

## Taxonomic Study of the Genus *Conocephalus* Thunberg in Korea (Orthoptera: Tettigoniidae: Conocephalinae)

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**ABSTRACT** The genus *Conocephalus* Thunberg in Korea was taxonomically studied. As the result, five species were confirmed to Korean fauna including a newly recorded species, *Conocephalus bambusanus* Ingrisch. The key to species, distributional data and comparative figures for identification are given.

**Key words :** Taxonomy, *Conocephalus*, Conocephalinae, Tettigoniidae, Orthoptera, Korea

### INTRODUCTION

The *Conocephalus* Thunberg is the representative genus of subfamily Conocephalinae (Orthoptera, Tettigoniidae), which have been recognized 156 species throughout the world (Naskrecki and Otte, 1999). They are very common in the field and easily distinguished from the other Korean tettigoniids by small size and slanting head shape.

A few faunistics in Korea had been made only in a part of Order Orthoptera by Mori (1933), Cho (1959, 1969), and Lee (1990). However, a comprehensive study of Korean *Conocephalus* has not been provided until now.

In the result of this study, five species of *Conocephalus* are confirmed to Korean fauna, including a newly recorded species *Conocephalus bambusanus* Ingrisch. The key to species, distributional data, comparative figures for identification are given.

On the other side, *Conocephalus melas* [*melanum*] de Haan was reported by Ju (1969) from North Korea. However, in Korean peninsular, the presence of this remarkable species originated from Indo-Malaysia region would be truly doubtful because it was found that no previous workers had never reported that. We believe that the record is not so reliable.

The depositories and the provinces of Korea are given in abbreviated form as follows: EU- Ehwa Women's Univ.; GSU- Gyeongsang Univ.; NIAST-

National Institute of Agricultural Science and Technology; SNU- Seoul National Univ.; SSU- Sungshin Women's Univ.; YNU- Yeongnam Univ.; GW- Gangwon-do; GG- Gyeonggi-do; CB- Chungcheongbuk-do; CN- Chungcheongnam-do; GB- Gyeongsangbuk-do; GN- Gyeongsangnam-do; JB- Jeollabuk-do; JN- Jeollanam-do; JJ- Jeju-do.

### SYSTEMATICS

#### Genus *Conocephalus* Thunberg, 1815

Mém Acad. Sci. St. Petersb. 5: 214. Type species: *Gryllus (Tettigonia) conocephalus* Linnaeus.

**Remark.** It might be needed for reconsideration to state of each species in the subgenera *Anisoptera*, *Conocephalus* s. str. and *Xiphidion* by reanalysis of characteristics.

#### Key to known species of Korean *Conocephalus*

1. Prosternum unarmed; Male cercus with two inner teeth (Fig. 10) .....  
..... ***C. bambusanus* Ingrisch**
- Prosternum bispinose; Male cercus with one inner tooth ..... 2
2. Hind femora with ventral spines .....  
..... ***C. japonicus* (Redtenbacher)**
- Hind femora without ventral spines ..... 3
3. Radial area of tegmina with regular black spots (Fig. 13) ..... ***C. maculatus* (Le Guillou)**
- Radial area of tegmina without black spots ..... 4
4. Dorsal width of rostrum narrow and similar with

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- ventral one; Ovipositor nearly green, shorter than hind femora .....  
 ..... *C. chinensis* (Redtenbacher)  
 - Dorsal width of rostrum two times more wider than ventral one; Ovipositor brown, much longer than hind femora .....  
 ..... *C. gladius* (Redtenbacher)

### 1. *Conocephalus bambusanus* Ingrisch

대나무썩새기 (신칭) (Figs. 1, 10, 11)

*Conocephalus bambusanus* Ingrisch, 1990 ["1989"]. Senckenb. Bio. 70(1-3): 113. Abb. 42-43, 60-63. Thailand.

**Diagnosis.** Length of body with wings 31-33 mm. Pale green, brown or combination. Prosternum unarmed. Hind femora with ventral spines. Male cercus with two inner teeth. Female ovipositor shorter than hind femora.

