpomeres, the lengths of antennae and elytra, the relative length of the basal antennomeres, the degree of development of the mesosternal process between mesocoxae, and the shapes of the pronotum, hypomeron, scutellar shield and abdominal ventrite V. A key to all species in Taiwan is provided.

**Key words:** Dimini, East Asia, new species, Oriental region, redescription

### Introduction

*Penia* Laporte 1838 is the largest elaterid genus in the tribe Dimini Candèze 1863, subfamily Dendrometrinae Gistel 1848, and includes more than 100 species from the Oriental region (Kundrata *et al.*, 2018; Kundrata and Németh, 2019; Qiu, 2021). Eighty-five of these species are concentrated around the Himalayas in Bhutan, India, and Nepal and in mainland China (Schimmel, 1996; Kundrata *et al.*, 2018; Qiu, 2021). The *Penia* species are poorly known in other areas, such as Southeast Asia and Taiwan. Taiwan is at the edge of the range of the genus and *Penia* is not known from Japan, its northern neighbor. Kishii (1991) reported the first record of *Penia* in Taiwan, but the species was recorded as *Csikia dimatoides* Szombathy 1910. This record was revised as a new species, *P. babai* Kishii 1994. Subsequently, two additional species were described from Taiwan, with three brownish endemic species currently confirmed: *P. babai*, *P. takasago* Kishii 1997, and *P. smetanai* Schimmel 1996. The former two species have broad bodies that are 2.4–2.45 times as long as they are wide (Kishii, 1994, 1997), while the latter is an elongate species, with a body 3.3–3.4 times as long as it is wide (Schimmel, 1996). *Penia babai* and *P. takasago* were also recorded after their original descriptions (Platia and Schimmel, 2007; Platia, 2008), but those papers show only photos of the male aedeagus, and do not provide detailed descriptions, so the identifications are unclear. There are no subsequent records of *P. smetanai*, and important features of *P. smetanai*, such as the genitalia, remain unclear. Here, I studied the type specimens of the three known species and additional material from Taiwan to improve understanding of the Taiwanese *Penia* and found hitherto unrecorded blackish broad-bodied specimens and elongate-bodied specimens that differ remarkably from *P. smetanai* in body size. The taxonomy of the Taiwanese *Penia* is revised with redescriptions of the known species and descriptions of new species. A key to all known species on the island is also provided.

## Material

The type specimens of *P. babai* and *P. takasago* in the Osaka Museum of Natural History (OMNH; Osaka, Japan) were examined. Rainer Schimmel (Vinningen, Germany) personally loaned the author the paratype of *P. smetanai* and holotype of *P. sucinea* described from Vietnam for re-examination and comparison with the Taiwanese species, and they will be donated to the Natural History Museum (BMNH; London, United Kingdom). The type specimens of the new species and non-type specimens of *P. babai* in OMNH, the National Museum of Natural Science (NMNST; Taichung, Taiwan), and the author's collection (Kyoto, Japan) were also examined. The holotypes of the new species in the author's collection will be donated to NMNST, and the paratypes of the new species and non-type specimens will be at OMNH. The unique identifier numbers of the specimens that had not been assigned a number are PAA01, PBK01–05, PEA01, PPA01, PSS01, PTK01–02 and PTA01–05. Many of the specimens examined here were damaged, have missing body parts, or were covered in mold.

## Methods

The specimens were softened in warm water and the dirt and mold were removed in 80% ethanol before specimen observation. The methods used for specimen observation, taking photographs, dissection, and deposition of dissected parts generally follow Arimoto (2022). After dissection, the extracted pregenital segments and aedeagus were mounted in Euparal on paper cards to prevent deformation due to drying. The seams between the glass microvials and silicone stoppers, which were used to deposit female genitalia, were covered with nail polish. The cards and microvials were pinned under the specimens from which the parts were removed. After publication of the paper, labels of the bibliographic information with the unique identifier numbers will be attached to all of the examined specimens.

Maps were generated using DIVA-GIS 7.5.0. software. Digital images of the photographs and maps were edited and retouched using Adobe Photoshop v 24.6.0 (Adobe, San Jose, CA, USA).

The subtribe and generic classifications for the tribe Dendrometrini follow Kundrata *et al.* (2018). An identification key to the genera of the subtribe Dimini in Taiwan and the diagnosis of *Penia* are provided based on information from Suzuki (1979), Kishii (1991), Schimmel and Platia (1991), Schimmel (1996, 2015), Mertlik *et al.* (2017), and Qiu and Kundrata (2022), incorporating information obtained in the current study. A key to the species of the genus *Penia* from Taiwan is also provided based on information from the current study. The morphological nomenclature system generally follows Costa *et al.* (2010) and Douglas (2017).

## Measurements and indices

Measurements and indices also were made following Arimoto (2022). Measurements are shown in millimeters. The following abbreviations are used:

<b>BL</b>	Body length from head frontal margin to elytral apices
<b>BW</b>	The maximum body width
<b>MAE</b>	The maximum distance across the eyes in dorsal view
<b>MBE</b>	The minimum distance between the eyes in dorsal view
<b>OI</b>	Ocular index: $MAE/MBE \times 100$
<b>PL</b>	The maximum pronotum length including hind angles
<b>PML</b>	Length of the midline of the pronotum, equivalent to the minimum pronotum length in this study
<b>PW</b>	The maximum pronotum width including hind angles
<b>PAW</b>	The pronotum width between the anterior angles, equivalent to the minimum pronotum width in this study
<b>PLI</b>	Pronotum length index: $PL/PW \times 100$
<b>PWI</b>	Pronotum width index: $PAW/PW \times 100$
<b>EL</b>	The maximum elytron length
<b>EW</b>	The maximum elytron width

**EI** Elytra index: EL/EW x 100  
**BI** Body index: EL/PL x 100

## Taxonomy

### Tribe Dimini Candèze, 1863

**Included genera from Taiwan.** Five genera: *Csikia* Szombathy, 1910, *Dima* Charpentier, 1825, *Parapenia* Suzuki, 1982, *Penia* Laporte, 1838, *Pseudocsikia* Schimmel and Platia, 1991.

**Remarks.** Taiwanese *Pseudocsikia* species were suggested to be separate from the genus (Qiu and Kundrata, 2022).

### Key to the genera of the tribe Dimini in Taiwan

- (1) Hind wings not fully developed, shorter than elytra .....(2)
  - Hind wings fully developed, longer than elytra .....(3)
- (2) Anterior angles of pronotum without protruded structure and pits .....*Dima* Charpentier, 1825
  - Anterior angles of pronotum with stoutly protruded structure, with a large deep pit at the basal portion of each protrusion. . . . .*Pseudocsikia* Schimmel and Platia, 1991
- (3) Hind angles of pronotum with a pointed subapical tooth posteriorly in addition to angled tip .....*Parapenia* Suzuki, 1982
  - Hind angles of pronotum without subapical tooth .....(4)
- (4) Pronotum with a large pit just behind each anterior angle. Prosternal process with a pointed subapical tooth ventrally, but in some subapical tooth not protruding like a spine. Mesial impunctate ridge of hypomeron weakly grooved anteriorly .....*Csikia* Szombathy, 1910
  - Pronotum without pits around its anterior angles. Prosternal process without subapical tooth. Mesial impunctate ridge of hypomeron not grooved .....*Penia* Laporte, 1838

### Genus *Penia* Laporte, 1838

*Penia* Laporte, 1838: 11 (original description; type species: *Elater eschscholtzi* Hope, 1831).

**Diagnosis. Adults.** Body widest at elytra. Pronotum without protruded structure and pits around anterior angles; posterior edge without carinae next to sublateral incisions. Prosternal process without subapical tooth, curved dorsad from around procoxal cavities in lateral view. Hind angles of pronotum without subapical tooth. Pronotosternal sutures and mesial margin of hypomeron not grooved. Elytral shoulder without conspicuous cutout. Hind wings fully developed. Tarsomeres III and IV with lobe ventrally.

**Distribution.** Oriental region (Bhutan, China, India, Laos, Malaysia, Myanmar, Nepal, Taiwan, Thailand, Vietnam): 115 species (Kundrata *et al.*, 2018; Kundrata and Németh, 2019; Qiu, 2021; this study).

In Taiwan, *Penia* species have been found mainly in the central and south areas of the island (Fig. 1) but it is not known whether this is due to the features of the Taiwanese species or sampling bias. Further research is needed because few individuals have been collected in Taiwan.

**Ecology.** Adults are found throughout the year but distributional records are concentrated from May to July (Schimmel and Platia, 1991; Schimmel 1996). In Taiwan, adults were collected from February to August. Adults are attracted to lights at night and collected by sweeping and beating vegetation or with Malaise traps (Platia and Schimmel, 2007; Kundrata and Németh, 2019; Qiu, 2021; this study).

**Included species from Taiwan.** Eight species: *Penia alishanensis* Arimoto, sp. nov., *P. babai* Kishii, 1994, *P. elongata* Arimoto, sp. nov., *P. inopinata* Arimoto, sp. nov., *P. pulla* Arimoto sp. nov., *P. smetanai* Schimmel, 1996, *P. takasago* Kishii, 1997, *P. tsou* Arimoto sp. nov.

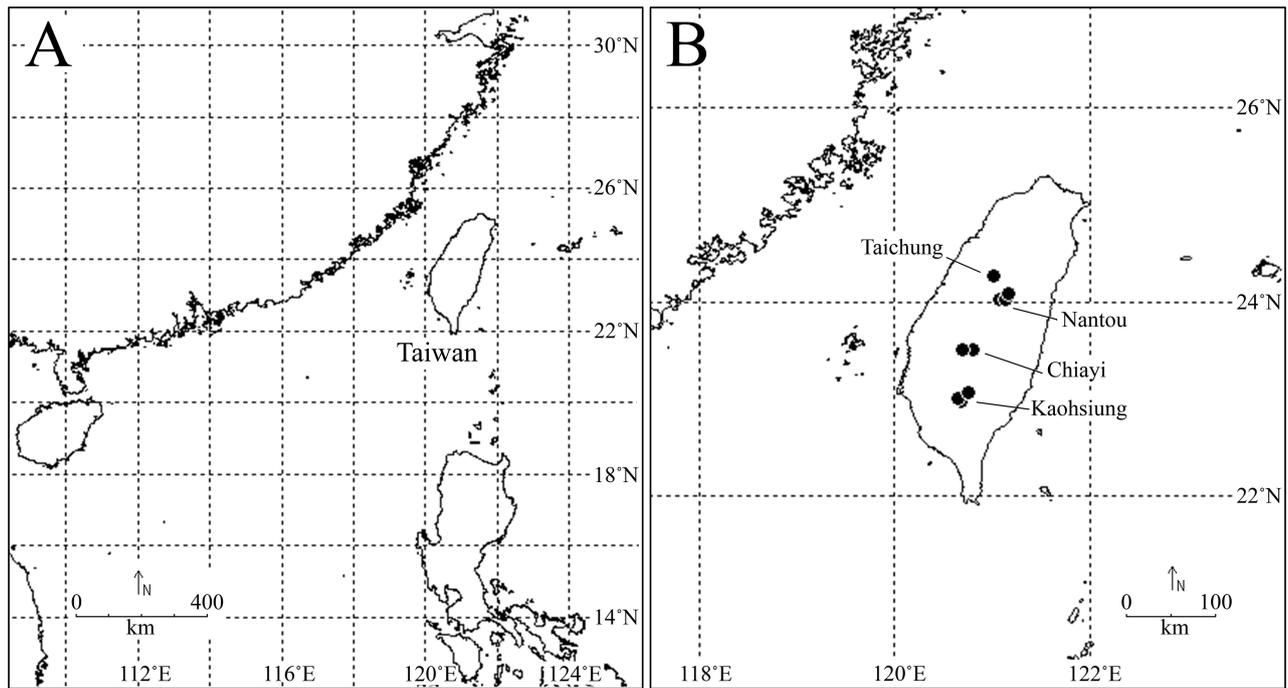


FIGURE 1. Map of Taiwan. A: location of Taiwan; B: the collection sites of the material used in this study.

### Key to the species of the genus *Penia* from Taiwan

- (1) Body elongated. Eyes protuberant, 0.45–0.5 x longer than interocular distance in dorsal view; maximum distance across the eyes/ minimum distance between the eyes (OI): 188–209. Elytron more than 4 x longer than its wide (EI: 449–547) . . . . . (2)
- Body broad. Eyes relatively normal in convexity, 0.2–0.4 x longer than interocular distance in dorsal view; maximum distance across the eyes/ minimum distance between the eyes (OI): 141–179. Elytron less than 4 x longer than its wide (EI: 314–366) . . . . . (4)
- (2) Antennomeres II and III similar. Apical maxillary palpomere longer than maximum eye length. Abdominal ventrite V trapezoidal, truncate apically . . . . . *Penia elongata* Arimoto, sp. nov.
- Antennomeres III distinctly longer than II. Apical maxillary palpomere shorter than maximum eye length. Abdominal ventrite V semicircular, rounded apically . . . . . (3)
- (3) Apical maxillary palpomere 2.3 x longer than wide. Hypomeron with distinct mesial projection. Anterior angle of hypomeron biangular. Scutellar shield 1.2 x longer than wide. Abdominal ventrite V curved triangular . . . . . *Penia alishanensis* Arimoto, sp. nov.
- Apical maxillary palpomere 2.8 x longer than wide. Hypomeron with slight mesial projection. Anterior angle of hypomeron rounded. Scutellar shield almost as long as wide. Abdominal ventrite V semicircular but slightly incurved laterally ahead of apex. . . . . *P. smetanai* Schimmel, 1996
- (4) Eyes 0.4 x longer than interocular distance in dorsal view; maximum distance across the eyes/ minimum distance between the eyes (OI): 177–179. Pronotum strongly narrowed ahead of hind angles; hind angles of pronotum acute . . . . . *P. takasago* Kishii, 1997
- Eyes 0.2–0.3 x longer than interocular distance in dorsal view; maximum distance across the eyes/ minimum distance between the eyes (OI): 141–162. Pronotum slightly narrowed or slightly widening ahead of hind angles; hind angles of pronotum broad. . . . . (5)
- (5) Antennae extending beyond pronotum posterior lateral apices by antennomere VIII. Scutellar shield 0.9 x longer than wide. Mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view. Elytron 3.2 x longer than pronotum length . . . . . *P. pulla* Arimoto sp. nov.
- Antennae extending beyond pronotum posterior lateral apices by antennomere VI or VII. Scutellar shield almost as long as wide. Mesosternal process between mesocoxae higher than mesocoxae, visible in lateral view. Elytron 2.5–3.0 x longer than pronotum length . . . . . (6)
- (6) Hind angles of pronotum not protruding laterally beyond pronotal side. Anterior angle of hypomeron rounded. Posterior edge of mesosternum between mesocoxae 0.15 x wider than total width of mesosternum . . . . . *P. inopinata* Arimoto, sp. nov.
- Hind angles of pronotum weakly protruding posterolaterad. Anterior angle of hypomeron nearly right angle. Posterior edge of mesosternum between mesocoxae 0.2–0.25 x wider than total width of mesosternum. . . . . (7)
- (7) Antennae surpassing elytral half by antennomere XI. Pronotum straightly and slightly narrowed ahead of hind angles. Hypomeron with distinct mesial projection . . . . . *P. babai* Kishii, 1994

- Antennae reaching around elytral half by antennomere XI. Pronotum straightly and slightly widening ahead of hind angles. Hypomeron with moderate mesial projection ..... *P. tsou* Arimoto sp. nov.

***Penia alishanensis* Arimoto, sp. nov.**

(Figures 2, 3)

**Etymology.** Specific epithet derived from Mt. Ali Shan, the type locality.

**Type material. Holotype.** Male, Taiwan, Chiayi County, Alishan Township, Mt. Ali Shan, 18 VIII 1977, Y. Watanabe leg. [NMNST; PAA01].

**Male. Diagnosis.** This species is characterized by the following features: eyes 0.45 x longer than interocular distance in dorsal view; antennae surpassing elytral half by antennomere XI; antennomeres III distinctly longer than II; IV 1.4 x longer than III, 0.9 x longer than II–III combined; apical maxillary palpomere 2.3 x longer than wide, shorter than eye maximum length; hypomeron with distinct mesial projection; anterior angle of hypomeron biangular, with outer angle right angle, with mesial angle rounded; scutellar shield 1.2 x longer than wide; mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view; posterior edge of mesosternal process 0.1 x wider than total length of mesosternum; elytra 4.5 x longer than wide; abdominal ventrite V curved triangular, rounded apically; phallobase 0.7 x longer than wide; apex of parameres beyond preapical expansions elongated fan-shaped; apex length 2.7 x width of parameres at expansions in ventral side.

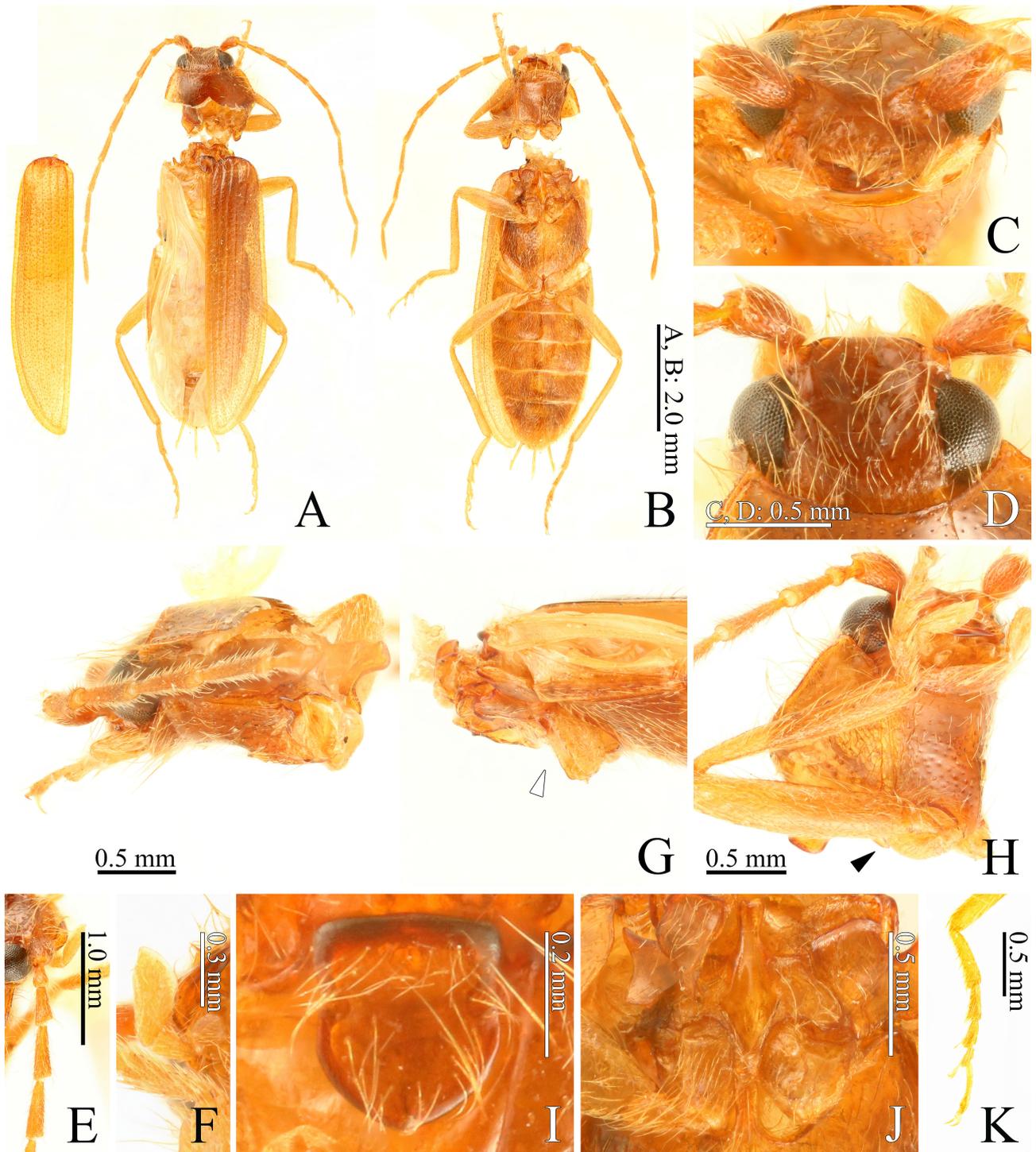
This species is similar to *P. smetanai* in features of the body shape, the eyes, the basal antennomeres, and the mesosternal process between mesocoxae. It is distinguished by the length-to-width ratios of the apical maxillary palpomere and scutellar shield, and the shapes of the hypomeron, abdominal ventrite V and apex of the parameres beyond the preapical expansions (see diagnosis in *P. smetanai*).

**Measurements.** BL: around 7.3 (estimate value), BW: 2.31, MAE: 1.09, MBE: 0.58, OI: 188, PAW: 1.01, EL: 5.19, EW: 1.16, EI: 449.

**Description.** Body elongated, widest behind elytral midlength (Fig. 2A); surface generally smooth; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 2A, B) but on elytra intermixed with larger and smaller punctures. Color. Body, antennae and legs orange. Head, median area of pronotum and elytral anterior half darker. External edges of mandible and scutellum, and anterior edge of elytra black. Metasternum and abdomen partly tinged with black. Body covered with long yellow setae.

