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Redescription and anatomy of *Diplodonta portesiana* (d'Orbigny, 1846) (Bivalvia, Ungulinidae) from Brazil

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Abstract

The present redescription of *Diplodonta portesiana* (d'Orbigny, 1846) is the first part of the revision of this genus in the East Atlantic. This species, despite being common in the Atlantic coast, remains poorly known. A detailed shell and anatomical study was conducted based not only on specimens from the type locality's vicinities but also on samples from other regions. Diagnostic characters for *D. portesiana* includes: rounded shell with a small ligament; triangular, short and deep nymph; external micro ornamentation composed of small concavities in a concentric pattern; small adductor muscles; reduced pedal gape; pair of long hemipalps with a large area covered by folds; stomach with four ducts leading to digestive diverticula; and long intestine length. Our study suggests at least two new diagnostic characters to the genus: the two pair of muscles that controls the incurrent and excurrent openings and a residual ring-like tissue surrounding the anterior half of the posterior foot retractor muscle.

Keywords

Diplodonta portesiana, Ungulinidae, anatomy, taxonomy, Atlantic Ocean

Introduction

The ungulinid genus *Diplodonta* Bronn, 1831 [type: *Venus lupinus* Broochi, 1814; Italy, Piemonte, Andona Valey; subsequent designation by Bronn 1831] shows a nearly worldwide distribution (Olsson 1961; Abbott 1974; Coan et al. 2000; Redfern 2001; Mikkelsen and Bieler 2007; Coan and Valentich-Scott 2012). Despite being especially common in the South East Atlantic coast, and as was already noted by Dall (1901), the genus' taxonomy remains problematic, with high oscillation of number of species. Recent shell catalogues frequently show, in our concept, incomplete character lists and descriptions (e.g., Rios 2009). The last revision is half a century old and dealt only with the genus' diagnostic characters (Chavan 1962). Moreover, the last detailed revision of the West Atlantic species complex was conducted almost one century ago (Lamy 1920), and it barely elucidates the species identification, only grouping names that were created in previous revisions, apparently lacking any discernment. The single detailed anatomical study including the genus *Diplodonta* (Allen 1958) is a comparison among members of the superfamily Lucinoidea, the superfamily used to include the Ungulinidae before recent revision (Williams et al. 2004).

The present paper is the first of a series concerned with the systematic revision of the West Atlantic *Diplodonta*. It focuses on *Diplodonta portesiana* (d'Orbigny, 1846), a common but usually misidentified regional species. The present redescription is based on type specimens and topotypes with a wide bulk of samples, and also extends the species' definition to include its anatomy.

Material and methods

A complete list of examined material is presented after the description. The holotype was examined and the other ~40 samples contain individuals from several localities. Shell measures were taken with a digital caliper: length corresponds to the greatest distance between anterior and posterior margin; height is the longest distance between the dorsal umbo's end and the ventral margin; width is the greatest straight line reaching from the right to the left valve. The dissected specimens were fixed in 70% ethanol and studied under a stereomicroscope by standard techniques (Simone 2009). All drawings were made with the aid of a camera lucida. The Scanning Electron Microscopy (SEM) was provided by the Laboratório de Microscopia Eletrônica do Instituto de Biociências from the Universidade de São Paulo.

The following abbreviations are used in the anatomical descriptions and figures: **aa:** anterior adductor muscle; **an:** anus; **cc:** cerebral connective; **cg:** cerebral ganglia; **cn:** ctenidial nerve; **cp:** cerebro-pedal connective; **cv:** cerebro-visceral connective; **dd:** digestive diverticula; **dg:** digestive gland; **dh:** dorsal hood; **em:** excurrent muscular wall; **er:** esophageal rim; **es:** esophagus; **fp:** posterior foot retractor muscle; **fr:** anterior foot retractor muscle; **ft:** foot; **gi:** gill; **go:** gonad; **gs:** gastric shield; **gt:** gill tissue; **he:** heart; **id:** inner demibranch; **im:** pair of incurrent channel muscle; **in:** intestine; **ip:** inner palp; **ki:** kidney; **lp:** labial palp; **ld:** left diverticula; **lp**: left pouch; **mt:** major typhlosole; **na:** anterior adductor muscle nerve; **np:** nephropore; **nt:** minor typhlosole; **od:** outer demibranch; **op:** outer palp; **pa:** posterior adductor muscle; **pg:** pedal ganglia; **pm:** pallial muscle; **pn:** pallial nerve; **rd:** right diverticula; **rn:** renal nerve; **sm:** pair of excurrent channel muscle; **ss:** style sac; **st:** stomach; **vg:** visceral ganglia; **vm:** visceral mass.

Institutional abbreviations: **CENEMAR**, Centro de Estudos Marinhos do Atlântico Sul, Porto Alegre, Brazil; **CMAC**, Museo Argentino Del Caracol, Argentina; **MZSP**, Museu de Zoologia da Universidade de São Paulo, Brazil; **MZUCR**, Museu de Zoologia da Costa Rica, Costa Rica; **NHMUK**, Natural History Museum of United Kingdom.

Systematics

***Diplodonta portesiana* (d'Orbigny, 1846)**
http://species-id.net/wiki/Diplodonta_portesiana
Figs 1–29

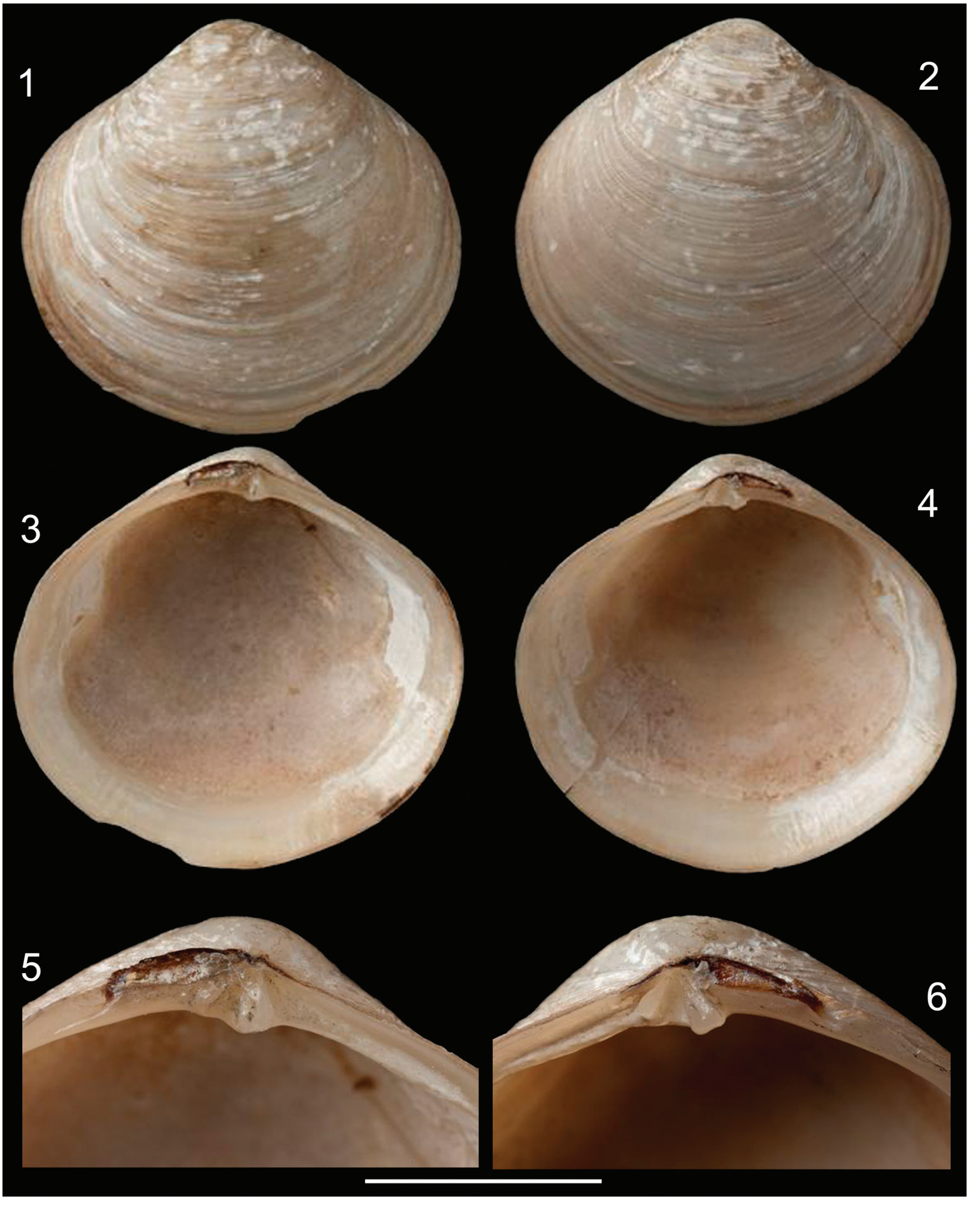
Lucina portesiana d'Orbigny, 1846: 586 (pl. 81, Figs 12–13); Gray 1857: 72; Baril 1862: 137; Tryon 1872: 84; Aguirre 1994: 357 (pl. 2, Figs 17a, b).
Diplodonta portesiana: Dall 1901: 794; Amaral et al. 1999: 44; 2010: 238.
Diplodonta nucleiformis: Morris 1947: 44 (pl. 20, fig. 22); Warmke and Abbott 1962: 175 (pl. 35, fig. j); Rios 1970: 174; 1975: 218 (fig. 1049); 1985: 233 (fig. 1165); 1994: 255 (fig. 1247); 2009: 518 (fig. 1440) (non Wagner 1838).

Type. Holotype NHMUK 1854.12.4.770 (Figs 1–6) (examined).

Type locality. São Cristóvão Bay, Rio de Janeiro, Brazil.

Redescription. *Shell* (Figs 1–14): Rounded, centrally pointed, equivalve and inequilateral. Laterally inflated (Fig. 11), maximum inflation ~60% of total length. Externally covered by shallow concentric ribs. Pattern of horizontal aligned, small, rounded pits, slight parallel to concentric growth lines, only visible under SEM (Fig. 14). Color white, periostracum thin, translucent, rarely cream to dark brown close to edges. Valves fragile; internally opaque (Figs 9–10). Anterior adductor muscle scar reniform, ventral portion 2.5 times wider than dorsal portion; located between mid and dorsal thirds of shell height. Posterior adductor muscle scar elliptical, same distance from shell border as anterior adductor, located in median third of valve height. Pallial line entire and thin, away from shell border ~10% of valve height. Umbos low, ~5% of total shell height. Ligament parvincular, opisthodetic, ~20% of total shell length (Figs 11–13). Hinge heterodont, with two cardinal teeth, anterior tooth of left valve and posterior tooth of right valve bifid (Figs 12, 13). Dental shelf long, length equivalent to half of total dorsal margin length, close to cardinal teeth. Dorsal margin concave, forming groove at fusion with dental shelf. Lateral teeth absent. Nymph short, ~20% of total shell length, ~5 times wider than long, triangular. Lunule and escutcheon absent.

Main muscles (Figs 15, 16, 20, 23): Anterior adductor muscle reniform in section, ~2.6 times higher than wider, ventral half ~2.5 wider than dorsal half (Figs 15, 16, 23); occupying ~1/15 of internal shell volume, located between middle and dorsal third of shell height (Figs 15, 16, 20). Posterior adductor muscle ~40% smaller than anterior muscle, located at opposite end and parallel to anterior muscle (Figs 15, 16, 23). Pair of anterior foot retractor muscles oval in section and thin, originating dorso-posterior-



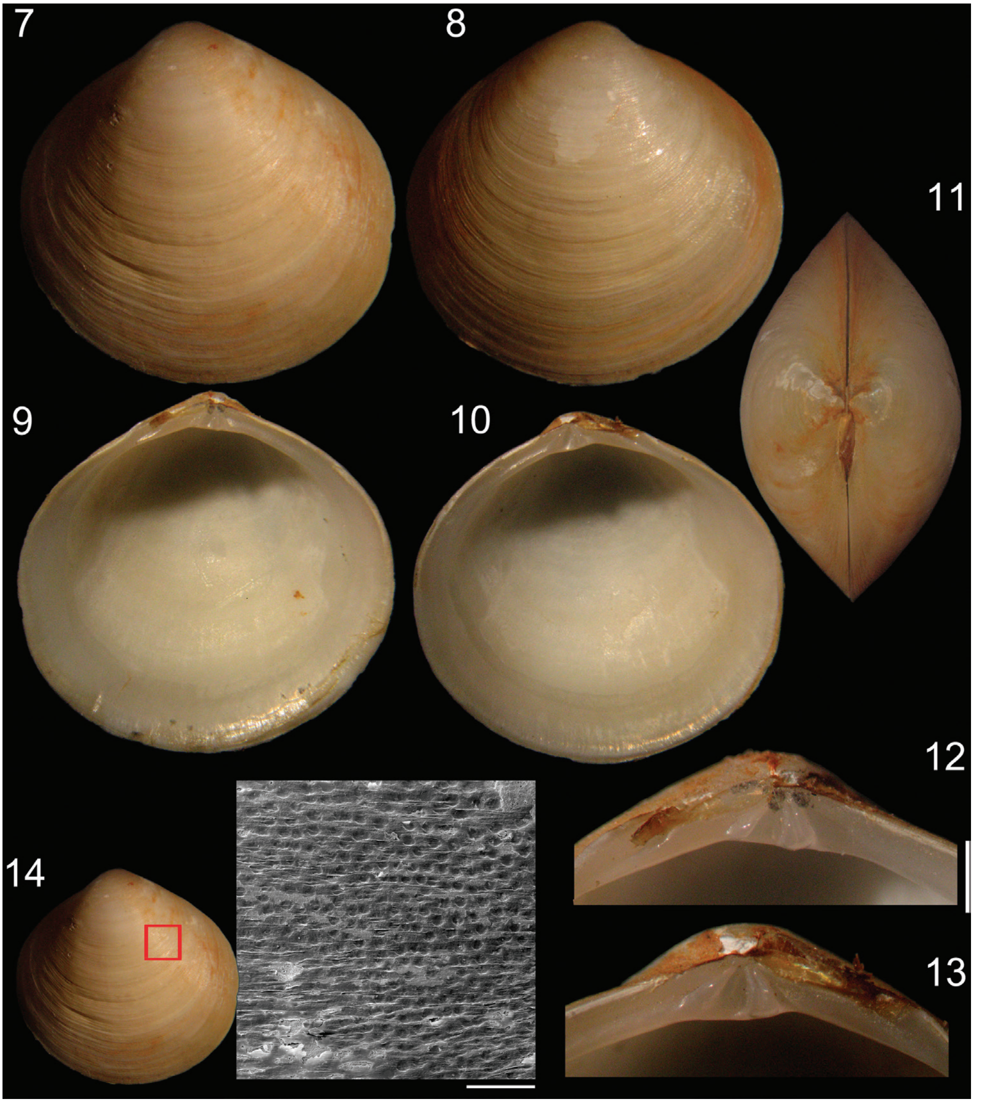
Figures 1–6. *Diplodonta portesiana*. Holotype (NHMUK 1854.12.4.770; L: 20 mm; H: 17 mm). **1** Left valve, external view **2** Right valve, external view **3** Left valve, internal view **4** Right valve, internal view **5** Left hinge detail **6** Right hinge detail. Scale: 2 mm.

ly to anterior adductor muscle, insertion area ~1/20 of adductor insertion, length ~1/4 of total shell length, fusion of both branches occurring in its half-length (Figs16, 23). Foot retractor muscles oval in section, slightly laterally compressed, thin, ~45% longer than anterior foot retractor muscles, inserting dorsally to anterior adductor muscle, in area equivalent to ~1/40 of anterior adductor insertion, both branches fusing in ventral quarter of shell length (Figs 16, 23). Incurrent and excurrent openings surrounded by two pairs of muscles (Fig. 20); pair of incurrent channel muscles bordering incurrent opening, inserting at dorsal ending of opening; long, straight and thin, equivalent to twice opening length (Fig. 20: im); pair of excurrent channel muscles narrow and thin, inserting below ventral ending of opening; bordering ~60% of excurrent opening length, ~30% shorter than pair of incurrent channel muscles (Fig. 20: sm).

Foot and byssus (Figs 15, 16, 23): Foot long, length ~70% of shell high; terminal bulb cylindrical, expanding ~30% beyond foot width, color orange to light brown; byssal groove and byssus absent.

Mantle (Figs 15–17): Mantle lobes symmetrical, thin, translucent, colorless. Pallial muscles strong and short, distributed evenly in ventral side of mantle lobe, length ~1/10 animal height (Fig. 15). Mantle border with three folds (Fig. 17): outer fold long and thin, ~1/3 of shell thickness, ~15 times higher than wide; middle fold short, twice wider and ~7.5 times shorter than outer fold; inner fold short, with twice as wide and ~5 times shorter than outer fold. Periostracum produced between outer and middle fold. Middle fold with 60 pairs of papillae, bordering all ventral border (Fig. 16); papilla twice taller than wide, tip rounded, separated by area equivalent to 5 times each papilla width. Mantle lobes partially free, fused in ~35% of total mantle lobes length, by inner fold; from incurrent opening to middle portion of animal's length (Fig. 16: mf); free portion extending until ventral surface of ventral half of anterior adductor muscle, forming pedal gape, corresponding to ~55% of total shell length. Incurrent and excurrent openings formed of fusion of third mantle fold; flanked by ~30 pairs of papillae (Fig. 19: eo); excurrent opening ~1/4 of total shell length; incurrent opening ~60% of total excurrent opening length. No well-developed siphons; except for thick muscular wall internally at excurrent opening, acting like socket to demibranchs (Fig. 20: em). Small striped "ring like" tissue surrounding middle portion of posterior foot retractor muscle, below gill insertion at visceral mass (Fig. 16: gt).

Pallial cavity (Figs 15–16, 18, 22): Occupying half of inner shell volume (Fig. 16). Labial palps small, ~1/30 of inner shell area, triangular; external surface smooth; outer and inner hemipalps similar in size, ~7% longer and ~60% wider than anterior adductor muscle insertion area (Figs 16, 22); outer hemipalp connected to mantle lobe by dorsal border, in ~2/5 of total length; inner hemipalp connected to visceral mass by dorsal border, in ~1/4 of this total length; internal surface of both hemipalps covered by 30 transversal folds; outer hemipalp folds high and rounded in section, covering ~95% of surface, thin smooth area in dorsal margin, corresponding to 1/25 of total surface of hemipalp; folds of inner hemipalp flattened in section and centrally grooved in length; covering ~80% of internal surface of hemipalp, forming two thin smooth areas at ventral and dorsal borders, corresponding 1/8 of total surface of hemipalp; near mouth folds decreasing until forming small grooves converging at middle region of palps, towards to mouth (Fig. 22). Gills large, area ~16 times wider than outer hemipalp area, ~1/3 of total valve area (Figs 16, 18); with two demibranchs; outer demibranch fusiform, twice longer than wide; folded upon



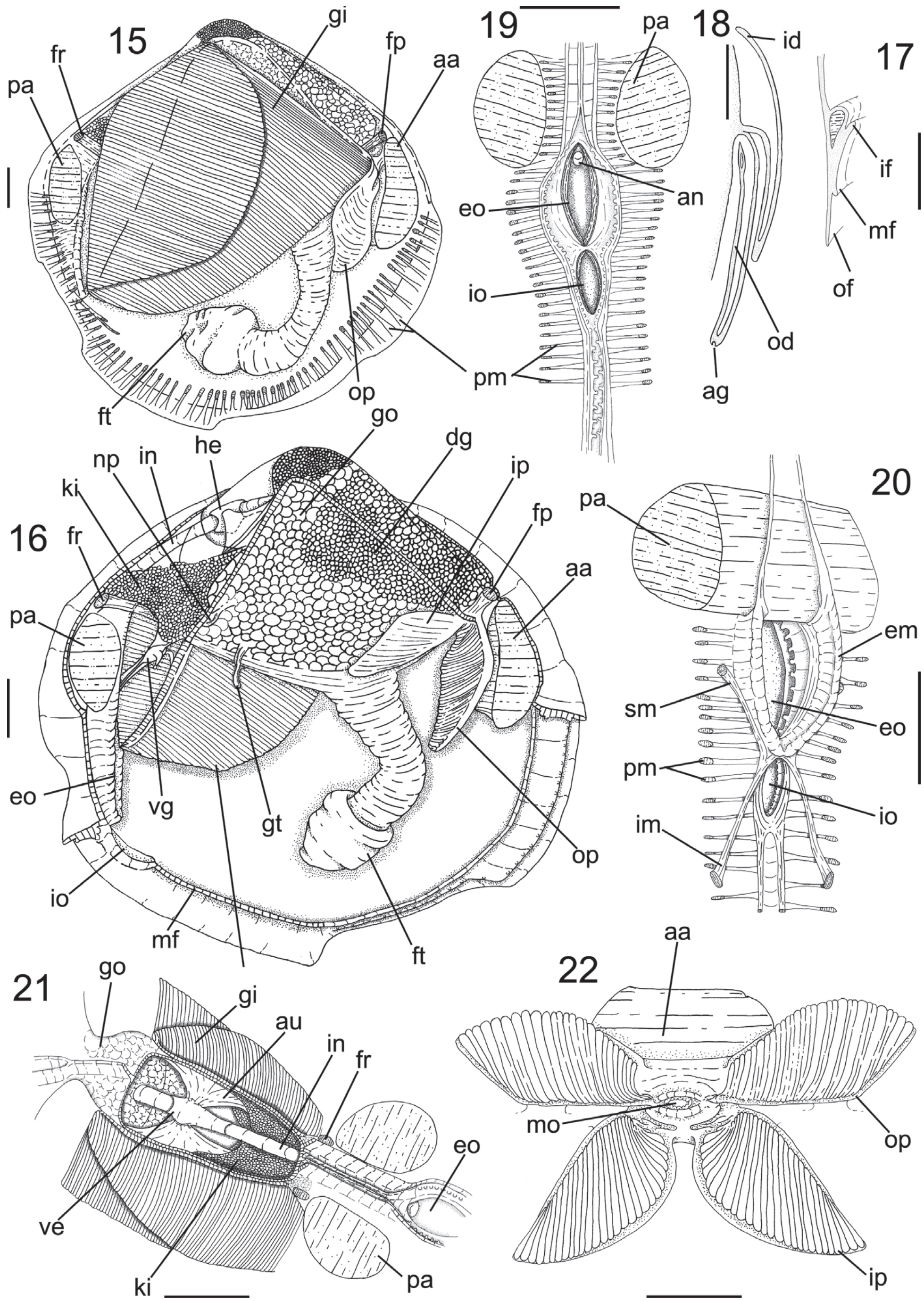
Figures 7–14. Specimen of *Diplodonta portesiana* (MZSP 22747, L: 13.4 mm, H: 13.1 mm, width: 7.7 mm). **7** Left valve, external view **8** Right valve, external view **9** Left valve, internal view **10** Right valve, internal view **11** Dorsal view **12** Left hinge detail **13** Right hinge detail **14** External surface of shell under SEM; Scale: 2 mm, except **14**: 200 µm.

~1/3 of own total area; covering pericardium and kidney; connected to mantle lobe by ~15% of length of postero-dorsal border; inner demibranch triangular, ~3 times longer than wide; folded upon half of total demibranch area; ~45% of external surface covered by outer demibranch; connection to visceral sac by cilia; gill filaments with rounded tips. Suprabranchial chamber volume ~3/5 of infrabranchial chamber volume (Fig. 16).

Visceral mass (Figs 16, 23): Visceral sac occupying half of inner shell volume; triangular, inflated, located dorsally between pair of anterior foot retractors and pair of posterior foot retractor, ~3 times larger than muscular base; ~35% of antero-dorsal region filled with greenish brown digestive gland, remainder areas filled with cream colored gonads. Stomach and style sac located vertically at central portion of visceral sac (Fig. 23).

Circulatory and excretory systems (Figs 16, 21): Pericardium located dorso-posteriorly of visceral sac, between umbonal cavity and dorsal kidney surface, occupying ~1/4 of visceral mass volume (Fig. 16). Pair of auricles antero-posteriorly elongated, connected to central axis of gills in 1/5 of gills total length; walls thick and translucent. Ventricle elongated, with thick walls; located at central portion of pericardium; surrounding ~1/3 of intestinal length crossing pericardium; connected to auricles at central portion of lateral walls (Fig. 21). Kidney located postero-ventrally in visceral mass (Fig. 16: ki), below posterior end of pericardium and dorsal surface of posterior foot retractor muscles, color light brown; shape triangular , occupying ~1/4 of visceral mass volume. Nephropore rounded, located at posterior portion of visceral mass, at ~10% of visceral mass height, opening in suprabranchial chamber (Fig. 16: np).

Digestive system (Figs 22–25): Palps and digestive glands described above. Mouth small, located centrally at palps intersection, with small lips (Fig. 22). Esophagus short and narrow, ~1/5 of total length of visceral sac and ~1/10 of high (Fig. 23), cylindrical; not touching anterior adductor muscle, crossing anterior third of anterior foot retractor muscles, parallel to anterior foot retractors (Fig. 23); inner surface covered by longitudinal folds until stomach entry, forming esophageal rim (Fig. 25); connected to anterior surface of stomach. Stomach of medium size, occupying ~1/5 of visceral sac volume, elliptical, located anteriorly at umbo; ~60% of visceral sac length and ~1/3 of high (Fig. 23: st); anterior portion ~30% wider than anterior portion. Pair of ducts to digestive diverticula located ventrally at anterior half of stomach, turned ventrally; digestive diverticula ducts connected to lateral walls of anterior half of stomach; one digestive diverticula duct connected at right wall, dorsally at esophagus line; one digestive diverticula duct connected at left wall, anteriorly to left pouch. Dorsal hood elongated and narrow, ~1/4 of stomach total length, ~4 times longer than wide, pointed anteriorly. Left pouch located below anterior ending of dorsal hood, anteriorly to digestive diverticula ducts; shallow and small, occupying area ~1/10 of surface of stomach (Fig. 24); internally anterior half of gastric chamber partially divided in ventral and dorsal portion by septum (Fig. 25); originating at anterior portion of right wall until dorsal hood entrance, septum length ~1/5 of total stomach length; dorsal surface covered by two sorting areas. Inner surface of stomach mostly smooth, with three distinct sorting areas; first sorting area starting at dorsal region of anterior portion, jointly to dorsal region of esophageal rim; heading dorsally until dorsal hood entrance and folding itself, covering posterior half of dorsal surface of gastric septum, narrow and long, composed of short and transverse folds with equivalent length and width; second sorting area starting on anterior half of dorsal surface of septum; heading from right side to dorsal hood, short and wide, composed of transverse folds twice longer than wide if compared with folds of first sorting area; third sorting area starting inside dorsal hood, running

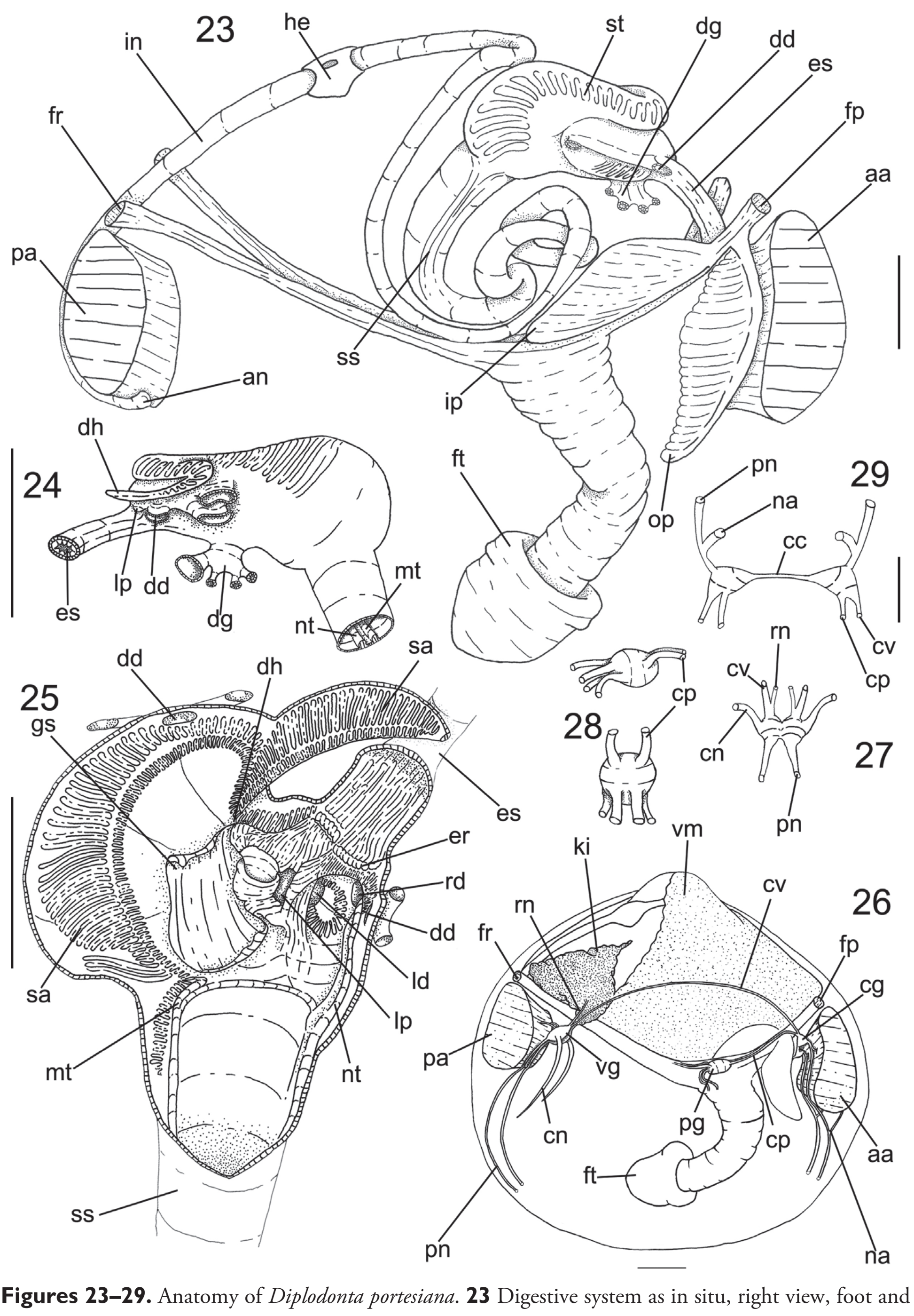


Figures 15–22. Anatomy of *Diplodonta portesiana.* **15** Right view, right mantle lobe removed **16** Same view, gill removed **17** Mantle border, transverse section in median portion **18** Gill, transverse section in middle portion **19** Incurrent and excurrent openings, posterior view **20** Same, anterior-slightly right view **21** Pericardium region, dorsal view **22** Labial palps, ventral view, hemipalps deflected; Scale: 2 mm, except **17**, **18**: 1mm.

on latero-dorsally posterior right portion of stomach, entering style sac and attenuating. Gastric shield in central region of dorsal wall of stomach, occupying ~25% of total gastric area, translucent and iridescent, with two lateral projections, anterior projection penetrate left pouch and posterior projection penetrate dorsal hood; two gastric ridges narrow and tall running towards style sac, on ventral gastric surface, typhlosoles originating from each ridge. Long ridge originating in internal right wall of left digestive diverticula, leaving posteriorly and entering anteriorly in right side of left diverticula, forming semi-circle, touching left internal wall of diverticula and leaving anteriorly from ventral side of diverticula, on surface of anterior gastric portion, entering in anterior portion of right diverticula; bordering right lateral wall and leaving posteriorly, running on ventral wall of stomach until style sac opening, forming minor typhlosole (Fig. 25: nt) at ventral surface of sac. Small ridge running on ventro-posterior region of stomach, circular shape, flanking style sac entrance, running on ventral surface of sac forming major typhlosole (Fig. 25: mt). Style sac (ss) connecting ventrally to dorsal portion of stomach; conic; narrowing towards dorsal region of visceral sac, ~3.5 longer than wide; occupying ~1/6 of visceral sac total volume, height half and width ~1/10 of visceral sac high (Fig. 23). Intestine narrow and long, originating in level where typhlosoles decreasing in shape at internal surface of style sac (Fig. 23); running towards ventral portion of visceral sac, below central portion of stomach; with three overlapping loops, last one covering dorsally other two; following to posterior portion of visceral sac, parallel to style sac; forming loop on dorso-posterior surface of stomach, leaving visceral sac, crossing pericardium and posterior surface of kidney, crossing between pair posterior foot retractor muscles; touching entire posterior surface of posterior adductor muscle (Fig. 23); intestine total length ~10 times longer than style sac. Anus simple, sessile, opening at ventral region of posterior adductor muscle.

Genital system (Fig. 16): Gonads cream- colored, in granular aspect. Pair of gonoducts connected to gonad acini along posterior portion of visceral sac. Genital pore simple, located at posterior region of visceral sac, opening inside renal chamber.

Central nervous system (Figs 26–29): Pair of cerebral ganglia (cg) surrounding dorsal surface of anterior portion of esophagus (Fig. 29); dorsally at external surface of outer labial palp; triangular shaped, longer than wide; length half of esophagus length; each ganglion with ~1/3 of a transverse section of esophagus; cerebral commissure ~1/7 longer than ganglia total length; from anterior portion connecting anterior adductor muscle nerve (na), touching posterior surface of anterior adductor muscle, bifurcating in two branches; internal branch penetrating dorso posterior third of muscle and leaving at ventral surface of muscle; outer branch bordering posterior surface of anterior muscle, both branches fusing at ventral region of anterior muscle (Fig. 26); two connectives originating dorsally in ganglia, anteriorly to cerebro-visceral connective (cv) crossing visceral mass, touching gonopore dorsally, bordering anterior portion of kidney and connecting dorsally at visceral ganglia, connecting posteriorly cerebro-pedal connective (cp) running immersed in pedal muscles, connecting to anterior region of pedal ganglia. Pair of visceral ganglia (vg) fusiform, small, length same than height, ~1/2 of cerebral ganglia length, partially fused at median portion, with slightly central groove (Fig. 27); located



Figures 23–29. Anatomy of *Diplodonta portesiana*. **23** Digestive system as in situ, right view, foot and main muscles also shown **24** Stomach, left view **25** Internal stomach surface, right view, dorsal gastric wall sectioned longitudinally and deflected **26** Nervous system and topology of other main structures, right view **27** Visceral ganglia, ventral view **28** Pedal ganglia, superior figure in right view, inferior figure in ventral view **29** Cerebral ganglia, anterior view; Scale: **23, 26**: 2 mm; **24, 25**: 1 mm; **27–29**: 0,5 mm.

ventrally to kidney, parallel to posterior adductor muscle, in dorsal tip connecting cerebra-visceral connective (described above) and renal nerve (rn), penetrating into kidney area; laterally originating ctenidial nerves (cn) running thought central axis of posterior portion of gills; dorsally originating posterior adductor muscle nerve, penetrating middle region of anterior surface of posterior muscle; at ventral tip originating pallial nerve (pn), touching anterior surface of ventral portion of posterior adductor muscle, running parallel to incurrent and excurrent apertures and mantle border, diffusing at mantle lobe board (Fig. 26). Pair of pedal ganglia (pg) oval, longer than wide, totally fused with each other, similar length and height of cerebral ganglia (Fig. 28); located internally to posterior retractor pedal muscles, above foot insertion, in anterior tip connecting cerebro-pedal connectives from cerebral ganglia; in posterior tip connecting two pairs of nerves, dorsal pair running towards posterior region, inside posterior foot retractor muscles; postero-ventral nerves curved to ventral region, running internally foot.

