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Research article

Epiverta Dieke (Coleoptera: Coccinellidae: Epilachnini): A Complex of Species, Not a Monotypic Genus

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Abstract

Rich sampling and modern research techniques, including SEM, revealed that rarely collected epilachnine species *Epiverta chelonia* is a complex of four closely related species: *E. chelonia* (Mader, 1933), *E. albopilosa, E. angusta*, and *E. supinata* spp. nov. All *Epiverta* species are described and illustrated, a key to the species and a distribution map are provided. Lectotype of *Solanophila chelonia* Mader, 1933 is designated and its type locality delimited to Yunnan Province, Deqin County (China).

Key words: entomology, taxonomy, Coccinelloidea, *Epiverta*

Epilachnini Mulsant, as currently defined (Szawaryn et al. 2015, Tomaszewska and Szawaryn 2016), with its over 1,000 described species is one of the largest groups and the only primarily phytophagous group of the mostly predatory family Coccinellidae. The family is classified in the superfamily Coccinelloidea (Robertson et al. 2015)—former Cerylonid Series of the superfamily Cucujoidea (e.g. Crowson 1955, Robertson et al. 2008, Lord et al. 2010, Ślipiński and Tomaszewska 2010, Bocak et al. 2014).

Historically Epilachninae was divided into four tribes: Epilachnini Mulsant, Madaini Gordon, Epivertini Pang & Mao and Eremochilini Gordon & Vandenberg (Jadwiszczak and Węgrzynowicz 2003). Seago et al. (2011) however combined these into a single tribe Epilachnini within a broadly defined subfamily Coccinellinae. This was confirmed by molecular and morphology based research by Szawaryn et al. (2015) who reconstructed phylogeny of Epilachnini confirming its monophyly, and proposed a modern classification of this tribe.

Szawaryn et al. (2015) made the first attempt to test monophyly of formerly recognized genera of phytophagous Coccinellidae (Jadwiszczak and Węgrzynowicz 2003, Szawaryn and Tomaszewska 2013, Tomaszewska and Szawaryn 2013). As a result of that study, 27 genera of the tribe have been recognized.

Epiverta Dieke is very distinctive among Epilachnini, easily recognized by its very widely explanate elytral lateral margins and lack of metaventral and abdominal postcoxal lines. In the molecular and combined phylogenetic analyses (Szawaryn et al. 2015) *Epiverta* was recovered as sister taxon to the remaining genera of Epilachnini, as the next lineage after the split of the Asian clades formed from the former *Epilachna* species (*Afissa*, *Diekeana*, *Ryszardia* = *Uniparodentata*—Szawaryn *et al.* 2015, Tomaszewska and Szawaryn 2016). In morphological analysis, it was placed closely to the former *Epilachna* species from Asia or to *Papuaepilachna* plus the Papuan species of *Henosepilachna* (Szawaryn et al. 2015).

The genus *Epiverta* was established by Dieke (1947) for *Solanophila chelonia* Mader, 1933, described originally from Sichuan and Tibet (Mader 1933). Comprehensive investigations of the Epilachnini materials from the museum historical collections and recently collected samples of Chinese ladybirds, carried out by the authors, revealed in new findings. Apart from the type species *E. chelonia*, three new species have been recognized and are described here as *Epiverta albopilosa, E. angusta*, *E. supinata* spp. nov. This genus is known only from China.

Material and Methods

This study was based on examination of material from the following museums:

- IOZ—The Institute of Zoology, Chinese Academy of Science, Beijing, China;
- MIZ—Museum and Institute of Zoology PAS, Warszawa, Poland;
- MNHN—Muséum National d'Histoire Naturelle, Paris, France;
- BMNH—The Natural History Museum, London, United Kingdom;

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- NHMV—Naturhistorisches Museum, Vienna, Austria;
- SCAU—Department of Entomology, South China Agriculture University, Guangzhou, China

Genitalia of both sexes were dissected, cleared in a 10% solution of KOH, rinsed with distilled water, transferred to glycerol, and examined on slides. Photographs were taken from slide preparations using a digital camera attached to Leica microscope (www.leica-microsystems.com). After examination the genitalia were transferred to microvials and pinned beneath the specimens. Measurements were made using an ocular micrometer attached to an Olympus (SZX 16) (www.olympus-global.com) dissecting microscope. The following measurements as shown in Fig. 1a–d were made and are used in descriptions: TL—total length, from apical margin of clypeus to apex of elytra; PL—pronotal length, from the middle of anterior margin to margin of basal foramen; PW—pronotal width at widest part; EL—elytral length across sutural line including scutellum; EW—elytral width across both elytra at the widest part; ED—width of elytral disc, across both elytra, measured at the same position as EW; BH—body height; ventral surfaces: pl—length of prosternum in front of procoxa; pp—width of prosternal process medially between procoxae; mp—width of mesoventral process medially between mesocoxae; eew—elytral epipleuron width in widest part; een—elytral epipleuron width in narrowest part; mf—mesofemur length. Scanning electron images were made using a HITACHI S-3400N machine (www.hitachi.com) in the Electron Microscopy Laboratory of the MIZ. Photographs of total specimens were produced using a digital camera, and enhanced using Helicon Focus software. The final plates were prepared using Adobe Photoshop CS.

The species descriptions start from the type species then are ordered alphabetically.

Labels of many specimens written originally in Chinese have been translated here to Latin alphabet (by LH) and new labels have been printed and attached to specimens examined—these labels are marked with asterisk (*) in the "Type Material" and "Other Material Examined" sections under each species description.

The beetle-specific terminology and classification follow Ślipiński and Tomaszewska (2010).

Nomenclature

This article and the nomenclatural acts it contains have been registered in Zoobank (www.zoobank.org), the official register of the International Commission on Zoological Nomenclature. The LSID (Life Science Identifier) number of the publication is: urn:lsid:zoobank.org:pub:6D40CA1B-AE6D-482F-BC40-3480BC1AFCE6.

Results

Genus Diagnosis and Species Descriptions

***Epiverta* Dieke, 1947**

Epiverta Dieke, 1947: 169. Type species: *S. chelonia* Mader, 1933 (by original designation).—Pang and Mao 1979: 159; Jadwiszczak and Węgrzynowicz 2003: 208; Kovár 2007: 631; Szawaryn et al. 2015: 556, 565; Tomaszewska and Szawaryn 2016: 47, redescription.

Diagnosis. Epiverta is easily recognizable by the following combination of characters: body (Fig. 2a–x) of males weakly smaller, more oval and less convex than in females, gular sutures at least as long as half length of gula; antenna longer than head width; scutellum transverse or as long as wide; epipleura with at least weak foveae for

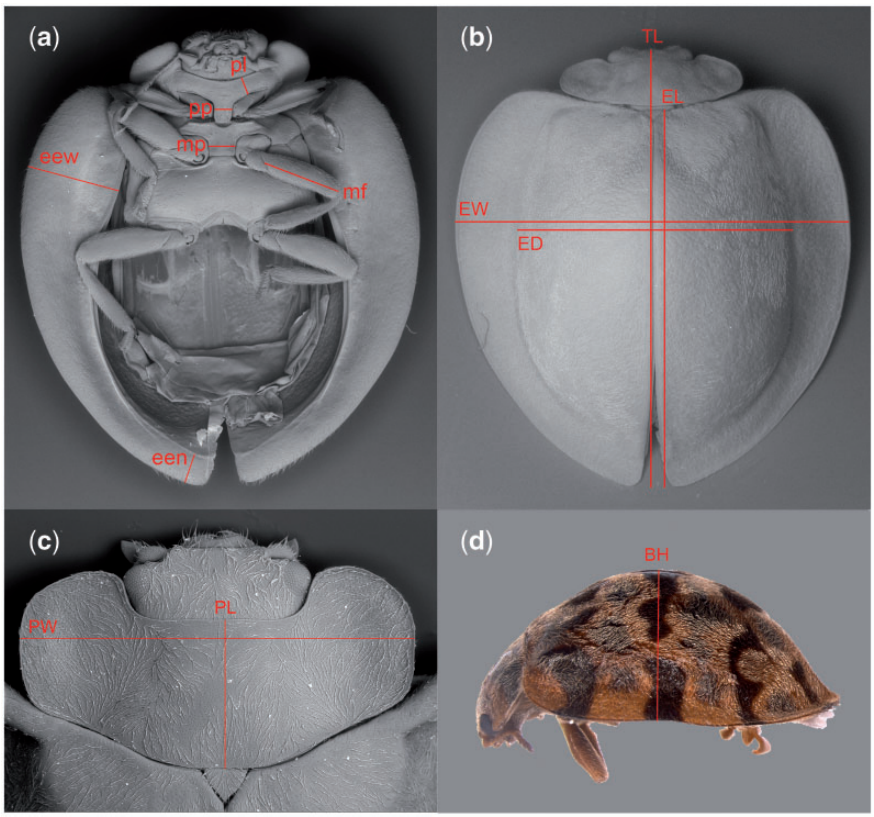

Fig. 1. Measurements. (a, b) *E. chelonia* (Mader). (c) *Epiverta supinata* sp. nov. (d) *Epiverta albopilosa* sp. nov.