Head. Frons slightly flattened medially (Fig. 2C, D); frontal carina not complete (Fig. 2C); frontal margin hexagonal, almost straight apically in dorsal view (Fig. 2D); frontoclypeal region protruding beyond base of labrum. Eyes protuberant, 0.45 x longer than interocular distance in dorsal view (Fig. 2D). Antennae surpassing elytral half by antennomere XI; antennomeres longer than wide; II globular, shortest, 1.35 x longer than wide; III weakly serrated, 2.3 x longer than wide, 1.8 x longer than II; IV weakly serrated, 3.1 x longer than wide, 1.4 x longer than III, 0.9 x longer than II–III combined (Fig. 2E); V–XI filiform; V 3.35 x longer than wide, 1.1 x longer than IV; XI 8.85 x longer than wide, 1.1 x longer than X. Mandible bidentate. Apical maxillary palpomere semicircular (Fig. 2F), 2.3 x longer than wide, shorter than eye maximum length; anterior edge rounded.

Prothorax with back half broken and lost (Fig. 2A, G). Pronotum roundly widening anteriorly, with punctate lateral ridge; anterior edge concave; anterior angles nearly right angle. Hypomeron with distinct mesial projection (Fig. 2H: arrow); anterior angle biangular, with outer angle right angle, with mesial angle rounded; mesial and posterior margins with impunctate ridge. Prosternum incurved ventrally in lateral view; anterior lobe distinctly protruding beyond prosternal ventral line in lateral view (Fig. 2G); anterior edge broadly rounded in ventral view (Fig. 2B). Pronotosternal sutures not grooved, almost straight in ventral view (Fig. 2B), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 2I), 1.2 x longer than wide, widest anteriorly, weakly constricted anteriorly and then narrowed posterad, flat, inclined anterior-downwards, not visible in lateral view; anterior edge slightly broadly rounded; posterior edge rounded. Mesosternum: borders of mesosternal cavity straight anteriorly and then moderately curved in lateral view (Fig. 2G); mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view (Fig. 2G); posterior edge 0.1 x wider than total length of mesosternum, weakly emarginate (Fig. 2J). Mesepisternum reaching mesocoxal cavity (Fig. 2J). Metasternum sulcate medially and ahead of metacoxal cavities (Fig. 2B). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 1/10 in ventral view (Fig. 2B). Elytron convex but flat in median area, but with outer margin narrowly depressed, widest behind midlength, 4.5 x longer than wide; apex rounded. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 2K).



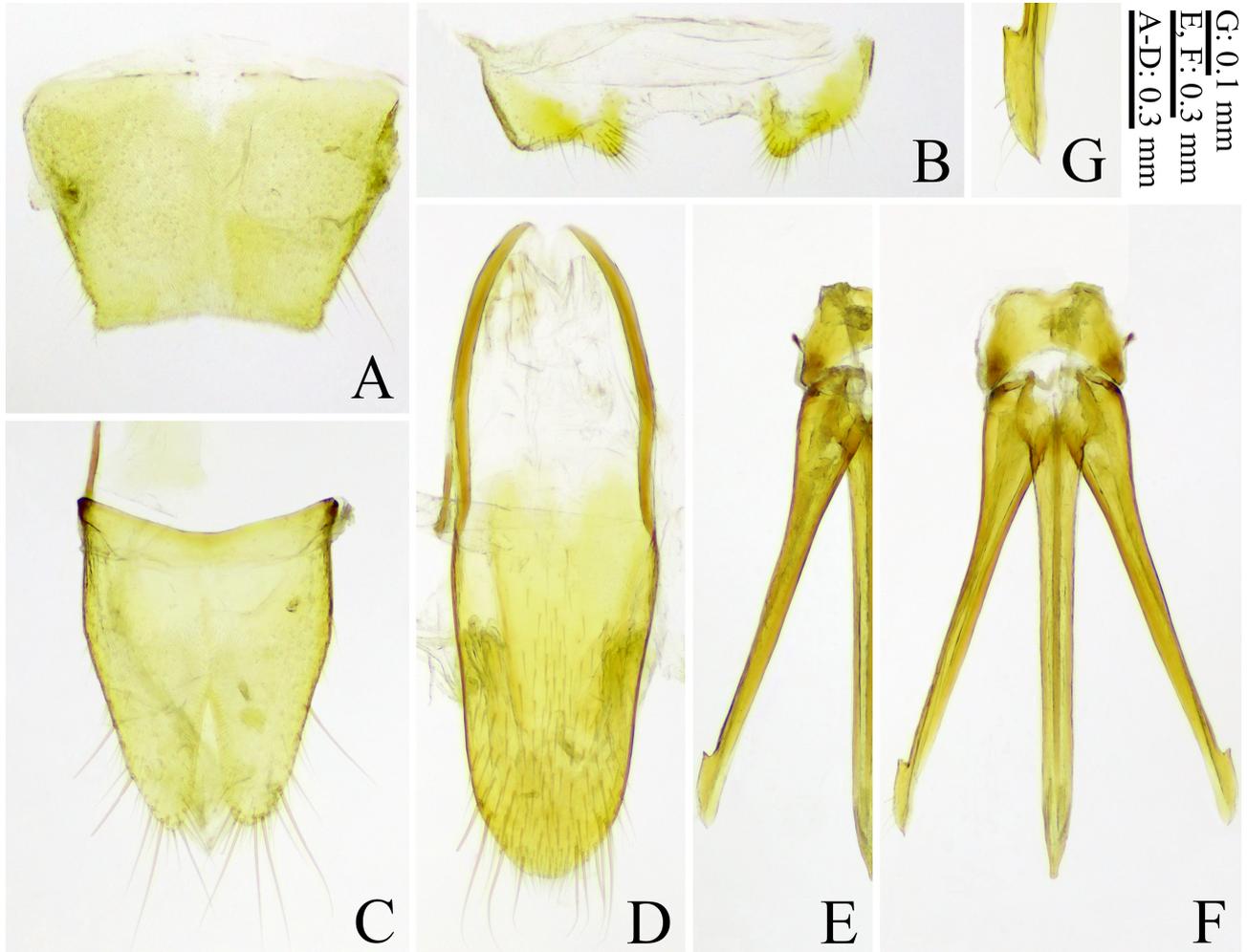
**FIGURE 2.** *Penia alishanensis*, holotype, male (PAA01). A: habitus, dorsal side; B: habitus, ventral side; C: head, anterior view; D: head, dorsal view; E: basal antennomeres of right antenna; F: right maxillary palp, ventral side; G: head, prothorax and mesothorax, lateral view (arrow: the direction perpendicular to the mesosternal process between mesocoxae); H: right hypomeron (arrow: hypomeron with distinct mesial projection); I: scutellar shield; J: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (arrow of figure 2G); K: right mid tarsus.

Abdomen. Ventrite V curved triangular, rounded apically (Fig. 2B), 0.65 x longer than wide. Tergites and sternites VIII–X yellow. Tergite VIII 1.5 x longer than wide, trapezoidal, narrowed posterad; posterior margin weakly incurved (Fig. 3A). Sternite VIII posteriorly widely concave between two projections (Fig. 3B). Tergite IX 1.35 x longer than wide; median notch 0.4 x total length of tergite IX (Fig. 3C). Tergite X longer than wide, triangular apically (Fig. 3C). Sternite IX 3.2 x longer than wide, constricted anterior 2/5 (Fig. 3D), rounded apically. Aedeagus

yellow (Fig. 3E, F). Phallobase 0.2 x total length of aedeagus, 0.7 x longer than wide. Median lobe exceeding apices of parameres by apical 1/20; basal struts 0.15 x total length of median lobe. Parameres slender, not fused ventrally (Fig. 3F); preapical expansions protruding anterolaterad (Fig. 3G); apex beyond preapical expansions elongated fan-shaped (Fig. 3G), with a seta dorsally, with three setae ventrally; apex length 2.7 x width of parameres at expansions in ventral side.

**Female.** Unknown.

**Distribution.** Taiwan: Chiayi County (Fig. 1).



**FIGURE 3.** *Penia alishanensis*, holotype, male (PAA01). A: tergite VIII; B: sternite VIII; C: tergites IX–X; D: sternite IX; E: aedeagus, dorsal side; F: aedeagus, ventral side; G: apical part of right paramera, ventral side.

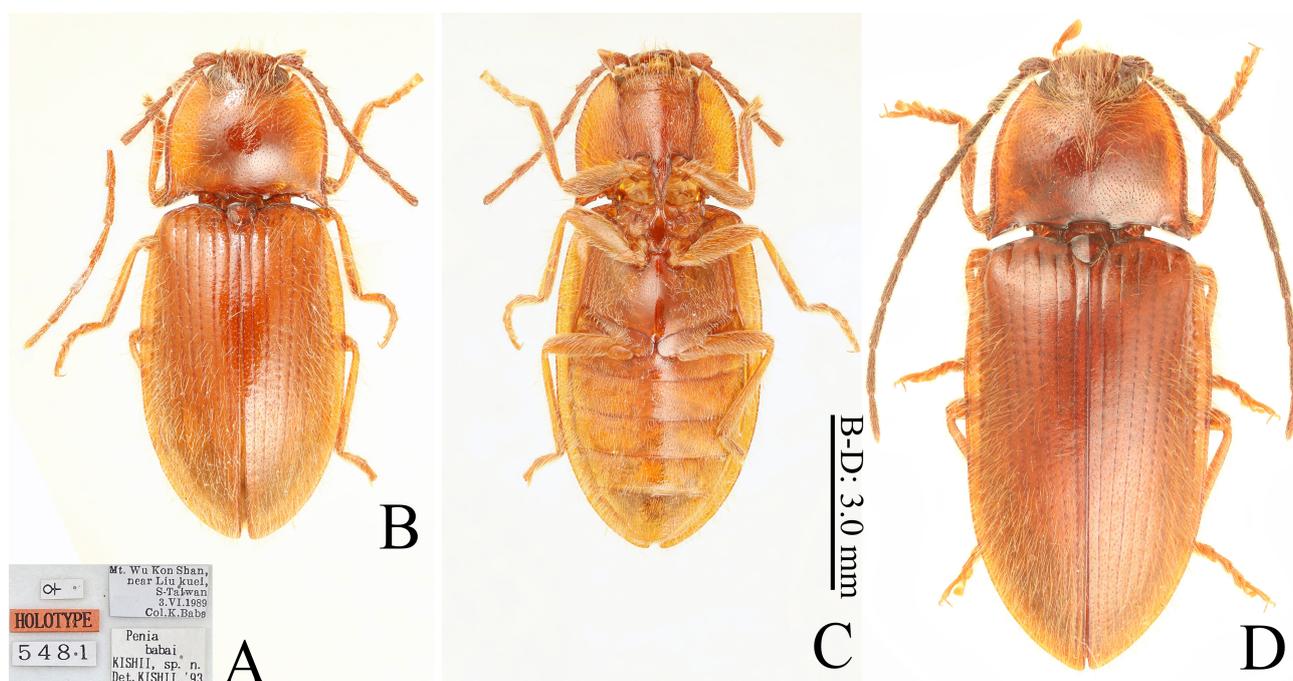
### ***Penia babai* Kishii, 1994**

(Figures 4–7)

*Csikia dimatoides* Szombathy, 1910; Kishii, 1991: 3 (record of female from Kaohsiung City, Taiwan) [misidentification].

*Penia babai* Kishii, 1994: 211 (original description; type locality: Taiwan, Kaohsiung City, Liouguei District, Mt. Wukon Shan); Suzuki, 1999: 121 (catalogue); Cate, 2007: 185 (catalogue); Platia, 2008: 193 (record of male from Kaohsiung City, Taiwan); Kundrata *et al.*, 2018: 36 (catalogue).

**Type material. Holotype.** Female, Taiwan, Kaohsiung City, near Liouguei District, Mt. Wukon Shan, 3 VI 1989, Kintarô Baba leg. [OMNH; 5481]. Verbatim label data (Fig. 4A). “Female symbol”; “HOLOTYPE”; “5481”; “Mt. Wu Kon Shan,/ near Liu kuei,/ S-Taiwan/ 3. VI. 1989/ Col. K. Baba”; “*Penia/ babai/ KISHII, sp. n./ Det. KISHII, ’93*”.



**FIGURE 4.** *Penia babai*. A–C: holotype, female (5481); D: male (PBK02). A: labels; B, D: habitus, dorsal side; C: habitus, ventral side.

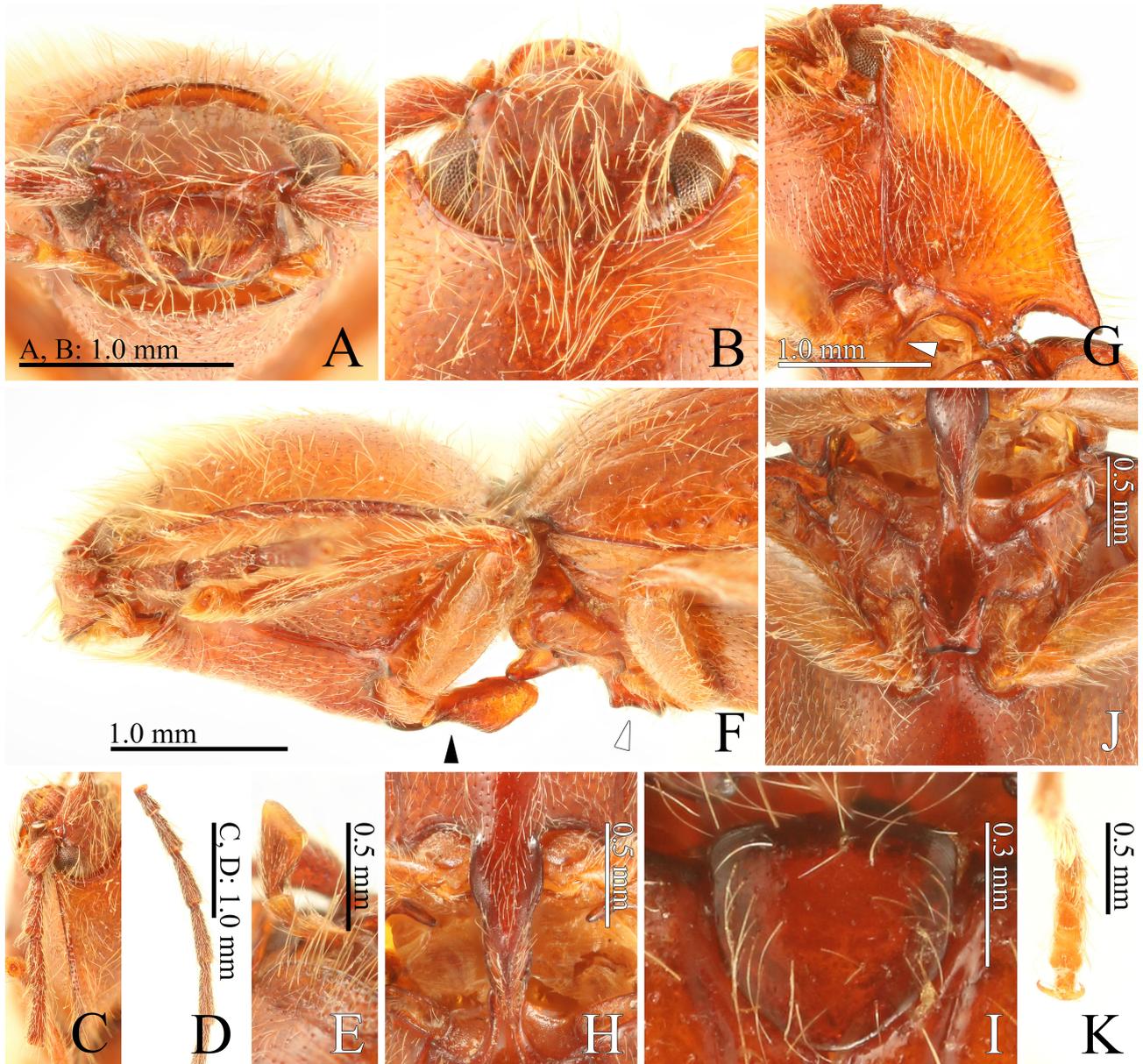
**Non-type material.** Taiwan. 1 male, Nantou County, Ren'ai Township, Nanshan Xi, 19 IV 1985, collector unknown [OMNH; PBK01]; 1 male, Kaohsiung City, Taoyuan District, Tengjih, 5 V 1985, collector unknown [OMNH; PBK02]; 1 female, Kaohsiung City, Liouguei District, 4 VII 1981, T. Kamakari leg. [OMNH; PBK03]; 1 female, Kaohsiung City, Liouguei District, Mt. Nanho Shan, 18 V 1985, collector unknown [OMNH; PBK04]; 1 male, Kaohsiung City, Taoyuan District, Mt. Pao-shan (as Chungshinrun in data label), 20 V 1975, K. Matsuda leg. [OMNH; PBK05]; 1 male, Kaohsiung City, near Liouguei, Gokang Shan, 7 V 1991, M. Yagi leg. [OMNH; 6689].

**Diagnosis.** This species is characterized by the following features: eyes 0.3 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VI or VII, surpassing elytral half by antennomere XI; antennomeres III distinctly longer than II; IV 1.3–1.4 x longer than III, 0.8–0.9 x longer than II–III combined; apical maxillary palpomere 1.9–2.4 x longer than wide, shorter than maximum length of eye; pronotum straightly and slightly narrowed ahead of hind angles; posterior edge of pronotum with sublateral incisions; hind angles of pronotum broad, weakly protruding posterolaterad; hypomeron with distinct mesial projection; anterior angle of hypomeron almost right angle; hind angle of hypomeron broadly triangular; scutellar shield almost as long as wide; mesosternal process between mesocoxae distinctly higher than mesocoxae, visible in lateral view; posterior edge of mesosternal process 0.2–0.25 x wider than total width of mesosternum; elytron 3.1–3.6 x longer than wide, 2.5–2.7 x longer than pronotum length; abdominal ventrite V semicircular, rounded apically; phallobase 0.9 x longer than wide; apex of parameres beyond preapical expansions large triangular; apex length 0.4–0.6 x width of parameres at expansions in ventral side; spiculum ventrale 5.6 x longer than length of sternite VIII; ovipositor longer than length of abdomen.

This species is similar to *P. tsou* in features of the eyes, the basal antennomeres, the apical maxillary palpomere, the hind angles of the pronotum, the anterior and hind angles of the hypomeron, the scutellar shield, the mesosternal process between mesocoxae, the elytron, and the abdominal ventrite V. It is distinguished by antenna length, the shapes of the pronotum and apex of parameres, and the degree of development of the mesial projection of the hypomeron (see diagnosis of *P. tsou*).

**Measurements. Male** (n=4). BL: 8.62–10.6, BW: 3.32–4.24, MAE: 1.34–1.67, MBE: 0.83–1.10, OI: 151–162, PL: 2.24–2.75, PML: 1.75–2.13, PW: 2.69–3.52, PAW: 1.46–1.84, PLI: 78.2–83.3, PWI: 178–191, EL: 5.67–7.43, EW: 1.67–2.06, EI: 253–270, BI: 253–270. **Female** (n=3; holotype in parentheses). BL: 7.83–9.23 (8.30), BW: 3.29–3.86 (3.48), MAE: 1.32–1.48 (1.40), MBE: 0.83–0.97 (0.91), OI: 152–160 (154), PL: 2.20–2.58 (2.32), PML: 1.72–2.06 (1.83), PW: 2.69–3.15 (2.80), PAW: 1.45–1.73 (1.54), PLI: 81.6–82.9 (82.9), PWI: 182–186 (182), EL: 5.40–6.49 (5.75), EW: 1.71–1.94 (1.77), EI: 315–334 (325), BI: 246–251 (247).

