

Redescription of *Podontia lutea* (Olivier, 1790) and *P. dalmani* Baly, 1865 (Insecta: Coleoptera: Chrysomelidae: Galerucinae: Alticini), with Notes on the Biology of *P. lutea*

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Abstract

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Podontia lutea (Olivier) is the largest flea beetle in the world. In addition to the penis, gonocoxae, spermatheca, abdominal ventrite VIII in females, and the abdominal ventrites II–V of both sexes are illustrated and are diagnostic based on comparisons with those of another widespread species, *P. dalmani* Baly. Detailed biological information is provided, including larval and adult feeding behaviors, host plants, and life cycle.

Key words: Leaf beetles, Taxonomy, Anacardiaceae, *Rhus succedanea*, *Rhus sylvestris*.

INTRODUCTION

The genus *Podontia* Dalman is a member of the *Blepharida*-group of genera, which are characterized by the emarginate anterior margin of the metatibial apex; elongate-oval eye shape, converging dorsally (except *Podontia*); the convex, chrysomeline appearance of the body; *Blepharida* morpho-group form of the metafemoral spring; and closed procoxal cavities in adults. These genera are also well defined by their biology, especially their shared host plant families (Anacardiaceae and Burseraceae) and their larval morphology (external leaf feeding) (Furth & Lee 2000).

Sixteen genera were listed in the *Blepharida*-group, and their biological information was reviewed by Furth (1998). The genera of the Oriental region were revised by Medvedev

(1999) and three new genera were described: *Blepharella*, *Furthia*, and *Asiophrida*. The genus *Podontia* was redefined by Medvedev (1999) to include ten Asian species ranging from Indonesia to Indo-China. Of which, *P. laosensis* Scherer, 1969 was synonymized with *P. pitalohita* Maulik, 1926 [synonymized with *P. rufocastanea* Baly, 1865 by Medvedev (1999)]. The total number of valid species was thus reduced to nine.

Podontia lutea (Olivier) is a widespread species in Indo-China and East Asia (see below). Adults are reputedly the largest flea beetles in the world (Furth 1999). Its host plant was documented by Chûjô (1935). Larval morphology was studied by Takizawa (1978) and Lee (1999), respectively. However, other biological information is limited (Prathapan & Chaboo 2011), based only on field observations (Takizawa 1978) or brief descrip-

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tions (Hsu 1934; Lee & Cheng 2007). Although adults have been described often, only the penis was illustrated (Scherer 1969). For the present study, the diagnostic value of other genitalic characters were evaluated by comparisons with those of another widespread congener, *P. dalmani* Baly. Biological information is updated based on results of an indoor rearing study.

MATERIALS AND METHODS

A seedling of the host plant for *Podontia lutea*, *Rhus succedanea* var. *succedanea* L., was collected in the field and transferred into the second author's house for container culture. Three adults of *P. lutea* were collected in March 24, 2011 from Fushan, New Taipei City and put on the seedling for rearing.

For delimiting variability of diagnostic characters, at least one pair from each locality or color form was examined. Length was measured from the anterior margin of the eye to the elytral apex, and width at the greatest width of the elytra. All examined specimens are deposited at the insect collection, Applied Zoology Division, Taiwan Agricultural Research Institute.

Terminology of the grooves on pronota follows Medvedev (1999).

RESULTS

Genus *Podontia* Dalman

Podontia Dalman, 1824: 23 (type species: *Galeruca grandis* Gröndal, 1808, synonymized with *Chrysomela lutea* Olivier, 1790); Chapuis, 1875: 29 (redescription); Heikertinger, 1924: 50 (key); Maulik, 1926: 220 (redescription); Chen, 1933: 215 (key); Chen, 1934a: 266 (redescription); Chûjô, 1935: 463 (catalogue); Gressitt & Kimoto, 1963: 785 (catalogue); Scherer, 1969: 166 (catalogue); Mohamedsaid, 1989: 277 (redescription); Medvedev, 1999: 179 (redefinition); Kimoto, 2000: 222 (catalogue).

Paramerista Lopatin, 2011: 143 (type species: *Paramerista luteola* Lopatin, 2011); synonymized by Bezděk (2012).

Specimens examined for comparison. In addition to *Podontia lutea* and *P. dalmani*, two more species are involved in this study: *P. affinis* (Gröndal 1808): **CHINA. Yunnan:** 1♀, Mocheng (磨整), 12.V.2018, leg. Y.-T. Wang; *P. quatuordecimpunctata* (Linnaeus, 1767): **CHINA. Yunnan:** 1♀, Manfen (曼粉), 20.IX.2017, leg. Y.-T. Wang; 1♂, Menglun (勳倫), 29.III.2018, leg. Y.-Q. Lu; 1♀, Rongshuwang (榕樹王), 11.IX.2014, leg. Y.-T. Wang; 1♂, Ruili (瑞麗), 25.IX.2013, leg. Y.-F. Hsu.

Diagnosis. Pronotum (Fig. 1) with a divided area (AL) near anterior angles delimited by longitudinal (LAL) and transverse (TAL) grooves; a longitudinal groove at appendix (AAL); basal margin with longitudinal lateral grooves (LG); central longitudinal line (CL) more or less reduced; one more groove (PG) near lateral margin behind middle. Prosternal process bifurcate. Mesoventrite (Fig. 2) with saddle-like process for receiving metasternal process. Metafemora with angular process at posterior margins near apices. Claws bifid. Tarsomeres I of front and middle legs more swollen in males (Fig. 3) than in females (Fig. 6).

