

Taxonomy of Languriinae Crotch (Coleoptera: Cucujoidea: Erotylidae) in Korea

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한국산 방아벌레붙이아과(딱정벌레목: 머리대장상과: 버섯벌레과의 분류학적 검토

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ABSTRACT: We conducted taxonomic study of Languriinae in Korea. Nine species that belong to two genera of one tribe were identified in Korea. Two species, *Anadastus ruficeps* (Crotch) and *Anadastus praetermissus* (Janson), were recorded for the first time in Korea. Description, photographs of adults, illustrations of diagnostic characteristics, and a key have been provided.

Key words: Erotylidae, Languriinae, New to Korea, Taxonomy

초록: 한국산 버섯벌레과에 속해 있는 방아벌레붙이아과(Languriinae Crotch)를 분류학적으로 검토하였다. 한국산 방아벌레붙이아과에는 1속, 2속, 9종이 포함되는데, 그 중 *Anadastus ruficeps* (Crotch)와 *Anadastus praetermissus* (Janson) 2종을 국내에서 처음으로 보고한다.

검색어: 버섯벌레과, 방아벌레붙이아과(Languriinae), 한국미기록, 분류

The subfamily Languriinae Crotch (now designated as a subfamily of Erotylidae) comprises around 131 species in 16 genera of 2 tribes in the Palaearctic region (Wegrzynowicz, 2007) since Villiers (1945). Many languriid species are represented in hot and humid regions, but most are concentrated in South-East Asia and Africa, less numerous in Americas and Australia, absent in Europe and Northern Asia (Leschen and Wegrzynowicz, 1998; Wegrzynowicz, 2002).

The Languriinae beetles can be distinguished by the following combination of characters: body strongly elongated; parallel-sided, moderately flattened or relatively convex; usually glabrous;

color various, bright metallic colouration; antennal grooves absent; antenna forming a club, antennomeres symmetrical or not; subapical serrations of mandible absent; elytral punctation confused or serrate; tarsomere 4 reduced and hidden ventrally; tarsal formula 5-5-5 (Leschen and Skelly, 2002; Wegrzynowicz, 2002; Leschen, 2003).

Languriids are mostly phytophagous (Leschen and Wegrzynowicz, 1998). Some species are considered pests of stored grain or herbaceous crops (Leschen and Skelly, 2002). Languriines are collected on their host plant and may be sifted from leaf litter, beaten from rotting flowers or collected at lights (Leschen and Skelly, 2002).

Recently morphology and molecular based phylogenetic studies have shown that the former 'Languriidae' is paraphyletic

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with respect to the former 'Erotylidae' (Wegrzynowicz, 2002; Leschen, 2003; Robertson et al., 2004). The former separation of these two groups was primary based on their different biology, with 'Erotylidae' being mycophagous and 'Languriidae' being phytophagous (Drilling et al., 2010). Languriidae was combined with Erotylidae based on adult morphology (Wegrzynowicz, 2002; Leschen, 2003; Leschen and Buckley, 2007) and is supported by molecular work (Robertson et al., 2004).

Leschen (2003) proposed a new classification of the family Erotylidae, which was ranked former Languriidae as a subfamily Languriinae. Historically there has been disagreement about the validity of family Erotylidae and Languriidae. Many taxonomists have supported the recognition of Languriidae as a separate family (e.g. Lewis, 1884; Arrow, 1925; Boyle, 1956; Sen Gupta and Crowson, 1971). Others (e.g. Crotch, 1873; Chapuis, 1876; Gorham, 1899; Fowler, 1908; Roberts, 1939, 1958) have included them as a subgroup within Erotylidae (Robertson et al. 2004). Now the former Languriidae are ranked as subfamily of Erotylidae, based on the recent cladistic analysis (Leschen and Wegrzynowicz, 1998; Leschen, 2003).