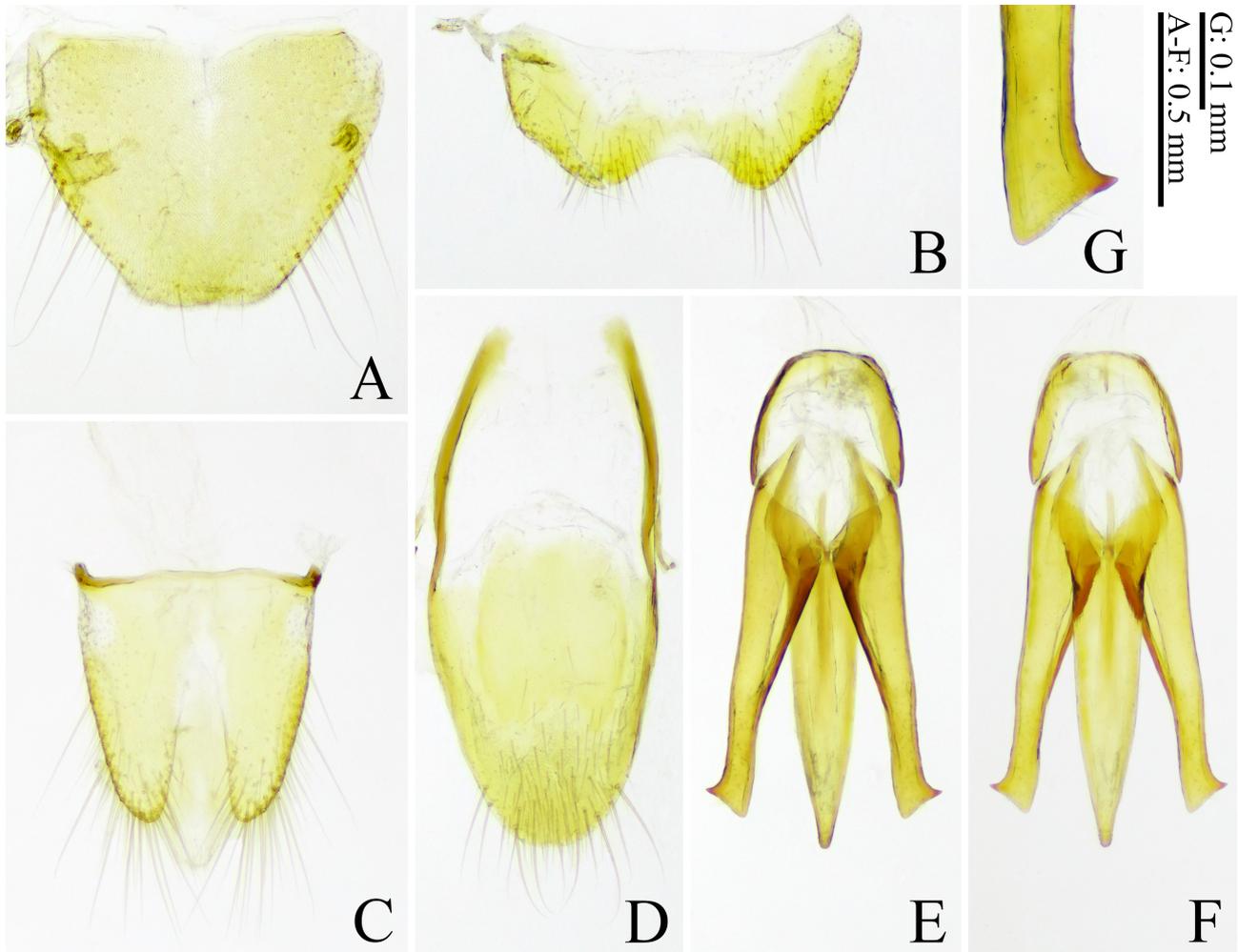
**Redescription.** Body broad, widest ahead of elytral midlength (Fig. 4B); surface generally smooth; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 4B, C). Color. Body light orange to dark red (Fig. 4B, D). Lateral margin of elytra paler. External edge of mandible, lateral and posterior edges of pronotum, posterior edge of prosternum, outer and posterior edges of hypomere, external edge of scutellum, posterior edge of mesosternum and anterior edge of elytra black. Antennae reddish brown or black. Legs light orange to reddish brown. Body covered with long yellow setae.



**FIGURE 5.** *Penia babai*. A–C, E–M: holotype, female (5481); D: male (PBK01). A: head, anterior view; B: head, dorsal view; C, D: basal antennomeres of left antenna; E: right maxillary palp, ventral side; F: head, prothorax and mesothorax, lateral view (black arrow: the direction perpendicular to the base of ventral lobe of prosternal process, white arrow: the direction perpendicular to the mesosternal process between mesocoxae); G: left hypomeron (arrow: hypomeron with distinct mesial projection); H: prosternal process from the direction perpendicular to base of ventral lobe (black arrow of figure 5F); I: scutellar shield; J: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (white arrow of figure 5F); K: left mid tarsus.

Head. Frons flatted medially (Fig. 5A, B); frontal carina not complete (Fig. 5A); frontal margin rectangular but broadly rounded apically in dorsal view (Fig. 5B); frontoclypeal region protruding beyond base of labrum. Eyes relatively normal in convexity, 0.3 x longer than interocular distance in dorsal view (Fig. 5B). Antennae extending beyond pronotum posterior lateral apices by antennomere VI in **male** and by VII in **female**, surpassing elytral half

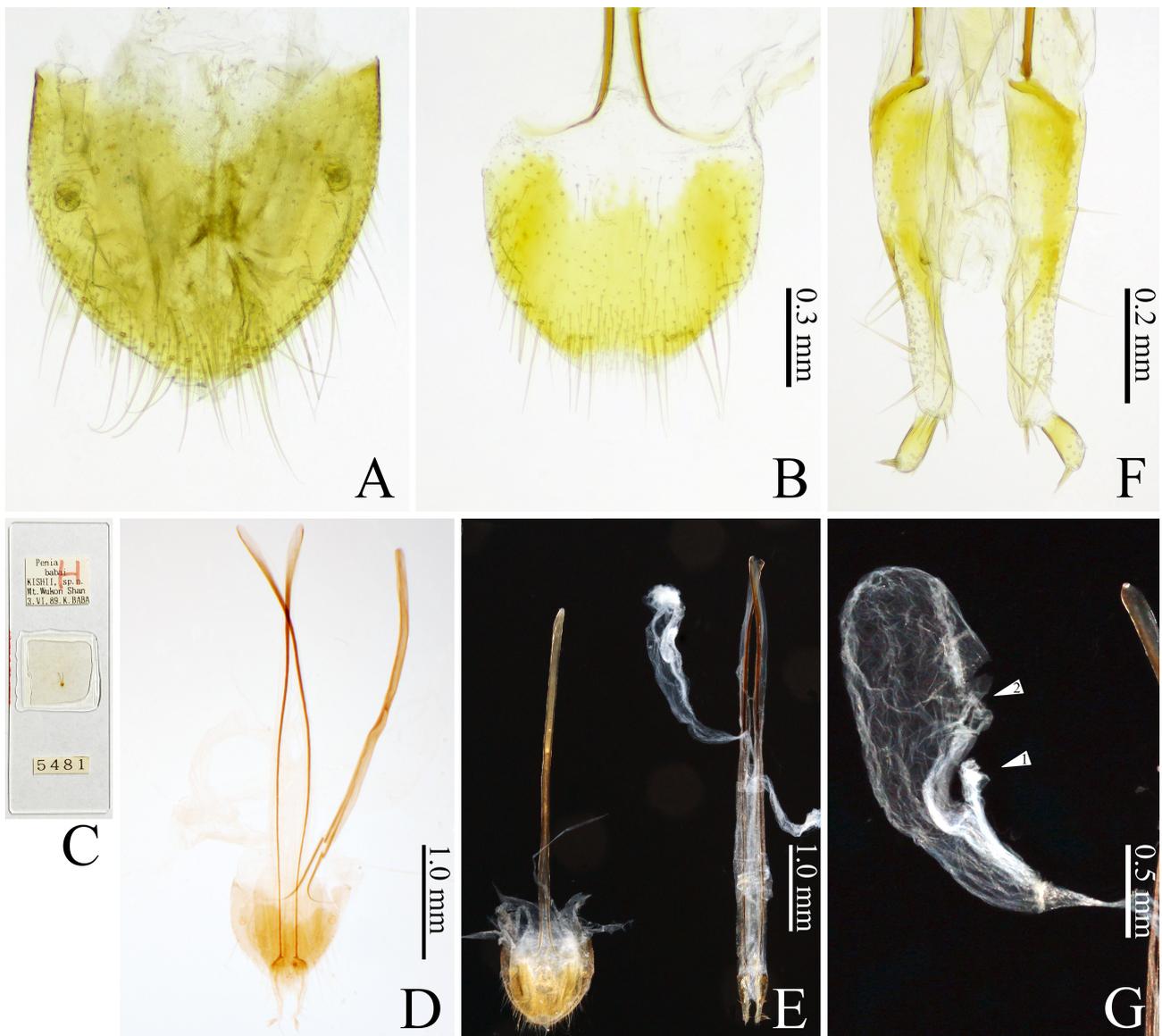
by antennomere XI; antennomeres longer than wide; II obconical, shortest, 1.2–1.7 x longer than wide; III weakly serrated, 2.1–2.4 x longer than wide, 1.7–2.0 x longer than II; IV–XI filiform; IV 2.6–3.5 x longer than wide, 1.3–1.4 x longer than III, 0.8–0.9 x longer than II–III combined (Fig. 5C, D); V 3.0–3.6 x longer than wide, 1.0–1.1 x longer than IV; XI 4.1–5.6 x longer than wide, 1.0–1.2 x longer than X. Mandible bidentate (Fig. 5A). Apical maxillary palpomere semicircular or triangular in holotype (Fig. 5E) and left side of non-type (PBK04), 1.9–2.4 x longer than wide, shorter than maximum length of eyes; anterior edge rounded.



**FIGURE 6.** *Penia babai*, male (PBK01). A: tergite VIII; B: sternite VIII; C: tergites IX–X; D: sternite IX; E: aedeagus, dorsal side; F: aedeagus, ventral side; G: apical part of left paramera, ventral side.

Prothorax. Pronotum hexagonal, 0.8 x longer than wide, roundly widening anteriorly, straightly and moderately narrowed ahead of hind angles, widest just ahead of posterior lateral apices (Fig. 4D) but in holotype widest at midlength and just ahead of posterior lateral apices (Fig. 4B), tallest around midlength (Fig. 5F), without median longitudinal depression posteriorly; anterior edge strongly concave; anterior angles simple, nearly right angle; punctate lateral ridge extending from anterior angles to hind angles (Fig. 4B); hind angles simple, broad, weakly protruding posterolaterad; posterior edge with a sublateral incision near each hind angle, without carinae next to sublateral incisions (Fig. 4B). Hypomeron with distinct mesial projection (Fig. 5G: arrow); anterior angle almost right angle; mesial edge almost straight; mesial and posterior margins with impunctate ridge (Fig. 5G); posterior margin with rectangular projection between two large emarginations; hind angle broadly triangular. Prosternum nearly straight ventrally in lateral view; anterior lobe not protruding beyond prosternal ventral line in lateral view (Fig. 5F); anterior edge broadly rounded but nearly straight apically in ventral view (Fig. 4C). Prosternal process broad, 1.8–2.1 x longer than procoxal cavity length, concave between procoxae, strongly curved dorsad from the middle of procoxal cavities in lateral view (Fig. 5F), without subapical tooth; dorsal lobe roundly expanded ahead of apex in ventral view (Fig. 5H); ventral lobe roundly expanded near base and then abruptly narrowed posteriad in ventral view (Fig. 5H); ventral margin strongly and triangularly expanded medially in lateral view (Fig. 5F); apex

rounded in lateral and ventral views (Fig. 5F, H). Pronotosternal sutures not grooved (Fig. 5G), sinuate in ventral view (Fig. 4C), moderately opened anteriorly. Scutellar shield tongue-shaped (Fig. 5I), 0.9–1.0 x longer than wide, widest anteriorly, weakly narrowed behind anterior ridge, almost parallel-sided in anterior half and then narrowed posterad, flat, inclined anterior-downwards, visible in lateral view (Fig. 5F); anterior edge broadly rounded, in some slightly protruding medially; posterior edge rounded. Mesosternum: borders of mesosternal cavity straight anteriorly and then curved ventrad in right angle in lateral view (Fig. 5F); mesosternal process between mesocoxae distinctly higher than mesocoxae, visible in lateral view (Fig. 5F: white arrow); posterior edge 0.2–0.25 x wider than total width of mesosternum, weakly emarginate (Fig. 5J). Mesepisternum reaching mesocoxal cavity (Fig. 5J). Metasternum sulcate medially and ahead of metacoxal cavities (Fig. 4C). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 2/5 in ventral view (Fig. 4C). Elytron broadly strongly convex, but with outer margin widely depressed, widest ahead of midlength, 3.1–3.6 x longer than wide, 2.5–2.7 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 5K).



**FIGURE 7.** *Penia babai*, females. A, B, E, F: non-type (PBK03); C, D: holotype (5481); G: non-type (PBK04). A: tergite VIII; B: sternite VIII; C: slide; D, E: pregenital segments and genitalia; F: coxites, ventral side; G: vagina and bursa copulatrix (arrow 1: bursa copulatrix posteriorly with a short sac, arrow 2: bursa copulatrix with a sac at the middle).

Abdomen. Ventrite V semicircular, rounded apically (Fig. 4C), 0.45–0.6 x longer than wide. **Male.** Tergites and sternites VIII–X yellow. Tergite VIII 0.8 x longer than wide, trapezoidal, narrowed posterad; posterior margin nearly straight (Fig. 6A). Sternite VIII posteriorly widely concave between two projections (Fig. 6B). Tergite IX almost as long as wide; median notch 0.7 x total length of tergite IX (Fig. 6C). Tergite X longer than wide, rounded apically (Fig. 6C). Sternite IX 2.3 x longer than wide, constricted ahead of midlength (Fig. 6D), rounded apically. Aedeagus yellow (Fig. 6E, F). Phallobase 0.3 x total length of aedeagus, 0.9 x longer than wide. Median lobe exceeding apices of parameres by apical 1/10; basal struts 0.3 x total length of median lobe. Parameres broad, not fused ventrally (Fig. 6E); preapical expansions protruding laterad (Fig. 6G); apex beyond preapical expansions large triangular (Fig. 6G), with a seta dorsally, with a seta ventrally; apex length 0.4–0.6 x width of parameres at expansions in ventral side. **Female.** Tergite VIII and sternite VIII yellow. Tergite VIII semicircular, 1.1 x longer than wide (Fig. 7A); sternite VIII (between base of spiculum ventrale and apex) semicircular, 0.9 x longer than wide (Fig. 7B); the pregenital segments and genitalia of holotype had been mounted in balsam on slides and were distorted by the pressure exerted by the coverslip, Fig. 7C, D); spiculum ventrale 5.6 (in holotype 4.5) x longer than length of sternite VIII (Fig. 7E). Ovipositor 1.2 x longer than length of abdomen; coxites two segmented at ventral side (Fig. 7F), with several setae each dorsally, ventrally, and apically; stylus with several setae apically (Fig. 7F). Vagina short; bursa copulatrix elongated spheroid, without sclerotized structures (Fig. 7G), with a short sac posteriorly (Fig. 7G: arrow 1), with a sac around midlength (Fig. 7G: arrow 2).

**Distribution.** Taiwan: Nantou County and Kaohsiung City (Fig. 1).

***Penia elongata* Arimoto, sp. nov.**

(Figures 8, 9)

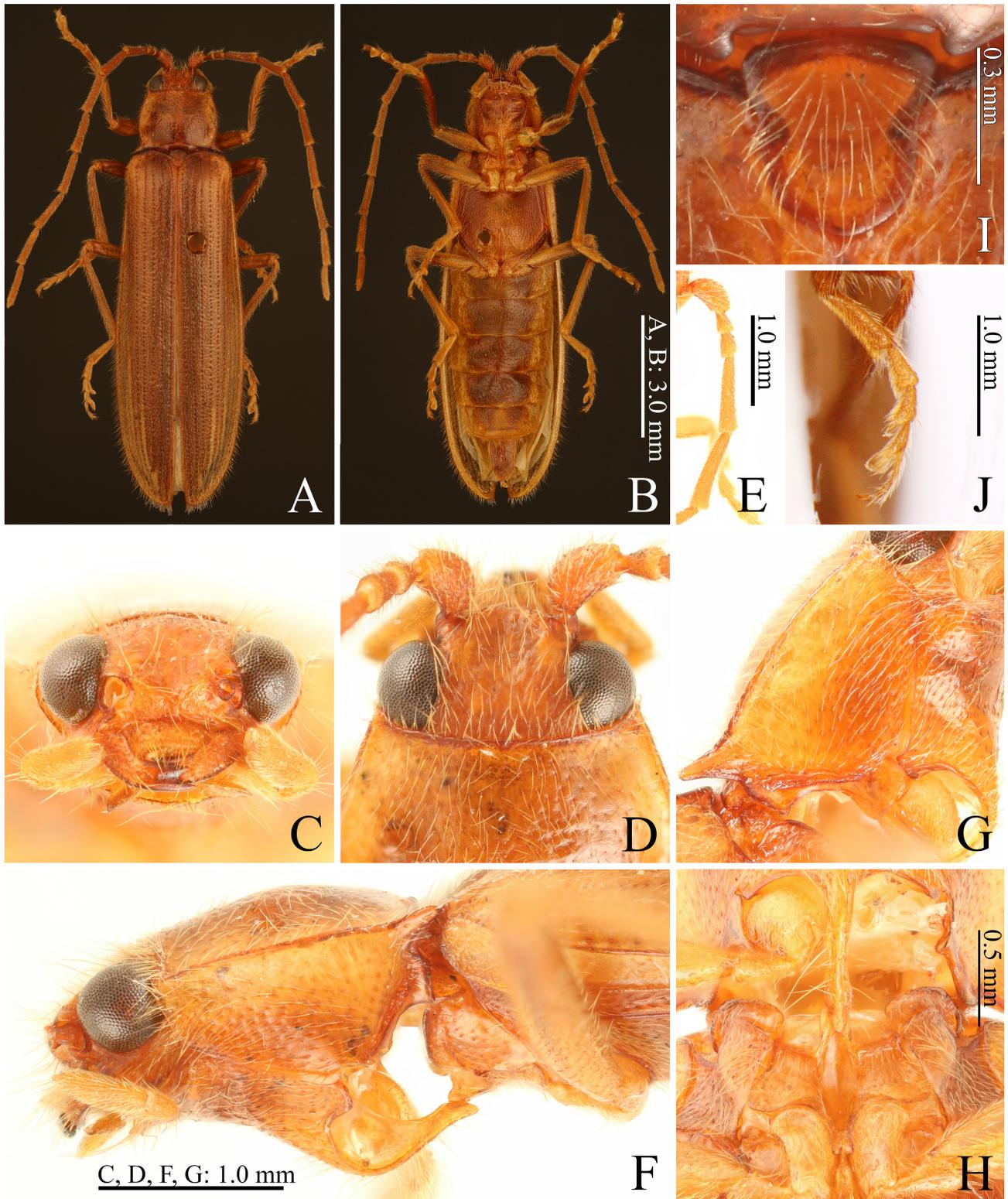
**Etymology.** In reference to the elongated body.

**Type material. Holotype.** Male, Taiwan, Nantou County, Meifeng, 3 II–9 III 2004, C.-S. Lin and W.-T. Yang leg., by malaise trap [NMNST; PEA01].

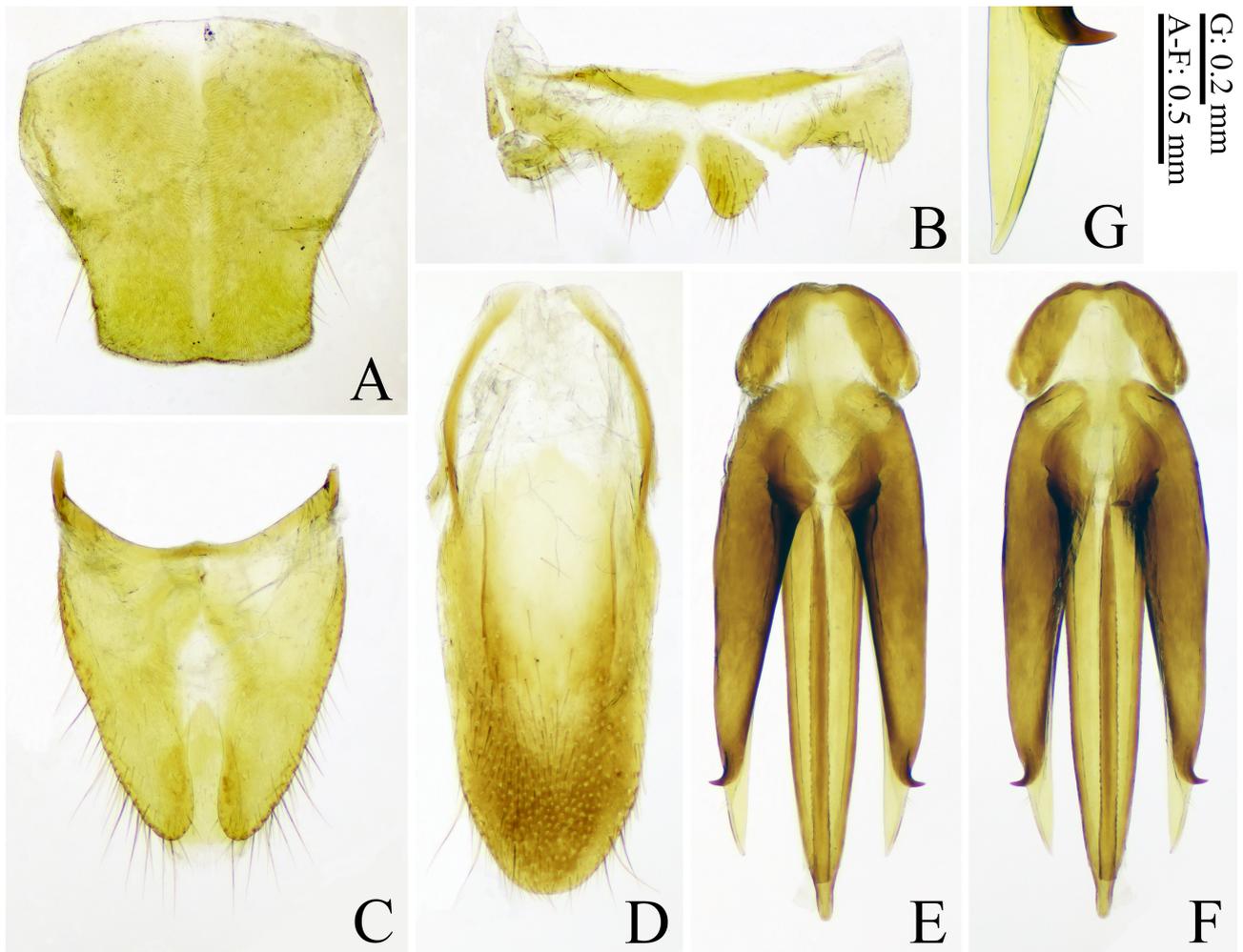
**Male. Diagnosis.** This species is characterized by the following features: eyes 0.5 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI; antennomeres II and III similar, short; IV 3.3 x longer than III, 1.8 x longer than II–III combined; apical maxillary palpomere 3.7 x longer than wide, longer than maximum eye length; pronotum roundly narrowed and distinctly constricted ahead of hind angles; posterior edge of pronotum without sublateral incisions; hind angles of pronotum acute, strongly protruding posterolaterad; hypomeron without mesial projection; anterior angle of hypomeron biangular, with mesial angle rounded, with outer angle nearly right angle; hind angle of hypomeron narrowly triangular; scutellar shield slightly longer than wide; mesosternal process between mesocoxae a little higher than mesocoxae, slightly visible in lateral view; posterior edge of mesosternal process 0.1 x wider than total width of mesosternum; elytron 5.5 x longer than wide, 5.5 x longer than pronotum length; abdominal ventrite V trapezoidal, rounded posterolaterally, truncate apically; phallobase 0.6 x longer than wide; preapical expansions of parameres claw-like shaped, protruding laterally beyond side of apex; apex of parameres beyond preapical expansions blade-like shaped; apex length 1.8–1.9 x width of parameres at expansions in ventral side.