Remarks. Grooves on the pronotum were used for species identities by Medvedev (1999). However, this study found that their diagnostic values are limited due to infraspecific variations. For example, AAL is absent in *P. affinis* based on the key to species made by Medvedev (1999) but it is distinct on the specimen examined. CL is deeply impressed in *P. dalmani* based on the key, but it is feeble on most of the specimens examined.

Podontia lutea (Olivier)

Chrysomela lutea Olivier, 1790: 692 (East Indies); Olivier, 1807: 539 (redescription with illustration).

Podontia lutea: Gemminger & Harold, 1876: 3522 (India or.); Heikertinger, 1924: 50 (China, Korea); Maulik, 1926: 222 (China, Myanmar, Vietnam, Taiwan; not in India); Miwa, 1931: 192 (Taiwan); Chen, 1933: 216 (China: Guizhou, Jiangxi, Sichuan, Yunnan, Zhejiang);

Chen, 1934a, 268 (catalogue); Chen, 1934b: 47 (Canton, = Guanzhou, in Guandong, China); Chûjô, 1935: 463 (Taiwan, including Lanyu island; host plant); Heikertinger & Csiki, 1940: 414 (catalogue); Chûjô, 1963: 400 (additional records in Taiwan); Gressitt & Kimoto, 1963: 786 [China: Fujian, Guandong, Hong Kong, Hubei, Shaanxi, Sichuan, Sikang (= Xikang, now combined with Sichuan), Yunnan, Zhejiang]; Scherer, 1969: 167 (Laos, Vietnam); Kimoto, 1970: 214 (additional records in Taiwan); Kimoto, 1986: 59 (additional records in Taiwan); Takizawa *et al.*, 1995: 14 (additional records in Taiwan); Kimoto & Chu, 1996: 99 (catalogue); Reid, 1997: 36 (Indonesia: Kalimantan); Kimoto, 2000: 224 (catalogue); Lee & Cheng, 2007: 145 (immature stages and biology).

Galeruca grandis Gröndal, 1808: 288 (India or.), synonymized by Gemminger & Harold (1876).

Podontia grandis: Dalman, 1824: 25.

Paramerista luteola Lopatin, 2011: 143 (Chongqing, in Sichuan, China); synonymized by Bezděk (2012).

Specimens examined. CHINA. Fujian: 1♀, Houzhai (後宅), 25.VI.2014, leg. Y.-T. Chung; 1♀, Shangzhai (上寨), 1.VII.2014, leg. Y.-T. Chung; **Guangxi:** 1♂, Anjiangping (安江坪), 7.VII.2018, leg. Y.-T. Chung; 1♀, Damingshan (大明山), 28.VI.2014, leg. Y.-Q. Lu; 1♂, 1♀, same but with “13.VI.2014”; 1♀, same but with “11.IV.2016”; 1♀, same but with “22.V.2016”; 1♀, Dayaoshan (大堯山), 13.IV.2016, leg. J.-T. Zhang; 1♀, same but with “24.IV.016”; 1♀, Guiyan (鬼岩), 12.VI.2017, leg. Y.-Q. Lu; 1♀, Panwangshan (盤王山), 24.IV.2018, leg. J.-T. Zhang; 1♀, Yaoshan (堯山), 13.V.2014, leg. Y.-F. Hsu; 1♀, Zhaojiang (趙江), 14.IV.2020, leg. Y.-B. Li; **Guizhou:** 1♂, Maolan (茂蘭), 21-24.VIII.2011, leg. Y.-F. Hsu; Hainan: 1♀, Jianfengling (尖峰嶺), 10.V.2015, leg. Y.-T. Wang; **Hong Kong:** 2♂♂, 1♀, 14.V.1926, leg. S. Ishida; 2♀♀, 12.X.2009, leg. U. Ong; **Shanxi:** 1♂, Huashuping (樺樹坪), 19.VI.2020, leg. I.-T. Zhao; **Sichuan:** 2♂♂, 1♀, Jinfoshan (金佛山), 21.VII.2010, leg. W.-H. Lin; **Zhejiang:** 1♀, Hangchow (杭州), 15.IV.1932, leg. C.

