



Revision of the Oriental Genus *Physodera* Eschscholtz, 1829 (Coleoptera, Carabidae, Lebiini, Physoderina), with the descriptions of two new species

YUNLONG MA¹, HONGLIANG SHI^{1,3} & HONGBIN LIANG²

¹College of Forestry, Beijing Forestry University, Beijing 100081, China

²Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China

³Corresponding author. E-mail: shihl@bjfu.edu.cn

Abstract

The Oriental genus *Physodera* Eschscholtz, 1829 is revised. A key to species is provided, along with distribution maps, and illustrations of habitus and male genitalia of all available species. Two new species are described: *Physodera sciakyi* sp. n. (type locality: S. Sulawesi, Indonesia), and *Physodera unicolor* sp. n. (type locality: Zhejiang, China). Three new synonyms are proposed: *Physodera parvicollis* Van de Poll, 1889 = *Physodera eschscholtzii* Parry, 1849, *Allocota sumatrensis* Kirschenhofer, 1996 = *Physodera eschscholtzii* Parry, 1849, and *Physodera noctiluca* Mohnike, 1875 = *Physodera dejeani* Eschscholtz, 1829.

Key words: ground beetles, key, new species, new synonym

Introduction

This is a supplementary work of the previous monograph (Shi *et al.*, 2013), in which all genera of the subtribe Physoderina were dealt with except *Physodera* Eschscholtz, 1829 and *Lachnoderma* MacLeay, 1873. In this paper, we review the genus *Physodera* Eschscholtz, along with proposing two new species and three new synonyms. A key to all known species is provided. Species of *Physodera* are divided to five species groups, mainly based on male genitalia, secondary sexual and tergal characters.

Material and methods

Material. This work was based on the examination of 299 specimens, including 62 types. Many of them were borrowed from or examined in the following collections:

| | |
|------|--|
| CCCC | Collection of Changchin Chen, Tianjin, China |
| CRS | Collection of Riccardo Sciaky, Milano, Italy |
| CMB | Collection of Martin Baehr, Mulich, Germany |
| HBUM | Hebei University Museum, Baoding, China |
| IZAS | Institute of Zoology, Chinese Academy of Sciences, Beijing, China |
| MNHN | Muséum National d'Histoire Naturelle, Paris, France |
| NHML | The Natural History Museum, London, U. K. |
| NNML | Naturalis Nationaal Natuurhistorisch Museum, Leiden, the Netherlands |
| SNSD | Staatliches Museum für Tierkunde, Dresden, Germany |
| SNUM | Shanghai Normal University, Shanghai, China |

The following collections are cited in this paper, but we did not examine any specimen:

BRIO Biosystematics Research Institute, Ottawa, Canada
NHMV Naturhistorische Museum, Vienna, Austria
ZMUM Moscow State University, Moscow, Russia

Methods. Details of methods and terminology follow Shi *et al.* (2013).

Taxonomy

Genus *Physodera* Eschscholtz, 1829

Eschscholtz 1829: 8; Schmidt-Göbel 1846: 46; Lacordaire 1854: 130; Van de Poll 1889: 251; Heller 1923: 304; Jedlička 1963: 300; Shi *et al.* 2013: 38.

Type-species: *Physodera dejeani* Eschscholtz, 1829, monotypic.

Synonym: *Nepalotarsus* Mateu 1990: 156. Nomen nudum.

Key to species of *Physodera* Eschscholtz

1. Pronotum bicolor, dark with distinct light pattern; sternum and tergum VII blackish, both with striking yellowish pattern (Figs. 45–47) 2
- Pronotum unicolor, sometimes lateral expansion a little lighter, but never forming distinct pattern; sternum and tergum VII usually uniformly blackish, sometimes only tergum VII with vague yellowish pattern around spiracles (Fig. 48). 6
2. Pronotum light pattern plain, not forming callosity; elytra dark with light pattern on disc or apex (*amplicollis*-group) 3
- Pronotum each side with an ivory callosity (Figs. 29, 30); elytra unicolor (*dejeani*-group) 5
3. Elytra with large orange-yellow zigzag pattern on disc (Figs. 27, 28); interval punctures dense and same size as stria punctures, stria puncture rows indistinct. *P. bousqueti* Mateu, 1990
- Elytra with narrow yellowish band at apex (Figs. 13, 25, 26); interval punctures much smaller than stria punctures, stria puncture rows distinct. 4
4. Pronotal hind angles fully round; pronotal lateral expansions yellow, without dark spot (Fig. 13) .. *P. diglena* Andrewes, 1930
- Pronotal hind angles more or less distinct; pronotal lateral expansions yellow to orange yellow, each side with a dark spot in (Figs. 25, 26) *P. amplicollis* Van de Poll, 1889
5. Pronotal callosities large, distinctly larger than eyes; pronotum base shortly lobed, lateral notch (between posterior angle and basal lobe) width more than two times as length (Fig. 52); elytral interval finely punctate; larger species, 9.5–10.5mm; widely distributed in Oriental Realm, except for Malay Peninsula and Borneo *P. dejeani* Eschscholtz, 1829
- Pronotal callosities small, about same size as eyes; pronotum base strongly lobed, lateral notch width about same as length (Fig. 53); elytral interval impunctate; smaller species, 8.5–9.0mm; Malay Peninsula and Borneo *P. chalceres* Andrewes, 1930
6. Elytra dark, disc with a pair of ivory callosities; antennomeres 5–11 distinctly widened (Fig. 59) (*eburata*-group) 7
- Elytra without callosity, unicolor or bicolor; apical antennomeres not widened (Fig. 58) 9
7. Elytral callosity ovate, larger, length more than 0.4 times as elytral length (Fig. 18); Borneo *P. bifenestrata* Heller, 1923
- Elytral callosity smaller, length about 0.2–0.25 times as elytral length 8
8. Elytral callosity nearly round, without distinct notch (Fig. 19); third interval with five or six setigerous pores; fifth interval with three or four pores (Fig. 62); Sulawesi *P. sciakyi* sp. n.
- Elytral callosity distinctly notched posteriorly (Fig. 17); third interval with two setigerous pores; fifth interval with one pore near base; the Philippines *P. eburata* Heller, 1923
9. Elytra dark metallic, with two reddish spots near apex. 10
- Elytra uniformly metallic, without spot 11
10. Head and pronotum reddish brown, elytra metallic blue; elytral red spots occupied intervals 1 to 6 (Fig. 20); the Philippines .. *P. andrewesi* (Jedlička, 1934)
- Head and pronotum dark brown, elytra metallic dark green; elytral red spots occupied intervals 2 to 4 (Fig. 21); New Guinea, China (Xizang) *P. bacchusi* Darlington, 1971
11. Pronotal lateral margins more or less angulate near middle (Fig. 49); the fifth elytral interval with one large setigerous pore near base only *P. eschscholtzii* Parry, 1849
- Pronotal lateral margins about evenly round near middle; the fifth elytral interval with three or more setigerous pores 12
12. Body form relative flat; pronotal hind angles blunt, not projected; elytral intervals with fine punctures; SE. China *P. unicolor* sp. n.
- Body form strongly convex; pronotal hind angles about acute, a little projected laterally; elytral intervals almost impunctate; Sulawesi *P. cyanipennis* Van de Poll, 1889

amplicollis-group

The *amplicollis*-group contains three species: *P. amplicollis* van de Poll, *P. diglena* Andrewes, and *P. bousqueti* Mateu.

This species group distributes in southeastern Asia, including southern Chinese continent, Taiwan Island, Indo-China Peninsula, Malay Peninsula, Borneo, Java, and Sumatra (Fig.63).

The diagnostic characters of this species group are: Pronotum and elytra with distinct pattern; tergum VII yellowish, with distinct black pattern: three well defined spots or one central spot and vague lateral ones (Figs. 45, 46). Terminal labial palpomeres securiform in both sexes (Fig. 61); male mesotarsus with adhesive hairs at least well developed on the first tarsomere; males with two pairs of setae on sternum VII. Aedeagus gently slender, with apical lamella large, strongly oblique to right side; internal sac with main flagellum not reaching apical orifice; trumpet-form expansion small, length about 0.3 times of the main flagellum; secondary flagellum long and strongly sclerotized; apical bursa distinct (Figs. 34–36).

These three species are close in the following similarities: (1) aedeagal apical lamella longer than any other species in *Physodera*; (2) secondary flagellum of aedeagal internal sac about half as main flagellum, main flagellum apex not reaching apical orifice; (3) tergum VII with three dark spots (lateral spots vague in *P. bousqueti*) (Figs. 45B, 46B); (4) the fifth elytral interval with only one basal setigerous pore.

Physodera amplicollis Van de Poll, 1889

Figs. 25, 26, 34.

Van de Poll 1889: 254 (type locality: Java; syntype probably destroyed); Heller 1923: 305; Csiki 1932: 1346; Jedlička 1963: 301; Shi *et al.* 2013: 41.

Material examined. **China:** 1 male (IZAS), "Anhui Prov., Huangshan, Tangkou Town, Fuxi Village, 2013.7.11, 30°04'44"N, 118°08'56"E, 542m, Qiu Jianyue & Xu Hao lgt.". 1 male (IZAS), "Fujian Prov., 1989.IX.27, Jiang Fan lgt.". 1 female (IZAS), "Yunnan Prov., Xishuangbanna, Menglun Town, west conservation station, 2004-II-13, Wu Jie lgt., 720m". 1 male (CCCC), "Yunnan Prov., Hekou County, Nanxi Town, Huayudong, 150m Lin Wenshin lgt., 2010.V.3N". 1 male (IZAS), "Hainan Prov., Jianfengling, Mingfenggu, 2011.VII.14, Jin Ming lgt.". 1 male (CCCC), "Taiwan, Chen Changchin lgt.". 1 male (CCCC), "Taiwan, Taipei, Sanhsia Town, Shihsaitou, 1994.IX.5". 1 male (CCCC), "Taiwan, Taoyuan County, Fuhsing Village, Xicun, Chen Changchin lgt, 1994.V.28". 1 male (CCCC), "Taiwan, Ilan County, Tung'ao, 300m, 2009.V.25, Chen Changchin lgt.". 1 female (CCCC), "Taiwan, Ilan County, Su'ao Town, Chenniaoshihpi, 1994.VI.3, Li Chunlin leg.". **Vietnam:** 1 specimen (MNHN), "Tonkin occ., Env de Hoa-Binh, R. P. A. de Cooman, 1919". **Laos:** 1 specimen (NHML), "Laos, Phongsaly prov., Phongsaly env., 6–17 v.2004, ~1500m, 21°41'N 102°06E, M. Brancucci leg.". 1 specimen (NHML), "Laos, Pak Lag, le 11.9.1914, R. Vitalis de Salvaza". **Thailand:** 1 male (CRS), "Thailand bor., Chiang Dao env., 21.5–4.6.1995, lgt. Snizek M.". 1 specimen (CMB) "N. Thailand, CW Nan, NE Nan, 1400m, Dol Phuka NP, 2.5.2004, R. Grimm". **Indonesia:** 1 specimen (NNML), "Leg. H. Lucht, G. Raoang, Java, Bajoekidoel, 450–700 Mr., IX.1932". 1 specimen (NHML), "S. Moenia Java, Tjolo 800m, II.1935, P.H.v. Doesburg".

Notes on type. According to the original literature, the syntype of *P. amplicollis* should be in the collection of NNML. But, Jedlička (1963) indicated that the type was destroyed. The second author of this paper did not find the type when he visited NNML. However, before finding additional evidence to support the loss of type, we are not to designate a neotype.

Diagnosis. Body length 8.8–10.0 mm. Pronotum bicolor, lateral areas yellow, not tumid, two isolated dark spots present in the yellow areas. Elytra metallic blue to violaceous, yellow patch only present at apex (Figs. 25, 26). Tergum VII orange-yellow with three black spots, the central one largest (Fig. 45B). Sternum VII black, apex narrowly orange-yellow, a pair of oblique orange-yellow bands present on each side (Fig. 45A). Pronotal hind angles about rectangular. Elytral striae with distinct puncture rows, the third interval with three or four setigerous pores; the fifth with only one near base.

P. amplicollis can be readily distinguished from all the other members of *Physodera*, but it is similar to *P. bousqueti* and *P. diglena* by the pronotal pattern. It is different from *P. bousqueti* by: elytra without yellow pattern

on disc; elytral striae with regular puncture rows; aedeagus less slender, apical lamella shorter (versus elytra with yellowish zigzag pattern on disc; elytral interval densely punctate, striae puncture rows indistinct; aedeagus slender, apical lamella longer in *P. bousqueti*). Its rectangular hind angles of pronotum, the third interval of elytra with three or four setigerous pores, shorter apical lamella of aedeagus which is more sinuate before apex making it is easily separated from *P. diglena* (which has completely rounded hind angles of pronotum; two setigerous pores on the third interval of elytra and longer apical lamella of aedeagus which is less sinuate before apex).

Male genitalia (Fig. 34). Median lobe of aedeagus gently slender, distinctly bent to right side in dorsal view, right margin strongly sinuate before apex; dorsal surface with a few fine setae subapically; apical lamella large, rounded apically, about triangular in lateral view, its length subequal to basal width. Internal sac with main flagellum not reaching the apical orifice; secondary flagellum long and distinctly sclerotized, length about 0.6 times as the main flagellum; trumpet-form expansion small, length about 0.3 times as the main flagellum; apical bursa present.

Female genitalia. Apical segment of ovipositor about 2.8 times long as its basal width, widest at base, gradually narrowed to apex, apex sharp; outer margin about straight, inner margin curved; apical half with long setae; membranous extension slender, slightly expanded at apex.

Distribution. China (Anhui, Fujian, Yunnan, Hainan, Taiwan), Vietnam, Laos, Thailand, Indonesia (Java). (Fig. 63)

Variation: Specimens from China (Fig. 25) are slightly but distinctly different in color from those from other counties (Fig. 26) in: (1) pronotum orange yellow (versus pale yellow); (2) elytra metallic dark blue (versus dark violaceous); (3) elytral apical yellow patch very narrow, patch greatest width about 1/30 as elytra full length (versus wider and forming transverse zigzag patch, patch greatest width about 1/8 as elytra full length). In some Taiwanese individuals, the pronotal black spots are close to the median patch.

***Physodera diglena* Andrewes, 1930**

Figs. 13, 36.

Andrewes 1930b: 202 (Original spelled as *Physodera diglenus*; type locality: Selangor (Malaya); holotype in NHML); Csiki 1932: 1347; Shi *et al.* 2013: 41.

Material examined. Holotype of *Physodera diglena* Andrewes (NHML), a male "58" [round label]; "*Physodera diglenus* / Type Andr. / H. E. Andrewes det."; "Selangor F. M. S / Kuala Lumpur / 21st mile, Gombak Valley / Oct. 19, 1921 / H. M. Pendlebury"; "Malay Penins. / B. M. 1931-186"; "Type" [round label with red rim]. (Figs. 1, 13)

Paratype of *Physodera diglena* Andrewes: 1 female (NNML), "*diglenus* / *andrewes*"; "Museum Leiden / *Physodera diglenus* / cotype Andr. / Det. H. E. Andrewes"; "cotype" [green label]; "type" [red label]; "*H. Veen / Padang / bovenl / Sum.*" [round label]; 1 female (MNHN), "Sumatra, Médan; Env. De Dolok-Baros; 2 semestr 1905". 1 male (CMB), "Brunei KBFSC, 4°32'. 8 N 115°09'. 4E, light Trap-canopy, 12. Jul-1997 LC-3, R L Kitching H Mitchell". 1 male (MNHN), "Borneo, Kuching, 25-11-1910, Herrit"; "Museum Paris, Ex coll. M. Maindron, Coll. G.Babault 1930". 1 specimen (MNHN), "Bornéo Oc., Riv. Mandor, Fr. Buffat 1897"; "*Physodera* sp., volisine de amplicollis, v.d.Poll"; "*Physodera diglenus*, Andr., Compared with, type H.E.A".

Diagnosis. Body length 8.7–10.2 mm. Dorsal side metallic with yellow patch. Pronotum bicolor, center area dark, lateral areas completely yellow, without spot. Elytra metallic blue to bluish-purple, apex with a very narrow yellowish patch. Tergum and sternum VII similar with those in *P. amplicollis*, yellowish pattern on sternum VII sometimes reduced to a pair of small spots near sternum base. Pronotal lateral margins curved near middle, straight before hind angles, hind angles fully rounded. Elytral striae with distinct puncture rows; the third interval with two setigerous pores; the fifth with only one near base.

Male genitalia (Fig. 36). Median lobe of aedeagus gently slender, distinctly bent to right side in dorsal view, right margin weakly sinuate before apex; apical lamella large, rounded apically, about oviform in lateral view, its length about 1.5 times as the basal width. Internal sac with main flagellum not reaching the apical orifice; secondary flagellum long and distinctly sclerotized, length about 0.6 times as the main flagellum; trumpet-form expansion small, length about 0.3 times as the main flagellum; apical bursa present.

Female genitalia. Not studied.

Distribution. Sumatra, Borneo, Malaya. (Fig. 63)

***Physodera bousqueti* Mateu, 1990**

Figs. 27, 28, 35, 55.

Mateu 1990: 156 (type locality: Berganj Lothar (Nepal); holotype in BRIO); Kabak 2003: 438; Shi *et al.* 2013: 41.

