Elytra, *Tokyo*, New Series, **5** (2): 269–280
November 25, 2015

Review of the Japanese Species of the Genus *Cicindela* (*Sophiodela*) (Coleoptera, Carabidae, Cicindelinae) Based on the Characters of Internal Sac

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Abstract The Japanese species of *Cicindela* (*Sophiodela*) are reviewed and redefined on the basis of the characteristics of the inflated internal sac. *Cicindela* (*S.*) *japonica* and *C.* (*S.*) *okinawana* are treated as an independent species from a subspecies of *C.* (*S.*) *chinensis* because of the differentiated characteristics of the internal sac. *Cicindela* (*S.*) *ferriei indigonacea* is synonymized with *C.* (*S.*) *ferriei ferriei*, because there is no significant difference in the structure of internal sac between the subspecies. As a result, the Japanese *Sophiodela* comprises *C.* (*S.*) *ferriei* Fleutiaux, 1895, *C.* (*S.*) *japonica* Thunberg, 1781, and *C.* (*S.*) *okinawana* Nakane, 1957. They essentially share the basic features of the internal sac and form a related species group. In addition, the subgenus is relatively more similar to the genus *Cosmodela* than *Cicindela* (*Cicindela*), and therefore it seems to have a closer relationship with *Cosmodela*.

Introduction

The genus *Cicindela* Linnaeus, 1758 is the largest genus of the subfamily Cicindelinae (Coleoptera, Carabidae). It has been divided into dozens of subgenera and species groups (*e.g.* Rivalier, 1950, 1957, 1961). However, the subgenera and the species groups of the genus still have controversial taxonomic problem (*e.g.* Ashida, 2007).

Among the subgenera, a small subgenus *Sophiodela* Nakane, 1955 was established based on the *chinensis* species group sensu Nakane (1955) of which the type species is the Japanese species, *C. japonica* Thunberg, 1781 (Nakane, 1955). This subgenus consists of five species and two subspecies distributed in Nepal and East Asia, and three species of them with two subspecies, *C.* (*S.*) *ferriei ferriei* Fleutiaux, 1895, *C.* (*S.*) *ferriei indigonacea* (Miwa, 1935), *C.* (*S.*) *japonica*, and *C.* (*S.*) *chinensis okinawana* Nakane, 1957 have been known from Japan (*e.g.* Nakane, 1963).

Of those Japanese members, the taxonomic position of *C. japonica* has been unstable. It has been regarded as an independent species based on the structures of the male genitalia and prothorax (Nakane, 1955; Ashida, 2007), meanwhile several researchers (*e.g.* Satô, 1985; Puchokov & Matalin, 2003) treated it as a subspecies of *C. chinensis* De Geer, 1774, respectively. One of principal reasons for this taxonomic confusion is caused by the slight differences of diagnoses such as the shape of median lobe (Nakane, 1955; Ashida, 2007) and/or the prothorax (Ashida, 2007). It is therefore necessary to review their taxonomic statuses by using more effective features.

The structure of everted internal sac of male genitalia is recently noted its taxonomic significance

not only in defining species but also in estimating phylogenetic relationship on Cicindelinae (*e.g*. Matalin, 1998, 1999; Sasakawa, 2008) as well as the other Coleoptera. Also, it contributes to finding cryptic species on the family Carabidae (*e.g*. Imura *et al*., 1998; Sugaya & Yamasako, 2014). Therefore, the structure of the internal sac has high likelihood to become effective diagnosis for clarifying the taxonomic status of *Cicindela* (*Sophiodela*). Nevertheless, little is known about taxonomic studies focused the structure of the internal sac on the subgenus so far.

From those points of view, we herein reviewed the Japanese species of *Cicindela* (*Sophiodela*) on the basis of a detailed observation of the everted internal sac.

Materials and Methods

The terminologies on the internal sac are followed Matalin (1998).

This study was based on dried specimens deposited in Ehime University Museum (EUMJ) and our private collections.

All dissection, observation, and measurement in this study were conducted under a stereomicroscope (OLYMPUS SZ40, LEICA® S8APO). The photos were taken by CCD camera (NIKON Digital Sight DS-Fil CCD Camera) through the stereomicroscope. For focus staking of the captured images, an image processing software (CombineZM) was used.

For observation of the internal sac with eversion, the entire male genital organs were extracted from abdomen using the tweezers and soaked in 10% KOH solution for 30 minutes. After muscles and visceral tissues were removed, aedeagus was carefully separated from the other parts.

The basal part of aedeagus was attached to the tip of a pipet tip (Eppendorf 3110 or 4910, 0.5–2.5 ml) using a little jelly instant glue composed mainly of cyanoacrylate. When the adhesive dried, toothpaste was injected to the internal sac through aedeagus. After eversion and well inflation, the aedeagus with the pipet was soaked in acetone to dissolve the adhesive, and thence the aedeagus was carefully detached.

After observation, the genital organs were preserved in polyethylene genital vials filled with glycerin.

This is an applied method based on the approaches of Imura (2008) and Sugaya and Yamasako (2014) for observing carabid endophallus with inflation and eversion.