receiving tips of femora; inner margin of epipleuron with bordering line extending at most to level of mid coxa; fore and mid trochanters simple; tergite VIII of both sexes weakly emarginate medially at apex; penis guide on outer edge broadened in apical part in lateral view, pointed at apex; ventral surface of coxite with sclerotized pocket antero-medially; apodeme of male sternum IX absent; metaventral and abdominal postcoxal lines absent or sometimes poorly developed postcoxal lines visible on metaventrite.

Distribution. Southwest China (including Tibet) (Fig. 3).

Epiverta chelonia (Mader)
(Figs. 2m–r, 3, 4a–g, and 5a–d)

Solanophila chelonia Mader, 1933: 79. Type locality: Yunnan Province, Deqin County, China.

Epiverta chelonia: Dieke 1943:169.—Pang and Mao 1979: 159; Jadwiszczak and Węgrzynowicz 2003: 208; Tomaszewska and Szawaryn 2016: 47.

Differential Diagnosis. *Epiverta chelonia* most closely resembles *E. supinata* in its body shape and color pattern on the elytra, however

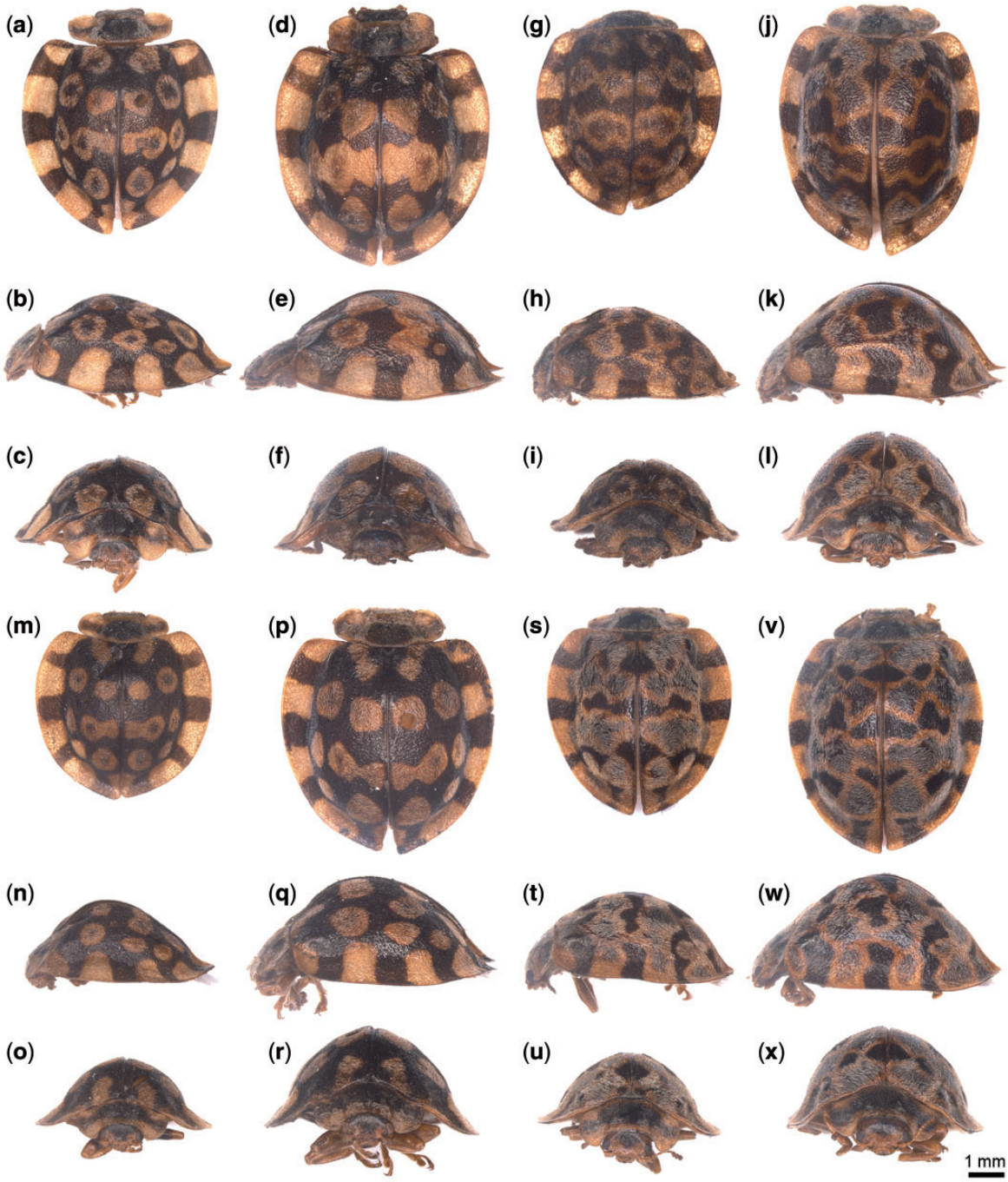

Fig. 2. Habitus: (a, b, c) *Epiverta supinata* sp. nov., male—dorsal, lateral and anterior. (d, e, f): *Epiverta supinata* sp. nov., female—dorsal, lateral and anterior. (g, h, i) *Epiverta angusta* sp. nov., male—dorsal, lateral and anterior. (j, k, l) *Epiverta angusta* sp. nov., female—dorsal, lateral and anterior. (m, n, o) *E. chelonia* (Mader), male—dorsal, lateral and anterior. (p, q, r) *E. chelonia* (Mader), female—dorsal, lateral and anterior. (s, t, u) *Epiverta albopilosa* sp. nov., male–dorsal, lateral and anterior. (v, w, x) *Epiverta albopilosa* sp. nov., female—dorsal, lateral and anterior.

