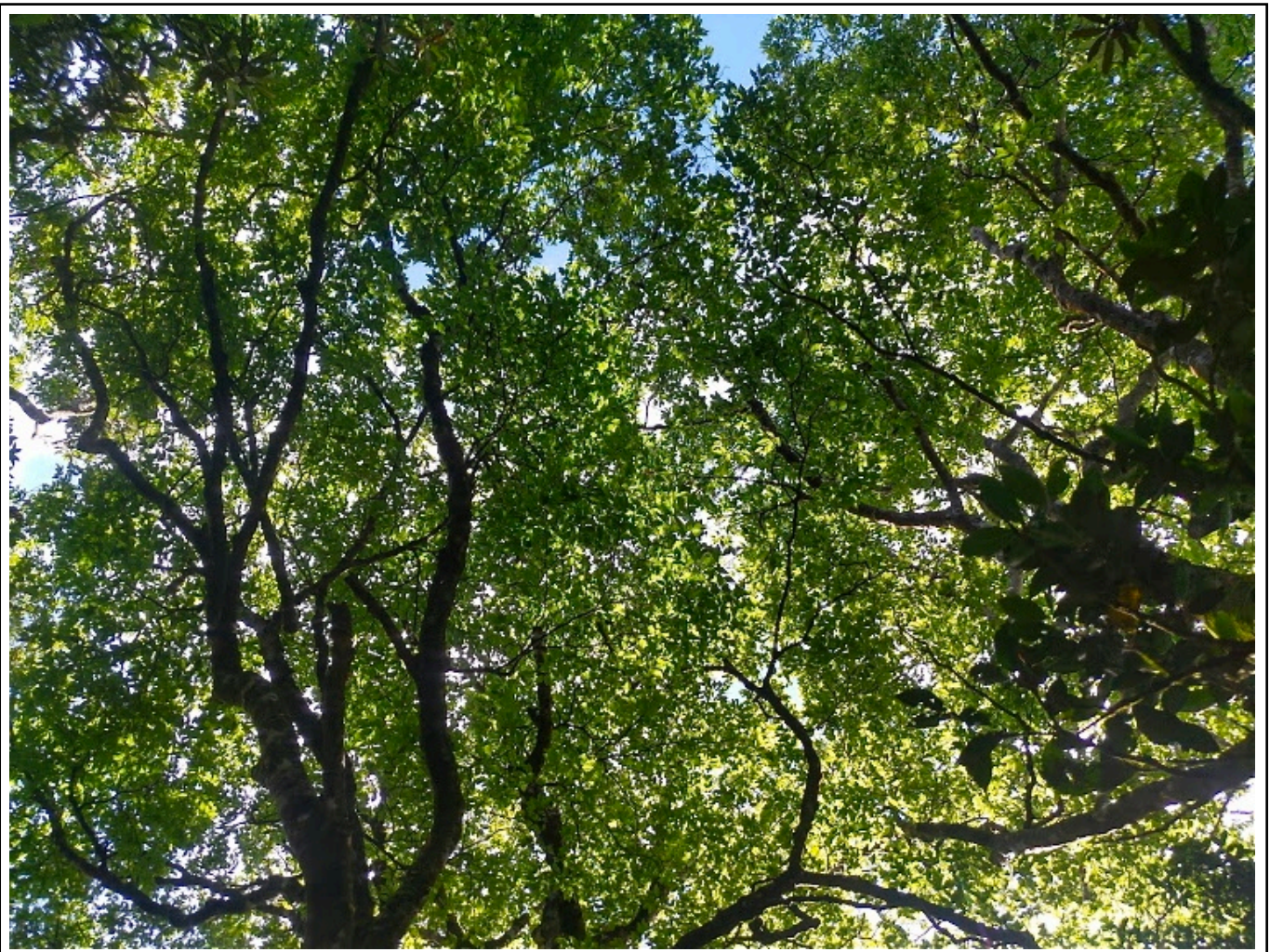


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Description of a new species of the genus *Neolucanus* Thomson, 1862 from Taiwan, with new localities record of *N. taiwanus* (Coleoptera, Lucanidae)

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Keywords:

Coleoptera; *atayal*;
Lucanidae; taxonomy;
Neolucanus; new species;
taiwanus; Taiwan.

Abstract. – A new species of the genus *Neolucanus* Thomson, 1862 is described from Taiwan, *Neolucanus atayal* **sp. nov.** This species is the smallest of all known species of the same genus in Taiwan. Pictured and compared with the related species. Important morphological characters of the new species are illustrated. The new species is related to *Neolucanus taiwanus* Mizunuma, 1994. On top of morphological differences there is also an ecological isolation (distinct habitat and elevation distribution).

Lin J.-Z. & Chou W.-I, 2021. – Description of a new species of the genus *Neolucanus* Thomson, 1862 from Taiwan, with new localities record of *N. taiwanus* (Coleoptera, Lucanidae). *Faunitaxys*, 9(7): 1 – 9.