Habitat. Infaunal, in muddy sands; from 0 to 68 m depth.

Measurements (*length, height and width in mm*). MZSP 22747 (Figs 7–14): 13.4 by 7.1 by 7.7; MZSP 105725 #1: 16.4 by 16.1 by 10.1; CENEMAR: 17.6 by 17.3 by 11.7.

Geographic range. From Limón, Cahuita, Costa Rica, to, Bombinhas, Santa Catarina, Brazil.

Material Examined. Holotype HMUK 1854.12.4.770 (d'Orbigny col. 1842); COSTA RICA. **Limón**; Refugio Nacional de Vida Silvestre, Gandoca- Manzanillo, between Gandoca and Rio Sixaola river mouth, 12 m depth, 09°34'37.8966"N, 82°34'33.0309"W, MZUCR- INB0003816046, 3 valves (T: 181-S. Avilla/Lote: 73904, A. Berrocal id., S. Ávila col. 12/vi/2003); Cahuíta, National Park, 1 km to east of Puerto Vargas. 12 m depth, 9°43'33.3681"N, 82°48'31.5178"W, MZUCR- INB0003414093, 2 valves (S. Ávila id, S. Ávila col. 09/vi/20010); 3 km to North east of Cahuita, reef out, 12 m depth. 9°45'50.3530"N, 82°49'29.9092"W, MZUCR- INB0003411964, 2 valves, (S. Ávila id., J. Magaña col. 11/vi/2001); Punta Cahuita, 8 m depth, 9°44'58.2370"N, 82°49'10.5220"W, MZUCR- INB0001494593, 1 valve (J. Espinosa id., Y. Camacho col. 24/v/1998). BRAZIL. **Bahia;** Salvador, Todos os Santos bay, MZSP 105725, 1 specimen (CETESB col. ii/2000). **Rio de Janeiro;** Angra dos Reis, Ilha Grande bay, 7.5 m depth, MZSP 22747, 9 specimens (Emília sta. 61, Ilha Grande Project, 10/xii/1965); 9.6m depth, MZSP 22780, 4 specimens, (Ilha Grande Project, Penna- Neme col. 25/vii/1966); Sepetiba bay, Itacuruça Island, MNRJ 12458, 8 specimens. **Santa Catarina;** Bombinhas, 3–5 m depth, CENEMAR, 2 specimens, (in shrimp net, J. Tarasconi col., 03/iv/ 1994); 5-10 m depth, CMAC, 3 valves (J. Tarasconi col, 1995); 8–10 m depth, CMAC, 2 valves (trawled by shrimpers, J. Tarasconi col. x/1994).

Discussion

Below, characters described on this study are compared between classical anatomical studies on genus *Diplodonta*. Lastly, general aspects concerning the species are analyzed, improving current data about the genus.

Shell: The original description by d'Orbigny (1846) lacks data on the shell variation, despite its noteworthy emphasis on the rounded form. Beyond the overall shape, a typical shell of *D. portesiana* has other new discovered exclusive features, such as: ligament length ~1/5 of total animal length, with its anterior limit below the umbo; a short and deep nymph. Besides, *Diplodonta portesiana* shell shows a concentric pattern of microscopically concavities. Mikkelsen and Bieler (2007) already demonstrated this character on ungulind shells, showing different patterns between species, being radial or concentric patterns.

Muscular system: A first description on the species' adductor muscles was offered by Mittré (1850), who noticed a slight discrepancy in shape and size of both adductors in a specimen of *D. punctata*. Allen (1958) justified the presence of an elongated anterior adductor by relating it with the ability to form an anterior inhalant tube. This was the first time that pairs of anterior and posterior foot retractor muscles were described for the genus, including the absence of a pair of protractor muscles in such an active burrowing genus (Domaneschi 1979). A new pair of muscles is described in this paper: the inhalant and exhalant channel muscles. It is possible that this pair of muscles has a role in controlling the contractions of the inhalant and exhalant apertures, as well as in sustaining the muscular wall to compensate the lack of an exhalant siphon.

Foot: The foot shape is one of the most outstanding characters in Ungulinidae. It was described by Duvernoy (1842) and Mittré (1850) as being long and cylindrical, with a terminal expansion. In histological studies, Allen (1958) showed differences between muscular fibers of the tip and proximal portions of the foot's terminal expansion, as well as a large concentration of mucous cells. Other biological considerations further improved this knowledge, especially regarding the production of mucous tubes: Haas (1942) discussed the production of mucous-sediment tubes in *Diplodonta orbella* Gould, 1852 to accommodate the siphons; Domaneschi (1979) described the production of mucus by *D. punctata*. As no specimen of *D. portesiana* has been seen alive, we can only infer this habit by some mucous-sand structures surrounding the anterior portion of some shells.

Mantle: The current translucent mantle and the pedal gape, common to the genus (Mittré, 1850), was found in *D. portesiana*. A concentration of glandular cells below the main rejection tract, i.e., between the outer and middle folds of the mantle, and no differences between the papillae of the middle and inner folds have been found in histological studies of ungulinids (Allen 1958).

Pallial cavity: Duvernoy (1842) and Mittré (1850) described two demibranchs for each gill, a feature confirmed in this study. The palps are thin (Mittré 1850) and show a moderate size, with a variable folded area. Allen (1958) described the rejection tracts of palps as very narrow and located at their ventral margin, a feature also found. A new character is, moreover, described here: a "ring-like" tissue fused with the muscular and visceral sac surfaces located below the connection of the gill to the visceral sac. It was postulated that this could be analogous to the flower-like organ described for the Galeommatidae (Mikkelsen and Bieler 1992, Simone 2001). But these structures only occur at the anterior portion of the foot, differing from the structure of the ungulinids, which occurs at the posterior half of foot. The gills of *Diplodonta* are free from each other, while other ungulinid genera have their gills fused in their posterior portion by a tissue originated in same location as the "ring-like" tissue described here. We offer here a first hypothesis regarding this "ring-like" tissue: considering the existence of ungulinids with fused and free gills, this "ring-like" structure could be a residual tissue from a complete connection between the gills.

Circulatory system: A ventricle and intestine crossing was noticed by Duvernoy (1842). Allen (1958) described the circulatory system as not significantly different from other Eulamellibranchia. Greater attention should be called to the thin and delicate pericardial tissue. The pair of auricles has thin walls and is connected to the central axis of demibranch.

Digestive system: The digestive structures are delicate and mostly covered by the gonads and the digestive gland. The most striking character in the digestive system is the stomach, complex, possessing several sorting areas and folds. Allen (1958) described a *Diplodonta* stomach as morphologically and functionally similar to other Eulamellibranchia. Compared to Allen's results, the number of ducts attached to the gastric wall can be variable between species. Purchon (1960), based on Allen's description, classified the ungulinids' stomach as "type V" mainly due to: conjoined style-sac and intestine; major typhlosole penetrating both diverticula; gastric shield penetrating dorsal hood and left pouch openings; ducts to digestive diverticula opening on right wall of stomach; presence of a sorting area on roof of anterior side of dorsal hood; a sorting area inside left pouch and presence of a sorting area below esophagus orifice. *Diplodonta portesiana* stomach shows all characters described above, and is strongly characterized by two main gastric characters: firstly, the constancy in number of lateral ducts of digestive diverticula, each one attached at each side of stomach; second, the number of sorting areas covering gastric chamber, with one starting below esophagus's rim and a second covering dorsal hood surface, as described to a characteristic ungulinid stomach.

Central nervous system: Duvernoy (1842) noticed three ungulinid pairs of ganglia, which were later described by Allen (1958) as having no great modifications when compared to other Eulamellibranchia. This general feature was found in *D. portesiana*, except for a connection described between the pallial nerve and the anterior adductor nerve, also found in other Lucinoidea.

As stated above, a revision of the genus *Diplodonta* is still in progress, and several diagnostic morphological and shell characters have already been found. This paper, with a more complete description of *D. portesiana*, is only the first step of this effort. The other species already are under study in order to improve the taxonomy of *Diplodonta* in the near future. The further publications will allow more comparisons and discussion of the taxonomical features, from species to family levels.

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RESEARCH ARTICLE

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Description of *Pella maoershanensis* sp. n. (Coleoptera, Staphylinidae, Aleocharinae) associated with *Lasius spathepus* from Guangxi, South China

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Abstract
Pella maoershanensis Song & Li, **sp. n.**, collected from a colony of *Lasius* (*Dendrolasius*) *spathepus* in Maoershan Natural Reserve, Guangxi, is diagnosed, described and illustrated. The discovery represents the first record of the genus in South China.

Keywords
Coleoptera, Staphylinidae, Aleocharinae, *Pella*, South China, myrmecophilous

Introduction

According to the latest catalogue of Lomechusini (Hlaváč et al. 2011), the genus *Pella* Stephens contains 61 species worldwide, among which seven are known from China: *P. beijingorum* Pace (Beijing), *P. cooterorum* Maruyama (Beijing, Yunnan), *P. hlavaci* Maruyama (Beijing), *P. jureceki* Dvořák (Beijing), *P. kishimotoi* Maruyama (Hunan), *P. puetzi* Assing (Yunnan) and *P. zhoui* Maruyama (Beijing). Members of *Pella* are commonly found in association with the ant genus *Lasius* Fabricius (Maruyama 2006). Recently, the senior author and his colleagues surveyed the staphylinid fauna of the Maoershan Mountain (Guangxi, South China), and collected a large series of an unidentified aleocharine beetle by sifting leaf litter near a nest of *Lasius* (*Dendrolasius*) *spathepus*. A closer examination of this material revealed a new species of the genus *Pella*. In this paper we describe the new species, provide illustrations of its major diagnostic features, and briefly discuss the biology.

Meterials and methods

Specimens were killed with ethyl acetate and preserved in 75% ethanol before dissection;

Photos of habitus were taken with a Canon EOS 50D with an MP-E 65mm Macro Photo Lens.

Head length was measured from the clypeal anterior margin to the occipital constriction; elytral length at the suture from the apex of the scutellum to the elytral posterior margin.

All the types were deposited in the Insect Collection of Shanghai Normal University, Shanghai, China (**SNUC**).

Taxonomy

Pella maoershanensis **Song and Li, sp. n.**
urn:lsid:zoobank.org:act:C88CD3B9-6194-4FF7-8EB3-96EE761E35E4
http://species-id.net/wiki/Pella_maoershanensis
Fig. 1

Type material (24 ♂♂, 28 ♀♀)**.** Holotype: ♂, labeled '25°53'03.51"N, 110°29'15.67"E / Maoer shan / (1,150 m). Xingan County / Guilin City / [Guangxi, China] / 24.VII.2012, Song X-B & Hu J-Y // HOLOTYPE [red] / *Pella maoershanensis* sp. n. / Song & Li / det. 2013, SNUC'. Paratypes: 23 ♂♂, 28 ♀♀, same label data as holotype, all bearing the following label: 'PARATYPE [yellow] / *Pella maoershanensis* sp. n. / Song & Li / det. 2013, SNUC'.

Diagnosis. *Pella maoershanensis* shares with *P. puetzi* a similar form of male sexual character on the head (Assing 2009). The two species can be readily distinguished by the smaller body size, the distinctly transverse antennomeres VI–X, and different forms of the aedeagal distal crest and ventral process in *P. maoershanensis*. The new species is also similar to the other species of the *P. cognata* group in general appearance (Maruyama 2006) but can be readily separated by the sexually modified head in the male.

Description. Body (Fig. 1A) length: 5.5–5.8 mm. Coloration: fore body brownish; abdomen blackish, with the posterior margins of the segments reddish-brown; leg and antennae reddish-brown.

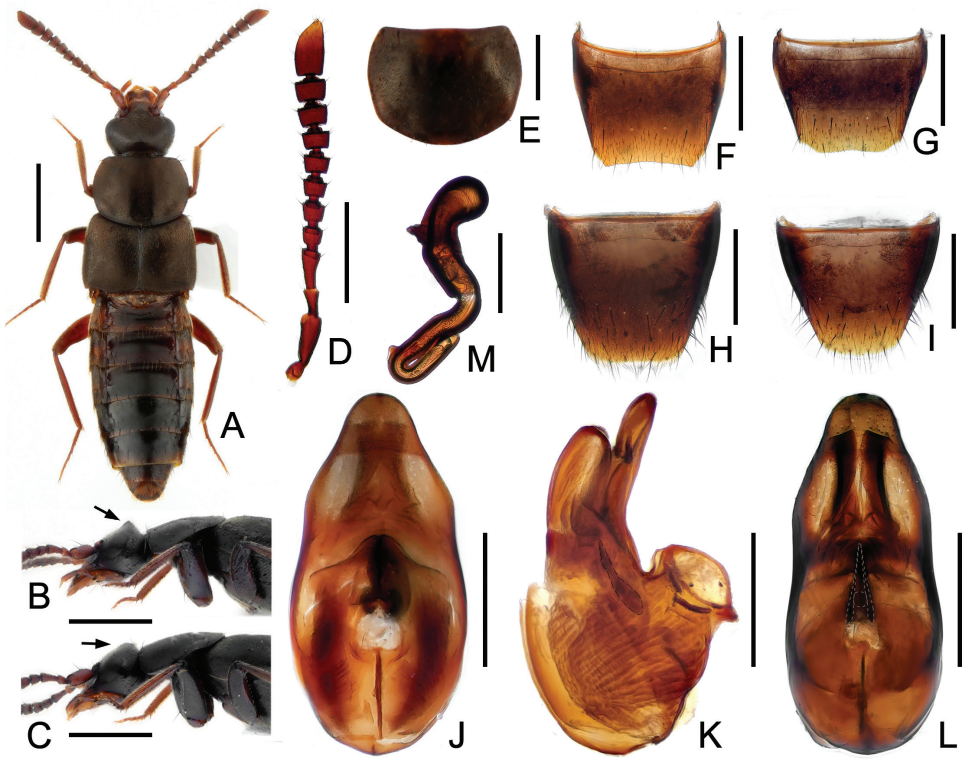

Figure 1. *Pella maoershanensis*. **A** Dorsal habitus **B** Head and pronotum in lateral view, male **C** Head and pronotum in lateral view, female **D** Antenna **E** Pronotum **F** Male tergite VIII **G** Female tergite VIII **H** Male sternite VIII **I** Female sternite VIII **J** aedeagus, in ventral view **K** same, in lateral view **L** same, in dorsal view **M** Spermatheca. Scales (mm): **A** = 2; **B, C** = 1; **D** = 0.25; **E, F, G, H, I** = 0.5; **J, K, L** = 0.3; **M** = 0.2.

Head (Fig. 1A) almost 1.2 times as wide as long; widest just behind eyes; surface finely reticulate, covered with short golden setae. Antennae (Fig. 1D) about 2.2 mm long, shorter than head, pronotum and elytra combined; antennomeres VI–X distinctly transverse. Pronotum (Fig. 1E) 1.35 times as wide as long and 1.37 times as wide as head; widest around anterior third, narrowed posteriorly; posterior margin almost rounded; covered with short golden setae, with six macrosetae; hypomera fully visible in lateral view. Elytra (Fig. 1A) about 1.9 times as long as pronotum; covered with short golden setae; humeral angle with one macrosetae. Hind wings fully developed. Abdomen (Fig. 1A) widest at segments IV–V; surface with transverse microsculpture.

Male. Posterior margin of head distinctly angled at middle (Fig. 1B); posterior margin of tergite VIII broadly concave and finely crenulate (Fig. 1F); posterior margin of sternite VIII (Fig. 1H) almost truncate; median lobe of aedeagus as in Figs 1J–L.

Female. Posterior margin of head indistinctly angled at middle (Fig. 1C); tergite VIII (Fig. 1G) and sternite VIII (Fig. 1I) distinctly shorter than that of male; spermatheca as in Fig. 1M.

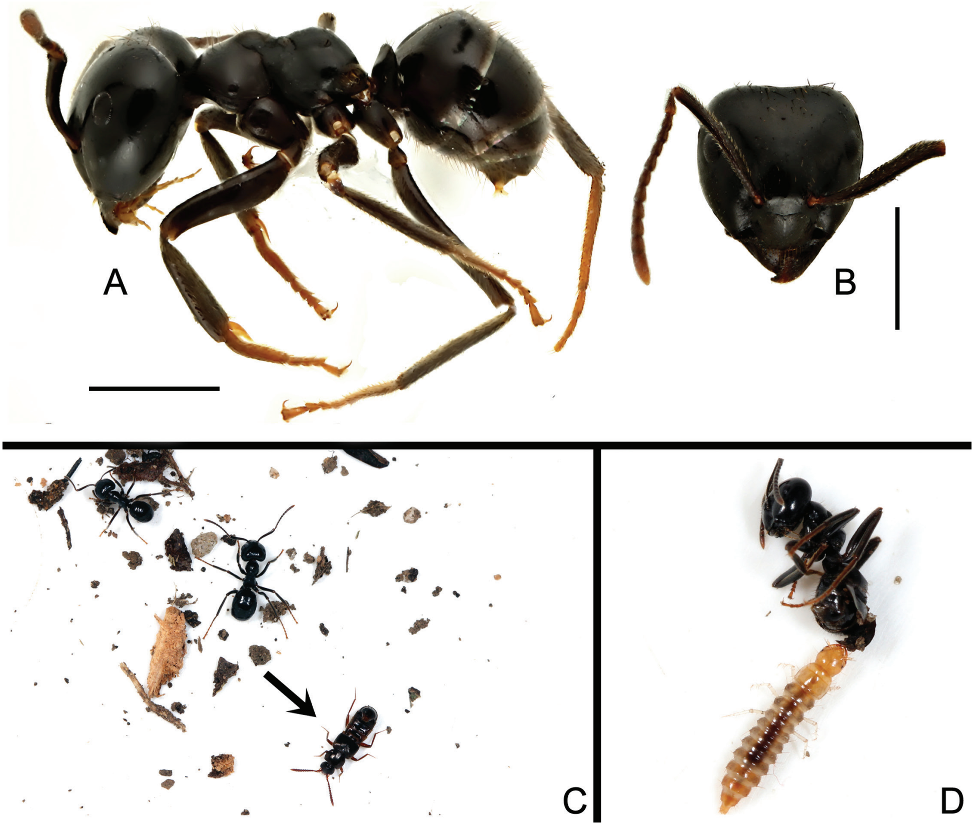

Figure 2. A Host ant, habitus in lateral view **B** Same, anterior view of head **C** A living species of *Pella maoershanensis* with host ants **D** A possible larva of *P. maoershanensis* feeding on a dead worker of host ant. Scales (mm): **A, B** = 1.

Host ant. *Lasius* (*Dendrolasius*) *spathepus* (det. by M. Maruyama) (Figs 2A, B).

Biological notes. Species of *Pella* are usually observed walking around the host's nest but never appear in it (Maruyama 2006). All individuals of the new species, plus three other aleocharine species were taken by sifting mixed leaf litter around the ant nest (Fig. 2C). Three possible larvae of the new species were taken back to the lab, and were observed to feed on a dead worker of the host ant (Fig. 2D). It's worth a note that two males and a female of an undescribed *Dendrolasiophilus* Nomura species (Yin pers. comm.) were directly collected from the deep site of the nest.

Etymology. Named after the type locality.

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RESEARCH ARTICLE

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Further studies on the *Pselaphodes* complex of genera from China (Coleoptera, Staphylinidae, Pselaphinae)

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Abstract

New data on the *Pselaphodes* complex of genera (Pselaphitae: Tyrini) from China is presented. The generic limits of *Labomimus* Sharp and *Pselaphodes* Westwood are discussed and expanded. A revised key to the genera of the *Pselaphodes* complex is provided. New geographic evidence suggests that previously believed wide-spread species *Pselaphodes tianmuensis* Yin, Li & Zhao contains a number of related species, resulting in a division of the species to nine separate taxa. Fourteen new species belonging to three genera are diagnosed, described and illustrated: *Dayao emeiensis* Yin & Li, **sp. n**. (Sichuan), *Labomimus fimbriatus* Yin & Hlaváč, **sp. n.** (Yunnan), *L. jizuensis* Yin & Hlaváč, **sp. n.** (Yunnan), *L. simplicipalpus* Yin & Hlaváč, **sp. n.** (Sichuan), *Pselaphodes anhuianus* Yin & Li, **sp. n.** (Anhui), *P. daii* Yin & Hlaváč, **sp. n.** (Sichuan), *P. grebennikovi* Yin & Hlaváč, **sp. n.** (Yunnan), *P. hainanensis* Yin & Li, **sp. n.** (Hainan), *P. kuankuoshuiensis* Yin & Li, **sp. n.** (Guizhou), *P. longilobus* Yin & Hlaváč, **sp. n.** (Hunbei, Yunnan), *P. monoceros* Yin & Hlaváč, **sp. n.** (Xizang), *P. pengi* Yin & Li, **sp. n.** (Sichuan), *P. tiantongensis* Yin & Li, **sp. n.** (Zhejiang) and *P. wrasei* Yin & Li, **sp. n.** (Yunnan). *Labomimus sichuanicus* Hlaváč, Nomura & Zhou (Sichuan) is redescribed and illustrated based on a paratype and the material from the type locality. Two recently described species, *Pselaphodes tibialis* Yin & Li (Yunnan), and *P. venustus* Yin & Li (Yunnan), are transferred to *Labomimus* (**comb. n.**) due to the presence of a median metaventral fovea. New locality data is provided for *P. aculeus* Yin, Li & Zhao (Anhui, Fujian, Guangxi, Hainan, Yunnan), *P. maoershanus* Yin & Li (Guangxi, Guizhou), *P. tianmuensis* (Zhejiang, Anhui, Fujian, Jiangxi, Guangxi) and *P. pectinatus* Yin, Li & Zhao (Hainan), with the aedeagus newly illustrated for the latter species.

Keywords

Staphylinidae, Pselaphinae, Tyrina, key, taxonomy, *Dayao, Labomimus, Pselaphodes*, China

Introduction

A large number of tyrine beetles (Staphylinidae: Pselaphinae: Tyrini) from China in various collections have been studied by the first author, with the cooperation of the second and third authors. The results of this study are a new concept of the *Pselaphodes* complex of genera, description of fourteen new species, two new combinations, and new locality data for four known species. We report this information herein.

Material and methods

The material treated in this study is housed in the following public institutions and private collections:

NSMT National Museum of Nature and Science, Tokyo, Japan (Shûhei Nomura)
SNUC Insect Collection of Shanghai Normal University, Shanghai, China (Zi-Wei Yin)
pcPH private collection of Peter Hlaváč, Košice, Slovakia
pcMS private collection of Michael Schülke, Berlin, German

The collection data of the referred material are quoted verbatim. A slash (/) is used to separate lines on the same label, and a double slash (//) is used to separate different labels. Authors' notes are included in '[]'. Type material bears the following type label: 'HOLOTYPE [red] or PARATYPE [yellow] / [genus name, species name] / sp. n., [authors of the species] / det. 2013. The depository is indicated after the collection data of the respective species.

The terminological terms follow Chandler, 2001, except for using 'ventrite' instead of 'sternite' when discussing the meso- and metathoracic structures.

All measurements are in millimeters. The following acronyms are applied: **AL**–length of the abdomen along the midline; **AW**–maximum width of the abdomen; **BL**–length of the body (= HL + PL + EL + AL); **EL**–length of the elytra along the sutural line; **EW**–maximum width of the elytra; **HL**–length of the head from the anterior clypeal margin to the occipital constriction; **HW**–width of the head across eyes; **PL**–length of the pronotum along the midline; **PW**–maximum width of the pronotum.

Taxonomy

***Pselaphodes* complex of genera** (sensu Hlaváč, 2002: 283)

Discussion. The shape of maxillary palpomeres II–IV was usually used as an important character to separate genera of the *Pselaphodes* complex (Hlaváč 2002; Hlaváč and Chandler 2005). Use of the form of the maxillary palpi in combination with the foveal patterns, will usually lead to the recognition of most genera (Chandler 2001: 400). However, when more material of the homogeneous *Pselaphodes* complex of genera was studied, conflicts between these characters appeared, and some species cannot be assigned to any known genus based on their current definitions. One new species described here, e.g. *Labomimus simplicipalpus* sp. n., which has a well-defined setose median metaventral fovea (typical for *Labominus*), but small and completely symmetric palpomeres II–IV (typical for *Lasinus* and *Paralasinus*). Another species, described as *Pselaphodes monoceros* sp. n., has nearly symmetric maxillary palpi, with palpomeres III being indistinctly projecting laterally (*Pselaphodes* are usually with palpomeres II–IV strongly asymmetric), and has the male sexual character located on the frons (previously unknown in members of the complex). We do not believe there is a justification to erect any supraspecific taxa for these species; hence we here expand the generic limits of *Labomimus* and *Pselaphodes*. Consequently we provide a modified key to genera of the *Pselaphodes* complex.

Key to genera of *Pselaphodes* complex (modified from Hlaváč 2002: 284)

1 Second tarsomeres broadly lobed beneath the third and extending nearly to the tarsal claws **2**
– Second tarsomeres simple, linear, not strongly lobed, rarely extending beneath the third tarsomeres **3**
2 Frontal foveae present; setose pronotal median and lateral antebasal foveae connected by shallow antebasal sulcus .... ***Taiwanophodes* Hlaváč**
– Frontal foveae absent; pronotum lacking antebasal sulcus, median antebasal fovea nude .... ***Nomuraius* Hlaváč**
3 Setose median metaventral fovea present **4**
– Median metaventral fovea absent **6**
4 Vertexal and frontal foveae absent or weakly-defined; head and pronotum roughly punctate; pronotal median longitudinal sulcus absent .... ***Linan* Hlaváč**
– Vertexal and frontal foveae well-defined; head and pronotum usually finely punctate; pronotal median longitudinal sulcus usually present **5**
5 Pronotum lacking median antebasal fovea; elytra carinate .... ***Indophodes* Hlaváč**
– Pronotal median antebasal fovea well-defined; elytra not carinate .... ***Labomimus* Sharp**
6 Maxillary palpi with palpomeres II–IV simple, completely symmetric **7**

– Maxillary palpi with at least some segment of II–IV asymmetric, roundly expanded or slightly to distinctly projecting laterally.................................... **8**

7 Pronotum with antebasal sulcus connecting lateral antebasal foveae.. ***Paralasinus* Hlaváč & Nomura**

– Pronotum lacking antebasal sulcus.. ***Lasinus* Sharp**

8 Head with frontal fovea .... ***Pselaphodes* Westwood**

– Head lacking frontal fovea .... ***Dayao* Yin, Li & Zhao**

Genus *Dayao* Yin, Li & Zhao

Dayao Yin, Li & Zhao, 2011b: 47. Type species: *Dayao pengzhongi* Yin, Li & Zhao, 2011b.

Dayao emeiensis Yin & Li, sp. n.

urn:lsid:zoobank.org:act:5647FE6D-0705-4361-8332-BD5ADF0A3D96
http://species-id.net/wiki/Dayao_emeiensis
Figs 1A, 2

Type material (1 ♂, 1 ♀)**.** Holotype: ♂, labeled ‘CHINA: Sichuan, E’meishan City / E’mei Shan Mt., pass between / Xixiangchi and Yanwang Slope / 29°33'28"N, 103°20'36"E, 2200 m / (leaf litter, sifted), 2012.vii.23 / C. C. Dai, Z. Peng & Z. W. Yin leg.’ (SNUC). Paratype: ♀, same label data as holotype (SNUC).

Diagnosis. Reddish brown; length 2.96; postgenae narrowed; antennomeres IX–XI enlarged, unmodified in both sexes; pronotum rounded at anterolateral margins; male with large metaventral processes; aedeagus with asymmetric median lobe.

Description. Male (Fig. 1A). Length 2.96–2.97. Head longer than wide, HL 0.73, HW 0.62; eyes each composed of about 25 facets. Antennal clubs as in Fig. 2A. Pronotum (Fig. 2B) about as long as wide, PL 0.64, PW 0.62, rounded at anterolateral margins. Elytra wider than long, EL 0.73, EW 1.06. Long metaventral processes with truncate apices (Fig. 2C). Protrochanters and profemora simple (Fig. 2D); protibiae with small apical projection (Fig. 2E); mesotrochanters (Fig. 2F) slightly protuberant at ventral margin; metatrochanters and metafemora simple (Fig. 2G). Abdomen broad at base and narrowed apically, AL 0.86, AW 1.14. Sternite IX as in Fig. 2H. Aedeagus length 0.46, with symmetric median lobe broad (Figs 2I–K).

Female. Similar to male in general; BL 2.97, HL 0.74, HW 0.59, PL 0.65, PW 0.62, EL 0.68, EW 1.06, AL 0.90, AW 1.19. Eyes each composed of about 15 facets. Antennae simple; metaventral processes absent,.

Comparative notes. Males of the new species can be readily separated from those of the only known congener, *D. pengzhongi*, by the unmodified antennae, the pronotum lacking tufts of long golden setae near the anterior margin, the much larger metaventral processes, and the aedeagus has broader parameres. *Dayao pengzhongi* has

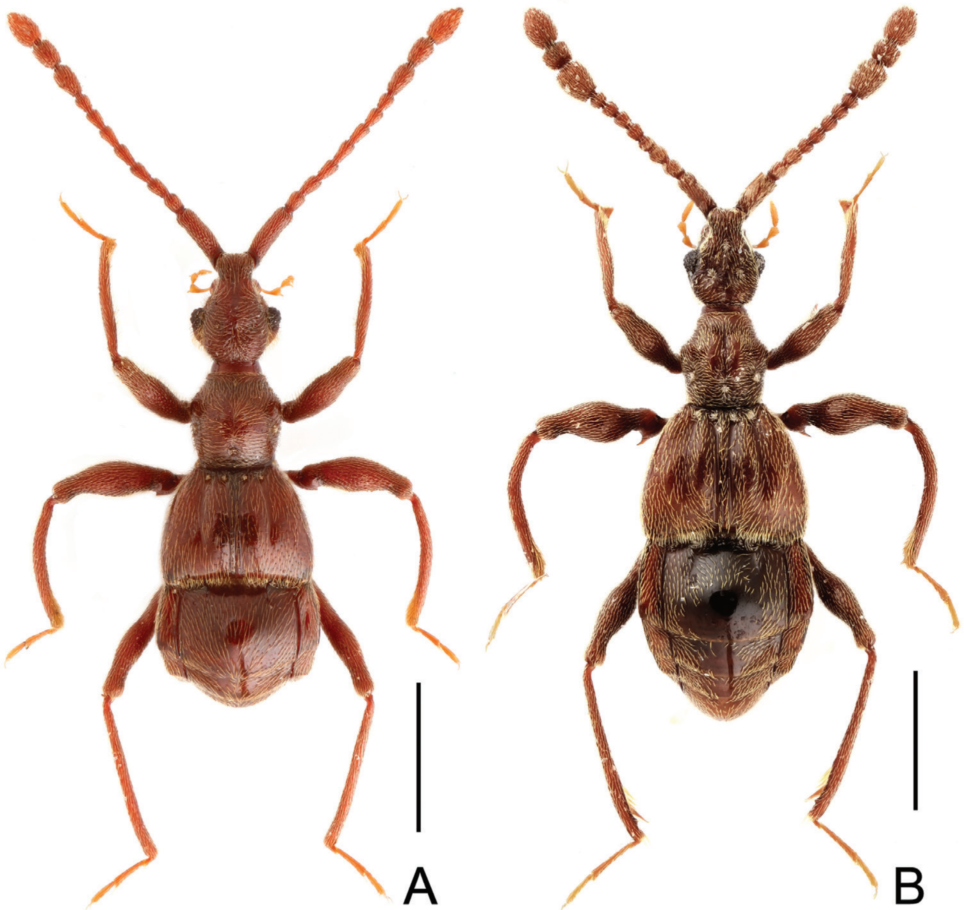

Figure 1. Male habitus of *Dayao emeiensis* (**A**) and *Labomimus fimbriatus* (**B**). Scales: 1.0 mm.

modified antennomeres IX and pronotum, and the aedeagus has relatively much thinner parameres (Yin et al. 2011b: 51, figs 11–13).

Distribution. Southwest China: Sichuan.

Biology. Adults were collected by sifting leaf litter in a mixed forest.

Etymology. The new species is named after the type locality, E'mei Shan Mountain.

Notes. A female specimen (in pcPH) from Nibashan Mt., (Daxiangling Mts., ca. 50 km. W E'meishan) has slightly greater body size, and has each eye composed of about 20 facets. An associated male from Nibashan is needed for species identification.

Genus *Labomimus* Sharp

Labomimus Sharp, 1883: 300. Type species: *Labomimus reitteri* Sharp, 1883.