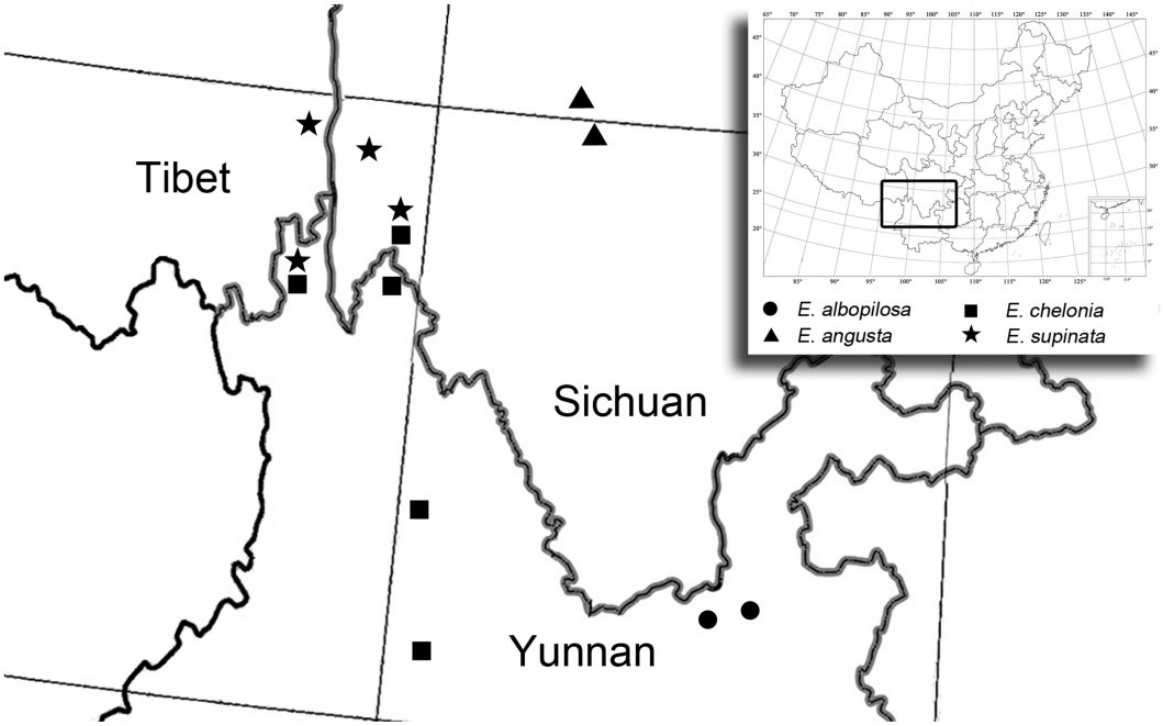

Fig. 3. Distribution map of the genus *Epiverta*.

E. chelonia can be separated from that species by having humeral margins of the elytra simple (Fig. 4c and f) (at most weakly thickened but not upturned) and lateral margins of the pronotum evenly arcuate (Fig. 4b). Moreover, the following combination of characters distinguish *E. chelonia* from its congeners: (1) penis guide not longer than parameres, (2) tegminal strut more or less distinctly emarginate at its apex, (3) anterior elytral maculae (near scutellum) in form of weakly arcuate, most often uniformly yellow stripes or sometimes with inner dark marking (Fig. 2m and p).

Description. Length 5.55–7.55 mm; TL/EW = 1.07–1.20; PL/PW = 0.38–0.42; EL/EW = 0.88–1.01; TL/BH = 2.36–2.70.

Body regularly oval (Figs. 2m and p, 4f). Background of elytra distinctly brownish black with regular yellow maculae arranged as in Fig. 2m and p. Pubescence moderately dense and moderately long, yellowish.

Head (Fig. 4b) with interocular distance 0.68 times as wide as head across eyes. Antenna (Fig. 4a) with antennomere 3 about 1.25 times as long as antennomere 4 and about 1.15 times as long as 5; antennomere 4 about 0.90 times as long as antennomere 5. Terminal maxillary palpomere about 1.12 times wider than long (Fig. 4e).

Pronotum with lateral margins evenly arcuate (Fig. 4b). Prosternal process 0.62–0.74 times as wide as mesoventral process (pp/mp) (Fig. 4d); 0.80–0.97 times as wide as length of prosternum in front of procoxa (pp/pl). Elytra with lateral flattened margins scarcely narrowing toward elytral apices (Fig. 4f); humeral margins at most weakly thickened and raised (Fig. 4c); elytral total width 1.35–1.48 times of elytral disc width (EW/ED); elytral epipleuron in widest part 2.75–4.00 times as wide as epipleuron in narrowest part (eew/een), 2.65–3.40 times as wide as mesoventral process (eew/mp) and 0.90–1.07 as wide as mesofemur length (Fig. 4g) (eew/mf).

Abdomen. Hind margin of male ventrite 5 widely emarginate. Hind margin of male ventrite 6 excised. Male tergite VIII subtruncate to weakly emarginate. Tergite × transverse subtruncate to scarcely emarginate at apex. In females apical margin of ventrite 5 weakly emarginate; ventrite 6 rounded apically; tergite VIII subtruncate to scarcely excised apically.

Male genitalia. Aedeagus stout. Tegmen (Fig. 5b and c) with parameres scarcely longer than penis guide; tegminal strut truncate or emarginate apically; anterior margin of tegminal plate weakly produced, emarginate or simply rounded medially (without pointed triangular projection medially). Penis guide with pointed apex almost straight or weakly curved backwards in lateral view (Fig. 5b). Penis with remnant of inner arm of reduced basal T-shaped capsule in form of regular triangle (Fig. 5a).

Female genitalia (Fig. 5d) with proctiger (TX) weakly excised at apex; coxites with styli well developed; spermatheca weakly curved in about half length; accessory gland about 2 times longer than spermatheca.

Type Material. Lectotype of *S. chelonia* Mader, male, YUNNAN PROVINCE, "Thibet. Atentse [=Deqin]. (R. P. Goutelle)./Coll. Mus. Vindob./Für diese Art [...] jetzt eine neue Gattung gemacht worden (hand writing)/*S. chelonia* Mad., det. Mader" (NHMV). Paralectotype of *S. chelonia* Mader, female, "Thibet. Atentse [=Deqin]. (R. P. Goutelle)/Epilachna chelonia Fairm." (MNHN).

Other Material Examined. YUNNAN PROVINCE, "Yunnan Province, Deqin County, 3,300 m, 2.IX.1987, Wang Shuyong leg./IOZ(E) 626305″ (*one: MIZ); same but IOZ(E) 626306″ (*one: IOZ); "Yunnan Province, Zhongdian County, Wegnshui Village, 3,000 m, 10.VII.1982, Zhang Xuezhong leg./IOZ(E) 626243″ (*one female: MIZ); "Yunnan Province, Deqin County, Meili Snow Mountain, 3,350 m, 25.VII.1982, Zhang Xuezhong leg./IOZ(E) 626307″ (*one male: IOZ); same but IOZ(E) 626308 (*one female: MIZ); "CHINA: NW-Yunnan, 10 km SW Lijiang, 2,500 m, 5.7.1994, leg. Schillhammer (13)″ (one female: MIZ, and two:

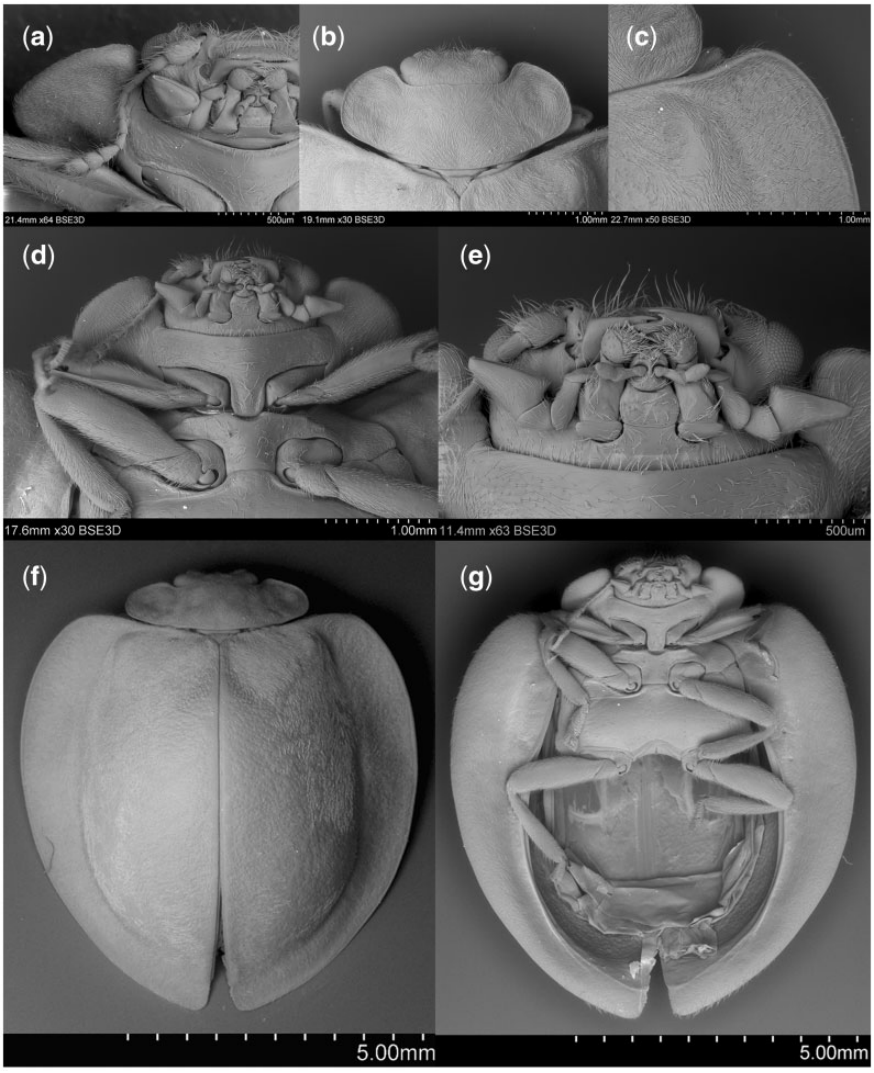

Fig. 4. *E. chelonia* (Mader): (a) antenna, (b) pronotum, (c) antero-lateral margin of elytron, (d) prosternum and mesoventrite, (e) mouthparts, (f) habitus, dorsal view, (g) habitus, ventral view.

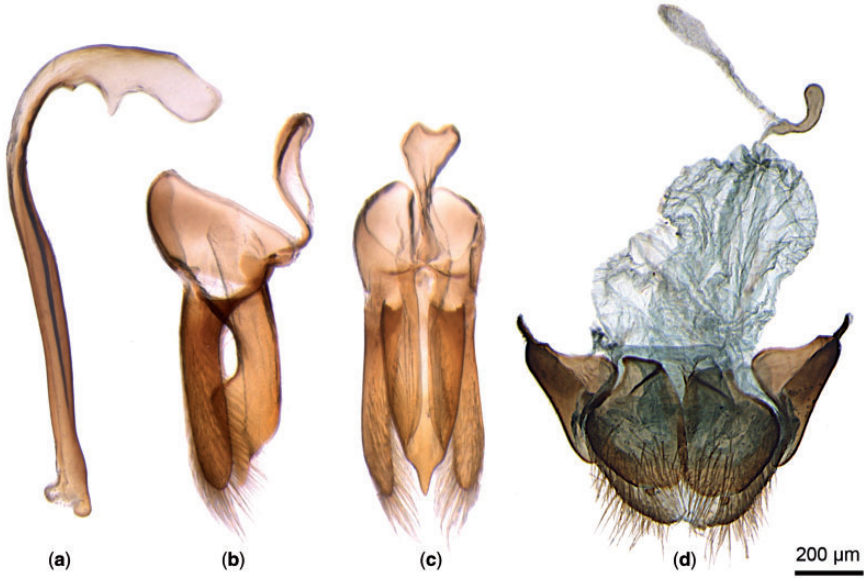

Fig. 5. *E. chelonia* (Mader): (a) penis, (b) tegmen, lateral, (c) tegmen, ventral, (d) female genitalia.

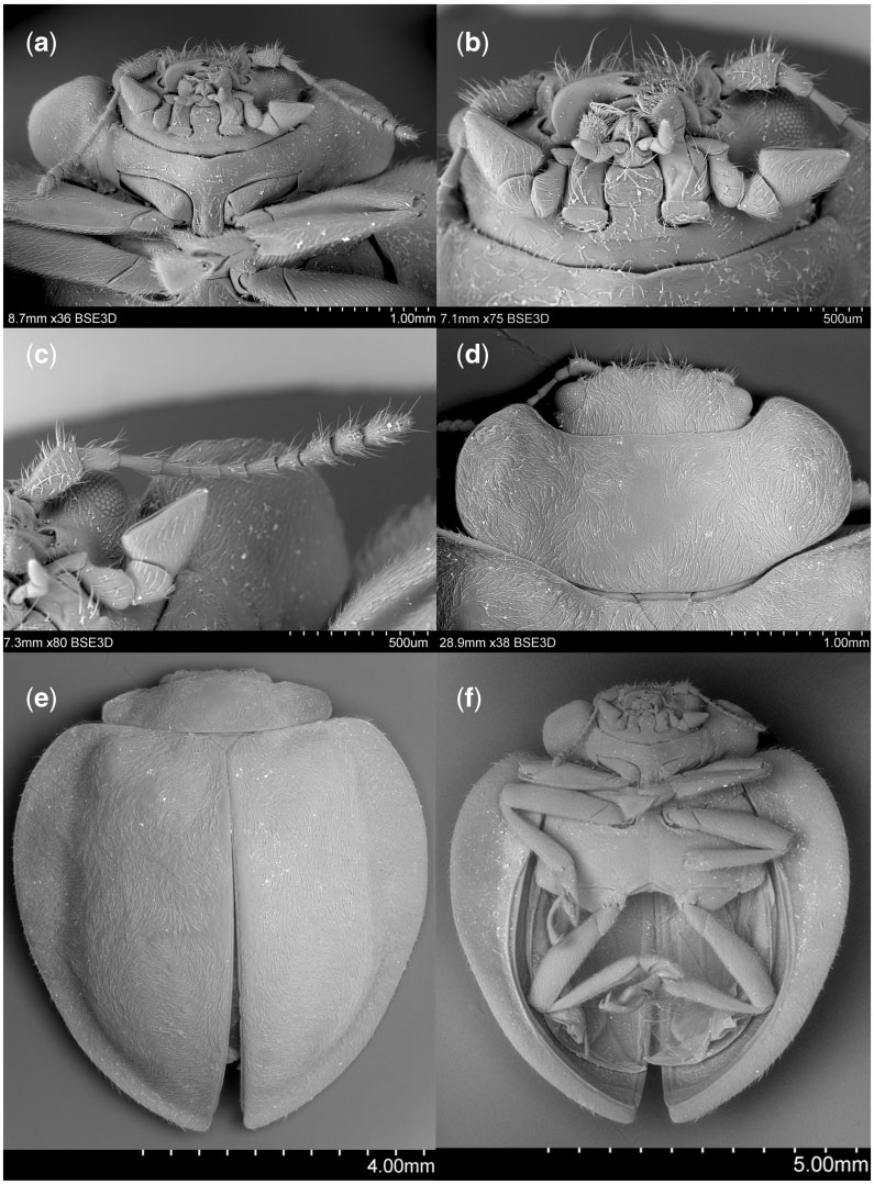

Fig. 6. *Epiverta albopilosa* sp. nov.: (a) head and prothorax, ventral view, (b) mouthparts, (c) antenna, (d) pronotum, (e) habitus, dorsal view, (f) habitus, ventral view.

NHMV); "Yunnan Province, Dali, Cangshan Mountain, 2,850 m, 30.VI.1981, Wang Shuyong leg./IOZ(E) 626310″ (*one male: MIZ); same but IOZ(E) 626311″ (*one female: IOZ); "Yunnan Province, Lijiang City, 3100 m, 27.V.1980, Wang Linyao leg./IOZ(E) 626285″ (*one male: IOZ). SICHUAN PROVINCE, "China, S.W. Sichuan, Qingmai 3,000 m, N28°48′46.7″, E099°52′09.2″, 3.7.2006, lgt. Janata M./BMNH(E), 2006-158, M Janata/Epiverta sp., det. R.G. Booth 2006″ (female and male: BMNH).

Distribution. Southwest China: NW Yunnan, SW Sichuan (Fig. 3).

Epiverta albopilosa sp. nov
(Figs. 2s–x and 3, 6a–f, 7a–d)
(urn:lsid:zoobank.org:act:D00BEA06-441F-4757-A8C8-8DF76B9FD0AE)

Etymology. The name of the new species refers to white, dense pubescence covering the body, especially its dorsal surfaces.

