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A New Species of the Genus *Lebia* (Coleoptera, Carabidae) from the Ryukyus, Southwestern Japan, with Notes on *Lebia formosana* Jedlička

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Abstract A new lebiine carabid species, *Lebia kurosai* Arai et Morita, sp. nov., is described from the Ryukyus, southwestern Japan. It is similar in general appearance to *L. formosana* Jedlička from Taiwan but differs from it mainly in the colouration of elytral intervals VIII and IX and the structures of the male genital organ. *Lebia formosana* Jedlička is briefly noted based on examination of type and other specimens.

Among Japanese carabid specialists, it has been well known that the undescribed lebiine carabid has been collected from several islands of the Ryukyus, southwestern Japan by many coleopterists. This carabid is almost identical in every external feature with *Lebia formosana*, described based on a single female by Jedlička (1946, p. 8), but seemed to be slightly different in the shape of the elytral patch. In order to identify the Japanese form, we compared a number of specimens from Japan and Taiwan directly with the type specimen of *L. formosana*.

Before presenting our results, we would like to acknowledge Dr. Kazuyoshi Kurosa, who passed away on January 18th of this year. When we were in the study carabid beetles, he had already studied them for many years and kindly watched over our work. Therefore, this paper is dedicated to his memory. We pray from the bottom of our hearts that his soul may rest in peace.

The abbreviations used herein are as follows: L — body length, measured from apical margin of clypeus to apices of elytra; HW — greatest width of head; PW — greatest width of pronotum; PL — length of pronotum, measured along the midline; PA — width of pronotal apex; PB — width of pronotal base; EW — greatest width of elytra; EL — greatest length of elytra; M — arithmetic mean; NMPC — National Museum, Praha, Czech Republic; NMNST — Department of Zoology, the National Museum of Nature and Science, Tsukuba.

The aedeagal inner sac was examined using a Leica MZ95 stereomicroscope. To examine male genitalia, specimens were macerated in cold water with a neutral detergent for about one day and then dissected under the microscope. Genitalia illustrations were drawn using a Leica drawing tube attached to the microscope.

The measurements used in the description are based on the holotype and paratypes (9 males and 10 females from Ishigaki Is.) of the new species, and the female type and other specimens (1 male and 3 females from Taiwan) of *L. formosana*.

Lebia* (*Poecilothais*) *kurosai Arai et Morita, sp. nov.

[Japanese name: Kurosa-jûji-atokiri-gomimushi]

(Figs.1, 2, 4 & 6 a)

Description. L: 5.63−6.56 mm. Body flat and medium-sized, with rather narrow elytra. Head and pronotum reddish brown; elytra yellowish brown; elytral patch blackish brown to black and as in Fig. 2; most of intervals VIII and IX blackish brown to black; apical parts of elytra yellowish brown

