J. Insect Biodiversity 63 (1): 026–029
https://www.mapress.com/jib

Correspondence

ISSN 2538-1318 (print edition)
J. Insect Biodiversity
ISSN 2147-7612 (online edition)

https://doi.org/10.12976/jib/2025.63.1.3
http://zoobank.org/urn:lsid:zoobank.org:pub:1D45F413-FBE2-46C2-8475-0537CCA5CA58

A new synonym of *Isoscelipteron pectinatum* (Navás, 1905) (Neuroptera: Berothidae) from Japan

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Isoscelipteron okamotonis (Nakahara, 1914) is proposed as a new synonym of *I. pectinatum* (Navás, 1905) based on the examination of specimens from Japan.

Key words: beaded lacewings, taxonomy, Eastern Asia.

Data text

The family Berothidae, commonly referred to as beaded lacewings, is a moderately sized group of Neuroptera with a worldwide distribution across all zoogeographical regions (Aspöck & Randolf 2014). Currently, the family comprises less than 120 extant species in 26 genera, classified into six subfamilies (Oswald & Machado 2018; Li *et al.* 2018, 2020). The genus *Isoscelipteron* Costa, 1863, assigned to the subfamily Berothinae, exhibits a broad and highly vicariant distribution across the Palearctic, Oriental and Australian regions (Aspöck & Randolf 2014; Li *et al.* 2018).

The species *Berotha* (*Isoscelipteron*) *okamotonis* (= *I. okamotonis*) was originally described by Nakahara (1914) based on a female specimen collected from Mt. Iwawaki and a male specimen collected from Minoh, Honshu. Unfortunately, efforts to locate type specimens of this species deposited at the National Museum of Nature and Science, Tsukuba, Japan (Nakamura 2011), have been unsuccessful. Morphological comparisons suggest that *I. okamotonis* show similar identical genital characters to *Isoscelipteron pectinatum* (Navás, 1905) (Li *et al.* 2018). To clarify the taxonomic status of *I. okamotonis*, male and female specimens from the type locality Minoh, have been examined, and the synonym of *I. okamotonis* with *I. pectinatum* is proposed.

The specimens examined in this study were collected from the Japanese Archipelago and are stored in Minoh Park Insect Museum, Osaka Japan (MPIM) and Osaka Museum of Natural History, Osaka, Japan (OMNH). The male and female terminalia were prepared by removing the apex segments of the abdomen and treated with a 10% potassium hydroxide (KOH) solution at room temperature for approximately 12 to 24 h. After rinsing off the KOH with distilled water, the apex of the abdomen was transferred to 80% ethyl alcohol for further examination. The observation was conducted using a Nikon SMZ800. All figures were processed and assembled with Adobe Photoshop and Illustrator CC 2024.