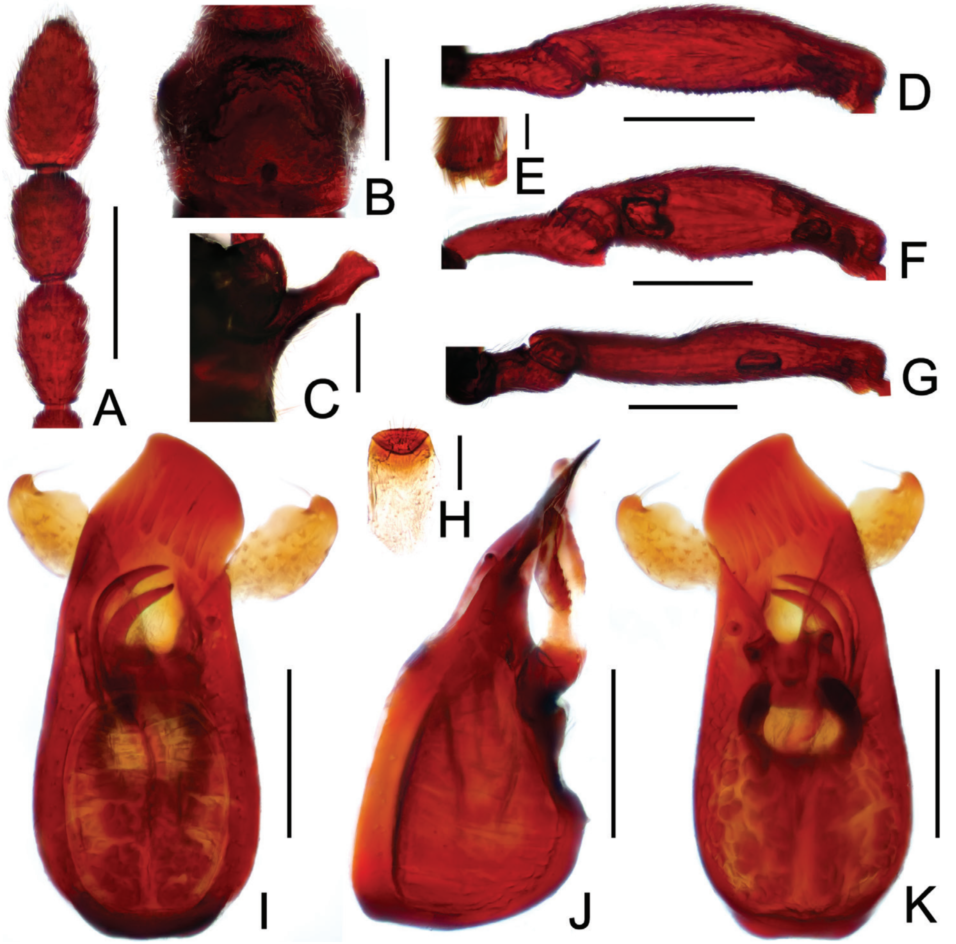

Figure 2. Diagnostic features of *Dayao emeiensis* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Labomimus fimbriatus **Yin & Hlaváč, sp. n.**

urn:lsid:zoobank.org:act:2A8B615E-D062-4CEE-BA60-58D81342A3C1
http://species-id.net/wiki/Labomimus_fimbriatus
Figs 1B, 3

Type material (7 ♂♂, 6 ♀♀)**.** Holotype: ♂, labeled 'CHINA: Yunnan, Lushui County / Pianma Town, Gaoligongshan Mt. / 25°58'46"N, 98°40'33"E, 3000 m, / (mixed leaf litter, sifted) / 2012.vi.24, Liang Tang leg. (SNUC). Paratypes: 1 ♂, same label data as holotype (SNUC); 2 ♂, 3 ♀♀, labeled 'CHINA: Yunnan [CH07-24], Nujiang / Lisu Aut. Pref., Gaoligong Shan, valley 18 / km W Gongshan, 3020 m, 27°47'54''N, / 98°30'13''E, mixed forest, litter, moss, / wood sifted, 7.VI.2007, M. Schülke' (pcMS, SNUC); 1 ♀, CHINA:

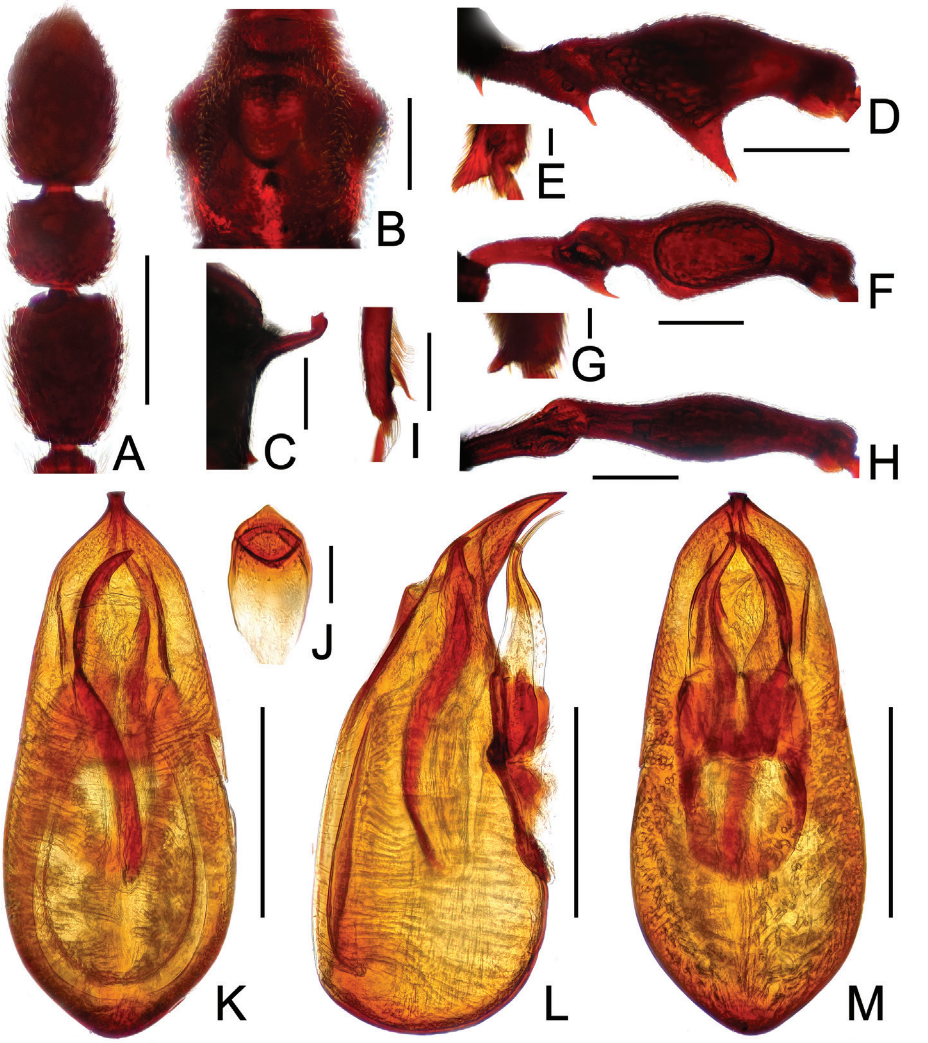

Figure 3. Diagnostic features of *Labomimus fimbriatus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** procoxa, protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur G apical portion of mesotibia **H** metatrochanter and metafemur **I** apical portion of metatibia **J** sternite IX **K** aedeagus, in dorsal view **L** same, in lateral view **M** same, in ventral view. Scales (mm): **A, B, C, D, F, H, I, K, L, M** = 0.3; **J** = 0.1; **E, G** = 0.05.

Yunnan [CH07-26], Nujiang / Lisu Aut. Pref., Gaoligong Shan, pass 21 / km NW Liuku, 3150 m, 25°58'22''N, / 98°41'00''E, bamboo with shrubs, litter / sifted, 9.VI.2007, M. Schülke' (pcMS); 1 ♀, same label data, except '25°58'49''N, 98°41'48''E' (SNUC); 1 ♂, labeled 'CHINA: Yunnan, Nujiang Lisu Pref., / Gaoligong Shan, "Cloud pass", / 21 km NW Liuku, 25°58'21''N / 98°41'01''E, 3150 m, shrubs & / bamboo, litter sifted, 3.IX.2009, leg. M. Schülke [CH09-22a]' (SNUC); 1 ♂, 1 ♀, same label data, except '2.IX.2009 D. W. Wrase [22A]' (SNUC); 1 ♂, labeled 'CHINA (Yunnan) / Nujiang Lisu

Aut. Pref., / Gaoligong Shan, creek valley / 20 km NW Liuku, 3000 m, / 25°58'49''N, / 98°41'48''E / (bamboo, shrub, litter sifted) / 9.VI.2007 D.W. Wrase [27]' (pcMS).

Diagnosis. Reddish brown; length 3.47–3.77; postgenae rounded laterally; antennomeres IX–XI enlarged; IX modified in male; pronotum roundly expanded at anterolateral margins; male with long curved metaventral processes; metacoxae simple; aedeagus with symmetric median lobe.

Description. Male (Fig. 1B). Length 3.52–3.77. Head slightly longer than wide, HL 0.70–0.72, HW 0.60–0.65; eyes each composed of about 30 facets. Antennal clubs as in Fig. 3A. Pronotum (Fig. 3B) slightly longer than wide, PL 0.70–0.71, PW 0.65–0.69, roundly expanded at anterolateral margins. Elytra wider than long, EL 0.87–0.92, EW 1.22–1.26. Metaventral processes (Fig. 3C) long, curved anteriorly at apices. Procoxae, protrochanters and profemora spinose at ventral margin (Fig. 3D), protibiae with distinct triangular apical projection (Fig. 3E); mesotrochanters with large ventral spine, mesofemora roundly broadened ventrally (Fig. 3F), mesotibiae with small apical tubercle (Fig. 3G); metatrochanters and metafemora (Fig. 3H) simple, metatibiae with setose tuft near apices (Fig. 3I). Abdomen broad at base and narrowed apically, AL 1.25–1.42, AW 1.29–1.37. Sternite IX as in Fig. 3J. Aedeagus length 0.75, with symmetric median lobe (Figs 3K–M).

Female. Similar to male in general; BL 3.47–3.65, HL 0.73–0.76, HW 0.62–0.63, PL 0.70–0.72, PW 0.64–0.65, EL 0.74–0.75, EW 1.25–1.32, AL 1.30–1.42, AW 1.37–1.47. Eyes each composed of about 30 facets. Antennae not modified; metaventral processes absent.

Comparative notes. This species is close to *L. jizuensis* and *L. simplicipalpus* (both described below) in sharing similar modifications of the antennae and legs. *Labomimus fimbriatus* and *L. simplicipalpus* share a symmetric aedeagal median lobe. The two species can be separated by the larger size, nearly symmetric antennomeres X, and more slender aedeagus in *L. fimbriatus*, while *L. simplicipalpus* is much smaller in size, has strongly asymmetric antennomeres X, and the aedeagus is more robust. *Labomimus jizuensis* can be separated from both former species by the clearly asymmetric aedeagal median lobe.

Distribution. Southwest China: Yunnan.

Biology. Adults were commonly sifted from mixed leaf litter in shrubs and forests and are abundant in litter from appropriate habitats.

Etymology. The Latin word '*fimbriatus*' means 'having a fringe, fringed', referring to the fringed apical portion of the metatibiae of the new species.

Labomimus jizuensis Yin & Hlaváč, sp. n.

urn:lsid:zoobank.org:act:5A178599-49BF-4C09-8CB9-E45EE4CDA574
http://species-id.net/wiki/Labomimus_jizuensis
Figs 4A, 5

Type material (3 ♂♂)**.** Holotype: ♂, labeled 'CHINA: Yunnan / above Dali, 2700-2900 m / 14.IV.1999 / leg. W. SCHAWALLER' (pcPH). Paratypes: 2 ♂♂, labeled

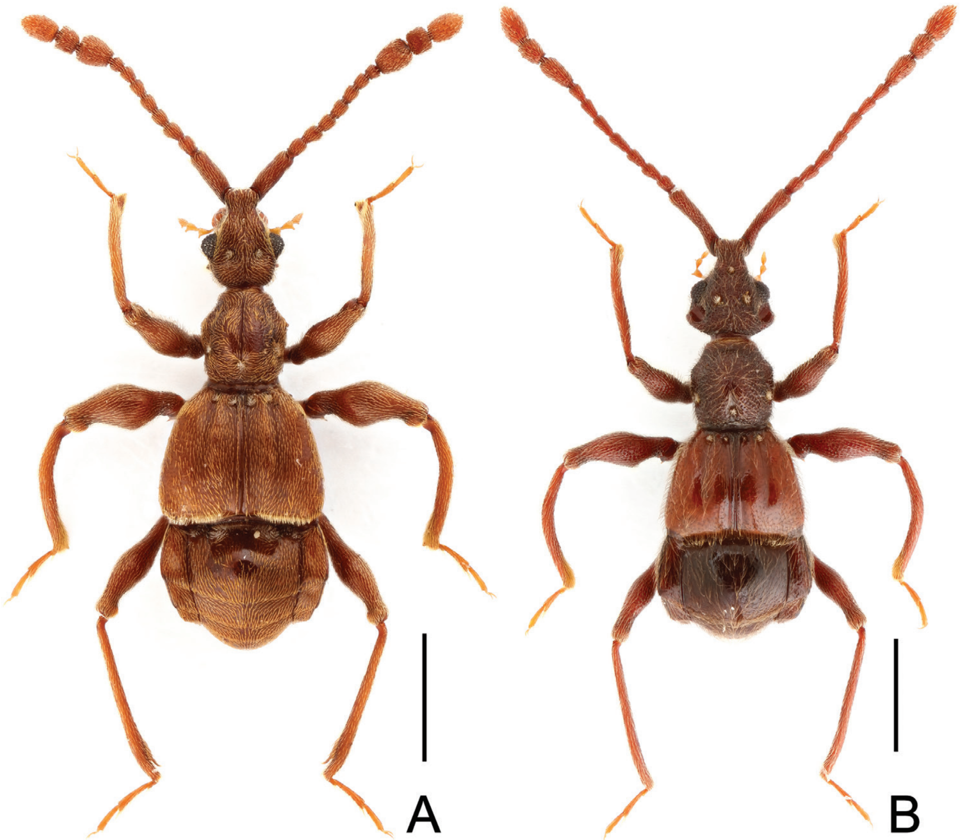

Figure 4. Male habitus of *Labomimus jizuensis* (**A**) and *Labomimus sichuanicus* (**B**). Scales: 1.0 mm.

'CHINA (Yunnan) Dali Bai Aut. / Pref., Jizu Shan, / path to cable car, 37 km NE Dali / 2450 m, 25°58'N, 100°23'E / (mixed forest, litter, moss sifted) / 5.IX.2009 D.W. Wrase [29]' (pcMS, SNUC).

Diagnosis. Reddish brown; length 3.54–3.64; postgenae rounded laterally; antennomeres IX–XI enlarged; IX–X modified in male; pronotum roundly expanded laterally at anterolateral margins; male with short metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 4A). Length 3.54–3.64. Head longer than wide, HL 0.76–0.80, HW 0.63–0.65; eyes each composed of about 40 facets. Antennal clubs as in Fig. 5A. Pronotum (Fig. 5B) slightly longer than wide, PL 0. 0.73–0.76, PW 0.69–0.71, roundly expanded laterally at anterolateral margins. Elytra wider than long, EL 0.93–0.94, EW 1.29–1.31. Metaventral processes (Fig. 5C) short, truncate apically. Procoxae, protrochanters and profemora spinose at ventral margin (Fig. 5D), protibiae with distinct triangular apical projection (Fig. 5E); mesotrochanters with small ventral spine, mesofemora broadly thickened ventrally (Fig. 5F), mesotibiae with small apical tubercle (Fig. 5G); metatrochanters and metafemora (Fig. 5H) simple, metatibiae with setose tuft near apices (Fig. 5I).

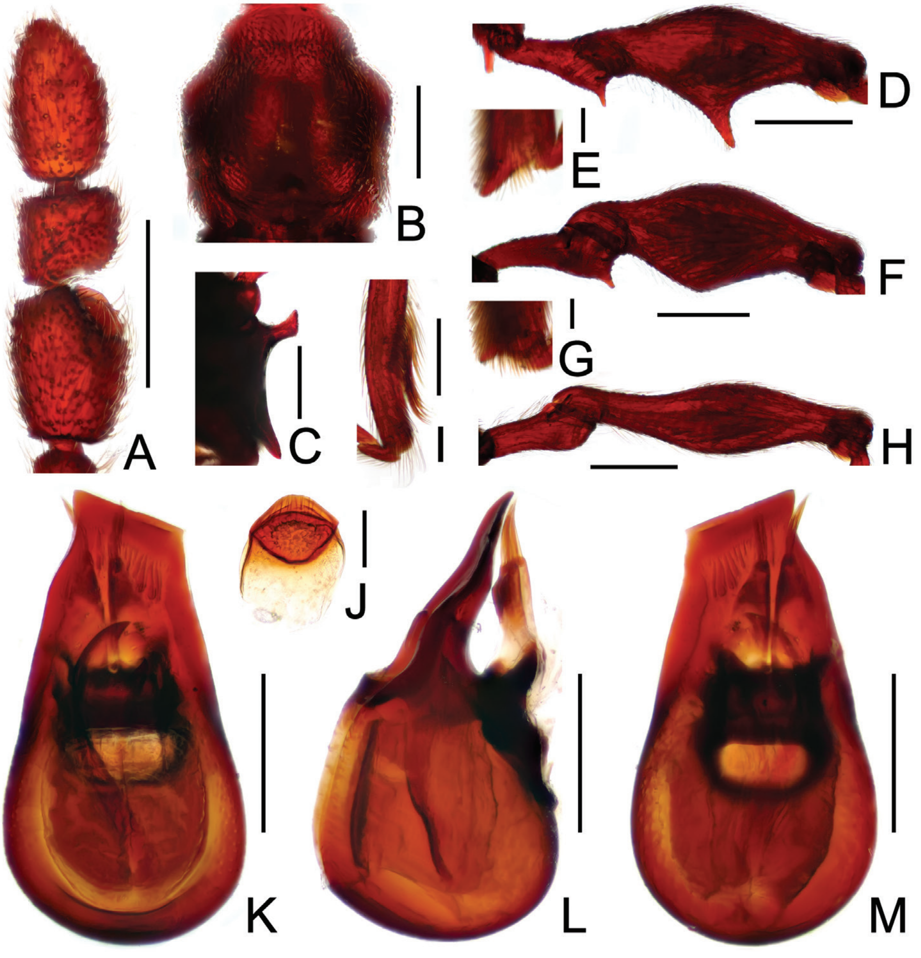

Figure 5. Diagnostic features of *Labomimus jizuensis* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** procoxa, protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur G apical portion of mesotibia **H** metatrochanter and metafemur **I** apical portion of metatibia **J** sternite IX **K** aedeagus, in dorsal view **L** same, in lateral view **M** same, in ventral view. Scales (mm): **A, B, C, D, F, H** = 0.3; **I, K, L, M** =0.2; **J** = 0.1; **E, G** = 0.05.

Abdomen broad at base and narrowed apically, AL 1.12–1.14, AW 1.32–1.38. Sternite IX as in Fig. 3J. Aedeagus length 0.57, with asymmetric median lobe (Figs 5K–M).

Female. Unknown.

Comparative notes. *Labomimus jizuensis* is closely allied to *L. fimbriatus* and *L. simplicipalpus* as discussed above, it can be readily separated from both species by the clearly asymmetric aedeagal median lobe.

Distribution. Southwest China: Yunnan.

Biology. Individuals were collected by sifting litter and moss in mixed forests.

Etymology. The new species is named after the locality where the two paratypes were collected, Jizushan Mountain.

Labomimus sichuanicus **Hlaváč, Nomura & Zhou**
http://species-id.net/wiki/Labomimus_sichuanicus
Figs 4B, 6

Labomimus sichuanicus Hlaváč, Nomura & Zhou, 2000: 149. Type locality: Qingchengshan Mountain, Sichuan, Southwest China.

Type material examined. Paratype: ♂ [with aedeagus, tergite VIII and sternite VIII dissected, preserved in Canada balsam on a plastic plate pinned under the specimen], labeled 'Wolong (1,770-1,790 m) / Wenchuan Xian / Sichuan Prov. // SE-China [should be SW-China] / 24.xi.1996, S. Nomura leg. // PARATYPE [blue] / *Labomimus sichuanicus* / Hlaváč, Nomura et Zhou' (NSMT).

Other material examined (5 ♂♂, 10 ♀♀)**.** 3 ♂♂, 9 ♀♀, labeled 'CHINA: Sichuan, Dujiangyan City / Qingchengshan Mt., pass near / Baiyun Temple, 30°56'55''N, / 103°28'28''E, 1650 m (bamboo / leaf, dead wood, sifted), 2012.vii.27 / C. C. Dai, Z. Peng & Z. W. Yin leg.'. 2 ♂♂, 1 ♀, same label data, except '1700 m' (all SNUC).

Diagnosis. Reddish brown; length 3.40–3.69; postgenae broadly expanded laterally; antennomeres IX–XI enlarged, simple in both sexes; pronotum rounded at anterolateral margins; male with short metaventral processes; metacoxae spinose ventrally; aedeagus with asymmetric median lobe.

Redescription. Male (Fig. 4B). Length 3.40–3.50. Head longer than wide, HL 0.86–0.87, HW 0.68–0.72; eyes each composed of about 35 facets. Antennal clubs as in Fig. 6A. Pronotum (Fig. 6B) slightly longer than wide, PL 0.76–0.83, PW 0.74–0.75, rounded at anterolateral margins. Elytra wider than long, EL 0.86–0.87, EW 1.23–1.25. Metaventral processes very short (Fig. 6C). Protrochanters and profemora simple (Fig. 6D), protibiae with tiny apical spur (Fig. 6E); mesotrochanters with small ventral spine, mesofemora simple (Fig. 6F); metacoxae with short ventral protuberance, metatrochanters and metafemora simple (Fig. 6G). Abdomen broad at base and narrowed apically, AL 0.92–0.93, AW 1.31–1.38. Sternite IX as in Fig. 6H. Aedeagus length 0.55, with asymmetric median lobe elongate (Figs 3I–K).

Female. Similar to male in general; BL 3.59–3.69, HL 0.87–0.89, HW 0.64–0.70, PL 0.77–0.81, PW 0.73–0.77, EL 0.82–0.83, EW 1.32–1.34, AL 1.13–1.16, AW 1.43–1.47. Eyes each composed of about 28 facets. Metaventral processes absent.

Comparative notes. This species is placed in the same group as *L. shibatai* Sawada, *L. dabashanus* Yin & Li, and *L. schuelkei* Yin & Li by sharing the laterally expanded postgenae. *Labomimus sichuanicus* is closest to *L. schuelkei* by sharing the postgenae being largely expanded laterally together with a thickened posterior margin, and the strongly elongate antennomeres V–VIII. The two species can be readily separated by the simple antennomeres IX–X, and the aedeagus with a much broader median lobe in *L. sichuanicus*, while *L. schuelkei* has strongly modified antennomeres IX–X, and the aedeagal median lobe is strongly narrowed dorsoventrally.

Distribution. Southwest China: Sichuan.

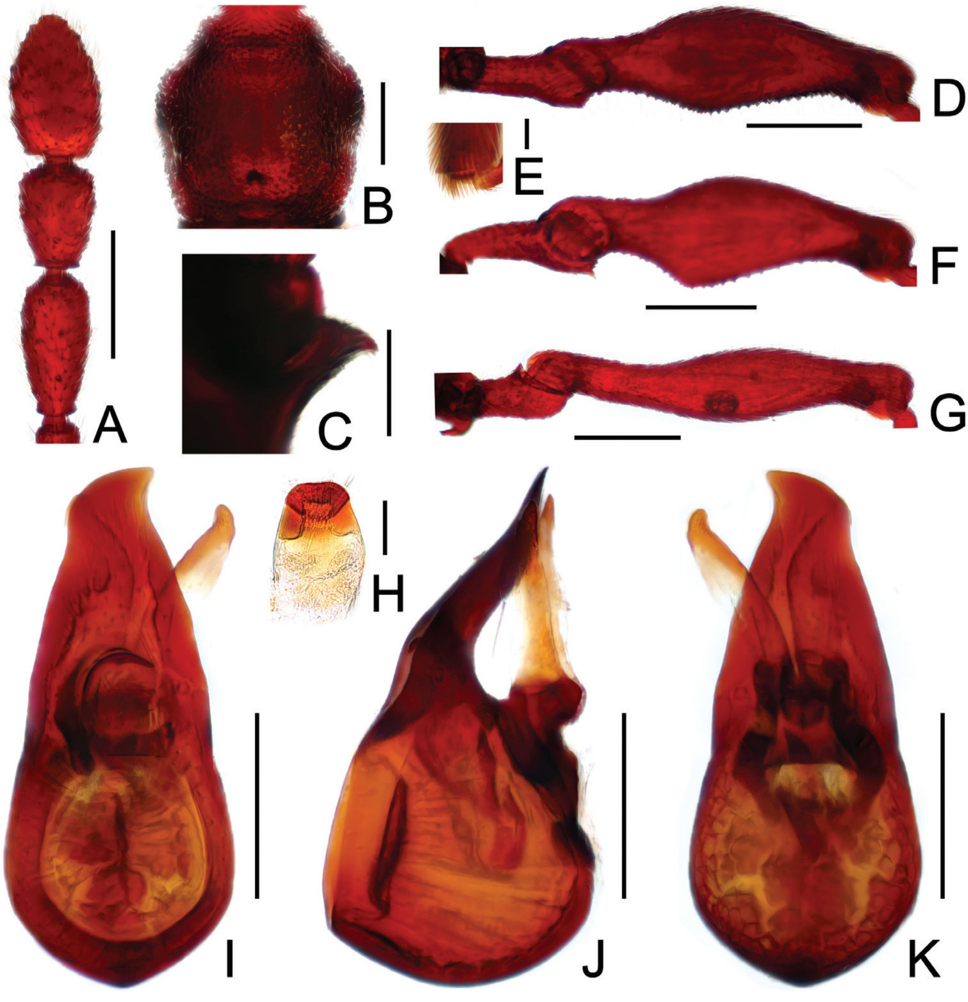

Figure 6. Diagnostic features of *Labomimus sichuanicus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metacoxa, metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Biology. Individuals were sifted from mixed broad-leaved and bamboo leaf litter in a bush.

Remarks. This species was described from three males and two females from Qingchengshan Mountain (type locality) and Wolong Natural Reserve of the Sichuan Province. The holotype and paratypes preserved in the Institute of Zoology, Academia Sinica, Beijing cannot be located at this time (Zhou per. comm.). The descriptions and illustrations provided by Hlaváč et al. (2000: 150) as well as a comparison with a paratype housed in NSMT leave no doubt that the material listed above is conspecific with the holotype.

***Labomimus simplicipalpus* Yin & Hlaváč, sp. n.**
urn:lsid:zoobank.org:act:52556982-D4CF-45B5-9A08-BA9EFFE642A2
http://species-id.net/wiki/Labomimus_simplicipalpus
Figs 7A, 8

Type material (1 ♂)**.** Holotype: ♂, labeled 'CHINA: Sichuan, Luding County / Hailuogou N. R., 28°35'47''N / 102°03'05''E, 2200–2300 m / (mixed leaf litter, sifted) / 2006.vii.27, Hu & Tang leg.' (SNUC).

Diagnosis. Reddish brown; length 3.00; postgenae rounded laterally; antennomeres IX–XI enlarged; IX–X modified in male; pronotum roundly expanded laterally; male with long metaventral processes; metacoxae simple; aedeagus with symmetric median lobe.

Description. Male (Fig. 7A). Length 3.00. Head slightly longer than wide, HL 0.65, HW 0.59; eyes each composed of about 40 facets. Antennal clubs as in Fig. 8A. Prono-

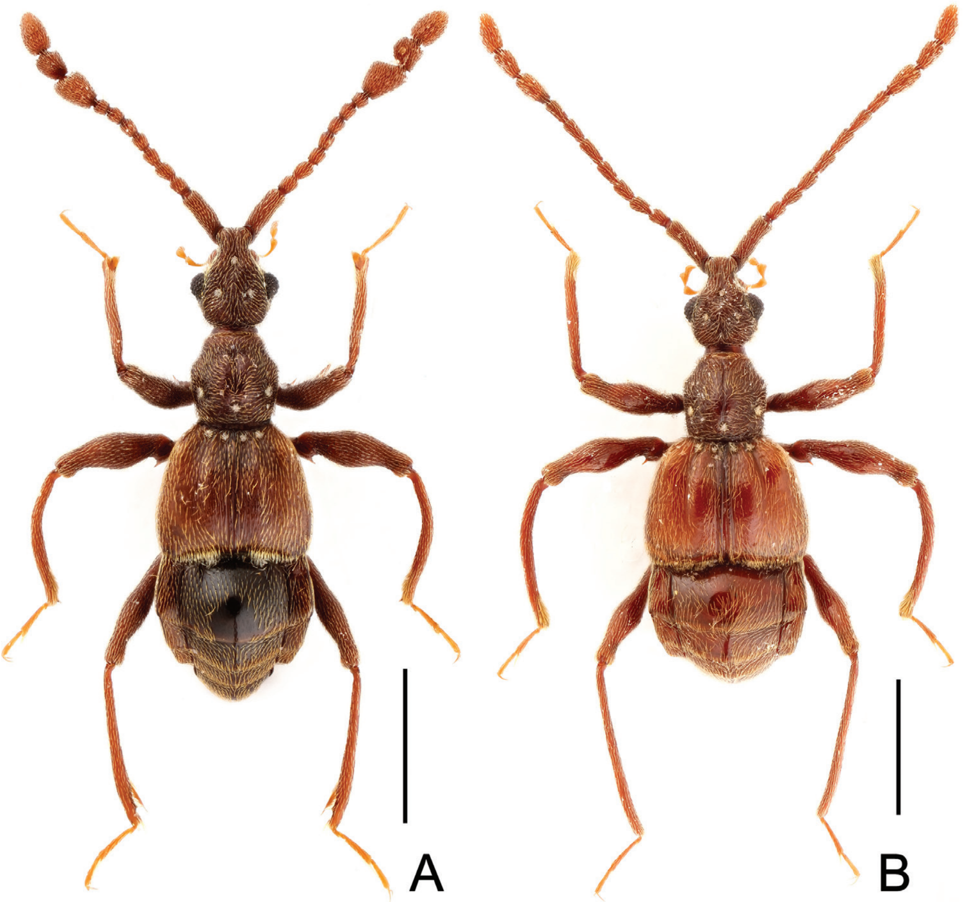

Figure 7. Male habitus of *Labomimus simplicipalpus* (**A**) and *Pselaphodes anhuianus* (**B**). Scales: 1.0 mm.

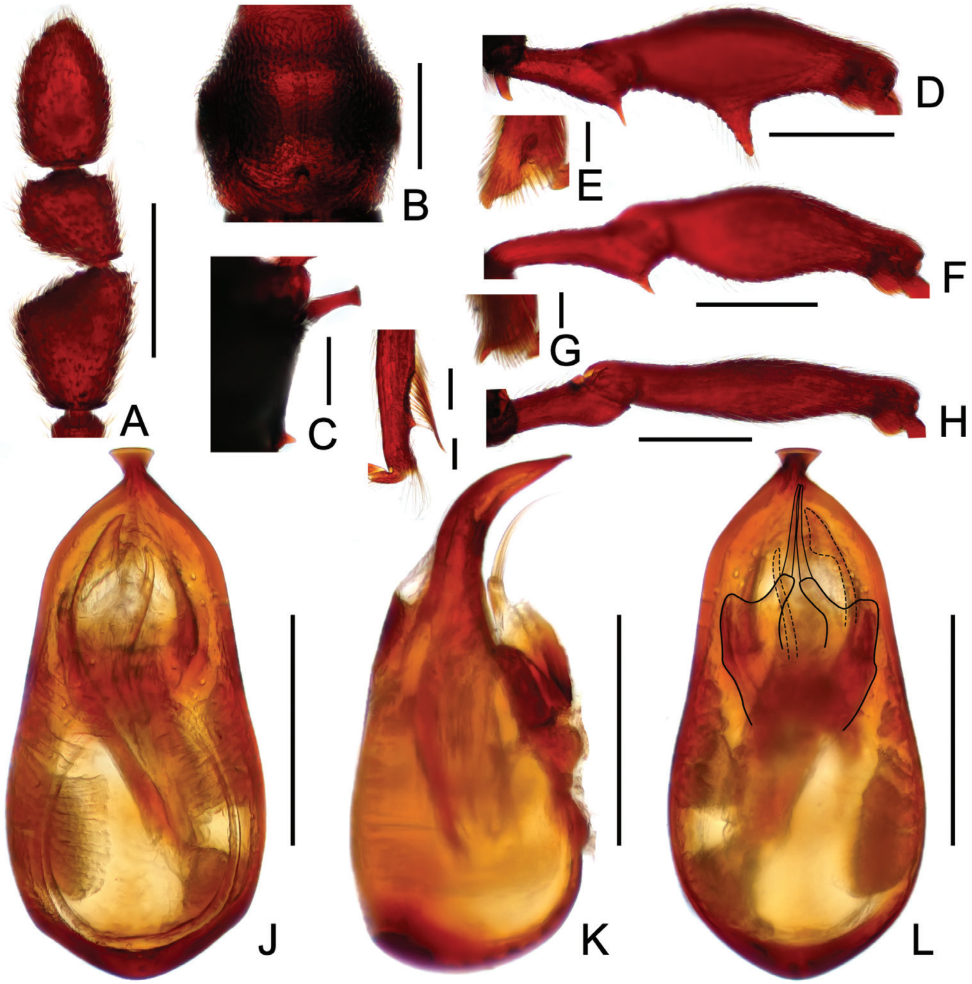

Figure 8. Diagnostic features of *Labomimus simplicipalpus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** procoxa, protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** apical portion of mesotibia **H** metatrochanter and metafemur **I** apical portion of metatibia **J** aedeagus, in dorsal view **K** same, in lateral view **L** same, in ventral view. Scales (mm): **A, B, D, F, H** = 0.3; **C, J, K, L** = 0.2; **I** = 0.1; **E, G** = 0.05.

tum (Fig. 8B) slightly longer than wide, PL 0.61, PW 0.59, roundly expanded laterally. Elytra wider than long, EL 0.81, EW 1.06. Metaventral processes (Fig. 8C) long, broadened and truncate at apices. Procoxae, protrochanters and profemora spinose at ventral margin (Fig. 8D), protibiae with distinct triangular apical projection (Fig. 8E); mesotrochanters with distinct ventral spine, mesofemora simple (Fig. 8F), mesotibiae with small apical tubercle (Fig. 8G); metatrochanters and metafemora (Fig. 8H) simple, metatibiae with setose tuft near apices (Fig. 8I). Abdomen broad at base and narrowed apically, AL 0.93, AW 1.06. Aedeagus length 0.45, with symmetric median lobe (Figs 3J–L).

Female. Unknown.

Comparative notes. *Labomimus simplicipalpus* is closely related to *L. fimbriatus* and *L. jizuensis* as discussed above. The new species can be separated from *L. jizuensis* by the symmetric aedeagal median lobe, from *L. fimbriatus* by the smaller size, and the asymmetric antennomeres IX–X. The simple maxillary palpi of the new species are very unusual for *Labomimus*, and due to this the generic limit of *Labomimus* has to be expanded.

Distribution. Southwest China: Sichuan.

Biology. The single adult was collected from sifted mixed leaf litter in a forest.

Etymology. The specific name refers to the simple maxillary palpi.

Labomimus tibialis (Yin & Li), comb. n.

http://species-id.net/wiki/Labomimus_tibialis

Pselaphodes tibialis Yin & Li, 2012: 110. Type locality: Diancangshan Mountain, Dali, Yunnan, Southwest China.

Type material examined (2 ♂♂)**.** Holotype: ♂, labeled 'CHINA: Yunnan [CH07-09], / Dali Bai Aut. Pref., Diancang Shan 45 / km NW Dali, 2730 m, 26°01'20''N, / 99°53'17''E, creek valley, pines, ferns, / sifted, 29.V.2007, M. Schülke' (pcMS). Paratype: 1 ♂, same label data as holotype (pcMS).

Comments. *Labomimus tibialis* is here transferred to *Labomimus* based on the presence of a median metaventral fovea. This species is placed in the same group as *Labomimus paratorus* Yin & Li, *Labomimus torus* (Yin, Li & Zhao), and *Labomimus venustus* (Yin & Li) based on the similar modifications of the male legs, and the strongly asymmetric aedeagal median lobe.

Labomimus venustus (Yin & Li), comb. n.

http://species-id.net/wiki/Labomimus_venustus

Pselaphodes venustus Yin & Li, 2012: 111. Type locality: Jizushan Mountain, Dali, Yunnan, Southwest China.

Type material examined (1 ♂, 1 ♀)**.** Holotype: ♂, labeled 'CHINA (Yunnan) Dali Bai Aut. Pref., Jizu Shan, summit plateau, / 37 km NE Dali 3150 m, (mixed / forest, sifted from litter, moss) / 25°58'30''N, 100°21'36''E / 5.IX.2009 DW Wrase [28]' (pcMS). Paratype: 1 ♀, same label data, except 'leg. M. Schülke [CH09-28]' (pcMS).

Comments. *Labomimus venustus* is here transferred to *Labomimus* based on the presence of a median metaventral fovea. This species is placed in the group with *Labomimus paratorus* Yin & Li, *Labomimus tibialis* (Yin & Li), and *Labomimus torus* (Yin, Li & Zhao) based on the similar modifications of the male legs, and the strongly asymmetric aedeagal median lobe.