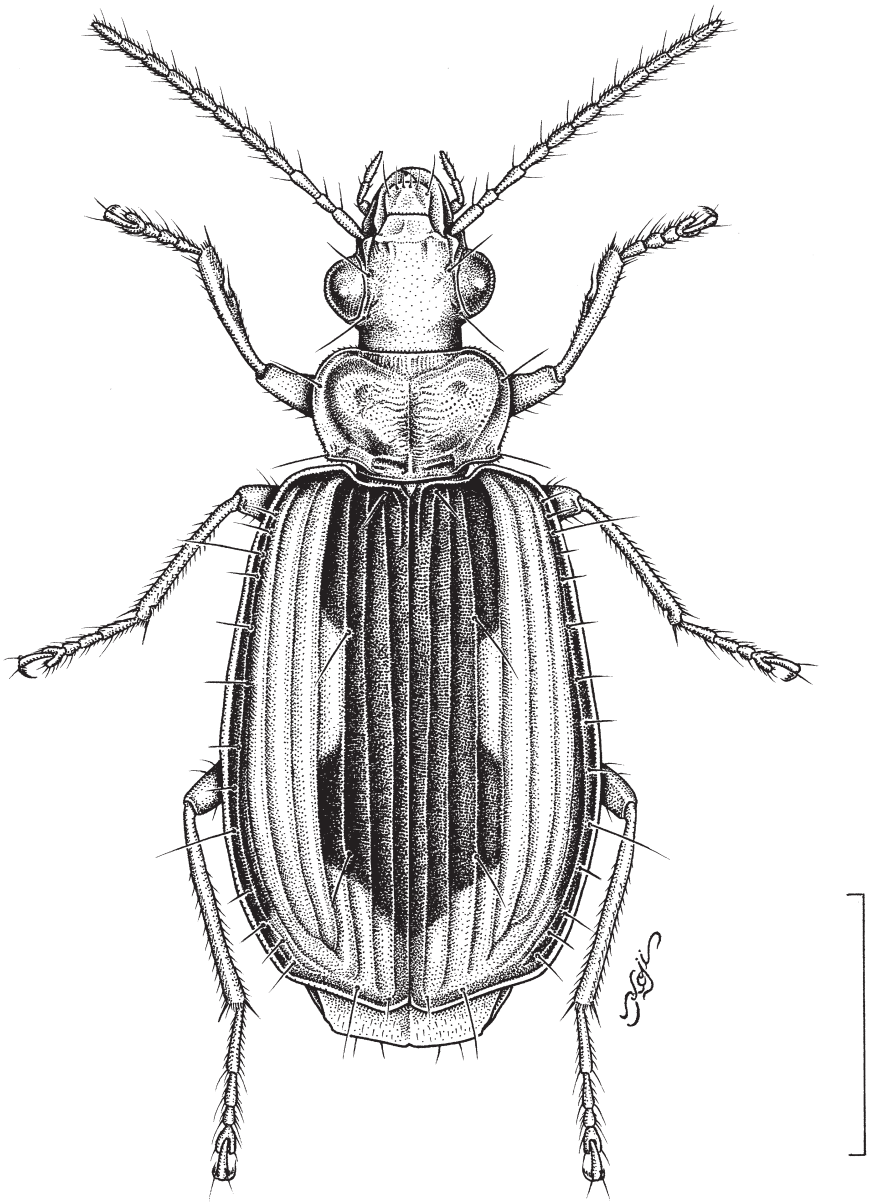
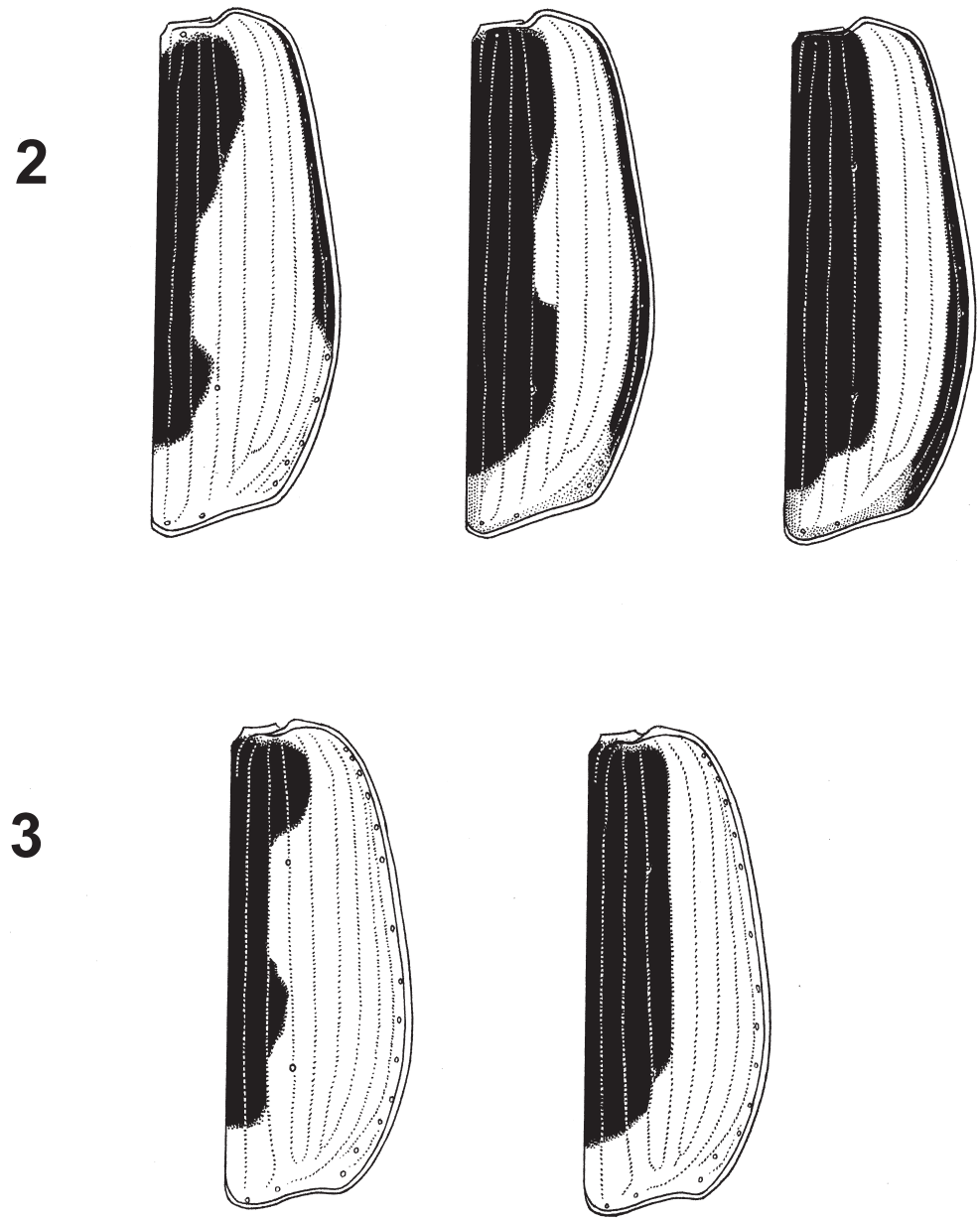