Taxonomy

Cicindela (*Sophiodela*) Nakane, 1955

Sophiodela Nakane, 1955: 26 (type species: *Cicindela japonica* Thunberg, 1781).
Sericina Rivalier, 1961: 123 (type species: *Cicindela chinensis* De Geer, 1774). [Synonymized by Nakane (1973).]

Description. Internal sac in lateral view short and thick, almost cylindrical in shape, with three membranous large projections: ventro-apical, dorso-apical and basal bladders, and several chitinous armatures: flagellum, upper limitator, shield, lower limitator, spring and medial tooth, but lucking flag.

Ventro-apical bladder laid on the latero-ventral side near the apex of sac, well developed, projected latero-dorsally, swollen in triangular pyramid shape; dominant part of dorsal area covered with numerous sclerosed spines. Dorso-apical bladder on the latero-dorsal side of sac behind ventro-apical bladder, well developed, roundly swollen, with flagellum. Basal bladder on the right lateral side near the base of sac, roundly swollen, with numerous small spines on surface.

Flagellum curved, usually forming “S” shape. Spring long, laid along right dorsal margin of ven-

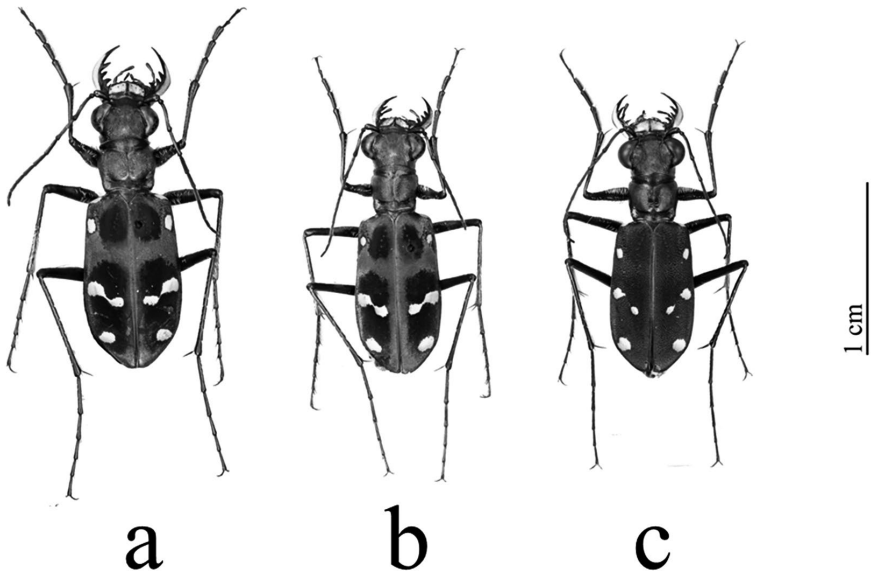

Fig. 1. Habitus of Japanese *Cicindela* (*Sophiodela*) spp. ——— a, *Cicindela* (*S.*) *japonica*; b, *C.* (*S.*) *okinawana*; c, *C.* (*S.*) *ferrieri*.

tro-apical bladder. Medial tooth on later-dorsal side near the base of internal sac acuminate at apex.

Remarks. The structure of internal sac of this subgenus (Figs. 2–4, 5a–d) is well different from the nominotypical subgenus of the genus, *Cicindela* (*Cicindela*) (Fig. 5e–f), but relatively similar to the genus *Cosmodela* (Fig. 5g–h) and sharing the following characteristics with the latter: sac short and thick, basal bladder and ventro-apical bladder with numerous sclerosed spines. This subgenus is easily distinguishable from *Cosmodela* by the simpler form of the sac.

Cicindela* (*Sophiodela*) *japonica THUNBERG, 1781

[Japanese name: Nami-Hanmyô]

(Figs. 1a, 2a–p)

Cicindela japonica THUNBERG, 1781: 2.
Cicindela chinensis var. *japonica*: HORN, 1921: 19.
Cicindela chinensis var. *konoi* GOTÔ et IGA, 1950: 14. [Synonymized by NAKANE (1963).]
Cicindela (*Sophiodela*) *japonica*: NAKANE, 1955: 26; ASHIDA, 2007: 6, 8.
Cicindela chinensis japonica: SATÔ, 1985: 11; PUCHKOV & MATALIN, 2003: 108.

Description (Fig. 2a–p). Internal sac in left-lateral view weakly constricted at base, slightly and arcuately curved apically. Ventro-apical bladder in lateral view well developed, projected in triangular pyramid shape, with numerous spinous sclerites on dominant area of dorsal side in right-lateral view. Dorso-apical bladder well developed, roundly swollen above. Basal bladder well developed, swollen into elongate oval shape, projected right-latero-ventrally, with numerous small spinous sclerites forming a narrow oblong band along apical margin.