Material examined. **China:** 1 male (HBUM), "Hainan Prov. Changjiang, Bawangling, East-first station, 750m, 2008.VI.5–7, Ba Yibin & Lang Juntong leg.". 1 male (IZAS), "Hainan Prov., Qiongzong Baihualing, D 2009.11.26, Liang Hongbin leg.". 1 female (IZAS), "Yunnan, Xishuangbanna, Menglun botany garden, Lyushilin, 2009.XI.17, 647m, Tang Guo, Yao Zhiyuan lgt.". **Vietnam:** 1 male (IZAS), "Tonkin, Hoa-Binh, 1940.VIII, leg. A. de Cooman". **Malaysia:** 1 female (NHML), "Malay Penin. West Coast, Langkawi Is, Apr. 21.1928."

Diagnosis. Body length 8.5–9.0 mm. Dorsal side dark brown with purple hue and yellowish pattern. Pronotum bicolor, with brown I-shaped patch in the middle, lateral areas pale yellow, a pair of isolated dark spots present on lateral areas. Elytra with pale yellow zigzag pattern on disc. Tergum VII yellow, with one large central black spot, side area dark, forming vague side spots (Fig. 46B). Sternum VII black, apex narrowly orange-yellow, a pair of oblique orange-yellow bands present on each side (Fig. 46A). Pronotal hind angles distinct, about rectangular. Elytral intervals densely punctate, punctures similar with striae ones, so that the striae puncture rows difficult to distinguish; the second interval with one setigerous pore near apical fourth; the third one with one or two pores; the fifth one with one large pore near base.

P. bousqueti can be readily distinguished from all the other members of *Physodera* by the confused elytral punctures and zigzag pattern on elytra disc.

Male genitalia (Fig. 35). Median lobe of aedeagus gently slender, distinctly bent to right side in dorsal view, right margin strongly sinuated before apex; dorsal surface with a few fine setae subapically; apical lamella very large and long, rounded apically, oviform in lateral view, its length about two times as the basal width. Internal sac with main flagellum not reaching the apical orifice; secondary flagellum long and distinctly sclerotized, length about 0.6 times as the main flagellum; trumpet-form expansion small, length about 0.3 times as the main flagellum; apical bursa present.

Female genitalia (Fig. 55). Apical segment of ovipositor about 2.6 times long as its basal width, widest at base, gradually narrowed to apex, apex sharp; apex distinctly bent, outer margin weakly curved, inner margin strongly curved; apical half with long setae; membranous extension slender, pointed laterally.

Variation. This is a rare and relatively widely distributed species. We didn't examine the type specimen from Nepal. Compared with the habitus of type in the original literature (Mateu 1990), some specimens (Hainan, Vietnam) are slightly different in elytral patch: there is a branch of elytral patch in the third interval which is strongly extended almost reaching elytral apex in the type specimen, while this branch only shortly extended in our studied specimens.

Distribution. China (Hainan, Yunnan), Vietnam, Malaysia and Nepal. (Fig. 63)

Remarks. Two females from Yunnan and Langkawi Island (Malaya) are distinctly different from those from Hainan and Vietnam in coloration: dorsal coloration higher light; pronotum without isolated spots, which fused with the middle patch; elytral patch about quadrate, though weakly zigzag. This may be the phenomenon of sexual dimorphism.

***dejeani*-group**

The *dejeani*-group contains two species: *P. dejeani* Eschscholtz and *P. chalceres* Andrewes.

The *dejeani*-group distributes in southeast Asia, including south Chinese continent, Taiwan Island, Indo-China Peninsula, northeastern India, Malay Peninsula, the Philippines, Borneo, Java, and Sumatra (Fig. 64).

The diagnostic characters of this species group are: Pronotum with a pair of ivory callosities on each side; elytral dark purplish, without pattern; tergum and sternum VII dark, with yellowish patch on each side (Fig. 47); elytral apex strongly curved; third interval with only two setigerous pores; terminal labial palpomeres tubiform in both sexes (Fig. 60); male mesotarsus with adhesive hairs rudimentary on the first two tarsomeres; males with one pair of setae on sternum VII. Aedeagus stout and straight, apical lamella very small; internal sac with main flagellum thick, reaching apical orifice; trumpet-form expansion large, length 0.4–0.45 times of the main flagellum; secondary flagellum and apical bursa absent (Figs. 37, 38).

These two species are doubtless closest in this genus. They seem to be relatively distant from other species groups for the following unique characters: (1) Male terminal labial palpomeres tubiform (securiform in other species groups); (2) elytral apex strongly curved (truncated in other species groups); (3) males with only one pair of setae on sternum VII (with two pairs in other species groups); (4) aedeagal secondary flagellum absent (present in other species groups); (5) apical segment of ovipositor slenderer than other species groups, length about 4 times as basal width (membranous extension excluded); length 2.5–3.4 times as basal width in other species groups (Fig. 54–57).

***Physodera dejeani* Eschscholtz, 1829**

Figs. 14, 29, 37, 54.

Eschscholtz 1829: 8 (type locality: Manila (the Philippines); syntypes in ZMUM (probably) and MNHN); Schmidt-Göbel 1846: 46; Lacordaire 1854: 130; Andrewes 1923: 22; Heller 1923: 305; Csiki 1932: 1347; Jedlička 1963: 300; Darlington 1971: 326; Ball *et al.* 1995: 278; Kirschenhofer 1996: 781; Kabak 2003: 438; Shi *et al.* 2013: 41.

Physodera noctiluca Mohnike 1875: 154 (Type locality: Java; syntype in MNHN); Csiki: 1932: 1347; Shi *et al.* 2013: 41. **syn. n.**

Material examined. Syntype of *Physodera dejeani* Eschscholtz, a male (MNHN), "*Dejeani, Esch, Physodera, in Ins. Philipp. D.*" [yellow label]; "*Eschscholtz*" [yellow label]; "Paratype" [red label]; "Ex Musaeo, Chaudoir" [red print]; "Museum Paris, 1952, Coll. R. Oberthür". (Figs. 2, 14) **Syntype** of *P. noctiluca* Mohnike, 1 female (MNHN), "*Java, coll., Mohnike*"; "Ex Musaeo, H.W. Bates, 1892"; "Museum Paris, 1952, Coll. R. Oberthür". (Figs. 3, 15); **China**: 1 male (IZAS), "Yunnan Prov., Xishuangbanna, Mengla, 620–650m, 1959.VI.9, Zhang Yiran lgt.". 1 female (IZAS), "Yunnan Prov., Xishuangbanna, Menglun town Xipian, 720m, 2004.II.13, Wu Jie lgt.". 1 female (IZAS), "Yunnan Prov., Cangyuan Town, Banlao power station, 1010m, 1980.V.15, light trap, Li Yanbao lgt.". 1 female (CCCC), "Taiwan, Taoyuan county, Chen Changchin lgt., 1994. V. 28". 1 specimen (HBUM), "Hainan Prov., Ledong Jianfengling, 2007.V.17–21, Ba Yibin & Lang Juntong lgt.". **Vietnam**: 1 female (IZAS), "Tonkin Hoa-Binh, leg. A. de Cooman". **the Philippines**: 1 specimen (MNHN), "Balabac". 1 specimen (MNHN), "Balabac, Standinger". 1 specimen (MNHN), "Philippines, Ch. Seinper". **Java**: 1 specimen (MNHN), "Java occ. Wynkoops Bay.". 2 specimens (MNHN), "Java, Radjamandala, 1937.". 1 specimen (MNHN), "Java, Mt. Moeria, 3-4000". 5 specimens (MNHN), "Java, Malang". 1 specimen (MNHN), "Java"; "Ex Musaeo, H.W. Bates, 1892". 2 specimens (MNHN), "Java, J.D. Pasteur 268-94". **Sumatra**: 2 specimens (MNHN), "Dohrn, Sumatra, Liangagas". 1 specimen (MNHN), "Malare". 1 specimen (MNHN), "Sumatra, Montes Battak, ex coll. Fruhstorfer". 1 specimen (MNHN), "Dr. B. Hagen., Tandjong Morawa., Serdang, (N.Sumatra)". **Bhutan**: 1 specimen (MNHN), "Maria Basti, British Bootang". 2 specimens (MNHN), "British Bootang, Maria Basti, L. Durel". 5 specimens (MNHN), "British Bootang, L. Durel, 1898". **India**: 3 specimens (MNHN), "Khasia Hills". 2 specimens (MNHN), "Andamans". 2 specimens (MNHN), "Gopaldhara, Br. Sikkim, H. Stevens.". 1 specimen (MNHN), "Inde Anglaise, Pedong, Région de Darjeeling., Chasseurs indigènes, 1933.".

Notes on type. *P. dejeani* Eschscholtz: In the original literature, the author did not indicate or imply how many specimens belonging to the type series. We found a male, bearing Dejean's hand-written label in the collection of MNHN. This one belonged to Dejean's collection, and supposed to be presented from Eschscholtz, and doubtless one of the type series. However, Eschscholtz's own collection ought to be in ZMUM, and more syntypes are expected to be found there. We are not to designate a lectotype until more syntypes are examined.

***P. noctiluca* Mohnike:** In the original literature, the author merely mentioned the locality Java without more information on the type specimens. In the collection of MNHN, we found a female bearing a hand-written label "Java, coll., Mohnike", fitting with the original literature, and should be one of the syntypes.

Diagnosis. Body length 9.5–10.8 mm. Dorsal side black or dark brown with purple hue; pronotum with a pair of ivory callosities on each side, callosities distinctly larger than eyes; elytra unicolor. Tergum VII bicolor, middle area black, lateral sides with large yellow patch (Fig. 47B); sternum VII black, lateral sides with a pair of oblique yellow bands on each side (Fig. 47A). Pronotum base shortly lobed, lateral notch (between posterior angle and basal lobe) width more than two times as length (Fig. 52). Elytral third interval with two setigerous pores; apical margin strongly curved.

This species can be readily distinguished from other members of *Physodera* by the present of ivory callosities

on pronotum, except for *P. chalceres*. These two very similar species are different in: *P. dejeani* is generally larger than *P. chalceres*; *P. dejeani* with pronotal callosities much larger than eyes (versus the pronotal callosities smaller, about same size as eyes in *P. chalceres*); the pronotum base shortly lobed, and the lateral notches width much greater (more than two times) than length (Fig. 52) (versus the pronotum base strongly lobed, the lateral notches deeper, its width about same as length (Fig. 53) in *P. chalceres*); median lobe of aedeagus with apex strongly bent to the right side, apical lamella longer, its length about same as basal width (Fig. 37) in *P. dejeani* (versus median lobe of aedeagus with apex only slightly bent to the right side, apical lamella shorter, its length about 0.6 times as basal width (Fig. 38) in *P. chalceres*).

Male genitalia (Fig. 37). Median lobe of aedeagus fairly stout, apex strongly bent to right side in ventral view, right margin weakly sinuate before apex; dorsal surface with finely setose subapically; apical lamella small, its length about same as basal width, rounded apically. Internal sac with main flagellum thick, apex almost reaching apical orifice; trumpet-form expansion large, length about 0.4 times as the main flagellum; secondary flagellum and apical bursa absent.

Female genitalia (Fig. 54). Apical segment of ovipositor coniform and straight, widest at base, gradually narrowed to apex, apex sharp, its length about 4 times as basal width; outer and inner margins weakly curved; apical half with long setae; membranous extension slender, slightly expanded at apex.

Distribution. China (Yunnan, Hainan and Taiwan), Vietnam, the Philippines, Java, Sumatra, Bhutan, North India. (Fig. 64)

Remarks. When describing *P. noctiluca*, Mohnike noticed that his specimen has no morphological difference with *P. dejeani*. After examining the syntypes of these two, the synonymy between *P. noctiluca* and *P. dejeani* is confirmed. Actually, *P. noctiluca* was established merely for the presence of bioluminescence on pronotal callosities (Mohnike 1875). So far, in Coleoptera, bioluminescence is only recorded in four families (Elateridae, Lampyridae, Phengodidae, and Rhagophthalmidae) of Elateroidea. It looks that the confirmation of bioluminescence in *P. dejeani* is interesting. But, in the early of 2016, one of the authors (SHL) observed a living individual of *P. chalceres* which is very close to *P. dejeani*, in Sabah, and confirmed that the observed species has no bioluminescence. So, we suspect that, the record of bioluminescence in *P. dejeani* was just a misconception of the striking contrast between dark pronotum and light callosity.

***Physodera chalceres* Andrewes, 1930**

Figs. 16, 30, 38.

Andrewes 1930a: 135 (type locality: Penang (Malaya); holotype in NHML); Csiki 1932: 1346; Shi *et al.* 2013: 41.

Material examined. Holotype of *Physodera chalceres* Andrewes (NHML), a male "Type" [round label with red circle]; "Penang. / (Lamb.) / Pascoe Coll."; "Pascoe Coll. / 93-60"; "*Physodera / chalceres / Type Andr. / H.E.Andrewes det.*". (Figs. 4, 16) **Paratype** of *Physodera chalceres* Andrewes, a male (NHML), "Perak / L.C."; "Doherty"; "Fry coll. / 1905.100."; "Ex. coll. / Brit. Mus."; "*Physodera / chalceres / Cotype Andr. / H.E.Andrewes det.*"; "H.E.Andrewes Coll. / B.M. 1945-97."; 1 specimen (MNHN), "Malacca, Perak, W. Doherty"; "Museum Paris, 1952, Coll. R. Oberthür". 1 specimen (MNHN), "Labouan, Borneo"; "Ex Musaeo, Mniszech"; "Museum Paris, 1952, Coll. R. Oberthür". 1 male (IZAS), "Borneo: Sabah, Keningau district, Jungle Girl Camp. N5.4430, E116.4512; 1182m; Shi H.L. & Liu Y. lgt. light trap, 2016.V.1 N".

Diagnosis. Body length 8.1–8.9 mm. Dorsal side dark brown with purple hue; pronotum with a pair of ivory callosities on each side, callosities about same size as the eyes; elytra unicolor. Tergum VII bicolor, middle area widely black, lateral sides with yellow patches around spiracles; sternum VII black, lateral sides with a pair of yellow patches adjacent to the tergal ones. Pronotum base strongly lobed, lateral notch (between posterior angle and basal lobe) width about same as length (Fig. 53). Elytral third interval with two setigerous pores; apical margin strongly curved. Comparison with related species see diagnosis of *P. dejeani*.

Male genitalia (Fig. 38). Median lobe of aedeagus fairly stout, apex weakly bent to right side in ventral view, right margin weakly sinuate before apex; apical lamella very small, its length about 0.6 times as basal width, rounded apically. Internal sac with main flagellum thick, apex almost reaching apical orifice; trumpet-form expansion large, length about 0.45 times as the main flagellum; secondary flagellum and apical bursa absent. Female genitalia not studied.

Distribution. Malay Peninsula, Borneo. (Fig. 64)

***eburata*-group**

The *eburata* -group contains three very similar species: *P. eburata* Heller, *P. bifenestrata* Heller, and *P. sciakyi* **sp. n.**

These three insular species of the *eburata*-group distribute in the Philippines, Borneo, and Sulawesi. (Fig. 65)

The diagnostic characters of this species group are: Pronotum unicolor; elytra black with purplish hue, disc with a pair of ivory callosities; tergum VII and sternum VII dark, without light pattern; antennameres 5–11 distinctly widened and flattened (Fig. 59). Terminal labial palpomeres truncate in both sexes, not strongly securiform (Fig. 60); males with two pairs of setae on sternum VII. Aedeagus stout and straight, apical lamella short and wide; internal sac with main flagellum thick, reaching apical orifice; trumpet-form expansion large, length 0.4–0.45 times of the main flagellum; secondary flagellum short and thick, weakly sclerotized; apical bursa present.

These three species are doubtless close for the similarities mentioned above. The following characters are unique in the genus: elytra with a pair of ivory callosities; antennameres distinctly widened since the fifth. The *eburata*-group could be also close to *dejeani*-group for their aedeagus stouter than other species groups and both have ivory callosities. But differences on some secondary sexual characters (male labial palpomere, and seta on sternum VII) show otherwise.

***Physodera eburata* Heller, 1923**

Fig. 17.

Heller 1923: 304 (Original: *Physodera*; type locality: Los Banos (Luzon); lectotype deposited in SNSD); Csiki 1932: 1347 (catalogue); Jedlička 1963: 301; Shi *et al.* 2013: 41.

Material examined. Lectotype of *Physodera eburata* Heller, designated herein (SNSD), a female, "Los Banos / P.I. Baker"; "*eburata* / Typus" [red label]; "1920 / 3" [yellow label]; "Staatl. Museum für / Tierkunde, Dresden". (Figs. 5, 17); 1 female (SNSD), "Samar Borongan, coll. W.Schultze"; "Coll. W.Schultze, Ankauf 1942"; "Staatl. Museum für Tierkunde, Dresden".

Diagnosis. Body length 10.1–11.5 mm. Dorsal side black with metallic purple hue; pronotum unicolor; elytra with a pair of ivory callosities on disc, callosity about 1/4 as elytron in length, placed in the middle of elytron, round in shape, strongly notched posteriorly. Tergum and sternum VII without distinct pattern. Antennameres 5–11 distinctly widened and flattened. Elytral third interval with two setigerous pores, the fifth with only one pore near base; apical margin truncated.