Fig. 1. Dorsal habitus of *Lebia* (*Poecilothais*) *kurosai* Arai et Morita, sp. nov., male from Yonehara, Ishigaki Is. Scale: 2.00 mm.

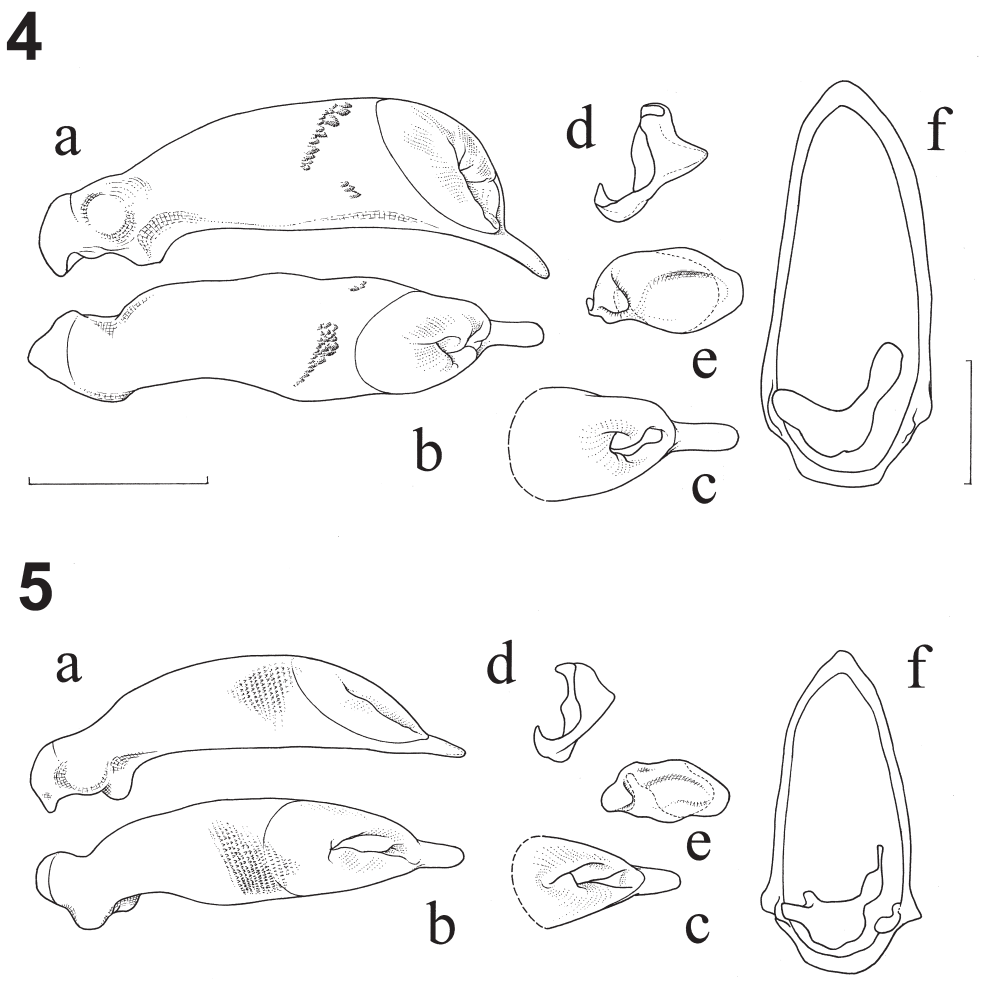
to brown; ventral side reddish brown; appendages reddish brown.