C. Tao; **Yunnan:** 2♂♂, 1♀, Menglun (勐倫), 16.IV.2020, leg. Y.-Q. Lu; **TAIWAN. Chiayi:** 1♂, Arisan (= Alishan, 阿里山), 12.V.1935, leg. Y. Miwa; **Han:** 1♂, 1♀, Riyohen (= Chinyuehtsun, 金岳村) – Rato (= Lotung, 羅東), 5.IX.1929, leg. R. Takahashi; 1♂, 5♀♀, Taiheizan (= Taipingshan, 太平山), V.1935, leg. Y. Miwa; 1♀, same locality, 10.V.1942, leg. A. Tanaka; **Hsinchu:** 1♂, Wufeng (五峰), 17.II.2009, leg. S.-F. Yu; **Kaohsiung:** 1♂, Erhchituan (二集團), 25.VIII.2012, leg. P.-H. Kuo; 1♂, Shihtung Hot Spring (石洞溫泉), 28.VI.2013, leg. Y.-F. Hsu; 1♂, Tona trail (多納林道), 24.VII.2016, leg. U. Ong; **Miaoli:** 2♂♂, 1♀, 大南庄 (Tananchuan), 12.X.1952, leg. S. C. Chiu, C. T. Lee; 3♂♂, 1♀, Tunglo (銅鑼), 9.II.2011, leg. H.-T. Shih; **Nantou:** 1♀, Horisha (= Puli, 埔里), 10.V.1913, leg. M. Maki; 1♂, 2♀♀, Lushan (廬山), 27-31.V.1980, leg. K. S. Lin & L. Y. Chou; 1♀, Musha (= Wushe, 霧社), 12.III.1927, leg. M. Kato; 1♂, same locality, 25.VI.-5.VII.1947, leg. Maa, Chen, Lin; 2♀♀, same locality, 26-28.VIII.1981, leg. L. Y. Chou & S. C. Lin; 2♀♀, Nichigetsutan (= Sunmoon Lake, 日月潭), 5-20.III.1929, leg. Y. Miwa; 1♀, same locality, 20.V.1956, leg. S. C. Chiu; **New Taipei City:** 1♀, Mt. Shiungkung (熊空山), 6.VII.2013, leg. T.-Y. Liu; 1♀, Shinten (= Hsintien, 新店), 22.IV.1936, leg. R. Takahashi; 1♀, same locality, 11.IV.1963, leg. H. H. Tseng; **Pingtung:** 1♀, Tahanshan (大漢山), 26.VII.2019, leg. Y.-T. Chung; **Taipei:** 2♀♀, Rimogan (= Fushan, 福山), 12.V.1933, leg. M. Chujo; 1♂, same locality, 30.III.2012, leg. C.-F. Lee; 1♂, Sozan (= Yangmingshan, 陽明山), 11.VIII.1930, leg. Y. Izumi; 5♂♂, 5♀♀, same locality, 25.X.1936, leg. M. Chujo; 1♀, same but with “18.IX.1938”; 1♂, same locality, 18.IV.1938, leg. Y. Miwa; 1♀, same but with “7.V.1938”; 1♀, same but with “27.VI.1938”; 1♀, same locality, 1.VII.2007, leg. M.-H. Tsou; 1♂, Taihoku (= Taipei, 台北), 29.I.1920, leg. Yoshida; 1♂, same locality, 20.IX.1923, leg. T. Shiraki; 1♂, same locality, 25.IV.1925, leg. M. Kato; 1♂, same locality, 10.II.1926, leg. R. Takahashi; 2♀♀, same locality, VII.1926, leg. J. Sonan; 1♂, same locality, 5.V.1930, leg. M. Chujo; **Taitung:** 1♀, Chipen (知本), 17.I.2009, leg. C.-F.

Lee; 1♂, Kotosho (= Lanyu Island), 25.IX.1928, leg. T. Okuni; 1♂, Taimali (太麻里), 12.V.2009, leg. W.-T. Liu; VIETNAM. Vinh Phúc: 1♂, Ngoc Than, 31.V.2014, leg. N.-Y. Tsai.

Redescription. Length 14.1–17.8 mm, width 7.7–9.3 mm. General color (Figs. 3–5) yellow; antennae black except two basal antennomeres; prosternum brown; tibiae and tarsi black. Antennae filiform in males (Fig. 9), but antennomere I strongly bent, length ratios of antennomeres I–XI 1.0 : 0.3 : 0.5 : 0.5 : 0.6 : 0.6 : 0.7 : 0.6 : 0.6 : 0.6 : 0.8, length to width ratios of antennomeres I–XI 3.2 : 1.3 : 1.9 : 2.0 : 2.0 : 2.2 : 2.5 : 2.5 : 2.6 : 2.5 : 3.0; similar in females (Fig. 10), antennomeres III–X straight, length ratios of antennomeres I–XI 1.0 : 0.3 : 0.5 : 0.5 : 0.6 : 0.6 : 0.7 : 0.6 : 0.6 : 0.6 : 0.7, length to width ratios of antennomeres I–XI 3.1 : 1.6 : 2.3 : 2.1 : 2.1 : 2.1 : 2.2 : 2.2 : 2.5 : 2.4 : 3.1. Pronotum transverse, 1.8× wider than long, lateral margin moderately rounded from apex to middle, then parallel-sided from middle to base; apical margin medially and moderately concave, basal margin medially and slightly convex. Elytra parallel-sided, 1.5× longer than wide. Tarsomeres I of front and middle legs strongly swollen in males (Fig. 17); less swollen in females (Fig. 18). Apical margin of abdominal ventrite V in males trilobed (Fig. 19), notches shallow, basal margin expanded slightly posteriorly; basal margins of other ventrites not modified; apical margin of abdominal ventrite V rounded with one pair of short ridges near middle in females, basal margin not modified (Fig. 16). Penis (Figs. 11–12) elongate, 4.3× longer than wide; parallel-sided, apically narrowed from apical 1/10, apex rounded; slightly bent at middle at lateral view; endophallic sclerites composed of three sclerites at ostium, median sclerite large, apically tapering, one pair of lateral sclerites basally connected with ostium, basally slender. Gonocoxae (Fig. 15) with only apices sclerotized, with several short setae along apical margin. Ventrite VIII (Fig. 13) membranous except speculum, with one transverse row of long setae at sides of apical margin; spiculum short and basally broadened. Receptacle of spermatheca (Fig. 14) strongly swollen, apically connected with distal spermathecal duct and basally connected with pump, inseparable between distal sper-

mathecal duct, receptacle, and pump; pump short; distal spermathecal duct short and subapically connected with receptacle.