**Material examined.** GN- 1 female, Simcheon-ri Namhae, 29-30 VIII 1998, Park (GSU); 1 female, Gajwa-dong Jinju, 16 IX 1992 (GSU); 1 female, Wa-ri Yulgok-myeon Hapcheon, 10 IX 2000, Kim (SNU); 2 males 15 females, Baechun-ri Chukdong-myeon Sacheon, 13 VIII 2001, Paik (SSU). JB- 1 female, Saja-dong Buan, 13 IX 1998, Ryu (GSU).

**Distribution.** Korea (new record), Japan, Thailand, Vietnam, Malaysia.

**Remarks.** According to the original description, the mid femora have a few ventral spines. However, it was not observed in Korean specimens. As the etymology, this species mostly captured in the bamboo forest, especially *Pseudosasa* spp. in Korea.

### 2. *Conocephalus japonicus japonicus*

(Redtenbacher) 썩새기 (Figs. 2-3, 12)

*Xiphidium japonicum* Redtenbacher, 1891. Verh. Zool. Bot. Ges. Wien, 41: 525. Japan.

*Xiphidium japonicum*: Doi, 1932: 37.

*Xiphidion japonicum*: Kamijo, 1933: 49; Mori, 1933: 56; Mori, 1935: 9, 16. pl. 2, fig. 4, text-fig. 7. Chosen.

*Xiphidion* [sic] *japonicum*: Mori, 1935: 16.

*Conocephalus japonica*: Cho, 1959: 162, fig. 34A-B; Cho, 1969: 758, pl. 51, 80. text-fig. 10.

*Conocephalus japonicum*: Ju, 1969: 17.

*Conocephalus japonicus*: Lee, 1990: 111; Moon and Yoon, 1993: 57; Kwon and Huh, 1994: 48; Kwon et al., 1996: 103.

*Conocephalus japonicus japonicus*: Storozhenko,

1986: 251. Korea.

**Material examined.** GW- 1 male, Balsan-ri Chuncheon, 14 X 1999, Kim (NIAS). GG- 1 female, Macroptera, Jangheung, 23 IX 1998, Kim (NIAS); 1 female, Ilyeong Goyang, 22 X 1966, Park (EU); 1 male 2 females, Ungogae Gwangju, 23 X 1982, Kim et al. (SSU); 1 male, Suwon, 1 XI 1955 (NIAS); 1 male 1 female, *ibid*, 18 X 1958 (NIAS); 1 male, *ibid*, 3 IX 1975, Lee (S.M. Lee's collection); 1 male, Mt. Yongmunsan, 16 IX 1990, Oh (SSU); 2 females, Jeongok Yeoncheon, 1 IX 1998, Park (NIAS); 1 female, Geumchon Paju, 2 X 1990, Park (SSU); 1 male 4 females, Mt. Dobongsan, 19 X 1958, Lee (NIAS); 1 male, Ehwa Univ. Campus, 8 X 1966, Na (EU).

**Distribution.** Korea, Japan, Taiwan, China.

### 3. *Conocephalus maculatus* (Le Guillou)

점박이썩새기 (Figs. 4-5, 13)

*Xiphidium maculatum* Le Guillou, 1841. Rev. Mag. Zool. 4: 294. Malaysia.