Together with *P. bifenestrata* and *P. sciakyi* **sp. n.**, *P. eburata* can be readily distinguished from other species of *Physodera* by the presence of ivory callosities on elytra. These three species have differences in the shape of elytra callosities (round with a notch in *P. eburata*, and without a notch in *P. bifenestrata* and *P. sciakyi* **sp. n.**) and different distributions.

Male genitalia. Unknown.

Female genitalia. Not studied.

Distribution. Only known from the Philippines (Luzon, Samar). (Fig. 65)

Remarks. In the original literature, Heller (1923) indicated that this species has elytra dull in apical part, and shining in *P. bifenestrata*. However, after examined a "normal" specimen in the collection of SNSD, we found that the dull elytra of the lectotype is caused by deformation when emergence, and not a taxonomical character.

***Physodera bifenestrata* Heller, 1923**

Fig. 18, 39.

Heller 1923: 304 (type locality: Sandakan (Borneo); lectotype in SNSD); Csiki 1932: 1347; Jedlička 1963: 301; Shi *et al.* 2013: 41.

Material examined. Lectotype of *Physodera bifenestrata* Heller, designated herein (SNSD), a male, "Sandakan / Borneo / baker"; "1920"; "*bifenestrata* / Typus" [red label]; "Staatl. Museum für / Tierkunde, Dresden". (Figs. 6, 18); 1 male (MNHN), "Borneo Occ., Pontianak, 1900"; "*Physodera spec.*"; "Ritsema, vidit 1901."; "Museum Paris, 1952, Coll. R. Oberthür".

Notes on type. In the original literature, Heller mentioned the locality "Sandakan, Borneo", but didn't indicate the number of type series. We borrowed a male from SNSD bearing a type label and perfectly fitting with the type locality. We herein designate this specimen as lectotype for the purpose of fixing the name to unique name-bearing type.

Diagnosis. Body length 9.1–9.9 mm. Dorsal side black with metallic purple hue; pronotum unicolor; elytra with a pair of ivory callosities on disc, callosity about 0.4–0.5 times as elytron in length, placed in the middle of elytron, ovate in shape, without notch. Tergum and sternum VII without distinct pattern. Antennameres 5–11 distinctly widened and flattened (Fig. 59). Elytral third interval with two setigerous pores, the fifth with only one pore near base; apical margin truncated.

This species can be distinguished from related species (*P. eburata* and *P. sciakyi*) by: elytral callosities larger, more than 0.4 times as the elytra length; pronotum wider, greatest width about 1.9 times as the median length (PW/PL less than 1.7 in the other two species).

Male genitalia (Fig. 39). Median lobe of aedeagus fairly stout and straight, apex barely bent to right side in ventral view, right margin weakly angulated before apex; apical lamella very small, its length about half as basal width, about triangular, rounded apically. Internal sac with main flagellum thick and straight, apex almost reaching apical orifice; secondary flagellum short and thick, weakly sclerotized, length about 0.3 times as the main flagellum; trumpet-form expansion large, length about 0.4 times as the main flagellum; apical bursa present.

Female genitalia. Unknown.

Distribution. Only known from Borneo. (Fig. 65)

Physodera sciakyi sp. n.

Figs. 19, 40, 62.

Type series. **Holotype** (CRS), a male, "Sulawesi S/ Puncak Palopo/ I.2010". "Holotype / *Physodera sciakyi* / sp. n. / Des. Ma & Shi, 2016"[red label]. (Figs. 7, 19) **Paratype**, 1 male (CRS), "Indonesia/ S.Sulawesi/ Palopo env./ Puncak V.1999/ loc. Collector Igt.". "Paratype / *Physodera sciakyi* / sp. n. / Des. Ma & Shi, 2016"[red label].

Diagnosis. Dorsal side black with metallic purple hue; pronotum unicolor; elytra with a pair of ivory callosities on disc, callosity about 0.2 times as elytron in length, placed in the middle of elytron, round in shape, without notch or only weakly serrated posteriorly. Tergum and sternum VII without distinct pattern. Antennameres 5–11 distinctly widened and flattened. Elytral third interval with five or six setigerous pores, the fifth with three or four pores near base; apical margin truncated.

P. sciakyi sp. n. is most similar with *P. eburata* in general appearance. Besides distribution ranges, they are also different in the following characters: Elytral callosities different in shape; round without distinct notch in *P. sciakyi* sp. n. (versus round with a distinct notch posteriorly in *P. eburata*); the elytral third interval with five or six setigerous pores and the fifth with three or four pores near base (Fig. 62) (versus the third interval with two pores and the fifth with only one near base); Pronotum almost glabrous in *P. sciakyi* sp. n., except for sporadic punctures along the basal half of median line, lateral expansion completely impunctate (versus pronotum distinctly punctate, heavy and dense punctures distributed on lateral expansion, median line, sub-anterior area, and basal fovea and in *P. eburata*); Accessory setae more abundant on the pronotal front and hind angles in *P. sciakyi* sp. n. (versus less in *P. eburata*). Based on these, we believe the specimens from Sulawesi represent a new species different from *P. eburata*, although we didn't compare their male genitalia.

For another related species, *P. bifenestrata* from Borneo, we have male materials to compare with the new species. The aedeagus of them are different in: the median lobe stronger bent to the right side apically, right margin about curved before apex in *P. sciakyi* sp. n. (versus the median lobe barely bent to the right side apically, right margin weakly angulated before apex in *P. eburata*); a small transverse sclerotized piece present on the left margin of apical orifice in *P. sciakyi* sp. n. (versus such piece hardly defined in *P. eburata*); the main flagellum gradually curved in the middle in *P. sciakyi* sp. n. (versus the main flagellum almost straight along its full length in *P. eburata*).

Description. Body length 10.9–11.5 mm. Dorsal surface dark blue with strong metallic reflections; mouthparts dark purplish, terminal palpomeres yellowish apically; antennae black, apex of terminal segment brown; pronotum evenly metallic; elytra dark with strong blue-purplish metallic hue, lateral margins brownish; elytral disc with a pair of ivory callosities, round, slightly transversal, not notched or weakly serrated posteriorly, occupying the middle fifth of elytra in length, and interval 4–8 in width; legs metallic purple; ventral side dark brown; tergum and sternum VII without pattern, lateral sides a little light. **Head.** Tempora short, about half as long as eyes, abruptly narrowed behind eyes; frons smooth, without puncture. Males with terminal labial palpomeres wider than maxillary ones, apex truncated, but not typically securiform. Antennamere 4 about triangular, slightly widened since middle, antennameres 5–11 strongly widened and flattened, gradually widened and shortened to apex, the fifth with width/length 1.0, the tenth with width/length 1.5. **Pronotum** widest at about anterior third, ratio PW/PL 1.61–1.68, base shortly lobed. Front angles wide and round; lateral margins fully rounded in the middle, strongly sinuate before hind angles; hind angles distinct, not projected, about rectangular. Accessory setae rich on front angles, less on hind angles, absent on the middle of lateral margins. Disc slightly convex; median line short, not reaching apex or base; pronotum almost glabrous, except for sporadic punctures in the basal half of median line; lateral expansions wide, rugose but impunctate. **Elytra** wide, gradually widened apically; lateral margins concaved near anterior third; apex truncated; basal border incomplete, reaching the third interval. Striae not furrowed, composed of fine puncture rows; strial rows absent before apex and in the callosities. Intervals flat, finely and sparsely punctate; the third interval with five or six setigerous pores, about equally arranged, the last one adjacent to the second stria, others placed on the middle of interval; the fifth interval with three or four pores restricted in the basal fifth; the seventh and eighth intervals weakly tumid apically. (Fig. 62) **Ventral side.** Prosternum setose on anterior region and intercoxal process; mesosternum and metaepisternum about smooth; metasternum densely setose except the middle, abdomen densely setose; males with sternum VII emarginate, with two pairs of setae.

Male genitalia (Fig. 40). Median lobe of aedeagus fairly stout and straight, apex distinctly bent to right side in ventral view, right margin fully curved before apex; apical lamella very small, its length about 0.8 times as basal width, about triangular, rounded apically. Internal sac with main flagellum thick and curved, apex almost reaching apical orifice; secondary flagellum short and thick, weakly sclerotized, length about 0.4 times as the main flagellum; trumpet-form expansion large, length about 0.45 times as the main flagellum; apical bursa present; an additional transverse sclerotized piece present on the left margin of apical orifice. Female genitalia unknown.

Distribution. Only known from Sulawesi (Palopo). (Fig. 65)

Etymology: The name of this new species is dedicated to our friend, Dr. Riccardo Sciaky from Milano, a specialist on Carabidae, who kindly lent this rare species for our study.

***andrewesi*-group**

The *andrewesi*-group contains three species: *P. andrewesi* (Jedlička), *P. bacchusi* Darlington, and *P. unicolor* **sp. n.** This species group has a rather wide and discontinuous distribution range in southeast Asia, including south Chinese continent, Taiwan Island, the Philippines, and New Guinea. (Fig. 66)

The diagnostic characters of this species group are: Body form weakly convex; pronotum unicolor; elytra unicolor or with two spots near apex; tergum VII uniformly black, or with vague light pattern. Terminal labial palpomeres securiform in both sexes (Fig. 61); male sternum VII with two pairs of setae; elytral third interval with four or more setigerous pores. Aedeagus gently slender, with apical lamella short and wide, about coniform, strongly oblique to right side; internal sac with main flagellum reaching apical orifice; trumpet-form expansion small, length 0.25–0.3 times of the main flagellum; secondary flagellum short and weakly sclerotized; apical bursa present or not. (Figs. 41, 42)

We consider these three species are close for the following similarities: (1) body form weakly convex; (2) elytral third and fifth interval with three or more setigerous pores; (3) tergum VII without distinct pattern; (4) aedeagal apical lamella short, about coniform.

The *andrewesi*-group is very similar with *eschsoltzii*-group in color coordination, and male secondary sexual characters. But, the *andrewesi*-group is different from the latter species group in body form (weakly convex in *andrewesi*-group, strongly convex in *eschsoltzii*-group) and aedeagus shape (much slenderer in *eschsoltzii*-group).

***Physodera andrewesi* (Jedlička, 1934)**

Fig. 20.

Jedlička 1934: 120 (type locality: Mt. Makiling (the Philippines); holotype in NHML, monotypic); Jedlička 1940: 17 (*Allocota*); Jedlička 1963: 305 (*Allocota*); Kirschenhofer 1996: 763 (*Allocota*); Shi *et al.* 2013: 41.

Material examined. **Holotype** of *Lachnoderma andrewesi* Jedlička (NHML), a female, "Mt. Makiling / Luzon, Baker"; "Type" [round label with red frame]; "TYPUS" [red label]; "*Lachnoderma / andrewesi / type* sp. n. / Det. ING. JEDLIČKA"; H.E. Andrewes Coll. / B.M. 1945-97". (Figs. 8, 20); 1 female (IZAS), "Kabanglasan, Bukidnon, Mindanao, the Philippines, January 2016, indigenous collectors".

Diagnosis. Body length 8.0–8.6 mm; body form weakly convex. Head and pronotum reddish brown, pronotum without pattern; elytra metallic blue, with a pair of large red spots behind middle: spots about one third as the elytra in length, occupying intervals 1–6 in width, spots conjoint at the elytral suture, forming a cordiform patch. Tergum and sternum VII uniformly dark. Pronotal hind angles sharp and acute; long and dense setae present near front angles, short and sparse setae along the full length of lateral margins (Fig. 50). Elytral third interval with four or five setigerous pores; the fifth with two or three ones near base.

P. andrewesi can be readily distinguished from all the other members of *Physodera* by the presence of red spots on elytra, except for *P. bacchusi*. These two species are different in: (1) head and pronotum reddish brown, and elytra metallic blue in *P. andrewesi*; head and pronotum dark brown, and elytra dark metallic green in *P. bacchusi*. (2) elytral spots larger in *P. andrewesi*, about one third as the elytra in length, occupying intervals 1–6 in width, conjoint at elytral suture; in *P. bacchusi*, spots about one seventh as the elytra in length, occupying intervals 2–4 in width, not conjoint at elytral suture. (3) *P. andrewesi* smaller in size, body length 8.0–8.6mm; *P. bacchusi* larger, 11.0–11.5 mm. (4) *P. andrewesi* with pronotum narrower, PW/PL about 1.7; *P. bacchusi* with pronotum wider, PW/PL about 1.9–2.1. (5) pronotum relative small in *P. bacchusi*, elytral length about 4.5 times as the pronotal length; in *P. andrewesi* such proportion about 3.4. (6) *P. bacchusi* with a series of fine setae along elytral seventh interval; *P. andrewesi* without setae on the seventh interval.

Female genitalia. Not studied.

Distribution. Only known from the Philippines (Luzon and Mindanao). (Fig. 66)

***Physodera bacchusi* Darlington, 1971**

Figs. 21, 31, 41.

Darlington 1971: 326 (type locality: Finisterre Range (New Guinea); holotype in NHML); Shi *et al.* 2013: 41.

Material examined. **Holotype** of *Physodera bacchusi* Darlington (NHML), a male, "Holo / type" [round label with red circle]; "Stn. No. / 30"; "New Guinea: / Madang Dist., / Finisterre Mts. / Damanti 3,550 ft. / 2–11.x.1964"; "M.E.Bacchus. / B.M. 1965-120"; "*Drawn 1968 / M.Catron / No.498*"; "*Drawn 1968 / M.Catron / No.483*"; "*Holotype / Physodera / bacchusi / Darl.*" [red label] (Figs. 9, 21); 3 males (CCCC) "Xizang auto region., Mêdog county, near the township, 1100m, on tree trunk; Yang Xiaodong lgt., 2012.VII.30."

Diagnosis. Body length 11.0–11.5mm; body form weakly convex. Head and pronotum dark brown, pronotum without pattern; elytra dark green, with distinct metallic hue, and a pair of small red spots near apex: spots about one seventh as the elytra in length, occupying intervals 2–4 in width, spots not conjoint at elytral suture. Tergum and sternum VII dark, without distinct pattern, a little yellowish around spiracles. Pronotal hind angles sharp, about rectangular; setae only present near front and hind angles. Elytral third interval with three very small setigerous pores; the fifth with four or five small pores near base; the seventh interval with a series of fine setae. Comparisons with related species see diagnosis under *P. andrewesi*.

Male genitalia (Fig. 41). Median lobe of aedeagus gently slender, apex strongly bent to right side in ventral view, right margin sinuated before apex; apical lamella small, its length about equal to the basal width, about triangular, rounded apically. Internal sac with main flagellum fine and curved, apex reaching apical orifice; secondary flagellum weakly sclerotized, length about 0.4 times as the main flagellum; trumpet-form expansion small, length about 0.3 times as the main flagellum; apical bursa absent. Female genitalia unknown.

Distribution. New Guinea and China (Xizang). (Fig. 66)

Remarks. It is unexpected to find this species in south Xizang, where is very far from the only know locality, New Guinea. The identical external and male genital characters between specimens from the two localities (Figs. 21, 31) educed that this rare species has a very wide range. Further explorations are expected to fill the distribution gaps in southeast Asia.

***Physodera unicolor* sp. n.**

Fig. 22, 42, 56.