Diagnosis. Adults of *Podontia lutea* are similar to those of *P. flava* Baly and *P. jalur* Mohamedsaid, with yellow bodies, but they can be distinguished by the following combination of characters: black antennae, tibiae, and tarsi (yellow antennae, tibiae, and tarsi in others) and flat interspaces of elytral rows (convex interspace of elytral rows in *P. jalur*). In genitalic characters, *P. lutea* differs from *P. dalmani* by the parallel-sided penis (Figs. 11–12) [slightly concave-sided penis in *P. dalmani* (Figs. 30–31)]; gonocoxae with only apices sclerotized and with a number of short setae along apical margin (Fig. 15) [gonocoxae entirely sclerotized and with four long setae on apices in *P. dalmani* (Fig. 35)]; spermatheca with strongly swollen receptacle, short pump, and visible distal spermathecal duct (Fig. 14) [spermatheca with slightly swollen receptacle, long pump, and distal spermathecal duct not visible in *P. dalmani* (Fig. 33)]; abdominal ventrite VIII with a row of long setae along sides of apical margin in females (Fig. 13) [ventrite VIII with a clustered long setae at sides of apical margin in females of *P. dalmani* (Fig. 32)]; basal margin of abdominal ventrite V expanded moderately posteriorly, basal margins of other abdominal ventrites not modified in males (Fig. 19) [basal margin of abdominal ventrite V expanded strongly posteriorly, basal margin of ventrite IV expanded moderately posteriorly, basal margins of ventrites II and III expanded slightly in males of *P. dalmani* (Fig. 38)]; apical margin of abdominal ventrite V widely rounded and basal margin not modified in females (Fig. 16) [apical margin of abdominal ventrite V with a short median notch, basal margin expanded slightly posteriorly in females of *P. dalmani* (Fig. 34)].

Host plants. Anacardiaceae: *Rhus succedanea* var. *succedanea* L. (Chûjô 1935; Takizawa 1978; Kimoto & Takizawa 1997; Lee & Cheng 2007; present study); *R. sylvestri* Siebold & Zucc. (present study).

Biology. Eggs of *P. lutea* are deposited in masses, laid in single layer on adaxial surfaces of leaves. In the laboratory, the egg mass-

es comprised about 20 eggs. Each pale gray egg was oriented vertically (Fig. 21). Larvae hatched after 5–7 d. The neonate larvae are lemon yellow with a dark head (Fig. 22). They feed by scraping the abaxial surface of the lamina, while older larvae feed by cutting the leaf lamina (Fig. 24). Older larvae were observed singly on leaves, suggesting solitary habits. The larva with its fecal coat resembles a bird dropping (Fig. 23). The larval period varied from 23–27 d. Full fed final instar larvae shed the fecal coat (Fig. 25) and remained motionless for about 1–2 d. Prior to pupation, they wriggle on wet soil and create a small depression on the surface and gather soil particles from around the body and manipulate these with the legs and mouthparts to form a layer covering the body. Ultimately this layer becomes an earthen cocoon roughly globular in shape (Fig. 26). The larva never dug into soil, but always constructed the cocoon on the surface. The adult emerged through a nearly circular exit hole (Fig. 27). Duration from construction of the cocoon to adult emergence was 25–27 d. The total life cycle was completed in 53–61 d. Adults feed by cutting the leaf lamina. They feign death and fall (thanatosis) or jump reluctantly when disturbed. Like larvae, adults preferred to remain on the abaxial side of leaves (Fig. 20). Hsu (1934) assumed that populations in Zhejiang, China were univoltine. In Taiwan, females start to lay eggs during late March. Takizawa (1978) observed that young and mature larvae were found simultaneously on July 11, 1976 in Yangmingshan (陽明山) and on July 5–9, 1977, Tongpo (東埔), Central Taiwan. Hsueh Lee, one member of Taiwan Chrysomelid Research Team, also observed the similar situation on June, 2006, in Yangmingshan. Therefore, it is reasonable to assume that Taiwanese populations are multivoltine.

Distribution. China, Indonesia (Kalimantan), Korea, Laos, Myanmar, Taiwan, Vietnam.

Podontia dalmani Baly

Podontia dalmani Baly, 1865: 405 (Indonesia: Lombok; Thailand); Allard, 1891: 230 (Indochina); Chen, 1934a: 269 (China: Guizhou, Guangxi; Vietnam); Chen, 1939: 55 (catalogue);

Gressitt & Kimoto, 1963: 786 (catalogue); Scherer, 1969: 170 (Myanmar, Laos, Vietnam, China: Hainan); Kimoto, 2000: 224 (Laos, Vietnam).

Specimens examined. CHINA. Hainan: 1♀, Wuzhishan (五指山), 3.V.2013, leg. Y.-F. Hsu; Yunnan: 2♀♀, Huayudong (花魚洞), 23.IV.2016, leg. Y.-T. Wang; 1♂, 3♀♀, Manfen (曼粉), 12.V.2016, leg. Y.-T. Wang; 1♀, Menglun (勐侖), 29.III.2018, leg. Y.-Q. Lu; 1♀, Nanxi (南溪), 30.V.2010, leg. W.-H. Lin; 1♂, Pupang (補蚌), 24.III.2018, leg. Y.-Q. Lu; VIETNAM. Ninh Binh: 1♀, Cúc Phương N. P., 5.VI.2014, leg. N.-Y. Tsai; Vinh Phúc: 1♂, Ngoc Than, 31.V.2014, leg. N.-Y. Tsai.