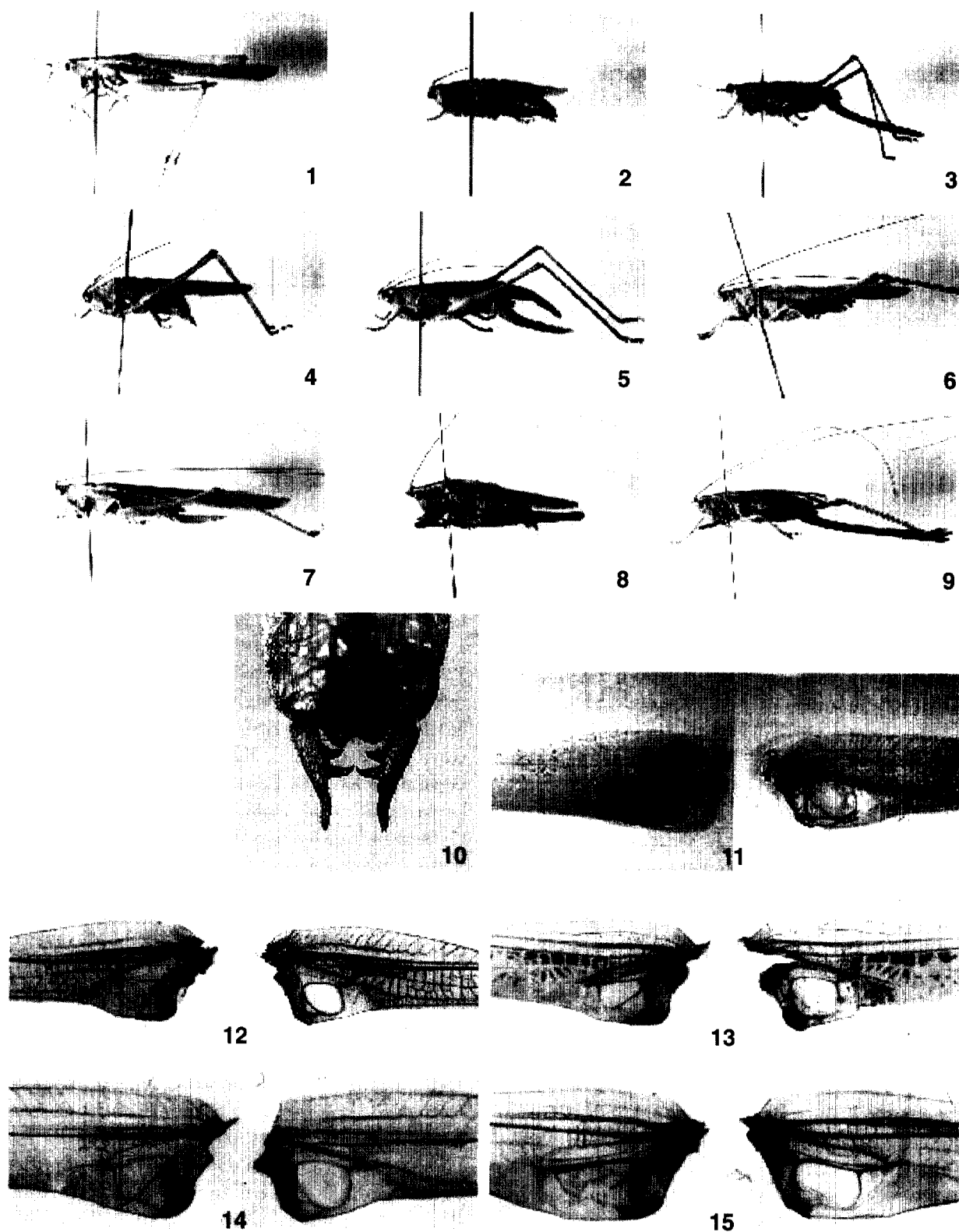
*Xiphidium maculatum*: Doi, 1932: 37.

*Xiphidion maculatum*: Mori, 1933: 55; Doi, 1933: 88; Haku, 1937: 73.

*Conocephalus* (*Xiphidion*) *maculatus*: Furukawa, 1942: 35, figs. 1(1), 2(1, 7), 3(1), 4(1). Chosen.

*Conocephalus maculatus*: Furukawa, 1942: 35; Cho, 1959: 162, fig. 33; Cho, 1969: 757, pl. 51, text-fig. 9; Ju, 1969: 17; Lee, 1990: 109; Moon and Yoon, 1993: 57; Kwon and Huh, 1994: 48; Kwon et al. 1996: 103.