Material examined. Holotype (IZAS), a male, "China, Zhejiang Prov. / Lin'an, Qingliangfeng / Station / N30.11106°, E118.90077°"; "920m, 2004.VI.18N / Liang Hongbin & Teiji Sota / Institute of Zoology, / Chinese Acad. Sciences"; "*Holotype* / *Physodera unicolor* / sp. n. / Des. Ma & Shi, 2016" [red label]. (Figs. 10, 22)

Paratypes. China: 1 male (IZAS), "Gansu Prov., Kangxian county, Qinghe forestry farm, 1450–1650m, 1998.VII.15, Yao Jian lgt". 2 females (IZAS), "Hubei Prov., Xingshan, Longmen, 1350m, 1993.VII.14, Sun Baowen lgt.". 1 male, 1 female (IZAS), "Zhejiang Prov., Lin'an, Qingliangfeng Station, N30.11106° E118.90077°, 920m, 2004.VI.18N, Liang Hongbin & Teiji Sota lgt.". 1 male (IZAS), "Zhejiang Prov., Lin'an, Tianmushan, N30°19' E119°27', 300–400m, 2006.VIII.19, light trap, Shi Hongliang lgt.". 1 male (IZAS), "Zhejiang, Tianmushan, 1999.VII.". 2 male (SNUM), " Zhejiang Prov., West Tianmu, 300m, 2008.IV.26, Yinziwei lgt.". 1 male, 2 females (SNUM), "Zhejiang Prov., Lin'an, West Tianmu, 2008.VI., Huang Hao lgt.". 1 female (SNUM), "Zhejiang Prov., West Tianmu, 300–400m, 2008.VIII, Yin ziwei lgt.". 1 male (IZAS), "Mokanshan, 1935.V.9". 1 male, 3 females (IZAS), "Zikawei, 1924.III.17". 1 female (IZAS), "ZO-SE, 1939.IV.". 2 males (IZAS), "Anhui Prov., Yaoluoping, 2006.VIII, Ding Liang lgt.". 1 male (IZAS), "Anhui Prov., Yaoluoping, 2006.VIII, Ding Liang. lgt.". 2 males (HBUM), "Anhui Prov., Yaoluoping Reserve, 2007.VII.17–21, Ba Yibin, Lang Juntong, Wang Fengyan lgt.". 1 female (SNUM), "Anhui Prov., Yuexi County, Yaoluoping Reserve, N30°59'05" E116°04'41", 1050m, 2013.6.16, Dai & Peng lgt.". 1 specimen (IZAS), "Anhui Prov., Huanshan, Tangkou town, Fuxi villiage, 30°04'44" 118°08'56", 2013.VII.11, Xu Hao and Qiu Jianyue lgt.". 1 male (IZAS), "Jianxi Prov., Yanshan Town, Wuyishan Reserve, Yejiachang, 2006.VIII.2, light trap, Shi Hongliang lgt.". 1 female (IZAS), "Fujian Prov., Shanghang, Gonghe, 1987.VII.19, Lin Min lgt.". 1 male (IZAS), "Fujian Prov., Tongmuzhai, 1975.IX.29, Qi Shicheng lgt.". 1 specimen (HBUM), "Guangdong Prov., Nanling, 2010.VIII.10, Liu Haoyu lgt.". 2 males (IZAS), "Guangxi Prov., Longsheng county, Huaping res., Cunjiang, 2006.VIII.8, Lin Meiyang lgt.". 1 female (IZAS), "Guangxi Prov., Maoershan, Jiuniutang, 1100m, 1985.VII.10, light trap, Liao Subai lgt.". 1 specimen (IZAS), "Guangxi Prov., Maoershan, Gaozhai village, 2007.VII.13, light trap, Yang Ganyan lgt.". 1 specimen (IZAS), "Guizhou Prov., Guiyang, southern campus of Guizhou university, 2010.V–VI, Liu Ye lgt, light trap". 1 specimen (IZAS), "Guizhou Prov., Fanjingshan, 1775m, 2009.VII.9, Lin Wenhsin lgt.". 1 specimen (IZAS), "Guizhou Prov., Fanjingshan Huguosi, 2008.VII.16, Liu Ye lgt.". 3 males, 2 female (IZAS), "Guizhou university, N26.25130, E106.40164, 2010.V–VI, Liu Ye lgt.". 1 male (CCCC), "Taiwan, Taipei, Wulan Town, Fushan Village, 2009.VI.1N". 1 male (CCCC), "Taiwan, Hsinchu county, Jianshi Town, Ninglao village, 1997.VI.1, Chen Changchin lgt.". 1 male (CCCC), "Taiwan, Taitung county, Peinan town, Chialin Road, 1996.VII.20, Chen Changchin lgt.". 1 specimen (CCCC), "Taiwan, Taoyuan county, Fuhsing town, 1994.V.28, Chen Changching lgt.". 1 specimen (CCCC), "Taiwan, Hsinchu county, Wutse town, Talulintao, 1440m, 1994.VI.5, Chen Changching lgt.".

Diagnosis. Body Length: 8.7–10.5mm; body form weakly convex. Head and pronotum dark brown to black, elytra dark green, with distinct metallic hue, dorsal side without distinct pattern. Tergum and sternum VII dark, without or with very faint brownish-yellowish pattern (Fig. 48). Pronotal hind angles blunt; lateral margins with one or two primary setae near middle, long accessory setae along margins before middle (Fig. 51). Elytral third and fifth interval with about ten very small setigerous pores, pores on the fifth restricted in the basal half; the seventh interval sometimes with 1–4 small pores before middle; sometimes elytra with accessory setae.

P. unicolor sp. n. can be readily distinguished from all the other members of *Physodera* by dorsal side without pattern and body form only weakly convex. From dorsal color and setigerous pores on elytral intervals, *P. unicolor* sp. n. may be confused with *P. cyanipennis*. The new species can be easily distinguished from the latter by: body form only weakly convex; pronotum hind angles blunt; elytral intervals finely punctate; aedeagus less slender.

P. unicolor sp. n. is closest to *P. andrewesi* from the Philippines. Besides their different color, they are also

different in: Pronotum hind angles blunt in *P. unicolor* (Fig. 51) (versus sharp in *P. andrewesi* (Fig. 50)); elytral interval finely punctate in *P. unicolor* (versus impunctate in *P. andrewesi*); elytral third with more than eight small setigerous pores in *P. unicolor* (versus with four or five in *P. andrewesi*); pronotal lateral margins with one or two primary setae near middle in *P. unicolor* (Fig. 51) (versus without primary seta in *P. andrewesi* (Fig. 50)).

Description. Body length 8.7–10.6 mm. Dorsal side without distinct pattern; head and pronotum dark brown to blackish, pronotum lateral expansions yellowish brown; mouth parts and antennae brown, terminal palpomeres yellow; elytra dark green with metallic reflections, epipleura brownish; legs brown with metallic hue; ventral side dark brown. **Head.** Tempora short, about half as long as eyes, gradually narrowed behind eyes; frons glabrous, vertex punctate and rugose; terminal maxillary palpomere fusiform in both sexes; terminal labial palpomere securiform in both sexes (Fig. 61). **Pronotum** widest near middle, ratio PW/PL 1.65–1.76; base very shortly lobed; lateral expansions wide. Front angles wide and round; lateral margins evenly curved near middle, strongly sinuate before hind angles; hind angles about rectangular, blunt, not projected. Lateral margins with one or two primary setae near middle; accessory setae long and dense, present along margins before middle, and near hind angles (Fig. 51). Disc slightly convex; usually glabrous (sometimes sparsely to moderately pubescent); median line shallow, not reaching apex or base; heavy punctures present on lateral expansions, basal and anterior regions. **Elytra** gradually widened apically; lateral margins concaved near anterior third; apex truncated; basal border incomplete, reaching the third interval. Striae not furrowed, composed of puncture rows; punctures gradually decreased near apex. Intervals flat, finely punctate; the third interval with eight to twelve small setigerous pores; the fifth with four to thirteen setigerous pores, usually restricted before middle, sometimes arranged in double rows; the first and seventh interval sometimes also with some small setigerous pores; the seventh and eighth intervals tumid apically; marginal series composed of 18–20 setigerous pores. **Ventral side.** Prosternum sparsely pubescent; mesosternum and metaepisternum smooth; metasternum and abdomen sparsely pubescent; males with sternum VII emarginate apically, with two pairs of setae. Males with adhesive hairs well developed on the first three tarsomeres of pro- and mesotarsus.

Male genitalia (Fig. 42). Median lobe of aedeagus gently slender, apex strongly bent to right side in ventral view, right margin weakly sinuate before apex; apical lamella larger than the previous species, its length about equal to the basal width, about triangular, rounded apically. Internal sac with main flagellum fine and curved, gradually narrowed and ended before apical orifice; secondary flagellum weakly sclerotized, length about 0.5 times as the main flagellum; trumpet-form expansion small, length about 0.3 times as the main flagellum; apical bursa present. **Female genitalia.** Apical segment of ovipositor (Fig. 56) about 2.6 times long as its basal width, widest at base, gradually narrowed to the apical third, and then abruptly narrowed, apex sharp; outer margin about straight, inner margin curved; apical half with long setae; membranous extension fine and long, filiform, basal half slightly sclerotized.

Etymology. The specific epithet "*unicolor*" implies this new species has no pattern.

Distribution. Widely distributed in south China: Gansu, Hubei, Zhejiang, Shanghai, Anhui, Jiangxi, Fujian, Guangdong, Guangxi, Guizhou and Taiwan. (Fig. 66)

Variation. Specimens from Taiwan examined by us usually have accessory setae on pronotal disc, elytral apex and odd intervals (versus glabrous in specimens from other localities). Since there is no other difference on external or genital characters, we merely consider it as a geographical variation.

eschsoltzii-group

The *eschsoltzii*-group contains two very similar species: *P. eschsoltzii* Parry and *P. cyanipennis* Van de Poll. This species group distributes in southeast Asia, including south Chinese continent, Taiwan, Indo-china Peninsula, Malay Peninsula, the Philippines, and Greater Sunda Islands. (Fig. 67)

The diagnostic characters of this species group are: Elytra strongly convex; pronotum and elytra metallic, without distinct pattern; tergum VII black, with vague light patches around spiracles (as in Fig. 48). Terminal labial palpomeres securiform in both sexes (as in Fig. 61); male mesotarsus with adhesive hairs rudimentary on the first two tarsomeres; male sternum VII with two pairs of setae. Aedeagus fairly slender, with apical lamella large, strongly oblique to right side; internal sac with main flagellum reaching apical orifice; trumpet-form expansion small, length 0.25–0.3 times of the main flagellum; secondary flagellum long and strongly sclerotized, its apex widened forming a sclerotized small piece; apical bursa present. (Figs. 43, 44)

These two species are doubtless close for the similarities mentioned above. The following characters are unique in the genus: aedeagus very slender; internal sac with secondary flagellum very long, about 0.6 times as the main flagellum, its apex widened forming a sclerotized small piece.

***Physodera eschscholtzii* parry, 1849**

Figs. 23, 24, 32, 43, 48.

Parry 1849: 179 (type locality: Ceylon; lectotype in MNHN); Lacordaire 1854: 130; Bates 1886: 209; Bates 1892: 425; Van de Poll 1889: 251 (misspelled as *eschscholtzi*); Heller 1923: 305 (misspelled as *eschscholtzi*); Csiki 1932: 1347 (misspelled as *eschscholtzi*); Jedlička 1963: 300 (misspelled as *eschscholtzi*); Kabak 2003: 438; Shi *et al.* 2013: 41.

Physodera davidis Fairmaire 1887: 92 (type locality: Fokien (China); lectotype in MNHN); Van de Poll 1889: 252; Andrewes 1921: 150 (synonymized with *P. eschscholtzii* Parry); Shi *et al.* 2013: 41.

Physodera parvicollis Van de Poll 1889: 252 (Type locality: Hongkong; syntype probably destroyed); Heller 1923: 305; Csiki 1932: 1347; Jedlička 1963: 300; Kabak 2003: 438; Shi *et al.* 2013: 41. **syn. n.**

Allocota sumatrensis Kirschenhofer 1996: 761 (Type locality: Sumatra; holotype in NHMW); Kirschenhofer 2010: 62 (as subspecies of *P. eschscholtzii*); Shi *et al.* 2013: 41. **syn. n.**

Material examined. Lectotype of *Physodera eschscholtzii* Parry, designated herein (MNHN), a male, "TYPE" [red label]; "*Physodera / Eschscholtzii Parry / type. Sp. Ceylon*" [yellow label]; "Janson / Acq. 1884"; "SYNTYPE ♂ / *Physodera eschscholtzii* / Parry, 1849 / det. SHI H.L. 2011" [red label]. (Figs. 11, 23) **Lectotype** of *P. davidis* Fairmaire, designated herein (MNHN), a male, "TYPE" [red label]; "Chine / A. DAVID" [with "*Fokien*" hand written on backside]; "MUSEUM PARIS / 1952 / Coll. R. OBERTHÜR"; "*Physodera / Davidis / Fairm.*"; "LECTOTYPE ♂ / *Physodera davidis* / Fairmaire, 1887 / des. SHI H.L. 2011" [red label]. (Figs. 12, 24); **China:** 1 female (CCCC), "Fujian Prov. Nanping, 2008.VI.10". 1 specimen (MNHN), "Fokien"; "Ex Musaeo, Arm. David, 1900". 1 specimen (MNHN), "Chine Orient, Tchekiang, Ning Po, G. Cladin 1909". 2 specimens (MNHN), "Kiang-Si". 1 specimen (MNHN), "Kiukiang, June 1887, A.E.Pratt". 1 female (IZAS), "Hunan Prov., Jishou, Tangledong, 400m, 1987.VIII.8, Liao Subai lgt.". 1 male (IZAS), "Guangxi Prov., Jinxiu, Shengtangshan, 900m, 1999.V.18, Gao Mingyuan lgt.". 1 male (IZAS), "Guangxi, Jinxiu, Luoxiang, 400m, 1999.V.15, Liu Dajun lgt.". 1 male (IZAS), "Guangxi Prov., Ningming, Longrui, 1984.V.22, Huang Jinwen lgt.". 1 female (IZAS), "Guizhou Prov., Maolan, Wuyanqiao, 2008.VIII.2, Liu Ye lgt.". 1 female (IZAS), "Guizhou Prov., Xishui County, Dabaitang, 600m, 2000.IX.28, Liang Hongbin lgt.". 1 male (IZAS), "Yunnan Prov., Xishuangbanna, Mengzhe, 870m, 1958.VI.8, Pu Fuji lgt.". 1 female (IZAS), "Yunnan Prov., Xishuangbanna, Mengla, 620–650m, 1959.VII.7, Li Suofu lgt.". 1 female (IZAS), "Yunnan Prov., Xishuangbanna, Xiaomengyang, 850m, 1958.VIII.18, Zhang Yiran lgt.". 1 female (IZAS), "Yunnan Prov., Ruili rare botanic garden, N24.07230°, E97.81944°, 1152m, 2009.VIII.8, night, rotten tree, Shi Hongliang lgt.". 1 female (IZAS), "Yunnan Prov., Ruili forestry academy of science, N24.05105°, E97.93767°, 846m, 2009.VIII.7, night, rotten wood, Shi Hongliang lgt.". 2 females (IZAS), "Hainan Prov., Baisha County, Naikai Town, N19.07926°, E109.41133°, 262m, 2009.XI.22, beating on vegetation, Liang Hongbin lgt.". 1 specimen (HBMU), "Hainan Prov., Changjiang county, Bawang, 2006.XI.14, Ren Guodong lgt.". 4 males, 1 female (IZAS), "Hainan Prov., Jianfengling, Tianchi resort, 950m, 2009.4.6–15, Zhu Xiaoyu lgt.". 1 specimen (IZAS), "Hannan Prov., Bawangling, 2009.4.21, Tang Guo lgt.". 1 male (IZAS), "Hainan Prov., Baisha county, Nankai village, beating on vegetation, 2009.11.22, Liang Hongbin lgt.". 1 female (IZAS), "Hainan Prov., Qiongzong, Baihualing, D. 2009.11.26, Liang Hongbin lgt.". 1 specimen (MNHN), "China, Hongkong". 1 female (CCCC), "Taiwan, Taitung, Chihpen Road, 2004.IV.18, Wu Shuping lgt.". 1 male (CCCC), "Taiwan, Taipei, Sanhsia Town, Shihsaitou, 1994.IX.5". 1 specimen (MNHN), "Shanmei, 400m, 23-Mai 77, Taiwan". **India:** 1 specimen (MNHN), "Noa-Dehing, Valley, Assam". **Vietnam:** 1 specimen (MNHN), "Coptodera, hexagonodem, Fair. Tonkin"; "Ex Musaeo, L.Fairmaire, 1896". 1 specimen (MNHN), "Tonkin, Cap. Fauguel, 1900". 4 specimens (MNHN), "Tonkin, prov. De Tuyen-Quan, Haute Rivière Claire, A. Weiss 1901". 2 specimens (MNHN), "Hoa Binh, Indo-Chine". 1 specimen (MNHN), "Tonkin, Dr. R. Bavay 1904". 5 specimens (MNHN), "Tonkin, Région de Hoa-Binh". 1 specimen (MNHN), "Tonkin, Rég. De Hoa Binh, A. De Cooman 1927". 1 specimen (MNHN), "Tonkin, Rég. De Hoa-Binh, A. De Cooman 1929". 8 specimens (MNHN), "Tonkin occ. Env. De Hoa-Binh, R.P.A. de Cooman, 1919". 3 specimens (MNHN), "Hoah Binh, Tonkin XII-1934, A. De Cooman". 5 specimens (MNHN), "Hoah binh, Tonkin". 1 specimen (MNHN), "Hoah Bing, Tonking, leg. Coomanns". 1 specimen (MNHN), "Cochichine, Baria, leg. A. Baebion, Dr. J.L.". 1 specimen (MNHN), "Cochineh. Or., Kon hengo, R.P. Guerlach

98". 1 specimen (MNHN), "annam, Phuc Son, Nov. Dez., H.Fruhstorfer". 3 males and 3 females (IZAS), "Tonkin, Hoa-Binh, leg. A. de Cooman". **Laos:** 2 specimens (MNHN), "Born Van Ena, pres Vientiane, Laos, 15-VI-67". **the Philippines:** 1 specimen (MNHN), "Philippine"; "Ex Musaeo, Chaudoir"; "Eschscholtzii Parry, Iles Philippines, Coll. Waterhouse". 1 specimen (MNHN), "Philippines, Ch. Semper". **Malaya:** 1 specimen (MNHN), "Malcca, Deyrolle"; "Parryi, Chaud.". 1 specimen (MNHN), "Malacca"; "Ex Musaeo, Mniszech". 2 specimens (MNHN), "Penang"; "Janson, Acq. 1884". 1 specimen (MNHN), "Pèrak., Malacca." **Singapore:** 1 specimen (MNHN), "Singapore". 1 specimen (MNHN), "Singapore, A. Raffray". **Borneo:** 30 specimens (MNHN), "Bornèò Occ, Pontianak, 1898". 3 specimens (MNHN), "Bornèò Occ, Pontianak, 1899". 1 specimen (MNHN), "Bornèò Occ, Pontianak, 1901". 2 specimens (MNHN), "ornèò Occ, Pontianak, 1903". 4 specimens (MNHN), "Bornèò Occ, Pontianak, 1906". 8 specimens (MNHN), "Bornéò, Riv. Mandor, Fr. Buffat 1897". 3 specimens (MNHN), "Bornéò Occ., Riv. Samben, Fr. Buffat, 7bre 1897". 1 specimen (MNHN), "Bornéò Occ., Lohaban, J.B.Ledru 1897". 1 specimen, "Boreno"; "Ex Musaeo, H.W.Bates, 1892". 1 specimen (MNHN), "Boreno, North"; "Ex Musaeo, H.W.Bates, 1892". 1 specimen (MNHN), "N.W. Borneo, Kuching. Capt. Jan.23.00, by Dyak coll., Pres. 1900 by R. Shelford.". 3 specimens (MNHN), "Ponrianak, Borneo". 2 specimens (MNHN), "Brunnei, (Borneo)". 2 specimens (MNHN), "Brunei.". **Sumatra:** 1 specimen (MNHN), "Sumatra, Kepahiang". 2 specimens (MNHN), "Pangar Alam, Sumatra, J. Bouchard". 1 specimen (MNHN), "Sumatra, Rég de Benkoelen, Tandjong Sakti, Mme. M.E. Walsh, 1935". **Java:** 1 specimen (MNHN), "Java, Goen Halimoen, 1937". 1 specimen (MNHN), "Java occident. Pengalengan, 4000. 1893, H.Fruhstorfer.". 1 specimen (MNHN), "Ile de Kangean, Pres Java, Mme E. Walsh. 1936". 1 specimen (MNHN), "Java Prient, M. Ardjoeno". 2 specimens (NNML). "Nederland Indie, W. Java 2000ft, Z.W. Priangan, 1–15.XII.1941, J.M.A.v. Groenendael".