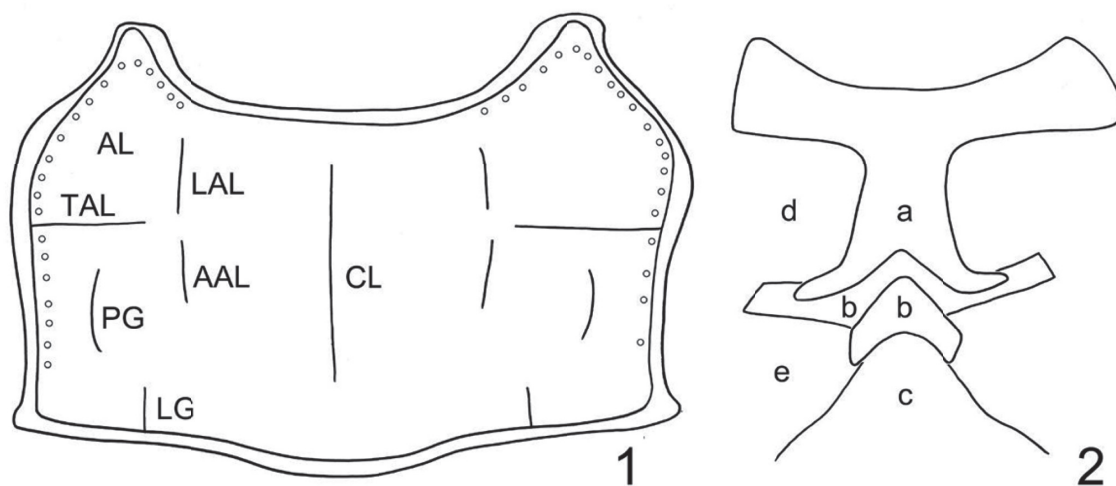
Redescription. Length 15.7–17.3 mm, width 8.2–9.9 mm. General color (Figs. 6–8) yellowish-brown; three transverse dark brown stripes on elytra: one dark stripe at apical 1/3, sides expanding anteriorly, another dark stripe at middle, the other stripe along apices, yellowish-brown spots or longitudinal stripes present between longitudinal row of punctures. Antennae filiform in males (Fig. 28), but antennomere I strongly bent, length ratios of antennomeres I–XI 1.0 : 0.3 : 0.5 : 0.6 : 0.7 : 0.7 : 0.7 : 0.7 : 0.7 : 0.7 : 0.8, length to width ratios of antennomeres I–XI 3.3 : 1.7 : 2.9 : 3.0 : 3.3 : 3.2 : 3.3 : 3.4 : 3.6 : 3.4 : 3.9; similar in females (Fig. 29), antennomeres III–X straight, length ratios of antennomeres I–XI 1.0 : 0.3 : 0.5 : 0.5 : 0.6 : 0.6 : 0.6 : 0.6 : 0.6 : 0.6 : 0.7, length to width ratios of antennomeres I–XI 3.3 : 1.6 : 2.8 : 3.0 : 2.7 : 2.8 : 2.6 : 2.9 : 3.0 : 2.8 : 3.3. Pronotum transverse, 1.7–1.8× wider than long, lateral margin moderately rounded, widest at apical 1/3; apical margin medially and moderately concave, basal margin medially and slightly convex. Elytra parallel-sided, 1.4–1.5× longer than wide. Tarsomeres I of front and middle legs strongly swollen in males (Fig. 36); less swollen in females (Fig. 37). Apical margin of abdominal ventrite V in males trilobed (Fig. 38), notches deep, basal margin expanded strongly posteriorly; basal margins of ventrite IV expanded moderately posteriorly; basal margins of ventrites II and III expanded slightly posteriorly; apical margin with a shallow median notch in females, basal margin expanded slightly posteriorly (Fig. 34). Penis (Figs. 30–31) elongate, 4.0× longer than wide;

sides gradually narrowed towards apical 1/4, apically narrowed from apical 1/10, apex rounded; slightly bent in lateral view; endophallic sclerites composed of three sclerites at ostium, median sclerite large, apically tapering, one pair of lateral sclerites basally connected with ostium, basally slender. Gonocoxae (Fig. 35) well sclerotized, with four long setae at apices. Ventrite VIII (Fig. 32) membranous except speculum, with clustered long setae at sides near apical margin; spiculum short and narrow. Receptacle of spermatheca (Fig. 33) slightly swollen, apically connected with distal spermathecal duct and basally connected with pump, inseparable between distal spermathecal duct, receptacle, and pump; pump long; distal spermathecal duct entirely connected with receptacle.

