

Research article

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Lectotype designation and the southernmost collection record of the ground beetle *Pterostichus macrogenys* Bates, 1883 (Coleoptera: Carabidae)

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Abstract

This study clarifies taxonomic problems in *Pterostichus macrogenys* Bates, 1883, a Japanese endemic flightless carabid beetle. Specifically, to address the lack of examination of the male genitalia of the type specimens and a potential risk regarding nomenclatural stability, the syntype male is designated as the lectotype and its genitalia (including the sufficiently inflated endophallus) are examined. The results confirm that the species previously treated as *P. macrogenys* is indeed *P. macrogenys*. Additionally, a male specimen from Mt. Amagisan on the Izu Peninsula is reported as the southernmost collection record of this species.

Key words: endophallus, genitalia, *Nialoe*, syntype, taxonomy.

<http://zoobank.org/urn:lsid:zoobank.org:pub:E57EA057-D694-4376-A706-885AA627629D>

Introduction

Pterostichus macrogenys Bates, 1883 and its allied species are a group of flightless carabid beetles endemic to Honshû, Japan. These species closely resemble one another externally, and their species-level taxonomy was not well understood until the early 2000s (e.g., Nakane 1963; Tanaka 1985; Kasahara 1988). Since then, studies that have focused on the morphology of the endophallus (a membranous sac everted from the aedeagus of males) have shown that what was previously classified as *P. macrogenys* is in fact a complex of multiple distinct species with two to three species often found together sympatrically (e.g., Sasakawa 2005a, 2009; Sasakawa et al. 2020). Currently, this group is recognized as including 43 species-group taxa (42 species and 1 subspecies) (Sasakawa & Mitsuduka 2023).

However, taxonomic challenges persist for certain species, including *P. macrogenys*. This species was originally described based on syntypes that included one male and one female from Mt. Nyohôsan in the Nikkô Mountains (Bates 1883). The original description primarily covered superficial external morphology and did not examine the male genitalia, a key taxonomic feature in this group. Fur-

thermore, there is a concern regarding nomenclatural stability, especially because the discovery of multiple sympatric species continues across various regions (Ito & Ogai 2015; Sasakawa et al. 2020; Sekine & Nakase 2022; Sasakawa & Mitsuduka 2023), raising the possibility that the male and female syntypes may represent different species.

To resolve these issues, in this work the male syntype was designated the lectotype and its genital morphology, including the endophallus, was examined. Additionally, a new southernmost collection record for this species is reported, identified during type examinations of *P. macrogenys*.

Materials and methods

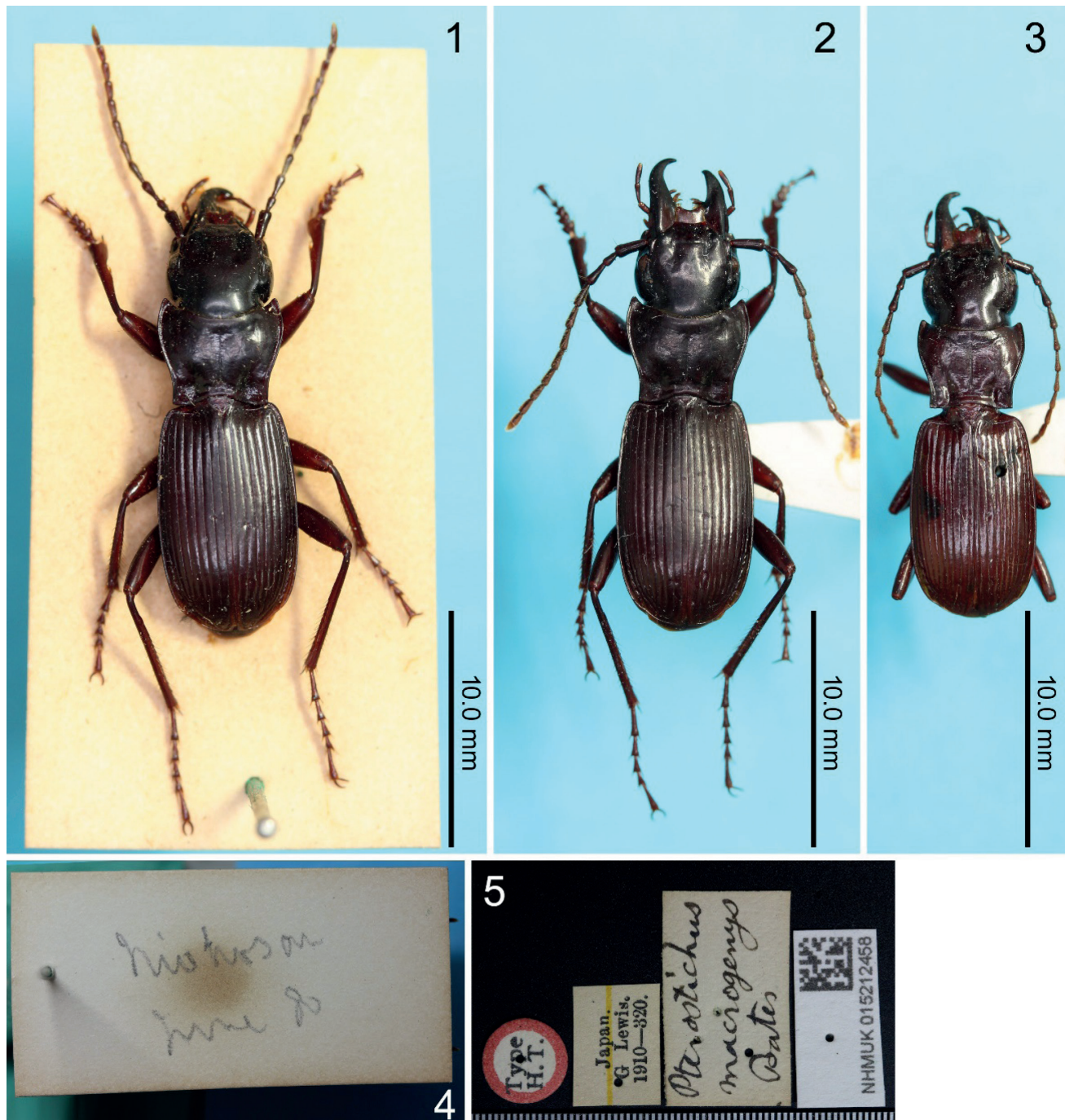
The examined materials are housed at the Natural History Museum, London, U.K. (NHMUK). The endophallus was everted by injecting toothpaste at the basal end of the aedeagus. In the label data, a backslash (\) was used to separate lines on the same label, and a double backslash (\\) was used to separate different labels. Asterisks (*) denote characters that could not be read. Terminology of endophallus structures followed Sasakawa & Mitsuduka (2023).