Notes on types of different authors. *Physodera eschscholtzii* Parry: In the original literature, Parry (1849) mentioned two syntypes: the one from the Philippines brought by Cuming should be deposited in NHML, and the other one from Ceylon was in Parry's collection. However, we failed to find the one from the Philippines in NHML, but examined a male from Ceylon in MNHN. This one bears a yellow hand writing label according with Parry's script, and should be one of the syntypes. It was transferred to MNHN through EW Janson and R Oberthür. We herein designate this specimen from Ceylon as lectotype for the purpose of fixing the name to unique name-bearing type.

***Physodera davidis* Fairmaire:** The original literature didn't indicate or imply how many specimens were examined, but only mentioned the locality "Fokien". It can be confirmed that the male examined in MNHN belongs to the type series. We herein designate this one as lectotype for the taxonomic purpose of fixing the name to unique name-bearing type. Moreover, we examined one other specimen labeled "Fokein" used to be in the collection of A. David in MNHN. But, there is no more evident to show this one was examined by Fairmaire when the species described.

***Physodera parvicollis* Van de Poll:** According to the original literature, the syntype of *P. parvicollis* should be in the collection of NNML. But, Jedlička (1963) indicated that the type was destroyed. The type of *P. parvicollis* was not found when the second author visited NNML. However, before finding additional evidence to support the loss of type, we are not about to designate a neotype.

Diagnosis. Body length 10.5–12.5 mm; body form strongly convex. Head and pronotum dark, with faint bluish metallic reflections; elytra dark, with strong cupreous to purplish metallic reflections, lateral margins usually different in color, bluish or greenish. Tergum and sternum VII dark, without distinct pattern, tergum lighter around spiracles. Pronotum hind angles distinct, acute or rectangular; lateral margin usually somewhat angulate in the middle (Fig. 49). Elytral third interval usually with three or four setigerous pores (sometimes with two, five, or six pores), fifth interval with only one pore near base.

P. eschscholtzii can be distinguished from most species of the genus by the absence of pattern on pronotum or elytra, and strongly convex body form, except form *P. cyanipennis*. The differences between these two species see diagnosis of *P. cyanipennis*.

Male genitalia (Fig. 43). Median lobe of aedeagus fairly slender, apex strongly bent to right side in ventral view, right margin gradually curved in the middle, weakly sinuate before apex; left margin strongly curved; apical lamella small, its length about equal to the basal width, about triangular, rounded apically. Internal sac with main flagellum fine and sinuate, reaching apical orifice; trumpet-form expansion small, length about 0.25 times as the main flagellum; secondary flagellum long and fine, strongly sclerotized, length about 0.4 times as the main flagellum, its apex widened forming a sclerotized small piece; apical bursa present.

Female genitalia (Fig. 48). Apical segment of ovipositor about 3.3 times long as its basal width, widest at base, gradually narrowed and curved to apex, apex sharp; outer margin about straight, inner margin curved; apical half of inner margin and full length of outer margin with long setae; membranous extension slender, slightly expanded at apex.

Distribution. China (Zhejiang, Fujian, Jiangxi, Hunan, Guizhou, Guangxi, Yunnan, Hainan, Hong Kong and Taiwan); Vietnam; Laos; the Philippines; Singapore; Malaya; Borneo; Sumatra; Java; India; Sri Lanka. (Fig. 67)

Variation. *P. eschscholtzii* is one of the most common and widely distributed species of the genus, and a highly variable species as well. Even for individuals from same locality, morphological characters are variable in the following aspects: elytra disc color varies from bronzy to violaceous; pronotum varies in shape: wider to narrower, lateral margins distinctly angulate to somewhat rounded in the middle, hind angles barely to strongly projected; the third elytral interval with setigerous pores varies from two to six.

Remarks. In the original literature, van de Poll erected the species *P. parvicollis* for its smaller and narrower pronotum than *P. eschscholtzii*. And for *Allocota sumatrensis*, although he did not compare it with *P. eschscholtzii*, but latter (Kirschenhofer 2010) the author assigned it to a subspecies of *P. eschscholtzii*, and indicated that it is different from the nominotypical subspecies by wider pronotum, less incised marginal groove, pronotal sides more narrowing anteriorly, elytra more convex, and striae with finer punctures. As discussed above, all these differences should be considered as individual variations. So, we herein synonymize *P. parvicollis* Van de Poll and *Allocota sumatrensis* Kirschenhofer with *P. eschscholtzii* Parry.

***Physodera cyanipennis* Van de Poll, 1889**

Fig. 33, 44.

Van de Poll 1889: 253 (type locality: Bonthain (Indonesia); syntype depository unknown); Heller 1923: 305; Csiki 1932: 1347; Shi *et al.* 2013: 41.

Material examined. 1 male (CMB), "INDONESIA N-Sulawesi, 1km W Toraut, Dumoga, Bore NP 200–300m, 0°34'17"N, 123°54'19"E, 02.II.2006 leg. A. Weigel". 1 male (CRS), "INDONESIA S-Sulawesi, Palopo env., PUNCAK v. 1999, loc. collector leg."

Diagnosis. Body length 10.2–11.0 mm; body form strongly convex. Head and pronotum black, with bluish metallic reflections; elytra dark, with strong bluish to purplish metallic reflections, lateral margins slightly different in color. Tergum and sternum VII dark, without distinct pattern, tergum lighter around spiracles. Pronotum generally wider than in *P. eschscholtzii*; hind angles acute, projected outwards; lateral margin about rounded in the middle. Elytral third interval with five to seven setigerous pores, and some additional small setae; the fifth interval with five to seven pores restricted in the basal third; the seventh interval sometimes with two or three very small pores near base.

P. cyanipennis is very similar with *P. eschscholtzii*, but can be distinguished by: The fifth elytral interval with more than five setigerous pores near base in *P. cyanipennis* (versus only one large pores in *P. eschscholtzii*); pronotal lateral margins about fully round in the middle in *P. cyanipennis* (versus usually more or less angulate in *P. eschscholtzii*); *P. cyanipennis* with pronotum generally wider than *P. eschscholtzii*, PW/PL 1.73–1.77 in *P. cyanipennis*, PW/PL 1.40–1.65 in most specimens of *P. eschscholtzii*, but very rarely wider up to 1.75; Median lobe of aedeagus weakly bent to the right side in *P. cyanipennis*, apical lamella distinctly protuberant to the right, right margin straight at basal half, strongly sinuate before apex (versus in *P. eschscholtzii*, median lobe distinctly bent to the right side, apical lamella not protuberant to the right, right margin slightly curved at basal half, weakly sinuate before apex); Allopatric distributions.

Male genitalia (Fig. 44). Median lobe of aedeagus fairly slender, weakly bent to right side in ventral view; apical lamella distinctly protuberant to the right; right margin slightly curved in the middle, strongly sinuate before apex; left margin slightly curved; apical lamella a little long, its length about 1.4 times as the basal width, about ovate, rounded apically. Internal sac with main flagellum fine and sinuate, reaching apical orifice; trumpet-form expansion small, length about 0.25 times as the main flagellum; secondary flagellum long and fine, strongly sclerotized, length about 0.6 times as the main flagellum, its apex widened forming a sclerotized small piece; apical bursa present.

Female genitalia. Unknown.

Distribution. Indonesia (Sulawesi). (Fig. 67)

Acknowledgements

We wish to thank the following curators and colleagues for their help in accessing material under their care: Mr Changchin Chen (CCCC), Dr Riccardo Sciaky (CRS), Dr Martin Baehr (CMB), Prof Guodong Ren (HBUM), Dr Thierry Deuve (MNHN), Mrs Azadeh Taghavian (MNHN), Ms Christine Taylor and Ms Beulah Garner (NHML), Mr Fred van Assen and Drs Hans Huijbregts (NNML), Dr Olaf Jäger (SNSD), Prof Lizhen Li and Dr Liang Tang (SNUM). This work was partially supported by the Fundamental Research Funds for the Central Universities (No 2016ZCQ07) and the Natural Science Foundation of China (grant Nos 31172047 and 31401992).

References

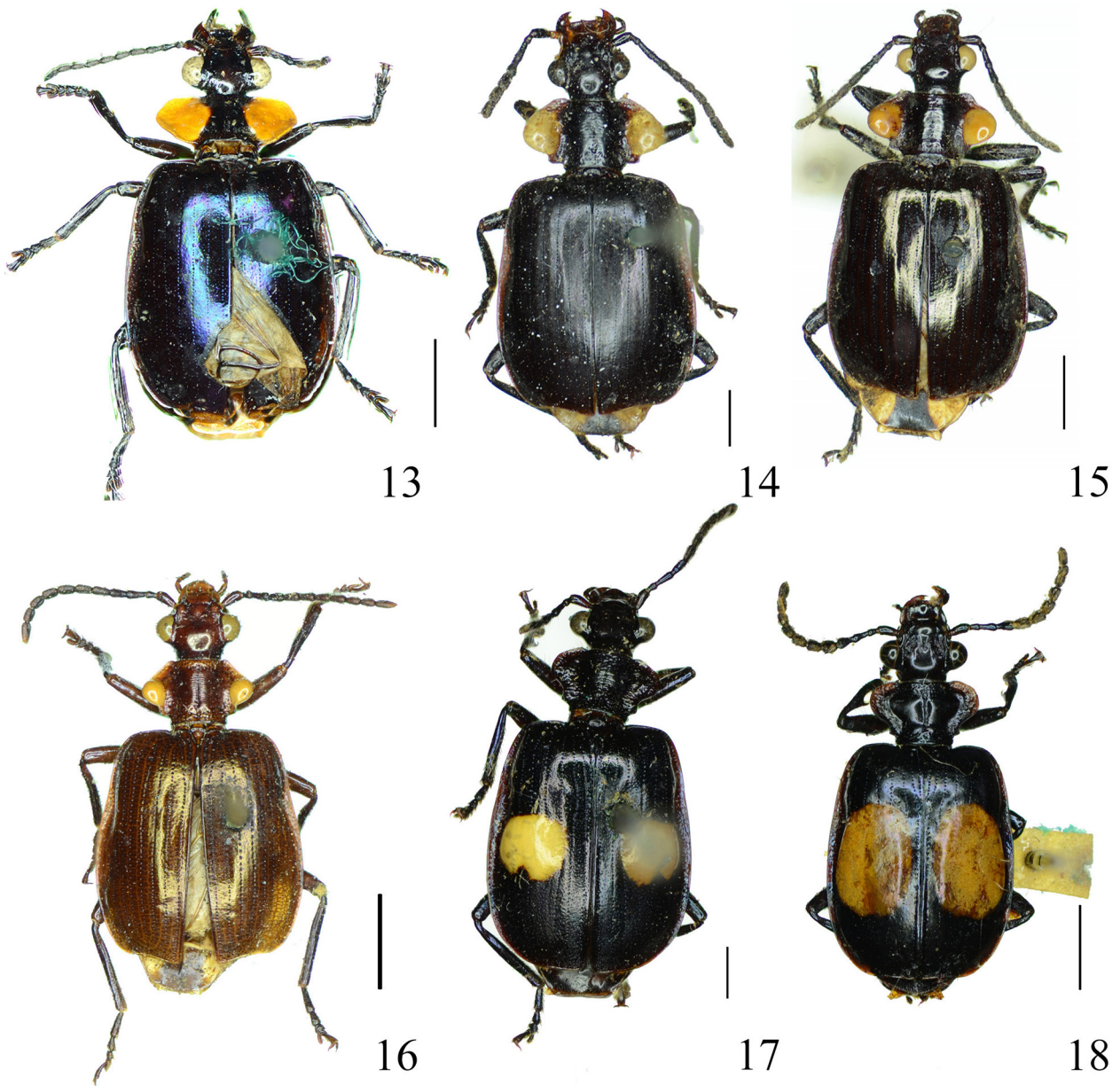
- Andrewes, H.E. (1921) Notes on synonymy and on some types of Oriental Carabidae in various foreign collections. *Transactions of the Entomological Society of London*, 1921, 145–195.
<https://doi.org/10.1111/j.1365-2311.1921.tb02805.x>
- Andrewes, H.E. (1923) On the types of Carabidae described by Schmidt-Göbel in his Faunula Coleopterorum Birmaniae. *Transactions of the Entomological Society of London*, 1923, 1–63.
- Andrewes, H.E. (1930a) On some new species of Carabidae from Sumatra. *Stettiner Entomologische Zeitung*, 91, 131–136.
- Andrewes, H.E. (1930b) On some new species of Carabidae from Sumatra contained in the collection of the Leyden Museum. *Zoologische Mededeelingen*, 13, 193–203.
- Ball, G.E., Kavanaugh, D.H. & Moore, B.P. (1995) *Sugimotoa parallela* Habu (Coleoptera, Lebiini): redescription, geographical distribution, and relationships based on cladistic analysis of adult structural features. *Special Bulletin of the Japanese Society of Coleopterology*, Series 4, 275–311.
- Bates, H.W. (1886) On the geodephagous Coleoptera collected by Mr. George Lewis in Ceylon. *The Annals and Magazine of Natural History*, Series 5, 17, 199–212.
- Bates, H.W. (1892) Viaggio di Leonardo Fea in Birmania e Regioni Vicini XLIV. List of the Carabidae. *Annali del Museo Civico di Storia Naturale di Genova*, Series 2, 267–428.
- Csiki, E. (1932) Carabidae: Harpalinae VII (Pars 124). In: Junk, W. & Schenkling, S. (Eds.), *Coleopterorum catalogus. Vol. III. Carabidae III*. W Junk, Berlin, pp. 1279–1598.
- Darlington, P.J. (1971) The carabid beetles of New Guinea. Part 4. General Considerations: Analysis and History of Fauna, Taxonomic Supplement. *Bulletin Museum of Comparative Zoology at Harvard College*, 142 (2), 133–338.
- Eschscholtz, J.F. (1829) *Zoologischer Atlas, enthaltend Abbildungen und Beschreibungen neuer Thierarten, während des Flottcapitanis v. Kotzebue zweiter Reise um die Welt, auf der Russisch-Kaiserlichen Kriegsschlupp Predprietië in den Jahren 1823–1826. Zweites Heft*. Reimer, Berlin, 13 pp.
- Fairmaire, L. (1887) Coléoptères de l'intérieur de la Chine. *Annales de la Société Entomologique de Belgique*, 31, 87–136.
- Heller, K.M. (1923) Some new Malayan Carabidae, especially Philippine. *The Philippine Journal of Science*, 23, 295–307.
- Jedlička, A. (1934) Noví Carabidi z východní Asie (VI díl). *Sborník Entomologického Oddělení při Zoologických Sbírkách Národního Muzea v Praze*, 12, 116–124.
- Jedlička, A. (1940) *Neue Carabiden aus Ostasien. XIII*. A. Jedlička, Prague, 18 pp.
- Jedlička, A. (1963) Monographie der Truncatipennen aus Ostasien, Lebiinae- Odacanthinae- Braehyninae (Coleoptera, Carabidae). *Entomologische Abhandlungen und Berichte aus dem Staatlichen Museum fuer Tierkunde in Dresden*, 28, 269–579.
- Kabak, I. (2003) Carabidae: tribe Lebiini Bonelli, 1810. In: Löbl, I. & Smetana, A. (Eds.), *Catalogue of Palaearctic Coleoptera. Vol. 1. Archostemata- Myxophaga- Adephega*. Apollo Books, Stenstrup, pp. 408–439.
- Kirschenhofer, E. (1996) Weitere neue und wenig bekannte Carabidae aus Sued- und Suedostasien (Coleoptera: Carabidae: Lebiinae: Colliurinae, Callistinae, Hexagoninae, Brachininae, Panagaeinae). II. Teil. *Linzer Biologische Beiträge*, 28 (2), 757–799.
- Kirschenhofer, E. (2010) New and little-known species of Carabidae from the Middle East and Southeast Asia (Coleoptera, Carabidae: Lebiini, Brachinini). *Annales Historico-Naturales Musei Nationalis Hungarici*, 102, 25–64.
- Lacordaire, J.T. (1854) *Histoire naturelle des insectes. Genera des Coléoptères ou exposé méthodique et critique de tous les genres proposés jusqu'ici dans cet ordre d'insectes. Tome premier contenant les familles des Cicindélites, Carabiques, Dytiscides, Gyrinides, et Palpicornes*. Roret, Paris, 486 pp.
- Mateu, J. (1990) Une nouvelle espece du genre *Physodera* Eschscholtz du Nepal (Coleoptera, Carabidae). *Nouvelle Revue d'Entomologie*, 7 (2), 155–158.
- Mohnike, O.G.J. (1875) Allgemeine Sitzung vom 7 Juni 1875. In: Andrä, C.J. (Eds.), Sitzungsberichte der niederrheinischen Gesellschaft für Natur- und Heilkunde in Bonn. *Verhandlungen des naturhistorischen Vereins der preussischen Rheinlande*

und Westfalens, 32 (4), pp. 158.