ZooBank: <http://zoobank.org/7FDC20E8-D4BE-4F0F-9993-632631CB0BEB>

Introduction

The genus *Neolucanus* Thomson, 1862 is distributed in the Eastern Oriental region including Taiwan, China, Indochinese Peninsula, the islands of Japan, etc... Asian region, among them about 6 taxa of the genus are known from Taiwan so far including as listed (Schenk, 2014):

- *Neolucanus swinhoei* Bates, 1866;
- *Neolucanus maxinus vendli* Dudich, 1923;
- *Neolucanus zebra* Lacroix, 1988;
- *Neolucanus eugeniae* Bomans, 1991;
- *Neolucanus taiwanus* Mizunuma, 1994;
- *Neolucanus doro doro* Mizunuma, 1994.

Neolucanus taiwanus was originally described by Mizunuma (1994) on a small series of specimens coming from Juisui Township, Hualien County, Eastern Taiwan. Since then very few specimens were collected in that area. Recently, a good number of both male and female specimens of *N. taiwanus* were collected in different localities by the authors and take this opportunity to figure this rare material. The authors concluded that after comparing with holotype specimens figured in the original description. The specimens of this species from different localities seem to support their own geographical form, and believe the specific classification is meaningful and suitable.

In the present paper, a new species, *Neolucanus atayal* **sp. nov.**, is described and illustrated from northern Taiwan. In the present study, the author describes and illustrates a new species collected from Taoyuan and Hsinchu, Taiwan. Its diagnosis from congeneric species is provided with some selected but important morphological characters which are illustrated with color plates and explain both habitat diversity.

The type specimens are deposited in the following public and private collections:

- **ASIZHX**: Biodiversity Research Museum, Academia Sinica, Taiwan;
- **JZLT**: Private collection of Jing-Zhi Lin, Taipei, Taiwan;
- **WICT**: Private collection of Wen-I Chou, Taitung, Taiwan;

- **CHHT**: Private collection of Chia-Hung Hsu, Taipei, Taiwan;
- **FLYT**: Private collection of Fu-Lin Yang, Taipei, Taiwan;
- **TMSJHS**: Taipei Municipal Sanmin Junior High School, Taiwan;
- **KPM**: Kanagawa Prefectural Museum, Odawara, Japan.

Materials and methods

In total, 103 specimens were studied (all wild-collected) and compared with holotype of *Neolucanus taiwanus*. The specimens were examined through naked eye observation, or/and with a stereomicroscope. Specimens were relaxed and softened in hot water for 24 hours and then transferred to distilled water to clean. Dissection of male genitalia was made by extraction with forceps through an aperture between tergite VI and the propygidium. In order to examine the genitalia, the abdomen was detached and treated with a 10% solution of potassium hydroxide for 12 hours, then transferred to distilled water to flush the remaining KOH and stop any further bleaching. The parameters were then glued on a card and pinned below the specimens. Each specimen of the type series of the new species bears a red label: "*Neolucanus atayal* **sp. nov.**" / [Holotypus] Paratypus / Lin et Chou, det. 2021. The morphological terminology follows Fujita (2010) and Huang & Chen (2017).

Measurement criteria (mm) are as follows:

- **Body length**: length between the apex of mandible and the elytral apex along the midline;
- **Pronotal width**: widest part of pronotum;
- **Elytral width**: widest part of both elytra combined;
- **Elytral length**: length between the basal border and the apex of elytra along suture;
- **Head width**: widest part of head (including eyes);
- **Mandible length**: length from the apex of mandible to its base;
- **Pronotal length**: length of the pronotum along the midline;
- **Head length**: length between the anterior apex of the clypeus and the posterior margin of occiput along the midline.

Results

Genus *Neolucanus* Thomson, 1862

(Taiwanese vernacular name: 圓翅鍬形蟲屬)

Neolucanus atayal sp. nov.

(Taiwanese vernacular name: 泰雅圓翅鍬形蟲)

(Fig. 1)

ZooBank: <http://zoobank.org/6D7953E8-6051-489D-B39F-A0D7C2A3DC8D>

Holotype, ♂ (ASIZHX205083): Taiwan, Hsinchu County, Jianshi Township, [新竹縣尖石鄉], 1500 m, 22. VI. 2019, J.-Z. Lin leg.

Paratypes (22 ex.)(Fig. 3)