Flagellum long and thin, curved and formed “S” shape. Spring long and thin, laid along right lat-

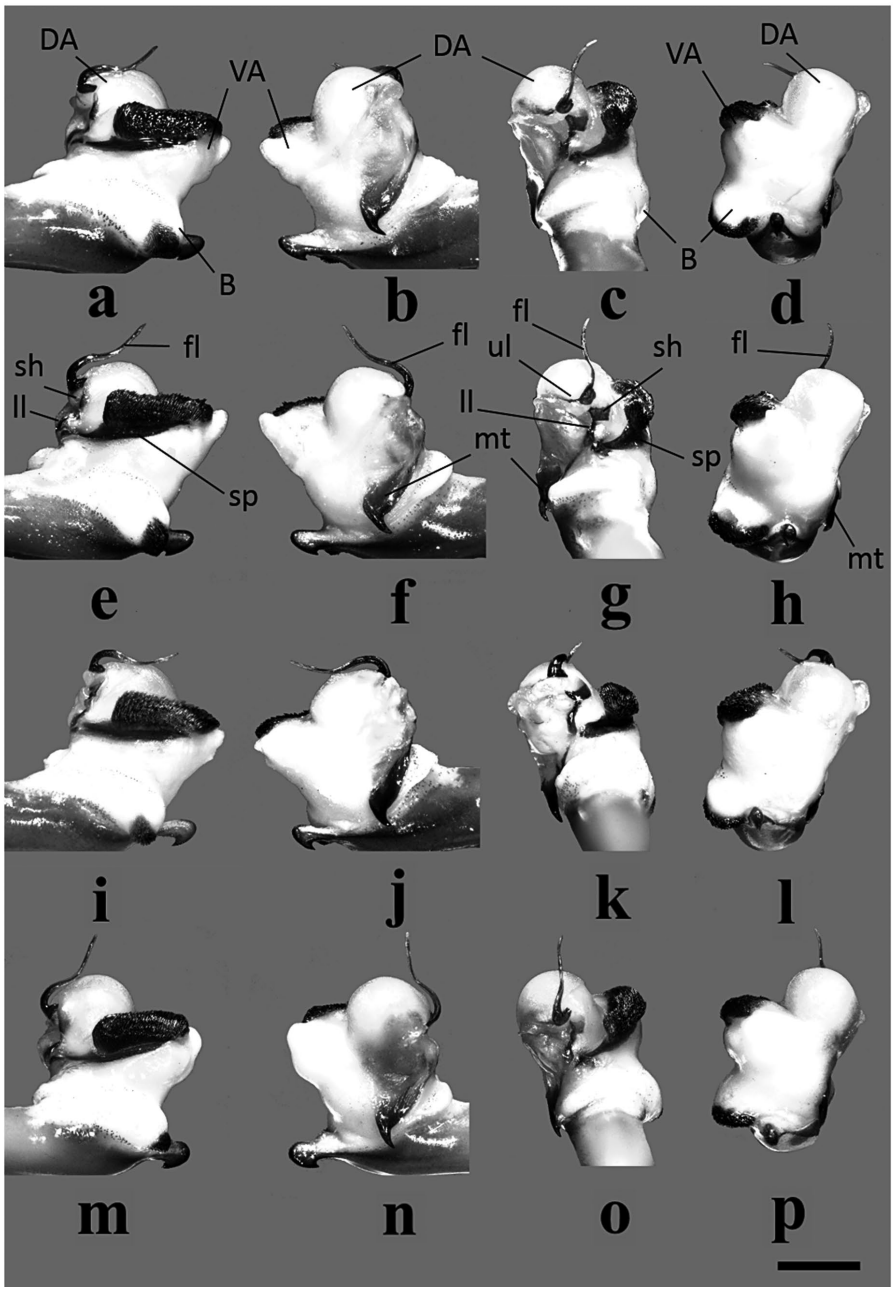

Fig. 2. Internal sacs of *Cicindela* (*Sophiodela*) *japonica*. ——— a–h, Ehime Pref., Japan (a–d, Otaniike, Iyo City; e–h, Komenono, Matsuyama City); i–l, Kyoto Pref.; m–p, Kagoshima Pref. ——— a, e, i, m, Right-lateral view; b, f, j, n, left-lateral view; c, g, k, o, dorsal view; d, h, l, p, ventral view. Scale: 1.0 mm. Abbreviations: B, basal bladder; DA, dorsal-apical bladder; VA, ventro-apical bladder; fl, flagellum; ul, upper limitator; sp, spring; sh, shield; mt, medial tooth; ll, lower limitator.

eral margin of spinous area on dorsal side of ventro-apical bladder. Medial tooth well thick, orthogonally curved at apical third.

Specimens examined. [Japan] 1 ♂, Izumi, Tsushima Isls., Nagasaki Pref., 29.III.1965, Y. HORI leg.; 1 ♂, Hakatajima Is., Ehime Pref., 17.IX.1972, H. TAGUCHI leg.; 1 ♂, Mt. Miyukiji, Matsuyama City, Ehime Pref., 5.IX.1976, S. HASHIMOTO leg.; 1 ♂, Ishitegawa-dam, Matsuyama City, Ehime Pref., 8.V.1978, N. TAKAGI leg.; 1 ♂, Komenono, Matsuyama City, Ehime Pref., 1.VI.1978, M. TAKAKI leg.; 1 ♂, Gomyo, Matsuyama City, Ehime Pref., 21.VI.1978, SUWA leg.; 1 ♂, Gomyo, Matsuyama City, Ehime Pref., 21.VI.1978, Y. TAGAWA leg.; 1 ♂, Iwaya-shrine., Nagasaki City, Nagasaki Pref., 15. IX.1987, M. TSUNEOKA leg.; 1 ♂, Shogakuin, Sakyô-ward, Kyoto City, Kyoto Pref., 23.IV.2002, ST. HISAMATSU leg.; 1 ♂, Otani-pond, Iyo City, Ehime Pref., 8.V.2004, T. KITANO leg.; 1 ♂, Yamanouchi, Toon City, Ehime Pref., 18.VIII.2010, Y. FUKUDA leg.; 1 ♂, Miyanoura, Koseda, Kagoshima Pref., unknown date, K. ITO leg.