This species is similar to *Penia sucinea* Schimmel 1996, which is known from northern Vietnam, in terms of long antennae, a large apical maxillary palpomere, the posterior edge of the pronotum lacking sublateral incisions, the biangular anterior angle of the hypomeron, a narrowly triangular hind angle of the hypomeron, the slightly longer scutellar shield, the weak developmental mesosternal process between mesocoxae, the elongated elytron, a trapezoidal abdominal ventrite V, a claw-like preapical expansion of the parameres, and the blade-like shape of the apex of the parameres beyond the preapical expansions. It is distinguished from *P. sucinea* by the following contrasting characters (*P. sucinea* in parentheses): eyes 0.5 x longer than interocular distance in dorsal view (eyes 0.4 x longer than interocular distance in dorsal view); antennomeres II and III similar, short (antennomere III longer than II); antennomere IV 3.3 x longer than III, 1.8 x longer than II–III combined (antennomere IV 2.6 x longer than III, 1.5x longer than II–III combined), apical maxillary palpomere 3.7 x longer than wide (apical maxillary palpomere 2.7 x longer than wide); hypomeron without mesial projection (hypomeron with distinct mesial projection); anterior mesial angle of hypomeron rounded and anterior outer angle of hypomeron nearly right angle (anterior mesial and outer angles of hypomeron rounded); elytron 5.5 x longer than pronotum length (elytron 4.3 x

longer than pronotum length); abdominal ventrite V rounded posterolaterally, truncate apically (abdominal ventrite V round-sided, slightly concave apically); phallobase 0.6 x longer than wide (phallobase 0.9 x longer than wide); apex of parameres beyond preapical expansions 1.7–1.9 x width of parameres at expansions in ventral side (apex of parameres beyond preapical expansions 1.25 x width of parameres at expansions in ventral side).



**FIGURE 8.** *Penia elongata*, holotype, male (PEA01). A: habitus, dorsal side; B: habitus, ventral side; C: head, anterior view; D: head, dorsal view; E: basal antennomeres of right antenna; F: head, prothorax and mesothorax, lateral view; G: right hypomerone; H: prosternal process and mesothorax, ventral side; I: scutellar shield; J: right hind tarsus.



**FIGURE 9.** *Penia elongata*, holotype, male (PEA01). A: tergite VIII; B: sternite VIII; C: tergites IX–X; D: sternite IX; E: aedeagus, dorsal side; F: aedeagus, ventral side; G: apical part of left paramera, ventral side.

**Measurements.** BL: 10.7, BW: 3.03, MAE: 1.41, MBE: 0.68, OI: 209, PL: 1.59, PML: 1.42, PW: 2.11, PAW: 1.45, PLI: 75.2, PWI: 145, EL: 8.67, EW: 1.58, EI: 547, BI: 546.

**Description.** Body elongated, widest behind elytral midlength (Fig. 8A); surface generally smooth but prothorax and abdomen with microstructures; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 8A, B). Color. Body, antennae, and legs brown. External edge of mandible, posterior edges of pronotum, anterior edge of scutellum, anterior edges of elytra and median line of abdomen black. Body covered with long yellow setae.

**Head.** Frons depressed medially (Fig. 8C); frontal carina not complete (Fig. 8D); frontal margin trapezoidal, almost straight apically in dorsal view (Fig. 8C); frontoclypeal region protruding beyond base of labrum. Eyes protuberant, 0.5 x longer than interocular distance in dorsal view. Antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI; antennomeres longer than its wide; II obconical, shortest, 1.3 x longer than wide; III obconical, 1.4 x longer than wide, 1.2 x longer than II; IV–XI filiform; IV 4.2 x longer than wide, 3.3 x longer than III, 1.8 x longer than II–III combined (Fig. 8E); V 4.3 x longer than wide, slightly longer than IV; XI 7.5 x longer than wide, 1.1 x longer than X. Mandible bidentate (Fig. 8D). Apical maxillary palpomere elongated securiform, 3.7 x longer than wide (Fig. 8A), longer than maximum length of eyes; anterior edge rounded.

Prothorax. Pronotum hexagonal, 0.75 x longer than wide, roundly widening anteriorly and then roundly narrowed, distinctly constricted ahead of hind angles (Fig. 8A), widest across posterior lateral apices, tallest medially (Fig. 8F), without median longitudinal depression posteriorly; anterior edge weakly concave; anterior angles simple, acute; punctate lateral ridge extending from anterior angles to hind angles (Fig. 8A); hind angles simple, acute, strongly protruding posterolaterad; posterior edge without sublateral incisions, without carinae next to sublateral incisions (Fig. 8A). Hypomerone without mesial projection (Fig. 8G); anterior angle biangular, with mesial angle rounded, with outer angle nearly right angle; mesial edge almost straight; mesial and posterior margins with impunctate ridge (Fig. 8G); posterior margin with triangular projection between two large emarginations; hind angle narrowly triangular. Prosternum strongly incurved ventrally in lateral view; anterior lobe distinctly protruding beyond prosternal ventral line in lateral view (Fig. 8F); anterior edge broadly rounded in ventral view (Fig. 8B). Prosternal process slender, 2.0 x longer than procoxal cavity length, strongly curved dorsad from middle of procoxal cavities in lateral view, without subapical tooth; dorsal lobe roundly expanded ahead of apex in ventral view (Fig. 8H); ventral lobe moderately narrowed posterad toward apex in ventral view (Fig. 8H); ventral edge straight and then weakly curved posterad around apex in lateral view (Fig. 8G); apex rounded in lateral and ventral views (Fig. 8F, H). Pronotosternal sutures not grooved (Fig. 8G), sinuate in ventral view (Fig. 8B), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 8I), 1.05 x longer than wide, widest anteriorly, narrowed posteriad but parallel-sided around midlength, flat, inclined anterior-downwards, visible in lateral view (Fig. 8F); anterior edge broadly rounded; posterior edge rounded. Mesosternum: borders of mesosternal cavity straight anteriorly and then curved obtusely ventrad in lateral view (Fig. 8F); mesosternal process between mesocoxae a little higher than mesocoxae, slightly visible in lateral view (Fig. 8F); posterior edge 0.1 x wider than total width of mesosternum, triangularly concave medially (Fig. 8H). Mesepisternum reaching mesocoxal cavity (Fig. 8H). Metasternum sulcate medially and ahead of metacoxal cavities (Fig. 8B). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 1/10 in ventral view (Fig. 8B). Elytron convex but flat in median area, with outer margin narrowly depressed, widest behind midlength, 5.5 x longer than wide, 5.5 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 8J).

Abdomen. Ventrite V trapezoidal, rounded posterolaterally, truncate apically (Fig. 8B), 0.4 x longer than wide. Tergites and sternites VIII–X yellow, but posterior part of sternite IX darker. Tergite VIII hexagonal, almost as long as wide, roundly narrowed posterad from around anterior 1/3 and then sub-parallel sided at posterior 1/4; posterior margin widely weakly rounded, but slightly emarginate medially (Fig. 9A). Sternite VIII posteriorly narrowly concave between two projections (Fig. 9B); posterior lateral angle protruding posterad. Tergite IX 1.3 x longer than wide; median notch 1/3 x total length of tergite IX (Fig. 9C). Tergite X longer than wide, rounded apically (Fig. 9C). Sternite IX 2.7 x longer than wide, constricted around anterior 1/3 (Fig. 9D), rounded apically. Aedeagus blackish brown, but apical parts of parameres yellow (Fig. 9E, F). Phallobase 0.2 x total length of aedeagus, 0.6 x longer than wide. Median lobe exceeding apices of parameres by apical 1/10; basal struts 0.2 x total length of median lobe. Parameres broad, not fused ventrally (Fig. 9F); preapical expansions claw-like shaped, protruding laterad (Fig. 9G); apex beyond preapical expansions blade-like shaped (Fig. 9G), strongly constricted behind preapical expansions, with two setae dorsally, with one seta laterally; apex length in ventral side 1.8–1.9 x width of parameres at expansions, 2.6–2.8 x width of parameres beyond constriction behind preapical expansions.

**Distribution.** Taiwan: Nantou County (Fig. 1).

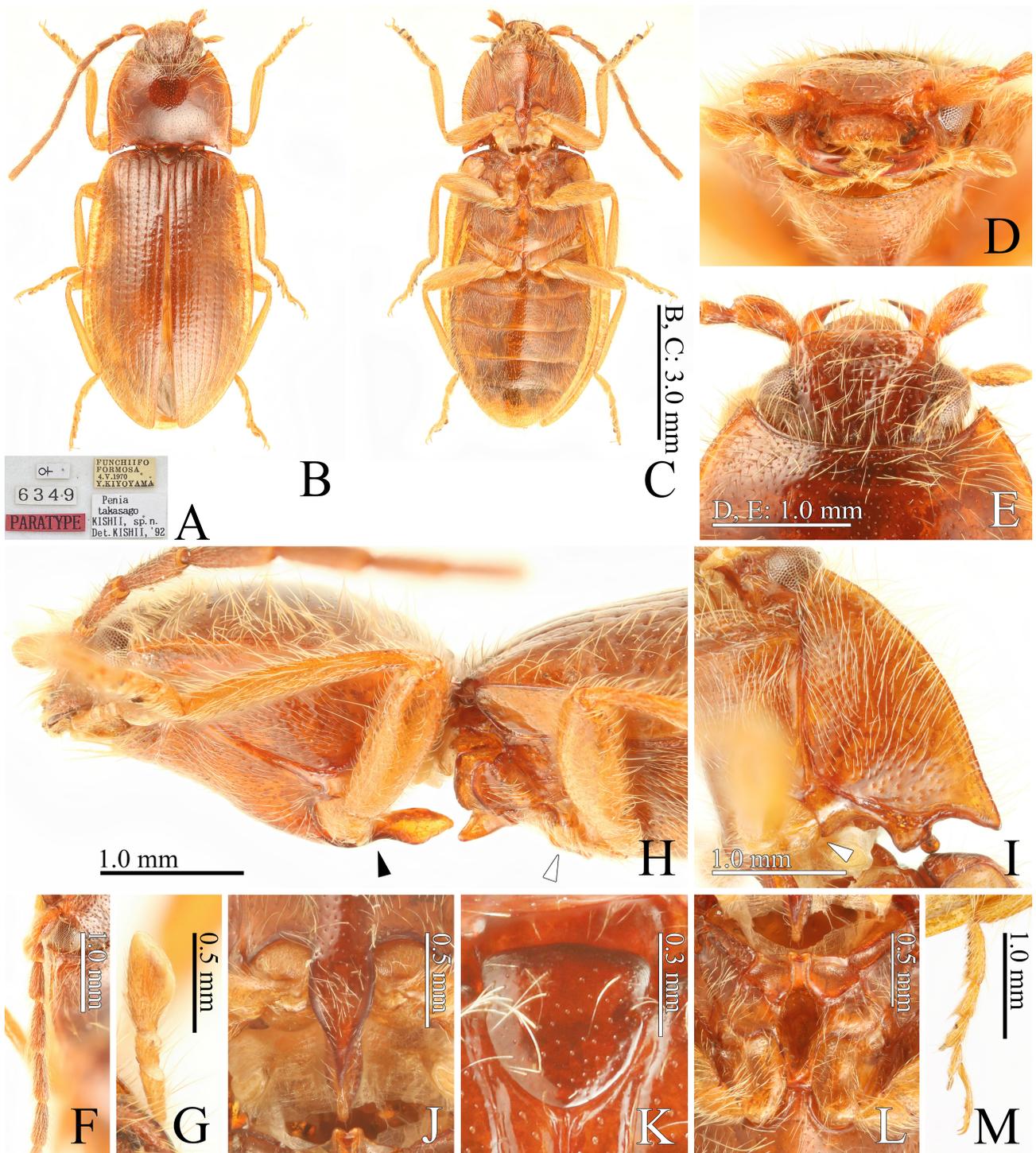
### *Penia inopinata* Arimoto, sp. nov.

(Figure 10, 11)

*Penia takasago* Kishii, 1997: 12 (original description; type locality: Taiwan, Nantou County, Sungkang) [partim].

**Etymology.** Specific epithet derived from the circumstances of the discover of the species.

**Type material. Holotype.** Female, Taiwan, Chiayi County, Zhuqi Township, Fenqihu, 4 V 1970 (as 8 V 1970 in original description of *Penia takasago*), Y. Kiyoyama leg. [OMNH; 6349]. Verbatim label data (Fig. 10A). “Female symbol”; “6349”; “PARATYPE”; “FUNCHIFO/ FORMOSA/ 4. V. 1970/ Y. KIYOYAMA”; “Penia/ takasago/ KISHII, sp. n./ Det. KISHII, '92”.



**FIGURE 10.** *Penia inopinata*, holotype, female (6349) (= paratype of *Penia takasago*). A: labels; B: habitus, dorsal side; C: habitus, ventral side; D: head, anterior view; E: head, dorsal view; F: basal antennomeres of left antenna; G: left maxillary palp, dorsal side; H: head, prothorax and mesothorax, lateral view (black arrow: the direction perpendicular to the base of ventral lobe of prosternal process, white arrow: the direction perpendicular to the mesosternal process between mesocoxae); I: left hypomerite (arrow: hypomerite with slight mesial projection); J: prosternal process from the direction perpendicular to base of ventral lobe (black arrow of figure 10H); K: scutellar shield; L: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (white arrow of figure 10H); M: left mid tarsus.

**Female. Diagnosis.** This species is characterized by the following features: eyes 0.25 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VII; antennomeres III distinctly longer than II; IV 1.2 x longer than III, 0.8 x longer than II–III combined; apical maxillary

palpomere 2.1 x longer than wide, almost as long as maximum length of eye; pronotum straightly and slightly narrowed ahead of hind angles; posterior edge of pronotum with sublateral incisions; hind angles of pronotum broad, not protruding laterally beyond pronotal side; hypomerion with slight mesial projection; anterior angle of hypomerion rounded; hind angle of hypomerion broadly triangular; scutellar shield almost as long as wide; mesosternal process between mesocoxae a little higher than mesocoxae, visible in lateral view; posterior edge of mesosternal process 0.15 x wider than total width of mesosternum; elytron 3.4 x longer than wide, 2.7 x longer than pronotum length; abdominal ventrite V semicircular, rounded apically; spiculum ventrale 5.45 x longer than length of sternite VIII; ovipositor longer than length of abdomen.

This species is more similar to *P. babai* than to *P. takasago* in the eye size, the relative length of the basal antennomeres, the length-to-width ratios of the apical maxillary palpomere, scutellar shield and elytron, the shapes of the hind angle of the hypomerion and abdominal ventrite V, and the lengths of the spiculum ventrale and ovipositor. It is distinguished from *P. babai* by the following contrasting characteristics (*P. babai* in parentheses): apical maxillary palpomere almost as long as maximum length of eye (apical maxillary palpomere shorter than maximum length of eye); hind angles of pronotum not protruding laterally beyond pronotal side (hind angles of pronotum weakly protruding posterolaterad); anterior angle of hypomerion rounded (anterior angle of hypomerion nearly right angle); hypomerion with slight mesial projection (hypomerion with distinct mesial projection); mesosternal process between mesocoxae a little higher than mesocoxae (mesosternal process between mesocoxae distinctly higher than mesocoxae); posterior edge of mesosternum between mesocoxae 0.15 x wider than total width of mesosternum (posterior edge of mesosternum between mesocoxae 0.2–0.25 x wider than total width of mesosternum).

**Measurements.** BL: 8.96, BW: 3.63, MAE: 1.54, MBE: 1.02, OI: 151, PL: 2.30, PML: 1.80, PW: 2.77, PAW: 1.72, PLI: 83.3, PWI: 161, EL: 6.17, EW: 1.83, EI: 336, BI: 268.

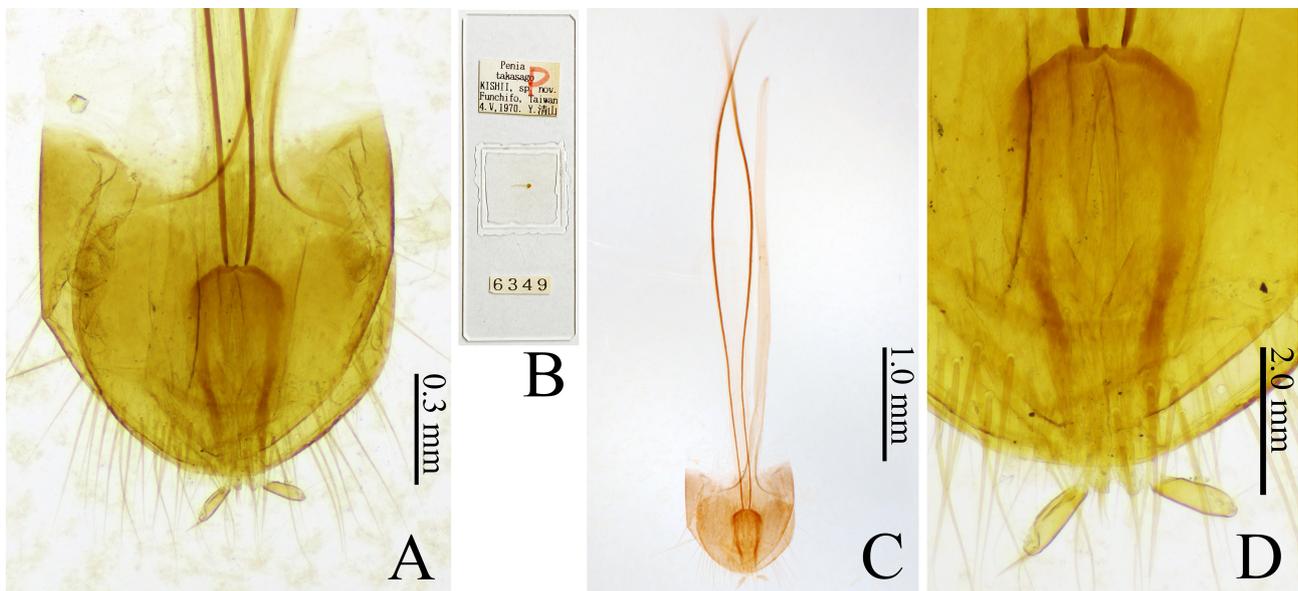
**Description.** Body broad, widest around elytral midlength (Fig. 10B); surface generally smooth; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 10B, C). Color. Body, antennae and legs reddish brown. External edge of mandible, posterior edges of prosternum and anterior edge of scutellum black. Body covered with long yellow setae.

Head. Frons flatted medially (Fig. 10D, E); frontal carina not complete (Fig. 10D); frontal margin hexagonal, almost straight apically in dorsal view (Fig. 10E); frontoclypeal region protruding beyond base of labrum. Eyes relatively normal in convexity, 0.25 x longer than interocular distance in dorsal view (Fig. 10E). Antennae extending beyond pronotum posterior lateral apices by antennomere VII; antennomeres longer than wide; II obconical, shortest, 1.5 x longer than wide; III weakly serrated, 2.7 x longer than wide, 2.1 x longer than II; IV–XI filiform; IV 3.2 x longer than wide, 1.2 x longer than III, 0.8 x longer than II–III combined (Fig. 10F); V 3.4 x longer than wide, almost as long as IV; right antennomeres II–XI and left antennomeres IX–XI lost in holotype (Fig. 10B). Mandible bidentate (Fig. 10D). Apical maxillary palpomere semicircular (Fig. 10G), 2.1 x longer than wide, almost as long as maximum length of eye; anterior edge rounded.