- 1 ♂ (ASIZHX205084): Taiwan, Taoyuan City, Fuxing District, 1420 m, 15. VI. 2006, C.-H. Hsu leg.
- 2 ♂♂ (ASIZHX205085-86): Taiwan, Hsinchu County, Jianshi Township, 1450 m, 29. VI. 2016, Y.-A. Hou leg.
- 1 ♂ (ASIZHX205087): Taiwan, Hsinchu County, Jianshi Township, 1450 m, 14. VI. 2016, T.-H. Hou leg.
- 1 ♂ (JZLT): Taiwan, Taiwan, Taoyuan City, Fuxing District, 1420 m, 15. VI. 2006, C.-H. Hsu leg.
- 1 ♂ (JZLT): Taiwan, Taoyuan City, Fuxing District, 1420 m, 22. VI. 2007, T.-H. Hou leg.
- 4 ♂♂ (JZLT): Taiwan, Taoyuan City, Fuxing District, 1400-1500 m, 21. VI. 2007, T.-H. Hou leg.
- 1 ♀ (JZLT): Taiwan, Hsinchu County, Jianshi Township, 1400 m, 23. VI. 2016, T.-H. Hou leg.
- 1 ♀ (JZLT): Taiwan, Hsinchu County, Jianshi Township, 1450 m, 14. VI. 2016, Y.-A. Hou leg.
- 1 ♂ (WICT): Taiwan, Taoyuan City, Fuxing District, 1700 m, 09. VII. 1996, C.-Y. Kao leg.
- 1 ♂ (WICT): Taiwan, Taoyuan City, Fuxing District, 1600 m, 16. VII. 1998, C.-C. Lu leg.
- 1 ♀ (WICT): Taiwan, Taoyuan City, Fuxing District, 1400 m, 22. VI. 1993, Wen-I Chou leg.
- 1 ♂ (CHHT): Taiwan, Taoyuan City, Fuxing District, 1400 m, 19. VI. 2004, C.-H. Hsu leg.
- 3 ♂♂ (TMSJHS): Taiwan, Taoyuan City, Fuxing District, 1400-1500 m, 21. VI. 2007, T.-H. Hou leg.
- 1 ♂ (TMSJHS): Taiwan, Hsinchu County, Jianshi Township, 1450 m, 14. VI. 2016, T.-H. Hou leg.
- 1 ♀ (TMSJHS): Taiwan, Hsinchu County, Jianshi Township, 1450 m, 29. VI. 2016, T.-H. Hou leg.
- 1 ♂ (FLYT): Taiwan, Hsinchu County, Jianshi Township, 1520 m, 22. VI. 2016, T.-H. Hou leg.

Description of the holotype (Fig. 1),

Dimensions (mm). – Size small for the genus.

- Total length: 22.3;
- Mandibles length: 2.1;
- Prothorax width: 8.9;
- Elytra length: 12.3;
- Elytra width: 9.6;
- Total length of the paratypes: 18.8 - 26.

Head. – Transverse (W/L: 1.23), matt, finely and irregularly granulose, trapezoidal, slightly concave. – *Mandibles* shorter than head, base more than 1/3 times wider than frontal margin of head, apical fork curved inward, with 5-6 small, irregular teeth at the inner margin, dorsal surface minutely punctured, widest at margins of eyes. Mandible short, not so reflexed: antero-lateral side of head obliquely, almost straightly lungate. – *Eyes* completely divided by the canthi. – *Canthi* relatively narrow, parallel-sided, angulated in front and obtusely round posterior. – *Epistom* convex, very small. – *Antennal clubs* formed by 3 lamellate antennae, each with well-formed lamella. – *Submentum* lack of pubescence and sparsely punctured.

Prothorax. – *Pronotum* transverse (W/L: 1.96), matt, finely and unevenly granulose, lateral margin slightly concave between anterior angle and lateral one, less shining at the central part and laterally. – *Shoulders* broadly rounded. – *Surface* very minutely punctured.

Elytra. – Oval elongated, narrower than prothorax. – *Lateral margins* convex, the median and posterior angles slightly angulated but not acute. – *Surface* very minutely and sparsely punctured, an longitudinal striae protrusion on both sides of the elytra.

Legs. – Slender, fairly shining, micro reticulate with large, shallow, unevenly set punctures. – *Front tibiae* narrow at base strongly expanded, forked at apex, with 4 (left) or 3 (right) spines on outer edge, mid tibiae with ones, all increasing in size from base to apex. – *Hind tibiae* with one very small and weakly protruding pre-apical spine.

Genitalia. – *Aedeagus* robust; basal piece slender (total length 4.68 mm) (Fig. 4-1), with long and slightly apically widened flagellum; the proximal part closed to paramere broad and the distal part blunt. – *Flagellum* 2.75 as long as parameres, paramere relatively short with almost straight outer margins; apex blunt rounded from the dorsal and ventral view, but slightly sharp from the lateral view, median lobe stout, shorter than paramera, distinctly asymmetric, broad, the left lobe slightly longer than the right one.

♀ **Paratype (allotype).**

- Total length: 23.5 mm;
- Prothorax width: 10.7 mm;
- Elytra length: 16.8 mm;
- Elytra width: 10.2 mm.

General form wider, matt black, antennae and palpi black, mandibles black with black base, elytra black. Colour and structure of the surface of the body the same as at the ♂, but head stronger punctured and the elytra less elongate. Anterior tibiae wider with 3 spines behind the apical fork.

Etymology. – The specific epithet is dedicated to in honour of the Taiwanese indigenous people – Atayal. Because the type locality of the new specimens, belong to the traditional area of the Atayal people.

Field observations. – Field observations of *Neolucanus atayal* sp. nov. in northern Taiwan, 1400 m, as shown in (Fig. 5).

Distribution. – Taiwan (endemism).

Remarks.