**Material examined.** GW- 2 males 2 females, Bukpyeong Jeongseon, 17 VIII 1989, Lee (SSU); 1 male, Dong-myeon Hongcheon, 24 VI 1997, Chae (SSU). GG- 1 female, Mt. Godongsan Gapyeong, 9 IX 1980, Jang (SSU); 1 female, Ganghwa, 18 VIII 1990, Oh (SSU); 1 male 1 female, Byeokje Goyang, 30 IX 1993, Lee (SSU); 1 male, Wongdang Goyang, 26 VII 1990, Lee (SSU); 1 male, Ilsan Goyang, 26 IX 1998, Song (SSU); 1 male, Jangheung, 12 X 1992, Cha (SSU); 1 female, Mt. Gwanaksan, 5 IX 1996, Choi (SSU); 1 female, Mt. Cheonggyesan, 22 IX 1991, Lee (SSU); 1 female, Gwangneung, 22 IX 1990, Kim (SSU); 2 males 2 females, Haan-dong Gwangmyeong, 21 VIII 1994, Kim (SSU); 1 female, Namhansanseong, 11 IX 1995, Lee (SSU); 1 female, Yongmi-ri Gwangtan, 2 X 1987, Lee (SSU); 1 female, Migeum Namyangju, 7 X 1984, Bang (SSU); 1 female, Joam Namyangju, 1 IX 1995, Ryu (SSU); 2 females, Hwajeop Jinjeop Namyangju, 5 IX 1982,



**Figs. 1-9.** Lateral view of bodies, 1. *Conocephalus bambusanus* Ingrisch; 2-3. *Conocephalus japonicus* (Redtenbacher); 4-5. *Conocephalus maculatus* (Le Guillou); 6-7. *Conocephalus chinensis* (Redtenbacher); 8-9. *Conocephalus gladius* (Redtenbacher).

**Fig. 10.** Terminalia of male *Conocephalus bambusanus* Ingrisch.

**Figs. 11-15.** Stridulatory apparatus of males, 11. *Conocephalus bambusanus* Ingrisch; 12. *Conocephalus japonicus* (Redtenbacher); 13. *Conocephalus maculatus* (Le Guillou); 14. *Conocephalus chinensis* (Redtenbacher); 15. *Conocephalus gladius* (Redtenbacher).