Distribution [ref. NAKANE (1963)]. Japan: Honshu, Shikoku, Kyushu, Tsushima Isls. and Yakushima Is.

Remarks. This species is most similar to *Cicindela* (*Sophiodela*) *okinawana* among the congeners in the general appearance (NAKANE, 1957). It also well shares the characteristics of the internal sac with *C*. (*S*.) *okinawana* (Fig. 3a–p) and *C*. (*S*.) *chinensis* (Fig. 5a–d), but can be easily distinguishable from them by the following characteristics: basal bladder projected right-latero-ventrally; medial tooth thick, curved orthogonally. With these differences, *C*. (*S*.) *japonica* should be an independent species as is referred by ASHIDA (2007).

Cicindela* (*Sophiodela*) *okinawana NAKANE, 1957

[Japanese name: Okinawa-Hanmyô]
(Figs. 1b, 3a–p)

Cicindela chinensis okinawana NAKANE, 1957: 235; ASHIDA, 2007: 6, 8.

Description (Fig. 3a–p). Internal sac in left-lateral view moderately constricted at base, arcuately curved toward the apex of ventro-apical bladder. Ventro-apical bladder in lateral view projected in rounded triangular shape; dominant part of dorsal area covered with numerous sclerosed spines. Dorso-apical bladder well developed, roundly swollen upward, slightly inclined latero-dorsally. Basal bladder well swollen in oblong oval shape, projected laterally, evenly with numerous small spines forming a wide oblong band along apical edge.

Flagellum long and thin, gently curved into "S" shape. Spring long and thick, laid along right dorsal margin of ventro-apical bladder. Medial tooth slightly thin, gently curved laterally at apical third.

Specimens examined. [Japan, Okinawa Pref.] 1 ♂, Mt. Manse-dake, Ishigaki City, Ishigaki-jima Is., 15.VI.1965, Y. HORI leg.; 1 ♂, Yona, Kunigami Village, Okinawa-jima Is., 17.VII.1965, Y. HORI leg.; 2 ♂♂, Yonaguni-jima Is., 19–20.IV.1974, T. KINOSHITA leg.; 1 ♂, Ohgimi Village, Taiho, Okinawa-jima Is., 30.III.1999, H. NAKANISHI leg.; 1 ♂, Kanakadan, Gushikawa City, Okinawa-jima Is., 1.VI.2000, N. OHBAYASHI leg.

Distribution [ref. and modified NAKANE (1963), SATÔ and TAKAGI (2006)]. Japan: Okinawa-jima Is., Ishigaki-jima Is. and Yonaguni-jima Is. (new record).

Remarks. This species shares the characteristics of the internal sac with *C*. (*S*.) *ch*. *chinensis* (Fig. 5a–d), but is differentiated from the latter by the following structures: basal, and dorso-apical bladders rather weakly developed; ventro-apical bladder roundly swollen; medial tooth smaller and relatively thick in apical half. It is also similar to *C*. (*S*.) *japonica* in the general appearances, but distinguishable