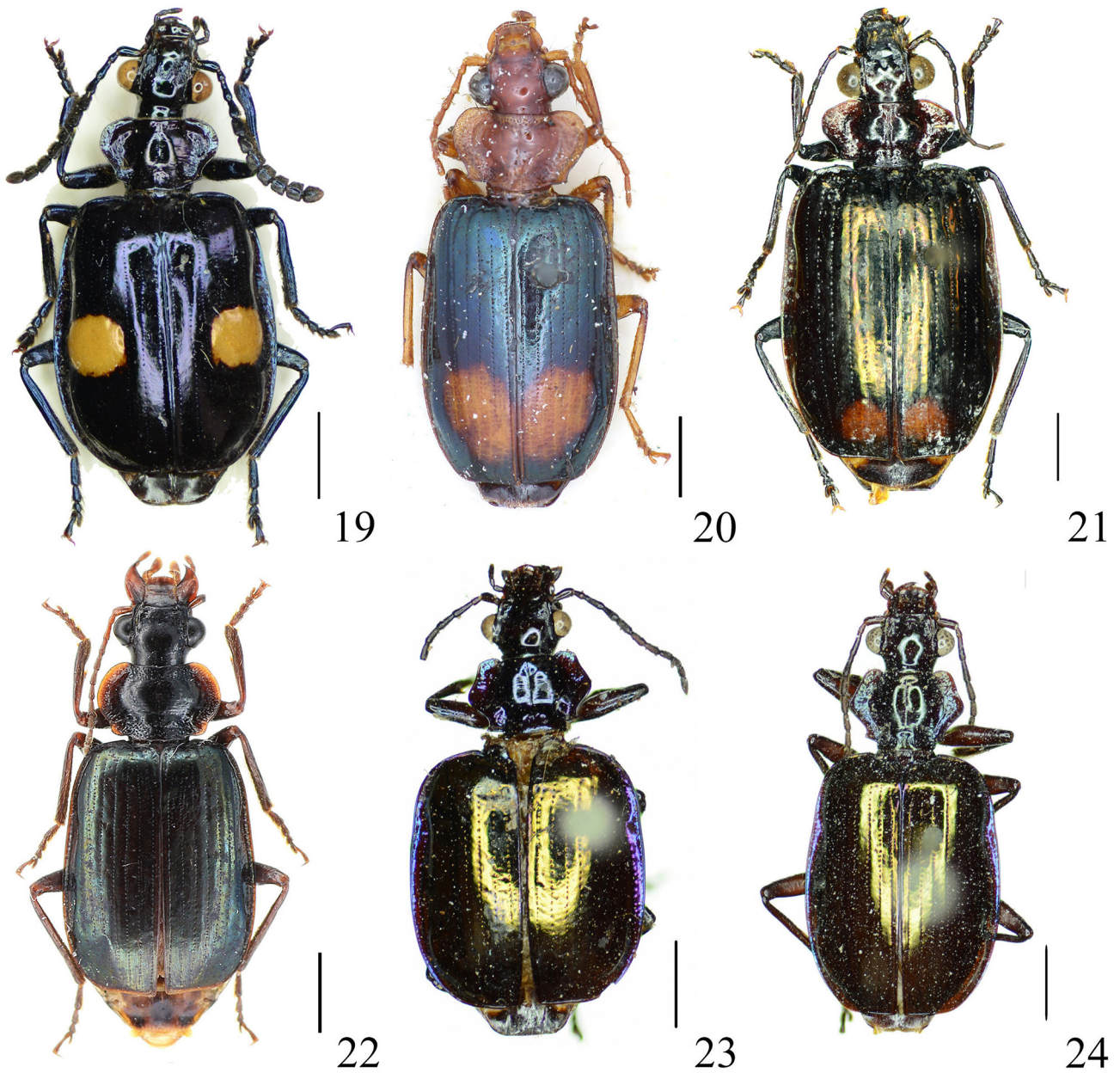
- Parry, F.J.S. (1849) Descriptions of some new species of Coleoptera. *The Transactions of the Entomological Society of London*, 5, 179–185.
- Schmidt-Göbel, H.M. (1846) *Faunula Coleopterum Birmaniae, adjectis nonnullis Bengaliae indiginis*. Haase, Prague, 94 pp., 3 pls.
- Shi, H.L., Zhou, H.Z. & Liang, H.B. (2013) Taxonomic synopsis of the subtribe Physoderina (Coleoptera, Carabidae, Lebiini), with species revisions of eight genera. *ZooKeys*, 284, 1–129.
<http://dx.doi.org/10.3897/Zookeys.284.3983>
- Van de Poll, J.R.H. (1889) Descriptions of three new species of the genus *Physodera* (Carabidae). *Notes from the Leyden Museum*, 11, 251–256.



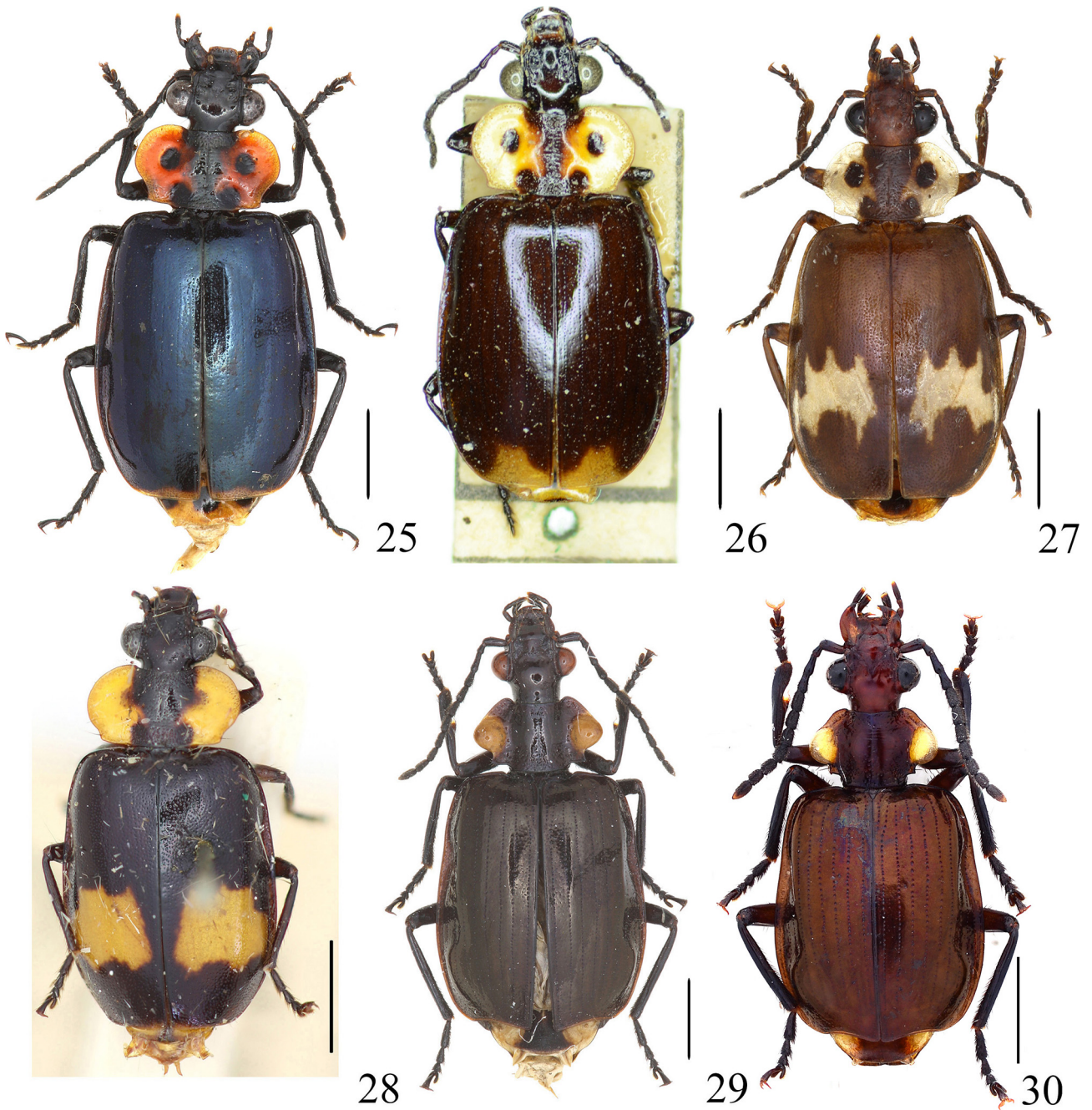
FIGURES 1–12. Labels for type materials: **Fig. 1**, holotype of *P. diglena* Andrewes; **Fig. 2**, syntype of *P. dejeani* Eschscholtz; **Fig. 3**, syntype of *P. noctiluca* Mohnike; **Fig. 4**, holotype of *P. chalcères* Andrewes; **Fig. 5**, lectotype of *P. eburata* Heller; **Fig. 6**, lectotype of *P. bifnestrata* Heller; **Fig. 7**, holotype of *P. sciakyi* sp. n. **Fig. 8**, holotype of *Lachnoderma andrewesi* Jedlička; **Fig. 9**, holotype of *P. bacchusi* Darlington; **Fig. 10**, holotype of *P. unicolor*, sp. n.; **Fig. 11**, lectotype of *P. eschscholtzii* Dejean; **Fig. 12**, lectotype of *P. davidis* Fairmaire.



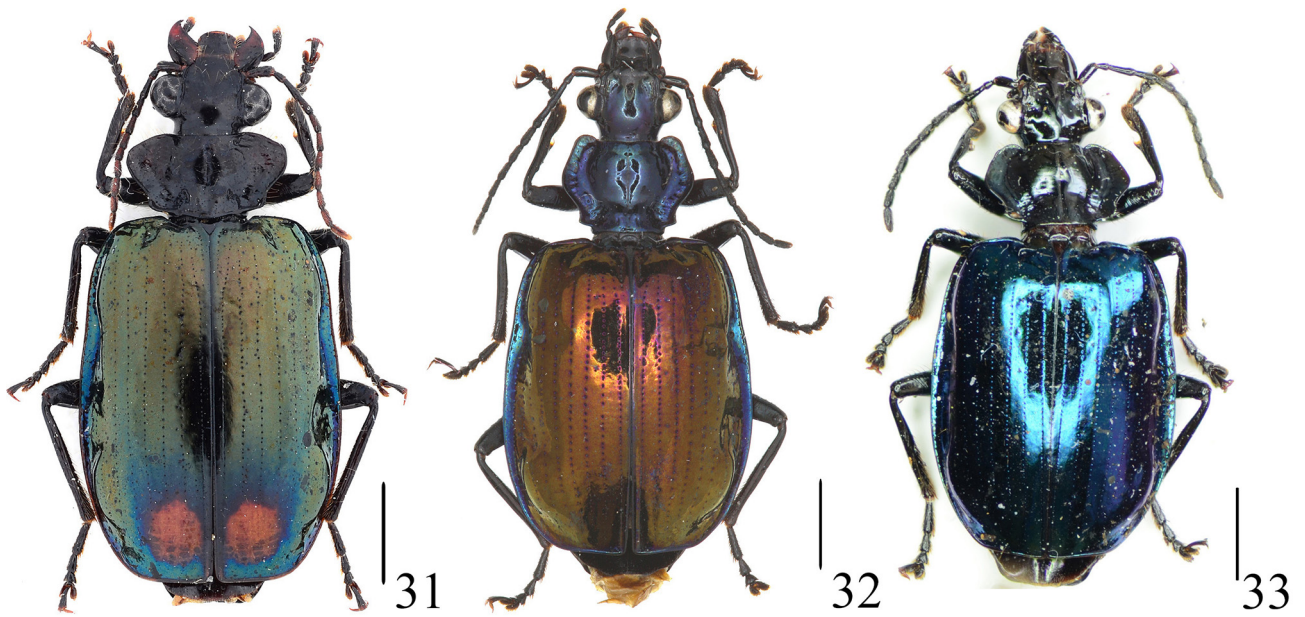
FIGURES 13–18. Habitus of type materials, scale bars = 2mm: **Fig. 13**, holotype of *P. diglena* Andrewes; **Fig. 14**, syntype of *P. dejeani* Eschscholtz; **Fig. 15**, syntype of *P. noctiluca* Mohnike; **Fig. 16**, holotype of *P. chalceres* Andrewes; **Fig. 17**, lectotype of *P. eburata* Heller; **Fig. 18**, lectotype of *P. bifnestrata* Heller.



FIGURES 19–24. Habitus of type materials, scale bars = 2 mm: **Fig. 19**, holotype of *P. sciakyi* sp. n.; **Fig. 20**, holotype of *Lachnoderma andrewesi* Jedlička; **Fig. 21**, holotype of *P. bacchusi* Darlington; **Fig. 22**, holotype of *P. unicolor*, sp. n.; **Fig. 23**, syntype of *P. eschscholtzii* Dejean; **Fig. 24**, lectotype of *P. davidis* Fairmaire.



FIGURES 25–30. Habitus, scale bars = 2 mm: **Fig. 25.** *P. amplicollis* van de Poll, Taiwan; **Fig. 26.** *P. amplicollis* van de Poll, Thailand; **Fig. 27.** *P. bousqueti* Mateu, Hainan; **Fig. 28.** *P. bousqueti* Mateu, Malaya; **Fig. 29.** *P. dejeani* Eschscholtz, Yunnan; **Fig. 30.** *P. chalceres* Andrewes, Sabah



FIGURES 31–33. Habitus, scale bars = 2 mm: **Fig. 31**, *P. bacchusi* Darlington, Xizang; **Fig. 32**, *P. eschscholtzii* Dejean, Thailand; **Fig. 33**, *P. cyanipennis* van de Poll, Sulawesi.



FIGURE 34. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. amplicollis* van de Poll, Taiwan, scale bar = 0.5 mm.



FIGURE 35. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. bousqueti* Mateu, Vietnam, scale bar = 0.5 mm.



FIGURE 36. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. diglena* Andrewes, Borneo, scale bar = 0.5 mm.

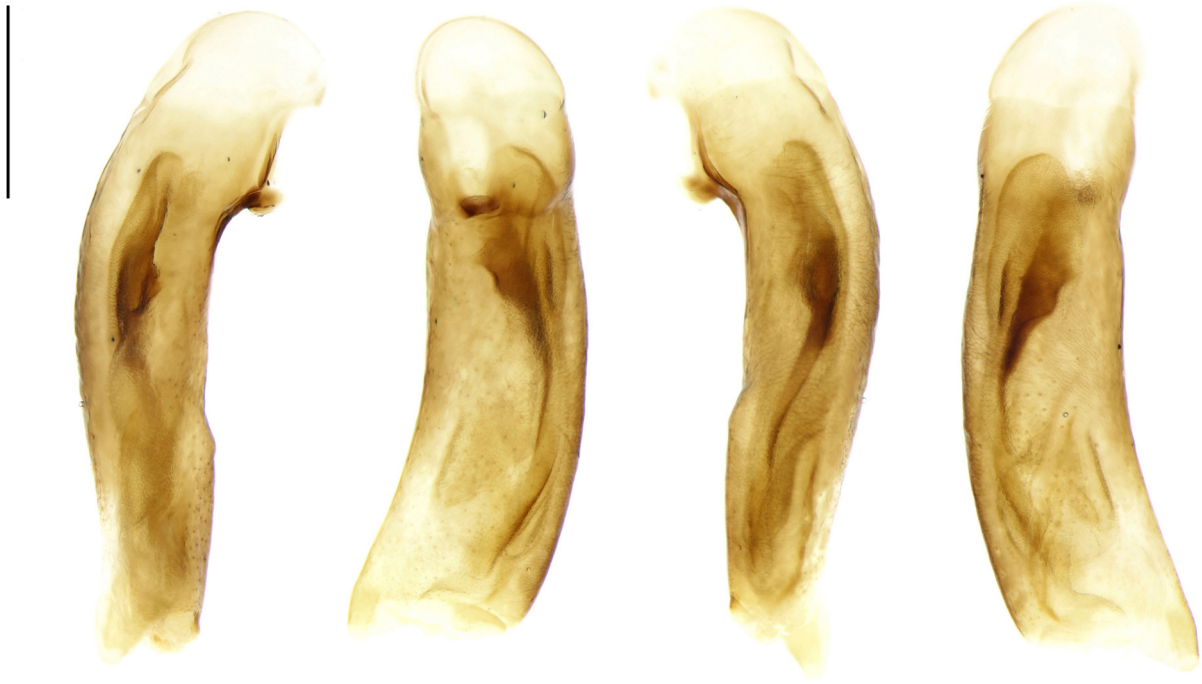


FIGURE 37. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. dejeani* Eschscholtz, Yunnan, scale bar = 0.5 mm.