The Korean fauna of Languriinae were reported only seven species were previously recorded under family Laguriidae from Korea (Kim et al. 1994; Kwon et al. 1996). Nevertheless, taxonomic study of this family has not been performed in Korea.

The purpose of this study is to review the subfamily Languriinae taxonomically and to report two unrecorded species, *Anadastus ruficeps* (Crotch, 1873) and *Anadastus praetermissus* (Janson, 1873), from Korea. A description, photos of adults, illustrations of diagnostic characteristics, and a key are provided.

Materials and Methods

The following records are based on specimens deposited in JUNG's Insect Collection (Seoul, Korea). Additional records were obtained from specimens contained in the collection of the Insect Classification Center belonging to the Department of Agricultural Biology, National Academy of Agricultural Science (NAAS), Suwon, Korea and Sungshin Natural History Museum, Seoul, Korea. The detailed morphological characters are carefully examined under stereomicroscopy (M50, DM2500, Leica, Germany) and captured by using digital camera (Canon, Japan).

The abbreviations used in this study are as follows: GW

(Gangwon-do), SL (Seoul), GG (Gyeonggi-do), GB (Gyeong-sangbuk-do), JB (Jeollabuk-do), JN (Jeollanam-do), JJ (Jeju-do).

Systematic account

Family Erotylidae Latreille, 1802 벚섯벌레과

Subfamily Languriinae Crotch, 1873 방아벌레붙이아과

Key to the Korean genera of Languriini

1. Body moderately elongate; striae puncture of elytra deep *Anadastus*
- Body strongly elongate; striae puncture of elytra shallow *Tetraphala*

Genus *Anadastus* Gorham, 1887

Anadastus Gorham, 1887: 362.

Neolanguria Gorham, 1887: 361.

Perilanguria Fowler, 1908: 19.

Stenodastus Gorham, 1887: 362.

Type species: *Languria cambodiae* Crotch, 1876.

Key to the Korean species of *Anadastus*

1. Body color mostly brownish red dorsally 5
- Body color mixed with bluish black and red 2
2. Head color red 3
- Head color black 4
3. Head and pronotum with tiny and sparse punctures; postnotum and ventrites black ventrally *A. ruficeps*
- Head and pronotum with dense and coarse punctures; postnotum and ventrites brownish yellow ventrally *A. praetermissus*
4. Leg mostly bluish black, base of femur and tibia partly red *A. atriceps*
- Leg mostly brownish red, apex of femur and base of tibia partly black *A. menetriesii*
5. Elytra bicolor, mostly brownish red, apical 1/5 part black *A. praeustus*
- Elytra unicolor; entirely brownish red *A. filiformis*