Kim (SSU); 2 females, Mt. Gwanggyosan Suwon, 16 VIII-20 IX 1992, Lee (SSU); 1 female, Yangsu-ri, 14 X 1978, Yoon (EU); 1 female, Bugok Yangju, 12 X 1998, Yim (SSU); 1 male 2 females, Mt. Yongmunsan Yangpyeong, 27 IX 1986, Park et al. (SSU); 1 male 1 female, Yongin, 5-7 VIII 1972, Yoo (EU); 1 female, Juan Incheon, 10 IX 1987, Choi (SSU); 1 male, Mt. Cheonmasan, 16 VII 1980, Ku (SSU); 3 females, Paju, 3 X 1999, Yoon (EU); 3 males 2 females, Mt. Gamaksan Seolma-ri Paju, 8 IX 1984, Jang et al. (SSU); 1 female, Pyeongtaek, 11 IX 1992, Kwak (SSU); 1 male, Songu-ri Pocheon, 24 VII 1996, Park (SSU); 1 female, Hwaseong, 12 IX 1992, Cho et al. (SSU); 1 male, Mt. Gaehwasan, 27 VI 1995, Kim (SSU); 1 male, Mt. Daemosan, 1 VIII 1996, Lee (SSU); 1 female, Mt. Dobongsan, 18 VIII 1983, Lee (SSU); 1 male, Bulgwang-dong Seoul, 26 VIII 1998, Kim (SSU); 1 female, Mt. Bulamsan, 18 IX 1966, Kim (EU); 1 female, Seodaemun, 25 VIII 1971, Nam (EU); 1 female, Mt. Ahasan, 2 X 1971, Won (EU); 1 male, Yeonse Univ. Campus, 13 X 1974, Lee (EU); 1 female, Mt. Yongmasan, 22 IX 1971, Won (EU); 1 female, Ehwa Univ. Campus, 21 IX 1967, Hong (EU). CN- 1 male, Gongju, 1 VIII 1996, Jang (SSU); 2 females, Mt. Gyeryongsan, 19 VIII 1993, Lee (SSU); 1 female, Sintanjin, 25 IX 1966, No (EU); 1 male 1 female, Hyudae-ri Asan, 20 IX 1992, Kim (SSU). GB- 2 males, Huibangsa Mt. Sobaeksan, 5 IX 2000, Kim (NIAST). JB- 1 female, Light trap [RGO], Muju, 1-5 IX 1992 (NIAST); 1 female, Munsujae Buan, 18 VII 1998, Ryu (YNU); 1 male 4 females, Bongeun-ri Buan, 10 X 1981, Jang (SSU); 1 male 2 females, Sannae-myeon Buan, 28 VI 1990, Shin et al. (SSU); 1 female, Taerin Jeongeup, 12 VIII 1995, Kim (SSU). JN- 1 male, Jungri Bogildo, 21 VII 1981, Yoon (EU); 1 female, Geomunseodo Yecheon, 12 VII 1984, Kim (SSU); 1 male, Odong Yeonggwang, 19 VIII 1989, Lee (SSU); 1 male, Hoengdo Yeonggwang, 19 VIII 1989, Lee (SSU); 1 male 1 female, Gogeumdo Wando, 26 VII 2000, Lee (NIAST); 5 female, Wando, 6-7 VII 1982, Kim et al. (SSU). JJ- 1 male, Gwaneumsa, 27 IX 2000, Kim (NIAST); 1 female, Musucheon, 26 IX 2000, Kim (NIAST); 2 males, Topyeong Seoguipo, 12 VII 1983, Jang (SSU); 3 males 3 females, Seonheul, 28 IX 2000, Kim et al. (NIAST); 4 males 10 females, Udo, 10 X 1999, Kim (NIAST); 2 males 2 females, Hyeopje, 26 IX 2000, Kim et al. (NIAST).

**Distribution.** Korea, Japan, Taiwan, Australia, Southeastern Asia.

#### 4. *Conocephalus chinensis* (Redtenbacher)

썩새기 (Figs. 6-7, 14)

*Xiphidium chinensis* Redtenbacher, 1891. Verh. Zool. Bot. Ges. Wien, 41: 509. Russia.

*Conocephalus chinensis*: Furukawa and Shiraki, 1950: 39, fig. 96. Chosen; Cho, 1959: 163, fig. 35; Cho, 1969: 759, pl. 80, text-fig. 11; Ju, 1969: 17; Lee, 1990: 109; Moon and Yoon, 1993: 57; Kwon and Huh, 1994: 48; Kwon et al. 1996: 103.

*Conocephalus (Xiphidion) chinensis*: Furukawa, 1942: 36, figs. 1(4), 2(4, 10), 3(4), 4(4). Chosen.

*Conocephalus longipenne*: Ju, 1969: 17. [misidentification]

*Xiphidium longipenne*: Doi, 1932: 37. [misidentification]

*Xiphidion longipenne*: Mori, 1933: 56. [misidentification]