Head moderately wide and slightly convex; PW/HW 1.15−1.26 (M 1.20) in ♂, 1.15−1.26 (M 1.22) in ♀; clypeus impunctate; frontal furrows rather deep, and usually with several oblique wrinkles; anterior supraorbital pores situated at level of basal 7/10 of eyes; posterior supraorbital pores situated at a little before the post-eye level; genae very short; apex of labrum weakly arcuate; antennae rather short and reaching basal 1/5 of elytra; antennal segment I with a long seta and several very short hairs;



Figs. 2–3. Variation of elytral patch of *Lebia* (*Poecilothais*) spp. —— 2, *Lebia* (*Poecilothais*) *kurosai* ARAI et MORITA, sp. nov.; 3, *L.* (*P.*) *formosana* JEDLIČKA.

segment II with several very short hairs; segment III with several long setae; relative lengths of antennal segments as follows: —— I : II : III : IV : V : VI : XI ≒ 1.00 : 0.41−0.50 (M 0.46) : 0.70−0.88 (M 0.81) : 0.73−0.89 (M 0.83) : 0.63−0.81 (M 0.73) : 0.62−0.79 (M 0.70) : 0.88−1.09 (M 1.00) in ♂, ≒



Figs. 4–5. Male genital organ and genital segment of *Lebia* (*Poecilothais*) spp. —— 4, *Lebia* (*Poecilothais*) *kurosai* Arai et Morita, sp. nov., from Yonehara, Ishigaki Is.; 5, *L.* (*P.*) *formosana* Jedlička from Taipei City, Taiwan. —— a, Aedeagus, left lateral view; b, same, dorsal view; c, apical part of aedeagus, dorso-apical view; d, right paramere, left lateral view; e, left paramere, left lateral view; f, genital segment, ventral view. Scale: 0.50 mm.

1.00 : 0.39−0.53 (M 0.49) : 0.74−0.87 (M 0.81) : 0.72−090 (M 0.82) : 0.64−0.83 (M 0.73) : 0.62−0.77 (M 0.70) : 0.94−1.07 (M 0.98) in ♀; mentum without setae; dorsal surface sparsely provided with weak to moderate punctures; microsculpture very weakly impressed and composed of wide mesh on frons, but vanishing on vertex and neck.