***Anadastus atriceps* (Crotch, 1873) 붉은가슴방아벌레붙이 (Fig. 1)**

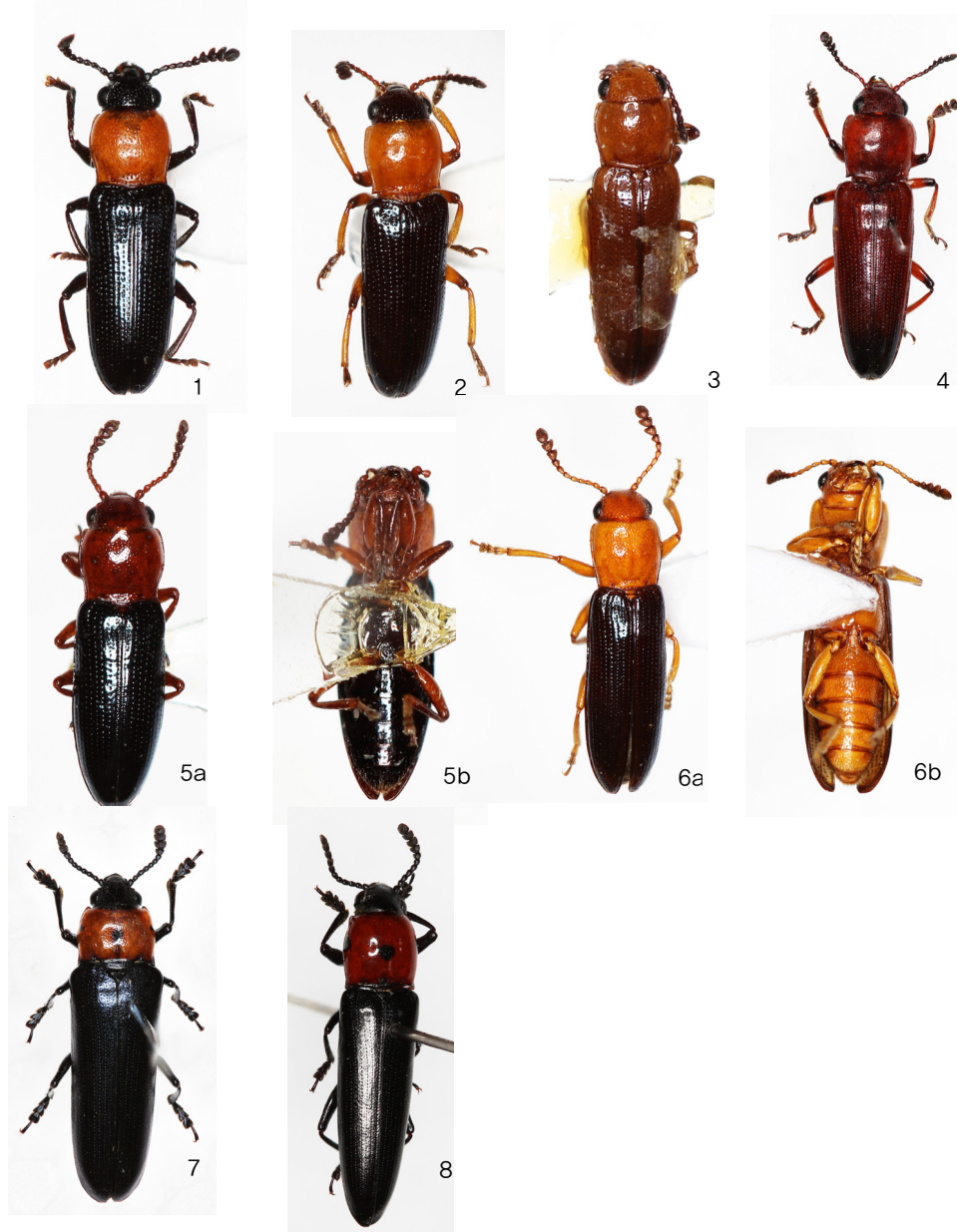
Languria atriceps Crotch, 1873: 185.

Anadastus atriceps: Kim and Chang, 1984:161; Kim and Park, 1991b: 145; Kim et al., 1994: 168; Kwon et al., 1996: 158.

Diagnosis. Body 3.0-5.5 mm in length; body elongate, weakly convex, glabrous; head and elytra black; pronotum red; leg mostly bluish black, base of femur and tibia partly red. Head with large and rough punctures; antennomeres 7-11 widened inward, forming a club. Pronotum strongly convex; with large and regular punctures; lateral margins weakly Ω shape, widest at middle part; basal margin black, weakly sinuous. Elytra

weakly convex; striate-punctate, striae punctures large, dense, deep and regular.

Specimens examined. [GW] 1ex. Gapcheon riverside, Gapcheonmyeon, Hoengseon-gun, 12.vi.2002, H.C. Park; [GG] 1ex. Mt. Acha-san, Guri-si, 25.vi.1997, H.C. Park; 1ex. Botonggol, Namhansanseong, Seongnam-si, 26.ix.2003, Y.B. Lee; 5exs. Anteo Ecological park, Haan-dong Gwangmyeong-si, 8.ix.2009, Y.B. Lee; [JB] 3exs. Mt. Naejang-san, Jeongseup-si, 10.vi.1975, K.R. Choe; [JN] 1ex. Mt. Baekyang-san, Jangseong-eup, 11.vi.1975, J.Y. Shim.



