Journal of Asia-Pacific Entomology 15 (2012) 17–20

Contents lists available at ScienceDirect

Journal of Asia-Pacific Entomology

journal homepage: www.elsevier.com/locate/jape

Taxonomic review of the subgenus *Uroleucon* (*Uromelan*) (Hemiptera: Aphididae) in the Korean peninsula

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ARTICLE INFO

Article history:
Received 22 January 2011
Revised 9 July 2011
Accepted 14 July 2011

Keywords:
Uromelan
Aphididae
Korea

ABSTRACT

Until now, five species of the subgenus *Uroleucon* (*Uromelan*) have been recognized in Korea. This is the first report of *Uroleucon* (*Uromelan*) *adenophorae* (Matsumura, 1918) occurring on *Adenophora triphylla* (Campanulaceae) in Gangwon-do, South Korea. Host plants are reviewed and an identification key to species is presented for six *Uroleucon* (*Uromelan*) species from the Korean Peninsula.

Introduction

The genus *Uroleucon* Mordvilko 1914 includes approximately 215 species worldwide (Nieto Nafrìa et al., 2007). It is subdivided into 6 subgenera: *Uroleucon*, *Uromelan*, *Lambersius*, *Belochilum*, *Divium*, and *Satula*. The subgenus *Uroleucon* (*Uromelan*) Mordvilko 1914 is one of the largest subgenera with about 60 species which are generally distributed in the Palaeartic, Nearctic, Oriental, and Afrotropical regions (Eastop, 1961; Remaudière and Remaudière, 1997; Lee et al., 2002a; Blackman and Eastop, 2006; Nieto Nafrìa et al., 2007). Most of *Uroleucon* (*Uromelan*) species live on the family Asteraceae as the major host plant. However, a few species live on the family Campanulaceae or other plant families (Blackman and Eastop, 2006).

Members of the *Uroleucon* (*Uromelan*) are distinguished from the other five subgenera by 'dark cauda and siphunculi and abdominal dorsum membranous with well pigmented and developed scleroites, comparing that some species are weakly pigmented and developed scleroites' (Hille Ris Lambers, 1939; Olive, 1963; Heie, 1995; Pashtshenko, 2000; Lee et al., 2002b; Blackman and Eastop, 2006; Nieto Nafrìa et al., 2007).

A review of the subgenus *Uroleucon* (s. str.) in the Korean Peninsula was first done by Lee et al. (2002b) and a review of the subgenus *Uroleucon* (*Lambersius*) with a description of one species was done by Lee et al. (2002a). In this paper, we review the other subgenus of *Uroleucon* (*Uromelan*).

Until now, five species belong to the subgenus *Uroleucon* (*Uromelan*) have been reported in the Korean peninsula: *Uroleucon* (*Uromelan*) *gobonis* (Matsumura, 1917), *U. giganteum* (Matsumura, 1918), *U. lactucicola* (Strand, 1929), *U. amamianum* (Takahashi, 1930), and *U. cephalonopli* (Takahashi, 1962) (Takahashi, 1930; Paik, 1972; Lee and Seo, 1990).

We describe *Uroleucon* (*Uromelan*) *adenophorae*) (Matsumura, 1918) occurring on the stems of *Adenophora* sp. (Campanulaceae) in Gangwon-do as a new record in the Korean peninsula.

Material and methods

Fresh aphid samples were preserved in 80% alcohol. Slide-glass specimens were made with Canada balsam, following Blackman and Eastop's (2000) and Martin's (1983) methods. Photographs for each species were taken by a digital camera (14.2 Color Mosaic, Diagnostic Instruments, Sterling Heights, MI, USA) attached to a microscope (DM 400B, Leica Microsystems, Wetzlar, Germany) at a resolution of 600 dpi. Measurements for each specimen were taken from the digital images by Image Laboratory v2.2.4.0 software (MCM Design Ltd, Hillerod, Denmark).