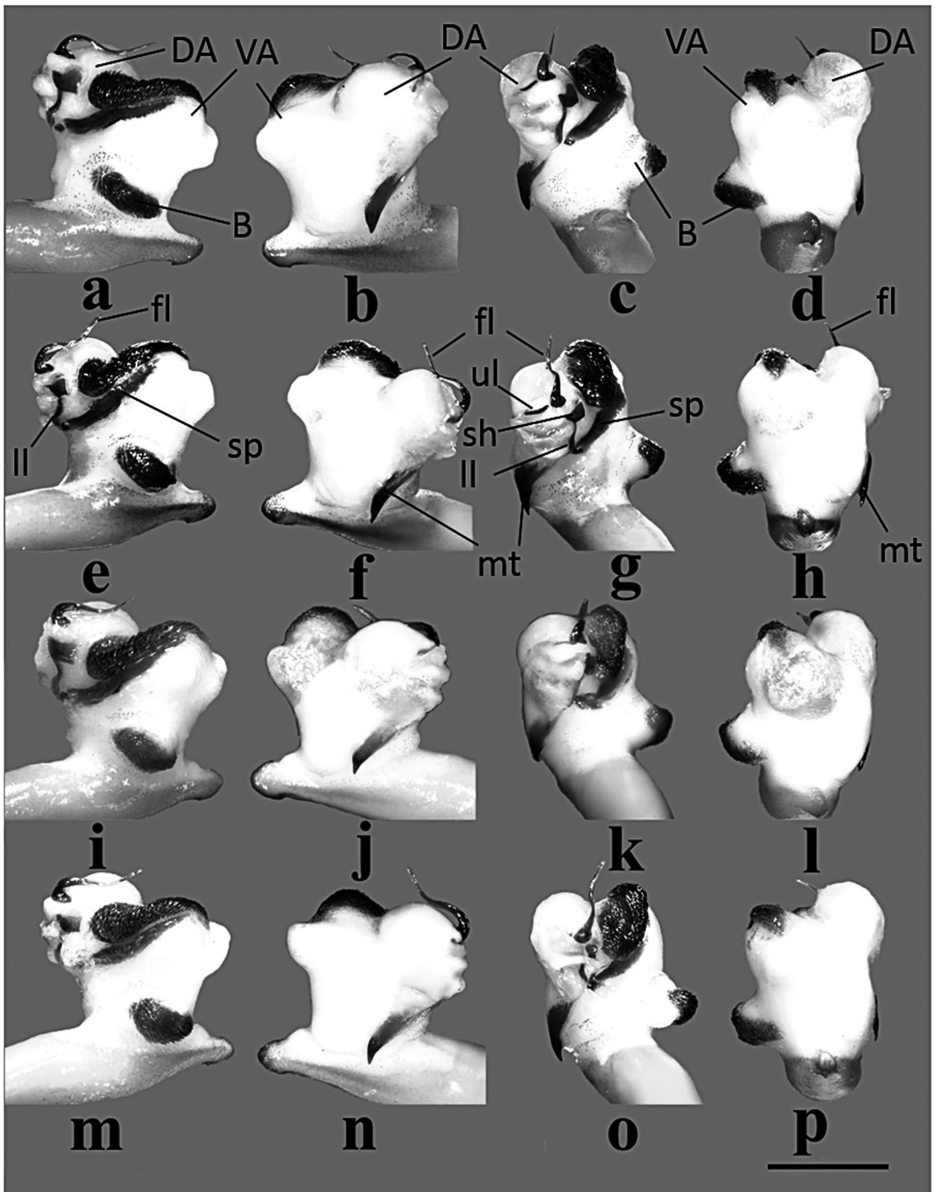

Fig. 3. Internal sacs of *Cicindela* (*Sophiodela*) *okinawana*. ——— a–h, Okinawa-jima Is.; i–l, Ishigaki-jima Is.; m–p, Yonaguni-jima Is. ——— a, e, i, m, Right-lateral view; b, f, j, n, left-lateral view; c, g, k, o, dorsal view; d, h, l, p, ventral view. Scale: 1.0 mm. For abbreviations, see Fig. 2.

from the latter by the general shape of the internal sac and the gently curved medial tooth. Therefore, *C*. (*S*.) *okinawana* should be an independent species by these differences as is suggested by ASHIDA (2007).

This species has been once recorded from Amami-Ôshima Is. by NAKANE (1963). Though the record is unlikely because no further specimens have been reported from the island so far except for NAKANE (1963). In addition, up until recently, *C*. (*S*.) *okinawana* had been considered to be endemic

in Okinawa-jima Is. (SATÔ & TAKAGI, 2006). Therefore, we omitted the record of this species from Amami-Ôshima Is. herein.

SATÔ and TAKAGI (2006) reported this species from Ishigaki-jima Is. based on the specimens collected in 2005 and suggested the possibility of artificial introducing from Okinawa-jima Is. to Ishigaki-jima Is. because of increased traffic in recent years. Though we found two specimens of which one was collected on Ishigaki-jima Is. in 1965 and the other was collected on Yonaguni-jima Is. in 1974. These collecting data are well before the introduced period estimated by SATÔ and TAKAGI (2006). There are no significant differences recognized in the structure of the internal sac among the populations from Okinawa-jima Is., Ishigaki-jima Is. and Yonaguni-jima Is., even though the islands are well separated geographically. Our result might suggests that this species migrated into those islands in relatively recent age and is not speciated in each islands as is suggested partly by SATÔ and TAKAGI (2006).

This is the first record of this species from Yonaguni-jima Is.

Cicindela* (*Sophiodela*) *ferriei FLEUTIAUX, 1895

[Japanese name: Amami-Hanmyô]

(Figs. 1c, 4a–h)

Cicindela ferriei FLEUTIAUX, 1895: cclxxxi.
Cicindela ferriei indigonacea MIWA, 1935: 15. *Syn. nov*.

Description (Fig. 4a–h). Internal sac in left-lateral view constricted at base, almost straight toward the apex of ventro-apical bladder. Ventro-apical bladder in lateral view well developed, projected above in triangular pyramid shape; almost part of dorsal area covered with numerous sclerosed spines. Dorso-apical bladder weakly developed, roundly swollen upward, slightly inclined larero-dorsally. Basal bladder well swollen in rotund oblong shape, projected laterally, evenly with numerous small spines forming a wide oblong band on apical half.

Flagellum distinctly short and thin, strongly curved in "S" shape. Spring long and thick, laid along right dorsal margin of ventro-apical bladder. Medial tooth well long and thick, slightly curved apically.

Specimens examined. [Japan, Kagoshima Pref.] 1 ♂, Shinmura, Amami-Ôshima Is., 20.VII.1954, S. HISAMATSU leg.; 1 ♂, same locality, 1.VIII.1959, A. URATA leg.; 1 ♂, Hatsuno, Amami-Ôshima Is., 8.VII.1962, N. OHBAYASHI leg.; 1 ♂, Nishi-agina, Tokunoshima Is., 25.VII.1963, M. SATÔ leg.; 2 ♂♂, Isen, Tokunoshima Is., 16.VII.1964, Y. HORI leg.; 1 ♂, Amagi Town, Tokunoshima Is., 19.VII.1964, K. HATTA leg.