Genus *Pselaphodes* Westwood

Pselaphodes Westwood, 1870: 129. Type species: *Pselaphodes villosus* Westwood, 1870

I. *Pselaphodes tianmuensis* species group

Included species. Nine species are placed in the *tianmuensis*-group (here proposed), seven are described here as new: *P. anhuianus* sp. n., *P. daii* sp. n., *P. hainanensis* sp. n., *P. kuankuoshuiensis* sp. n., *P. longilobus* sp. n., *P. tianmuensis* Yin, Li & Zhao, *P. tiantongensis* sp. n., *P. wrasei* sp. n., *P. yunnanicus* Hlaváč, Nomura & Zhou.

Diagnosis (based on male features)**.** Medium to large in size (usually greater than 3 mm); apical three antennomeres enlarged; antennomeres IX slightly modified, with a disc-shaped process at apices, X–XI simple; protrochanters and profemora spinose at ventral margins; mesotrochanters usually with multiple ventral spines, mesofemora simple; metatrochanters and metafemora always simple; aedeagus with asymmetric median lobe, apical portion usually bent leftwards.

Discussion. *Pselaphodes tianmuensis* Yin, Li & Zhao was recorded from a number of localities in China (Yin et al. 2010, 2011a). Putting aside the differences of aedeagal structure, populations from these localities present a relatively stable combination of male sexual characters; especially they share similar antennal modifications. Consequently, all of these were assigned to one, wide-spread species pending discovery of evidence leading to a different conclusion. Recently, when working on the material included in this paper, we found populations with two aedeagal forms that have a sympatric distribution (described as *P. anhuianus* and *P. longilobus* below). This geographical evidence proved not only the existence of two different species, but also the fact that other populations with different aedeagal forms cannot be treated as conspecific with *P. tianmuensis*. Hence we reevaluate the specific limit of *P. tianmuensis* and divide it into nine species.

Species identification of the group largely lies on the aedeagal from, the structure of the endophallus, the form of the metaventral processes, and the distribution. Further notes on these species, if any, will be provided in the 'Comparative notes' of the respective species.

Pselaphodes anhuianus Yin & Li, sp. n.

urn:lsid:zoobank.org:act:5B56F0E8-5E75-4AFD-B3A9-AA27055E010D
http://species-id.net/wiki/Pselaphodes_anhuianus
Figs 7B, 9

Type material (2 ♂♂, 1 ♀)**.** Holotype: ♂, labeled 'CHINA: Anhui, Qianshan County / Tianzhu Shan National Park / 30°43'56''N 116°27'11''E, 960 m / (mixed leaf litter, sifted) / 2006.iv.23, Hu & Tang leg.' (SNUC). Paratypes: 1 ♀, same label data

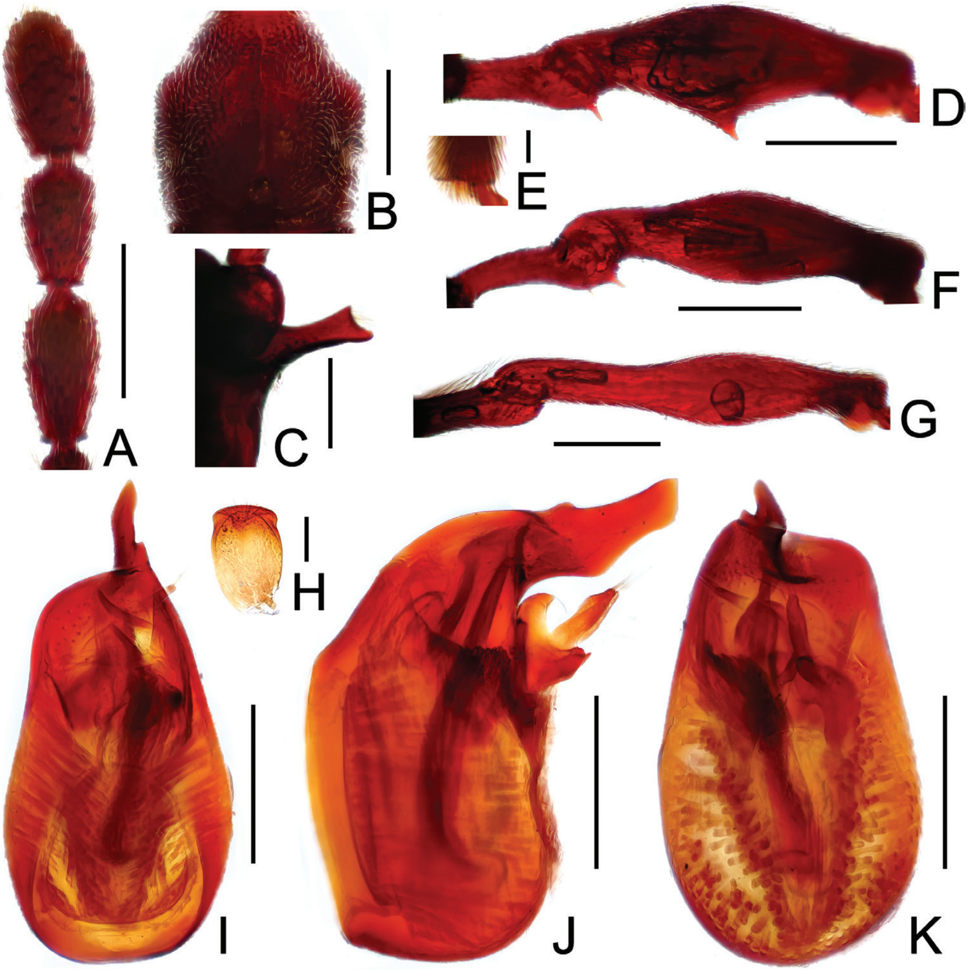

Figure 9. Diagnostic features of *Pselaphodes anhuianus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, C, D, F, G** = 0.3; **I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

as holotype (SNUC); 1 ♂, labeled 'P. R. CHINA, Hubei, Dabieshan, N31°06.013' E115°47.300' / 11–21.vi.2008, 640 m / sifting, V. Grebennikov (pcPH).

Diagnosis. Reddish brown; length 3.00–3.31; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at anterolateral margins; male with large metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 7B). Length 3.00–3.31. Head longer than wide, HL 0.66–0.72, HW 0.60–0.64; eyes each composed of about 50 facets. Antennal clubs as in Fig. 9A. Pronotum (Fig. 9B) slightly longer than wide, PL 0.65–0.72, PW 0.62–0.68, rounded at anterolateral margins. Elytra wider than long, EL 0.87–1.00, EW

1.25–1.34. Metaventral processes large, apically broadened (Fig. 9C). Protrochanters and profemora spinose ventrally (Fig. 9D), protibiae with tiny apical spur (Fig. 9E); mesotrochanters with small ventral spines, mesofemora simple (Fig. 9F); metatrochanters and metafemora simple (Fig. 9G). Abdomen broad at base and narrowed apically, AL 0.82–0.87, AW 1.20–1.31. Sternite IX as in Fig. 9H. Aedeagus length 0.60–0.66, with asymmetric median lobe (Figs 9I–K).

Female. Similar to male in general; BL 3.26, HL 0.72, HW 0.64, PL 0.71, PW 0.65, EL 0.87, EW 1.25, AL 0.96, AW 1.31. Eyes each composed of about 26 facets. Antennae simple; metaventral processes absent.

Comparative notes. This species can be separated from the other members of the group primarily by the large, apically concaved metaventral processes, the more robust aedeagus with short apical portion of the median lobe, the structure of aedeagal endophallus, and its distribution.

Distribution. East China: Anhui; Central China: Hubei.

Biology. Adults were collected by sifting mixed leaf litter in forests.

Etymology. The new species is named after the province where the type locality is located.

Notes. Slight differences in body size and structure of the aedeagal endophallus were observed between specimens from Tianzhushan Mountain and Dabieshan Mountain. Since both localities belong to the Dabieshan Mountain Range, and all specimens were collected at low altitude (below 1000 m), the differences are considered to be intraspecific variation.

Pselaphodes daii Yin & Hlaváč, sp. n.

urn:lsid:zoobank.org:act:BD741270-7F89-410B-A1A0-E4DD02E87669
http://species-id.net/wiki/Pselaphodes_daii
Figs 10A, 11

Type material (19 ♂♂, 10 ♀♀). Holotype: ♂, labeled ‘CHINA: Sichuan, Tianquan County / Er’lang Shan Mt., pass near summit / ca. 8 km SE Luding, 29°51'48''N / 102°17'32''E, 2800 m, (mixed leaf / litter, moss, sifted), 2012.vii.13 / C. C. Dai, Z. Peng & Z. W. Yin leg.’ (SNUC). Paratypes: 6 ♂♂, 5 ♀♀, same label data as holotype; 2 ♂♂, same label data, except ‘29°52'12''N, 102°17'03''E / 2700 m, 2012.vii.11’ (SNUC); 1 ♂, same label data, except ‘29°52’N, 102°18'E / 2900 m, 1999.VI.22 / leg. M. Schülke’ (pcMS); 2 ♂♂, labeled ‘P. R. CHINA, Sichuan, / NE slope Gongga Shan / N29°48'15'' E102°03' / 44'', 20.vi.2011, 2765 m / sift22. V. Grebennikov’ (pcPH, SNUC); 5 ♂♂, 2 ♀♀, same label data, except ‘N29°50'50'' E102°02' / 28'', 21.vi.2011, 3170 m / sift23’ (pcPH, SNUC); 1 ♂, 1 ♀ same label data, except ’18.VI.2011’ (pcPH, SNUC); 1 ♀, same label data, except ‘N29°49'29'' E102°03' / 24', 2986 m, sift 25'' (SNUC); 1 ♀, same label data, escept ‘N29°52'10''E102°02'01'' / 12.VI.2011, 3620 m, sift16’ (pcPH); 1 ♂, labeled ‘P. R. CHINA, Sichuan / E slope Gongga Shan / N29°34'31''E102°00' / 31'', 23.vi.2011, 2832 m / sift26, V. Grebennikov’ (pcPH).

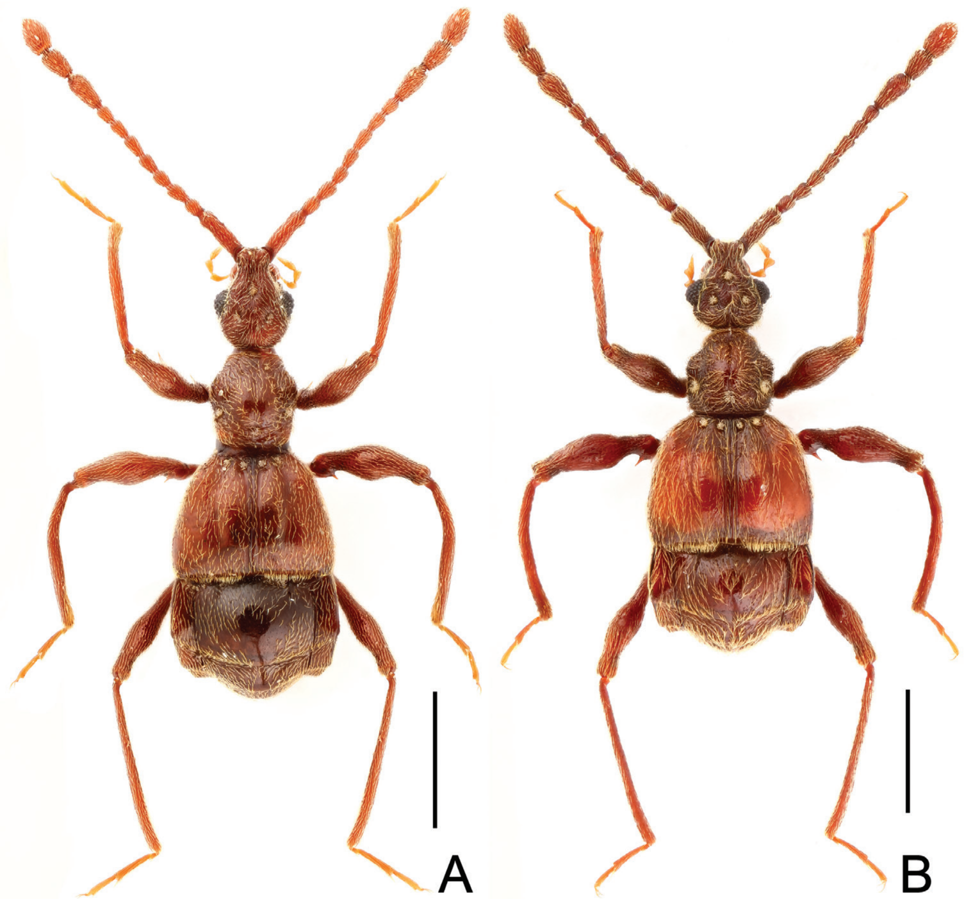

Figure 10. Male habitus of *Pselaphodes daii* (**A**) and *Pselaphodes hainanensis* (**B**). Scales: 1.0 mm.

Other material examined. 1 ♂, labeled 'CHINA: Sichuan, Luding County / Hailuogou N. R., 28°35'47''N / 102°03'05''E, 2200–2300 m / (mixed leaf litter, sifted) / 2006.vii.27, Hu & Tang leg.' (SNUC).

Diagnosis. Reddish brown; length 3.50–4.43; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at anterolateral margins; male with long, sharp metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 10A). Length 3.50–3.76. Head longer than wide, HL 0.78–0.81, HW 0.62–0.65; eyes each composed of about 30 facets. Antennal clubs as in Fig. 11A. Pronotum (Fig. 11B) slightly longer than wide, PL 0.74–0.78, PW 0.66–0.69, rounded at anterolateral margins. Elytra wider than long, EL 0.86–0.92, EW 1.33–1.34. Metaventral processes long, apically narrowed (Fig. 11C). Protrochanters and profemora spinose ventrally (Fig. 11D), protibiae with tiny apical spur (Fig. 11E); mesotrochanters with small ventral spines, mesofemora simple (Fig. 11F); metatro-

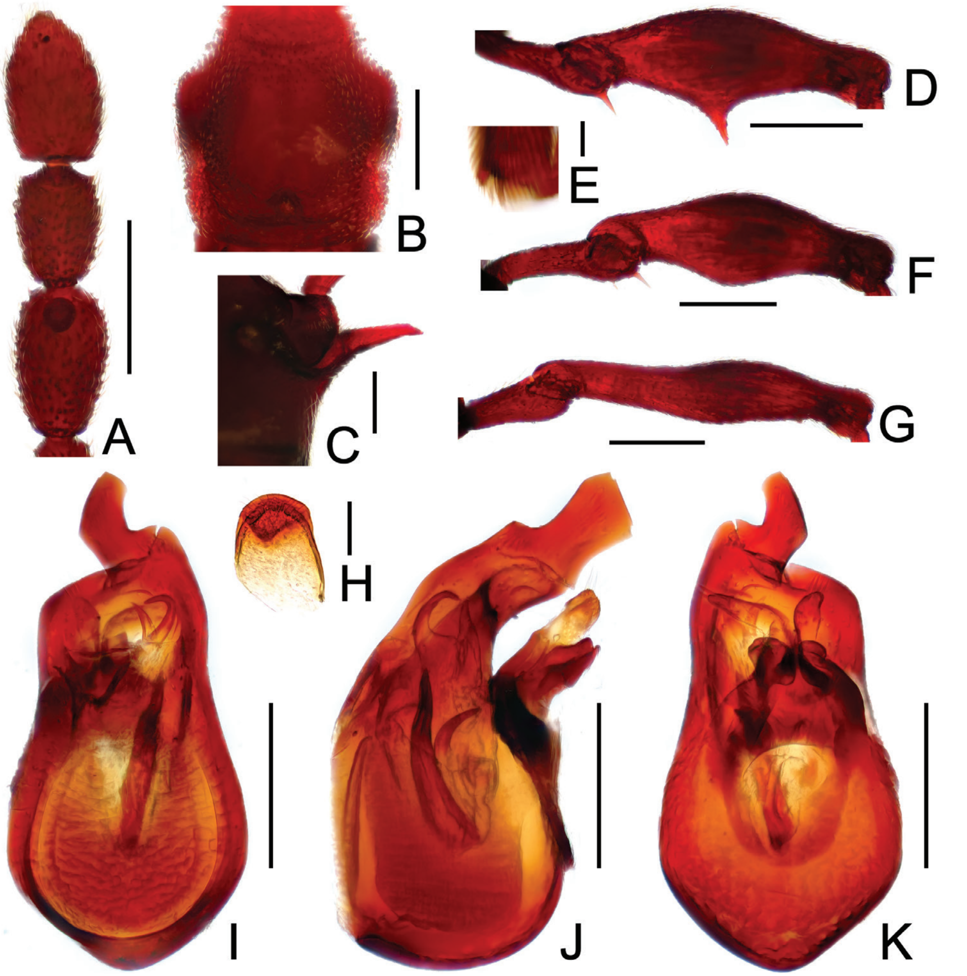

Figure 11. Diagnostic features of *Pselaphodes daii* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

chanters and metafemora simple (Fig. 11G). Abdomen broad at base and narrowed apically, AL 1.12–1.25, AW 1.40–1.46. Sternite IX as in Fig. 11H. Aedeagus length 0.61, with asymmetric median lobe (Figs 11I–K).

Female. Similar to male in general; BL 3.69–4.43, HL 0.77–0.84, HW 0.63–0.65, PL 0.76–0.81, PW 0.69–0.73, EL 0.88–0.89, EW 1.34–1.41, AL 1.28–1.89, AW 1.42–1.50. Eyes each composed of about 25 facets. Antennae unmodified; metaventral processes absent.

Comparative notes. The new species can be separated from the other members of the group primarily by the long, sharp metaventral processes, the aedeagus with a short, apically truncate median lobe, the structure of aedeagal endophallus, and its distribution.

Distribution. Southwest China: Sichuan.

Biology. Adults were sifted from moss and mixed leaf litter in forests.

Etymology. The new species is named after Cong-Chao Dai, co-collector of the type series.

Comments. The single male from Hailuogou has the aedeagal endophallus being slightly different to the males from Er'langshan Mountain. Though this difference is currently considered to be intraspecific variation, we choose a conservative approach here and exclude this specimen from the type series.

Pselaphodes hainanensis **Yin & Li, sp. n.**
urn:lsid:zoobank.org:act:5815C2CE-AB0E-4C4C-B101-8DA5B653D4A6
http://species-id.net/wiki/Pselaphodes_hainanensis
Figs 10B, 12

Type material (24 ♂♂, 8 ♀♀)**.** Holotype: ♂, labeled 'CHINA, Hainan, Baisha County / Yuanmeng, near Yinggezui Station / N19°03'10'' E 109°33'55, 660 m / (mixed leaf litter, sifted) / 2011.iv.26, Wen-Xuan Bi leg.' (SNUC). Paratypes: 7 ♂♂, same label data as holotype; 4 ♂♂, 1 ♀, labeled 'China: Hainan Prov. / Wuzhishan Mt. / Guanshandian / 20.iv.2012, 500–700 m / Yin et al. leg.'; 1 ♂, same label data, except '18.iv.2012, 650–700 m, Peng et al. leg.'; 1 ♂, 1 ♀, labeled 'China: Hainan Prov. / Lingshui County / Diaoluoshan Mt. / 21.iv.2010 / alt. 1000 m / Yin Z. W. leg.'; 2 ♂♂, same label data, except 'Light trap / 18.72510°N, 109.86861°E / 920 m, 2007.iii.25 / Shi H. L., Yuan F. coll.'; 1 ♂, 2 ♀♀, same label data, except '26.iv.2012, 600–1000 m / Zi-Wei Yin leg.'; 3 ♂♂, same label data, except 'Dai & Peng leg.'; 2 ♂♂, 3 ♀♀, labeled 'China: Hainan Prov. / Ledong County / Jianfengling N. R. / alt. 1000 m, 15.IV.2012 / Ting Feng leg.'; 1 ♀, same label data, except '16.IV.2012, 900 m / Yuan & Yin leg.'; 1 ♂, same label data, except '2.V.2012, Pan & Yin leg.'; 1 ♂, labeled 'China: Hainan Prov. / Qiongzhong County / Limu Shan Mt. / Qijiacun, 650 m / 2010.IV.6 (light trap) // 19.17310°N, 109.71968°E / Mei-Yin Lin leg. [data in Chinese]' (all SNUC).

Diagnosis. Reddish brown; length 3.14–3.43; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at anterolateral margins; male with broad metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 10B). Length 3.14–3.33. Head longer than wide, HL 0.69–0.72, HW 0.63–0.65; eyes each composed of about 40 facets. Antennal clubs as in Fig. 12A. Pronotum (Fig. 12B) slightly longer than wide, PL 0.65–0.68, PW 0.63–0.65, rounded at anterolateral margins. Elytra wider than long, EL 0.95–1.00, EW 1.28–1.32. Metaventral processes broad, apically narrowed (Fig. 12C). Protrochanters and profemora spinose ventrally (Fig. 12D), protibiae with tiny apical spur (Fig. 12E); mesotrochanters with two ventral spines, mesofemora simple (Fig. 12F); metatrochanters and metafemora simple (Fig. 12G). Abdomen broad at base and nar-

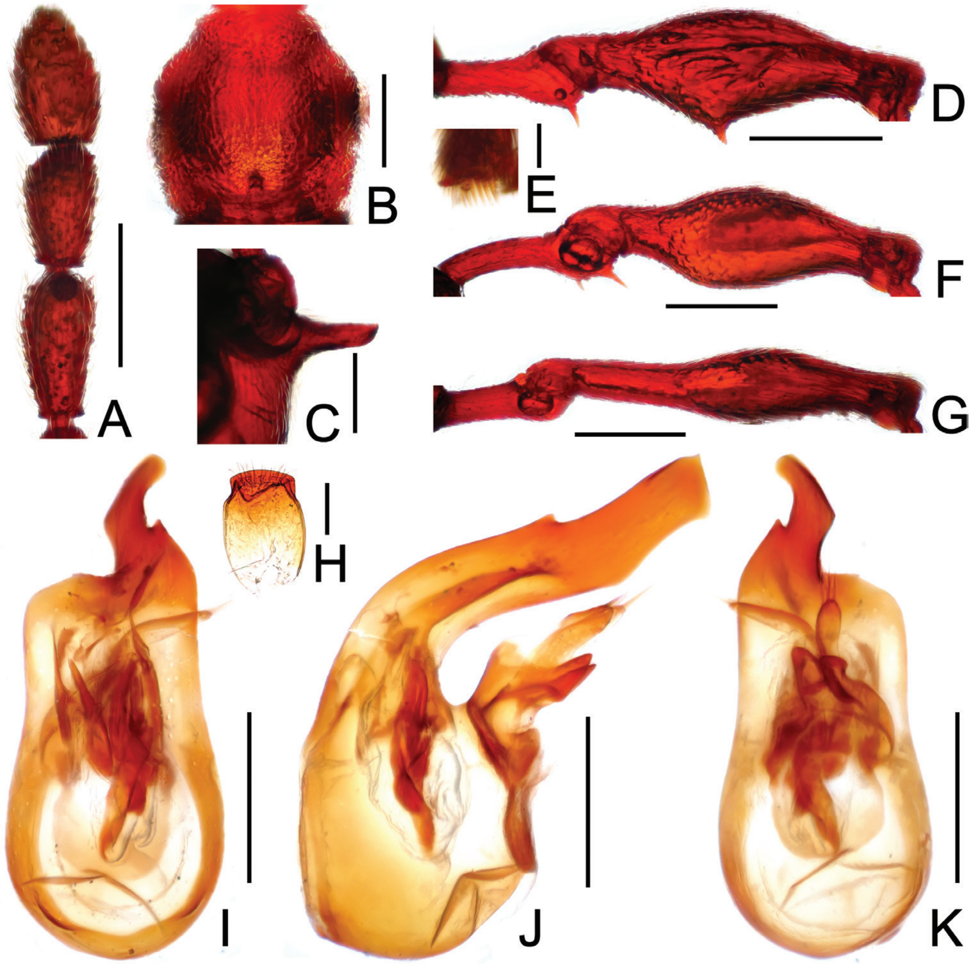

Figure 12. Diagnostic features of *Pselaphodes hainanensis* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

rowed apically, AL 0.85–0.93, AW 1.26–1.31. Sternite IX as in Fig. 12H. Aedeagus length 0.61, with asymmetric median lobe (Figs 12I–K).

Female. Similar to male in general; BL 3.28–3.43, HL 0.75–0.80, HW 0.62–0.69, PL 0.71–0.72, PW 0.67–0.68, EL 0.87–0.93, EW 1.28–1.35, AL 0.95–0.98, AW 1.35–1.46. Eyes each composed of about 30 facets. Antennae unmodified; metaventral processes absent.

Comparative notes. This new species can be separated from the other members of the group primarily by the short, thick metaventral processes, the rather elongate and apically truncate median lobe of the aedeagus, the structure of the aedeagal endophallus, and its distribution.

Distribution. South China: Hainan.

Biology. Adults are commonly found in leaf litter of mixed forests.

Etymology. The new species is named after the Province where the type locality lies.

Pselaphodes kuankuoshuiensis Yin & Li, sp. n.

urn:lsid:zoobank.org:act:0D35EE60-F1BC-4E61-9593-5EC12A8BB625
http://species-id.net/wiki/Pselaphodes_kuankuoshuiensis
Figs 13A, 14

Type material (2 ♂♂, 3 ♀♀)**.** Holotype: ♂, labeled 'China: Guizhou Prov. / Suiyang County / Kuankuoshui N. R. / Baishaogou, 750–900 m / 2010.VI.05, Yin & Zhai leg.' (SNUC) Paratypes: 1 ♂, 2 ♀♀, same label data as holotype (SNUC); 1 ♀, same label data, except '2010.VI.03, Lu, Yin & Zhai leg.' (SNUC).

Diagnosis. Reddish brown; length 2.99–3.27; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at

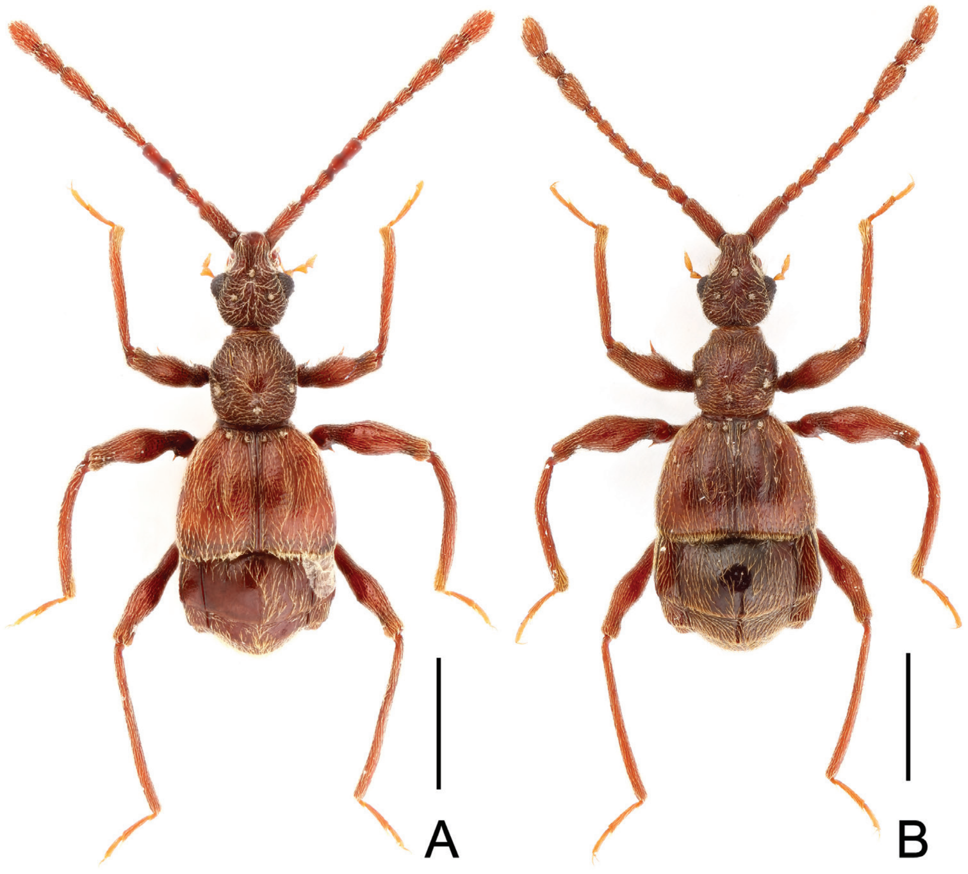

Figure 13. Male habitus of *Pselaphodes kuankuoshuiensis* (**A**) and *Pselaphodes longilobus* (**B**). Scales: 1.0 mm.

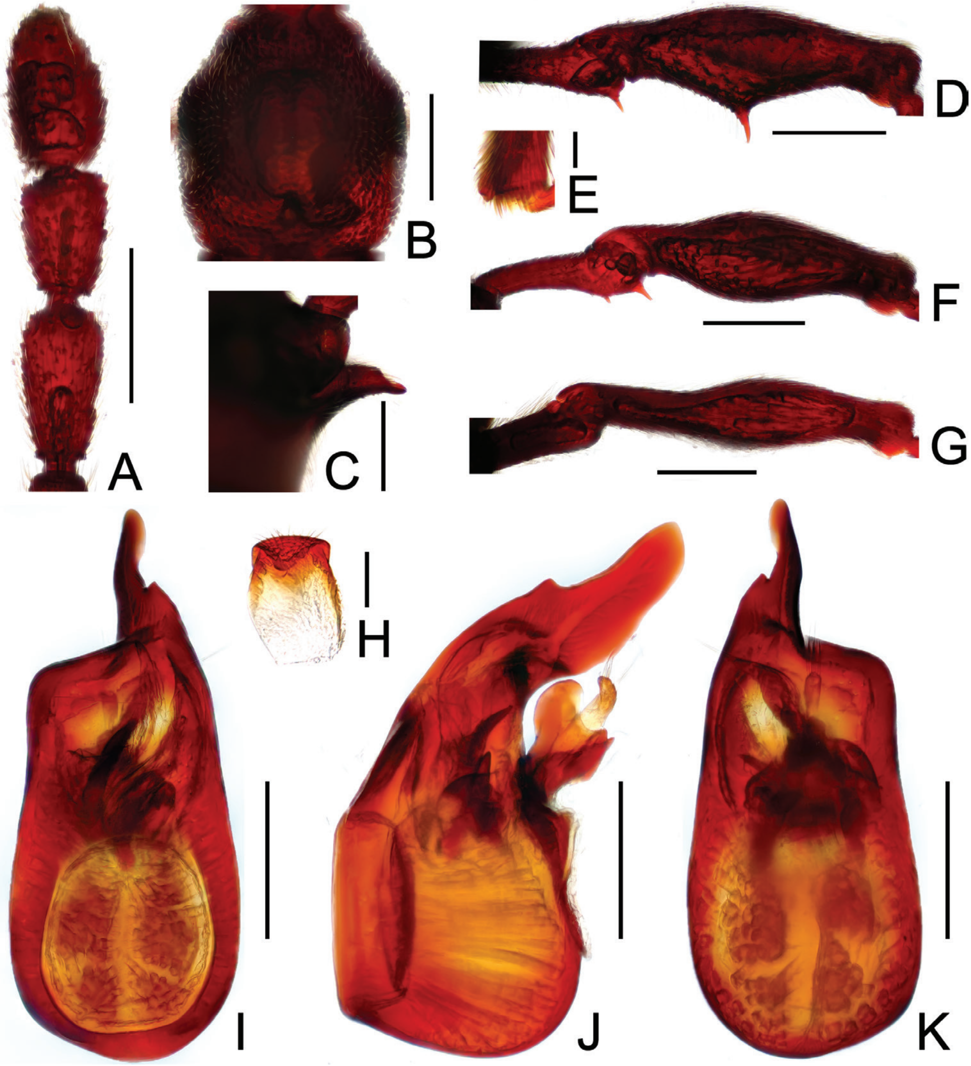

Figure 14. Diagnostic features of *Pselaphodes kuankuoshuiensis* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

anterolateral margins; male with short metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 13A). Length 2.99–3.12. Head longer than wide, HL 0.71–0.72, HW 0.64–0.65; eyes each composed of about 40 facets. Antennal clubs as in Fig. 14A. Pronotum (Fig. 14B) slightly longer than wide, PL 0.68–0.71, PW 0.63–0.65, rounded at anterolateral margins. Elytra wider than long, EL 0.90–0.92, EW 1.23–1.25. Metaventral processes short, apically narrowed (Fig. 14C). Protrochanters and profemora spinose ventrally (Fig. 14D), protibiae with small apical projection (Fig. 14E); mesotrochanters with two ventral spines, mesofemora simple (Fig. 14F); metatrochanters and metafemora simple (Fig. 14G). Abdomen broad at base and narrowed apically, AL 0.70–0.77, AW 1.20–1.22. Sternite IX as in Fig. 14H. Aedeagus length 0.61, with asymmetric median lobe (Figs 14I–K).

Female. Similar to male in general; BL 3.11–3.27, HL 0.71–0.73, HW 0.64–0.66, PL 0.70–0.71, PW 0.68–0.69, EL 0.90–0.95, EW 1.28–1.32, AL 0.80–0.88, AW 1.32–1.37. Eyes each composed of about 25 facets. Antennae unmodified; metaventral processes absent.

Comparative notes. This species can be separated from the other members of the group by the short, apically narrowed metaventral processes, the apically rounded median lobe of the aedeagus, the structure of the aedeagal endophallus, and its distribution.

Distribution. Southwest China: Guizhou.

Biology. Adults were sifted from leaf litter along a road in a forest.

Etymology. The new species is named after the type locality, Kuankuoshui Natural Reserve.

Pselaphodes longilobus **Yin & Hlaváč, sp. n.**

urn:lsid:zoobank.org:act:E0C29199-4328-468A-BE80-E4A231663A11
http://species-id.net/wiki/Pselaphodes_longilobus
Figs 13B, 15

Type material (4 ♂♂, 5 ♀♀)**.** Holotype: ♂, labeled 'P. R. CHINA, Yunnan / Jizushan, N25°58'39'' / E100°21'14 / 28.VI.2011, 3216 m / sift27, V. Grebennikov' (pcPH); Paratypes: 1 ♂, 4 ♀♀, same label data as holotype, except 'N25°58'18'' / E 100°21'33 / 30.VI.2011, 2875 m / sift30' (pcPH, SNUC); 2 ♂♂, 1 ♀, labeled 'P. R. China, Hubei / Dabieshan, N31°06.013' / E 115°47.300' / 11–21.VI.2008, 640 m / sifting, V. Grebennikov' (pcPH, SNUC).

Diagnosis. Reddish brown; length 3.31–3.37; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at anterolateral margins; male with long metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 13B). Length 3.31–3.37. Head longer than wide, HL 0.71–0.73, HW 0.63–0.64; eyes each composed of about 25 facets. Antennal clubs as in Fig. 15A. Pronotum (Fig. 15B) slightly longer than wide, PL 0.69–0.71, PW 0.61–0.66, rounded at anterolateral margins. Elytra wider than long, EL 0.87–0.88, EW 1.23–1.29. Metaventral processes broad and long, apically narrowed (Fig. 15C). Protrochanters and profemora spinose ventrally (Fig. 15D), protibiae with tiny apical projection (Fig. 15E); mesotrochanters with two ventral spines, mesofemora simple (Fig. 15F); metatrochanters and metafemora simple (Fig. 15G). Abdomen broad at base and narrowed apically, AL 1.04–1.05, AW 1.28–1.30. Sternite IX as in Fig. 15H. Aedeagus length 0.70, with asymmetric median lobe (Figs 15I–K).