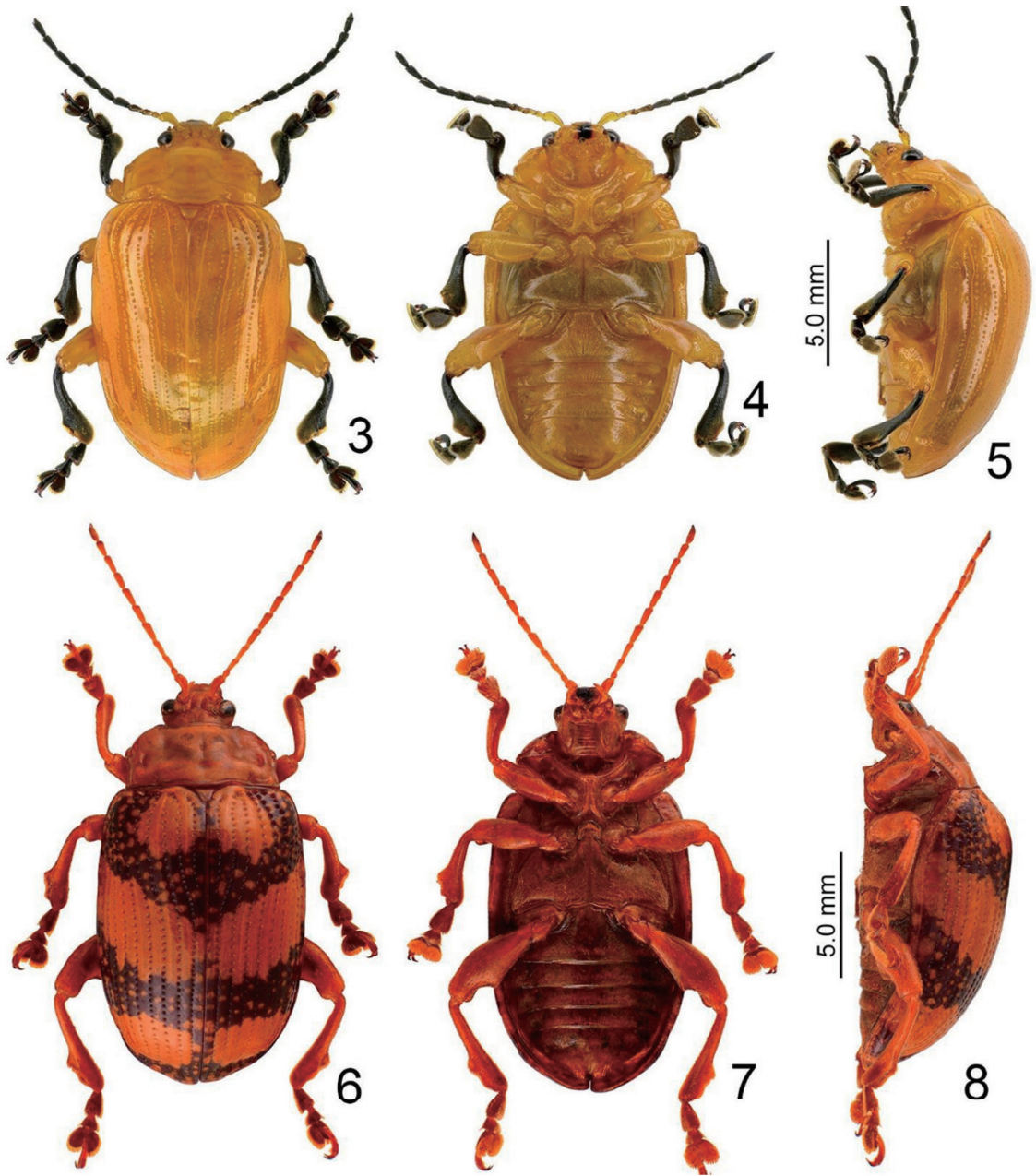
Diagnosis. Adults of *Podontia dalmani* are characterized by the color pattern on the elytra. The genitalic characters of *P. dalmani* can be separated from *P. lutea* by the slightly concave-sided penis (Figs. 30–31) [parallel-sided penis in *P. lutea* (Figs. 11–12)]; gonocoxae entirely sclerotized and with four long setae on apices (Fig. 35) [gonocoxae with only apices sclerotized and with a number of short setae

along apical margin in *P. lutea* (Fig. 15)]; spermatheca with strongly swollen receptacle, short pump, and visible distal spermathecal duct (Fig. 33) [spermatheca with slightly swollen receptacle, long pump, and distal spermathecal duct not visible in *P. lutea* (Fig. 14)]; abdominal ventrite VIII with a clustered long setae at sides of apical margin (Fig. 32) [abdominal ventrite VIII with a row of long setae along sides of apical margin in females in females of *P. lutea* (Fig. 13)]; basal margin of abdominal ventrite V expanded strongly posteriorly, basal margin of ventrite IV moderately expanded, basal margins of ventrites II and III slightly expanded in males (Fig. 38) [basal margin of abdominal ventrite V moderately expanded posteriorly, basal margins of other abdominal ventrites not modified in males of *P. lutea* (Fig. 19)]; apical margin of abdominal ventrite V with an short median notch, basal margin slightly expanded in females (Fig. 34) [apical margin of abdominal ventrite V widely rounded and basal margin not modified in females of *P. lutea* (Fig. 16)].