**Material examined.** GW- 1 female, Gyeongpo-dae Gangneung, 3 VIII 1997, Kim (SSU); 1 female, Jukhyeong-dong Gangneung, 29 VII 1997, Kim (SSU); 1 female, Gangchon Chuncheon, 18 X 1971, Lee (EU); 1 male, *ibid*, 20 IX 1996, Huh (SSU). GG- 1 male, Samhoe Gapyeong, 17 X 1992, Goh (SSU); 1 male, Mt. Manisan Ganghwa, 25 VII 1995, Song (SSU); 2 males 2 females, Mt. Bukhansan Goyang, 4 VII 1993, Kim (SSU); 1 male 1 female, Ilsan Goyang, 26 IX 1998, Kim (SSU); 1 female, Ilyeong Goyang, 3 X 1984, Seo (SSU); 1 female, Jangheung Goyang, 23 VIII 1998, Kim (SSU); 1 female, Mt. Gwanaksan Gwacheon, 5 X 1996, Choi (SSU); 1 male, Ungogae Gwangju, 15 IX 1984, Jeong (SSU); 2 females, Mt. Surisan Gunpo, 9 X 1971, Lee (EU); 1 female, Maseok Namyangju, 4 VI 1978, Oh (EU); 9 males 4 females, Seodun-dong Suwon, 27 IX-20 X 1999, Kim (NIAST); 1 male 1 female, Mt. Yeogisan Suwon, 26 X 1983, Yim (NIAST); 1 female, Ansan, 6 X 1994, Seol (SSU); 1 female, Anyang, 16 X 1971, Lee (EU); 1 male 1 female, Yangsu-ri, 13 X 1978, Yoon (EU); 1 male, Yangpyeong, 21 IX 1995, Eom (SSU); 1 female, Myeongji Univ. Campus Yongin, 5 IX 1994, Han (SSU); 1 male, Poil-dong Uiwang, 20 IX 1993, Eom (SSU); 1 female, Is. Yeongheungdo Ongjin Incheon, 15 VII 1999, An (NIAST); 1 female, Paju, 3 X 1999, Yoon (EU); 1 male 1 female, Mt. Cheonmasan Pyeongnae, 5 VIII-30 IX 1984, Kim et al. (SSU); 1 male 4 females, Misari Hanam, 13 IX-6 X 1998, Yoon et al. (SSU); 3 females, Mado Hwaseong, 10 IX 1984, An (SSU); 1 female, Hyangnam Hwaseong, 2 VIII 1989, Shim (SSU); 2 females, Mt. Dobongsan, 8 X

1996, Lee (SSU); 2 females, Mt. Ahasan, 18 IX 1971, Kang et al. (EU); 1 female, Yeonse Univ. Campus, 1 X 1971, Lee (EU); 1 male, Wonji-dong Seoul, 14 IX 1985, Lee (SSU); 1 female, Ehwa Univ. Campus, 28 X 1992, Yoon (EU); 2 males, Ilwon-dong Seoul, 20 IX 1994, Han (SSU); 2 males 1 female, Mt. Cheonggyesan, 5-19 VIII 1989, Kim et al. (SSU); 1 male, Taeneung, 15 IX 1973, Oh (EU); 1 male 6 females, Haggang river bed, 24-29 VIII 1997, Jeong et al. (SSU). CB- 4 males 11 females, Suryuji Nohyeon Boeun, 23 X 1990, Park et al. (SSU); 1 male, Mt. Songnisan, 7 VIII 1990, Kim (SSU); 2 males 6 females, Sojeong-ri Gunbuk-myeon Okcheon, 23 X 1990, Park et al. (SSU); 1 male, Namin-myeon Cheongwon, 25 IX 1994, Park (SSU); 1 female, Mipyeong Cheongju, 18 IX 1992, Park (SSU); 3 males, Mt. Namsan Chungju, 9 X 1985, Cho (SSU). CN- 2 males 4 females, Muryangsa Mt. Mansusan Boryeong, 19 VII 1999, Kang (NIAST); 6 males 2 females, AB area Seosan, 4 VII 2000, Lee (NIAST). GB- 1 female, Yeongnam Univ. Campus Gyeongsan, 26 VI 1996, Na (YNU); 2 males 2 females, Geumdan-dong Daegu, 10 VI 1980, Han (SSU); 1 male 3 females, Hahoemaoul Andong, 6 IX 2000, Kim (NIAST); 1 male, Jeongju, 1 VIII 1996, Paik (NIAST); 1 male, Cheongdo, 10 VII 1998, Lee (NIAST). GN- 1 male, Jinju, 15 VII 1986, An (SSU). JB- 1 male, Namwon, 27 IX 1996, Lee (SSU). JN- 1 male, Gwangyang Okgok, 11 VII 1999, Han (NIAST).

**Remarks.** This species is univoltine in mountain area or bivoltine in southern part and lowland from early June until the end of October in Korea as well as in Japan (Lee, 1990; Ito et al., 1996).