Pronotum transverse, weakly convex and widest at about basal 3/5; PW/PL 1.52−1.71 (M 1.62) in ♂, 1.57−1.75 (M 1.64) in ♀; sides moderately arcuate in front, and then weakly sinuate before hind angles; apex almost straight and vaguely bordered at sides; base as wide as apex; apical angles widely

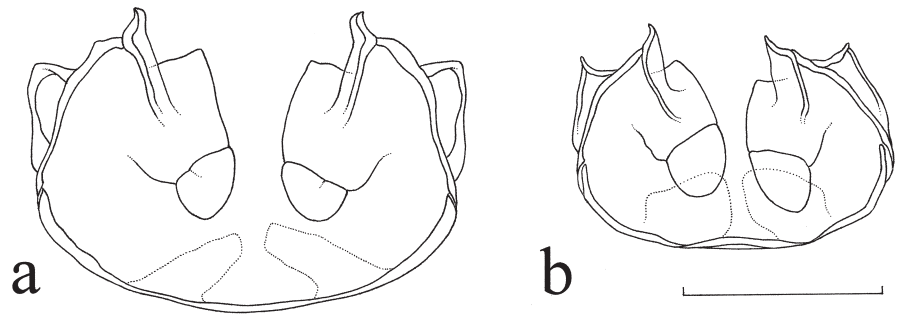


Fig. 6. Female genitalia of *Lebia* (*Poecilothais*) spp., ventral view. —— a, *Lebia* (*Poecilothais*) *kurosai* Arai et Morita, sp. nov., from Komi, Iriomote Is.; b, *L.* (*P.*) *formosana* Jedlička from "Baibara", Taiwan. Scale: 0.50 mm.

rounded; hind angles obtuse; lateral explanate areas smooth, moderately wide, becoming wider towards hind angles; median line deep and close to margins; anterior pair of marginal setae inserted at a little before the widest part; posterior pair of marginal setae a little before the tips of hind angles; PW/PA 1.55−1.73 (M 1.64) in ♂, 1.49−1.82 (M 1.63) in ♀; PW/PB 1.12−1.22 (M 1.15) in ♂, 1.12−1.18 (M 1.14) in ♀; PA/PB 0.65−0.74 (M 0.70) in ♂, 0.63−0.79 (M 0.71) in ♀; disc transversely and clearly rugose, and sparsely punctuate; microsculpture polygonally reticulate, very weakly impressed on basal area, and vanishing on disc.

Elytra rather wide, widest at basal 3/5; EW/PW 1.77−1.95 (M 1.84) in ♂, 1.78–2.01 (M 1.88) in ♀; shoulders widely rounded; sides very slightly arcuate towards the widest part, and moderately so behind; marginal grooves deeper; apical truncation oblique and weakly emarginate; EL/EW 1.33−1.45 (M 1.39) in ♂, 1.32−1.42 (M 1.37) in ♀; basal marginal groove deep throughout; striae rather deep, impunctate, and not reaching base; scutellar striole short and rather deep; basal pore situated on base of stria 1; intervals moderately convex and impunctate; dorsal pores present on interval III and adjoining stria 3; first pore situated at basal 1/4; second situated at basal 7/10; marginal series composed of 14 umbilicate pores; microsculpture polygonally reticulate and very clearly impressed.

Hind wings developed.

Ventral surface sparsely covered with minute hairs; sternite VII usually weakly arcuate between outer setae, rarely trapezoidal; microsculpture widely reticulate and very weakly impressed on sides of sternite VII, but vanished on other areas.

Legs slender; each tarsus with deeply bilobed segment IV.

Genital segment in ♂ elongate and a little longer than aedeagus.

Aedeagus almost straight or slightly curved at about basal 1/3 in dorsal view, and highest at apical 1/3 in lateral view; basal part moderately produced ventrad; when viewed laterally, apical lobe elongate, moderately bent ventrad, with simply rounded apex.

Inner sac armed with a patch of somewhat large sclerites situated at basal 3/5 of aedeagus.

Right paramere small, with elongate basal part; left paramere longer than right one, with almost truncate apex.

Apical styli in ♀ flat and semicircular.

Type series. Holotype: ♂ (NMNST), Yonehara, Ishigaki Is., Okinawa Prefecture, Japan, 8.