Taxonomy

Pterostichus (Nialoe) macrogenys Bates, 1883

Pterostichus macrogenys Bates, 1883: 245 (original description; type locality: “Niohozan” [Mt. Nyohôsan, the Nikkô Mountains]; subgenus not specified); Jedlička 1962: 281 (subgenus *Lianoe*); Nakane 1963: 34 (part;

subgenus not specified); Habu 1977: 14 (part; subgenus *Paranialoe*); Tanaka 1985: 114 (part; subgenus not specified); Kasahara 1988: 55 (part; subgenus not specified); Bousquet 2003: 498 (subgenus *Lianoe*); Sasakawa 2005a: 76 (subgenus *Nialoe* s.l.); Sasakawa 2005b: 1209 (subgenus *Nialoe* s.l.); Sasakawa 2009: 263 (subgenus *Nialoe* s.l.); Bousquet 2017: 725 (subgenus *Nialoe*); Sasakawa et al. 2020: 3 (subgenus *Nialoe* s.l.); Sasakawa 2021: 210



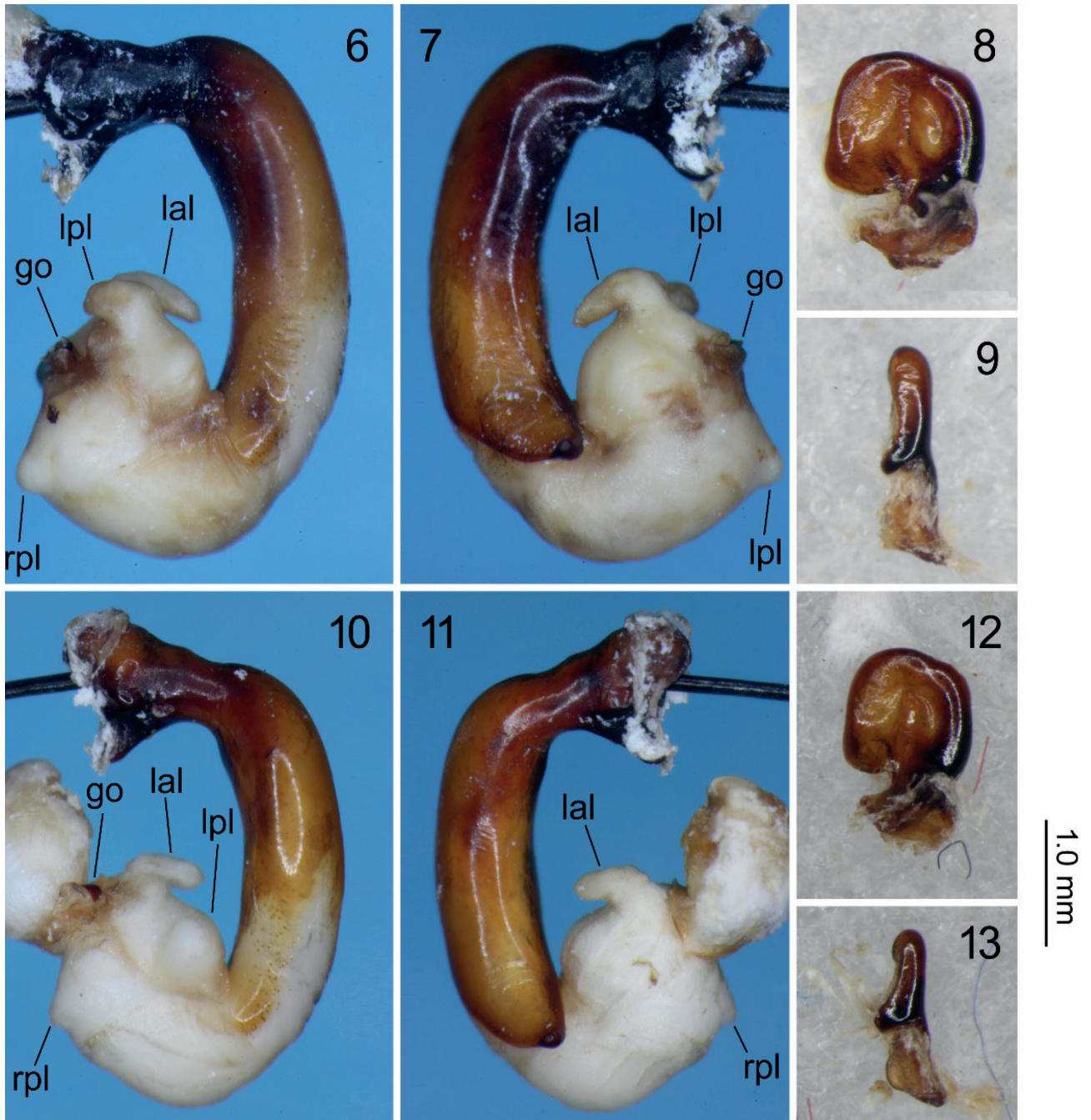
Figs 1–5 – Habitus (dorsal view) of *Pterostichus macrogenys* (1, the lectotype male prior to re-examination; 2, Ditto after dissection and re-mounting; 3, a male from Mt. Amagisan after dissection and re-mounting), the back side of the mounted card (4), and the labels (5) of the *P. macrogenys* lectotype.