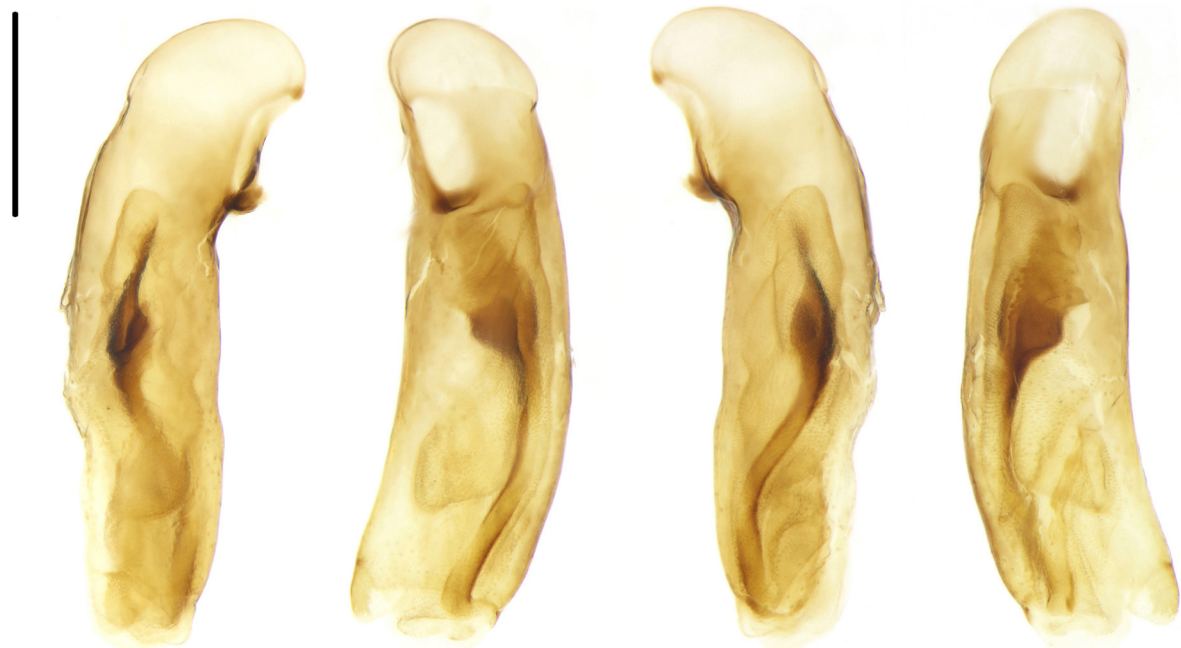


FIGURE 38. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. chalceres* Andrewes, a paratype from Perak, scale bar = 0.5 mm.



FIGURE 39. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. bifenestrata* Heller, Borneo, scale bar = 0.5 mm.

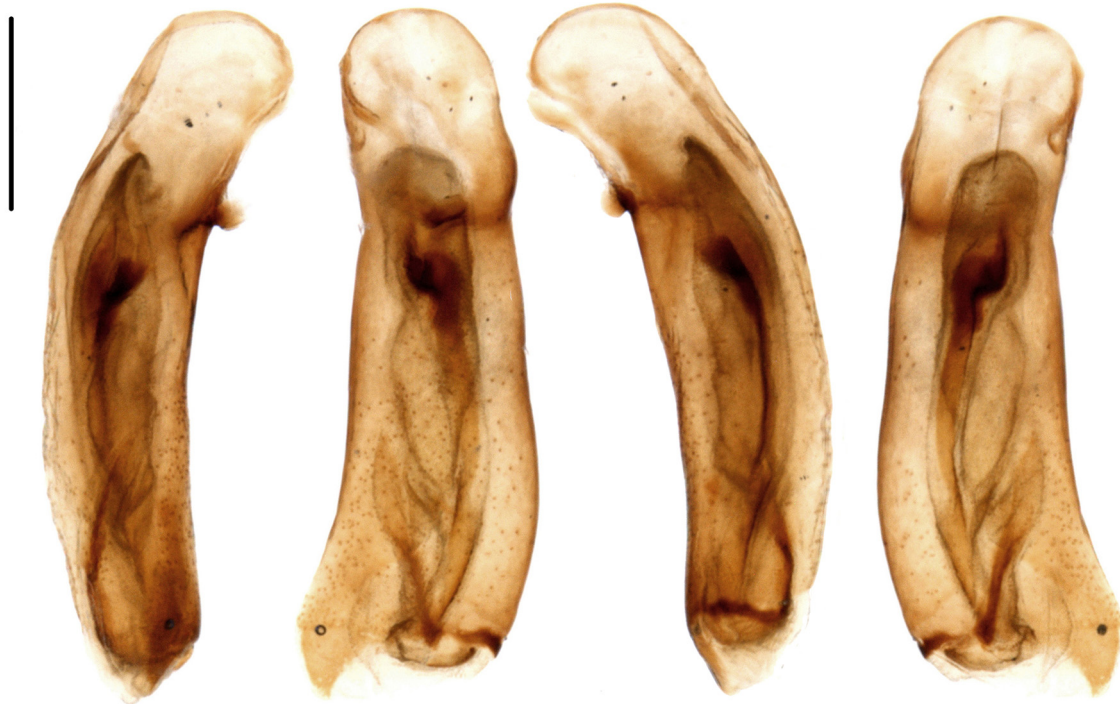


FIGURE 40. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. sciakyi* sp. n., holotype, scale bar = 0.5 mm.

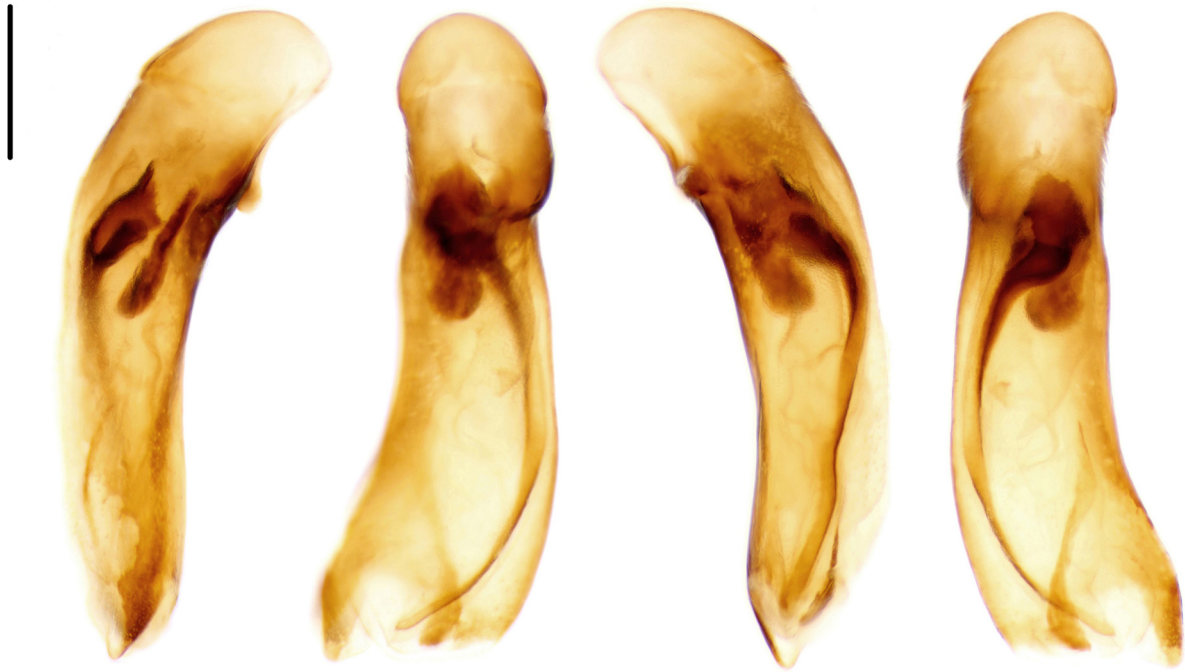


FIGURE 41. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. bacchusi* Darlington, holotype, scale bar = 0.5 mm.



FIGURE 42. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. unicolor* sp. n., a paratype from Anhui, scale bar = 0.5 mm.

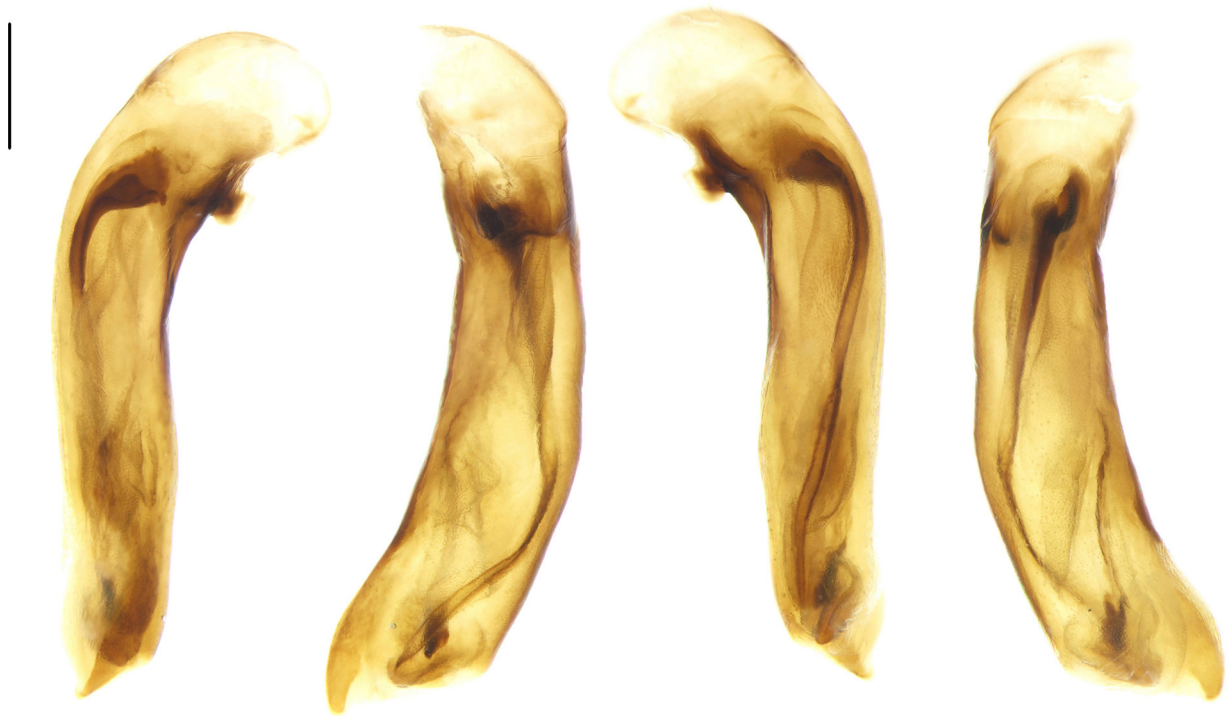
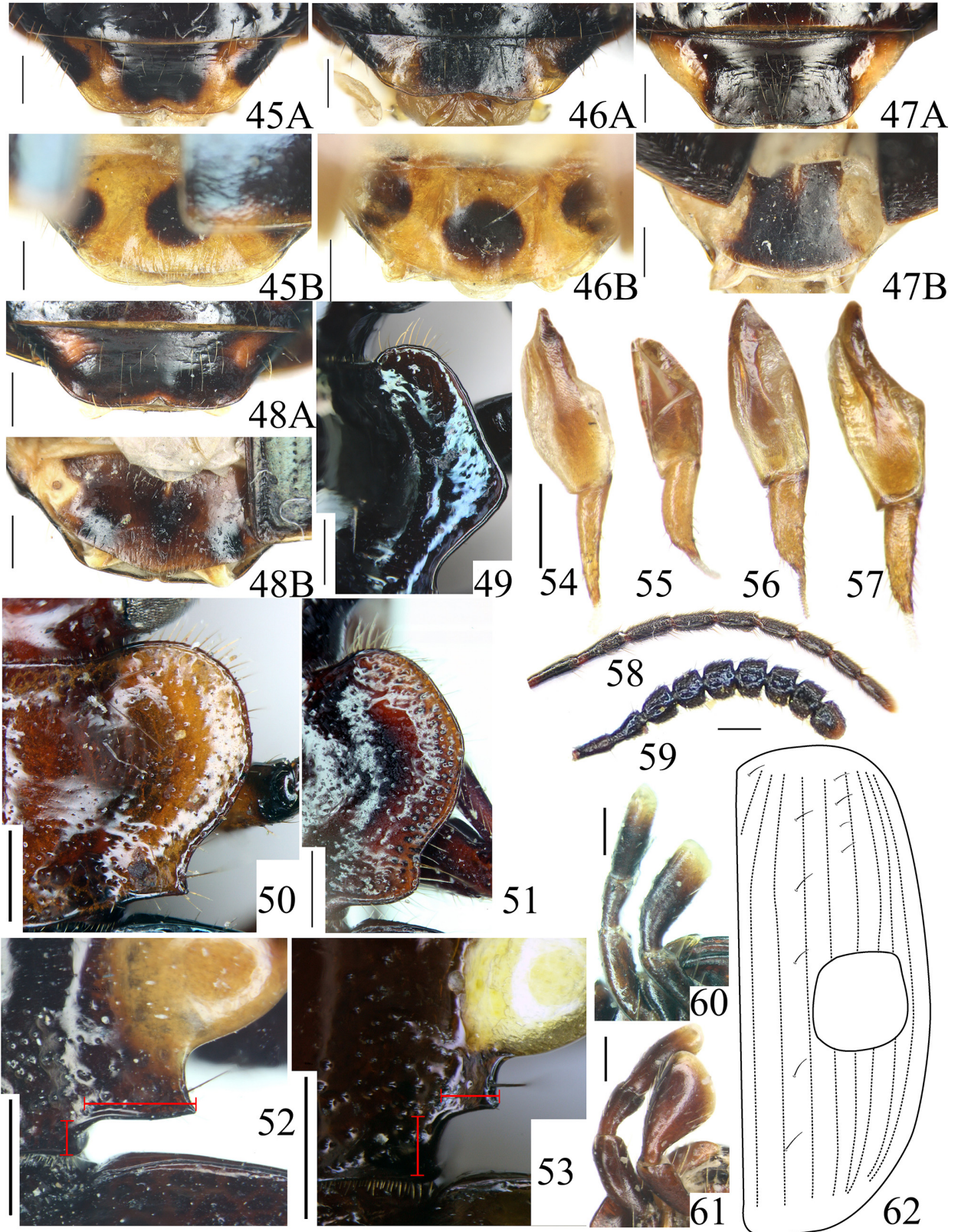


FIGURE 43. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. eschscholtzii* Parry, Hainan, scale bar = 0.5 mm.



FIGURE 44. Median lobe of male genitalia, right-lateral, ventral, left-lateral, and dorsal view of *P. cyanipennis* van de Poll, a specimen from Sulawesi, scale bar = 0.5 mm.





FIGURES 45–47. Coloration of terminal sternum (A) and tergum (B), scale bars = 0.5 mm: **Fig. 45**, *P. amplicollis* van de Poll, Taiwan; **Fig. 46**, *P. bousqueti* Mateu, Hainan; **Fig. 47**, *P. dejeani* Eschscholtz, Taiwan; **Fig. 48**, *P. unicolor* sp. n., a paratype from Guizhou.

FIGURES 49–51. Pronotum, showing marginal accessory setae and hind angle, scale bars = 0.5 mm: **Fig. 49**, *P. eschscholtzii* Parry, Taiwan, (accessory setae restricted in front angle); **Fig. 50**, *P. andrewesi* (Jedlikča), Philippines, (accessory setae along margin before middle, hind angle sharp); **Fig. 51**, *P. unicolor* sp. n., a paratype from Guizhou, (accessory setae along margin before middle, hind angle round).

FIGURES 52–53. Pronotal hind angle, showing lateral notch, scale bars = 0.5 mm: **Fig. 52**, *P. dejeani* Eschscholtz, Taiwan, (lateral notch width more than two times as length); **Fig. 53**, *P. chalceres* Andrewes, Sabah, (lateral notch width about same as length).

FIGURES 54–57. Left ovipositor of females, ventral view, scale bar = 0.2 mm: **Fig. 54**, *P. dejeani* Eschscholtz, Taiwan; **Fig. 55**, *P. bousqueti* Mateu, Yunnan; **Fig. 56**, *P. unicolor* sp. n., Zhejiang; **Fig. 57**, *P. eschscholtzii* Parry, Yunnan.

FIGURES 58–59. Antennameres 3–11, scale bar = 0.5 mm: **Fig. 58**, *P. eschscholtzii* Parry, Taiwan, (antenna normal, not widened); **Fig. 59**, *P. bifenestrata* Heller, Borneo, (antenna widened and flattened since the 5th antennamere).