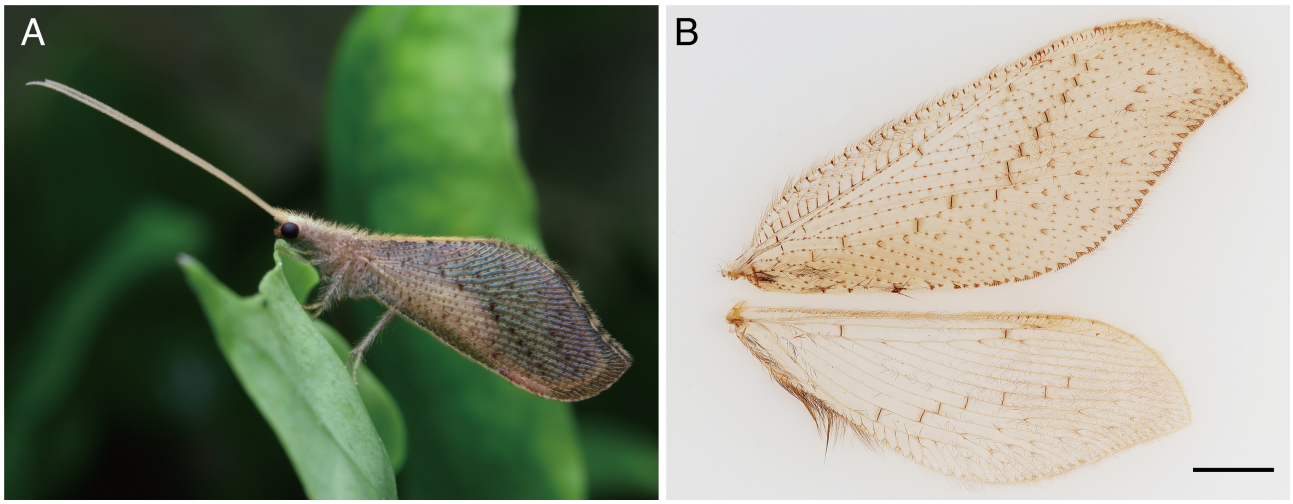

Figure 1. *Isoscelipteron pectinatum* (Navás, 1905) from Japan. **A,** living adult of *I. pectinatum* © Takashi Komatsu; **B,** right fore- and hind wing. Scale bar: 2.0 mm.

 Received: 30 Jan. 2025; Accepted by Srinivasan Pandiarajan: 11 Apr. 2025; published: 15 Apr. 2025

***Isoscelipteron pectinatum* (Navás, 1905)**

(Figs. 1–3)

Sisyrura pectinata Navás, 1905: 51. Type locality: Shanghai (China).

Isoscelipteron pectinatum (Navás, 1905): U. Aspöck & H. Aspöck, 1991: 65.

Berotha (*Isoscelipteron*) *okamotonis* Nakahara, 1914: 498. Type locality: Mt. Iwawaki, Prov. Kii and Minomo near Osaka (Japan). **syn. nov.**