Prothorax. Pronotum hexagonal, 0.8 x longer than wide, roundly widening anteriorly, widest around midlength, and then straightly and slightly narrowed ahead of hind angles (Fig. 10A), tallest just behind midlength (Fig. 10H), without median longitudinal depression posteriorly; anterior edge strongly concave; anterior angles simple, acute; punctate lateral ridge extending from anterior angles to hind angles (Fig. 10B); hind angles simple, broad, not protruding laterally beyond pronotal side; posterior edge with a sublateral incision near each hind angle, without carinae next to sublateral incisions (Fig. 10B). Hypomerion with slight mesial projection (Fig. 10I: arrow); anterior angle rounded; mesial edge slightly rounded; mesial and posterior margins with impunctate ridge (Fig. 10I); posterior margin with rectangular projection between two large emarginations; hind angle broadly triangular. Prosternum weakly incurved ventrally in lateral view; anterior lobe weakly protruding beyond prosternal ventral line in lateral view (Fig. 10H); anterior edge broadly rounded in ventral view (Fig. 10C). Prosternal process broad, 2.1 x longer than procoxal cavity length, concave between procoxae, strongly curved dorsad from the middle of procoxal cavities in lateral view (Fig. 10H), without subapical tooth; dorsal lobe abruptly narrowed posterad near apical region in ventral view (Fig. 10J); ventral lobe roundly expanded near base and then abruptly narrowed posterad in ventral view (Fig. 10J); ventral margin roundly and medially expanded in lateral view (Fig. 10J); apex rounded in lateral and ventral views (Fig. 10J, H). Pronotosternal sutures not grooved (Fig. 10I), weakly sinuate in ventral view (Fig. 10C), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 10K), almost as long as wide, widest anteriorly, slightly constricted near base and then narrowed posterad, flat, inclined anterior-downwards, not visible in lateral view (Fig. 10H); anterior edge broadly rounded and slightly protruding medially; posterior edge rounded.

Mesosternum: borders of mesosternal cavity slightly rounded and then curved obtusely ventrad in lateral view (Fig. 10H); mesosternal process between mesocoxae higher than mesocoxae, visible in lateral view (Fig. 10H: white arrow); posterior edge 0.15 x wider than total width of mesosternum, straight (Fig. 10L). Mesepisternum reaching mesocoxal cavity (Fig. 10L). Metasternum sulcate medially and ahead of metacoxal cavities (Fig. 10B). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 1/4 in ventral view (Fig. 10C). Elytron broadly moderately convex, but with outer margin widely depressed, widest around midlength, 3.4 x longer than wide, 2.7 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 10M).

Abdomen. Ventrite V wide semicircular, rounded apically (Fig. 10C), 0.4 x longer than wide. Tergite and sternite VIII yellow. Terigite VIII semicircular, almost as long as wide; sternite VIII (between base of spiculum ventrale and apex) semicircular, 0.8 x longer than wide (Fig. 11A; the pregenital segments of holotype had been mounted in balsam on slides and were distorted by the pressure exerted by the coverslip, Fig. 11B, C); spiculum ventrale 5.45 x longer than length of sternite VIII (Fig. 11C). Ovipositor 1.2 x longer than length of abdomen; coxites two segmented at ventral side, with three setae each dorsally, ventrally, and apically; stylus with several setae around apex (Fig. 11D). Vagina and bursa copulatrix lost in holotype (Fig. 11C).



**FIGURE 11.** *Penia inopinata*, holotype, female (6349) (= paratype of *Penia takasago*). A: pregenital segments, ventral side; B: slide; C: pregenital segments and ovipositor, ventral side; D: coxites, ventral side.

**Male.** Unknown.

**Discussion.** Four female types were assigned to *P. takasago* in the original description (Kishii, 1997). However, the paratype (6349) is distinguished from the holotype and other two paratypes of *P. takasago* by the following contrasting characters (the holotype and other two paratypes in parentheses): eyes 0.25 x longer than interocular distance in dorsal view (eyes 0.4 x longer than interocular distance in dorsal view); apical maxillary palpomere almost as long as maximum length of eye (apical maxillary palpomere shorter than maximum length of eye); pronotum slightly and straightly narrowed ahead of hind angles (pronotum strongly and straightly narrowed ahead of hind angles); hind angles of pronotum broad, not protruding laterally beyond pronotal side (hind angles of pronotum acute, strongly protruding posterolaterad); hypomeron with slight mesial projection (hypomeron with moderate mesial projection); hind angle of hypomeron broadly triangular (hind angle of hypomeron claw-like shaped); mesosternal process between mesocoxae higher than mesocoxae, visible in lateral view (mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view); ovipositor longer than length of abdomen (ovipositor shorter than length of abdomen). Moreover, the paratype is different from the other Taiwanese congeners (see diagnosis). Therefore, the paratype was determined to be a new species.

**Distribution.** Taiwan: Chiayi County (Fig. 1).

***Penia pulla* Arimoto sp. nov.**

(Figures 12, 13)

**Etymology.** In reference to the dark-colored body than the other Taiwanese species.

**Type material. Holotype.** Female, Taiwan, Chiayi County, Alishan Township, Mt. Ali Shan, 2300 m, 29–31 V 2004, Jar. Dalihod and Jana Dalihodová Baštová leg. [NMNST; PPA01].

**Female. Diagnosis.** This species is characterized by the following features: eyes 0.2 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VIII, not reaching elytral half by antennomere XI; antennomeres III distinctly longer than II; IV 1.3 x longer than III, 0.8 x longer than II–III combined; apical maxillary palpomere 2.1 x longer than wide, shorter than maximum length of eye; pronotum straightly and slightly widening ahead of hind angles; posterior edge of pronotum with sublateral incisions; hind angles of pronotum broad, weakly protruding posterolaterad; hypomeron with slight mesial projection; anterior angle of hypomeron nearly right angle; hind angle of hypomeron broadly triangular; scutellar shield 0.9 x longer than wide; mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view; posterior edge of mesosternal process 0.15 x wider than total width of mesosternum; elytron 3.7 x longer than wide, 3.2 x longer than pronotum length; abdominal ventrite V semicircular, rounded apically; spiculum ventrale 5.3 x longer than length of sternite VIII; ovipositor longer than length of abdomen.

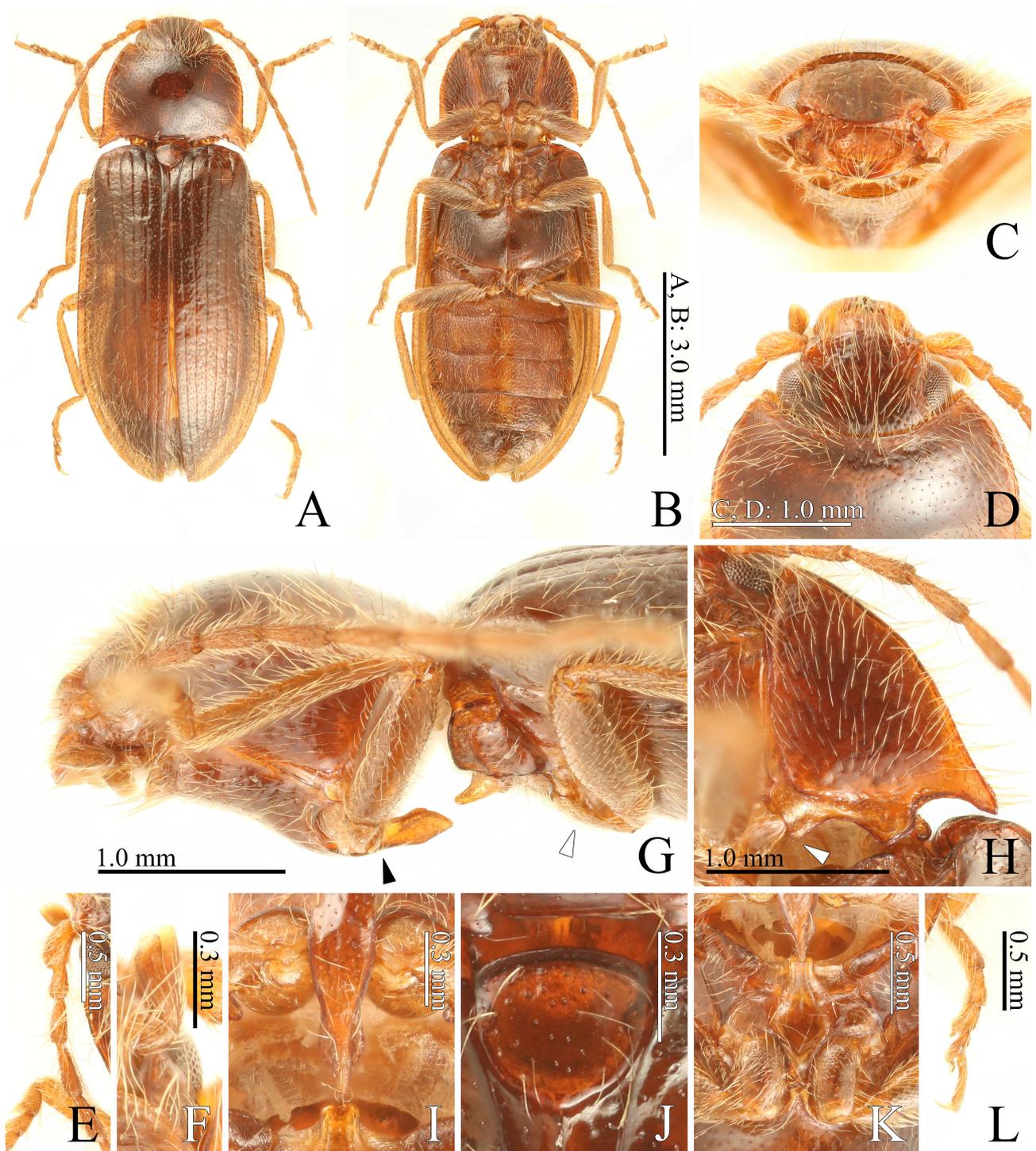
This species is similar to *P. tsou* in the feature of the basal antennomeres, the maxillary palpi, the pronotum, the anterior and hind angles of the hypomeron, and the abdominal ventrite V. It is distinguished by its eye size, antenna length, the degree of developments of the mesial projection of the hypomeron and mesosternal process between the mesocoxae, and the length-to-width ratios of the scutellar shield and elytron (see diagnosis of *P. tsou*).

**Measurements.** BL: 7.63, BW: 3.01, MAE: 1.28, MBE: 0.90, OI: 141, PL: 1.73, PML: 1.44, PW: 2.40, PAW: 1.42, PLI: 72.3, PWI: 169, EL: 5.53, EW: 1.51, EI: 365, BI: 319.

**Description.** Body broad, widest behind elytral midlength (Fig. 12A); surface generally smooth; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 12A, B). Color. Body blackish brown. Mandible, labrum, lateral margin of pronotum, external margins of hypomeron and prosternum, and lateral margin of elytra orange, but external edge of mandible, lateral edges of pronotum and elytra, and posterior edge of prosternum blackish brown. Antennae and legs orange, but coxae, trochanters and femora tinged with blackish brown. Body covered with long and whitish yellow setae.

Head. Frons flatted medially (Fig. 12C, D); frontal carina not complete (Fig. 12C); frontal margin semicircular, broadly rounded apically in dorsal view (Fig. 12D); frontoclypeal region protruding beyond base of labrum. Eyes relatively small, 0.2 x longer than interocular distance in dorsal view (Fig. 12D). Antennae extending beyond pronotum posterior lateral apices by antennomere VIII, not reaching elytral half by antennomere XI; antennomeres longer than its wide; II obconical, shortest, 1.5 x longer than wide; III–XI filiform; III 2.6 x longer than wide, 1.5 x longer than II; IV 3.3 x longer than wide, 1.3 x longer than III, 0.8 x longer than II–III combined (Fig. 12E); V 3.4 x longer than wide, slightly shorter than IV; XI 4.15 x longer than wide, 1.1 x longer than X. Mandible bidentate (Fig. 12C). Apical maxillary palpomere securiform (Fig. 12F), 2.1 x longer than wide, shorter than maximum length of eye; anterior edge rounded.

Prothorax. Pronotum hexagonal, 0.7 x longer than wide, roundly widening anteriorly and then straightly and slightly widening ahead of hind angles, widest just ahead of posterior lateral apices (Fig. 12A), tallest medially (Fig. 12G), without median longitudinal depression posteriorly; anterior edge strongly concave; anterior angles simple, nearly right angle; punctate lateral ridge extending from anterior angles to hind angles (Fig. 12A); hind angles simple, broad, weakly protruding posterolaterad; posterior edge with a sublateral incision near each hind angle, without carinae next to sublateral incisions (Fig. 12A). Hypomeron with slight mesial projection (Fig. 12H: arrow); anterior angle nearly right angle; mesial edge weakly sinuate anteriorly and straight posteriorly; mesial and posterior margins with impunctate ridge (Fig. 12H); posterior margin with rectangular projection between two large emarginations; hind angle broadly triangular. Prosternum weakly incurved ventrally in lateral view; anterior lobe distinctly protruding beyond prosternal ventral line in lateral view (Fig. 12G); anterior edge broadly rounded but almost straight apically in ventral view (Fig. 12B). Prosternal process broad, 1.7 x longer than procoxal cavity length, concave between procoxae, strongly curved dorsad from the middle of procoxal cavities in lateral view (Fig. 12G), without subapical tooth; dorsal lobe roundly expanded ahead of apex in ventral view (Fig. 12I); ventral lobe slightly and roundly expanded near base and then abruptly narrowed posterad in ventral view (Fig. 12I);



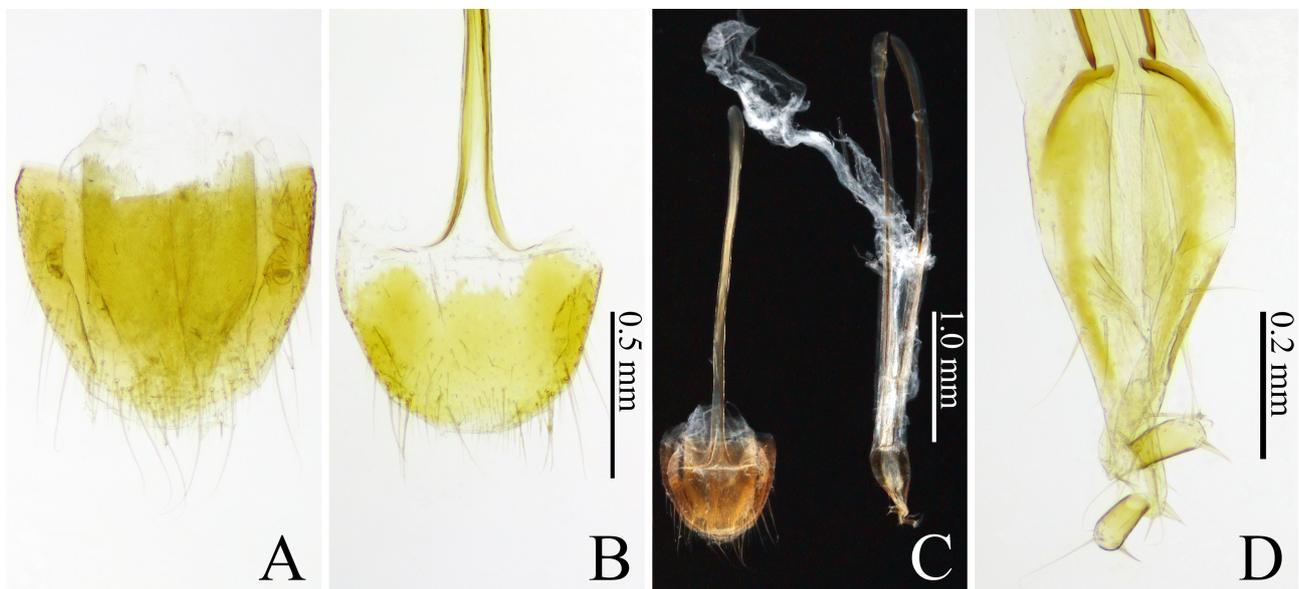
**FIGURE 12.** *Penia pulla*, holotype, female (PPA01). A: habitus, dorsal side; B: habitus, ventral side; C: head, anterior view; D: head, dorsal view; E: basal antennomeres of left antenna; F: left maxillary palp, ventral side; G: head, prothorax and mesothorax, lateral view (black arrow: the direction perpendicular to the base of ventral lobe of prosternal process, white arrow: the direction perpendicular to the mesosternal process between mesocoxae); H: left hypomeron (arrow: hypomeron with slight mesial projection); I: prosternal process from the direction perpendicular to base of ventral lobe (black arrow of figure 12G); J: scutellar shield; K: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (white arrow of figure 12G); L: right mid tarsus.

ventral margin weakly and roundly expanded medially in lateral view (Fig. 12G); apex rounded in lateral and ventral views (Fig. 12G, I). Pronotosternal sutures not grooved (Fig. 12H), weakly sinuate in ventral view (Fig. 12B), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 12J), 0.9 x longer than wide, widest anteriorly, narrowed

posteriad, flat, inclined anterior-downwards, not visible in lateral view (Fig. 12G); anterior edge broadly rounded; posterior edge rounded. Mesosternum: borders of mesosternal cavity nearly straight anteriorly and then obtusely curved ventrad in lateral view (Fig. 12G); mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view (Fig. 12G); posterior edge 0.15 x wider than total width of mesosternum, slightly emarginate (Fig. 12K). Mesepisternum reaching mesocoxal cavity (Fig. 12K). Metasternum sulcate medially and ahead of metacoxal cavities (Fig. 12B). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 3/10 in ventral view (Fig. 12B). Elytron generally moderately convex, but with outer margin widely depressed, widest behind midlength, 3.7 x longer than wide, 3.2 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 12L).

Abdomen. Ventrite V semicircular, rounded apically (Fig. 12B), 0.4 x longer than wide. Tergite and sternite VIII yellow. Terigite VIII semicircular, 1.15 x longer than wide (Fig. 13A). Sternite VIII (between base of spiculum ventrale and apex) semicircular, 0.7 x longer than wide (Fig. 13B); spiculum ventrale 5.3 x longer than length between base of spiculum ventrale and sternite VIII apex (Fig. 13C). Ovipositor 1.05 x longer than length of abdomen; coxites two segmented at ventral side (Fig. 13D), with several setae each dorsally, ventrally, and apically; stylus with several setae around apex (Fig. 13D). Vagina short; bursa copulatrix broken in holotype, without sclerotized structures (Fig. 13C).

**Distribution.** Taiwan: Chiayi County (Fig. 1).



**FIGURE 13.** *Penia pulla*, holotype, female (PPA01). A: tergite VIII; B: sternite VIII; C: pregenital segments and genitalia; D: coxites, ventral side.

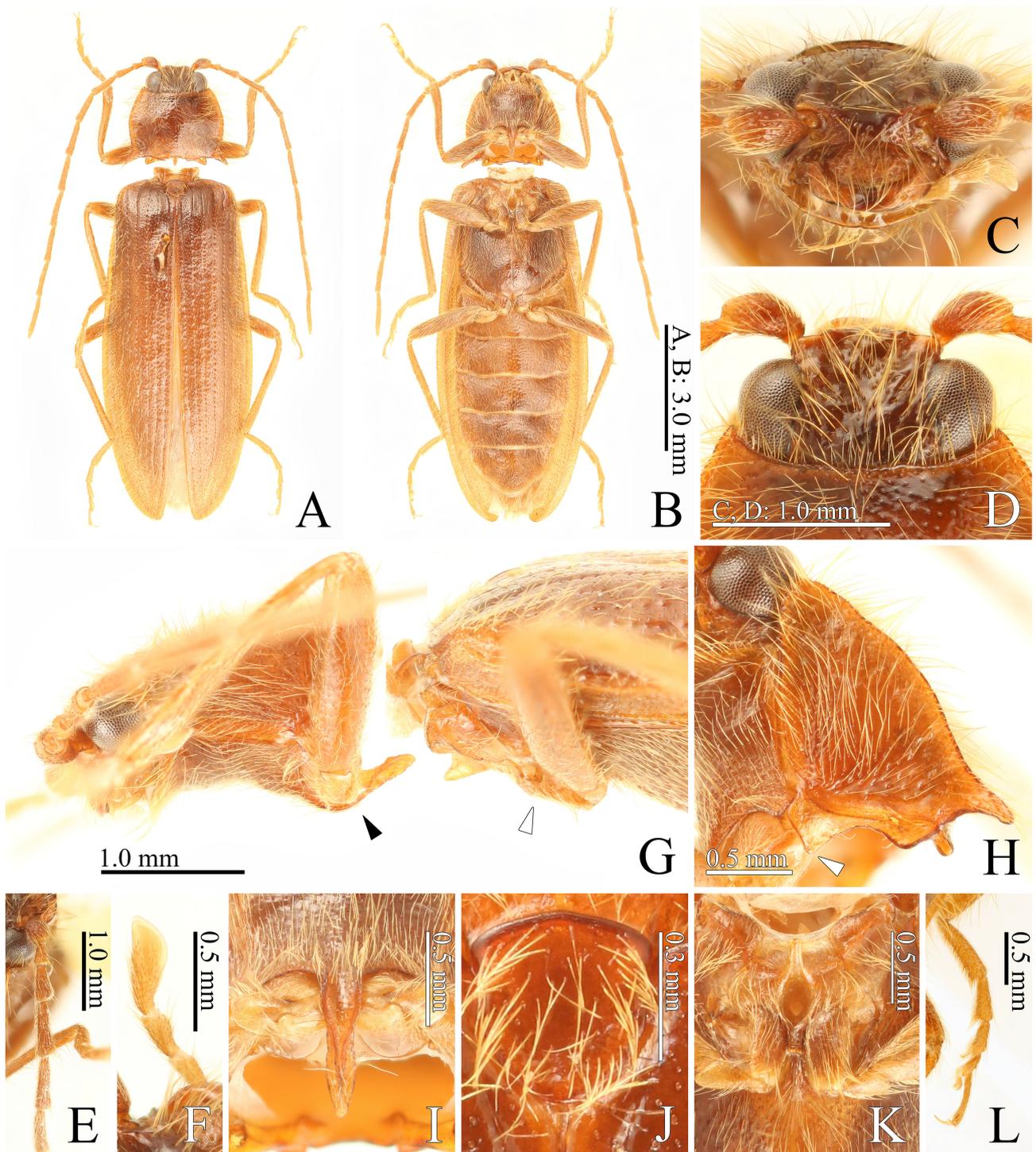
### *Penia smetanai* Schimmel, 1996

(Figures 14, 15)

*Penia smetanai* Schimmel, 1996: 187 (original description; type locality: Taiwan, Taichung City, Heping District, Mt. Anma Shan); Schimmel, 2001: 221, 227 (comparison with the other species); Kundrata *et al.*, 2018: 55 (catalogue).