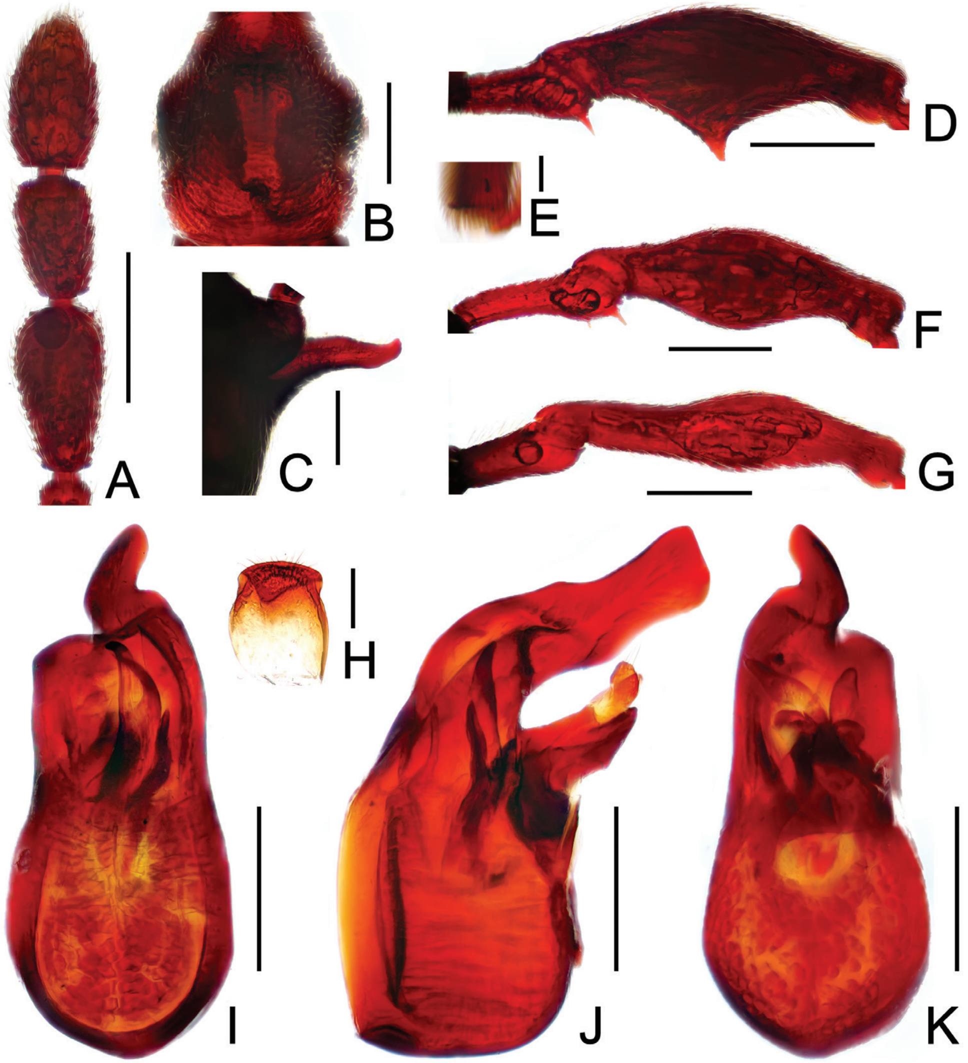

Figure 15. Diagnostic features of *Pselaphodes longilobus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Female. Similar to male in general; BL 3.36, HL 0.74, HW 0.61, PL 0.70, PW 0.65, EL 0.85, EW 1.29, AL 1.07, AW 1.38. Eyes each composed of about 20 facets. Antennae unmodified; metaventral processes absent.

Comparative notes. This new species can be separated from the other species of the group by the metaventral processes being curved from the mid-length and then narrowed apically, the aedeagus with an elongate and apically truncate median lobe, the structure of the aedeagal endophallus, and its distribution.

Distribution. Southwest China: Yunnan; Central China: Hubei.

Biology. Individuals were sifted from leaf litter in forests.

Etymology. The specific name refers to the long aedeagal median lobe of the new species.

Pselaphodes tianmuensis Yin, Li & Zhao

http://species-id.net/wiki/Pselaphodes_tianmuensis

Figs 16A, 17

Pselaphodes tianmuensis Yin, Li & Zhao, 2010: 22. Type locality: Tianmushan Mountain, Zhejiang, East China.

= *Pselaphodes wuyinus* Yin, Li & Zhao, 2010: 23. Type locality: Wuyishan Mountain, Fujian, East China.

Type material examined. [*P. tianmuensis*] Holotype: ♂, labeled 'CHINA: Zhejiang Prov. / West Tianmushan Mt. / 17.v.2006, alt. 300 m / HU & TANG leg.' (SNUC). [*P. wuyinus*] Holotype: ♂, labeled 'CHINA: Fujian Prov. / Wuyishan Mt. / Tongmu Villege / 28.vii.2008, alt. 800 m / QI & YIN leg.'(SNUC).

Additional material examined. 1 ♂, 8 ♀♀, labeled 'CHINA: Anhui Prov. / Guniujiang N. R. / 29.iv.2005, alt. 320–380 m / HU & TANG leg.'; 1 ♂, 3 ♀♀, labeled 'CHINA: Guangxi Prov. / Jinxiu County / Laoshan, 7 km / 21.vii.2011, 1200–1400 m / J. Y. Hu & Z. W. Yin leg.' (all SNUC).

Diagnosis and description. Yin, Li and Zhao, 2010 (P22, figs 7, 19, 37, 38, 64, 65, 96, 114, 115, 133, 144, 162, 163, 181); Figs 16A, 17.

Distribution. East China: Zhejiang, Anhui, Fujian, Jiagnxi; South China: Guangxi (**new provincial record**).

Comparative notes. The *Pselaphodes tianmuensis* group is based on this species. *Pselaphodes tianmuensis* can be separated from the other members of the group by the short, apically narrowed metaventral processes combined with the apically rounded median lobe of the aedeagus, the structure of the aedeagal endophallus, and its distribution.

Notes. The structure of aedeagal endophallus varies slightly among the populations from the listed localities. At this time we are not able to separate these populations at the species level.

Pselaphodes tiantongensis Yin & Li, sp. n.

urn:lsid:zoobank.org:act:ADE67E9B-9B6A-4BCD-ADC3-98DDAC2C4EB3

http://species-id.net/wiki/Pselaphodes_tiantongensis

Figs 16B, 18

Type material (5 ♂♂, 2 ♀♀)**.** Holotype: ♂, labeled 'CHINA: Zhejiang, Ningbo City / Yinzhou District, Tiantong Shan / 29°48'03''N, 121°46'56E, 600 m / (mixed leaf

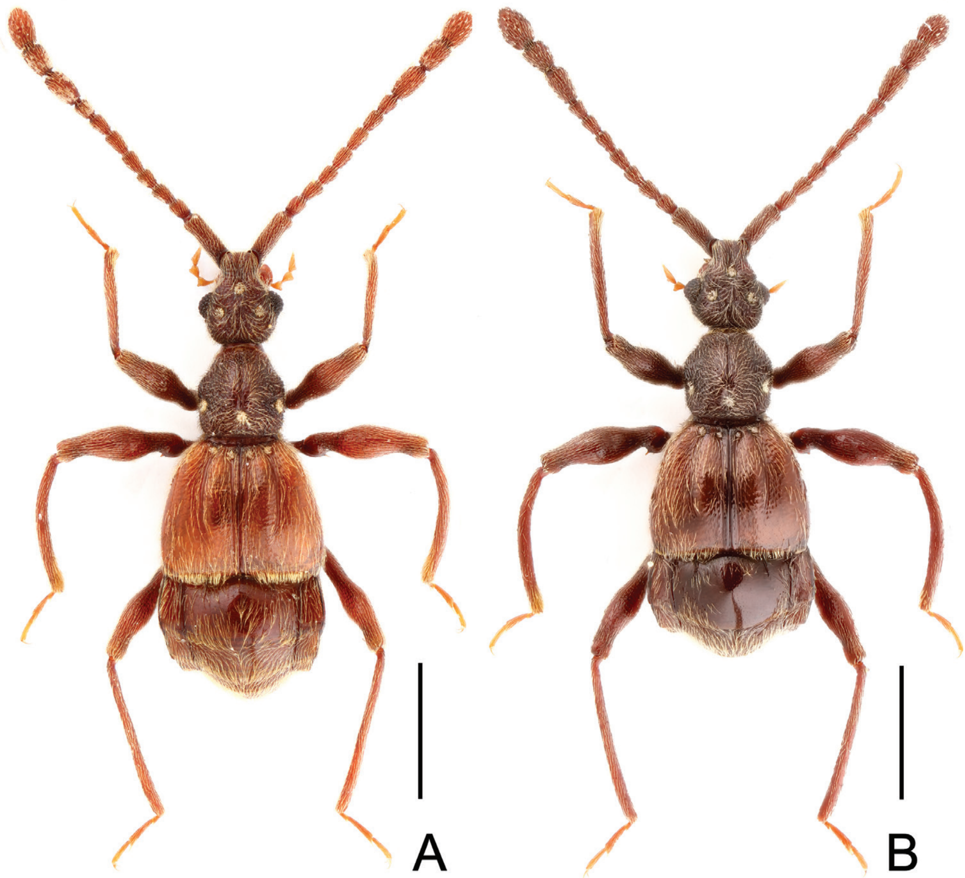

Figure 16. Male habitus of *Pselaphodes tianmuensis* (**A**) and *Pselaphodes tiantongensis* (**B**). Scales: 1.0 mm.

litter, sifted) / 2009.iv.26, Ting Feng leg.' (SNUC). Paratypes: 4 ♂♂, 2 ♀♀, same label data as holotype (SNUC).

Diagnosis. Reddish brown; length 3.28–3.45; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at anterolateral margins; male with short metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 16B). Length 3.34–3.45. Head longer than wide, HL 0.75–0.77, HW 0.67–0.68; eyes each composed of about 35 facets. Antennal clubs as in Fig. 18A. Pronotum (Fig. 18B) slightly longer than wide, PL 0.71–0.72, PW 0.66–0.69, rounded at anterolateral margins. Elytra wider than long, EL 1.00–1.01, EW 1.29–1.34. Metaventral processes short, apically narrowed and curved posteriorly (Fig. 18C). Protrochanters and profemora spinose ventrally (Fig. 18D), protibiae with indistinct apical projection (Fig. 18E); mesotrochanters with multiple ventral spines, mesofemora simple (Fig. 18F); metatrochanters and metafemora simple (Fig. 18G).

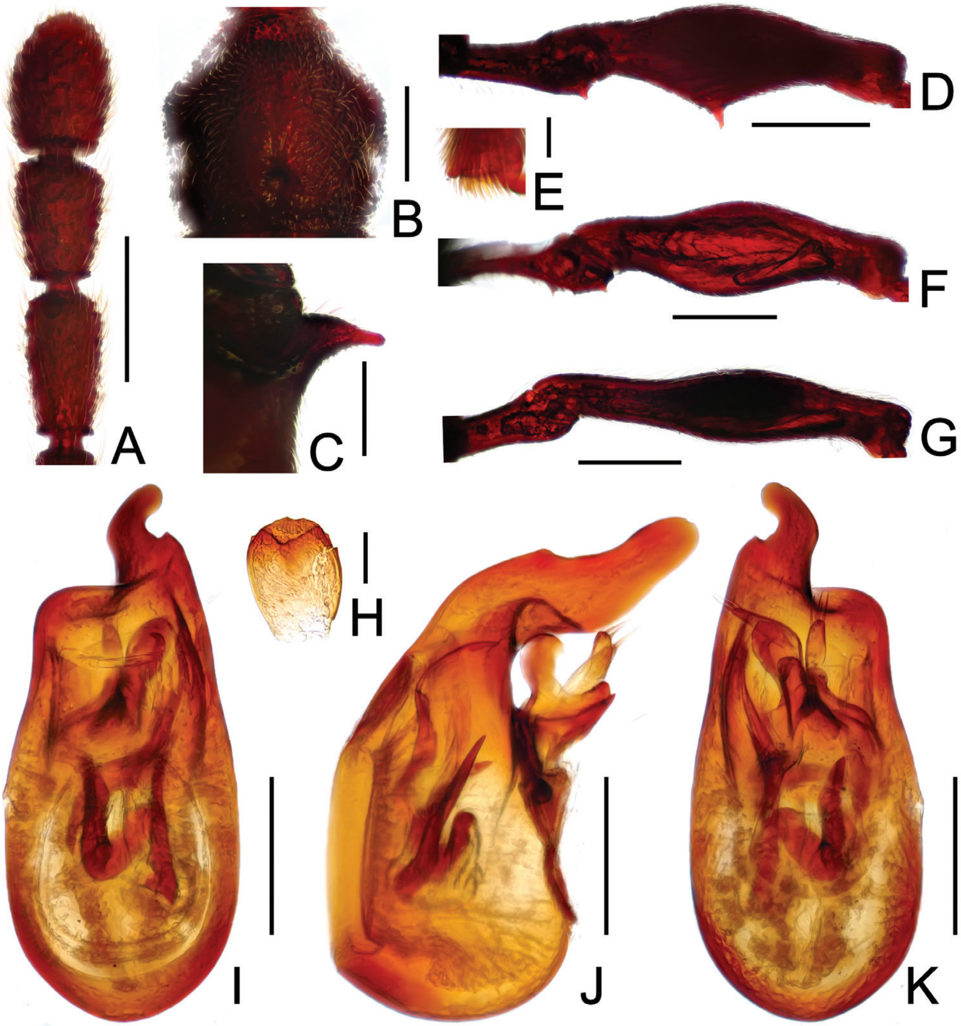

Figure 17. Diagnostic features of *Pselaphodes tianmuensis* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Abdomen broad at base and narrowed apically, AL 0.88–0.95, AW 1.29–1.31. Sternite IX as in Fig. 18H. Aedeagus length 0.78, with asymmetric median lobe (Figs 18I–K).

Female. Similar to male in general; BL 3.28–3.37, HL 0.76–0.77, HW 0.63–0.66, PL 0.69–0.71, PW 0.69–0.70, EL 0.93–0.95, EW 1.29–1.35, AL 0.90–0.94, AW 1.34–1.40. Eyes each composed of about 30 facets. Antennae unmodified; metaventral processes absent.

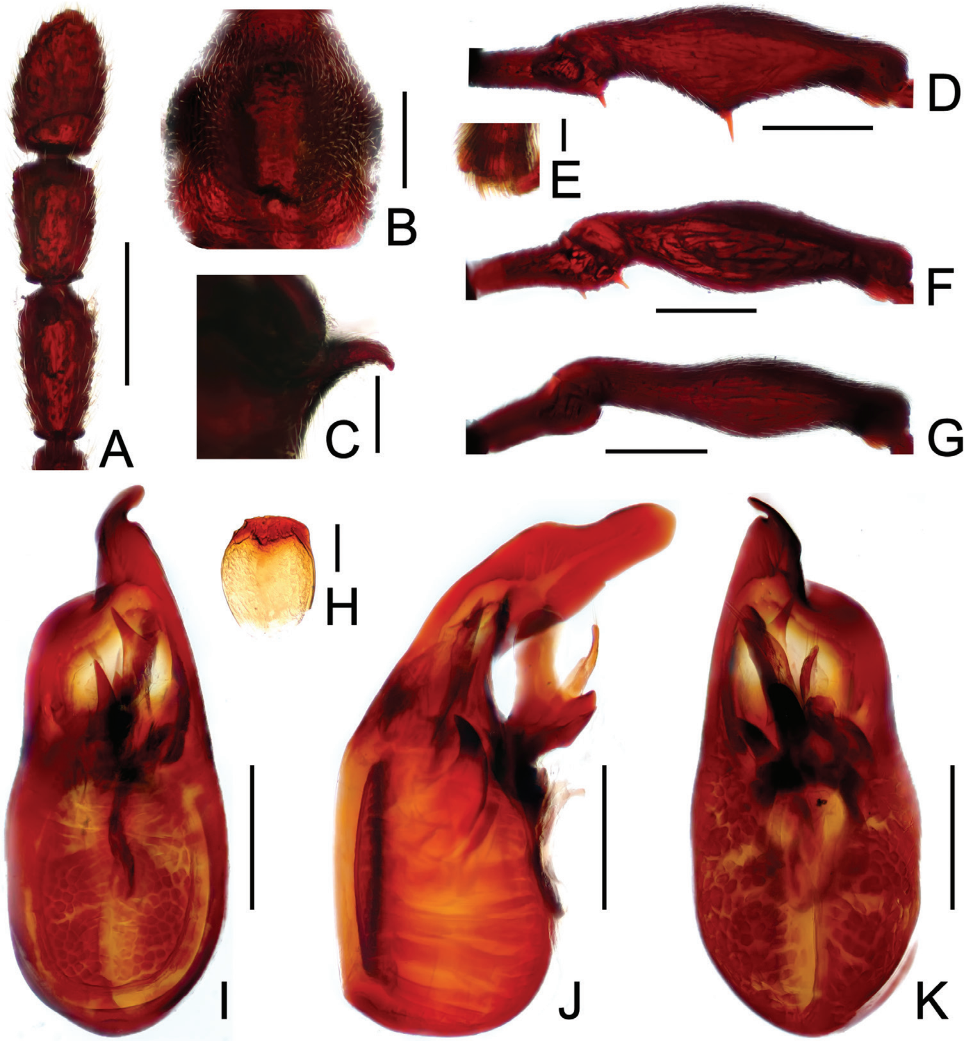

Figure 18. Diagnostic features of *Pselaphodes tiantongensis* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Comparative notes. This new species can be separated from the other species of the group by the short, apically curved and narrowed metaventral processes, the aedeagus with the median lobe being roundly broadened near apex, the structure of the aedeagal endophallus, and its distribution.

Distribution. East China: Zhejiang.

Biology. Individuals were sifted from mixed leaf litter of a forest.

Etymology. The new species is named after the type locality, Tiantongshan National Forest Park.

***Pselaphodes wrasei* Yin & Li, sp. n.**
urn:lsid:zoobank.org:act:9C525AD1-4FCA-43A6-A70A-2A5A7D5655E0
http://species-id.net/wiki/Pselaphodes_wrasei
Figs 19A, 20

Type material (1 ♂, 5 ♀♀)**.** Holotype: ♂, labeled 'CHINA (N-Yunnan) Zhongdian Co. / 36 km ESE Zhongdian, 3500–3550 m / 27°40'09''N 100°01'05E (over grown / rock hillside with old mixed forest, / bamboo, dead wood, leaf litter) / 23–24. VIII.2003 Wrase [13]' (pcMS); 4 ♀♀, same label data as holotype (pcMS); 1 ♀, same label data, except '24.VIII.2003, M. Schülke' (pcMS).

Diagnosis. Reddish brown; length 3.27–3.32; postgenae rounded laterally; antennomeres IX–XI enlarged; antennomeres IX modified in male; pronotum rounded at anterolateral margins; male with long metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 19A). Length 3.32. Head longer than wide, HL 0.75, HW 0.68; eyes each composed of about 45 facets. Antennal clubs as in Fig. 20A. Pronotum (Fig. 20B) slightly longer than wide, PL 0.72, PW 0.69, rounded at anterolat-

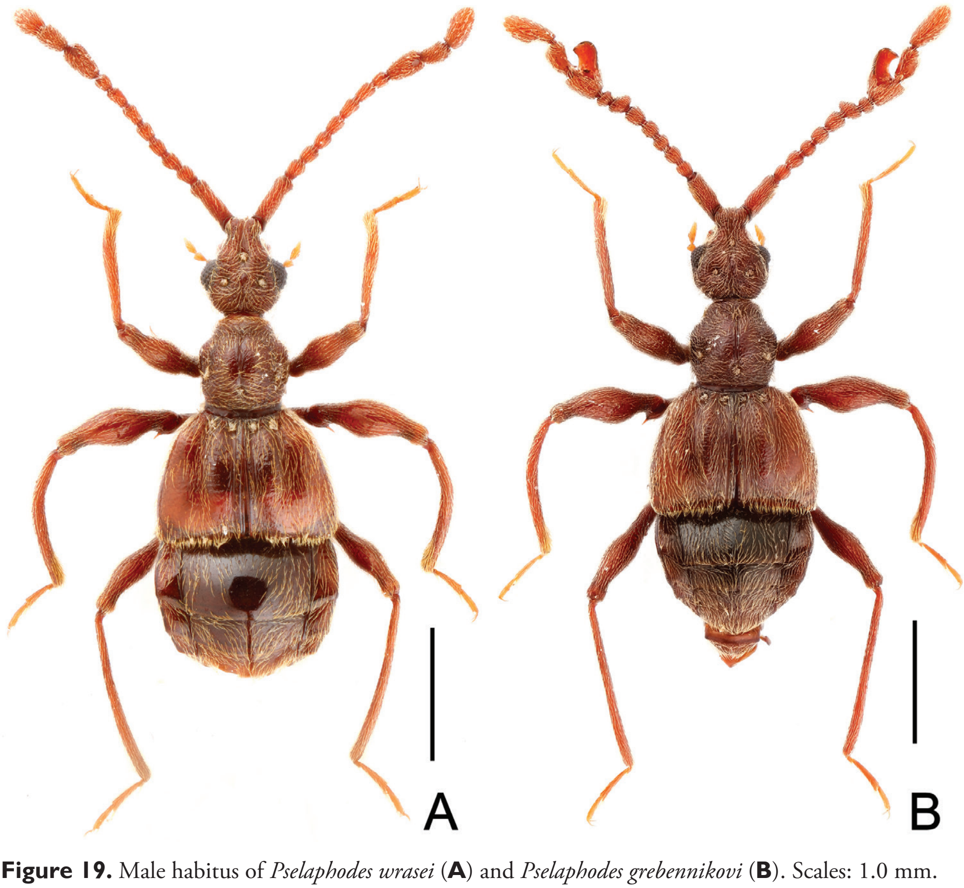

Figure 19. Male habitus of *Pselaphodes wrasei* (**A**) and *Pselaphodes grebennikovi* (**B**). Scales: 1.0 mm.

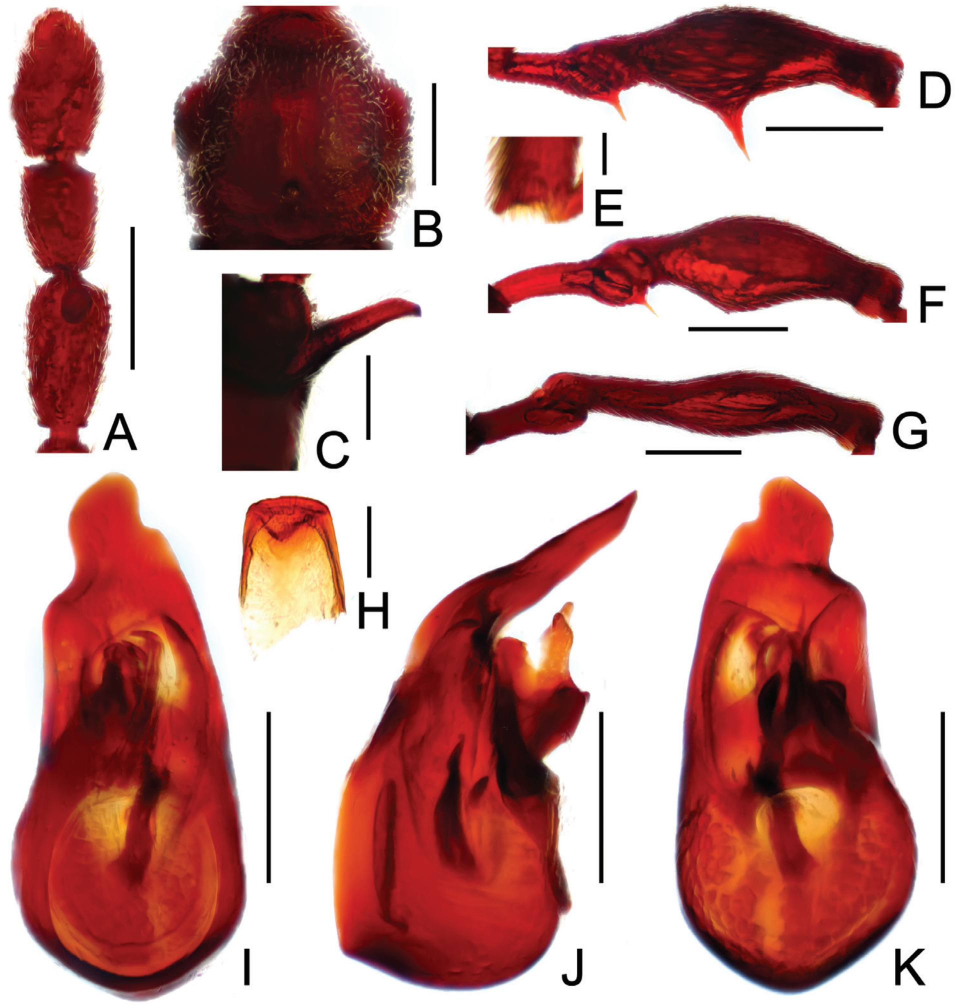

Figure 20. Diagnostic features of *Pselaphodes wrasei* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

eral margins. Elytra wider than long, EL 0.89, EW 1.34. Metaventral processes long, apically narrowed (Fig. 20C). Protrochanters and profemora spinose ventrally (Fig. 20D), protibiae with small apical projection (Fig. 20E); mesotrochanters with single ventral spine, mesofemora simple (Fig. 20F); metatrochanters and metafemora simple (Fig. 20G). Abdomen broad at base and narrowed apically, AL 0.96, AW 1.41. Sternite IX as in Fig. 20H. Aedeagus length 0.62, with asymmetric median lobe (Figs 20I–K).

Female. Similar to male in general; BL 3.27–3.32, HL 0.73–0.74, HW 0.62–0.63, PL 0.68–0.70, PW 0.65–0.66, EL 0.81–0.82, EW 1.29–1.31, AL 1.05–1.06, AW 1.45–1.46. Eyes each composed of about 25 facets. Antennae unmodified; metaventral processes absent.

Comparative notes. This species can be separated from the other species of the group by the thin, elongate metaventral processes, the thin median lobe of the aedeagus, the structure of the aedeagal endophallus, and its distribution.

Distribution. Southwest China: Yunnan.

Biology. Adults were collected by sifting leaf litter and moss in mixed forests.

Etymology. The new species is named after David W. Wrase, collector of the holotype and most paratypes.

II. Other *Pselaphodes* species

Pselaphodes aculeus Yin, Li & Zhao

http://species-id.net/wiki/Pselaphodes_aculeus

Pselaphodes aculeus Yin, Li & Zhao, 2010: 8. Type locality: Nabanhe Natural Reserve, Jinghong, Yunnan, Southwest China.

Additional material examined (2 ♂♂, 4 ♀♀)**.** 1 ♂, 3 ♀♀, labeled 'CHINA: FUJIAN Prov. / Wuyi Shan Nat. Res. / Sangan env. (900 m) / 3..V.-12.VI.2001 / Hlaváč & Cooter lgt.' (pcPH); 1 ♂, labeled 'Baigecunbian [near Baihe Village] / 400 m alt., Napo / Guangxi, CHINA / 8.iv.1998 / Hai-Sheng Zhou leg.' (pcPH)

Diagnosis and description. Yin, Li and Zhao, 2010 (P 8; figs 11, 23, 49–51, 68–70, 84, 85, 100, 122, 123, 136, 148, 170, 171, 177); Yin, Li and Zhao, 2011a (P 476; figs 111–116).

Distribution. East China: Anhui, Fujian (**new provincial record**); Southwest China: Yunnan; South China: Guangxi (**new provincial record**), Hainan.

Comments. The male pro- and metatibiae of this species are uniquely modified. Populations from different localities have the aedeagus differing in the apices of median lobe and endophallus. Since the male external features are quite stable, all populations are treated as one, wide-spread species.

Pselaphodes grebennikovi Yin & Hlaváč, sp. n.

urn:lsid:zoobank.org:act:C7FCE72A-D98C-49E7-B941-5FDFC1DED19E
http://species-id.net/wiki/Pselaphodes_grebennikovi
Figs 19B, 21

Type material (2 ♂♂, 5 ♀♀)**.** Holotype: ♂, labeled 'CHINA, Yunnan, / Cang Shan at Dali / N25°41'07'', E 100°06'58 / 2.VII.2011, 2714 m / sift33. V. Grebennikov' (pcPH). Paratypes: 1 ♂, 5 ♀♀, same label data as holotype (pcPH, SNUC).

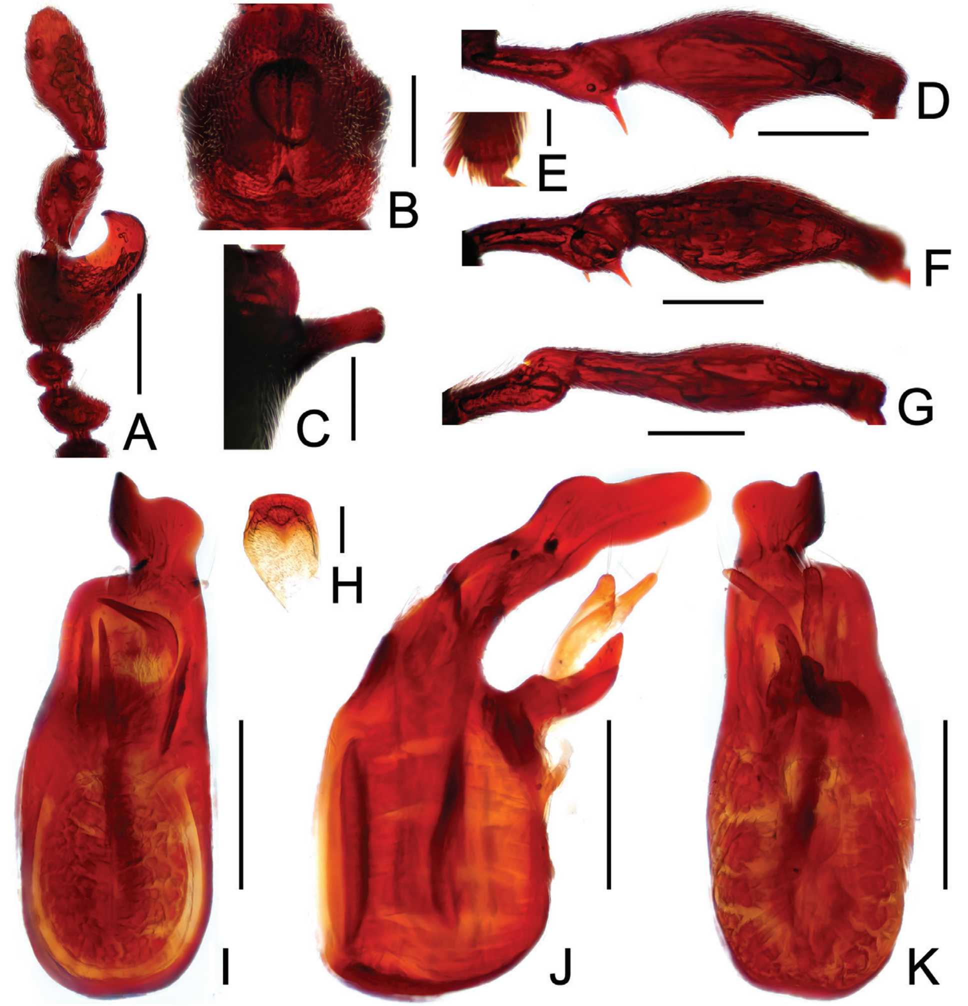

Figure 21. Diagnostic features of *Pselaphodes grebennikovi* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Diagnosis. Reddish brown; length 3.21–3.55; postgenae rounded laterally; antennomeres IX–XI enlarged; VII and IX–XI modified in male; pronotum rounded at anterolateral margins; male with long, broad metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

Description. Male (Fig. 19B). Length 3.37–3.55. Head longer than wide, HL 0.76–0.80, HW 0.66–0.69; eyes each composed of about 40 facets. Antennal clubs as in Fig. 21A. Pronotum (Fig. 21B) about as long as wide, PL 0.71–0.75, PW 0.71–0.73, rounded at anterolateral margins. Elytra wider than long, EL 0.90–0.93, EW 1.32–1.37. Metaventral processes long, and broad (Fig. 21C). Protrochanters and profemora spinose at ventral margins (Fig. 21D), protibiae with distinct blunt apical spur (Fig. 21E); mesotrochanters with small ventral spines, mesofemora simple (Fig. 21F); metatrochanters and metafemora simple (Fig. 21G). Abdomen broad at base and narrowed apically, AL 1.00–1.07, AW 1.29–1.38. Sternite IX as in Fig. 21H. Aedeagus length 0.57, with asymmetric median lobe (Figs 21I–K).

Female. Similar to male in general; BL 3.21–3.31, HL 0.74–0.75, HW 0.61–0.62, PL 0.71–0.72, PW 0.69–0.71, EL 0.83–0.84, EW 1.31–1.32, AL 0.93–1.00, AW 1.36–1.37. Eyes each composed of about 25 facets. Antennae unmodified; metaventral processes absent.

Comparative notes. This distinct species can be readily separated from all other members of the genus by the antennomeres IX being largely projecting mesally, the modified antennomeres VII, and the aedeagus with a long, apically rounded median lobe.

Distribution. Southwest China: Yunnan.

Biology. Individuals were collected by sifting leaf litter in a forest.

Etymology. The new species is named after Vasily Grebennikov, collector of the type series.

Pselaphodes maoershanus **Yin & Li**
http://species-id.net/wiki/Pselaphodes_maoershanus
Figs 22A, 23

Pselaphodes maoershanus Yin & Li, 2012 (Yin et al. 2012: 35). Type locality: Maoershan Mountain, Guilin, Guangxi, South China.

Additional material examined. 1 ♂, 2 ♀♀, labeled 'CHINA: Guizhou, Leishan Co. / SE Kaili, NE Leishan / Leigong Shan, E-slope / 26°23'39''N 108°13'33E // 2.5 km E of pass / 23–24.6.2001 / ca. 1600 m / leg. Schillhammer (17A)' (pcPH).

Diagnosis and description. Yin, Li and Gu, 2012 (P35; figs 3, 6, 9, 12, 15, 18, 21, 24, 27, 30); Figs 22A, 23.

Distribution. South China: Guangxi; Southwest China: Guizhou (**new provincial record**).

Comments. Adults from Leigongshan Mountain are readily identified as *P. maoershanus* based on the male features being identical with those from the type locality.

Pselaphodes monoceros **Yin & Hlaváč, sp. n.**
urn:lsid:zoobank.org:act:8A403224-2E7F-4422-802C-957017D73558
http://species-id.net/wiki/Pselaphodes_monoceros
Figs 22B, 24

Type material (5 ♂♂, 1 ♀)**.** Holotype: ♂, labeled 'China: Xizang Prov. / Cuona County / Lexiang, alt. 2500 m / 16.vii.2012, Ye Liu leg.' (SNUC); Paratypes: 4 ♂♂, 1 ♀, same label data as holotype type (SNUC).