– The habitats of *N. atayal* sp. nov. and *N. taiwanus* are obviously different. The *N. atayal* sp. nov. is distributed in Machilus-Castanopsis forest zone bottom (1400-1700 m), while *N. taiwanus* is in the Ficus-Machilus zone open-ground and miscanthus (300-900 m) (Fig. 6).

– *N. atayal* sp. nov. also has diurnal behavior has not been observed to be attracted to light traps.

– In external features so far *N. atayal* sp. nov. has been found only in northern Taiwan, the distribution range is limited and the number is scarce.

– *N. atayal* sp. nov. is also the smallest of all known species of the same genus in Taiwan.

– So far, adults in the field observe not recorded feeding behavior.

Differential Diagnosis. – The colour, shape and structure of the body of *Neolucanus atayal* sp. nov. are similar to that of *Neolucanus taiwanus* Mizunuma, 1994.

N. atayal sp. nov. can be separated from *N. taiwanus* by the following external morphological characters:

- 1) Upper surface of elytra more or less shining, and pronotal disc also provided with similar luster,
- 2) Spines at the end of the hind tibiae longer in most specimens,
- 3) Metasternal processes obviously narrower than *N. taiwanus*,

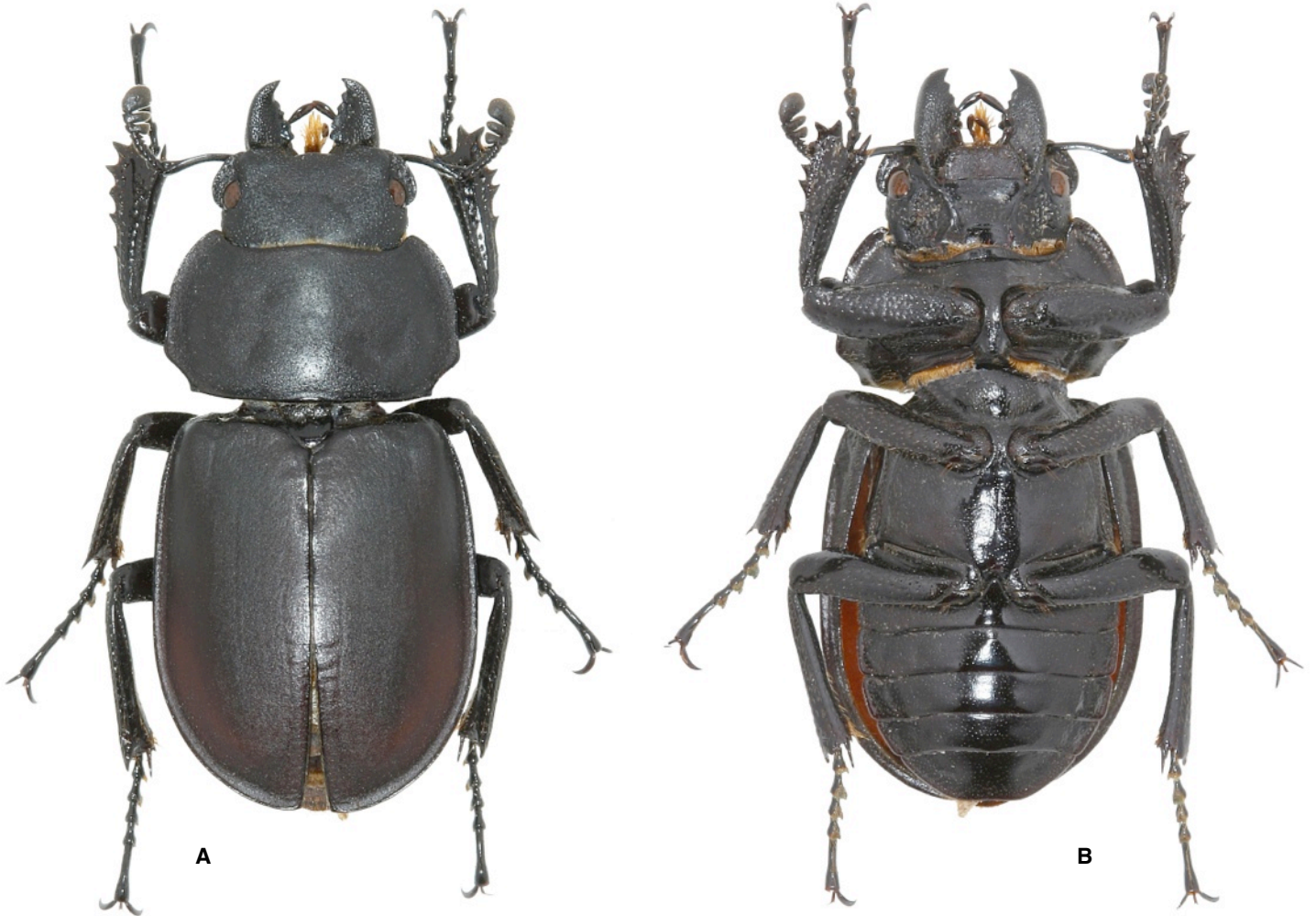


Fig. 1. Habitus of *Neolucanus atayal* sp. nov., holotype (22.3 mm), dorsal (A) and ventral (B) view.