Distribution [ref. NAKANE (1963), ENOKIDO (1996)]. Japan: Amami-Ôshima Is., Kakeroma-jima Is. and Tokunoshima Is.

Remarks. This species has been divided into two subspecies, *C. f. ferriei* (Amami-Ôshima Is. and Kakeroma-jima Is.) (Fig. 4a–d) and *C. f. indigonacea* (Tokunoshima Is.) (Fig. 4e–h) by mainly the body coloration (MIWA, 1935; ENOKIDO, 1996). However, there is no significant difference in the structure of internal sac between these subspecies. In addition, the body coloration of *C. f. indigonacea* has wide variety and sometimes shows no difference from *C. f. ferriei*. Therefore, we regard them as a single taxon without subspecies.

This species is clearly distinguished from the other Japanese species by the following characteristics: internal sac almost straight from base to apex; flagellum short; medial tooth slightly curved.

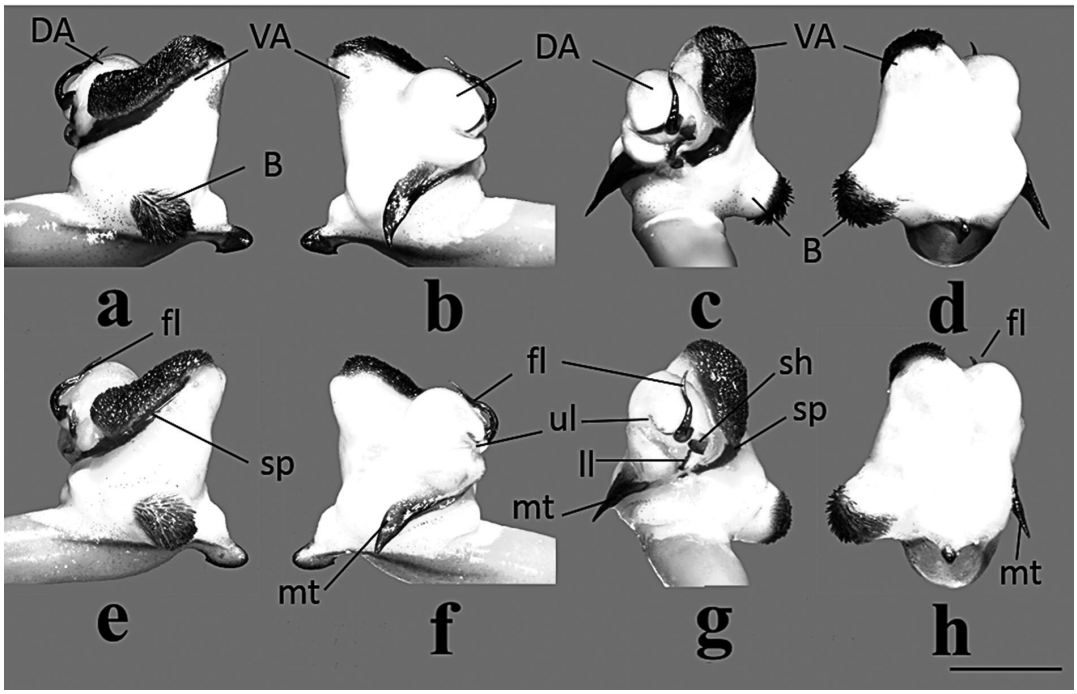

Fig. 4. Internal sacs of *Cicindela* (*Sophiodela*) *ferriei*. ——— a–d, Amami-Ôshima Is.; e–h, Tokunoshima Is. ——— a, e, Right-lateral view; b, f, left-lateral view; c, g, dorsal view; d, h, ventral view. Scale: 1.0 mm. For abbreviations, see Fig. 2.

Key to the Japanese Species of *Cicindela* (*Sophiodela*)

[modified Nakane (1973)]

1 Postmedian white markings of elytra always divided well into two circular spots (sometimes slightly oblong); metepisterna without scaly hairs. Lateral side of everted internal sac almost straight from base toward ventro-apical bladder. ····· *C.* (*S.*) *ferriei*

– Postmedian white markings of elytra usually connected with each other, but sometimes divided into two adjacent transverse striations; metepisterna with scaly hairs. Lateral side of everted internal sac arcuate from base toward ventro-apical bladder. ····· 2

2 Pronotum dully shining, with dense wrinkles; posterior margin of postmedian white markings of elytra parallel with basal margin; metepisterna with apical part provided with scaly and fine hairs; abdomen with a batch of scaly hairs on each side of ventrites I and II. Internal sac with basal bladder latero-ventrally projected; medial tooth orthogonally curved. ····· *C.* (*S.*) *japonica*

– Pronotum strongly shining, with coarse wrinkles; posterior margin of postmedian white markings of elytra oblique at middle, not parallel with basal margin; metepisterna provided with scaly and fine hairs, but scaly hairs rearranged into fine hairs in posterior half except for margin; abdomen with a batch of scaly hair only on sides of ventrite III. Internal sac with basal bladder laterally projected; medial tooth gently curved. ····· *C.* (*S.*) *okinawana*

Discussion

The Japanese species of *Cicindela* (*Sophiodela*) are revised on the basis of the characteristics of internal sac with inflation and eversion. They are considerable to be well congeneric because of essentially sharing the basic features of the internal sac. Our result also suggests that the structures of internal sac are useful for distinguishing taxon on the subgenus as well as already suggested the other cicindelid beetles (*e.g*. MATALIN. 1998, 1999; SASAKAWA, 2008).