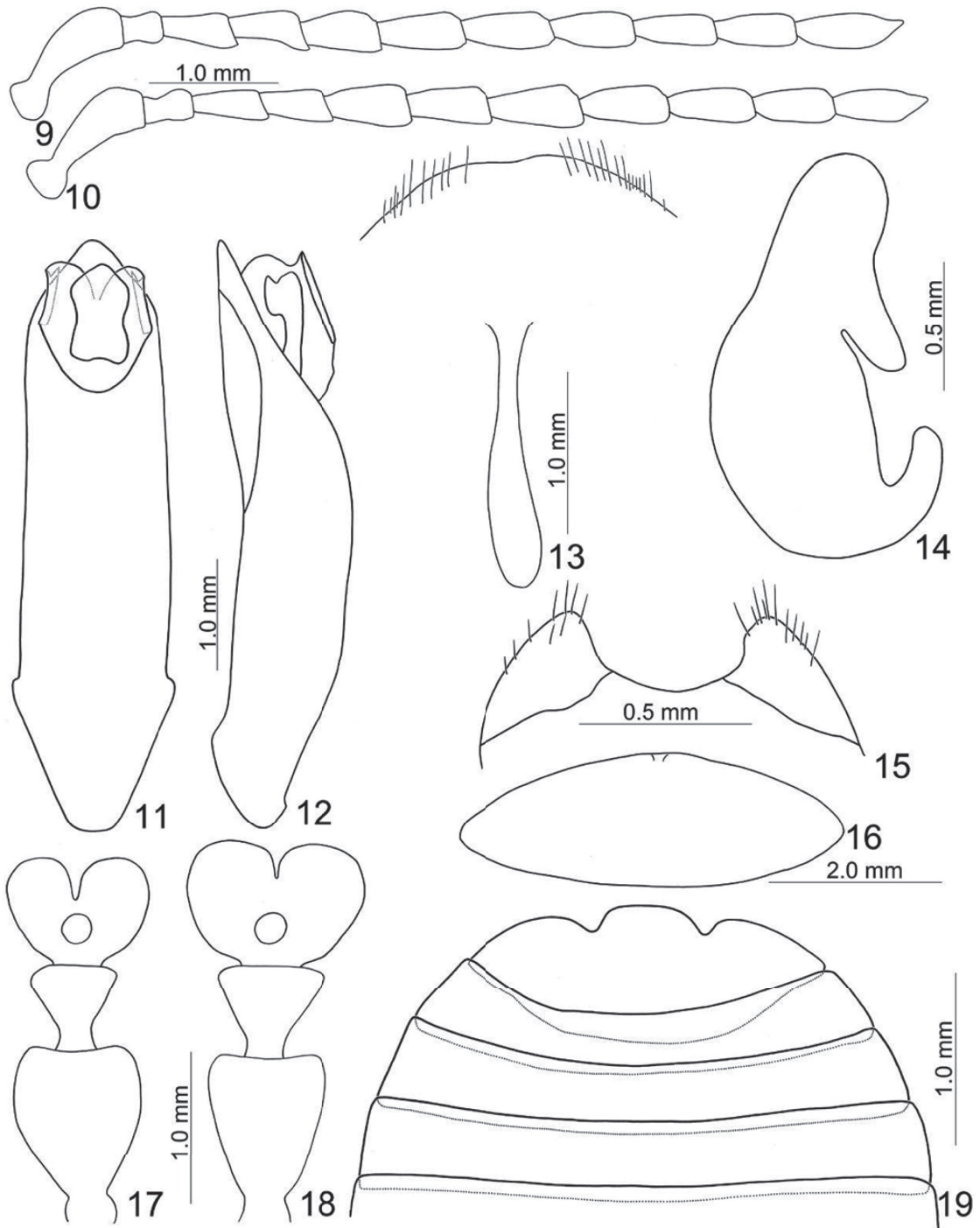
Distribution. China, Indonesia, Laos, Myanmar, Thailand, Vietnam.



Figs. 1–2. Diagnostic characters of pronotum and thoracic ventrites. 1. Pronotum, *Podontia dalmani*, AAL: longitudinal groove behind in appendix, AL: anterolateral area, CL: central line, LAL: longitudinal groove, LG: basal longitudinal groove, PG: posterior groove, TAL: transverse groove; 2. Thoracic ventrites, *P. lutea*, a: prosternum, b: mesoventrite, c: metaventrite, d: anterior coxa, e: middle coxa.