FIGURES 60–61. Labial and maxillary palpi of males, scale bars = 0.2 mm: **Fig. 60**, *P. dejeani* Eschscholtz, Yunnan (terminal labial palpomeres tubiform and truncate); **Fig. 61**, *P. unicolor* sp. n., a paratype from Guizhou, (terminal labial palpomeres securiform).

FIGURE 62. Line drawing of right elytron for *P. sciakyi* sp. n., holotype.

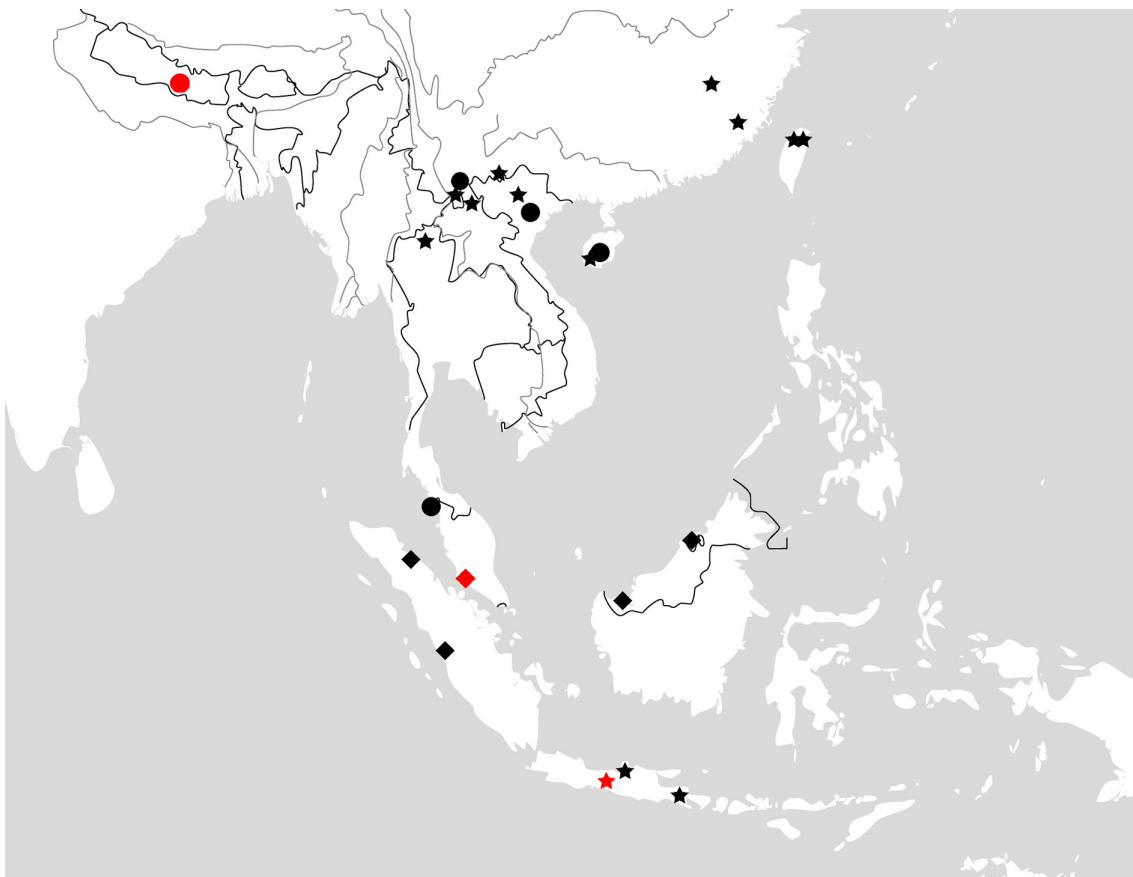


FIGURE 63. Known distribution of *Physodera amplicollis* group: ● *P. bousqueti* Mateu; ◆ *P. diglena* Andrewes; ★ *P. amplicollis* van de Poll., type localities for valid names in red.

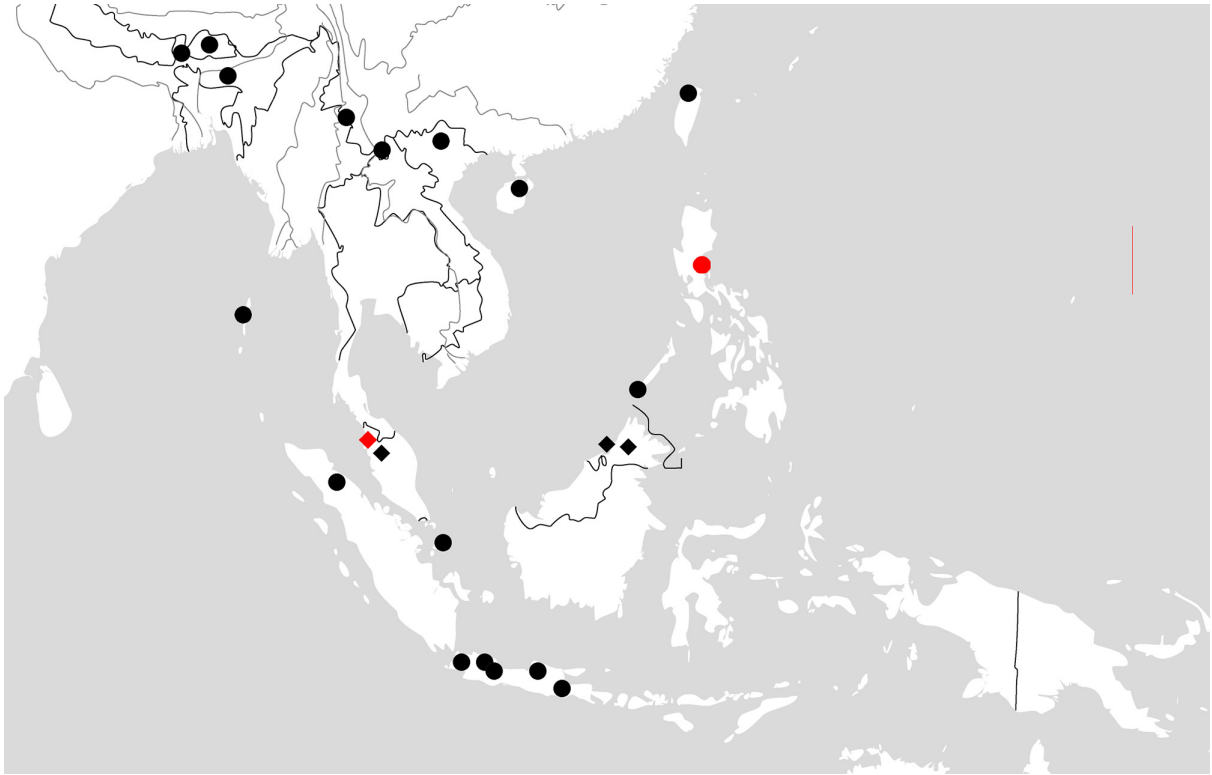


FIGURE 64. Known distribution of *Physodera dejeani* group: ● *P. dejeani* Eschscholtz; ◆ *P. chalceres* Andrewes, type localities for valid names in red.

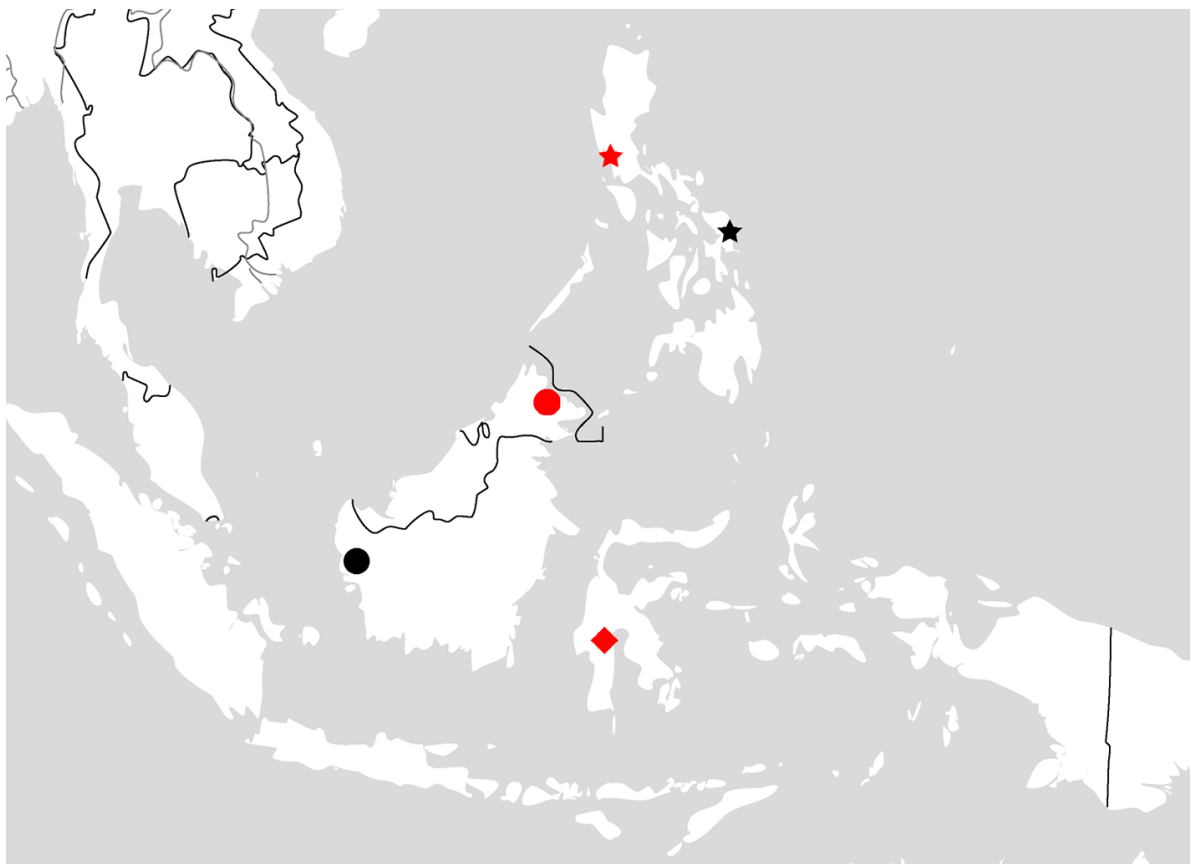


FIGURE 65. Known distribution of *Physodera eburata* group: ★ *P. eburata* Heller; ● *P. bifenestrata* Heller; ◆ *P. sciakyi* sp. n., type localities for valid names in red.

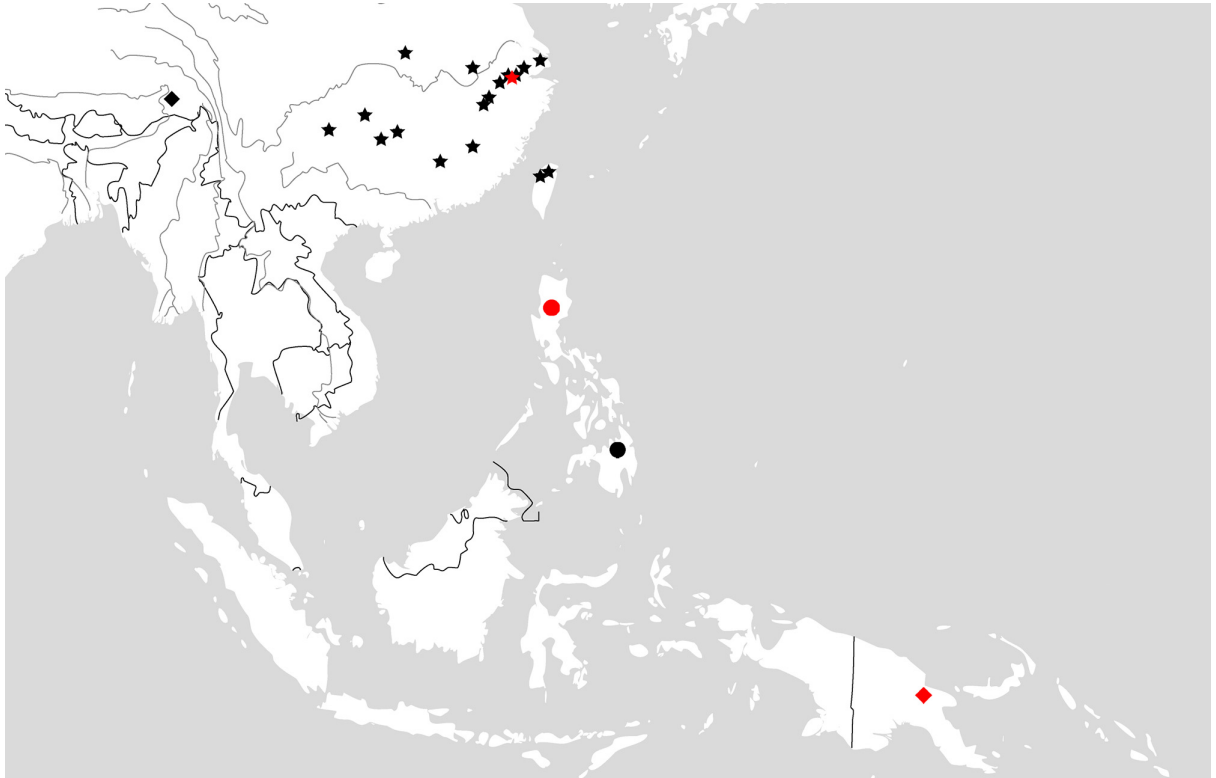


FIGURE 66. Known distribution of *Physodera andrewesi* group: ● *P. andrewesi* (Jedlička); ◆ *P. bacchusi* Darlington; ★ *P. unicolor* sp. n., type localities for valid names in red.

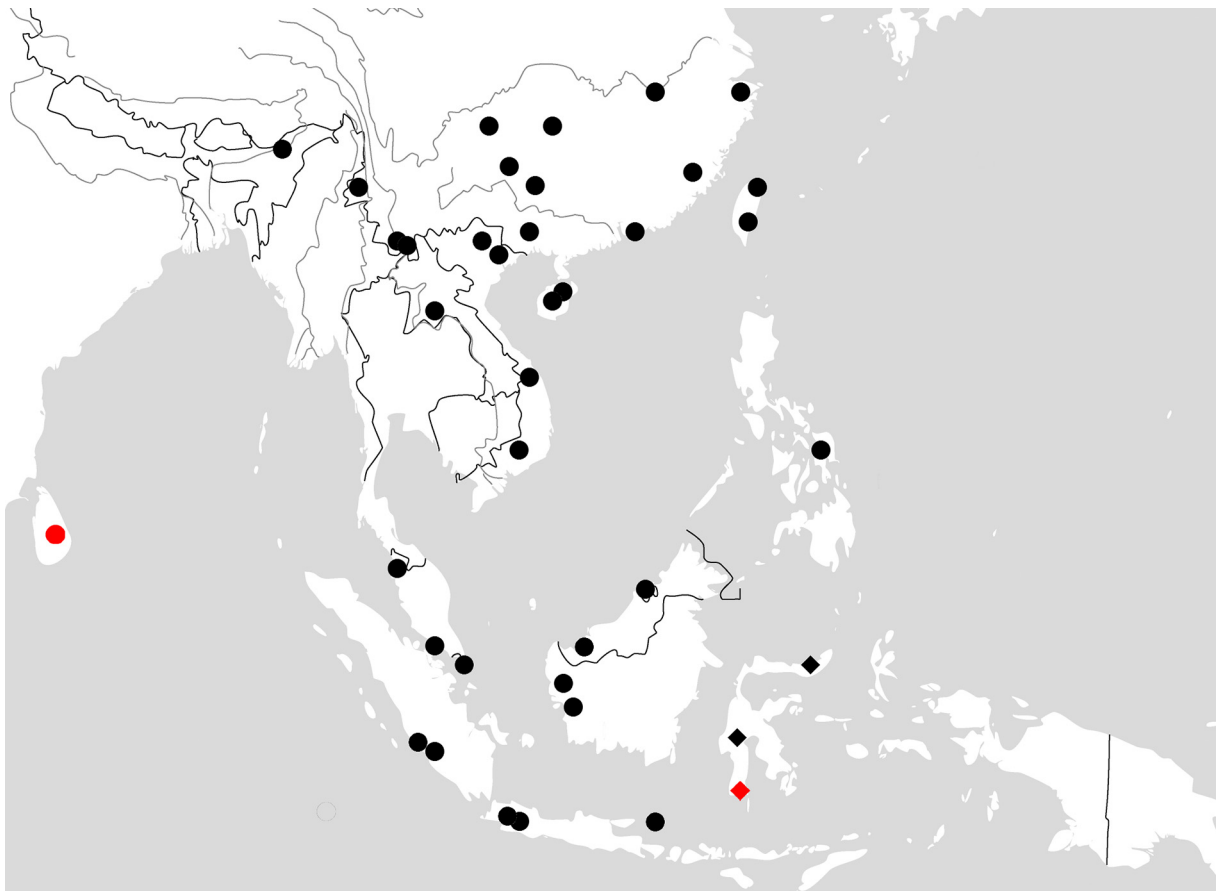


FIGURE 67. Known distribution of *Physodera eschscholtzii* group: ● *P. eschscholtzii* Parry; ◆ *P. cyanipennis* van de Poll, type localities for valid names in red.