Figs. 1-8. Habitus of Languriinae (a, dorsal; b, ventral). 1. *Anadastus atriceps*; 2. *Anadastus menetriesii*; 3. *Anadastus filiformis*; 4. *Anadastus praeustus*; 5. *Anadastus ruficeps*; 6. *Anadastus praetermissus*; 7. *Tetraphala collaris*; 8. *Tetraphala fryi*.

Distribution. Korea, Japan.

***Anadastus menetriesii* (Motschulsky, 1860)**

에방아벌레붙이(Figs. 2, 9)

Languria menetriesii Motschulsky, 1860: 240.

Languria fucosa Lewis, 1884: 358; Nakayama and Tabashi, 1933: 21; Cho, 1957: 207; ZSK, 1969: 107.

Anadastus menetriesii; Kim and Park, 1991a: 215; Kim et al., 1992: 129; Kim et al., 1994: 168; Kwon et al., 1996: 158; Wegrzynowicz, 2007: 533.

Diagnosis. Body 5.0-6.0 mm in length; body elongate, convex, glabrous; head, antennomeres 6-11, scutellum and elytra black; pronotum red; leg mostly brownish red, apex of femur and base of tibia partly black. Head with fine moderate, distinct and regular punctures; antennomeres 7-11 widened inward, forming a club. Pronotum strongly convex; with tiny and regular punctures; lateral margins almost weakly Ω shape, widest at middle part; basal margin weakly sinuous. Elytra weakly convex; parallel-sided; striate-punctate; strial punctures dense, large, deep and regular; interval strongly narrow and smooth.

Specimens examined. [CN] 1ex. Mt. Weolmyeong-sa, Naesan-ri, Buyeo-gun, 4.vii.2000, H.C. Park; [JB] 3exs. Is. Eocheongdo, Eocheongdo-ri, Okdo-myeon, Gunsan-si, 13.vi.2009, T.H. Kang; 3exs. Is. Eocheongdo, Eocheongdo-ri, Okdo-myeon, Gunsan-si, 27.vi.2009, T.H. Kang; [JJ] 1ex. Andeok valley, Seogwipo-si, 2.ix.2006, M.A. Kim.

Distribution. Korea, Japan, China (Fujian, Jilin), Russia (Far East).

***Anadastus filiformis* (Fabricius, 1801) 붉은에방아벌레붙이 (Fig. 3)**

Trogosita filiformis Fabricius, 1801: 152.

Languria nigripes Crotch, 1873: 184.

Languria rufotestaceus Motschulsky, 1860: 242.

Languria testaceus W. S. MacLeay, 1825: 45.

Anadastus filiformis: Kim et al., 1994: 168; Kwon et al., 1996: 158.

Diagnosis. Body 5.0-5.7 mm in length; body elongate, weakly convex, glabrous; body mostly yellowish brown; antennae and legs blackish brown. Head with large, regular and relatively sparse punctures; antennomeres 7-11 widened inward, forming

a club. Pronotum strongly convex; with large, regular and relatively sparse punctures; lateral margins almost parallel-sided, weakly arched at basal 1/4 part. Elytra striate-punctate; strial punctures clear, shallow, fine, sparse, and regular; interval flat, smooth and wider than striae.

Specimens examined. [JB] 1exs. Mt. Naejang-san, Jeongeup-si, 10.vi.1975, K.R. Choe.

Distribution. Korea, Japan, China (south), India (Sikkim, Darjeeling District, Arunachal Pradesh), Oriental region.

***Anadastus praeustus* (Crotch, 1873) 끝검은에방아벌레붙이 (Figs. 4, 10)**

Languria praeustus Crotch, 1873: 185.