Samples of this study are deposited in the College for Agriculture and Life Sciences, Seoul National University (CALS SNU, Korea), and the National Academy of Agricultural Sciences (NAAS, Suwon Korea).

Abbreviations used for descriptions are as follows: al., alate viviparous female; apt., apterous viviparous female; ny., nymph; Ant., antennae; Ant.I, Ant.II, Ant.III, Ant.IV, Ant.V, Ant.VI and Ant.VIb, antennal segments I, II, III, IV, V, VI and base of VI, respectively; BDAnt.III, basal diameter of antennal segment III; BL, length of body; GP, genital plate, 2HT, second segment of hind tarsus; PT, processes terminals; SIPH,

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1226-8615/$ – see front matter
doi:10.1016/j.aspen.2011.07.004

Table 1
Biometric data of *Uroleucon adenophorae*.

Part		Apterous viviparous (n = 7)	
		Average	Minimum–maximum
Length (mm)	Body	2.93	(2.71–3.38)
	Whole antennae	3.31	(3.11–3.70)
	Ant.I	0.11	(0.08–0.15)
	Ant.II	0.11	(0.07–0.14)
	Ant.III	0.96	(0.86–1.09)
	Ant.IV	0.55	(0.52–0.66)
	Ant.V	0.57	(0.53–0.62)
	Ant.VIb	0.20	(0.16–0.28)
	PT	0.85	(0.79–0.91)
	URS	0.16	(0.15–0.19)
	Hind femur	1.06	(0.99–1.26)
	Hind tibia	2.03	(1.89–2.21)
	2HT	0.19	(0.12–0.32)
	SIPH	0.64	(0.56–0.72)
	Cauda	0.52	(0.48–0.58)
	Setae on Ant.III	0.97	(0.86–1.09)
	Setae on tergite III	0.05	(0.02–0.07)
No. of hair on	Mandibular lamina	4	(3–5)
	Ant.I	4	(2–6)
	Ant.II	3	(2–4)
	Ant.III	19	(13–24)
	URS	3	(2–5)
	Tergite VI between SIPH	4	(2–6)
	Tergite VIII	5	(4–6)
	Median of GP	2	(1–3)
	Posterior margin of GP	11	(10–12)
	Cauda	17	(13–21)
No. of rhinaria on	Ant.III	65	(52–72)
Ratios	Whole antennae/body	1.13	(1.07–1.22)
	PT/Ant.VIb	4.41	(3.26–5.48)
	PT/Ant.III	0.89	(0.78–0.95)
	URS/2HT	0.94	(0.61–1.34)
	URS/Ant.VIb	0.83	(0.60–1.00)
	SIPH/body	0.22	(0.19–0.24)
	SIPH/Ant.III	0.67	(0.55–0.73)
	SIPH/hind femur	0.60	(0.57–0.66)
	SIPH/cauda	1.22	(1.12–1.29)
	Cauda/width of cauda	2.87	(2.63–3.58)
	Setae on Ant.III/Ant.IIIBD	1.09	(0.92–1.38)
	Setae on tergite VI/Ant.IIIBD	1.76	(1.33–2.15)

siphunculi; URS, ultimate rostral segment (segment IV + V). For the localities of distribution, the following provincial abbreviations are used: GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; GG, Gyeonggi-do; GW, Gangwon-do; HN, Hamgyeongnam-do; JB, Jeollabuk-do; JN, Jeollanam-do; JJ, Jeju-do; PN, Pyeongannam-do; RG, Ryanggangdo.

Systematic accounts

Genus *Uroleucon* Mordvilko 1914.
Subgenus *Uromelan* Mordvilko 1914.
Type species: *Aphis jaceae* Linnè, 1758.
Dactynotus (*Uromelan*): Hille Ris Lambers, 1939; Takahashi, 1962; Olive, 1963; Verma and Das., 1992.
Uroleucon (*Uromelan*): Smith and Cermeli, 1979; Moran, 1985; Robinson, 1985; Remaudière and Remaudière, 1997; Moran et al, 1999.