**Type material. Paratype.** Male, Taiwan, Taichung City, Heping District, Mt. Anma Shan, 2225 m, 11–15 V 1992, A. Smetana leg. [BMNH; PSS01].

**Male. Diagnosis.** This species is characterized by the following features: eyes 0.5 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI; antennomeres III distinctly longer than II; IV 1.5 x longer than III, almost as long as II–III combined; apical maxillary palpomere 2.8 x longer than wide, shorter than maximum length of eye; pronotum roundly narrowed and distinctly constricted ahead of hind angles; posterior edge of pronotum with a sublateral incision



**FIGURE 14.** *Penia smetanai*, paratype, male (PSS01). A: habitus, dorsal side; B: habitus, ventral side; C: head, anterior view; D: head, dorsal view; E: basal antennomeres of left antenna; F: left maxillary palp, dorsal side; G: head, prothorax and mesothorax, lateral view (black arrow: the direction perpendicular to the base of ventral lobe of prosternal process, white arrow: the direction perpendicular to the mesosternal process between mesocoxae); H: left hypomeron (arrow: hypomeron with slight mesial projection); I: prosternal process from the direction perpendicular to base of ventral lobe (black arrow of figure 14G); J: scutellar shield; K: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (white arrow of figure 14G); L: right mid tarsus.

near each hind angle; hind angles of pronotum acute, strongly protruding posterolaterad; hypomeron with slight mesial projection; anterior angle of hypomeron rounded; hind angle of hypomeron claw-like shaped; scutellar shield almost as long as wide; mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view;

posterior edge of mesosternal process less than 0.1 x wider than total width of mesosternum; elytron 4.7 x longer than wide, 4.4 x longer than pronotum length; abdominal ventrite V semicircular but slightly incurved laterally ahead of apex, rounded apically; phallobase almost as long as wide; apex of parameres beyond preapical expansions bullet-like shaped; apex length 2.4 x width of parameres at expansions in ventral side.

In Taiwan, three species with elongate bodies are known: *P. alishanensis*, *P. elongata*, and *P. smetanai*. Their elytra are more than 4× longer than their widths. They are separated from the other species, whose elytra are less than 4× longer than their widths.

*Penia smetanai* is more similar to *P. alishanensis* in the relative length of the basal antennomeres and the development of the mesosternal process between mesocoxae, but is distinguished from *P. alishanensis* by the following contrasting characters (*P. alishanensis* in parentheses): apical maxillary palpomere 2.8 x longer than wide (apical maxillary palpomere 2.3 x longer than wide); hypomeron with slight mesial projection (hypomeron with distinct mesial projection); anterior angle of hypomeron rounded (anterior angle of hypomeron biangular); scutellar shield almost as long as wide (scutellar shield 1.2 x longer than wide); abdominal ventrite V semicircular but slightly incurved laterally ahead of apex (abdominal ventrite V curved triangular); apex of parameres beyond preapical expansions bullet-like shaped (apex of parameres beyond preapical expansions elongated fan-shaped); apex length 2.4 x width of parameres at expansions in ventral side (apex length 2.7 x width of parameres at expansions in ventral side).

*Penia smetanai* is distinguished from *P. elongata* by many characters (*P. elongata* in parentheses): antennomeres III distinctly longer than II (antennomeres II and III similar, short); antennomeres IV 1.5 x longer than III, almost as long as II–III combined (antennomeres IV 3.3 x longer than III, 1.8 x longer than II–III combined); apical maxillary palpomere 2.8 x longer than wide, shorter than maximum length of eye (apical maxillary palpomere 3.7 x longer than wide, longer than maximum eye length); posterior edge of pronotum with sublateral incisions (posterior edge of pronotum without sublateral incisions); hypomeron with slight mesial projection (hypomeron without mesial projection); anterior angle of hypomeron rounded (anterior angle of hypomeron biangular); hind angle of hypomeron claw-like shaped (hind angle of hypomeron narrowly triangular); abdominal ventrite V semicircular (abdominal ventrite V trapezoidal); apex of parameres beyond preapical expansions bullet-like shaped (apex of parameres beyond preapical expansions blade-like shaped); apex length 2.4 x width of parameres at expansions in ventral side (apex length 1.8–1.9 x width of parameres at expansions in ventral side).

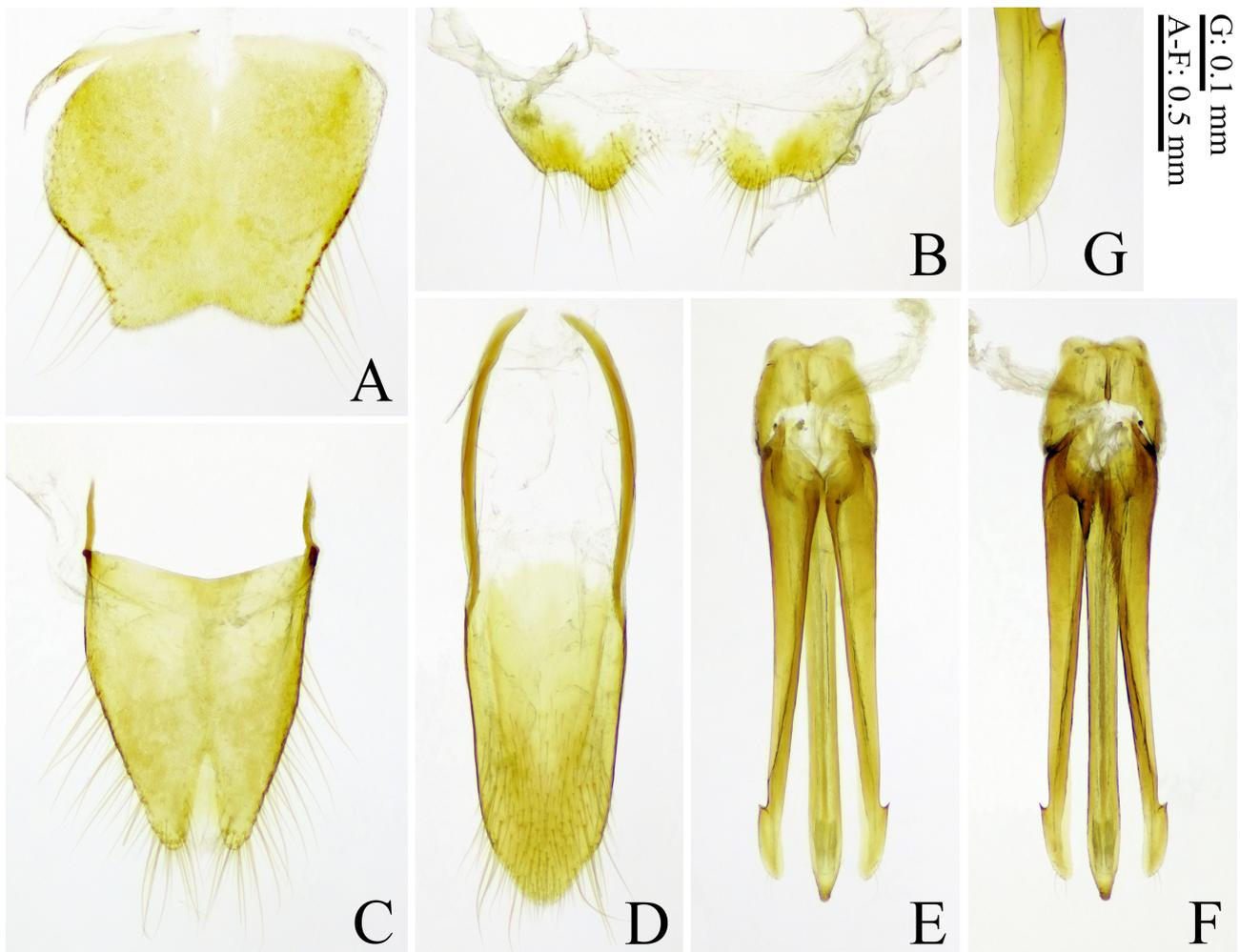
**Measurements.** BL: 10.5, BW: 3.42, MAE: 1.46, MBE: 0.72, OI: 203, PL: 1.86, PML: 1.53, PW: 2.45, PAW: 1.51, PLI: 75.8, PWI: 162, EL: 8.12, EW: 1.73, EI: 471, BI: 438.

**Redescription.** Body elongated, widest behind elytral midlength (Fig. 14A); surface generally smooth but prothorax and abdomen with microstructures; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 14A, B). Color. Body, antennae and legs brown. Lateral margins of pronotum and elytra, external margins of hypomeron and prosternum, and posterior margin of abdominal ventrite V yellowish. External edges of mandible and pronotum, posterior edge of prosternum, outer and posterior edges of hypomera, and anterior edges of scutellum and elytra blackish. Body covered with long yellow setae.

Head. Frons flatted medially (Fig. 14C, D); frontal carina not complete (Fig. 14C); frontal margin rectangular, nearly straight apically but weakly protruding medially in dorsal view (Fig. 14D); frontoclypeal region protruding beyond base of labrum. Eyes protuberant, 0.5 x longer than interocular distance in dorsal view (Fig. 14D). Antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI; antennomeres longer than wide; II obconical, shortest, 1.1 x longer than wide; III weakly serrated, 2.2 x longer than wide, 2.4 x longer than II; IV weakly serrated, 3.3 x longer than wide, 1.5 x longer than III, almost as long as II–III combined (Fig. 14E); V–XI filiform; V 3.7 x longer than wide, almost as long as x longer than IV; XI 7.9 x longer than wide, 1.2 x longer than X. Mandible bidentate (Fig. 14C). Apical maxillary palpomere elongated securiform (Fig. 14F), 2.8 x longer than wide, shorter than maximum length of eye; anterior edge rounded.

Prothorax. Pronotum hexagonal, 0.8 x longer than wide, roundly widening anteriorly and then roundly narrowed, distinctly constricted ahead of hind angles (Fig. 14A), widest across posterior lateral apices, tallest behind midlength (Fig. 14G), without median longitudinal depression posteriorly; anterior edge weakly concave; anterior angles simple, nearly right angle; punctate lateral ridge extending from anterior angles to hind angles (Fig. 14A); hind angles simple, acute, strongly protruding posterolaterad; posterior edge with a moderate sublateral incision near each hind angle, without carinae next to sublateral incisions (Fig. 14A). Hypomeron with slight mesial projection (Fig. 14H: arrow); anterior angle rounded; mesial edge weakly sinuate; mesial and posterior margins with impunctate

ridge (Fig. 14H); posterior margin with triangular projection between two large emarginations; hind angle claw-like shaped. Prosternum strongly incurved ventrally in lateral view; anterior lobe distinctly protruding beyond prosternal ventral line in lateral view (Fig. 14G); anterior edge rounded in ventral view (Fig. 14B). Prosternal process slender, 1.9 x longer than procoxal cavity length, concave between procoxae, strongly curved dorsad from middle of procoxal cavities in lateral view (Fig. 14G), without subapical tooth; dorsal lobe slightly roundly expanded anterior to apex in ventral view (Fig. 14I); ventral lobe weakly roundly expanded near base and then abruptly narrowed posterad in ventral view (Fig. 14I); ventral margin almost straight but slightly expanded medially in lateral view (Fig. 14G); apex rounded in lateral and ventral views (Fig. 14G, I). Pronotosternal sutures not grooved (Fig. 14H), straight anteriorly and curved posteriorly in ventral view (Fig. 14B), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 14J), almost as long as wide, widest anteriorly, weakly constricted anteriorly, almost parallel-sided and then narrowed posteriad, flat, inclined anterior-downwards, not visible in lateral view (Fig. 14G); anterior margin triangular; posterior edge rounded. Mesosternum: borders of mesosternal cavity straight anteriorly and then obtusely curved in lateral view (Fig. 14G); mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view (Fig. 14G); posterior edge less than 0.1 x wider than total width of mesosternum, emarginate (Fig. 14K). Mesepisternum reaching mesocoxal cavity (Fig. 14K). Metasternum sulcate medially and anterior to metacoxal cavities (Fig. 14B). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 7/10 in ventral view (Fig. 14B). Elytron convex but flat in median area, with outer margin narrowly depressed, widest behind middle, 4.7 x longer than wide, 4.4 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths:  $IV < III < V < I$ ; tarsomeres III and IV with lobe ventrally (Fig. 14L).



**FIGURE 15.** *Penia smetanai*, paratype, male (PSS01). A: tergite VIII; B: sternite VIII; C: tergites IX–X; D: sternite IX; E: aedeagus, dorsal side; F: aedeagus, ventral side; G: apical part of left paramera, ventral side.

Abdomen. Ventricle V semicircular but slightly incurved laterally anterior to apex, rounded apically (Fig. 14B), 0.6 x longer than wide. Tergites and sternites VIII–X yellow. Tergite VIII trapezoidal, 0.85 x longer than wide, narrowed posteriad, weakly incurved laterally anterior to posterior lateral apices; posterior edge emarginate (Fig. 15A). Sternite VIII posteriorly widely concave between two projections (Fig. 15B); posterior lateral angle weakly protruding posterad. Tergite IX 1.3 x longer than wide; median notch 1/3 x total length of tergite IX (Fig. 15C). Tergite X longer than wide, rounded apically (Fig. 15C). Sternite IX 3.45 x longer than wide, constricted anterior to midlength (Fig. 15D), rounded apically. Aedeagus yellow (Fig. 15E, F). Phallobase 0.2 x total length of aedeagus, almost as long as wide. Median lobe exceeding apices of parameres by apical 1/20; basal struts 0.2 x total length of median lobe. Parameres elongate, not fused ventrally (Fig. 15F); preapical expansions projecting anterolaterad (Fig. 15G); apex beyond preapical expansions bullet-like shaped (Fig. 15G), rounded apically, with a seta dorsally, with two or four setae ventrally; apex length 2.4 x width of parameres at expansions in ventral side.

**Distribution.** Taiwan: Taichung City (Fig. 1).

### *Penia takasago* Kishii, 1997

(Figures 16, 17)

*Penia takasago* Kishii, 1997: 12 (original description; type locality: Taiwan, Nantou County, Sungkang) [partim]; Suzuki, 1999: 121 (catalogue); Cate, 2007: 185 (catalogue); Kundrata *et al.*, 2018: 56 (catalogue).

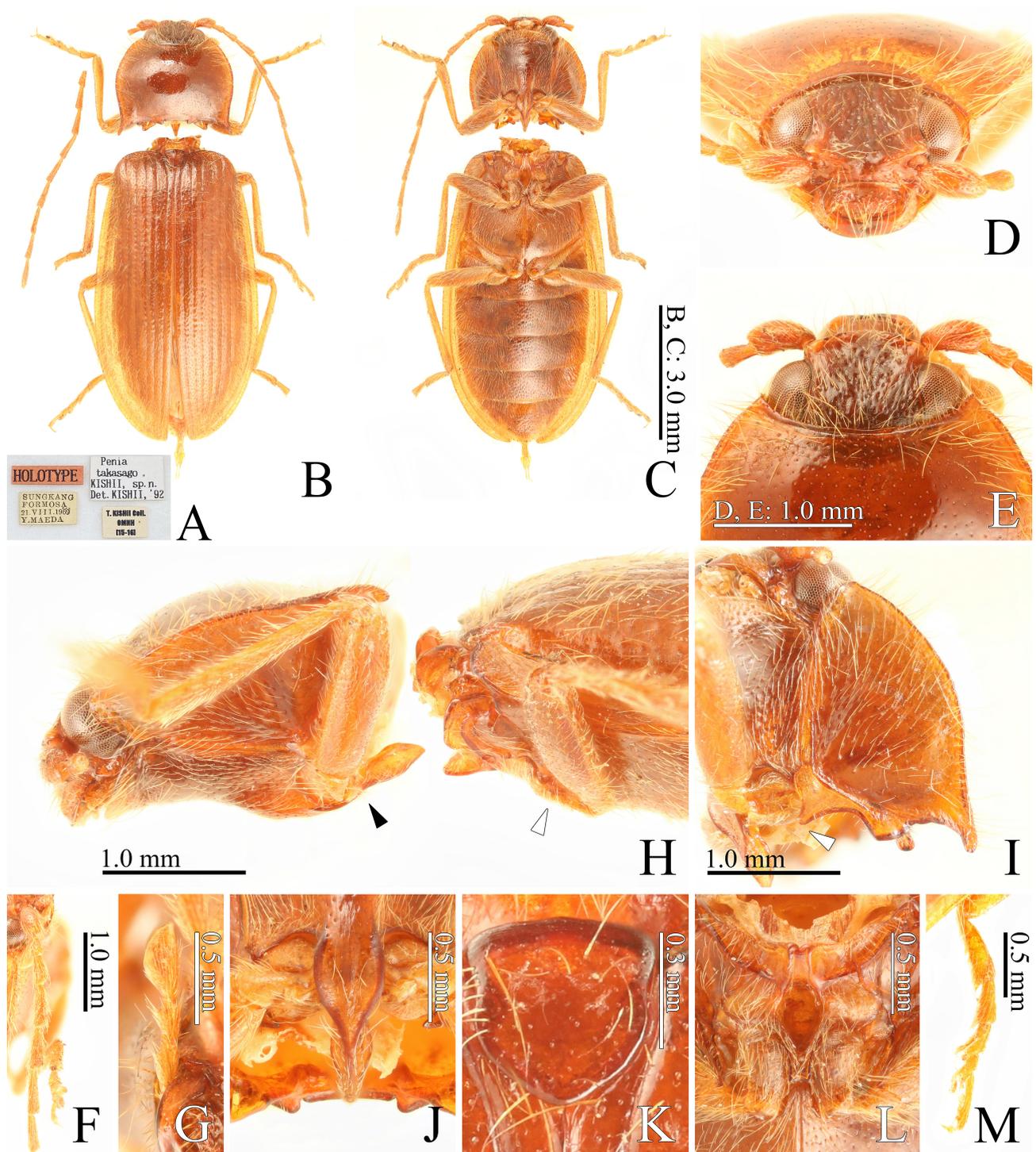
**Type material. Holotype.** Female, Taiwan, Nantou County, Sungkang, 21 VII 1969, Y. Maeda leg. [OMNH; PTK01]. Verbatim label data (Fig. 16A). “HOLOTYPE”; “SUNGKANG/ FORMOSA/ 21. VIII. 1969/ Y. MAEDA”; “*Penia takasago*/ KISHII, sp. n./ Det. KISHII, ’92”; “T. KISHII Coll./ OMNH/ [15-16]”. **Paratype.** 1 female, Taiwan, Nantou County, Musha, 7 VIII 1969, T. Kobayashi leg. [OMNH; PTK02]; 1 female, Taiwan, Nantou County, Sungkang, 6 VIII 1969 (as 6 VII 1969 in original description), Y. Maeda leg. [OMNH; 6348].

**Female. Diagnosis.** This species is characterized by the following features: eyes 0.4 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI; antennomeres III distinctly longer than II; IV 1.3–1.4 x longer than III, 0.8–0.85 x longer than II–III combined; apical maxillary palpomere 2.3–2.5 x longer than wide, shorter than maximum length of eye; pronotum strongly and straightly narrowed anterior to hind angles; posterior edge of pronotum with sublateral incisions; hind angles of pronotum acute, strongly protruding posterolaterad; hypomeron with moderate mesial projection; anterior angle of hypomeron rounded; hind angle of hypomeron claw-like shaped; scutellar shield almost as long as wide; mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view; posterior edge of mesosternal process 0.1–0.15 x wider than total width of mesosternum; elytron 3.4–3.6 x longer than wide, 2.9–3.0 x longer than pronotum length; abdominal ventrite V curved triangular, rounded apically; spiculum ventrale 3.9–4.6 x longer than length of sternite VIII; ovipositor shorter than length of abdomen.