Differential Diagnosis. *Epiverta albopilosa* resembles *E. angusta* in its dorsal coloration—background and maculae more irregular (as compared with *E. chelonia* and *E. supinata*) with background color of the elytra hard to distinguish (Fig. 2a and v). Both species are also similar in having white or greyish elytral pubescence. *E. albopilosa*, however, can be distinguished from that species and also from *E. chelonia* and *E. supinata* by: (1) antennomere 3 much longer than 4, (2) dorsal surfaces covered with dense and comparatively long, white pubescence, (3) elytral lateral flattened margins widest in about 1/3 of elytral length thence narrowing towards elytral apices, (4) penis base of different shape (Fig. 7a).

Description. Length 6.10–7.73 mm; TL/EW = 1.18–1.24; PL/PW = 0.41–0.42; EL/EW = 0.99–1.04; TL/BH = 2.40–3.00.

Body oval in males and elongate oval in females (Figs. 2s and v and 6e). Dorsum bicoloured: brownish black and orange–yellow but with background of elytra hard to distinguish; maculae irregular as in Fig. 2s and v. Pubescence dense, comparatively long, white.

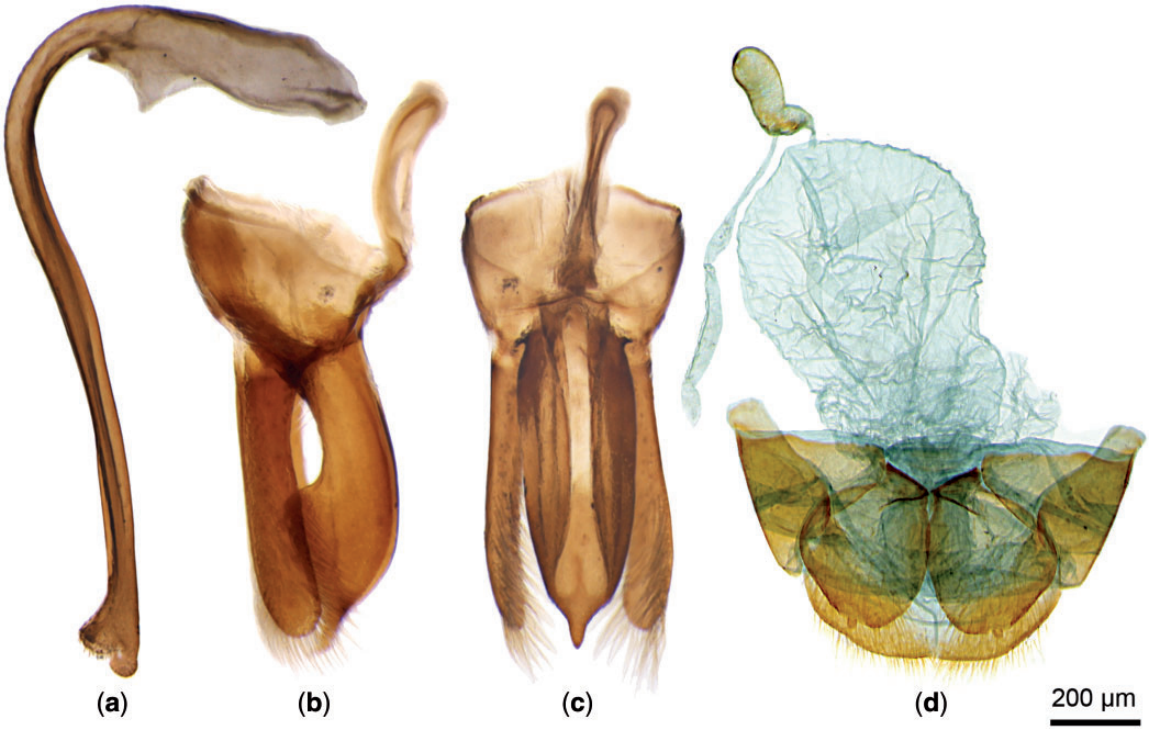

Fig. 7. *Epiverta albopilosa* sp. nov.: (a) penis, (b) tegmen, lateral, (c) tegmen, ventral, (d) female genitalia.

Head (Fig. 6d) with interocular distance 0.70 times as wide as head across eyes. Antenna (Fig. 6a and c) with antennomere 3 about 1.80 times as long as antennomere 4 and about 1.38 times as long as 5; antennomere 4 about 0.80 times as long as antennomere 5. Terminal maxillary palpomere about as wide as long (Fig. 6b).

Pronotum with lateral margins evenly arcuate (Fig. 6d). Prosternal process 0.62–0.80 times as wide as mesoventral process (pp/mp) (Fig. 6a); 0.82–0.96 times as wide as length of prosternum in front of procoxa (pp/pl). Elytra with lateral flattened margins gradually narrowing from about 1/3 of elytral length toward their apices (Fig. 6e) humeral margins simple; elytral total width 1.22–1.32 times of elytral disc width (EW/ED); elytral epipleuron in widest part 3.05–3.85 times as wide as epipleuron in narrowest part (eew/een), 2.70–3.20 times as wide as mesoventral process (eew/mp) and 0.70–0.82 as wide as mesofemur length (eew/mf) (Fig. 6f).

Abdomen. Hind margin of male ventrite 5 truncate to weakly emarginate. Hind margin of male ventrite 6 weakly emarginate. Male tergite VIII scarcely emarginate. Tergite × transverse truncate at apex. In females apical margin of ventrite 5 truncate; ventrite 6 subtruncate apically; tergite VIII rounded to subtruncate apically.

Male genitalia. Aedeagus stout. Tegmen (Fig. 7b and c) with parameres slightly shorter than penis guide; tegminal strut rounded apically; anterior margin of tegminal plate weakly produced, simply rounded medially or scarcely emarginate medially. Penis guide with pointed apex distinctly upturned backwards (visible in lateral view) (Fig. 7b). Penis with remnant of inner arm of reduced basal T-shaped capsule comparatively large, irregularly triangular (Fig. 7a).

Female genitalia (Fig. 7d) with proctiger (TX) scarcely excised at apex; coxites with styli well developed; spermatheca variable, shorter weakly curved near base or longer curved near mid length; accessory gland about 3 times longer than spermatheca.

Type Material. Holotype, male, YUNNAN PROVINCE, "CHINA, Yunnan Prov., Dongchuan; 19.VIII.1982; Xiao Ningnian leg." (SCAU). Paratypes, "CHINA, Yunnan Prov., Dongchuan; 19-VIII-1982; Xiao Ningnian leg." (two males: SCAU; one male and one female: MIZ); "Yunnan Province, Luquan County, Jiaozishan Mountain, 2750m, 23-VIII-2013, Huo Lizhi leg." (one female: SCAU).

Distribution. Southwest China: NE Yunnan (Fig. 3).

Epiverta angusta sp. nov
(Figs. 2g–l, 3, 8a–f, 9a–d)
(urn:lsid:zoobank.org:act:D32E2A64-A9AB-4362-A7F0-BFFDA632C62E)
Epiverta chelonia: Bielawski 1960: 441 (misidentification).

Etymology. The name of the new species in Latin means narrow and refers to flattened lateral margins of the elytra which are comparatively narrow throughout of their length.

Differential Diagnosis. *Epiverta angusta* is most similar to *E. albopilosa* in its dorsal coloration with the background and maculae more irregular (as compared with *E. chelonia* and *E. supinata*) with background color of the elytra hard to distinguish (Fig. 2d and j). Both species are also covered with white or greyish elytral pubescence (yellowish in *E. chelonia* and *E. supinata*). *E.angusta*, however, can be distinguished from *E. albopilosa* by: (1) lateral elytral flattened margins comparatively narrow throughout of their length, (2) antennomere 3 about 1.25 times longer than 4 (1.8 times longer in *E. albopilosa*), (3) antennomeres 3 and 5 subequal in length (antennomere 3 about 1.38 times longer than 5 in *E. albopilosa*), (4) different shape of penis base and spermatheca.

Description. Length 5.62–7.30 mm; TL/EW = 1.11–1.27; PL/PW = 0.39–0.42; EL/EW = 1.00–1.10; TL/BH = 2.27–2.74.