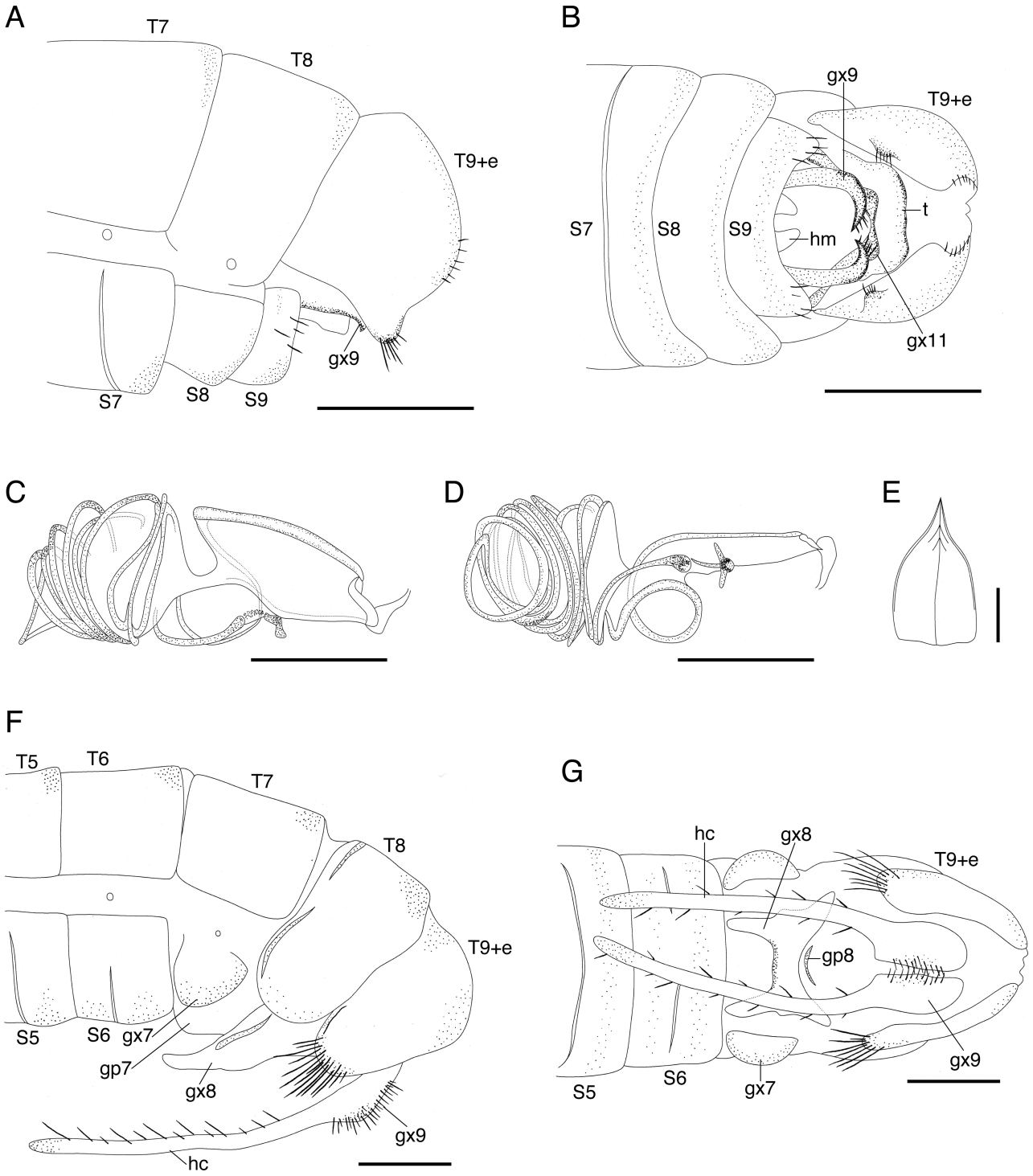

Figure 2. Male and female genitalia of *Isoscelipteron pectinatum* (Navás, 1905) from Japan. **A,** male genitalia, lateral view; **B,** ditto, ventral view; **C,** male complex of fused gonocoxites, gonapophyses and gonostyli 10 (= parameremediuncus complex), lateral view; **D,** ditto, ventral view; **E,** hypandrium internum, ventral view; **F,** female genitalia, lateral view; **G,** ditto, ventral view. e: ectoproct; gp7, 8: gonapophysis 7, 8; gx7–9: gonocoxite 7–9; gx11: gonocoxite 11 (= gonarcus); hc: hypocauda; hm: hypomere; t: torulus; S5–9: sternum 5–9; T5–9: tergum 5–9. Scale bars: A–D, F, G, 0.5 mm; E, 0.2 mm.

Diagnosis [modified from Li *et al.* (2018)]. *Isoscelipteron pectinatum* can be distinguished from other members of the genus *Isoscelipteron* by the male tergum 9 + ectoprocts posteroventrally with short obtuse processus (Fig. 2A), the fused gonocosites 11 with median incision, and torulus subquadrate (Fig. 2B). For detailed description, see Li *et al.* (2018: 250).