Fig. 2. Comparison of male *N. atayal* sp. nov. & *N. taiwanus* Mizunuma, 1994 at the same scale with some parts enlarged (red arrows directed to important characters).

A-B) *N. atayal* sp. nov.: A) Metasternal process; B) Ditto lateral view.

C-D) *N. taiwanus*: C) Metasternal process; D) Ditto lateral view.

- 4) Body smaller more elongated, elytra more narrower of both sexes,
- 5) Prothorax narrower, not prominent as at *N. taiwanus*,
- 6) Mandibles more shorter and regularly rounded, less strong punctured, upper lateral margins round not sharp and the upper margins without small tooth,
- 7) Protibia more wider and Hind tarsus shorter than *N. taiwanus*,
- 8) Scutellum flat and small,
- 9) Genitalia gaudal ventral plate of basal piece wider,
- 10) Elytra clearly flat when viewed from the side.
- 11) The female elytra of this new species swells only in the middle and back segments, while the one of *N. taiwanus* swells obviously at the front end.
- 12) There are also obvious markings on the front and back of the female of the new species, which is also not available in *N. taiwanus*.
- 13) From the shape of the posterior part of the pronotum, the cut corners of the posterior edge of this pronotum are very sharp, while *N. taiwanus* is relatively smooth.

New localities record of *N. taiwanus* Mizunuma, 1994

(Taiwanese vernacular name: 台灣圓翅鍬形蟲)

Material examined

Holotype, ♂ (in KPM), labeled: Juisui, Hualien County, Taiwan 10-20 VI. 1973, T. Mizunuma leg. (Fig. 3B17).

New record data:

- 7 ♂♂ & 2 ♀♀, Pinglin Township, 597 m, New Taipei City, Taiwan, 4-VI-2020, J.-Z. Lin leg.
- 1 ♂, Pinglin Township, 355 m, New Taipei City, Taiwan, 16-VIII-1984, Wen-I Chou leg.
- 2 ♂, Xindian City, 325 m, New Taipei City, Taiwan, 14-VI-2019, J.-Z. Lin leg.
- 1 ♂, Wulai Township, 450 m, New Taipei City, Taiwan, 10-VI-2014, J.-Z. Lin leg.
- 1 ♂, Sanxia Township, New Taipei City, Taiwan, 875 m, 12-VI-2012, J.-Z. Lin leg.
- 1 ♂, mt. Dongyan, 525 m, Fuxing Township, Taoyuan City, Taiwan, 11-VI-2015, J.-Z. Lin leg.
- 12 ♂♂, Toucheng Township, 397 m, Yilan County, Taiwan, 4-15. VI-2018, J.-Z. Lin leg.
- 1 ♂ & 1 ♀, Toucheng Township, 700-900 m, 27-VI-1996, Wen-I Chou leg.
- 2 ♂♂ & 1 ♀, Toucheng Township, 700-900 m, 08-VI-2005, Wen-I Chou leg.
- 13 ♂♂ & 1 ♀, Jiaoxi Township, 397 m, Yilan County, Taiwan, 11-VI-2018, J.-Z. Lin leg.
- 1 ♀, Jiaoxi Township, 397 m, Yilan County, Taiwan, 18-VI-2006, 400 m, Wen-I Chou leg.
- 4 ♂♂, Jiaoxi, 397 m, Yilan County, Taiwan, 23-VI-2007, 400 m, Wen-I Chou leg.
- 1 ♂, Juisui, Hualien County, Taiwan, 13-VI-2013, Wen-I Chou leg.

Résumé

Lin J.-Z. & Chou W.-I, 2021. – Description d'une nouvelle espèce du genre *Neolucanus* Thomson, 1862 de Taiwan, avec la présentation de localités nouvelles de *N. taiwanus* (Coleoptera, Lucanidae). *Faunitaxys*, 9(7): 1–9.

Une nouvelle espèce du genre *Neolucanus* Thomson, 1862 est décrite de Taiwan, *Neolucanus atayal* sp. nov. C'est le plus petit *Neolucanus* connu de Taiwan. La nouvelle espèce est décrite et comparée aux espèces les plus proches. Les caractères morphologiques principaux sont illustrés. La nouvelle espèce est apparentée à *Neolucanus taiwanus* Mizunuma, 1994. En plus des différences morphologiques, l'habitat et la répartition en altitude sont différents, traduisant un isolement géographique des deux espèces.

Mots clés. – Coleoptera, Lucanidae, *Neolucanus*, *taiwanus*, *atayal*, taxonomie, nouvelle espèce, Taiwan.