Key to the subgenera and species of *Uroleucon* (*Uromelan*) (based on the apterous viviparous female) (Figs. 1 and 2) modified from Miyazaki (1971) and Pashtshenko (1988).

1. Body green in life. Cauda pale and SIPH dark with pale base. Abdominal tergum membranous without any pigmentation.....Subgenus *Lambersius* Olive, 1965.
–Body dark red or black in life; if green, hind tibia with a row of peg-like setae. Cauda dark and SIPH dark–dusky. Abdominal tergum with many pigmented sclerites, with at least postsiphuncular sclerites.....2.
2. Cauda pale or yellow, distinctly paler than SIPH .....Subgenus *Uroleucon* Mordvilko 1914.
–Cauda dark, concolourous with SIPH (Subgenus *Uromelan* Mordvilko 1914).....3.
3. Cauda with 40 or more setae. SIPH smooth, reticulated only on apical 1/5. Tibia wholly black. On the genus *Cirsium* (Asteraceae)..... *U. giganteum* (Matsumura, 1918).
–Cauda at most with 35 setae. SIPH imbricated or spinulated, reticulated on more than apical 1/5. Tibiae pale at middle..... 4.
4. Primary rhinaria of Ant.V strongly protuberant and approx. 1.6–2.9 times larger than secondary rhinaria.....5.
–Primary rhinaria of Ant.V small and flat; if protuberant then approx. 0.6–1.1 times larger than secondary rhinaria .....6.
5. SIPH less than 1.3 times as long as cauda, reticulated on apical 1/3–2/5.....*U. amamianum* (Takahashi, 1930).
–SIPH more than 1.3 times as long as cauda, reticulated on apical 1/5–1/3x..... *U. lactucicola* (Strand, 1929).

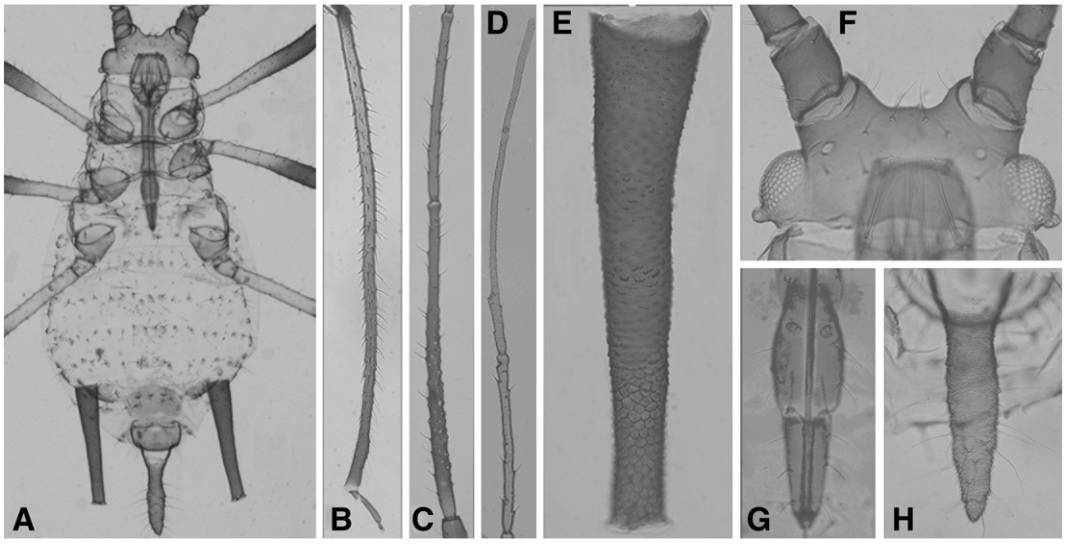

Fig. 1. Apterous viviparous female (A–H) of *Uroleucon adenophorae*. A, whole body. B, hind tibia and tarsus, C, antennal segments III–IV. D, antennal segments V–VI. E, siphunculus. F, head focused on dorsum. G, ultimate rostral segment. H, cauda.