**Distribution.** Korea, Japan, China, Russia.

### 5. *Conocephalus gladius* (Redtenbacher)

긴꼬리색새기 (Figs. 8-9, 15)

*Xiphidium gladium* Redtenbacher, 1891. Verh. Zool. Bot. Ges. Wien, 41: 514. Japan.

*Conocephalus gladium*: Cho, 1958: 32. sexual dimorphism; Ju, 1969: 17.

*Conocephalus (Xiphidium) gladius*: Ebner, 1939: 296, Korea; Furukawa, 1942: 35, figs. 1(3), 2(3, 9), 3(3), 4(3). Chosen.

*Conocephalus gladius*: Furukawa and Shiraki, 1950: 38, fig. 95. Chosen; Cho, 1959: 161, fig. 32; Cho, 1969: 757, pl. 80, text-fig. 8; Lee, 1990: 110; Moon and Yoon, 1993: 57; Kwon and Huh, 1994: 48; Kwon et al. 1996: 103.

*Xiphidium gladium*: Doi, 1932: 37.

*Xiphidium gladium*: Mori, 1933: 55; Haku, 1937: 73.

**Material examined.** GW- 1 female, Gyodong Gangneung, 7 X 1987, Lee (SSU); 1 female, Mt. Seoraksan, 9 X 1970, Byeon (EU); 1 female, 17 X 1974, Park (EU); 1 male, Changwon-ri Yeongwol, 13 VIII 1998, Park (NIAST); 4 male, *ibid*, 30 IX 1999, Kim (NIAST); 1 female, Mt. Chiaksan Wonju, 14 VIII 1987, Sohn (SSU); 2 male, *ibid*, 15 VIII 1999, Kim (NIAST); 1 female, Deokgeori Jangpyeong, 4 IX 1988, Jeon (SSU); 2 females, Gyeonggang Chunseong, 16 IX 1984, Jang (SSU); 1 female, Chuncheon, 24 VII 1994, Kwon (NIAST); 2 males 2 females, Gangchon Chuncheon, 4 IX 1982, Kim et al. (SSU); 2 females, *ibid*, 9 X 1994, Kwon (SSU); 1 female, *ibid*, 14 VIII 1997, Lee (SSU); 1 male 4 females, Balsan-ri Chuncheon, 28 VIII-25 IX 1998, Park (NIAST). GG- 1 female, Gapyeong, 11 IX 1998, Yoo (SSU); 1 male, Mt. Myeongjisan Gapyeong, 23 IX 1989, Lee (SSU); 1 female, Ganghwa, 18 VIII 1969, Yoon (EU); 1 male, Byeokje Goyang, 12 IX 1982, Jeong (SSU); 1 male 1 female, Wondang Goyang, 23 VIII 1972, Oh (EU); 1 female, Ilyeong Goyang, 17 X 1987, Lee (SSU); 2 females, Mt. Gwanaksan Gwacheon, 1 X 1984, Sohn (SSU); 1 female, Gwangneung, 1 X 1966, Cho (EU); 1 female, Mt. Mugapsan Gwangju, 15 IX 1991, Kim (SSU); 2 female, Eommi-ri Gwangju, 15 IX 1984, Kim et al. (SSU); 3 males 19 females, Ungogae Gwangju, 23-30 X 1982, Lee et al. (SSU); 1 female, Gimpo, 15 X 1969, Lee (EU); 1 female, Migeum Namyangju, 7 X 1984, Bang (SSU); 3 males, Mt. Bulamsan, 29 X 1982, Gye (SSU); 1 female, Mt. Chukryeongsan, 8 IX 1984, Song (SSU); 3 males, Mt. Soyosan Dongducheon, 19-21 X 1980, Lee et al. (SSU); 1 male 1 female, Namhansanseong, 29 VIII-6 IX 1997, Yoo (SSU); 1 female, Mt. Gwanggyosan Suwon, 20 IX 1992, Lee (SSU); 1 female, Bugok Yangju, 12 X 1998, Yim (SSU); 1 male, Sudong Yangju, 16 IX 1979, Dept. Bio. (SSU); 1 female, Mt. Yongmunsan, 3 X 1981, Jang (SSU); 1 male, Mt. Godaesan Sinseo-myeon Yeoncheon, 12 VIII 1987, Kim (SSU); 3 males 3 females, Mt. Cheonmasan Pyeongnae, 11 IX-30 X 1982, Kim et al. (SSU); 2 males, Huigok Pyeongtaek, 9 VIII 1989, Lee (SSU); 1 female, Gwangneungnae Pocheon, 25 IX 1983, Oh (SSU); 2 females, Yeongjeong Yeongpyeong Pocheon, 18 VIII-21 IX 1996, Kim et al. (SSU); 1 female, Idong-myeon Pocheon, 21 VIII 1994, Kwon (SSU); 1 female, Maesong