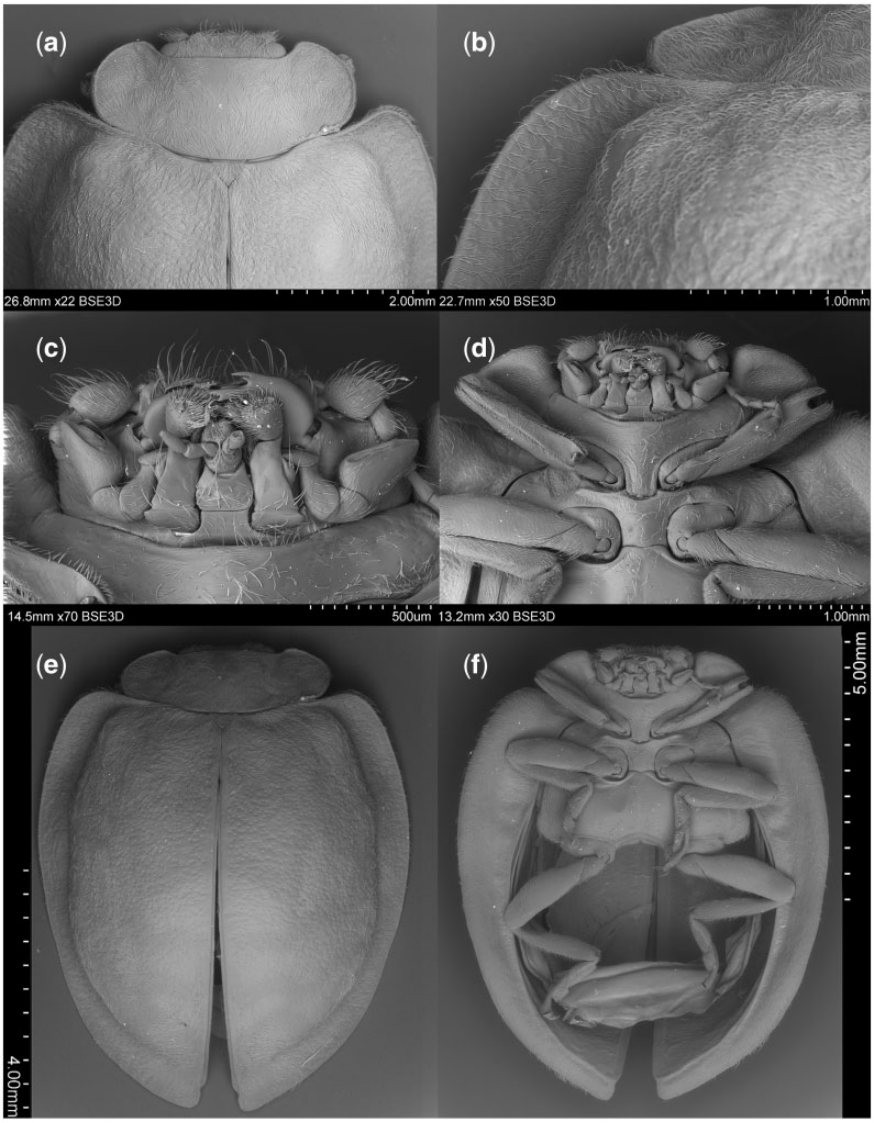

Fig. 8. *Epiverta angusta* sp. nov.: (a) pronotum and base of elytra, (b) antero-lateral margin of elytron, (c) mouthparts, (d) pro- and mesothorax, ventral view, (e) habitus, dorsal view, (f) habitus, ventral view.

Body oval in males and elongate oval in females (Figs. 2g and j and 8e). Dorsum bicoloured: brownish black and orange-yellow but with background of elytra hard to distinguish; maculae irregular as in Fig. 2g and j. Pubescence moderately dense and long, greyish.

Head (Fig. 8a) with interocular distance 0.70 times as wide as head across eyes. Antenna (Fig. 8d) with antennomere 3 about 1.25 times as long as antennomere 4 and about 1.04 times as long as 5; antennomere 4 about 0.83 times as long as antennomere 5. Terminal maxillary palpomere about as wide as long (Fig. 8c).

Pronotum with lateral margins evenly arcuate (Fig. 8a). Prosternal process 0.62–0.73 times as wide as mesoventral process (pp/mp) (Fig. 8d); 0.86–1.04 times as wide as length of prosternum in front of procoxa (pp/pl). Elytra with lateral flattened margins comparatively narrow, scarcely narrowing toward elytral apices (Fig. 8e); humeral margins simple; elytral total width 1.27–1.35 times of elytral disc width (EW/ED); elytral epipleuron in widest part 3.15–3.77 times as wide as epipleuron in narrowest part (eew/een), 2.90–3.73 times as wide as mesoventral process (eew/mp) and 0.83–1.00 as wide as mesofemur length (eew/mf) (Fig. 8f).

Abdomen. Hind margin of male ventrite 5 distinctly emarginate. Hind margin of male ventrite 6, tergite VIII and tergite X with scarce emargination/excision at apex. In females apical margin of ventrite 5 and tergite VIII subtruncate apically; ventrite 6 subtruncate to weakly triangularly angulate (with hind margin weakly projected backwards medially).

Male genitalia. Aedeagus stout. Tegmen (Fig. 9b and c) with parameres slightly shorter than penis guide; tegminal strut rounded apically; anterior margin of tegminal plate not produced, simply rounded medially. Penis guide with pointed apex weakly upturned backwards (visible in lateral view) (Fig. 9b). Penis with remnant of inner arm of reduced basal T-shaped capsule comparatively small, irregularly triangular (Fig. 9a).

Female genitalia (Fig. 9d) with proctiger (TX) subtruncate or sometimes weakly emarginated at apex; coxites with styli well developed; spermatheca curved in mid length; accessory gland 2.5–2.8 times as long as than spermatheca.

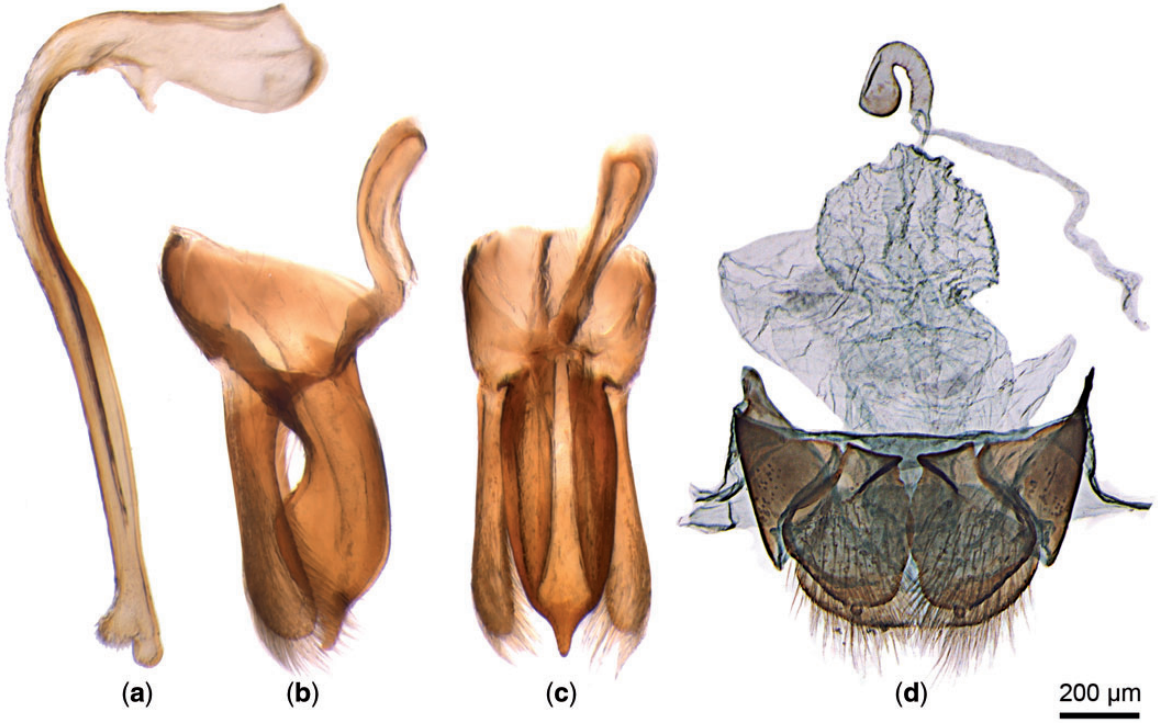

Fig. 9. *Epiverta angusta* sp. nov.: (a) penis, (b) tegmen, lateral, (c) tegmen, ventral, (d) female genitalia.