Anadastus praeustus: Kim et al., 1994: 168; Kwon et al., 1996: 158.

Diagnosis. Body 6.5-8.5 mm in length; body elongate, weakly convex, glabrous; head, pronotum and elytra brownish red; antennae (partly), leg (partly) and apical 1/5 part of elytra black. Head with relative tiny punctures; antennomeres 1-5 brownish red, antennomeres 6-11 black; antennomeres 7-11 widened, forming a club; antennomere 8-10 strongly widened inward. Pronotum almost weakly Ω shape; strongly convex; with relatively tiny and regular punctures. Elytra with striate-punctate, strial punctures deep, dense, regular and distinct; interval weakly flat and smooth.

Specimens examined. [CN] 1ex. Is. Hwajang-do, Anheung-myeon, Taean-gun, 1.ix.2005, T.H. Kang; [GB] 2exs. Is. Juk-do, Dodong-ri, Ulleung-gun, 27.vii.2001, S.L. Ahn; [JN] 1ex. Sangjeong-ri, Gogeu-myeon, Wando-gun, 3.ix.2003, H.C. Park.

Distribution. Korea, Japan, Russia (Kuril Islands), China (south and central), Oriental region.

Remarks. This species is widely distributed to Kuril Islands of the Far East Russia (Lafer, 1999) and Hokkaido of Japan through our country from the southern region.

***Anadastus ruficeps* (Crotch, 1873)**

붉은다리방아벌레붙이(신칭) (Figs. 5, 11)

Languria ruficeps Crotch, 1873: 185.

Diagnosis. Body 4.0-5.0 mm in length; body elongate, convex, glabrous; head, pronotum and legs brownish red; elytra bluish

black; postnotum and ventrites black ventrally. Head with tiny and sparse punctures; antennomeres 8-11 widened inward; 9-11 strongly enlarged, forming a club. Pronotum strongly convex; wider than its length; with tiny and regular punctures; anterior margin slightly straight; lateral margins round, widest at middle part; basal margin sinuous. Scutellum brownish red. Elytra weakly convex; parallel-sided, narrowing from apical 1/5 part to apex; striate-punctate, striae punctures regular, dense and moderate; interval flat and smooth. Leg brownish red; tarsomere 1-4 lobed ventrally, with dense seta; tarsomere 1 longer than tarsomere 2 and 3; tarsomere 4 reduced and hidden in ventral view.

Specimens examined. [JB] 4exs. Mt. Naejang-san, Jeongeup-si, 10.vi.1975, K.R. Choe; 1ex. Mt. Naejang-san, Jeongeup-si, 10.vi.1975, J.Y. Shim.

Distribution. Korea (new record), Japan, China (southeast).

Anadastus praetermissus (Janson, 1873)

붉은배방아벌레붙이(신칭) (Figs. 6, 12)

Languria praetermissus Janson, 1873: 186.

Diagnosis. Body 4.2-5.0 mm in length; body elongate, parallel-sided, weakly convex, glabrous; head, pronotum and legs brownish yellow; elytra bluish black; postnotum and ventrites brownish yellow ventrally. Head with dense, coarse, and relatively large punctures; antennomeres 8-11 widened, especially antennomeres 9-11 strongly widened inward, forming a club. Pronotum strongly convex; longer than its width, widest at anterior 1/3 part; anterior part wider than basal part; with dense, coarse, and relatively large punctures; anterior margin almost straight; lateral margins almost parallel-sided; basal margin weakly sinuous. Scutellum brownish yellow. Elytra strongly about 3 times longer than length of pronotum; weakly flat; parallel-sided, narrowing from apical 1/7 part to apex; striate-punctate, striae punctures regular, dense and large; interval flat and weakly rugose.

Specimens examined. [JB] 15 exs., Is. Eocheongdo, Eocheongdo-ri, Okdo-myeon, Gunsan-si, 27.vi.2009, T.H. Kang.

Distribution. Korea (new record), Japan.