Materials examined. [**Honshu**] 1♀, Sugatani-cho, Nagahama-shi, Shiga, 18.X.1986, O. Tominaga leg. (OMNH); 1♀, Mt. Satsuki-yama, Ikeda-shi, Osaka, 1.IX.2021, R. Matsumoto leg. (OMNH); 1♂, Minoh-koen, Minoh-shi, Osaka, 7.IX.1981, T. Saito leg. (MPIM); 1♀, same locality, 8.VII.2020, H. Nakamine leg. (MPIM); 1♀, same locality, 15.VIII.2021, H. Nakamine leg. (MPIM); 1♀, same locality, 17.IX.2021, H. Nakamine leg. (MPIM); 1♀, Hiraoka-koen, Higashiosaka-shi, Osaka, 20.VIII.2020, R. Matsumoto leg. (OMNH); 1♀, Mt. Nijo-zan, Taishi-cho, Osaka, 29.IX.2021, R. Matsumoto leg. (OMNH); 1♀, Ikuha, Awaji-shi, Hyogo, 6.X.1931. (OMNH); 2♀, Byakugouji-cho, Nara-shi, Nara, 10.VII.2021, R. Matsumoto leg. (OMNH); 2♂, Yata-cho, Yamatokôriyama-shi, Nara, 19.VII.2022, R. Matsumoto leg. (OMNH); 1♂, Tawaraguchi-cho, Ikoma-shi, Nara, 26.VII.2021, R. Matsumoto leg. (OMNH); 1♂, Komyo-cho, Ikoma-shi, Nara, 10.IX.2021, R. Matsumoto leg. (OMNH); 1♀, Tsuji-machi, Ikoma-shi, Nara, 13.VII.2022, R. Matsumoto leg. (OMNH); 2♀, Tsuyudani, Aoya-cho, Tottori-shi, Tottori, 11.VII.1982, H. Aoki leg. (OMNH); 1♀, Higashi-machi, Tottori-shi, Tottori, 10.VI.2023, Y. Obae leg. (MPIM); **[Shikoku]** 1♀, Mt. Takanawa-san, Matsuyama-shi, Ehime, 11.VIII.2017, R. Matsumoto leg. (OMNH); [**Nansei Islands**] 1♂, Aha, Kunigami-son, Okinawa, 8.X.2023, Y. Obae leg. (MPIM).