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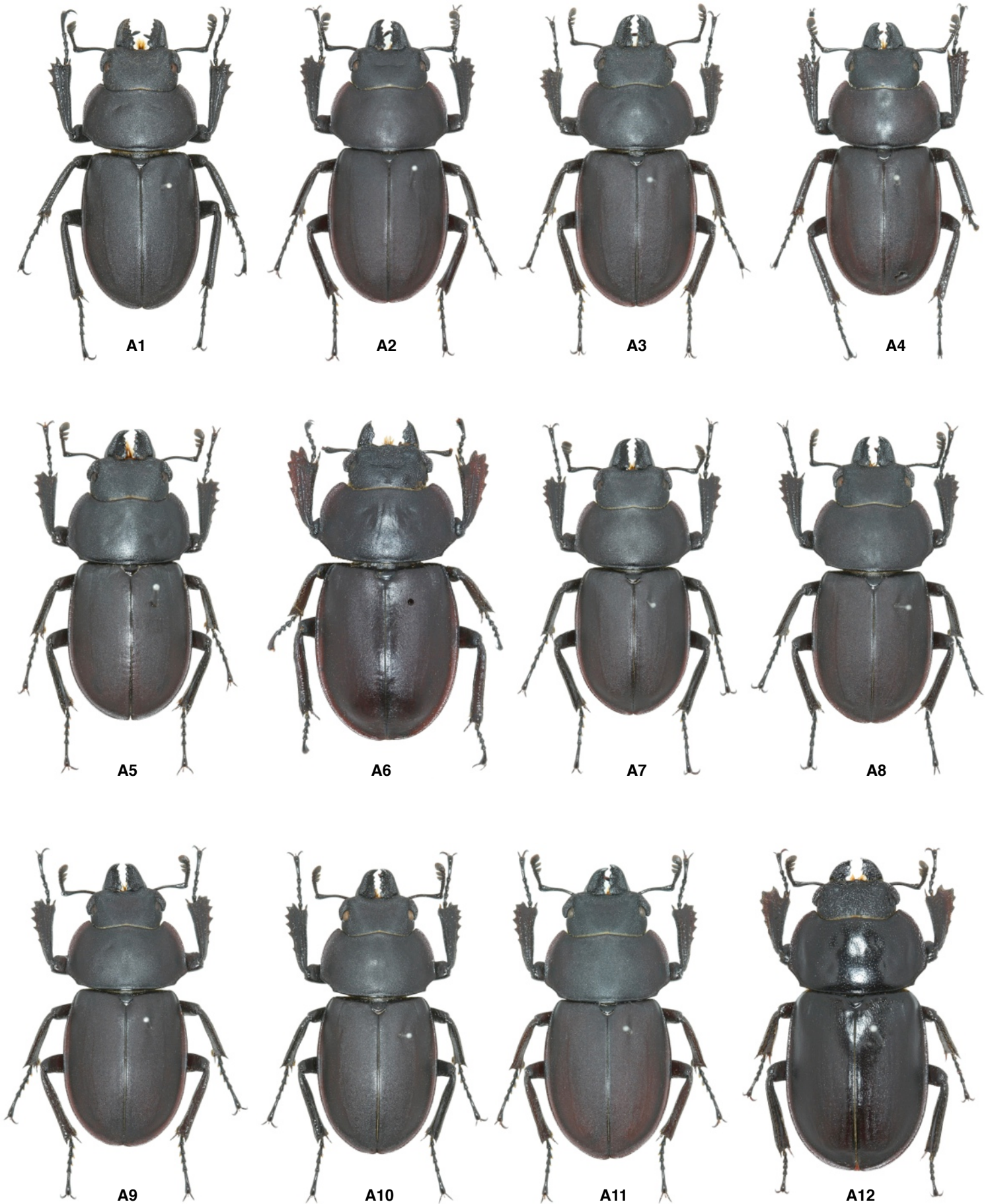


Fig. 3A. *N. atayal* sp. nov., paratypes (A1-12).