III.1995, K. Matsumoto leg. Paratypes: [Ishigaki Is.] 1 ♂, 1 ♀, Yoshihara, 6.IV.1992, T. Hanatani leg.; 2 ♂♂, 4 ♀♀, same locality, 30.IV.2002, H. Arimoto leg.; 1 ♀, Ogami-zaki, 25.IV.1992, S. Miyakawa leg.; 4 ♂♂, 5 ♀♀, Yonehara, 8.III.1995, K. Matsumoto leg. ; 1 ♂, same locality, 14.VI.1995, M. Kimura leg.; 1 ♀, Mt. Omoto-dake, 1.IV.1997, H. Yoshitake leg.; 1 ♂, 1 ♀, same locality, 18.III.2012, T. Nakata leg.; 2 ♀♀, same locality, 14.II.2015, T. Nakata leg.; 4 ♂♂, 2 ♀♀, same locality, 21.II.2015, T. Nakata leg.; 1 ♀, same locality, 13.II.2016, T. Nakata leg.; 1 ♀, Omoto-rindô, 7.IV.2007, H. Kurihara leg.; 1 ♂, Nakasuji, 10.III.1999, K. Kurihara leg.; 1 ♀, same locality, 14.V.2001, K. Kurihara leg.; 1 ♀, Takabe-Path, 25.III.1999, S. Tsuyuki leg.; 3 ♂♂, Mt. Nakasujimi-take, 8.V.1999, T. Mizusawa leg.; 1 ♂, Sakieda-rindô, 24.V.2001, Y. Obata leg.; 1 ♀, Mt. Yarabu-dake, 2.V.2003, M. Hirano leg.; 2 ♀♀, same locality, 26.V.2015, T. Nakata leg.; 2 ♀♀, Mt. Banna-dake, 6.VI.2012, K. Sakai leg.; 1 ♂, Yamabara, 31.I.2014, T. Nakata leg.; 1 ♀, Tamatori-zaki viewpoint, 27.V.2015, T. Nakata leg.; 1 ♂, Nosoko-rindô, 13.VI.2018, S. Uchida leg. [Iriomote Is.] 1 ♀, Sonai, 7.III.1976, S. Morita leg.; 1 ♂, same locality, 9.III.1976, S. Morita leg.; 1 ♂, same locality, 10.III.1976, S. Morita leg.; 2 ♀♀, Komi, 10. III. 1995, H. Satô leg.; 1 ♂, same locality, 21.VI.1998, T. Ishikawa leg.; 1 ♂, Ôtomi-rindô, 30 m alt., 28.III.2000, H. Watanabe leg. [Hateruma Is.] 1 ♀, Kipari, 25.V.1996, M. Sugimoto leg.; 1 ♂, 1 ♀, (no detailed locality), 21.IV.2012, J. Aoki leg.

Depository of type specimens. The holotype and some paratypes are deposited in the Department of Zoology, National Museum of Nature and Science, Tsukuba, and the remaining paratypes are in the author's collection.

Etymology. The specific name is given in memory of the late Dr. Kazuyoshi Kurosa.

Distribution. Japan (the Ryukyus: Ishigaki Is., Iriomote Is., and Hateruma Is.).

Notes. This new species is most closely allied with *Lebia* (*Poecilothais*) *formosana* Jedlička. It is, however, distinguished from the latter mainly by the following points: 1) body larger, 2) hind angles of pronotum obtuse, 3) elytral marginal grooves deeper, 4) elytral intervals VIII and IX blackish brown to black, 5) apical truncation of elytra more oblique, 6) aedeagus highest at apical 1/3 in lateral view, 7) apical lobe of aedeagus more elongate and moderately bent ventrad in lateral view, and 8) aedeagal inner sac armed with a patch of somewhat large sclerites.

Lebia* (*Poecilothais*) *formosana Jedlička, 1946

(Figs. 3, 5 & 6 b)

Lebia formosana Jedlička, 1946: 8.

Diagnosis. L: 5.08−6.07 mm (including the type specimen); head and pronotum reddish brown; elytral patch blackish brown and as in Fig. 3; hind angles of pronotum almost right angle, with obtusely rounded tips; basal marginal groove of elytra rather shallow; apical truncation of elytra weakly emarginate; aedeagus almost straight, and highest at about middle in lateral view; aedeagal inner sac armed with a patch of small sclerites.