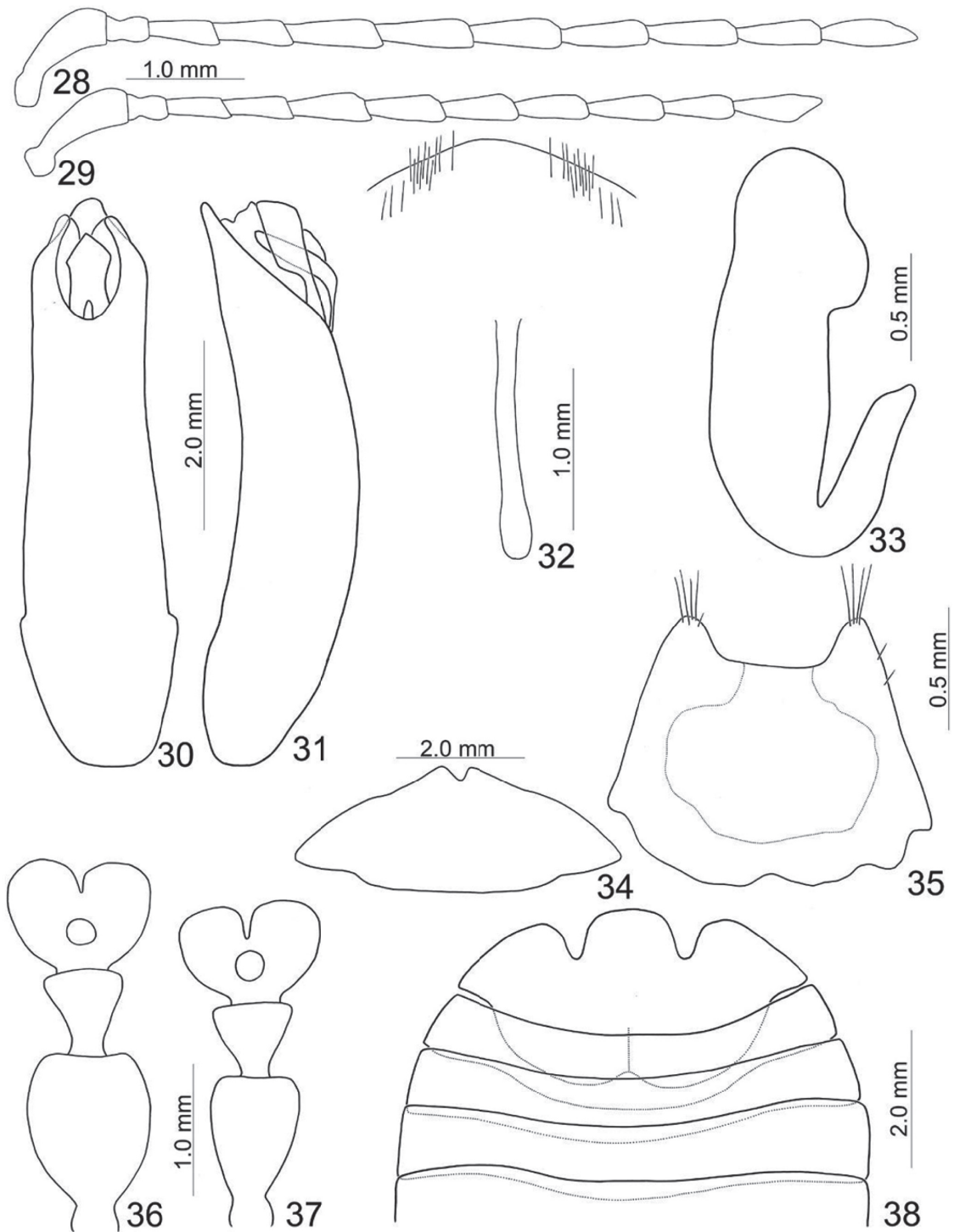
Figs. 3–8. Habitus of adult *Podontia* species. 3. *P. lutea*, male, dorsal view; 4. Ditto, ventral view; 5. Ditto, lateral view; 6. *P. dalmani*, female, dorsal; 7. Ditto, ventral view; 8. Ditto, lateral view.



Figs. 9–19. Diagnostic characters of *Podontia lutea*. 9. Antenna, male; 10. Antenna, female; 11. Penis, dorsal view; 12. Penis, lateral view; 13. Ventrite VIII, female; 14. Spermatheca; 15. Gonocoxae; 16. Ventrite V, female; 17. Tarsomeres I–III, male; 18. Tarsomeres I–III, female; 19. Ventrite I–V, male.



Figs. 20–27. Life stages on *Podontia lutea*. 20. Adult hiding under young shoots of host plants; 21. Egg mass; 22. First-instar larva; 23. Second-instar larva; 24. Fourth-instar larva; 25. Fourth-instar larva after shedding fecal coat and preparing to crawl to soil for pupation; 26. A pupa inside earth cocoon; 27. Empty earth cocoon with round opening.



Figs. 28–38. Diagnostic characters of *Podontia dalmani*. 28. Antenna, male; 29. Antenna, female; 30. Penis, dorsal view; 31. Penis, lateral view; 32. Ventrite VIII, female; 33. Spermatheca; 34. Ventrite V, female; 35. Gonocoxae; 36. Tarsomeres I–III, male; 37. Tarsomeres I–III, female; 38. Ventrite I–V, male.

CONCLUSION

This study confirms that more genitalic characters can be used for species identities besides the penis than previously described, including gonocoxae, spermathecal, female abdominal ventrite VIII, and abdominal ventrites II–V in both sexes. In addition, some features of genitalic characters are unique, such as presence of three endophallic sclerites at the ostium of the penis, almost membranous abdominal ventrite VIII in females except speculum, with long setae at sides near apical margin, and spermathecae with inseparable receptacle, pump, and distal spermathecal duct. They should be investigated further to determine if they are of diagnostic value in allied genera.

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大黃葉蚤 [*Podontia lutea* (Olivier, 1790)] 和褐帶凹緣葉蚤 [*P. dalmani* Baly, 1865] 的重新描述與大黃葉蚤的生物學注解 (鞘翅目：金花蟲科：螢金花蟲亞科：葉蚤族)

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摘要

李奇峰、余素芳。2021。大黃葉蚤 [*Podontia lutea* (Olivier, 1790)] 和褐帶凹緣葉蚤 [*P. dalmani* Baly, 1865] 的重新描述與大黃葉蚤的生物學注解 (鞘翅目：金花蟲科：螢金花蟲亞科：葉蚤族)。台灣農業研究 70(3):157–169。

大黃葉蚤 (*Podontia lutea*) 是全世界最大型的葉蚤；除了雄性生殖器，還針對雌蟲生殖突基節、雌蟲受精囊、雙性的第二至第五腹節及雌蟲的第八腹節腹板加以描繪；並藉由跟另外一個廣泛分布種褐帶凹緣葉蚤 (*P. dalmani*) 相互比對，證明這些特徵有診斷價值；並對此種生物學包括幼蟲及成蟲的取食行為、寄主植物及生活史提供更詳細的資料。

關鍵詞：金花蟲、分類學、漆樹科、木蠟樹、野漆樹。

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