Among the congeners, *C*. (*S*.) *japonica*, *C*. (*S*.) *okinawana* and *C*. (*S*.) *ch*. *chinensis* well share not only the structures of the internal sac but also the external features, and show a close relationship with each other. On the other hand, *C*. (*S*.) *ferreri* is unique in both structures among *Sophiodela*. Although its distribution, Amami Isls., is located between that of *C*. (*S*.) *japonica* and *C*. (*S*.) *okinawana*, *C*. (*S*.) *ferreri* seems to be a specialized and distinct species. The specialization on this species is probably related with the geological history of Amami Isls.

Moreover, our observation revealed that the internal sac of *Cicindela* (*Sophiodela*) is relatively similar to that of the genus *Cosmodela* than *Cicindela* (*Cicindela*) as mentioned above. In this point of view, *Sophiodela* is likely a distinctive group in the Asian cicindelid beetles and has possibility to have a closer relationship with *Cosmodela* than *Cicindela*. For the consideration of the systematic position of them, comprehensive studies based on abundant materials with the morphological characters including internal sac and DNA analyses are expected.

Acknowledgements

The first author would like to thank to Dr. Michio HORI (Professor Emeritus of Kyoto University) and Assoc. Prof. Hiroyuki YOSHITOMI (Ehime University Museum, Matsuyama City, Ehime) for providing valuable comments and guidance on this study. We express our gratitude to Dr. Liang TANG (Department of Biology, Shanghai Normal University, Shanghai), Mr. Hiroyuki MURAKAMI (Matsuyama City, Ehime), Mr. Kazuki SUGAYA (Bioindicator Co., Shinjuku, Tokyo), and Mr. Kengo IDEHARA (Hiroshima City, Hiroshima) for their kind help on sampling and offering us many materials of the tiger beetles.

要　　約

福田侑記・山迫淳介・小川　遼・酒井雅博：雄交尾器内袋の構造に基づく日本産ナミハンミョウ類（*Cicindela* 属 *Sophiodela* 亜属）（鞘翅目オサムシ科ハンミョウ亜科）の再検討．――― 反転した雄交尾器内袋の詳細な観察に基づいて，*Sophiodela* 亜属に含まれる日本産種の再検討を行った．その結果，これまで *C. chinensis* の亜種として扱われることの多かったナミハンミョウ *C*. (*S*.) *japonica* THUNBERG, 1781 に加え，*C*. (*S*.) *okinawana* NAKANE, 1957 もその内袋形状から独立性が指示された．一方で，アマミハンミョウ徳之島亜種 *C*. (*S*.) *ferriei indigonacea* は，外部形態および内袋構造に基亜種 *C*. (*S*.) *ferriei ferriei* と明確な差が認められないことから基亜種のシノニムとした．これらの結果から，日本産本亜属は，アマミハンミョウ *C*. (*S*.) *ferriei* FLEUTIAUX, 1895, ナミハンミョウ *C*. (*S*.) *japonica* THUNBERG, 1781, およびオキナワハンミョウ *C*. (*S*.) *okinawana* NAKANE, 1957 の 3 種に再構成されるべきとの結論を得た．さらに，本亜属の内袋構造は，同属の *Cicindela* 亜属よりも東南アジアに産する *Cosmodela* 属と共通点が多いことから，本亜属は日本産ハンミョウ類のなかでも独立した一群を形成し，*Cosmodela* 属と近縁である可能性が示唆された．また，比較に用いた *C*. (*S*.) *chinensis chinensis* を含む日本産全種の雄交尾器内袋の詳細な記載を行い，日本産 *Sophiodela* 亜属の内袋形質を加えた検索表を提示した．

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Appendix 1. Description for *Cicindela* (*Sophiodela*) *chinensis chinensis* De Geer, 1774.

Cicindela (*Sophiodela*) *chinensis chinensis* De Geer, 1774

(Fig. 5a–d)

Cicindela chinensis De Geer, 1774: 119.
Cicindela sinensis [sic]: Wood, 1874: 16 [incorrect spelling].

Description (Fig. 5a–d). Internal sac in left-lateral view weakly constricted at base, almost straight from ventral side toward the base of ventro-apical bladder. Ventro-apical bladder in lateral view relatively small, projected anteriorly in triangular pyramid shape; almost dorsal area covered with numerous sclerosed spines. Dorso-apical bladder well developed, roundly swollen upward, slightly inclined laterally. Basal bladder well swollen in oblong oval shape, projected laterally, evenly with numerous small spines forming a narrow oblong band on apical edge.

Flagellum long and thin, gently curved in "S" shape. Spring long and thick, laid along right dorsal margin of ventro-apical bladder. Medial tooth on later-dorsal side near base of internal sac, thick, gently curved laterad at apical third.