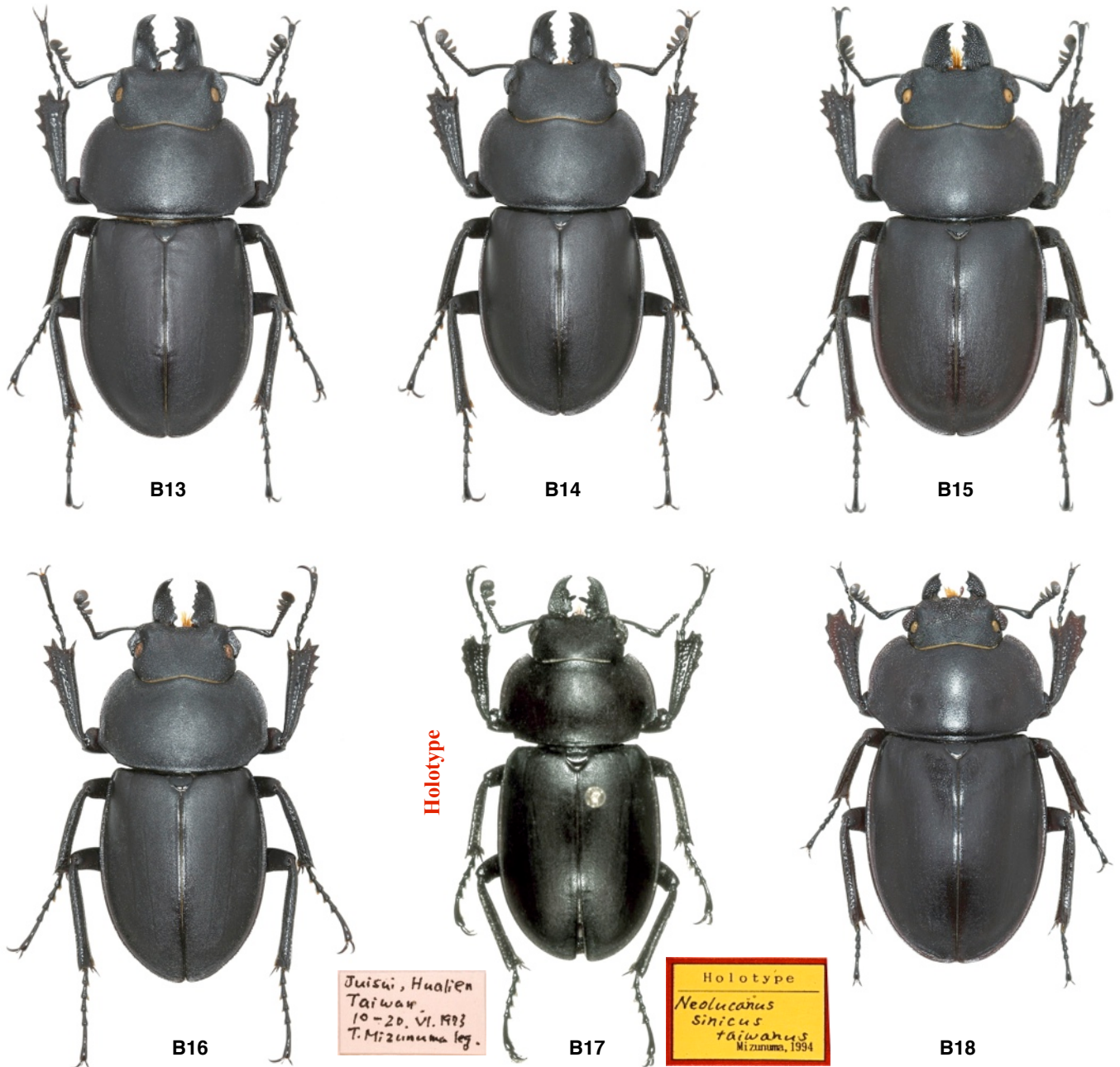


Fig. 3B. *N. taiwanus* Mizunuma, 1994, dorsal view (B13-18).

| | <i>N. atayal</i> sp. nov. | <i>N. taiwanus</i> |
|--|--|--|
| Body size of both sexes | small [18-26] mm | large [20-33] mm |
| Anterior tibiae and Hind tarsus (both sexes) | more wider / shorter | less wider / longer |
| Base pronotum - elytral humeru width | narrower | wider |
| Habitat | Machilus - Castanopsis forest zone bottom 1400 - 1700 m | Ficus - Machilus zone open - ground 300 - 900 m |

Table 1. - Differences between *N. atayal* sp. nov. and *N. taiwanus* Mizunuma, 1994.