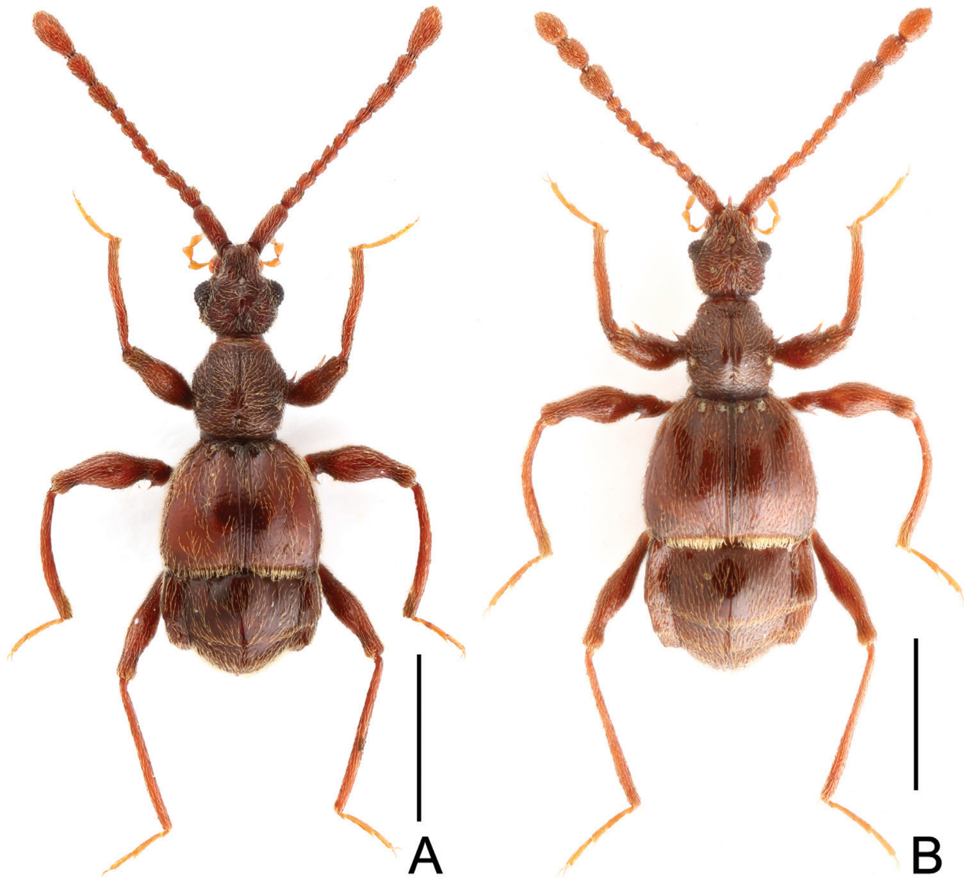

Figure 22. Male habitus of *Pselaphodes maoershanus* (**A**) and *Pselaphodes monoceros* (**B**). Scales: 1.0 mm.

Diagnosis. Reddish brown; length 2.91–3.03; clypeus projected anteriorly, forming a horn-like process in male; postgenae elongate, rounded laterally; antennomeres IX–XI enlarged; pronotum rounded at anterolateral margins; male with greatly elongate metaventral processes; metacoxae simple; aedeagus with symmetric median lobe.

Description. Male (Fig. 22B). Length 2.91–3.00. Head slightly longer than wide, HL 0.58–0.59, HW 0.56–0.58; clypeus projecting anteriorly (Fig. 24B); maxillary palpi (Fig. 24C) with segments III indistinctly projected laterally; eyes each composed of about 40 facets. Antennal clubs as in Fig. 24A. Pronotum (Fig. 24D) slightly longer than wide, PL 0.58–0.61, PW 0.55–0.59, rounded at anterolateral margins. Elytra wider than long, EL 0.89–0.90, EW 1.16–1.17. Metaventral processes greatly elongate, apically narrowed (Fig. 24E). Protrochantersand profemora spinose ventrally (Fig. 24F), protibiae with small apical spur (Fig. 24G); mesotrochanters spinose ventrally, mesofemora simple (Fig. 24H), mesotibiae with

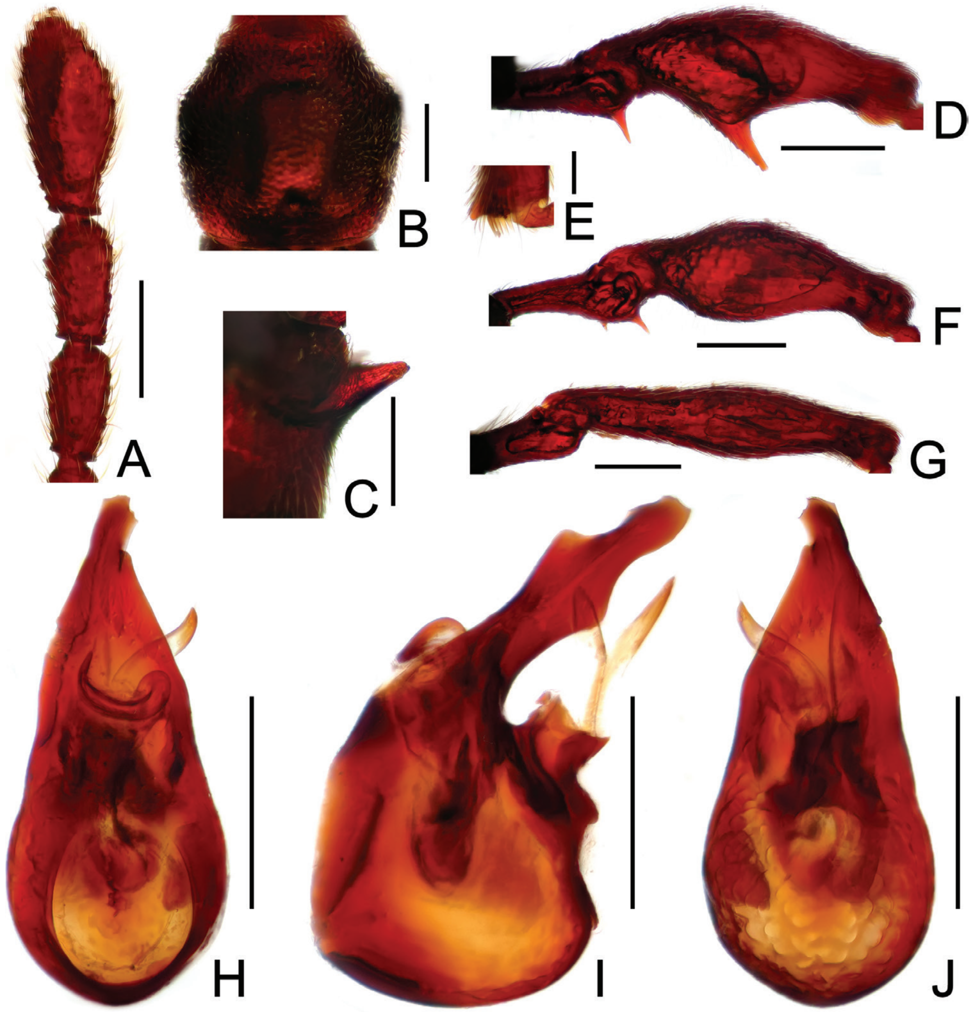

Figure 23. Diagnostic features of *Pselaphodes maoershanus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** aedeagus, in dorsal view **I** same, in lateral view **J** same, in ventral view. Scales (mm): all 0.2, except E = 0.05.

small apical spine (Fig. 24I); metatrochanters and metafemora simple (Fig. 24J). Abdomen broad at base and narrowed apically, AL 0.86–0.90, AW 1.16–1.19. Sternite IX as in Fig. 24K. Aedeagus length 0.56, with symmetric median lobe (Figs 24L–N).

Female. Similar to male in general; BL 3.03, HL 0.62, HW 0.57, PL 0.62, PW 0.60, EL 0.7, EW 1.19, AL 1.06, AW 1.28. Eyes each composed of about 20 facets. Antennae unmodified; metaventral processes absent.

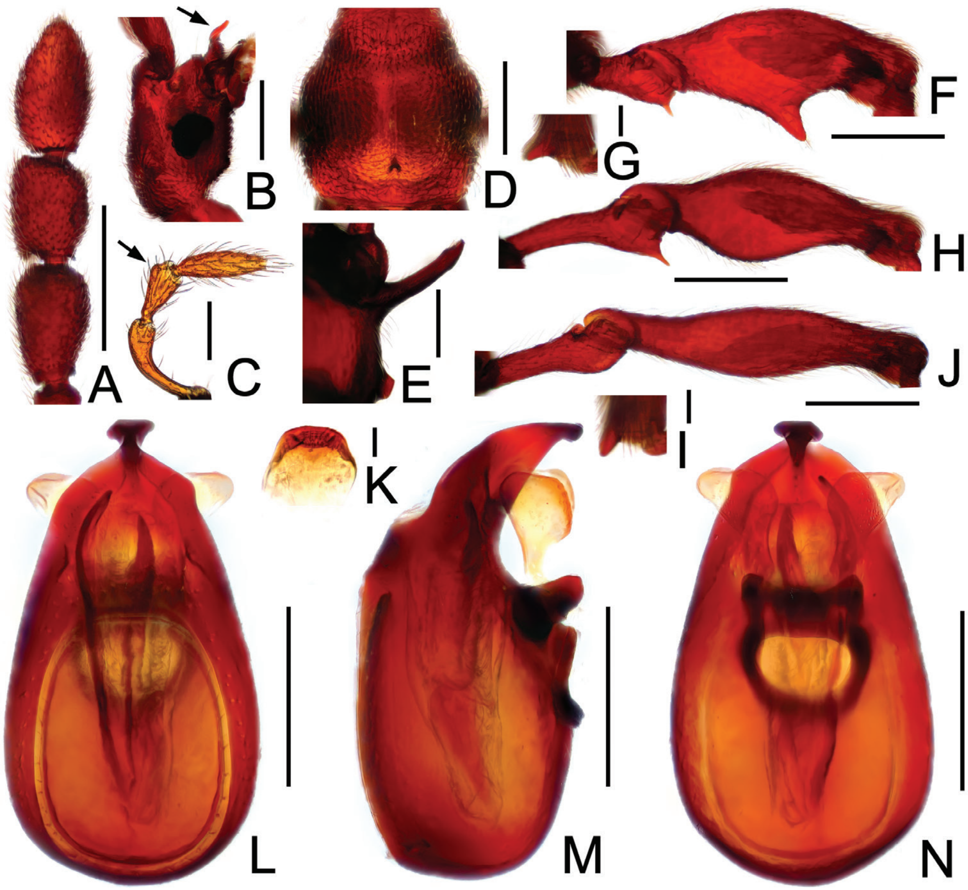

Figure 24. Diagnostic features of *Pselaphodes monoceros* in male. **A** antenna **B** head, in lateral view **C** maxillary palpus **D** pronotum **E** median metaventral process, in lateral view **F** protrochanter and profemur **G** apical portion of protibia **H** mesotrochanter and mesofemur **I** apical portion of mesotibia **J** metatrochanter and metafemur **K** sternite IX **L** aedeagus, in dorsal view **M** same, in lateral view **N** same, in ventral view. Scales (mm): **A, B, D, F, H, J** = 0.3; **E, L, M, N** = 0.2; **C** = 0.1; **G, I, K** = 0.05.

Comparative notes. This unusual *Pselaphodes* species has simple maxillary palpomeres II and IV, with palpomeres III only slightly projecting laterally on the anterolateral margins. This form of maxillary palpi together with the modified clypeus in the male is not known in any other species of the *Pselaphodes* complex of genera. These two characters, in combination with the form of the antennal clubs, and the greatly elongate metaventral processes readily separate the new species from all other congeners of the genus. The generic limit of *Pselaphodes* is expanded based on this species. The form of maxillary palpi seems to be occasionally variable within genus (also see comments on *Labomimus simplicipalpus* above). An extensive species-level phylogenetic analysis is needed for the determination of the taxonomic placements of these atypical species.

Distribution. Southwest China: Xizang (= Tibet).

Biology. Adults were collected by beating a pile of mixed live and dead branches in a forest.

Etymology. The Latin word '*monoceros*' means 'a unicorn', referring to the unique protuberance on the clypeus in the male.

Pselaphodes pectinatus Yin, Li & Zhao

http://species-id.net/wiki/Pselaphodes_pectinatus
Figs 25A, 26

Pselaphodes pectinatus Yin, Li & Zhao, 2011a: 474. Type locality: Bawangling Natural Reserve, Changjiang, Hainan, South China.

Additional material examined. 1 ♂, labeled 'China: Hainan Prov. / Wuzhishan Mt. / road to peak / 18.iv.2012, 650–700 m / Peng et al. leg.' (SNUC).

Diagnosis and description. Yin et al. 2011a (P474; figs 3 11, 23, 35, 47, 59, 63, 76, 89); Figs 25A, 26.

Distribution. South China: Hainan.

Comments. This species was described from a single male from Bawangling, Hainan. The aedeagus of the holotype was lost during the dissection. Here we provide new illustrations of major diagnostic features of this species including the aedeagus, based on a second male specimen from Wuzhishan Mountain, Hainan. *Pselaphodes pectinatus* can be readily separated from all other congeners at the first sight by the greatly modified apical portion of the protibiae in the male.

Pselaphodes pengi Yin & Li, sp. n.

urn:lsid:zoobank.org:act:BEDE3E50-7062-420D-9320-971586BF0B10
http://species-id.net/wiki/Pselaphodes_pengi
Figs 25B, 27

Type material (3 ♂♂)**.** Holotype: ♂, labeled 'CHINA: Sichuan, Tianquan County / Labahe N. R., Heixuan Valley, ca. 30 / km NW Tianquan, 30°10'36''N 102° / 28'04E, 2000 m, (mixed leaf litter / sifted), 2012.vii.10, Dai, Peng, Yin' (SNUC). Paratypes: 1 ♂, same label data as holotype (SNUC); 1 ♂, labeled 'CHINA: Sichuan, E'meishan City / E'mei Shan Mt., pass between / Jiuling Hill and Xixinsuo Temple / 29°33'15''N 103°21'24E, 1800 m / (leaf litter, sifted), 2012.vii.24 / C. C. Dai, Z. Peng & Z. W. Yin leg.' (SNUC).

Diagnosis. Reddish brown; length 3.41–3.50; postgenae rounded laterally; antennomeres IX–XI enlarged; VI–VII and IX–XI modified in male; pronotum rounded at anterolateral margins; male with long metaventral processes; metacoxae simple; aedeagus with asymmetric median lobe.

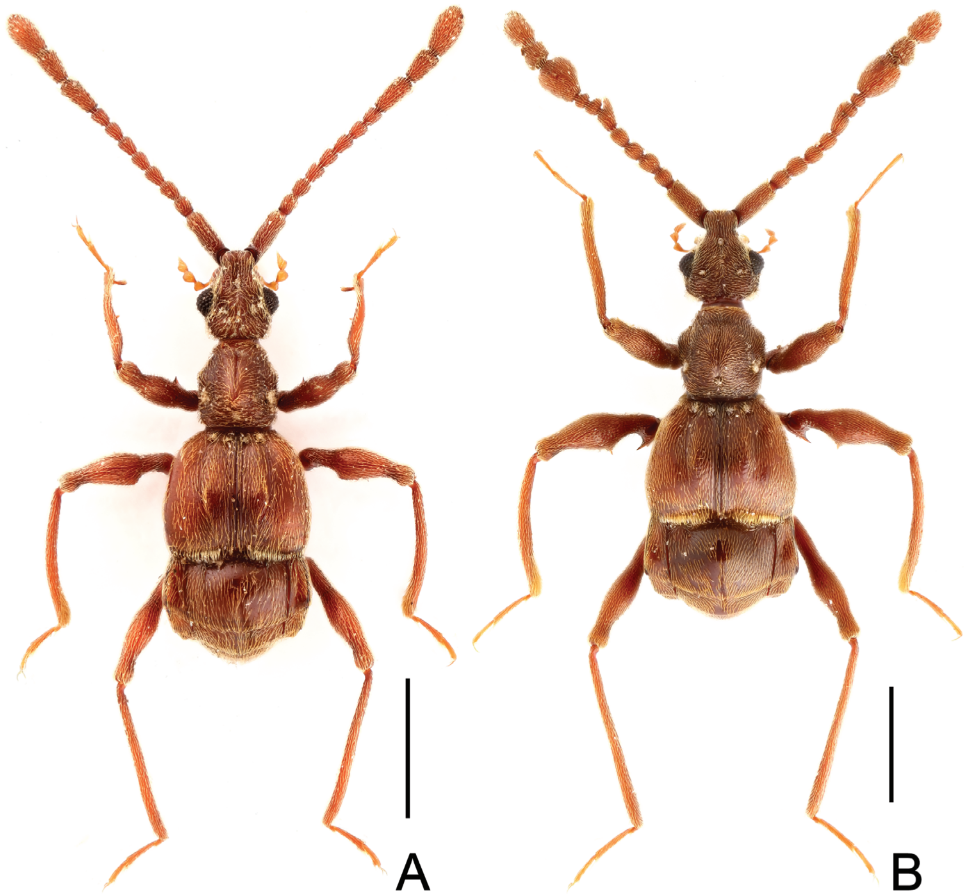

Figure 25. Male habitus of *Pselaphodes pectinatus* (**A**) and *Pselaphodes pengi* (**B**). Scales: 1.0 mm.

Description. Male (Fig. 25B). Length 3.41–3.50. Head longer than wide, HL 0.76–0.78, HW 0.74–0.75; eyes each composed of about 50 facets. Antennal clubs as in Fig. 27A. Pronotum (Fig. 27B) slightly longer than wide, PL 0.78–0.79, PW 0.74–0.75, rounded at anterolateral margins. Elytra wider than long, EL 0.94–0.99, EW 1.32–1.35. Metaventral processes long, apically broadened (Fig. 27C). Protrochanters and profemora strongly spinose at ventral margins (Fig. 27D), protibiae with small apical spur (Fig. 27E); mesotrochanters with distinct ventral spines, mesofemora with small ventral spine (Fig. 27F); metatrochanters and metafemora simple (Fig. 27G). Abdomen broad at base and narrowed apically, AL 0.93–0.94, AW 1.31–1.37. Sternite IX as in Fig. 27H. Aedeagus length 0.60, with asymmetric median lobe (Figs 27I–K).

Female. Unknown.

Comparative notes. The new species has unique, modified antennomeres VI, combined with the slightly modified antennomeres VII, the enlarged antennomeres

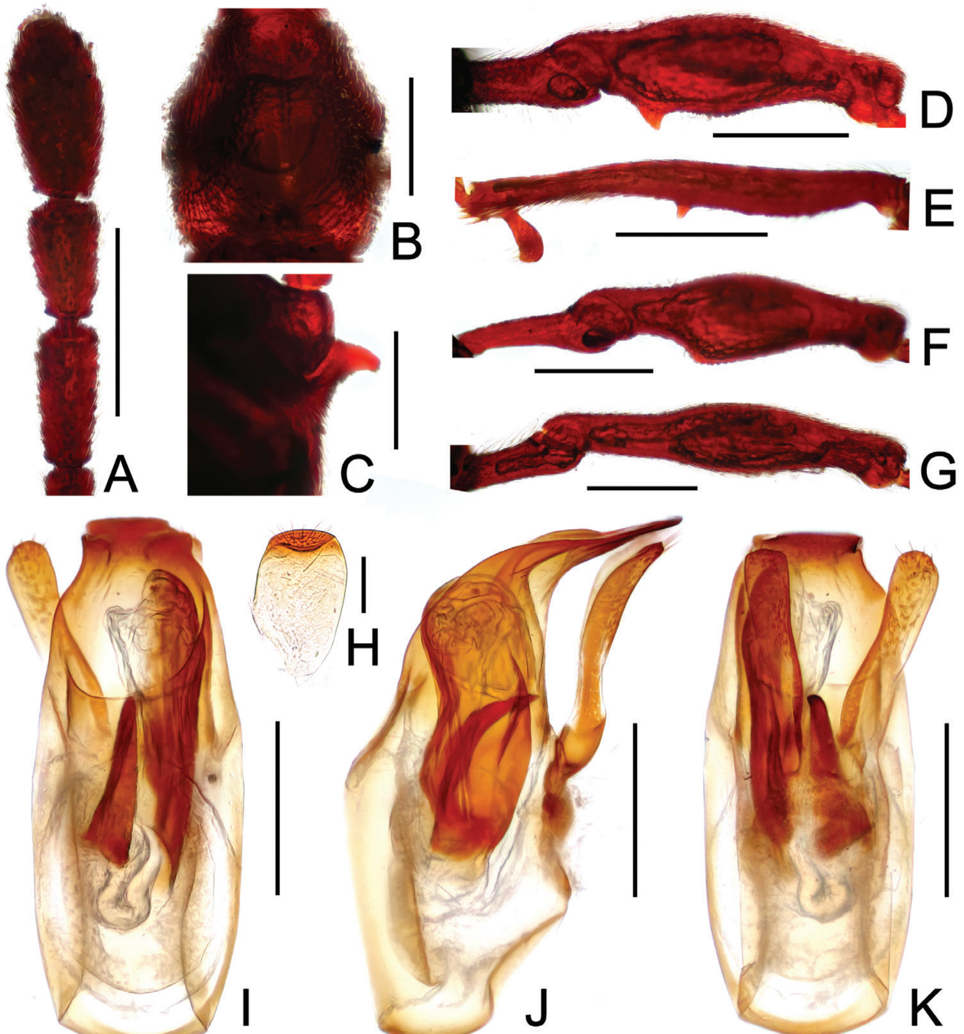

Figure 26. Diagnostic features of *Pselaphodes pectinatus* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, E F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1.

IX with a round apical process, the metaventral processes each with a preapical denticle on the upper surface, and the aedeagus with an apically greatly broadened median lobe, it can be quickly separated from all other species of the genus. Currently there is no other *Pselaphodes* species known to process modified antennomeres VI in the male.

Distribution. Southwest China: Sichuan.

Biology. Individuals were sifted from leaf litter along roads in forests.

Etymology. This species is named after Zhong Peng, co-collector of the type series.

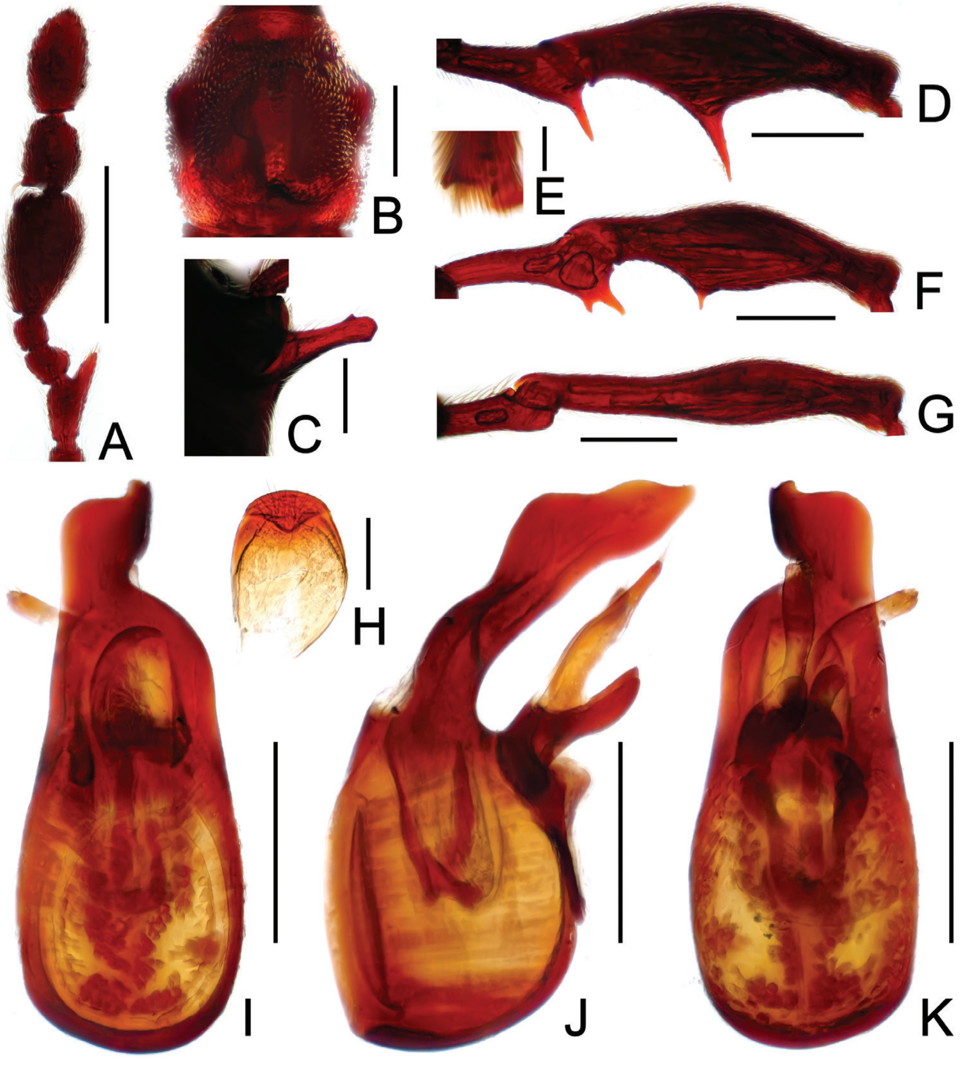

Figure 27. Diagnostic features of *Pselaphodes pengi* in male. **A** antenna **B** pronotum **C** median metaventral process, in lateral view **D** protrochanter and profemur **E** apical portion of protibia **F** mesotrochanter and mesofemur **G** metatrochanter and metafemur **H** sternite IX **I** aedeagus, in dorsal view **J** same, in lateral view **K** same, in ventral view. Scales (mm): **A, B, D, F, G** = 0.3; **C, I, J, K** = 0.2; **H** = 0.1; **E** = 0.05.

Acknowledgments

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RESEARCH ARTICLE

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One new and seven newly recorded Callichromatini species from China (Coleoptera, Cerambycidae, Cerambycinae)

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Abstract

One new species, *Schwarzerium yunnanum* **sp. n.** is described from Yunnan Province, China. And a new subgenus *Rugosochroma* **subgen. n.** is erected for it. Additionally, Seven species of the tribe Callichromatini are newly recorded from China: *Aphrodisium niisatoi* Vives & Bentanachs, 2007, *Aphrodisium tricoloripes* Pic, 1925, *Chelidonium violaceimembris* Gressitt & Rondon, 1970 (new from Vietnam too), *Chloridolum grossepunctatum* Gressitt & Rondon, 1970 (new from Vietnam too), *Chloridolum semipunctatum* Gressit & Rondon 1970, *Embrikstrandia vivesi* Bentanachs, 2005 and *Laosaphrodisium subplicatum* (Pic, 1937).

Keywords

Callichromatini, new subgenus, new species, new records, China, Oriental region

Introduction

The recent visit of the first author to the IZAS Collection (Institute of Zoology, Chinese Academy of Sciences, Beijing), enabled the identification of many Callichromatini species along with interesting observations, some of them described in this work. The

Callichromatini material in IZAS was not well studied before this work, with many specimens only identified at generic level. Seven species were found to be new for the Chinese fauna and herein reported for the first time. Meanwhile, one new subgenus and species are described from Yunnan.

Specimens depository are abbreviated as follows in the description:

BPBM	Bernice P. Bishop Museum, Honolulu, USA
CCCC	Collection of Chang-chin Chen, Tianjin, China
CJBB	Collection of Joan Bentanachs, Barcelona, Spain
EVC	Eduard Vives collection, Terrassa, Spain
IZAS	Institute of Zoology, Chinese Academy of Sciences, Beijing, China
MNHN	Muséum National d'Histoire Naturelle, Paris, France

Results

***Schwarzerium* (*Rugosochroma*) subgen. n.**

Type species. *Schwarzerium* (*Rugosochroma*) *yunnanum* sp. n.

Description. See "Diagnosis" below.

Etymology. *Rugoso+chroma* in reference of this new subgenus have wrinkled all the pronotal and elytral surface. *Rugoso* meaning wrinkled in Latin and *chroma* meaning colour in Greek. Masculine gender.

***Schwarzerium* (*Rugosochroma*) *yunnanum* sp. n.**

urn:lsid:zoobank.org:act:EEEC8301-4F43-4F39-B9D5-226188FBEABC
http://species-id.net/wiki/Schwarzerium_yunnanum
Figs 1–2

Description. Ground integument color bluish green, more intensely bluish and with long silvery pubescence underneath; antennae and legs bluish black; tarsi black, except slightly reddish onychium; head and pronotum shiny golden green; scutellum bluish green; elytra bluish green broadly along suture, with golden green dorsal longitudinal stripe, reaching from base to apex of elytra, cupreous golden sides from humeri to apex, and bluish epipleural margin.

Head large, transverse, strongly punctured, longitudinally furrowed from inter-antennal space to epistome; epistome short, straight, strongly punctured. Mandibles short, thick, slightly bent apically. Labrum trapezoidal, free, covered by fossulae and abundant golden setae. Eyes microfaceted, weakly protruding; upper lobe much smaller than lower. Antennae long, covered by long black setae and reaching apical 1/5 of elytra in males and apical quarter in females; segments saw-like beyond fifth antennomere, each segment (except first and second) with strong longitudinal outer margin demarcating two longitudinal porous areas.

Pronotum transverse (17:24), with strong transverse anterior depression on disc and two posterior transverse medially prominent humps; anterior border simple, posterior border weakly margined; sides armed with short median smooth bulge and smaller protuberance close to anterior angle; surface of pronotum strongly punctured, with golden setae at sides. Prosternum nearly smooth, shiny, with transverse striation at anterior half; prosternal process broad, punctured, expanded posteriorly to enclose procoxal cavities behind. Mesoventrite short, transverse, strongly punctured, wide between mesocoxae. Metaventrite longitudinally furrowed, finely punctured, covered by dense silvery white pubescence. Abdominal ventrites rather smooth and glossy, weakly punctured, sparsely pubescent; puncturation on pygidium stronger.

Scutellum triangular, margined laterally, smooth, depressed medially. Elytra long, narrow (11:4), sides subparallel; humeri round, protruding; suture fine, unmarginated; apex of elytra broadly round, with slightly marked sutural angle; surface of elytra rough, particularly at basal third, less so at apical quarter, covered by very sparse short, fine silvery tomentum; pubescence in apical area longer, denser and black.

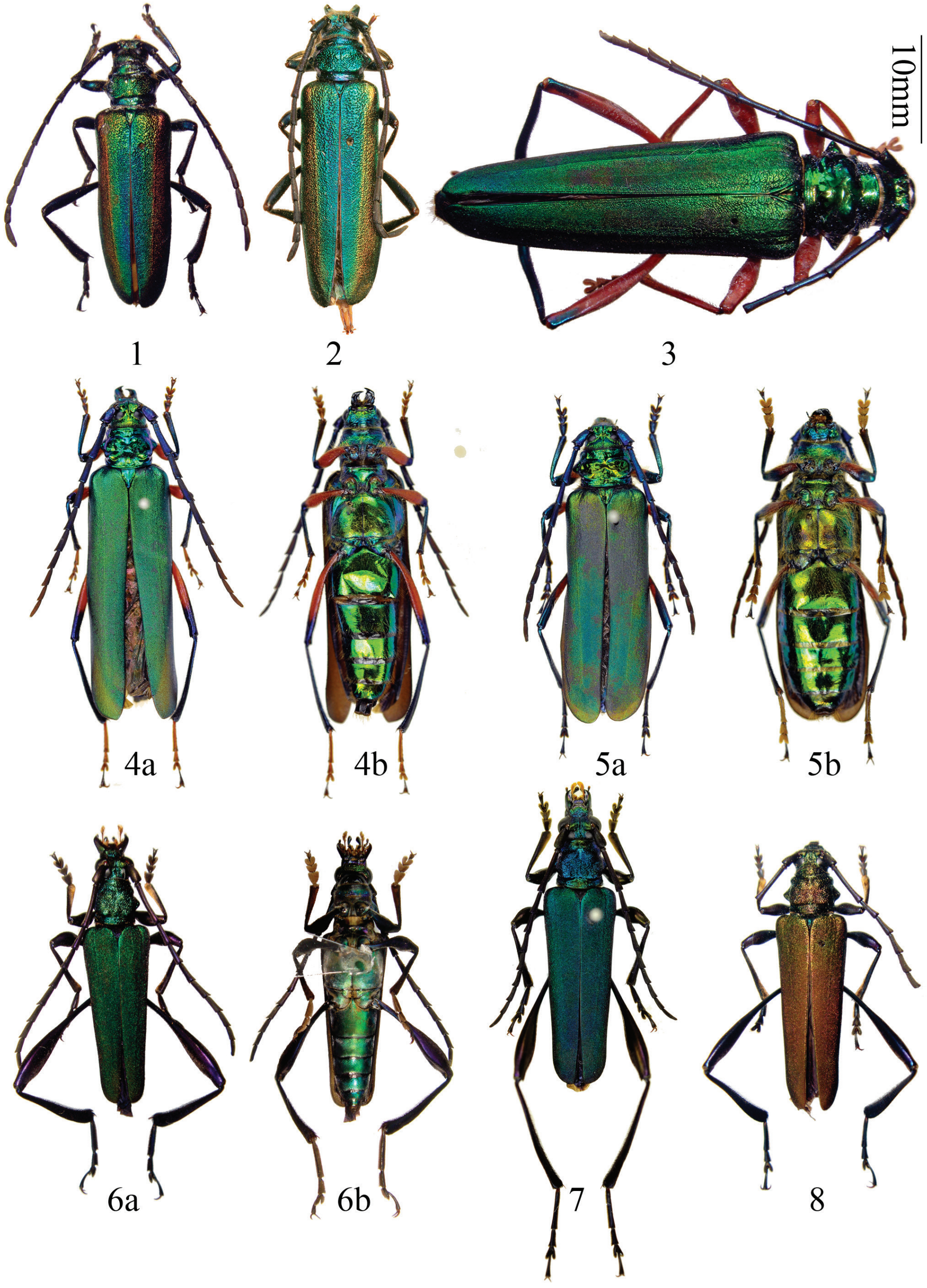
Legs short and slender; profemora enlarged medially, meso- and metafemora widened apically; mesotibiae slightly arched, metatibiae flattened; pro- and mesotarsi short and wide; first metatarsomere laterally compressed, and remaining metatarsomeres short and broad.

Diagnosis. This new species is similar to *Schwarzerium provosti* (Fairmaire) in its golden coloration and rough pronotum, but *S. yunnanum* can be distinguished by the smaller size, elytra more parallel, and very short unicolor legs without club-shaped mesofemora. It differs from every other species in the genus *Schwarzerium* Plavilstshikov in the second metatarsomere not compressed. Based on the divergence in this character, together with the distinctive shape of mesofemora, we propose to establish a new subgenus, *Rugosochroma* subgen. n. (noun, masculine), with *S. yunnanum* sp. n. as the subgeneric type.

Etymology. The species is named after the type locality "Yunnan".

Distribution. China: Yunnan.

Specimens examined. China, Yunnan Prov.: holotype: male, Yunnan, Zhongdian, Chongjianghe, alt. 1800 m, 1984.VIII.6, leg. Jianguo Fan (IZAS, IOZ(E) 1859281). **Paratypes:** 1 male (IZAS, IOZ(E) 1859283) and 1 female (EVC, ex IZAS, IOZ(E) 1905092), same data to holotype; 1 female, Yunnan, Lijiang, Yulongshan, alt. 2800 m, 1984.VIII.6, leg. Ruiqi Wang (IZAS, IOZ(E) 1859282).