In Taiwan, five species with broad bodies are known: *P. babai*, *P. inopinata*, *P. pulla*, *P. takasago*, and *P. tsou*. Their elytra are less than 4× their widths. They are separated from the elongate species, whose elytra are more than 4× the width. Among broad-bodied species, *P. takasago* is distinguished from the other congeners by the following characters (the other species in parentheses): eyes 0.4 x longer than interocular distance in dorsal view (eyes 0.2–0.3 x longer than interocular distance in dorsal view); OI: 177–179 (OI: 141–162); pronotum strongly and straightly narrowed anterior to hind angles (pronotum slightly narrowed or slightly widening anterior to hind angles); hind angles of pronotum acute (hind angles of pronotum broad); spiculum ventrale less than 5 x longer than length of sternite VIII (spiculum ventrale more than 5 x longer than length of sternite VIII); ovipositor shorter than length of abdomen (ovipositor longer than length of abdomen).

*Penia takasago* is remarkable also due to the many sclerotized spines inside the bursa copulatrix and the thick sac extending from around the apex of the bursa copulatrix and splitting in two; however, it is impossible to determine if these features are useful for species identification because the bursa copulatrix in the holotype of *P. inopinata* was lost and could not be compared to that of *P. takasago*.

**Measurements** (n=3; holotype in parentheses). BL: 8.61–8.79 (8.79), BW: 3.43–3.63 (3.58), MAE: 1.33–1.39 (1.39), MBE: 0.75–0.78 (0.78), OI: 177–179 (178), PL: 2.09–2.17 (2.17), PML: 1.63–1.71 (1.71), PW: 2.49–2.66 (2.62), PAW: 1.40–1.51 (1.50), PLI: 81.1–84.1 (83.0), PWI: 175–178 (175), EL: 6.25–6.45 (6.45), EW: 1.74–1.84 (1.82), EI: 341–364 (354), BI: 289–303 (297).



**FIGURE 16.** *Penia takasago*, holotype, female (PTK01). A: labels; B: habitus, dorsal side; C: habitus, ventral side; D: head, anterior view; E: head, dorsal view; F: basal antennomeres of right antenna; G: right maxillary palp, dorsal side; H: head, prothorax and mesothorax, lateral view (black arrow: the direction perpendicular to the base of ventral lobe of prosternal process, white arrow: the direction perpendicular to the mesosternal process between mesocoxae); I: left hypomeron (arrow: hypomeron with moderate mesial projection); J: prosternal process from the direction perpendicular to base of ventral lobe (black arrow of figure 16H); K: scutellar shield; L: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (white arrow of figure 18H); M: right mid tarsus.

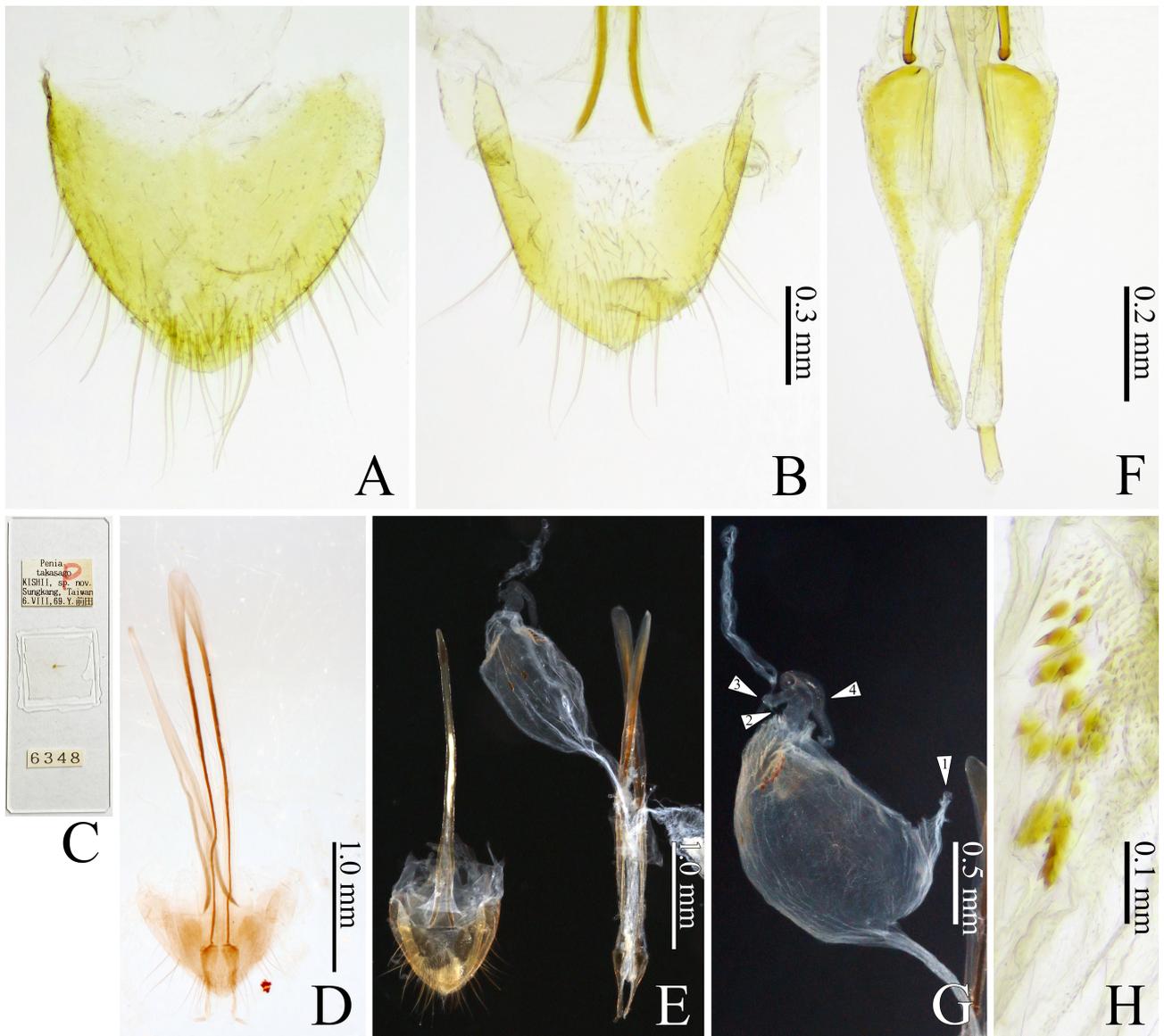
**Redescription.** Body broad, widest around elytral midlength (Fig. 16B); surface generally smooth; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 16B, C). Color. Body, antennae and legs reddish brown. Lateral margin of pronotum, and external margins of hypomeron and prosternum paler. Lateral

margin of elytra yellow. External edge of mandible, lateral and posterior edges of pronotum and mesosternal process between mesocoxae, posterior edges of hypomera and prosternum, external margin of scutellum and anterior edge of elytra blackish (Fig. 16B, C). Body covered with long yellow setae.

Head. Frons flatted medially (Fig. 16D, E); frontal carina not complete (Fig. 16D); frontal margin rectangular but broadly rounded apically in dorsal view (Fig. 16E); frontoclypeal region protruding beyond base of labrum. Eyes relatively normal in convexity, 0.4 x longer than interocular distance in dorsal view (Fig. 16E). Antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI; antennomeres longer than wide; II obconical, shortest, 1.6 x longer than wide; III weakly serrated, 2.2–2.4 x longer than wide, 1.6 x longer than II; IV–XI filiform; IV 3.0–3.1 x longer than wide, 1.3–1.4 x longer than III, 0.8–0.85 x longer than II–III combined (Fig. 16F); V 3.5–4.0 x longer than wide, 1.1–1.2 x longer than IV; XI 6.0–6.3 x longer than wide, 1.1–1.15 x longer than X. Mandible bidentate (Fig. 16D). Apical maxillary palpomere semicircular (Fig. 16G), 2.3–2.5 x longer than wide, shorter than maximum length of eye; anterior edge rounded.

Prothorax. Pronotum hexagonal, 0.8 x longer than wide, roundly widening anteriorly, widest around midlength, and then strongly and straightly narrowed anterior to hind angles (Fig. 16B), tallest just behind midlength (Fig. 16H), without median longitudinal depression posteriorly; anterior edge weakly concave; anterior angles simple, nearly right angle; punctate lateral ridge extending from anterior angles to hind angles (Fig. 16B); hind angles simple, acute, strongly protruding posterolaterad; posterior edge with a moderate sublateral incision near each hind angle, without carinae next to sublateral incisions (Fig. 16B). Hypomeron with moderate mesial projection (Fig. 16I: arrow); anterior angle rounded; mesial edge weakly and broadly rounded; mesial and posterior margins with impunctate ridge (Fig. 16I); posterior margin with triangular projection between two large emarginations; hind angle abruptly narrowed to apex, claw-like shaped. Prosternum weakly to strongly incurved ventrally in lateral view (Fig. 16H); anterior lobe distinctly protruding beyond prosternal ventral line in lateral view (Fig. 16H); anterior edge broadly rounded in ventral view (Fig. 16C). Prosternal process broad, 1.8 x longer than procoxal cavity length (Fig. 16J), concave between procoxae, strongly curved dorsad from anterior edge of procoxal cavities in lateral view (Fig. 16H), without subapical tooth; dorsal lobe roundly expanded anterior to apex in ventral view (Fig. 16J); ventral lobe strongly roundly expanded near base and then abruptly narrowed posterad in ventral view (Fig. 16J); ventral margin weakly and roundly expanded medially in lateral view (Fig. 16H); apex rounded in lateral and ventral views (Fig. 16H, J). Pronotosternal sutures not grooved (Fig. 16I), nearly straight in ventral view (Fig. 16C), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 16K), 0.95–1.00 x longer than wide, widest anteriorly, weakly constricted anteriorly and narrowed posteriad but parallel-sided in paratype, flat, inclined anterior-downwards, not visible in lateral view (Fig. 16H); anterior edge broadly rounded but slightly protruding medially in holotype; posterior edge rounded. Mesosternum: borders of mesosternal cavity slightly rounded and then obtusely curved in lateral view (Fig. 16H); mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view (Fig. 16H); posterior edge 0.1–0.15 x wider than total width of mesosternum, weakly to strongly emarginate (Fig. 16L). Mesepisternum reaching mesocoxal cavity (Fig. 16L). Metasternum sulcate medially and anterior to metacoxal cavities (Fig. 16L). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 1/8 in ventral view (Fig. 16C). Elytron broadly strongly convex, but with outer margin widely depressed, widest behind midlength, 3.4–3.6 x longer than wide, 2.9–3.0 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 16M).

Abdomen. Ventricle V curved triangular, rounded apically (Fig. 16C), 0.45–0.5 x longer than wide. Tergite and sternite VIII yellow. Tergite VIII curved triangular, rounded apically, 0.8–0.9 x longer than wide (Fig. 17A), 0.7 x longer than wide in paratype (6348); sternite VIII (between base of spiculum ventrale and apex) hexagonal, 0.8 x longer than wide, 0.7 x longer than wide in paratype (6348) (Fig. 17B; the subgenital segments of the paratype (6348) had been mounted in balsam on slides and were distorted by the pressure exerted by the coverslip, Fig. 17C, D); spiculum ventrale 3.9–4.6 x longer than length of sternite VIII (Fig. 17E), 3.4 x longer than length of sternite VIII in paratype (6348) (Fig. 17D). Ovipositor 0.85–0.9 x longer than length of abdomen; coxites two segmented at ventral side (Fig. 17F), with several setae each dorsally, ventrally, and apically; stylus with a seta around apex. Vagina short (Fig. 17E); bursa copulatrix elongated spheroid, posteriorly with a short sac (Fig. 17G: arrow 1); thick sac extending from around apex of bursa copulatrix (Fig. 17G: arrow 2), splitting in two (Fig. 17G: arrows 3, 4); many sclerotized spines in various sizes inside bursa copulatrix (Fig. 17H).



**FIGURE 17.** *Penia takasago*, females. A, B, E–G: holotype (PTK01); C, D: paratype (6348); H: paratype (PTK02). A: tergite VIII; B: sternite VIII; C: slide; D, E: pregenital segments and genitalia; F: coxites, ventral side; G: vagina and bursa copulatrix (arrow 1: bursa copulatrix posteriorly with a short sac; arrow 2: thick sac extending from around apex of bursa copulatrix; arrows 3, 4: thick sac splitting in two); H: sclerotized spines inside bursa copulatrix.

**Male.** Unknown.

**Discussion.** A female paratype of *Penia takasago* (6349) does not belong to *P. takasago* but rather to a new species, *P. inopinata* (see discussion of *P. inopinata*).

Platia and Schimmel (2007) reported a male of *Penia takasago* with a short description as the first record of a male but that was based on misidentification because the specimen differs from *P. takasago* in the shape of the pronotum and the ratio of the elytron length to pronotum length. Therefore, the male of *P. takasago* remains unknown. In this study, the male specimen, which is deposited at the Hungarian Natural History Museum, could not be examined.

**Distribution.** Taiwan: Nantou County (Fig. 1).

*Penia tsou* Arimoto, sp. nov.

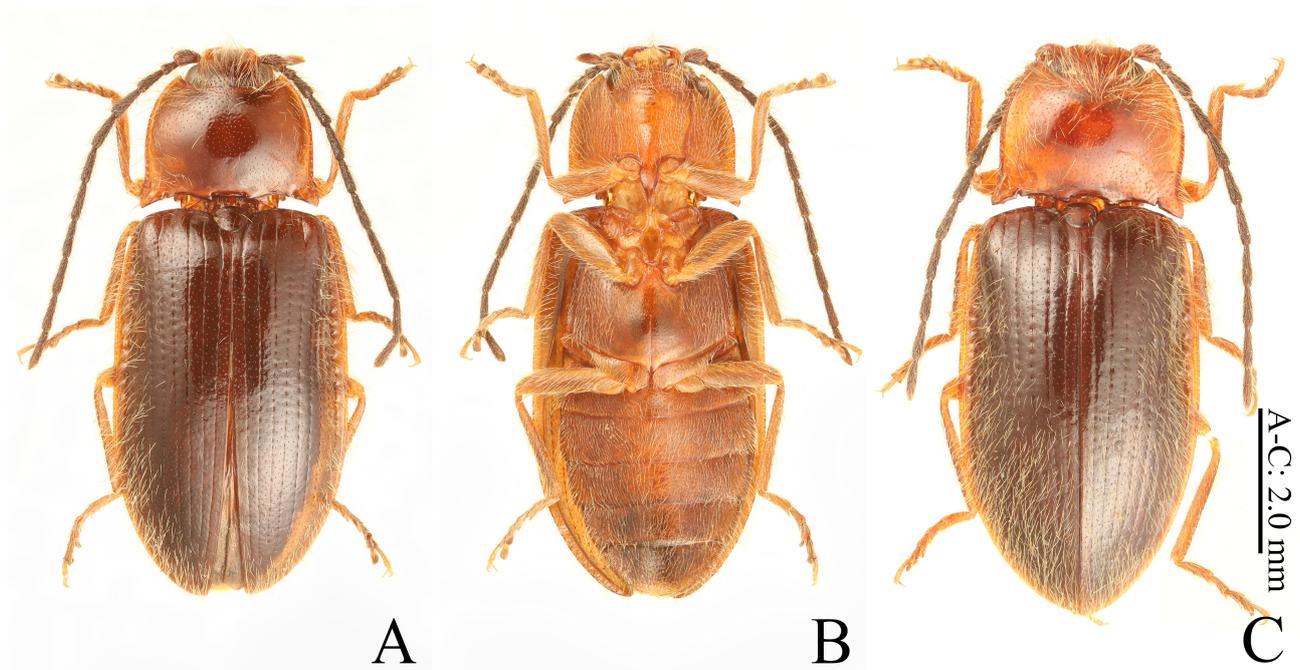
(Figures 18–20)

**Etymology.** Specific epithet derived from the Tsou, an indigenous people living near the type locality.

**Type material. Holotype.** Male, Taiwan, Kaohsiung City, Maolin District, Shan-Pimg, 24 IV 1985, collector unknown. [NMNST; PTA01]. **Paratypes.** 1 female, Taiwan, Kaohsiung City, Taoyuan District, Tengjih, 5 V 1985, collector unknown [OMNH; PTA02]; 1 female, Taiwan, Kaohsiung City, Taoyuan District, Tengjih, 23 IV 1998, M. Hayashi leg. [OMNH; PTA03]; 1 male, Taiwan, Kaohsiung City, Liouguei District, 10 IV 1984, collector unknown [OMNH; PTA04].; 1 female, Taiwan, Kaohsiung City, Liouguei District, 10 IV 1974, T. Ochi leg. [OMNH; PTA05].

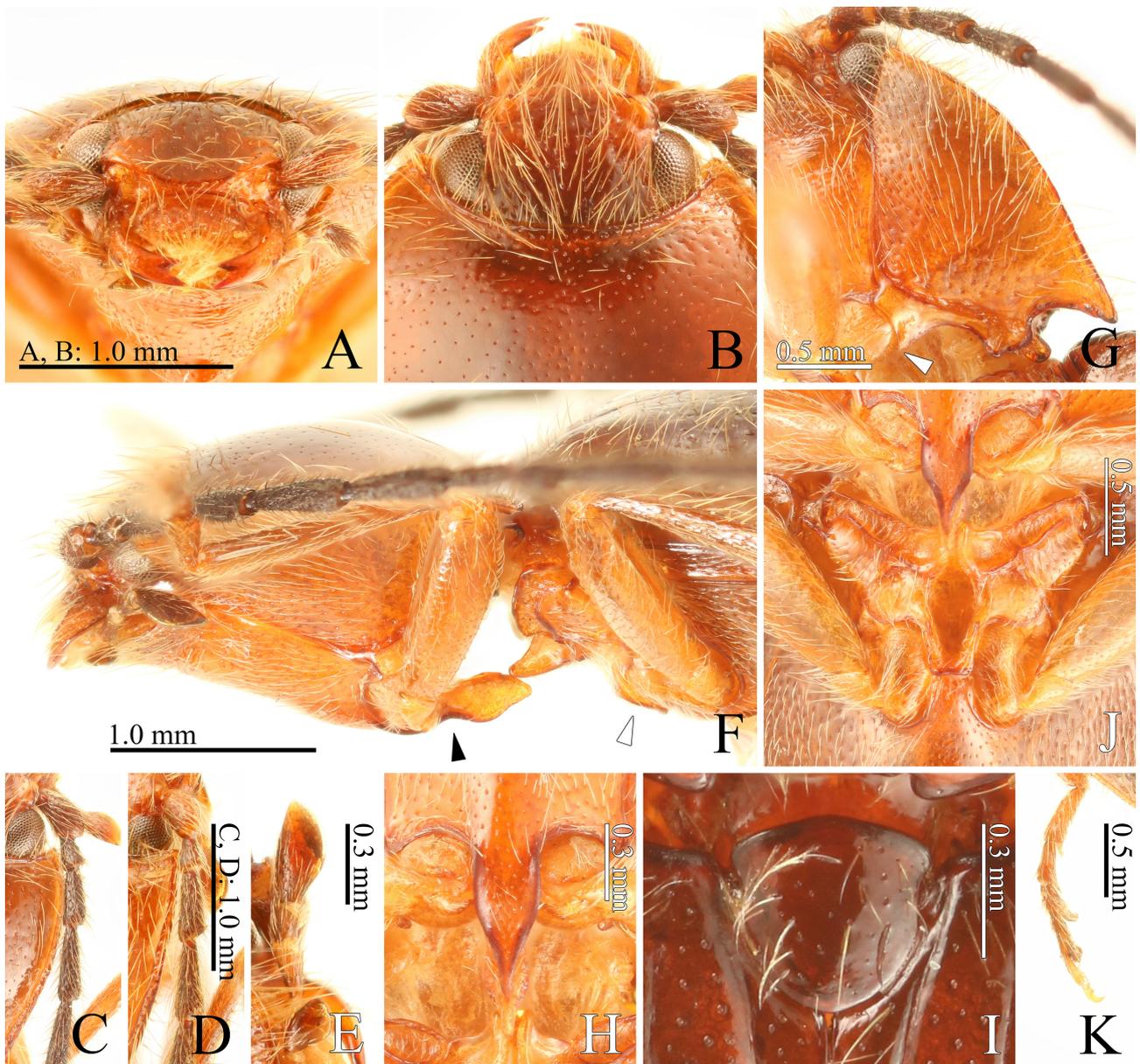
**Diagnosis.** This species is characterized by the following features: eyes 0.3 x longer than interocular distance in dorsal view; antennae extending beyond pronotum posterior lateral apices by antennomere VII, reaching around elytral half by antennomere XI; antennomeres III distinctly longer than II; IV 1.1–1.3 x longer than III, 0.8–0.9 x longer than II–III combined; apical maxillary palpomere 2.0 x longer than wide, shorter than maximum length of eye; pronotum straightly and slightly widening anterior to hind angles; posterior edge of pronotum with sublateral incisions; hind angles of pronotum broad, weakly protruding posterolaterad; hypomerion with moderate mesial projection; anterior angle of hypomerion nearly right angle; hind angle of hypomerion broadly triangular; scutellar shield almost as long as wide; mesosternal process between mesocoxae higher than mesocoxae, visible in lateral view; posterior edge of mesosternal process 0.2–0.25 x wider than total width of mesosternum; elytron 3.3–3.5 x longer than wide, 2.7–3.0 x longer than pronotum length; abdominal ventrite V semicircular, rounded apically; phallobase 0.85 x longer than wide; apex of parameres beyond preapical expansions small triangular; apex length 0.4 x width of parameres at expansions in ventral side; spiculum ventrale 5.4–6.1 x longer than length of sternite VIII; ovipositor longer than length of abdomen.