Genus *Tetraphala* Sturm, 1843

Tetraphala Sturm, 1843: 306.

Metabelus Gorham, 1887: 361.

Tetralanguria Crotch, 1876: 378.

Tetralanguroides Fowler, 1886: 318.

Type species: *Languria splendens* Wiedemann, 1823

Key to the Korean species of *Tetraphala*

1. antennomeres 8-11 strongly widened, forming a club;

anterior angles of pronotum moderately produced anteriorad
..... *T. collaris*

- antennomeres 7-11 strongly widened, forming a club; anterior angles of pronotum strongly produced anteriorad *T. fryi*

***Tetraphala collaris* (Crotch, 1876) 석점박이방아벌레붙이 (Figs. 7, 13)**

Pachylanguria collaris Crotch, 1876: 377.

Languria punctata Harold, 1879: 58.

Pachylanguria tripunctata Kraatz, 1900: 347.

Languria yunnana Fairmaire, 1887: 136.

Tetralanguria collaris: Cho, 1957: 36; ZSK, 1969: 108; Kim et al., 1994: 168; Chujo et al., 1994:188; Kim, 1995: 129; Kim et al., 1999: 125; Kwon et al., 1996: 158.

Tetraphala collaris: Wegrzynowicz, 2007: 535.

Diagnosis. Body 9.5-16.0 mm in length; body elongate, convex, glabrous; head, elytra and legs bluish black, pronotum red with three largely black spots. Head with fine and moderate punctures; antennomeres 8-11 strongly widened, forming a loose club. Pronotum with small triangular black spot at basal part; wider than its length; strongly convex; with very tiny punctures; anterior angles moderately produced anteriorad. Elytra with indistinct striate-punctate; striae punctures irregular, sparse, shallow and coarse; interval with irregular punctures and rugose.

Specimens examined. [GW] 1ex. near Mt. Seokbyeong-san, Imkye-ri, Imkye-myeon. 22.v.2002, J.D. Yeo.

Distribution. Korea, Japan, China (south, central, Manchuria), India (Himachal Pradesh, Sikkim, Darjeeling District), Oriental region.

***Tetraphala fryi* (Fowler, 1886) 대마도방아벌레붙이 (Figs. 8, 14)**

Tetralanguroides fryi Fowler, 1886: 319.

Tetralanguria fryi: Kim and Kim, 1974; Kim et al., 1991: 163;