(subgenus *Nialoe* s.l. or unnamed subgenus); Sasakawa & Mitsuduka 2023: 294 (subgenus *Nialoe* s.l.).

Materials examined. *Pterostichus macrogenys* lectotype ♂ (NHMUK), by present designation, “niohosan \ **** * [back side of mount card] \ Type \ H.T. \ Japan. \ G Lewis. \ 1910–320. \ Pterostichus \ macrogenys \ Bates \ [QR Code] \ NHMUK 015212458” (Figs 1, 2, 4–9); 1♂ (NHMUK

“amagi 1041 m \ Shizuoka-ken \ IV-10 1937 \ Coll. Y. Yano \ No. 479 \ YOSHIO YANO \ COLLECTION \ [a yellow-green paper piece with no letters] \ Feronia \ macrogenys \ Bates \ Compared with \ type H.E.A.” (Figs 3, 10–13).

Remarks. The structure of the endophallus of the lectotype (Figs 6, 7) is identical to that of the species considered *P. macrogenys* (Sasakawa 2005a, fig. 12; Sasakawa 2005b,



Figs 6–13 – Endophallus in left lateral (6, 10) and right lateral (7, 11) views, left paramere in left lateral view (8, 12), and right paramere in left lateral view (9, 13) of the lectotype male (6–9) and a male from Mt. Amagisan (10–13) of *Pterostichus macrogenys*. Abbreviations: go, gonopore; lal, left apical lobe; lpl, left preapical lobe; rpl, right preapical lobe.

fig. 3F; Sasakawa & Itô 2018, figs 2–5). Therefore, the species previously treated as *P. macrogenys* is confirmed to be the true *P. macrogenys*, justifying previous studies based on the assumption that species with this shape of endophallus are *P. macrogenys*. Measurements of external body parts of the lectotype are as follows: body length from the mandible apices to elytral end 20.07 mm; body length from anterior margin of labrum to elytral end 17.89 mm; body length from clypeal apex to elytral end 17.21 mm; head length from clypeal apex to neck base 4.08 mm; head width at widest part 4.52 mm; pronotum length along median line 3.26 mm; pronotum width at widest part 5.19 mm; pronotal anterior margin width 4.55 mm; pronotal posterior margin width 3.95 mm; elytral length from shoulder tip to apices 9.14 mm; elytral width at widest part 5.76 mm.

The other specimen was collected from Mt. Amagisan, the Izu Peninsula, and although the apex of the left preapical lobe could not be everted, the other structures of the endophallus (especially the basal part of the left preapical lobe; Sasakawa & Mitsuduka 2023) and the shape of the aedeagus were identical to those of the lectotype and other specimens of *P. macrogenys*, identifying it as *P. macrogenys*. The previous southernmost record of *P. macrogenys*, based on appropriately identified specimens (i.e., identified by the endophallus), was Mt. Fujisan (Sasakawa 2005a; Sasakawa & Mitsuduka 2023), located north of Mt. Amagisan, making the current record the new southernmost distributional record of *P. macrogenys*.

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