Measurements. Body length and standard ratios of body parts are as follows: L: 5.08−6.07 mm; relative lengths of antennal segments as follows: —— I : II : III : IV : V : VI : XI ≒ 1.00 : 0.52 : 0.84 : 0.82 : 0.79 : 0.75 : 1.09 in ♂, ≒ 1.00 : 0.49−0.52 (M 0.50) : 0.80−0.84 (M 0.82) : 0.78−0.82 (M 0.80) : 0.76−0.79 (M 0.78) : 0.74−0.78 (M 0.76) : 1.09−1.10 (M 1.09) in ♀; PW/HW 1.26 in ♂, 1.19−1.23 (M 1.21) in ♀; PW/PL 1.43 in ♂, 1.40−1.47 (M 1.45) in ♀; PW/PA 2.12 in ♂, 1.96−2.02 (M 1.98) in ♀; PW/PB 1.14 in ♂, 1.06−1.11 (M 1.09) in ♀; PA/PB 0.54 in ♂, 0.54−0.56 (M 0.55) in ♀; EW/PW 2.00 in ♂, 1.87−1.97 (M 1.90) in ♀; EL/EW 1.40 in ♂, 1.40−1.47 (M 1.44) in ♀.

Specimens examined. 1 ♀ (holotype; NMPC), "Baibara VII. 1929. Coll. R. Takahashi" // "typus" // "Mus. Nat. Pragae Inv. 22740"// "*formosana* sp. n. DET. ING. Jedlička"; 1 ♀ (NMNST), "Formosa

T. KANO” // “バイバラ 2. IV. 1926” // “94” ; 1 ♀ (NMNST), “Formosa T.KANO” // “バイバラ　夜” // “T. KANO Collection”; 1 ♂, Nan-kan, Taipei City, Taiwan, 20.VI.2001, K. TERADA leg.; 1 ♀, Fenshuiling, Manzhou Township, Pingtung County, Taiwan, 27.III.2004, T. MITA leg.

Distribution. Taiwan.

Notes. Although this Taiwanese species was regarded as a member of the nominotypical subgenus by JEDLIČKA (1946), LORENZ (2005), and KABAK (2017), we placed it in the subgenus *Poecilothais* MAINDRON, 1905, based mainly on the following characteristics: 1) elytral striae deep; 2) elytral intervals impunctate and with microsculpture; 3) elytral basal marginal groove almost complete; and 4) segment IV of all tarsi deeply bilobed.

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We wish to express our deep gratitude to Dr. Svatopluk BÍLÝ and Dr. Ivo KOVÁR, the former curators of the National Museum, Praha, Czech Republic for the study of the type specimen of *Lebia formosana* under their care. Hearty thanks are due to Dr. Yoshiro KUROSA for his kind help. Our thanks are also due to Dr. Shûhei NOMURA of the National Museum of Nature and Science, Tsukuba for the study of specimens of *Lebia* under his care, Ms. Alyssa SUZUMURA of Hokkaido University Museum, Sapporo for reviewing the original draft of this paper. Finally, we acknowledge the following persons for kindly providing specimens: Drs. Junichi AOKI, Masachika HIRANO, Tadashi ISHIKAWA, Takashi KURIHARA, Toshiharu MITA, Katsuyuki TERADA and Hiraku YOSHITAKE, and Messrs. Hisayuki ARIMOTO, Noboru ITO, Masaaki KIMURA, Keiichi MATSUMOTO, Takashi MIZUSAWA, Tadafumi NAKATA, Kaoru SAKAI, Hiroki SATÔ, Shigeo TSUYUKI, Shûta UCHIDA and Hideyuki WATANABE.

要　　約

新井浩二・森田誠司：琉球列島産ジュウジアトキリゴミムシ属 *Lebia*（鞘翅目オサムシ科）の 1 新種，および *Lebia formosana* JEDLIČKA に関するノート．――――琉球列島産 *Lebia* 属の一種を新種と認め，クロサジュウジアトキリゴミムシ（新称）*Lebia* (*Poecilothais*) *kurosai* ARAI et MORITA, sp. nov. と命名記載した．この新種は台湾に分布する *L.* (*P.*) *formosana* JEDLIČKA に近縁であるが，おもに前胸背板の後角が鈍角であること，上翅の第 8・9 間室が黒色ないし黒褐色であること，雄交尾器の外形ならびに内部構造の差異により識別はやさしい．

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