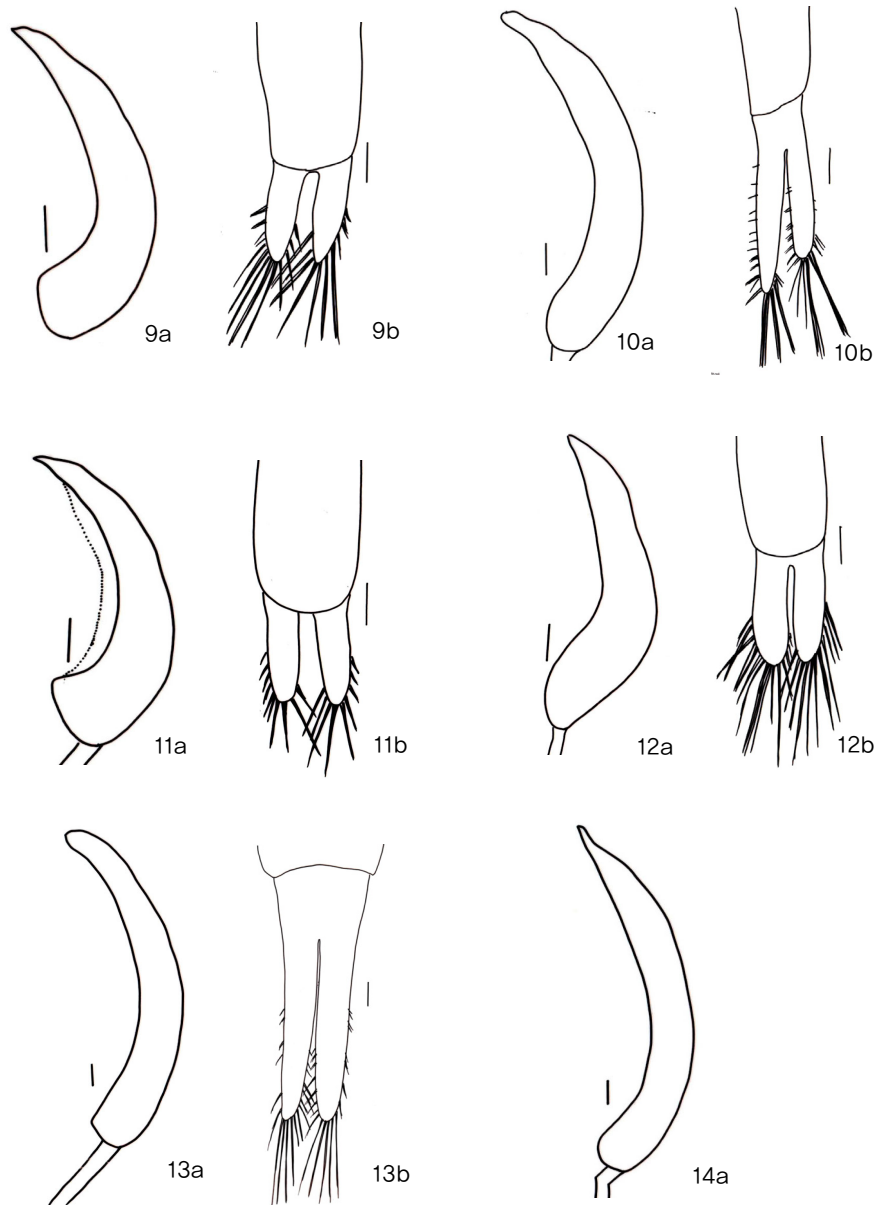
Kim et al., 1994: 168; Kim, 1995: 129; Kwon et al., 1996: 158.
Tetraphala fryi: Wegrzynowicz, 2007: 536.

Diagnosis. Body 10.5-13.0 mm in length; body elongate, convex, glabrous; head, elytra and legs mostly bluish black; pronotum red with three black spots. Head with antennomeres 7-11 strongly widened, forming a club. Pronotum with small triangular black spot at basal part; wider than its length; with very tiny punctures; anterior angles strongly produced anteriorly.

Elytra with indistinct striate-punctate; strial punctures irregular, sparse, shallow and coarse; interval with irregular punctures and rugose.

Specimens examined. [SL] 1 ex. Bukhansanseong, Seoul-si, 2.x.1971, K.H. Park; [JN] 1 ex. Mt. Wolchul-san, Yeongam-gun, 14.v.2000, S.J. Chang.

Distribution. Korea, Japan (Tsushima), China (Fujian, Zhejiang).



Figs. 9-14. Genitalia of Languriinae (Each scale bar = 0.1 mm; a. male genitalia, b. tegmen). 9. *Anadastus menetriesii*; 10. *Anadastus praeustus*; 11. *Anadastus ruficeps*; 12. *Anadastus praetermissus*; 13. *Tetraphala collaris*; 14. *Tetraphala fryi*.

Tetraphala miles (Fowler, 1913) 가슴빨간방아벌레붙이

Pachylanguria miles Fowler, 1913: 132; ZSK, 1969: 108; Kim et al., 1994: 168; Kwon et al., 1996: 158.

Remarks. No Korean specimens of this species were available. This species has been cited literally in Korean insect list, since ZSK (1969) reported firstly in the Korean insect list. However this species had been treated as endemic species in Taiwan (Villiers, 1945; Wegrzynowicz, 2007). It will be examine furthermore.

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