Distribution. JAPAN: Honshu, Shikoku, Kyushu, Okinawajima Is.; P. R. CHINA: Guizhou, Shandong, Shanghai, Sichuan, Zhejiang.

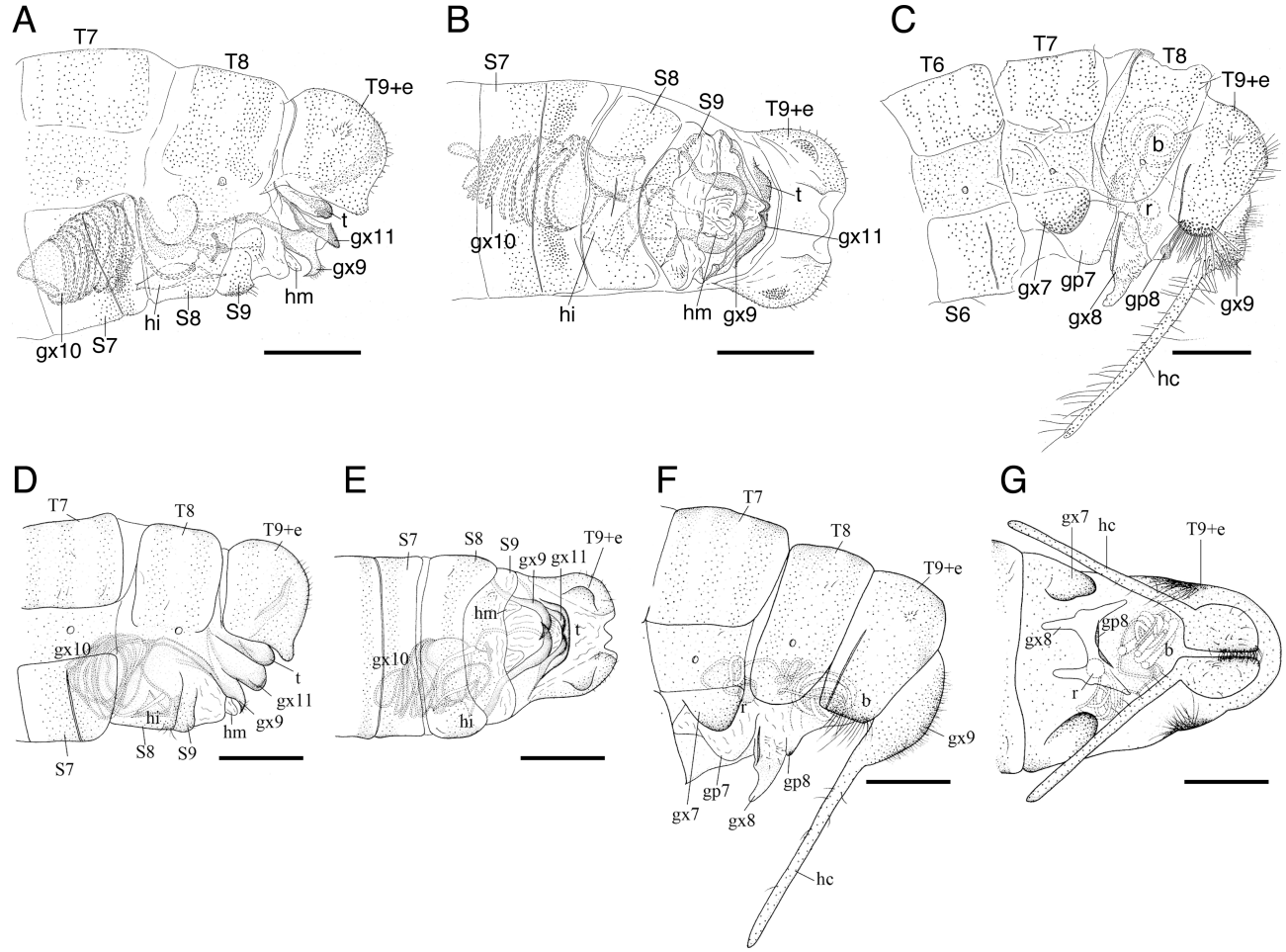

Figure 3. Male and female genitalia of *Isoscelipteron pectinatum* (Navás, 1905) from previous studies (A–C, adapted from Aspöck & Aspöck 1991; D–G, adapted from Li *et al.* 2018). **A,** male genitalia, lateral view; **B,** ditto, ventral view; **C,** female genitalia, lateral view; **D,** male genitalia, lateral view; **E,** ditto, ventral view; **F,** female genitalia, lateral view; **G,** ditto, ventral view. b: bursa copulatrix; e: ectoproct; gp7, 8: gonapophysis 7, 8; gx7–9: gonocoxite 7–9; gx10: complex of fused gonocoxites, gonapophyses and gonostyli 10 (= parameremediuncus complex); gx11: gonocoxite 11 (= gonarcus); hc: hypocauda; hi: hypandrium internum; hm: hypomere; r: spermatheca; t: torulus; S7–9: sternum 7–9; T7–9: tergum 7–9. Scale bars: 0.5 mm.

Remarks. The male and female genitalia of *Isoscelipteron pectinatum* from Japan are nearly identical in morphology to those illustrated by Aspöck & Aspöck (1991) and Li *et al.* (2018) based on specimens from China (Fig. 3). For example, the following morphological characteristics of the male genitalia are identical: tergum 9 + ectoprocts posteroventrally with short obtuse processus (Fig. 2A; Fig. 3A, D), paired gonocoxites 9 with hook-like apices, fused gonocoxites 11, arched with median incision, torulus subquadrate (Fig. 2B; Fig. 3B, E). In the female genitalia, the morphology of gonocoxites 8 with a pair of membranous digitiform processus is identical (Fig. 2F, G; Fig. 3C, F, G). Based on these highly similar morphologies, *I. okamotonis* is herein is proposed as a junior synonym of *I. pectinatum*.

Comments. Nakahara (1964) reported one male and two female specimens collected from Ishigakijima Is. and Iriomotejima Is. in the Yaeyama Islands, identifying them as *Acroberotha okamotonis* (= *Isoscelipteron okamotonis*). Since this report, no additional specimens of *Isoscelipteron* have been collected from the Yaeyama Islands, and despite extensive efforts, these specimens could not be located. Given the proximity of Yaeyama Islands and the type locality of *Isoscelipteron formosense* (Krüger, 1922) in Taiwan (Aspöck & Aspöck 1980; Aspöck *et al.* 2013), the possibility of *Isoscelipteron* specimens from the Yaeyama Islands belong to *I. formosense* cannot be ruled out. These uncertainities necessitate further investigation and research in the future.

Acknowledgements

I sincerely thank Lisha Jasper (Bernice Pauahi Bishop Museum), Rikio Matsumoto (Osaka Museum of Natural History), Toshiharu Mita (Kyushu University), and Utsugi Jinbo (National Museum of Nature and Science, Tokyo) for their assistance with the specimens research. I am also grateful to Yuito Obae for collecting the specimens. Special thanks to Takashi Komatsu for providing a photograph of the living *Isoscelipteron pectinatum*. Finally, I would like to express my sincere gratitude to the anonymous reviewers for their valuable and constructive comments on an earlier version of the manuscript.

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