This species is similar to *P. babai* in the eye size, relative length of the basal antennomeres, the length-to-width ratios of the apical maxillary palpomere, scutellar shield and elytron, the shapes of the hind angles of the pronotum, anterior and hind angles of the hypomerion and abdominal ventrite V, and the degree of development of the mesosternal process between mesocoxae (except for their coloration). It is distinguished from *P. babai* by the following contrasting characters (*P. babai* in parentheses): antennae reaching around elytral half by antennomere XI (antennae surpassing elytral half by antennomere XI); pronotum straightly and slightly widening anterior to hind angles (pronotum straightly and slightly narrowed anterior to hind angles); hypomerion with moderate mesial projection (hypomerion with distinct mesial projection); apex of parameres beyond preapical expansions small triangular (apex of parameres beyond preapical expansions large triangular).



**FIGURE 18.** *Penia tsou*. A, B: holotype, male (PTA01); C: paratype, female (PTA05). A, C: habitus, dorsal side; B: habitus, ventral side.

This species is also similar to *P. pulla* in terms of the relative length of the basal antennomeres, the length-to-width ratio of the apical maxillary palpomere, and the shapes of the pronotum and anterior and hind angles of the hypomeron and abdominal ventrite V; it is distinguished by the following contrasting characters (*P. pulla* in parentheses): eyes 0.3 x longer than interocular distance in dorsal view (eyes 0.2 x longer than interocular distance in dorsal view); antennae reaching around elytral half by antennomere XI (antennae not reaching around elytral half by antennomere XI); hypomeron with moderate mesial projection (hypomeron with slight mesial projection); scutellar shield almost as long as wide (scutellar shield 0.9 x longer than wide); mesosternal process between mesocoxae higher than mesocoxae and visible in lateral view (mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view); elytron 3.3–3.5 x longer than wide, 2.7–3.0 x longer than pronotum length (elytron 3.7 x longer than wide, 3.2 x longer than pronotum length).



**FIGURE 19.** *Penia tsou*. A–C, E–K: holotype, male (PTA01); D: paratype, female (PTA05). A: head, anterior view; B: head, dorsal view; C, D: basal antennomeres of right antenna; E: right maxillary palp, ventral side; F: head, prothorax and mesothorax, lateral view (black arrow: the direction perpendicular to the base of ventral lobe of prosternal process, white arrow: the direction perpendicular to the mesosternal process between mesocoxae); G: left hypomeron (arrow: hypomeron with moderate mesial projection); H: prosternal process from the direction perpendicular to base of ventral lobe (black arrow of figure 19F); I: scutellar shield; J: mesothorax from the direction perpendicular to mesosternal process between mesocoxae (white arrow of figure 19F); K: left hind tarsus.

**Measurements. Male** (n=2; holotype in parentheses). BL: 7.54–8.06 (7.54), BW: 3.16–3.23 (3.23), MAE: 1.24–1.32 (1.24), MBE: 0.79–0.84 (0.79), OI: 156–158 (158), PL: 1.80–1.92 (1.80), PML: 1.53–1.57 (1.53), PW: 2.46–2.56 (2.46), PAW: 1.38–1.42 (1.38), PLI: 73.3–75.0 (73.3), PWI: 178–181 (178), EL: 5.35–5.54 (5.35), EW: 1.59–1.60 (1.60), EI: 334–350 (334), BI: 288–297 (297). **Female** (n=3). BL: 7.91–8.89, BW: 3.32–3.57, MAE: 1.35–1.49, MBE: 0.89–0.95, OI: 149–156, PL: 1.98–2.31, PML: 1.62–1.86, PW: 2.62–3.00, PAW: 1.49–1.62, PLI: 75.4–77.0, PWI: 171–185, EL: 5.67–6.24, EW: 1.64–1.77, EI: 344–352, BI: 271–287.

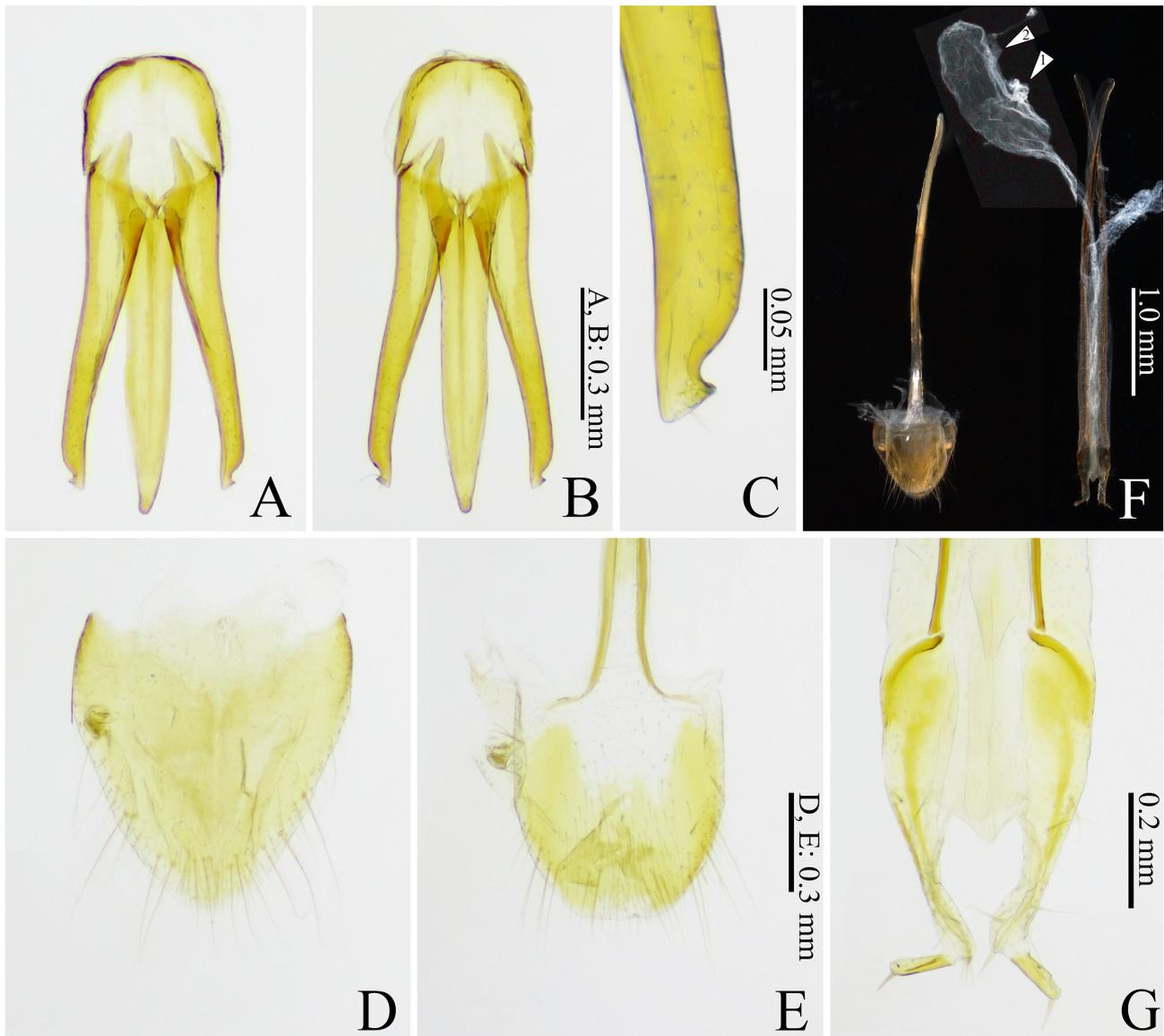
**Description.** Body broad, widest around elytral midlength (Fig. 18A); surface generally smooth; interspaces between punctures distinctly larger than fine puncture diameter (Fig. 18A, B). Color. Dorsal side dark reddish brown to orange, in some head and pronotum orange, and scutellum and elytra blackish brown (Fig. 18C); ventral side orange tinged with black (Fig. 18B). Lateral margins of pronotum and elytra orange. External edge of mandible, lateral and posterior edges of pronotum, external edge of hypomere, posterior edge of prosternum, and posterior edge of mesosternal process blackish. Antennae black to orange. Legs orange. Body covered with long yellow setae.

Head. Frons flatted medially (Fig. 19A, B); frontal carina not complete (Fig. 19A); frontal margin rectangular but broadly rounded apically in dorsal view (Fig. 19B); frontoclypeal region protruding beyond base of labrum. Eyes relatively normal in convexity, 0.25–0.3 x longer than interocular distance in dorsal view (Fig. 19B). Antennae extending beyond pronotum posterior lateral apices by antennomere VII, reaching around elytral half by antennomere XI; antennomeres longer than wide; II obconical, shortest, 1.1–1.7 x longer than wide; III filiform, in some slightly serrated, 2.5–2.8 x longer than wide, 1.8–2.4 x longer than II; IV–XI filiform; IV 2.8–3.3 x longer than wide, 1.1–1.3 x longer than III, 0.7–0.9 x longer than II–III combined (Fig. 19C, D); V 3.1–3.8 x longer than wide, 1.0–1.1 x longer than IV; XI 3.8–4.3 x longer than wide, 1.05–1.1 x longer than X. Mandible bidentate (Fig. 19A). Apical maxillary palpomere semicircular (Fig. 19E), 2.0–2.3 x longer than wide, shorter than maximum length of eye; anterior edge rounded.

Prothorax. Pronotum hexagonal, 0.7–0.8 x longer than wide, roundly widening anteriorly, straightly and slightly widening anterior to hind angles, widest just anterior to posterior lateral apices (Fig. 18A), tallest just behind midlength (Fig. 19F), without median longitudinal depression posteriorly; anterior edge strongly concave; anterior angles simple, nearly right angle; punctate lateral ridge extending from anterior angles to hind angles (Fig. 18A); hind angles simple, broad, weakly protruding posterolaterad; posterior edge with a sublateral incision near each hind angle, without carinae next to sublateral incisions (Fig. 18A). Hypomeron with moderate mesial projection (Fig. 19G: arrow); anterior angle nearly right angle; mesial edge weakly sinuate; mesial and posterior margins with impunctate ridge (Fig. 19G); posterior margin with rectangular projection between two large emarginations; hind angle broadly triangular. Prosternum nearly straight ventrally in lateral view (Fig. 19F); anterior lobe weakly protruding beyond prosternal ventral line in lateral view (Fig. 19F); anterior edge broadly rounded in ventral view (Fig. 18B). Prosternal process broad, 2.2–2.3 x longer than procoxal cavity length, concave between procoxae, strongly curved dorsad from anterior edge of procoxal cavities in lateral view (Fig. 19F), without subapical tooth; dorsal lobe roundly expanded anterior to apex in ventral view (Fig. 19H); ventral lobe slightly and roundly expanded near base and then abruptly narrowed posteriad in ventral view (Fig. 19H); ventral margin roundly expanded medially in lateral view (Fig. 19F); apex rounded in lateral and ventral views (Fig. 19F, H). Pronotosternal sutures not grooved (Fig. 19G), sinuate in ventral view (Fig. 18B), slightly opened anteriorly. Scutellar shield tongue-shaped (Fig. 19I), almost as long as wide, widest anteriorly, narrowed behind anterior angles and then parallel-sided, narrowed posteriorly, flat, inclined anterior-downwards, not visible in lateral view (Fig. 19F); anterior edge triangular; posterior edge rounded. Mesosternum: borders of mesosternal cavity slightly rounded anteriorly, straight and then curved in right angle in lateral view (Fig. 19F); mesosternal process between mesocoxae higher than mesocoxae, visible in lateral view (Fig. 19F); posterior edge 0.2–0.25 x wider than total width of mesosternum, almost straight but slightly emarginate (Fig. 19J). Mesepisternum reaching mesocoxal cavity (Fig. 19J). Metasternum sulcate medially and anterior to metacoxal cavity (Fig. 18B). Metacoxal plate narrowed toward outer side, becoming like a parallel-sided bar at its outer 1/4 in ventral view (Fig. 18B). Elytron broadly convex, but with outer margin narrowly depressed, widest around midlength, 3.3–3.5 x longer than wide, 2.7–3.0 x longer than pronotum length; apex rounded; elytral striae defined by lines of elongated punctures. Hind wings fully developed. Tibiae with paired spurs; relative tarsomere lengths: IV < III II < V < I; tarsomeres III and IV with lobe ventrally (Fig. 19K).

Abdomen. Ventrite V semicircular, rounded apically (Fig. 18B), 0.45–0.5 x longer than wide. **Male.** Subgenital segments lost in holotype (PTA01) and paratype (PTA05). Aedeagus yellow (Fig. 20A, B). Phallosome 0.25 x total length of aedeagus, 0.85 x longer than wide. Median lobe exceeding apices of parameres by apical 1/10; basal struts 0.2 x total length of median lobe. Parameres elongated, not fused ventrally (Fig. 20B), abruptly narrowed anterior to preapical expansions; preapical expansions protruding laterad (Fig. 20C); apex beyond preapical expansions small triangular, rounded apically (Fig. 20C), with a seta each dorsally and ventrally; apex length 0.4 x width of parameres at expansions in ventral side. **Female.** Tergite and sternite VIII yellow. Tergite VIII triangular but rounded apically or bullet-like shaped, 1.05–1.1 x longer than wide (Fig. 20D). Sternite VIII (between base of spiculum ventrale and apex) bullet-like shaped, 0.9–1.0 x longer than wide (Fig. 20E); spiculum ventrale 5.4–6.1 x longer than length of sternite VIII (Fig. 20F). Ovipositor 1.0–1.3 x longer than length of abdomen; coxites two segmented at ventral side (Fig. 20G), with several setae each dorsally, ventrally, and apically; stylus with two setae around apex (Fig. 20G). Vagina relatively long; bursa copulatrix without sclerotized structures, with a short sac each posteriorly (Fig. 20F: arrow 1) and anteriorly (Fig. 20: arrow 2).

**Distribution.** Taiwan: Kaohsiung City (Fig. 1).



**FIGURE 20.** *Penia tsou*. A–C: holotype, male (PTA01); D, E, G: paratype, female (PTA02); F: paratypes, females (PTA02, PTA05). A: aedeagus, dorsal side; B: aedeagus, ventral side; C: apical part of left paramera, ventral side; D: tergite VIII; E: sternite VIII; F: pregenital segments, ovipositor (PTA02) and bursa copulatrix (PTA05) (arrow 1: bursa copulatrix posteriorly with a short sac, arrow 2: bursa copulatrix anteriorly with a short sac); G: coxites, ventral side.

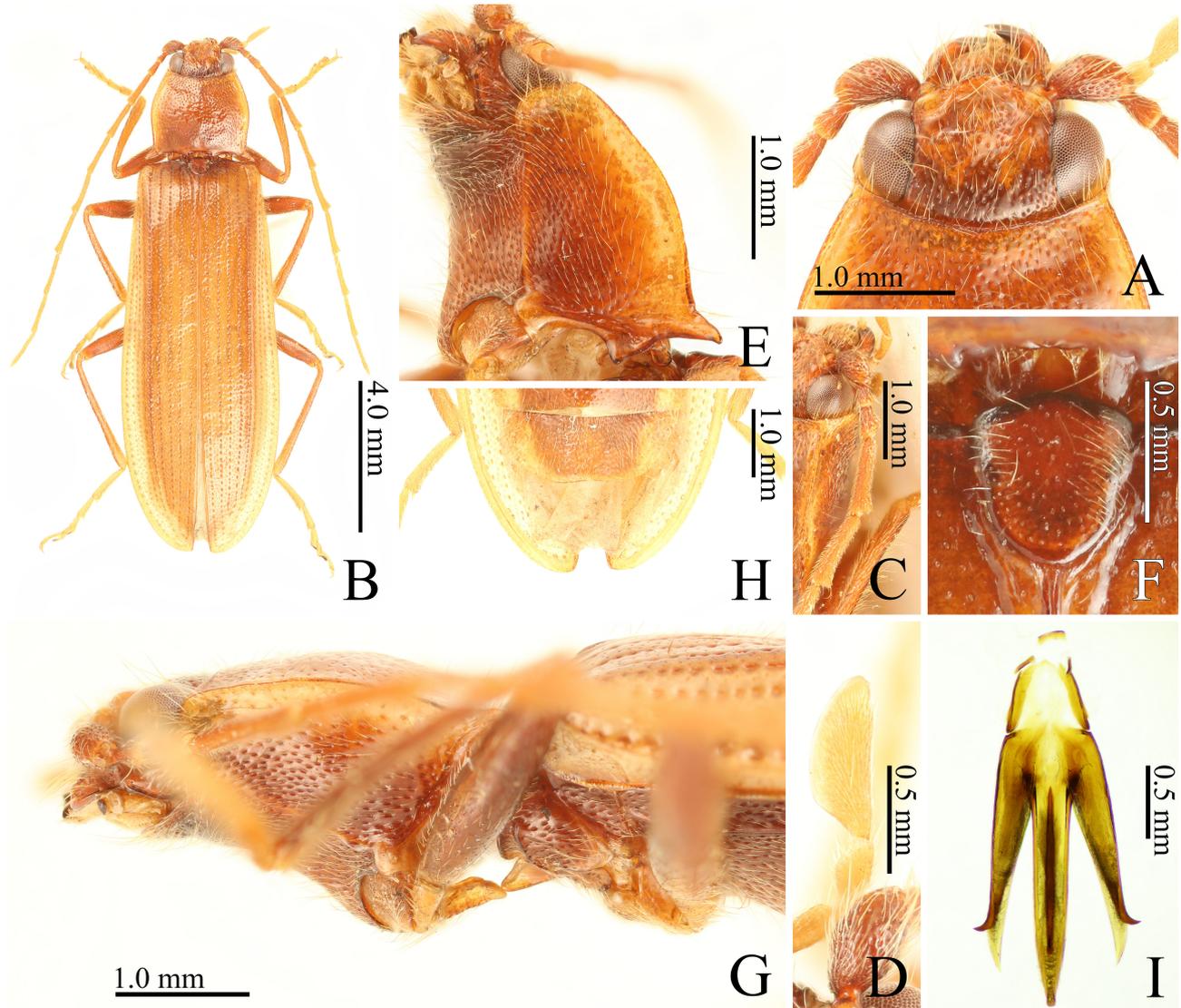
## Comparative data

### *Penia sucinea* Schimmel, 2001

(Figure 21)

*Penia sucinea* Schimmel, 2001: 226 (original description; type locality: Vietnam, Lào Cai Province, Hong Lien Son); Kundrata *et al.*, 2018: 55 (catalogue); Kundrata and Nemeth, 2019: (record from Lao Cai Province, Vietnam).

**Type material. Holotype.** Male, Vietnam, Lào Cai Province, Hong Lien Son, 22°18–23' N, 103°49–54' E, 1100–2400 m, 17–24 I 1994, L. and R. Businsky leg. [BMNH].



**FIGURE 21.** *Penia sucinea*, holotype, male. A: head, dorsal view; B: habitus, dorsal side; C: basal antennomeres of right antenna; D: right maxillary palp, dorsal side; E: left hypomeron; F: scutellar shield; G: head, prothorax and mesothorax, lateral view; H: abdominal ventrite V; I: aedeagus, ventral side.

**Diagnosis.** This species is characterized by the following features: eyes 0.4 x longer than interocular distance in dorsal view (Fig. 21A); antennae extending beyond pronotum posterior lateral apices by antennomere VI, surpassing elytral half by antennomere XI (Fig. 21B); antennomeres III longer than II; IV 2.6 x longer than III, 1.5x longer than II–III combined (Fig. 21C); apical maxillary palpomere 2.7 x longer than wide (Fig. 21D), longer than maximum length of eye; pronotum straightly narrowed and distinctly constricted anterior to hind angles; posterior edge of pronotum without sublateral incisions; hind angles of pronotum acute, strongly protruding posterolaterad; hypomeron with distinct mesial projection (Fig. 21E); anterior angle of hypomeron biangular, with mesial and outer

angles rounded; hind angle of hypomeron narrowly triangular; scutellar shield 1.1 x longer than wide (Fig. 21F); mesosternal process between mesocoxae lower than mesocoxae, not visible in lateral view (Fig. 21G); posterior edge of mesosternal process 0.1 x wider than total width of mesosternum; elytron 5.0 x longer than wide, 4.3 x longer than pronotum length (Fig. 21B); abdominal ventrite V trapezoidal, round-sided, slightly concave apically (Fig. 21H); phallobase 0.9 x longer than wide; preapical expansions of parameres claw-like shaped (Fig. 21I); apex of parameres beyond preapical expansions blade-like shaped, 1.25 x width of parameres at expansions in ventral side.

**Measurements.** BL: 13.5, BW: 4.08, MAE: 1.72, MBE: 0.97, OI: 178, PL: 2.42, PML: 1.91, PW: 2.88, PAW: 1.76, PLI: 84.1, PWI: 164, EL: 10.4, EW: 2.06, EI: 504, BI: 430.

**Distribution.** Vietnam: Lào Cai Province.

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