Type Material. Holotype, male, SICHUAN PROVINCE, "Ta-Tsien-Lu, 30.V.93, Potanin (translated and transcripted here from Russian, hand-writting)/*E. chelonia* (Mader), det. R. Bielawski 1959)/Inst. Zool. P.A.N, Warszawa, 86/60" (MIZ). Paratypes, "Fudian-xo (translated and transcripted here from Russian, hand writing)/K. A. Semenowa/*E. chelonia* (Mader), det. R. Bielawski 1958)/Inst. Zool. P.A.N, Warszawa, 95/59" (one male: MIZ); "Thibet, Chasseurs de, Tà-tsien-loû, 1895" (two males, two females and 13: MNHN; 2: MIZ); "Chasseurs Indigènes, des Missionnaires, de Ta-tsien-Loù, 1906" (one male, one female and nine: MNHN); "Sichuan Province, Kangding County, 2,400 m, 1963.VII.13, Mao Jinlong leg." (one male: IOZ); "Thibet, Tatsienlou, mgr F. Birt/Museum Paris, ex Coll., R. Oberthür" (two: MNHN; 1: MIZ); "Su-Tchuen, Mo-Sy-Mien, 1897" (two males, four females and 12: MNHN; 3: MIZ); "Su-Tchuen, Chass. Thibetains, 1897" (two: MNHN); same but 1899 (one: MNHN; one: MIZ); "CHINA: Sichuan Prov., 1999, Zeng Tao leg." (two males, two females: SCAU; one male and one female: MIZ).

Comment. Bielawski (1960) studied *Epiverta* material from "der Sammlung des Zoologischen Institut der Akademie der Wissenschafte der UdSRR in Leningrad (now Saint Petersburg). He studied 14 specimens from Sichuan Province (Ta-Tsien-Lu and Mao-nju-ku-Tal) and treated them as *E. chelonia*. He also provided drawings of the male genitalia of this species unknown until then. After study of two specimens from that series (retained in the MIZ collection), his pictures of the male genitalia (Bielawski 1960) (with tegmen with parameres slightly shorter than penis guide, tegminal strut rounded apically, anterior margin of tegminal plate not produced and simply rounded medially, and penis guide with pointed apex weakly upturned backwards in lateral view) and the drawings of elytral pattern commented by him, that "Die Flecken auf den Flügeldecken verbindensich miteinender auf sehr verschidene Weise und bilden eine Mosaik Schwarz und braungrau gefärbt", we recognize these specimens as belonging to the new species, described here as *E. angusta*.

Distribution. Southwest China: SW Sichuan (Fig. 3).

Epiverta supinata sp. nov
(Figs. 2a–f, 3, 10a–g, 11a–d)
(urn:lsid:zoobank.org:act:0BC7054D-3368-422D-9D97-EBAC94345B88)

Etymology. The name of the new species is derived from Latin "*supinatas*", which means upturned and refers to humeral margins of the elytra upturned backwards.

Differential Diagnosis. *Epiverta supinata* can be easily separated from its congeners by having humeral margins of the elytra thickened and upturned backwards (Fig. 10c and f), lateral margins of the pronotum subparallel along basal 2/3 length, antennomere 4 and 5 subequal in length, female genitalia with comparatively short styli and anterior margin of tegminal plate regularly, triangularly produced medially.

Description. Length 6.10–6.30 mm; TL/EW = 1.03–1.17; PL/PW = 0.38–0.43; EL/EW = 0.90–0.98; TL/BH = 2.11–2.60.

Body oval (Figs. 2a and d and 10f). Background of elytra brownish black with regular yellow maculae arranged as in Fig. 2a and d, most of them with inclusions of blackish spots. Pubescence moderately dense and moderately long, yellowish.

Head (Fig. 10b) with interocular distance 0.71 times as wide as head across eyes. Antenna (Fig. 10e) with antennomere 3 about 1.10 times as long as antennomere 4 and about 1.15 times as long as 5; antennomere 4 about as long as antennomere 5. Terminal maxillary palpomere about as wide as long (Fig. 10e).

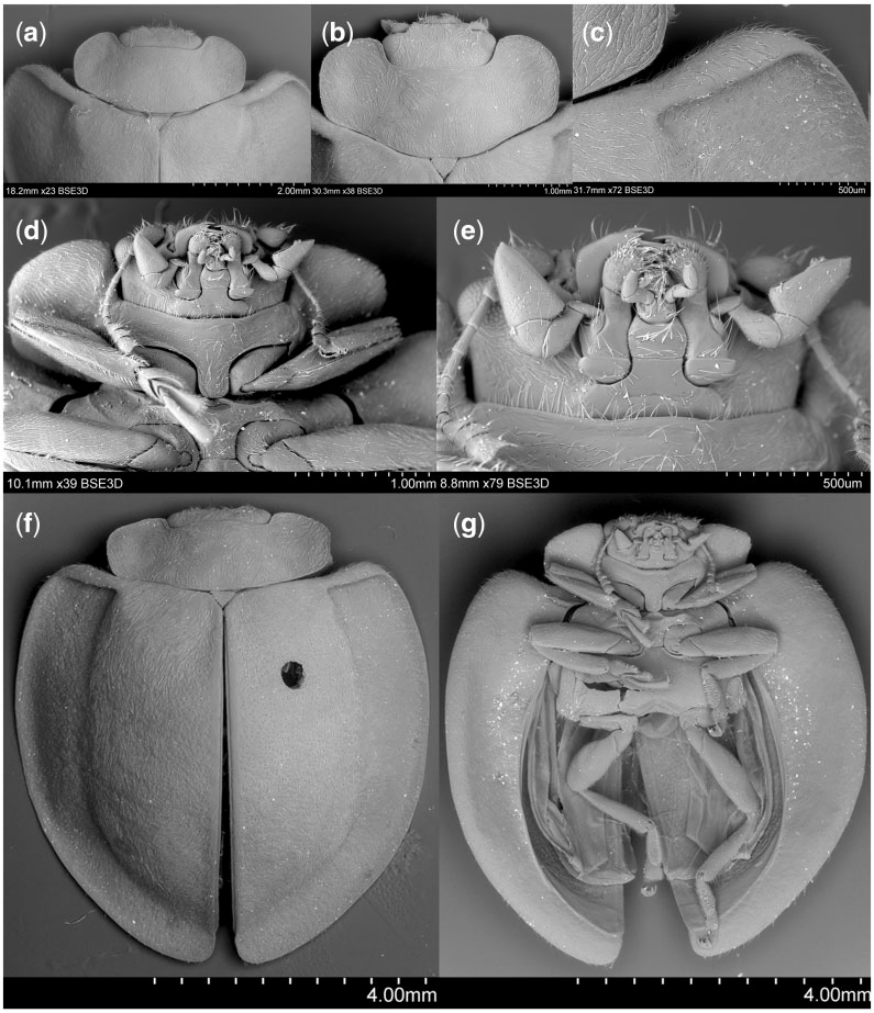

Fig. 10. *Epiverta supinata* sp. nov.: (a) pronotum and base of elytra, (b) pronotum, (c) antero-lateral margin of elytron, (d) prosternum and mesoventrite, (e) mouthparts, (f) habitus, dorsal view, (g) habitus, ventral view.

Pronotum with lateral margins subparallel along basal 2/3 length then arcuate anteriorly (Fig. 10a and b). Prosternal process 0.65–0.80 times as wide as mesoventral process (pp/mp) (Fig. 10d); 0.83–1.15 times as wide as length of prosternum in front of procoxa (pp/pl). Elytra with lateral flattened margins scarcely narrowing towards elytral apices (Fig. 10f); humeral margins thickened and upturned backwards (Fig. 10c and f); elytral total width 1.49–1.60 times of elytral disc width (EW/ED); elytral epipleuron in widest part 2.70–3.70 times as wide as epipleuron in narrowest part (eew/een), 3.90–4.80 times as wide as mesoventral process (eew/mp) and 1.10–1.30 as wide as mesofemur length (eew/mf) (Fig. 10g).