Hwaseong, 15 IX 1990, Lee (SSU); 1 male, Haengjusanseong Hwajeon, 1 X 1984, Chae (SSU); 2 female, Mt. Dobongsan, 5 X 1987, Ha (SSU); 1 female, Mok-dong Seoul, 4 X 1987, Park (SSU); 1 female, Mt. Ahasan, 12 IX 1981, Yoon (EU); 1 female, Ilwon-dong Seoul, 2 X 1994, Han (SSU); 1 male 1 female, Mt. Cheonggyesan, 7 IX 1986, Yim et al. (SSU). CB- 1 male, Jeongbang-ri Annaemyeon Okcheon, 12 X 2000, Lee (NIAST); 1 female, Onyang, 27 IX 1988, Jeon (SSU); 1 female, Deokgok Jecheon, 22 X 1995, Jeon (SSU); 1 male, Mt. Namsan Chungju, 25 VIII 2000, Kim (NIAST); 1 male, Mt. Wolaksan Sangmo-myeon Chunju, 13 X 2000, Kim (NIAST). CN- 1 male, Okryong-dong Gongju, 15 VIII 1988, Moon (SSU); 1 female, Dosan Dangjin, 12 VIII 1984, Choi (SSU). GB- 1 male, Yeongnam Univ. Campus Gyeongsan, 25 IX 1993, Yeo (YNU); 1 female, Sangri Seongsan Goryeong, 6 IX 1997, Ryu (YNU); 1 male, Osilnaru Goryeong, 6 IX 1997, Lee (YNU); 1 female, Daegu, 18 IX 1971, Lee (EU); 3 females, Waryong Andong, 22 IX 1991, An (SSU); 2 females, Hahoemaoul Andong, 6 IX 2000, Kim (NIAST); 1 male 1 female, Hwajinpo Songna-myeon Pohang, 7 IX 2000, Kim et al. (SSU). JB- 1 male, Light trap [RGO], Muju, 1-5 IX 1992 (NIAST); 1 male, Maljae Buan, 13 IX 1998, Ryu (YNU); 1 female, Siyong-dong Jeongup, 6 X 1998, Jeong (SSU). JN- 1 male, Mt. Baekwunsan Gwangyang, 25 VIII 1999, Kim (NIAST); 1 female, Mt. Mudeungsan Gwangju, 10 X 1988, Lee (SSU); 2 males, Nohwa Wando, 19 VIII 1982, Jang (SSU); 1 male, Piagol Mt. Jirisan, 1 VIII 1984, Jang (SSU); 1 male, Hampyeong, 23 IX 2000, Kim (NIAST). JJ- 1 male 3 females, Gwaneumsa, 27 IX 2000, Kim (NIAST); 4 males 2 females, Musucheon, 9 X 1999, Kim (NIAST); 1 male, *ibid*, 26 IX 2000, Kim (NIAST); 3 females, Mt. Sambangsan, 28 IX 2000, An et al. (NIAST); 1 female, Andeokgyegok, 27 IX 2000, Kim (NIAST); 5 males 3 females, Hyeopje, 26 IX 2000, Kim et al. (NIAST).

**Distribution.** Korea, Japan, China.

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