Specimens examined. [China] 1 ♂, Gunjiang, Anhui Prov., Alt. 320–380 m, 29.IV.2005, Hu & Tang leg.; 1 ♂, Mt. Tiantaishan, Tiantai City, Zhejiang Prov., 11–12.VII.2007, Shen & Xu leg.

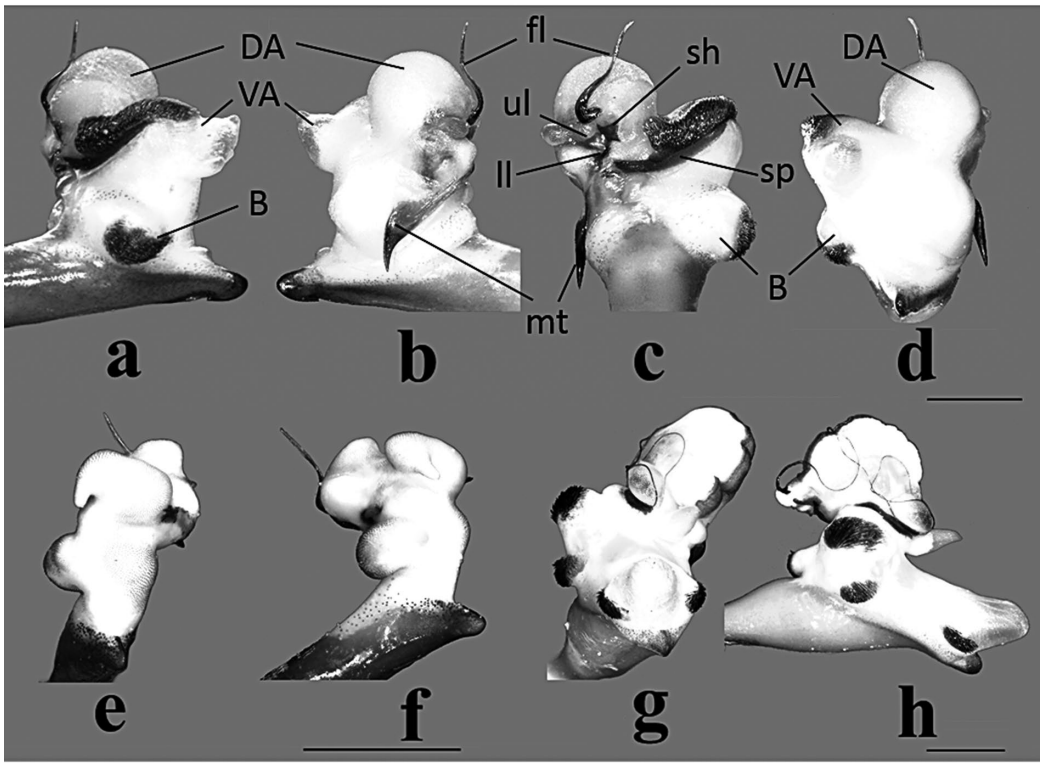

Fig. 5. Internal sacs of *Cicindela* (*Sophiodela*) *chinensis chinensis* (a–d), *Cicindela* (*Cicindela*) *transbaicalica japanensis* (e, f) and *Cosmodela batesi* (g, h). ——— a, f, h, Right-lateral view; b, left-lateral view; c, dorsal view; d, e, g, ventral view. Scales: 1.0 mm. For abbreviations, see Fig. 2.

Distribution [ref. Puchokov and Matalin (2003)]. China: Anhui, Fujian, Gansu, Guangdong, Guangxi, Hubei, Jiangsu, Jiangxi, Sichuan, Shaanxi, Yunnan and Zhejiang.

Remarks. *Cicindela* (*S*.) *chinensis* comprises two subspecies, *C*. *ch*. *chinensis* (China) and *C*. *ch*. *flammifera* Horn, 1921 (Korean Peninsula). We have no chance to observe any specimen of *C*. *ch*. *flammifera* in this study.

Appendix 2. The data of the examined specimens for *Cicindela* (*Cicindela*) *transbaicalica japanensis* Chaudoir, 1863 and *Cosmodela batesi* Fleutiaux, 1894.

Cicindela (*Cicindela*) *transbaicalica japanensis* Chaudoir, 1863

[Japanese name: Koniwa-Hanmyô]

(Fig. 5e–f)

Specimens examined. [Japan] 1 ♂, Matsuyama City, Ehime Pref., 29.IX.1950, H. Kusunoki leg.; 1 ♂, Muzuki Is., Ehime Pref., 14.X.1957, F. Takechi leg.; 1 ♂, the estuary region of Tenjin River, Tottori Pref., 8.X.2011, Y. Fukuda leg.

Cosmodela batesi Fleutiaux, 1894

(Fig. 5g–h)

Specimens examined. [Taiwan] 1 ♂, Wulai, Taipei Hsien, 14.VII.1969, Y. Hori leg.; 1 ♂, Dulan-shan (Mt.), Alt. ca. 600 m, Donghe Township, Taitung County, 5.VI.2013 (Light), H. Murakami leg.

Manuscript received 30 August 2015;
revised and accepted 19 October 2015.