Abdomen. Hind margin of male ventrite 5 emarginate. Hind margin of male ventrite 6 weakly excised; tergite VIII and tergite X with weakly emarginate at apex. In females apical margin of ventrite 5 truncate; ventrite 6 subtruncate to weakly rounded apically; tergite VIII subtruncate to scarcely emarginate apically.

Male genitalia. Aedeagus stout. Tegmen (Fig. 11b and c) with parameres slightly shorter than penis guide; tegminal strut rounded apically; anterior margin of tegminal plate triangularly produced medially. Penis guide with pointed apex weakly upturned backwards (visible in lateral view) (Fig. 11b). Penis with remnant of inner arm of reduced basal T-shaped capsule most often trigger like (Fig. 11a).

Female genitalia (Fig. 11d) with proctiger (TX) scarcely to weakly excised medially at apex; coxites with styli small to well developed; spermatheca curved in mid length; accessory gland 2.5–3.0 times longer than spermatheca.

Type Material. Holotype, male, SICHUAN PROVINCE, "Thibet, Yarégong [Sichuan], P. Soulié, 1900" (MNHN). Paratypes, same data as holotype (one male, two females and two: MNHN; two: MIZ); "Sichuan Province, Xiangcheng County, 2900 m, 17.VI.1982, Wang Shuyong leg./IOZ(E) 626295" (*one: IOZ); same but IOZ(E) 626296 and IOZ(E) 626297" (*one and male, respectively: IOZ); "Sichuan Province, Xiangcheng County, 3200 m, 26.VI.1982, Chai Huaicheng leg./IOZ(E) 626293" (*one: IOZ); same but IOZ(E) 626294 (*one female: MIZ). TIBET, "Tibet, Mangkang County, Haitong, 3250 m, 12.VIII.1982, Wang Shuyong leg./IOZ(E) 626298" (male: *IOZ). "Tibet, Mangkang County, Haitong 3200 m, 9.VIII.1982, Wang Shuyong leg./IOZ(E) 626301" (*one: MIZ); same data but IOZ(E) 626302" (*one female: MIZ); "Tibet, Mangkang County, Haitong 3250 m, 11.VIII.1982, Wang Shuyong leg./IOZ(E) 626300" (*one male: IOZ); same data but IOZ(E) 626303" (*one female: IOZ); "Tibet, Mangkang County, Haitong 3250 m, 12.VIII.1982, Wang Shuyong leg./IOZ(E) 626259" (*one: IOZ); same data but IOZ(E) 626299" (*one: IOZ).

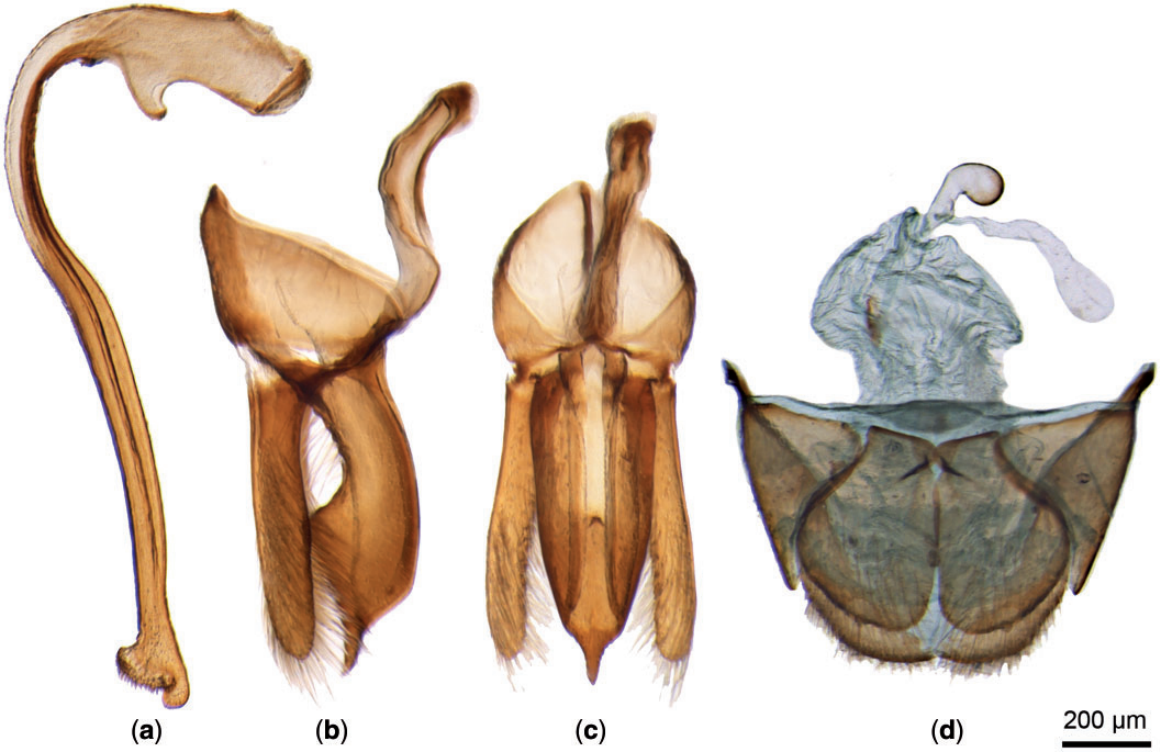

Fig. 11. *Epiverta supinata* sp. nov.: (a) penis, (b) tegmen, lateral, (c) tegmen, ventral, (d) female genitalia.

YUNNAN PROVINCE, "Yunnan Province, Deqin County, Adong Village, 2,700–3,000 m, 6.IX.1981, Wang Shuyong leg./IOZ(E) 626255" (*one male: IOZ); same but IOZ(E) 626256 and IOZ(E) 626257 (*two: IOZ).

Distribution. Southwest China: E Tibet, NW Yunnan, SW Sichuan (Fig. 3).

Key to Species of *Epiverta*

1. Lateral margins of pronotum subparallel along basal 2/3 length (Fig. 10a and b); humeral margins of elytra thickened and upturned backwards (Fig. 10c, f); total width of elytra 1.49-1.60 times as wide as elytral disc; elytral epipleuron in widest part 1.10-1.30 times of mesofemur length ..... *E. supinata* sp. nov.

– Lateral margins of pronotum regularly at least weakly arcuate; humeral margins of elytra simple and not upturned backwards; total width of elytra 1.22–1.48 times as wide as elytral disc; elytral epipleuron in widest part 0.70–1.07 times of mesofemur length 2

2. Elytra covered with dense and comparatively long, white pubescence (Fig. 2s and v); antennomere 3 about 1.8 times as long as antennomere 4 (Fig. 6c); elytral epipleuron in widest part 0.70-0.82 times of mesofemur length (Fig. 6f); ..... *E. albopilosa* sp. nov.

– Elytra covered with sparser and shorter, yellowish or greyish pubescence; antennomere 3 about 1.25 times as long as antennomere 4; elytral epipleuron in widest part 0.83–1.07 times of mesofemur length 3

3. Body covered with yellowish pubescence (Fig. 2m–r); elytra at most as long as wide; total width of elytra 1.35–1.48 times as wide as elytral disc; antennomere 3 about 1.15 times as long as antennomere 5; penis guide at most as long as parameres (Fig. 5b); tegminal strut emarginate or truncate apically (Fig. 5c) ..... *E. chelonia* (Mader)

– Body covered with greyish pubescence (Fig. 2g–l); elytra 1.00–1.10 times as long as wide; total width of elytra 1.27–1.35 times as wide as elytral disc; antennomere 3 about as long as antennomere 5; penis guide slightly longer parameres (Fig. 9b); tegminal strut rounded apically (Fig. 9c) ..... *E. angusta* sp. nov.

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