Figures 1–8. *Schwarzerium* (*Rugosochroma*) *yunnanum* subgen. n., sp. n., holotype male, from Yunnan **2** paratype, female, from Yunnan (in EVC) **3** *Aphrodisium niisatoi* Vives & Bentanachs, 2007, female, from Yunnan **4–5** *Aphrodisium tricoloripes* Pic, 1925 **4** female, from Guizhou **5** female, from Yunnan **6–8** *Chelidonium violaceimembris* Gressitt & Rondon, 1970 **6** male, from Hainan **7** female, from Hainan **8** female, from Yunnan. **a**. dorsal view. **b**. ventral view. Scale 10 mm.

***Aphrodisium niisatoi* Vives & Bentanachs, 2007**
http://species-id.net/wiki/Aphrodisium_niisatoi
Fig. 3

Aphrodisium niisatoi Vives & Bentanachs, 2007: 635, figs 1 (holotype), 2–8.

Remarks. This species is very typical with sexual dimorphism represented by larger mandibles in males than females.

Distribution. China (**new country record**): Yunnan; Vietnam.

Specimens examined. China, Yunnan Prov.: 1 female, 8 km North of Simao, 1957.V.22, leg. A. Monchadsky (IZAS); 1 male and 1 female, Yunnan, Mt. Kabi-ke, Menglian, 2006.VI.2, leg. local collector (EVC). **Vietnam, Vinh Phuc Prov.:** holotype, male, Tonkin, Mt. Tam Dao, 2001.VI. leg. Local collector (EVC).

***Aphrodisium tricoloripes* Pic, 1925**
http://species-id.net/wiki/Aphrodisium_tricoloripes
Figs 4–5

Aphrodisium tricoloripes Pic, 1925: 18.
Aphrodisium (s. str.) *tricoloripes*; Podaný 1971: 270, 276.
Aphrodisium tricoloripes; Breuning and Itzinger 1943: 39.

Remarks. This is a very rare species only known from China, Myanmar and Vietnam. It is close to *Aphordisium cribricolle* Poll, 1890, but can be separated by the morphological feature of pronotum and the typical color of the legs.

Distribution. China (**new country record**): Guizhou, Yunnan; Myanmar (Breuning & Itzinger, 1943), Vietnam.

Specimens examined. China, Guizhou Prov.: 1 female, Guizhou, Tongren, Jiangkou, Fanjingshan, 4500bu, alt. 1775, 2010.V-IX, leg. local collector (CCCC); **China, Yunnan Prov.:** 1 female, Yunnan, Deqin county, 28°28.835'N, 98°51.140'E–28°26.610'N, 98°55.212'E, alt. 3000–3500 m, 2006.VIII.10, light trap, leg. Xiaodong Yang (CCCC, 06B0683). Holotype, male, Tonkin, Anam. (MNHN, ex Collection M. Pic).

***Chelidonium violaceimembris* Gressitt & Rondon, 1970**
http://species-id.net/wiki/Chelidonium_violaceimembris
Figs 6–8

Chelidonium violaceimembris Gressitt & Rondon, 1970: 151, fig. 26 d.

Remarks. This is a typical oriental species. Very common in Laos and Vietnam and should be common in South China too.

Distribution. China (**new country record**): Hainan, Yunnan; Laos, Vietnam (**new country record).**

Specimens examined. China, Yunnan Prov.: 1 female, Yunnan, Xishuangbanna, Menghun, alt. 1200–1400 m, 1968.V.22, leg. Yiran Zhang (IZAS). **China, Hainan Prov.:** 2 males, Hainan, Baisha county, Yinggeling, alt. 600–780 m, 2011.IV.27–30, leg. Wenhsin Lin (IZAS & CCCC); 1 male, Baisha county, Yinggeling, Yinggezui, 2011.IV.30, leg. Yit-ing Chung (CCCC); 1 male 1 female, Wuzhishan, Dengshandao (entrance), 18.90840°N, 109.67359°E, alt. 708 m, 2010.IV.10, leg. Kuiyan Zhang (IZAS); 1 female, Hainan, Wuzhishan, 2010.IV.9, leg. WenI Chou (CCCC); 1 male, same data but 2010.IV.7; 1 female, Hainan, Qiongzhong county, Limushanzhufeng, 19.17863°N, 109.75071°E, alt. 840 m, 2010.IV.6, leg. Meiying Lin (IZAS); 3 males, Jianfengling, 2010.IV.13, leg. Wenhsin Lin (CCCC). **Vietnam, Vinh Phuc Prov.:** 3 males 2 females, Tam Dao National Park, 2011.VI.12 (EVC). **Laos, Vientiane Prov.:** holotype, male, Phou Khao Khoay, 1040 m, 1965.V.31, leg. J. A. Rondon (BPBM, examined by E. Vives in 2007.).

Embrikstrandia vivesi **Bentanachs, 2005**

http://species-id.net/wiki/Embrikstrandia_vivesi
Figs 9–12

Embrik-Strandia vivesi Bentanachs, 2005: 2, 3, figs 1 (holotype male), 2 (female), 3–4, 8–10.

Remarks. This species is highly polymorphic in elytral and pronotal coloration. The IZAS collection contains specimens showing the base of elytra completely red, and the series from Yunnan includes specimens with their pronotum black and reddish.

Distribution. China (**new country record**): Yunnan; Laos.

Specimens examined. China Yunnan Prov.: 5 males 3 females, Yunnan, Jinping, Mengla, alt. 400 m, 1956.IV.28–29, leg. Keren Huang et. al (IZAS); 2 males, same data but 1956.IV.24; 1 male, same data but 1956.V.1; 1 male 1 female, same data but alt. 500 m, 1956.V.2; 1 male, Yunnan, Xishuangbanna, Xiaomengyang, alt. 850 m, 1957.VI.14, leg. Lingchao Zang (IZAS); 5 females, Yunnan, Xishuangbanna, Menghun, alt. 750 m, 1958.VI.2–7, leg. Xuwu Meng et al (IZAS); 1 female, same data but alt. 1200 m, 1958.V.31. **Laos, Xieng Khouang Prov.:** holotype, male, Laos, Xieng Khouang, 1997.VI (CJBB).

Chloridolum grossepunctatum **Gressitt & Rondon, 1970**

http://species-id.net/wiki/Chloridolum_grossepunctatum
Fig. 13

Chloridolum (s. str.) *grossepunctatum* Gressit & Rondon 1970: 170, fig. 29a.

Remarks. This is a small species described from Laos and it is very common in North Vietnam.

Distribution. China (**new country record**): Yunnan; Laos; Vietnam **(new country record)**.

Specimens examined. China, Yunnan Prov.: 2 males, Yunnan, Mt. Daningshan, 2012.VI.7, leg. local collector (EVC). **Vietnam, Vinh Phuc Prov.:** 2 males 3 females, N. Vietnam, Tam Dao National Park, 2011.VI.12, leg. E. Vives (EVC). **Laos, Vientiane Prov.:** holotype, male, Laos, Vientiane Prov., Ban Van Heua, 1035 m, 1965.IV.30 (BPBM, Bishop 8361, examined by E. Vives in 2007.).

Chloridolum semipunctatum Gressit & Rondon 1970

http://species-id.net/wiki/Chloridolum_semipunctatum
Fig. 14

Chloridolum (s. str.) *semipunctatum* Gressit & Rondon 1970: 171, fig. 29b.

Remarks. This is a very rare species in Northern Laos. The morphology of this species is very different of other *Chloridolum* species.

Distribution. China (**new country record**): Yunnan; Laos.

Specimens examined. China, Yunnan Prov.: 1 male, Mt. Gaoligongshan, 2012.VI.12, leg. local collector (EVC). **Laos, Sayaboury Prov.:** holotype, male, Laos, Sayaboury (Xaignabouri), 280 m, 1966.V.20 (BPBM, Bishop 8362, examined by E. Vives in 2007.).

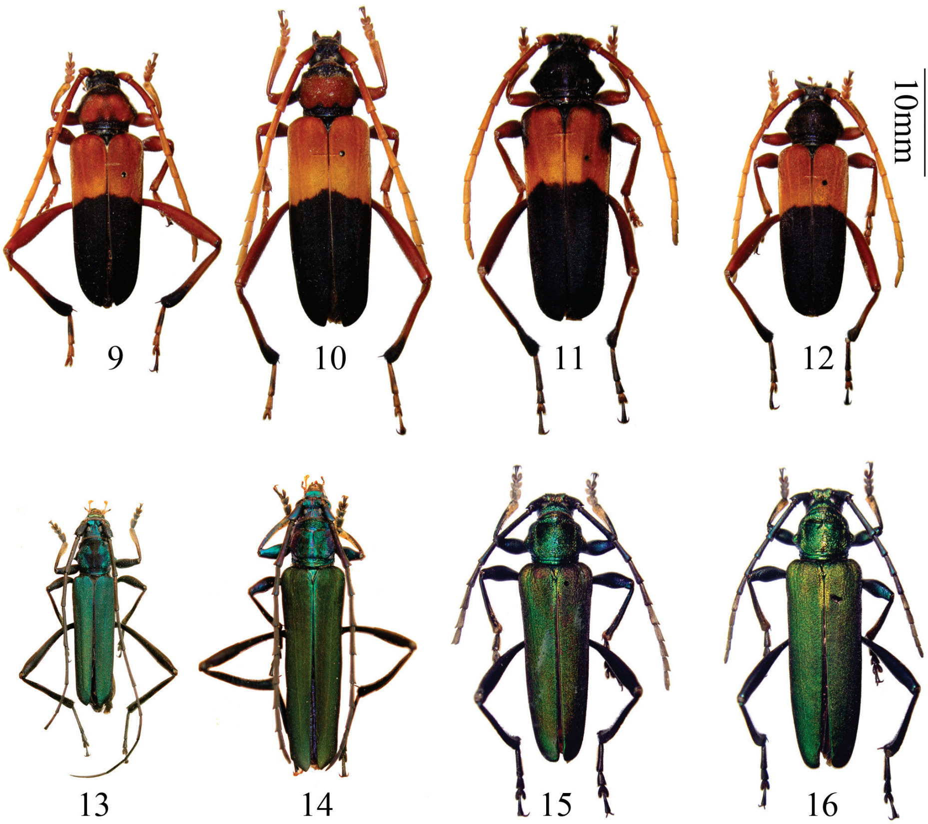
Laosaphrodisium subplicatum (Pic, 1937)

http://species-id.net/wiki/Laosaphrodisium_subplicatum
Figs 15–16

Chelidonium gibbicolle v. *subplicatum* Pic, 1937: 11.
Aphrodisium (s. str.) *subplicatum*; Gressitt and Rondon 1970: 149, fig. 25 i.
Chelidonium subplicatum; Podaný 1974: 7, 42.
Laosaphrodisium subplicatum; Bentanachs 2012: 81.

Remarks. This species was originally described as a variety of *Chelidonium gibbicolle* by Pic (1937). Gressitt and Rondon (1970) treated it as a species and combined it to the genus *Aphrodisium*. However, it was transferred to the genus *Laosaphrodisium* Bentanachs (2012) based on the following characters: body dull green, without yellow bands, discal area of pronotum with two longitudinal stripes of black pubescence.

Although Bentanachs (2012) wrote “China (Yunnan, Gressitt 1950)” under the distribution of this species, it was a big mistake (personal communication with Bentanachs in Dec. 2012). Gressitt did not report any record of *subplicatum* from China and Bentanachs did not examined any specimens from Yunnan. The reliable locality from China is only Guizhou up to now. Yunnan is a possible locality but it need the confirmation of specimens.



Figures 9–12. *Embrikstrandia vivesi* Bentanachs, 2005. **9** male, from Yunnan, pronotum mostly red **10** female, from Yunnan, pronotum mostly red **11** female, from Yunnan, pronotum mostly black **12** male, from Yunnan, pronotum mostly black **13** *Chloridolum grossepunctatum* Gressitt & Rondon, 1970. male, from Yunnan **14** *Chloridolum semipunctatum* Gressit & Rondon 1970. male, from Yunnan **15–16** *Laosaphrodisium subplicatum* (Pic, 1937) **15** male, from Guizhou **16** female, from Guizhou. Scale 10 mm.

Distribution. China (**new country record**): Guizhou; Laos, Vietnam.

Specimens examined. China, Guizhou Prov.: 1 female, Guizhou, Shiqian, Jinxing, alt. 670 m, 1988.VII.24, leg. Shuyong Wang (IZAS); 1 female, same data but alt. 670–800 m; 1 male, Guizhou, Shiqian, Jinxing, alt. 800 m, 1988.VII.25, leg. Hongxing Li (IZAS). **Vietnam, Vinh Phuc Prov.:** 2 males 1 female, Vinh Phuc Prov., Tam Dao National Park, 2011.VI.20, leg. E. Vives (EVC); holotype, male, Vietnam, Tonkin, Hoa-Binh (MNHN, ex Collection M. Pic).

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RESEARCH ARTICLE

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Description of a new species of *Distenia* (Coleoptera, Disteniidae, Disteniini) from Southeastern China, with records and diagnoses of similar species

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Abstract

A new species, *Distenia orientalis* **sp. n.** is described from Southeastern China. It was misidentified as *D. gracilis* (Blessig, 1872) but can be separated from the latter by the color of antennae and legs, structure differences on scape, maxillary palp, pronotum, tibiae, punctures on elytra, etc. Three related species are carefully diagnosed and treated.

Keywords

Distenia orientalis, new species, taxonomy, Oriental region, Disteniidae

Introduction

During research on the fauna of Tianmushan, the first author, Wenxuan Bi, experienced difficulties with identification of *Distenia gracilis* (*sensu* Gressitt 1951; Chen et al. 1959). The fresh material he collected from Tianmushan of Zhejiang Province seems very different from that from Northeastern China and continental Russia. After studying further material from different localities, we conclude that there are three species among the specimens hitherto identified as *D. gracilis*: *D. gracilis* (Blessig, 1872), *D. japonica* Bates, 1873 and *D. orientalis* sp. n.

Material studied is deposited in the following institutions and private collections:

CBWX Collection of Wenxuan Bi, Shanghai, China
CCCC Collection of Chang-chin Chen, Tianjin, China
CJM Collection of Ming Jin, Shanghai, China
CYZZ Collection of Zhizhou Yu, Shanghai, China
CZDY Collection of Deyao Zhou, Shanghai, China
IZAS Institute of Zoology, Chinese Academy of Sciences, Beijing, China
MD Collection of Mikhail L. Danilevsky, Moscow, Russia
NHML The Natural History Museum, London, UK
SNUC The Insect Collection of Shanghai Normal University, Shanghai, China
ZMAS Museum of Zoology, Academy of Sciences, Saint-Petersburg, Russia
ZMMU Zoological Museum of Moscow University, Moscow, Russia

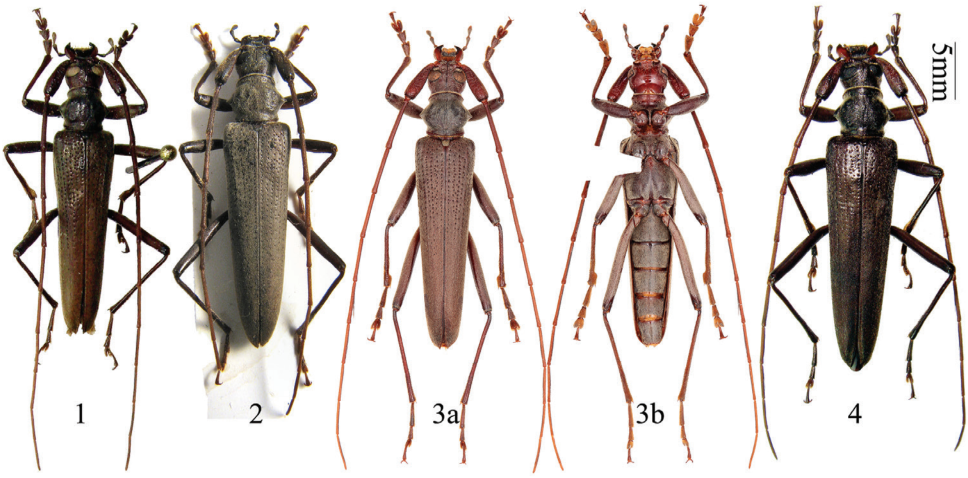
Results

***Distenia gracilis* (Blessig, 1872)**
http://species-id.net/wiki/Distenia_gracilis
Figs 1–15, 37–38

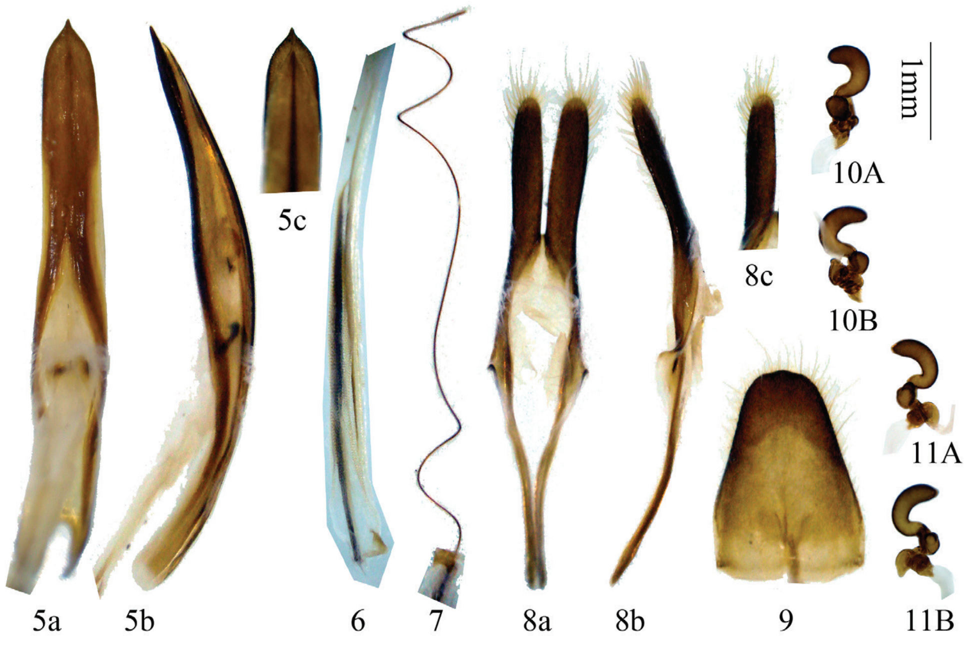
Apheles gracilis Blessig, 1872: 168, pl. VIII, fig. 1; Ganglbauer 1887: 131.
Distenia gracilis: Kraatz 1879: 91; Plavilstshikov 1936: 105, 492, fig. 70; Gressitt 1951: 45 [part]; Chen et al. 1959: 32, Pl. III, fig. 16 [part]; Lee 1987: 9, pl. I, fig. 1; Švácha and Danilevsky 1987: 38 [part]; Cherepanov 1990: 68; Hua 2002: 189 [part]; Hua et al. 2009: 448 [part]; Lin et al. 2010: 120 [part]; Danilevsky 2012: 902.

Host plant. *Alnus* sp. (BETULACEAE), *Chosenia* sp. (SALICACEAE) (Danilevsky 2012).

Remarks. This species was first recorded from Northeastern China (Manchuria) by Plavilstshikov (1936). Gressitt (1951) cited this information and added Zhejiang (Tianmushan) as a new locality, which was the first misidentification. Then, Chen et al. (1959) followed Gressitt (1951) and made a drawing based on specimens from Tianmushan, which misled subsequent Chinese longicornists to misidentify *D. orientalis* sp. n. as *D. gracilis*. Therefore, the record from Zhejiang and Jiangxi

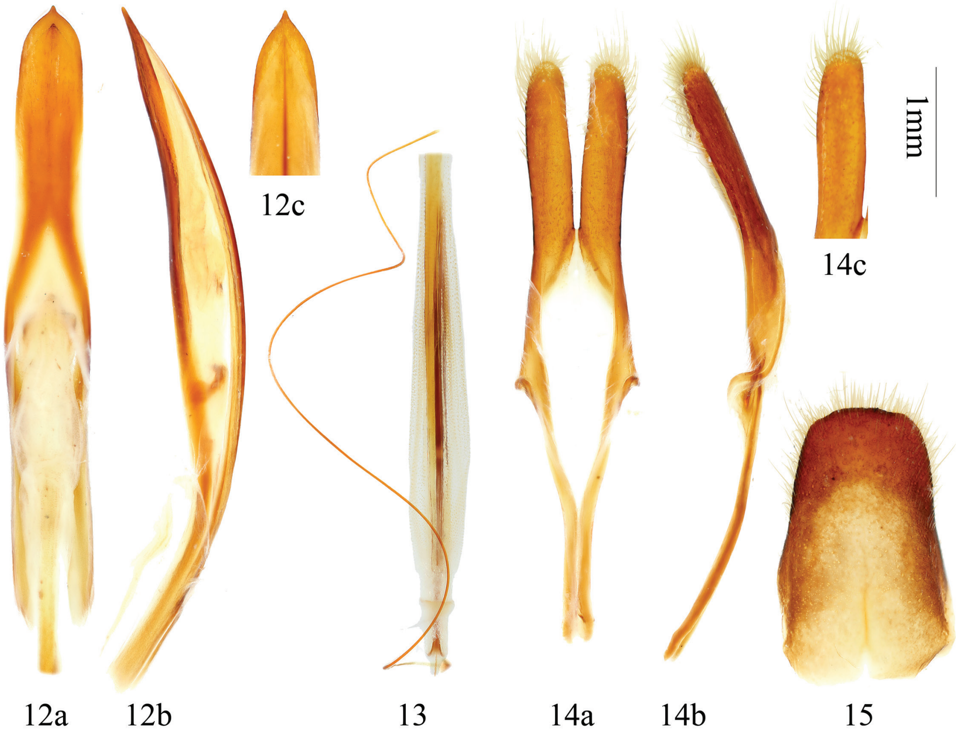


Figures 1–4. *Distenia gracilis* (Blessig, 1872). **1** male, from Far East Russia **2** female, from Far East Russia **3** male, from Liaoning, China **a** dorsal view **b** ventral view **4** female, from Liaoning, China. Scale 5 mm.



Figures 5–11. Genitalia of *Distenia gracilis* (Blessig, 1872). **5–9** male, from Far East Russia **5** median lobe **6** rods of endophallus **7** hair-like thin rod of ejaculatory duct **8** tegmen **a** ventral view **b** lateral view. **c** dorsal view **9** tergite VIII in dorsal view **10–11** female, spermathecal capsule, both from Liaoning, China. **A–B** from different sides. Scale 1 mm.

is incorrect, as it was based on misidentification of *D. orientalis* sp. n. The records from Hubei and Anhui are doubtful and may also be based on misidentification of *D. orientalis* sp. n. (or another species) but we did not have specimens available from these



Figures 12–15. Genitalia of *Distenia gracilis* (Blessig, 1872), male, from Liaoning, China **12** median lobe **13** rods of endophallus, including hair-like thin rod of ejaculatory duct **14** tegmen **a** ventral view **b** lateral view **c** dorsal view **15** tergite VIII in dorsal view. Scale 1 mm.

two provinces. Chou (2004) didn't include *D. gracilis* in his book on Taiwanese fauna. Records of *D. gracilis* from Japan were based on misidentification of *D. japonica.*

We did not have specimens from Korea for study. We consider the record by Ganglbauer (1887) and Lee (1987) correct based on the pictures by Lee (1987).

The holotype of *Apheles gracilis* Blessig, 1872 is a male from Russia, Sibérie (Amurland), collected by P. Wulffius. It was supposed to be deposited in ZMAS. We could not reach the curators in ZMAS. According to personal communication by Mikhail Danilevsky, he could not find the type in the collection of ZMAS.

Distribution. North China (Heilongjiang, Jilin, Liaoning), Korea (including South Korea and North Korea), Russia (Far East).

Specimens examined. China, Liaoning: 2 females, Benxi, Guanmenshan, 2011. VIII.21, coll. Xinlei Huang (IZAS); 1 male 1 female, Dandong, Saima, Wendong, 2006.IX.1, 3, coll. Haicheng Shan (IZAS, ex CCCC); 2 males, Dandong, Saima, Pushihe, 2008.VII.30, coll. Haicheng Shan (CBWX).

Russia, Far East: 1 male, Arsenyev env., 44°7'27"N, 133°20'00"E, 2007.VII.21, coll. S. Ivanov (MD); 1 male, Primorie Reg., Chernigovka distr., Merkushevka Env., 44°22'2.52"N, 132°48'0.42"E, 2011.VII.28–30, coll. S. Ivanov (MD).

Distenia japonica **Bates, 1873**
http://species-id.net/wiki/Distenia_japonica
Figs 16–24, 39–40

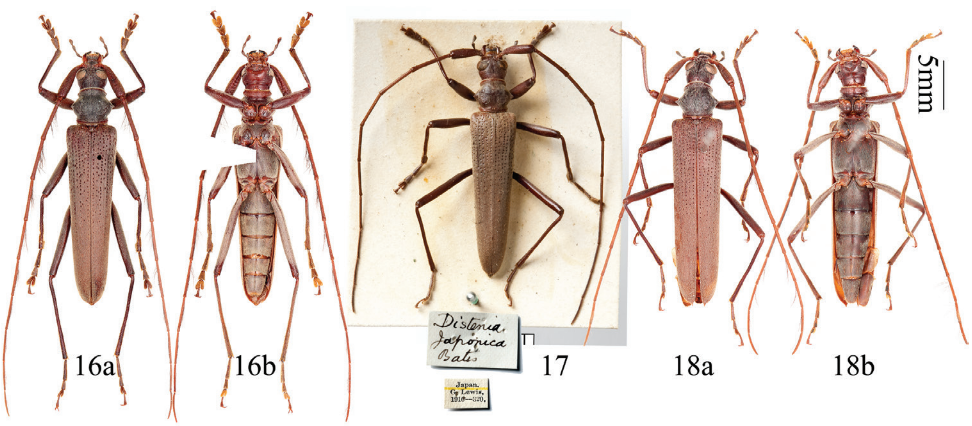
Distenia japonica Bates, 1873: 155.
Distenia gracilis: Kraatz 1879: 91; Švácha and Danilevsky 1987: 38 [part]; Lin et al. 2010: 120 [part].
Distenia gracilis gracilis: Ohbayashi and Niisato 2007: 335, pl. 1, figs 1 (male) & 2 (female) [Fauna].
Distenia japonica: Danilevsky 2012: 902.

Host plant. It is polyphagous with the following host plants recorded under *D. gracilis* (confused with *D. japonica*): *Acer* sp. (ACERACEAE), *Abies sachalinensis* Masters (PINACEAE), *Alnus* sp. (BETULACEAE), *Betula* sp. (BETULACEAE), *Chosenia* sp. (SALICACEAE), *Picea* sp. (PINACEAE), *Pinus* sp. (PINACEAE), *Quercus* sp. (FAGACEAE), *Salix* sp. (SALICACEAE), *Ulmus* sp. (ULMACEAE).

Diagnosis. According to Danilevsky (2012), *Distenia gracilis* Blessig, 1872 (mainland and Sakhalin) and *D. japonica* Bates, 1873 (islands) are different vicariant species, very easily distinguished by narrow scapus in *D. japonica*. Further differences are shown in Table 1.

Remarks. This species was first described by Bates (1873) based on syntypes from Japan, Honshu (Hyogo Prefecture), Maiyasan, collected by George Lewis. Kraatz (1879) synonymized it with *D. gracilis*, which was widely followed by subsequent authors until Danilevsky (2012) resurrected it.

Švácha and Danilevsky (1987) pointed out the habit differences between the mailand population and island population, and suspected "it is possible that we are facing two separate taxa". "However, reliable larval morphological differences have



Figures 16–18. *Distenia japonica* Bates, 1873. **16** male, from Iwate, Japan **17** syntype, male, from Hyogo, Japan **18** female, from Iwate, Japan **a** dorsal view **b** ventral view. Scale 5 mm.

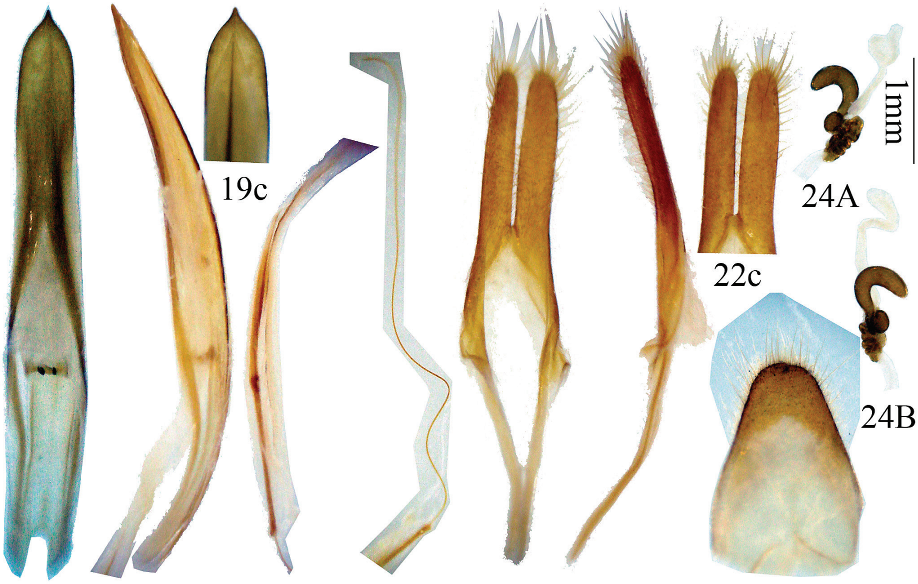
Table 1. Differences of *D. gracilis*, *D. japonica* and *D. orientalis* sp. n.

Character \ Species	***D. gracilis***	***D. japonica***	***D. orientalis*** sp. n.
Antennal segment extending beyond tip of elytra	in male 8th, in female 9th	in male 8th, in female 9th	in male 7th, in female 8th
Color of antennae and legs	uniformly black-brown	Uniformly brown	Mostly black-brown, with several orange-red rings
Scape in male	With basal grooves, punctures coarser	With basal grooves, punctures finer	Without basal grooves, with rugose punctures
Scape length / maximum width	ca.3.0 in male, ca. 2.8 in female	ca.3.5 in male, ca. 3.0 in female	ca.3.1 in male, ca. 3.4 in female
Last segment of maxillary palp	Stouter, length / maximum width < 2.5 in male, < 2.6 in female (Figs 37a, 38a)	Stoutest, length / maximum width < 2.1 in male, < 2.4 in female (Figs 39a, 40a)	Slender, length / maximum width > 2.5 in male, > 3.0 in female (Figs 41a, 42a)
Pronotum	Without transverse rugae, swelling indistinct (Figs 37c, 38c)	Without transverse rugae, swelling more distinct (Figs 39c, 40c)	With some transverse rugae (Figs 41c, 42c)
Mosotibiae of male	Apical protruding lobe very distinct (Fig. 37f)	Apical protruding lobe distinct (Fig. 39f)	Without apical protruding lobe (Fig. 41f)
Punctures on elytra	With distinct longitudinal rows, the row near suture not very dense (Figs 37d, 38d)	With distinct longitudinal rows, the row near suture very dense (Figs 39d, 40d)	Longitudinal rows indistinct, the row near suture very sparse (Figs 41d, 42d)
Sternite VII (ventrite V)	Figs 37e, 38e	Figs 39e, 40e	Figs 41e, 42e
Median lobe	Figs 5, 12	Figs 19	Figs 29
Spermathecal capsule	Figs 10–11	Figs 24	Figs 34–36

not been found." (Švácha and Danilevsky 1987). According to Danilevsky (2012), *D. gracilis* (mainland and Sakhalin) develops underground on healthy roots of living *Chosenia* (personal observation in Kedrovaya Pad) and on *Alnus*, but *D. japonica* lives under the old dead bark of many different trees (personal observation on Kunashir), often together with *Eutetrapha*. Therefore, the host plants recorded under *D. gracilis* could actually be host plants of *D. japonica.*

Distribution. Japan, Russia (Far East, Islands).

Specimens examined. Japan: 1 male, syntype, Japan (NHML, ex collection G. Lewis, examined through pictures); 1 male, Japan, Iwate Prefecture, Niisato-mura, Genbeidaira, 1982.VII.31, coll. N. Ohbayashi (CBWX); 1 female, Japon, Iwate Prefecture, Niisato-mura, Genbeidaira, 1982.VII.31, coll. N. Ohbayashi (CBWX); 1 male 1 female, Kyoto, Kibone, 1932.VII.1, coll. S. Yie (IZAS); 1 female, Tokushima, Mt. Tsurugi, 1971.VII.11, coll. H. Toshima (IZAS); 1 female, Tottori Pref., Mt. Hokki-Daisan, 1958.VII.22, coll. H. Toshima (IZAS).



Figures 19–24. Genitalia of *Distenia japonica* Bates, 1873. **19–23** male, from Kyoto, Japan **19** median lobe **20** rods of endophallus **21** hair-like thin rod of ejaculatory duct **22** tegmen. **a** ventral view **b** lateral view **c** dorsal view **23** tergite VIII in dorsal view **24** female, spermathecal capsule, from Kyoto, Japan. **A–B** from different sides. Scale 1 mm.

Distenia japonica yakushimana Yokoyama, 1966

http://species-id.net/wiki/Distenia_japonica_yakushimana

Distenia gracilis yakushimana Yokoyama, 1966: 54, pl. 6, fig. 1.
Distenia gracilis yakushimana: Ohbayashi and Niisato 2007: 336, pl. 1, fig. 3 (male) [Fauna].
Distenia japonica yakushimana: Danilevsky 2012: 902.

Diagnosis. According to Yokoyama (1966): "This subspecies differs from the typical species (*D. japonica*), in having the following points: body smaller and more blackish, sparsely covered with shorter brownish yellow pubescence, which is sparser on head and prothorax. Clypeus longer, vertex less punctured. Prothorax weakly irregularly wrinkled, lateral tubercles less developed, not acute at apex. Terminal joint of maxillary palpus rounded at apex (instead of truncate)."

Remarks. This subspecies was described based on the female holotype from Japan, Ryukyu island, Mt. Miyanouradake (alt. 1200 m), collected by Hajime Yokoyama on August 3, 1962. It is deposited in Osaka Museum of Natural History. We did not examine the holotype or other specimens but followed Ohbayashi and Niisato (2007) and Danilevsky (2012) in treating this form as a subspecies.

Distribution. Japan (Yaku-shima).

***Distenia orientalis* sp. n.**
urn:lsid:zoobank.org:act:14814F4C-97D8-4C2C-9125-7AA5DEDACFA6
http://species-id.net/wiki/Distenia_orientalis
Figs 25–36, 41–42

Distenia gracilis: Gressitt 1951: 45 [part]; Chen et al. 1959: 32, Pl. III, fig. 16; Hua 2002: 189 [part]; Hua et al. 2009: 448 [part]; Lin et al. 2010: 120 [part].