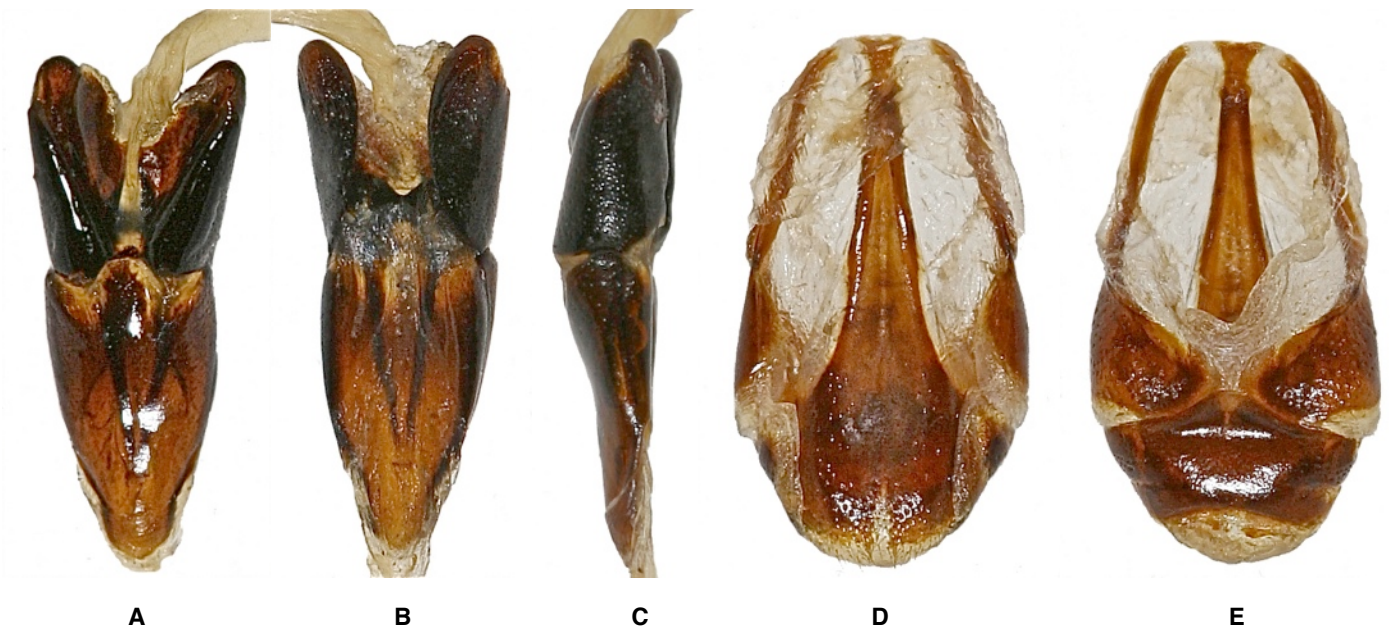


Fig. 4-1. *N. atayal* sp. nov., holotype.
A-C) Male genitalia: A) Ventral; B) Dorsal; C) Lateral. D-E) Abdominal segment IX: D) Ventral; E) Dorsal.

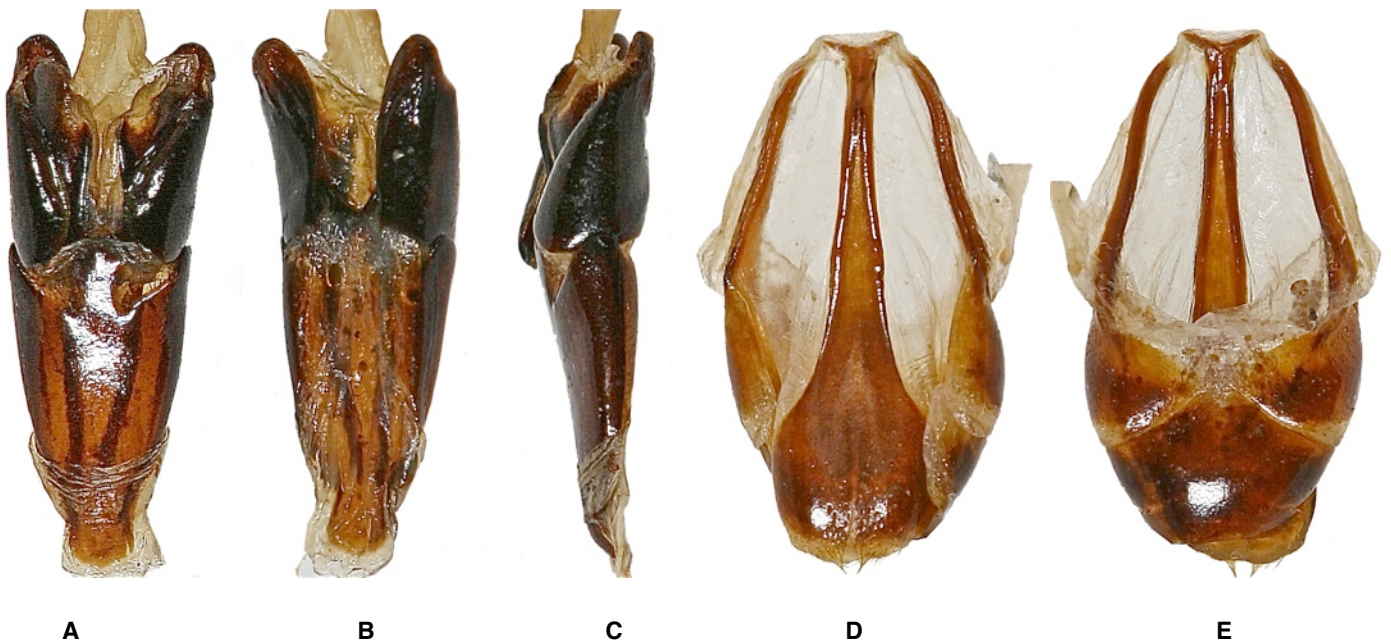


Fig. 4-2. *N. taiwanus* Mizunuma, 1994.
A-C) Male genitalia: A) Ventral; B) Dorsal; C) Lateral. D-E) Abdominal segment IX: D) Ventral; E) Dorsal.



Fig. 5. A-C) Field observations of the diurnal behavior of *N. atayal* sp. nov., ♂.



Fig. 6. Habitat. **A)** *N. atayal* **sp. nov.**, typical Machilus-Castanopsis zone, 1400 m; **B)** *N. taiwanus* Mizunuma, 1994, Ficus-Machilus zone open-ground, 400 m.

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SOMMAIRE

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CONTENTS

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Illustration de la couverture : The *Fagus hayatae* Palib, 1911, endemic and endangered plant in Taiwan, its the southernmost limit of beech growth in the world.

Crédits photos:

Fig. 1-6 & couverture : © Jing-Zhi Lin