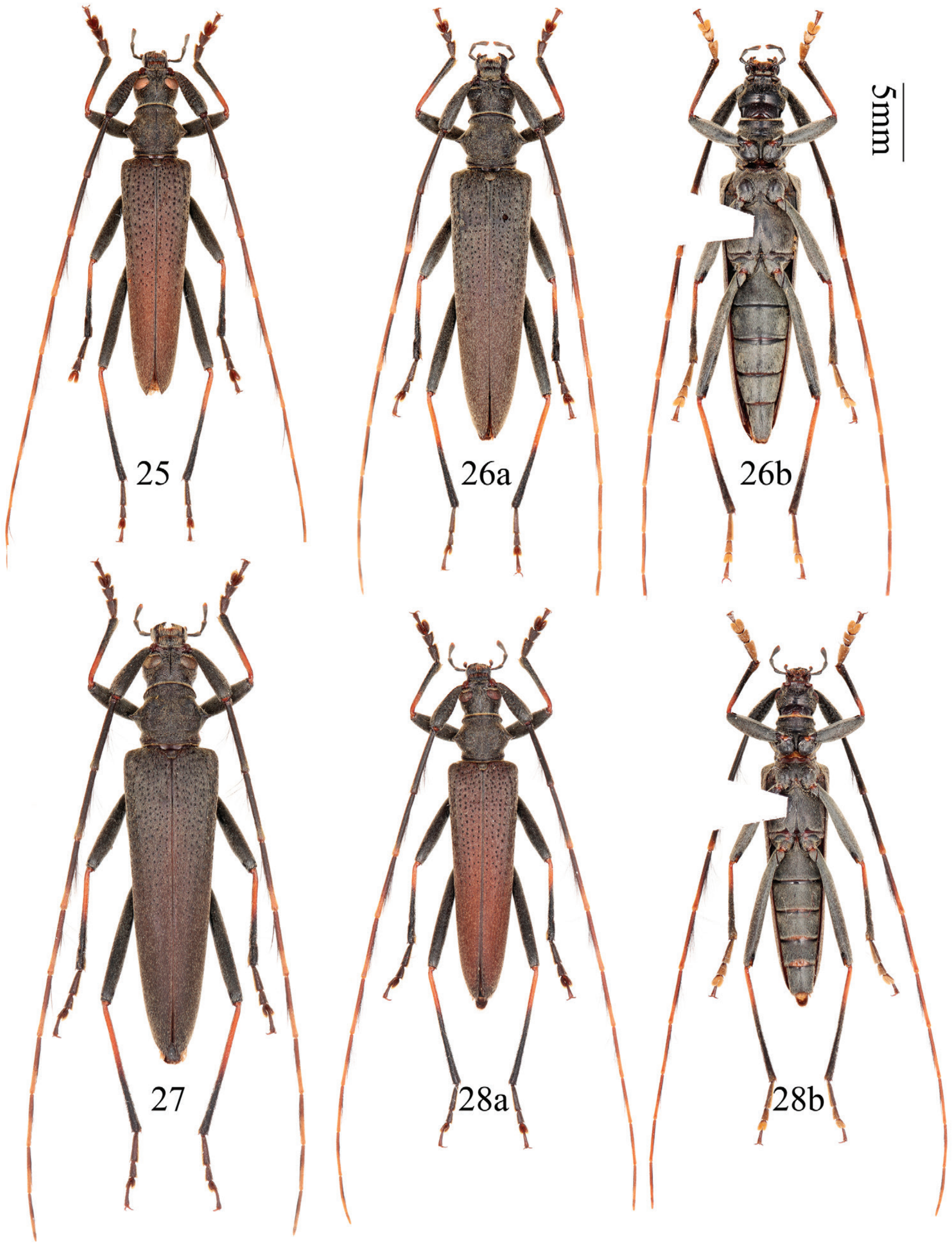
Description. Male: body length 18.7–25.5 mm, width at humeri 4.0–6.0 mm. Female: body length 22.0–26.6 mm, width at humeri 5.0–6.5 mm. Body uniformly black-brown, with rusty tinge (especially in male), except bases of tibiae (about 1/3 to 1/2), tips of antennal segments IV-XI (increasing from IV to XI), and extreme tips of last segments of maxillary and labial palps which are reddish-brown, and ventral side of tarsi and base of mandible being brown.

Body elongate, slender. Head with dense rugose punctures, with mouthparts turned forward and somewhat downward. Last segment of maxillary palp expanded and obliquely truncate apically. Frons between eyes with narrow interrupted longitudinal suture. Antennae long; scape very thick in male and more slender in female, without a groove on basal half, in male with coarse rugose punctures (Fig. 41a), in female not rugose but with finer punctures (Fig. 42a); scape not reaching midlength of pronotum in either sex; pedicel very small; subsequent segments slender; in male 7th, in female 8th segment extends beyond tip of elytra; antennal segments with recumbent long hairs beneath. The relative length of antennal segments, male: 10.6:1:12.9:13.2:13.1:12.5:11.9:11.1:9.7:8.7:8.8 (variable in narrow range); female: 9.9:1:10.2:10.3:10.3:10.1:9.5:8.5:7.4:6.5:6.3 (variable in narrow range).

Pronotum broadest in middle, with acute conical lateral spines, near posterior and anterior margins with slight transverse constriction, with rugae on disc, and with dense minute punctures and dense gray pubescence. Scutellum not longer than width at base, apically rounded, with yellowish pubescence.

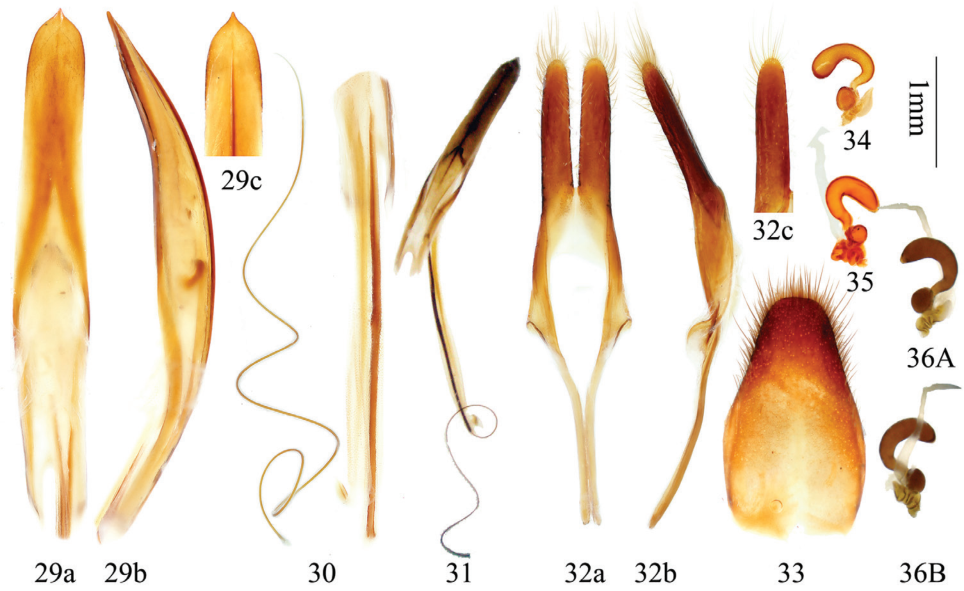
Elytra narrow, taper uniformly toward apex, length 3.0–3.4 times the total width at humeri, and anterior half with deep punctures forming several indistinct longitudinal rows. Abdominal ventrite V in female (Figs 26b, 34d) elongate, gently rounded posteriorly; in male (figs 28b, 33d) distinctly emarginate, with minute tender closely recumbent hairs. Legs long and slender, mesotibiae (of both male and female) without apical protruding lobe.

Male terminalia (Figs 29–33)**:** Tegmen (Fig. 32) approximately 5.0 mm in length; lateral lobes slender, length about 5 times the width, ventral side and apex with short setae; median lobe plus median struts (Fig. 29) slightly curved, longer than tegmen; the median struts less than 1/8 of the whole median lobe in length; apex of ventral plate bluntly pointed; internal sac bearing a basal armature (Fig. 29b) and two median rods of endophallus (Figs 30, 31), of which the strongly sclerotized one (coming from the gonopore) connected to a very long (much longer than the median rods) hair-like rod (inside ejaculatory duct, Fig. 30). Tergite VIII (Fig. 33) longer than broad, narrowed apically from middle, with rounded apex, apical half bearing short dorsal setae.



Figures 25–28. *Distenia orientalis* sp. n. **25** holotype, male, from Xitianmushan, Zhejiang, China **26** paratype, female, from Tianmushan, Zhejiang, China **27** paratype, female, from Fengyangshan, Zhejiang, China **28** paratype, male, from Wuyishan, Fujian, China **a** dorsal view **b** ventral view. Scale 5 mm.

Female terminalia (Figs 34–36)**:** Paraproct moderate in size, its baculi thick and long, straight and not bifurcate at base; valvifer indistinct; coxite with rough surface, each baculum very thick at base and narrowed towards apex; coxite lobes sclerotized



Figures 29–36. Genitalia of *Distenia orientalis* sp. n. **29–33** male, from Xitianmushan, Zhejiang, China **29** median lobe **30** rods of endophallus and hair-like thin rod of ejaculatory duct **31** whole median lobe, showing the position of rods of endophallus, not to scale **32** tegmen **a** ventral view **b** lateral view **c** dorsal view **33** tergite VIII in dorsal view **34–36** female, spermathecal capsule **35** from Fengyangshan, Zhejiang, China **34** & **36** from Tianmushan, Zhejiang, China. **A** & **B** from different sides. Scale 1 mm.

at each inner part, with tactile hairs; stylus articulated to the tip of each coxite lobe (slightly laterally), sclerotized except for apex and bearing tactile hairs; dorsal baculi sinuate and longer than paraproct baculi; proctiger baculi long and almost straight. Spermathecal capsule (Figs 34–36) large, heavily sclerotized and of very intricate structure, its apical part narrow, strongly bent at middle and basally with a protrusion (in shape of a question mark "?"), basal part irregularly twisted and with rather broad protrusion to which attaches the spermathecal gland at the middle part. Tignum much shorter than half of abdomen. In one measured specimen, tignum was 4.4 mm for an adult with 12.0 mm abdomen length in ventral view.

Diagnosis. The differences of the three species are shown in Table 1.

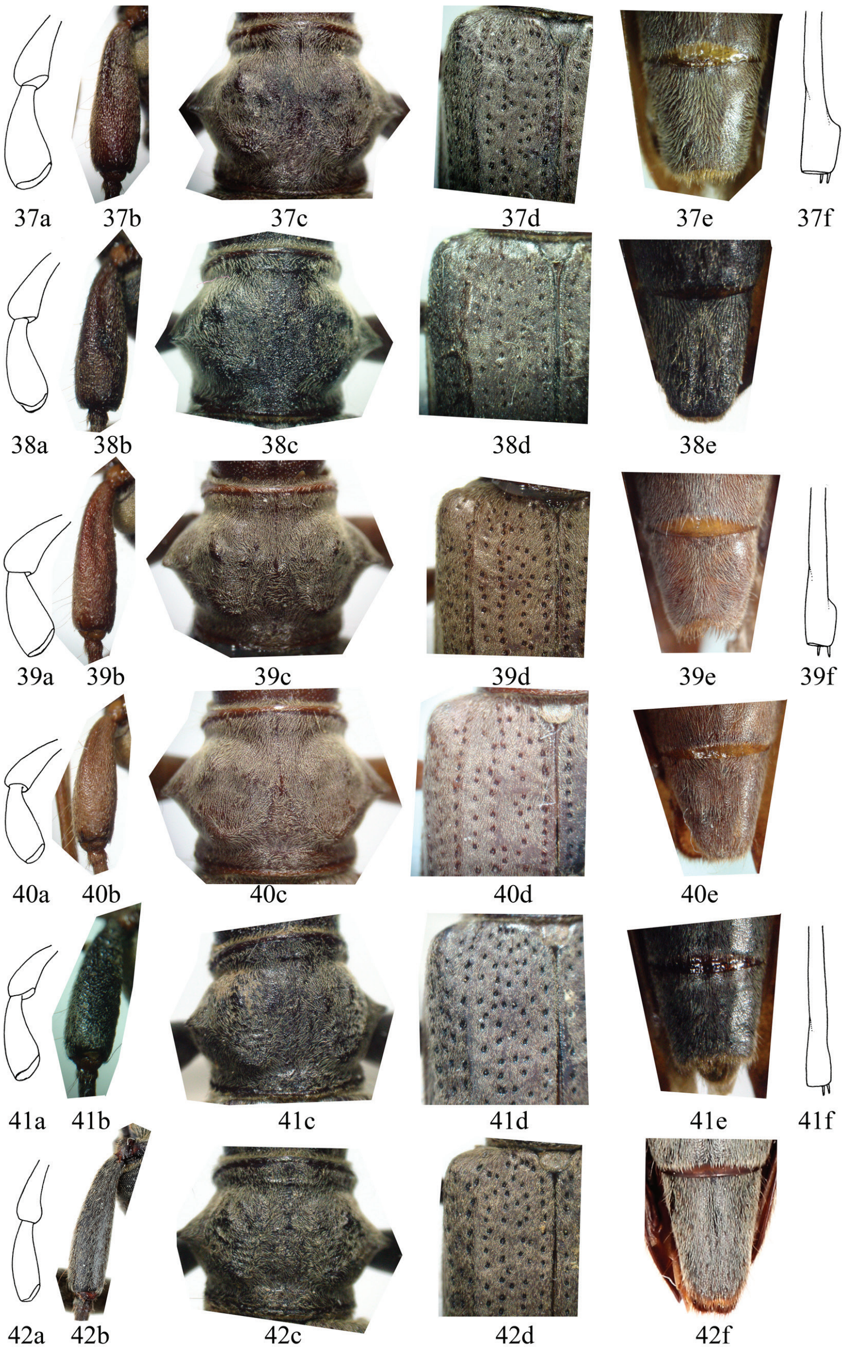
Etymology. The name of the new species refers to its distribution in southeast China, instead of northeast China (which is the distribution of *D. gracilis*).

Remarks. This species has been misidentified as *D. gracilis* since Gressitt (1951).

It is the 29th recorded species for the Chinese Disteniidae fauna (Lin et al. 2010; Lin and Murzin 2012).

One female from Mt. Wutaishan of Shanxi Province shows a strange dot on the distributional map. We believe that the distribution region will be extended after further survey.

Distribution. China: Zhejiang Prov., Fujian Prov., Guangdong Prov., Jiangxi Prov., Shanxi Prov.



Figures 37–42. Six important characters of *Distenia* spp. not to scale. **37–38** *D. gracilis*. **37** male from Far East, Russia **38** female from Liaoning, China **39–40** *D. japonica* **39** male from Kyoto, Japan **40** female from Kyoto, Japan **41–42** *D. orientalis* sp. n. **41** male from Tianmushan, China **42** female from Tianmushan, China **a** last segment of maxillary palp, showing the tip and the ration of length to width **b** scape **c** pronotum **d** basal part of elytron **e** ventrite V **f** mesotibia of male, showing the apical protruding lobe.

Specimens examined. Holotype, male, Zhejiang, Xitianmushan, alt. 1200 m, 2008.VII.2, coll. Hao Huang (SNUC, ex CBWX). **Paratypes: China, Zhejiang:** 1 male, Xitianmushan, alt. 1300 m, 2009.IV.19 (larva), 2009.V.14 (adult), coll. Wenxuan Bi (CBWX); 1 male, Xitianmushan, alt. 1100 m, 2008.III.1 (larva), 2008.V.27 (adult), coll. Wenxuan Bi (CBWX); 1 female, Tianmushan nature reserve, alt. 1100 m, 2008.VII.30, coll. Yongxiang Wu (CJM); 1 female, China, Chekiang, Tien-mu-shan, 1937.VI.30, coll. E. Surnson (ZMMU); 1 female, Xitianmushan, alt. 1000m, 2012.VII.11, coll. Deyao Zhou (CZDY); 1 female, Tienmushan, 1937.VIII.3 (IZAS, IOZ(E)1859289); 2 males, same data (IZAS, IOZ(E)1859290-91); 2 males, same data but 1937.VIII.4 (IZAS, IOZ(E)1859292-93); 1 male, same data but 1937.VII.21 (IZAS, IOZ(E)1859288); 1 female, Longquan, Fengyangshan, Lu'ao village, alt. 1100 m, 2008.VII.31, coll. Wenxuan Bi (CBWX); Qingyuan county, Baishanzu nature reserve, alt. 1000 m, 2009.VII.25-VIII.5, coll. Zhizhou Yu (CYZZ). **China, Fujian:** 1 male, Chong'an, Sangang, 1979.VIII.14 (IZAS, IOZ(E)1859287); 1 male, Fujian, Wuyishan nature reserve, 2009.VII.10–15. coll. Ming Jin (CJM). **China, Jiangxi:** 1 female, Wuyishan nature reserve, Yejiachang station, alt. 900 m, 2004.VIII.2 (CCCC). **China, Guangdong:** 1 female, Ruyuan county, Nanling nature reserve, 2008-2009, coll. Lei Gao (CCCC).

Additional specimen examined. China, Shanxi: 1 female, Wutaishan, alt. 2000 m, 1996.VII.17, coll. Wenzhu Li (IZAS, IOZ(E)1859062).

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RESEARCH ARTICLE

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A new species of *Haplothrips* from southern Iran (Thysanoptera, Phlaeothripidae)

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Abstract
Haplothrips herajius **sp. n.** is described from leaves and flowers of a species of *Suaeda* in the south of Fars Province, Iran. This is the second Iranian species of *Haplothrips* with the unusual character state of extra setae on the metanotum. Information on variation in color and structure of the new species is provided. The similarities and host plant associations of this new species and *H. kermanensis* are discussed, as both are phytophagous on species of Chenopodiaceae.

Keywords
Haplothrips, new species, phytophagous, *Suaeda* sp.

Introduction

Traditionally and still widely accepted, the known species of thrips are placed in a single order, the Thysanoptera, within which two suborders are recognized, the Terebrantia and Tubulifera (Mound et al. 1980, Mound and Morris 2007, Buckman et al. 2013). The suborder Tubulifera comprises a single family, the Phlaeothripidae with about 3500 described species (Mound 2013) classified into two subfamilies. In the more speciose of the subfamilies, the Phlaeothripinae, *Haplothrips* Amyot &

Serville, with 226 species worldwide, is the second largest genus, exceeded in number of described species only by *Liothrips* Uzel with 250 species (Mound 2013). Most species in this genus are Eurasian with just three described from South America (Mound and Zapater 2003, see also Goldarazena et al. 2012) and some world-wide in distribution (Pitkin 1976).

Among 20 genera of Phlaeothripidae recorded from Iran so far (Minaei 2013), the genus *Haplothrips* is considered to be the richest in this country (Minaei and Mound 2008). Apart from some species that are predators on other arthropods (Putman 1965, Bailey and Caon 1986, Palmer and Mound 1990, zur Strassen 1995, Kakimoto et al. 2006, Okajima 2006) most species in this genus live on two plant families, Asteraceae and Poaceae, with a few species found on plants in other families. One of these is *H. kermanensis* zur Strassen which was described from Iran based on specimens collected on *Haloxylon* sp. (Chenopodiaceae) (zur Strassen 1975), and this appears to be a specific host for this thrips (Minaei and Mound 2008). The objective of this paper is to describe a new species of *Haplothrips* collected on another chenopod species, *Suaeda* sp. These two thrips species are very similar in structure as discussed below.

Materials and methods

The new species discussed below was collected by beating leaves and flowers of *Suaeda* sp. (Chenopodiaceae) onto a plastic tray. The specimens were removed with a fine brush into a collecting vial containing 90% ethyl alcohol. They were then mounted onto slides in Canada balsam using a form of the protocol given by Mound and Kibby (1998). The line drawings were sketched using a drawing attachment. Terminology follows Mound and Minaei (2007) and Minaei and Mound (2008). The holotype and other specimens studied here are deposited in the collection of the Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, Iran. A few paratypes are deposited in the Australian National Insect Collection, Canberra and the Natural History Museum, London. The following abbreviations are used for pronotal setae: am—anteromarginals; aa—anteroangulars; ml—midlaterals; epim—epimerals; pa—posteroangulars.

Taxonomy

Haplothrips herajius **sp. n.**
urn:lsid:zoobank.org:act:FFCC20A9-BDC2-4700-B252-C87F008BA82B
http://species-id.net/wiki/Haplothrips_herajius

Type material. Holotype female, Iran, Fars Province, Mohr, Heraj village; *Suaeda* sp. (leaves), 31.iii.2012. (Mohsen Abdolahi); Paratypes: 58 females, 11 males taken with holotype; 14 females, 3 males, same place, *Suaeda* sp. (flowers), 21. ix. 2012.

Description. Female macroptera. Body brown (paler in summer forms), all tarsi, fore tibiae in distal half, distal apex of mid and hind tibiae are yellow; antennal segments I–II brown but the color of remaining segments variable depending on collecting date (III–VI yellow, VII–VIII yellow-brownish in summer forms; III yellow, IV–VIII yellow-brownish, gradually darker brown in spring forms); fore wing pale except for basal area; major body setae as well as sub-basal wing setae pale but tergite setae and anal setae slightly shaded at base.

Antennae 8-segmented, segment III with two, IV with four sensoria, VII slightly constricted at base, VIII short and broad at base (Fig. 1). Head a little longer than wide with maxillary stylets 0.2–0.3 of head width apart, retracted anterior to post ocular setae; post ocular setae blunt or capitate, extending to posterior margin of eye (Fig. 2). Cheeks weakly rounded. Maxillary bridge well developed. Mouth cone rounded.

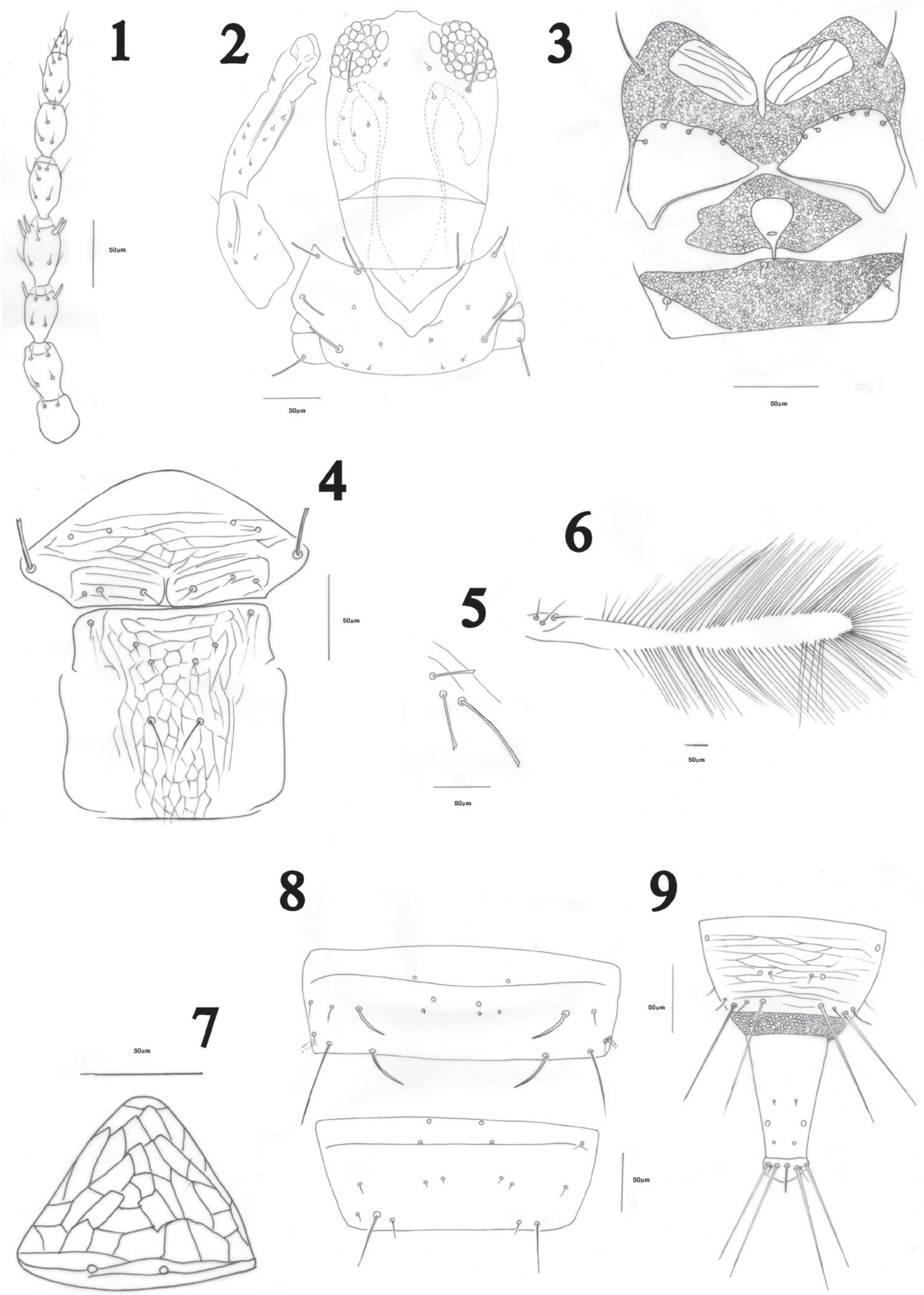
Pronotum transverse, without sculpture lines except close to posterior margin; notopleural sutures complete; five pairs of developed setae present: am, aa, ml, epim and pa, all blunt or capitate (Fig. 2); prosternum with paired basantra and ferna as well as a spinasternum, ferna broad (Fig. 3). Mesonotum transversely weakly reticulate, with no microtrichia, lateral setae well developed, weakly capitate (Fig. 4). Mesopresternum eroded medially (Fig. 3). Metanotum reticulate, with no microtrichia, median setae slender and acute, arise on posterior half of sclerite, with 2–4 small setae on anterior half (Fig. 4). Fore tarsal tooth conspicuous (Fig. 2). Fore wing constricted medially (Fig. 6), sub-basal setae S1, S2 and S3 blunt or capitate, their bases arranged in a triangle (Fig. 5), 2–7 duplicated cilia present (Fig. 6).

Pelta triangular, weakly reticulate (Fig. 7). Tergite II–VII with wing-retaining setae, anterior pair weaker than posterior one, these being weakest on tergite II; tergites II–VII with a few lines of sculpture and 3–5 discal setae lateral to two pairs of developed wing-retaining setae; marginal setae S1 and S2 on tergites VII–IX long and finely pointed, S2 on other tergites finely pointed but S1 usually blunt, rarely finely pointed and sometimes variable on different tergites, tending to be more pointed on posterior than anterior tergites. Tergite VII with two campaniform sensilla not close to each other, separated by at least 0.1 width of tergite, with four micro-setae laterally; tergite VIII campaniform sensilla further apart, more than two times as those on tergite VIII, three to four micro-setae between sensilla or sometimes in front of them (Fig. 8). Tube short, about twice as long as basal width (Fig. 9); anal setae usually longer than tube.

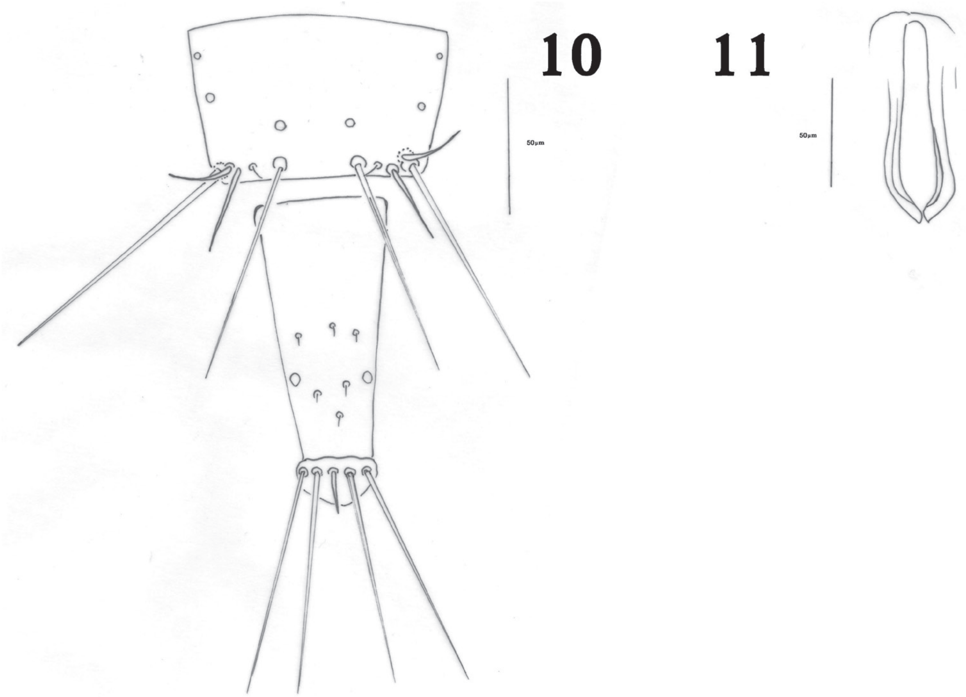
Measurements. (holotype female, in microns). Body distended length 1845. Head, length 190; median width 180; postocular setae 35. Pronotum, length 35; width 68; major setae am 34, aa 33, ml 26, epim 51, pa 43. Fore wing length 700; sub-basal wing setae 41, 50, 68. Tergite IX setae S1 95, S2 85. Tube length 108; basal width 58. Antennal segments III–VIII length 38, 47, 43, 41, 33, 21.

Male macroptera. Color and structure similar to female. Sternites with no pore plates; tergite IX setae S2 short and stout (Fig. 10). Pseudovirga spoon shaped at apex (Fig. 11).

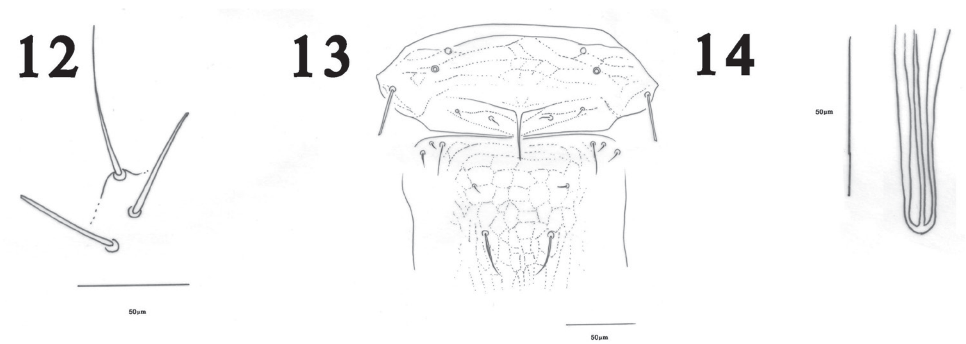
Diagnosis. The reticulation on the mesonotum and metanotum of *H. herajius* (Fig. 4) is unique among Iranian *Haplothrips* as well as for most other *Haplothrips* species. In other species of *Haplothrips* recorded from Iran, this reticulation is weakly



Figures 1–9. *Haplothrips herajius* sp. n. Female. **1** Antenna **2** Head and pronotum **3** Prosternum and mesopresternum **4** Mesonotum and metanotum **5** Sub basal wing setae **6** Forewing **7** Pelta **8** Tergites VII-VIII **9** Tergite IX and tube.



Figures 10–11. *Haplothrips herajius* sp. n. Male **10** Tergite IX and tube **11** Pseudovirga.



Figures 12–14. *Haplothrips kermanensis*. Female **12** Sub basal wing setae **13** Mesonotum and metanotum. Male **14** Pseudovirga.

developed or absent. The new species is very close to *H. kermanensis*. Both species have extra setae on metanotum (Figs 4, 13) that are not seen in other Iranian species of *Haplothrips*. Moreover, in both species the basal wing setae are arranged in a triangle (Figs 5, 12) (this arrangement in *H. kermanensis* was not reported by Minaei and Mound (2008), and the apex of the mid and hind tibiae are pale, also a conspicuous fore tarsal tooth is present in both species. However, the number of small setae anterior to the median pair of metanotal setae in the new species is variable, 2–4 (rarely 0, 5 or 6), whereas available specimens of *H. kermanensis* all consistently have one pair. In addition, am setae on the pronotum in *H. herajius* are blunt or capitate in contrast to *H. kermanensis* in which they are pointed. Furthermore, fore wing sub-basal setae S3 in the new species is blunt compared with weakly pointed in *H. kermanensis*. Males of the two species are clearly different in genitalia: spoon shaped in *H. herajius* but rod shaped in *H. kermanensis* (Figs 11, 14).

Variability. Color of body and antennal segments varies among specimens, being paler in summer specimens compared with specimens collected in early spring. The fore tarsal tooth is conspicuous, but variable from small to large among male specimens. Maxillary stylets are retracted to postocular setae but rarely are low in the head and not reaching the postocular setae. Moreover, in a few specimens, the pronotal am setae are not developed.

Etymology. Heraj is a village of Mohr city in the south of Fars Province, south of Iran which is located 300 km south of Shiraz, the capital of Fars Province.

Discussion

The presence on two separate chenopod species of two *Haplothrips* species that share unusual character states, as discussed above, is interesting. The large number of collected specimens of *H. herajius* on both leaves (early spring) and flowers (late summer) of *Suaeda* sp. suggest that the new species is phytophagous, and apparently this plant species is a specific host for the new species in that area. Recently Minaei et al. (2012) described another thrips species, *Ankothrips zayandicus* (Melanthripidae), from the same plant in Isfahan Province, central Iran.

Considering that most species of Chenopodiaceae bloom in summer months, the specimens studied here were collected at two seasons: in early spring on leaves and in late summer on flowers. The color of body and antennae differs between specimens collected at these two seasons as mentioned above. This difference is remarkable because the effect of temperature on body color during development was not noticed in any species of *Haplothrips* so far. However, in onion thrips, *Thrips tabaci*, a well-known pest of thripid family, experiments showed low temperatures during pupal development induce dark adult body color (Murai and Toda 2002). Similarly, in Australia an endemic and very common thrips, plague thrips, *Thrips imaginis*, is commonly dark after winter but pale yellow during summer (Mound and Masumoto 2005).

Bhatti et al. (2009) in their book on the Thysanoptera of Iran listed 29 species of *Haplothrips*, among them two species (*Haplothrips bagnalli, Haplothrips* nr. *bagrolis*) reported by Manzari (2004) from Iranian islands. However, only one *Haplothrips* (*H. bagnalli*) was reported by him (the other two species were thripids), although towards the end of the report he introduces, obscurely, a comparison between *H.* nr *bagrolis* and *H. ganglbaueri*. The somewhat cursory report was published in an informal newsletter and, given its nature; the presence of both species in Iran requires further verification. Similarly, the report of three other species, *caespitis*, *minutus* and *rabinovitchi* by Bagheri and Alavi (2007) needs to be confirmed (Minaei and Mound 2008, Bhatti et al. 2009). Moreover, Minaei and Mound (2010) demonstrated that *H. cerealis* does not occur in Iran, the reported occurrence of this species being a misidentification of *H. tritici*. So with the addition of the species described here, the confirmed Iranian species in *Haplothrips* comprise 24 species i.e. about 12% of the total Thysanoptera fauna in this country. Similarly this genus comprises about 8% of Thysanoptera fauna in Britain (Collins 2010). In contrast, the species composition of the Australian insect fauna (southern Hemisphere) is very different and the species of *Haplothrips* comprise about 3% of the known thrips fauna of that continent (Mound and Minaei 2007).

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