蝶と蛾 *Lepidoptera Science* **75**(3/4): 109–119, October 2024

Discovery of a new species of the genus *Nemophora* Hoffmannsegg (Lepidoptera, Adelidae) from the foot of Mt. Takao, Tokyo

Toshiya Hirowatari[1), 2)*], Ken-ichi Ito[3)], Jinhyeong Park[4)], Sadahisa Yagi[1), 2)]

[1)] Entomological Laboratory, Faculty of Agriculture, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka, 819-0395 Japan
[2)] Insect Science and Creative Entomology Center, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka, 819-0395 Japan
[3)] 1227-4, Hatsuzawa-machi, Hachioji, Tokyo, 193-0845 Japan
[4)] Entomological Laboratory, Graduate School of Bioresources and Bioenvironmental Sciences, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka, 819-0395 Japan

Abstract. A new species of the genus *Nemophora*, *N. takaosana* Hirowatari & Yagi sp. nov., was unexpectedly found at the foot of Mt. Takao (Takaosan), Tokyo, Japan. This species might have gone unnoticed until now due to its small size, compared to other members of the family Adelidae, and its unusual emergence from late September to early October among the Japanese Adelidae. We compared this new species with its close relatives, based on their morphological characteristics and DNA barcodes.

Key words. Fairy moth, Japan, morphology, swarming, taxonomy.

Introduction

The genus *Nemophora* includes approximately 200 species worldwide (Sun et al., 2022; Kozlov, 2023; Liao et al., 2023). Of these, only 28 species have been recorded in Japan (Hirowatari, 2013, 2023); apart from one undetermined species (Hori and Sakurai, 2015), no new species have been discovered in recent years. The second author of this study photographed a mating pair of unknown adelid species at the foot of Mt. Takao, Tokyo, during late September 2021, and shared this photograph (Fig. 1) on an online forum for moths. Upon seeing the photograph, the first author convinced that it was a potential new species in Japan. In early October 2022, we collected a good number of specimens for description and obtained biological information about them. We confirmed them as a new species, based on their morphological characteristics and DNA barcodes. In the present study, we described its features including the wing venation and male and female genitalia. Biological information of the species has also been provided.

*corresponding author, E-mail: hirowat_t@agr.kyushu-u.ac.jp

Materials and Methods

Study location and design

The survey site was at the foot of Mt. Takao, Tokyo (N35.638, E139.281), approximately 220 m above sea level, and the surrounding area was covered by trees such as *Quercus glauca* Thunb., *Q. serrata* Murray (Fagaceae), *Cerasus jamasakura* Sieb. et Zucc. (Rosaceae), and *Ilex pedunculosa* Miq. (Aquifoliaceae). The second author discovered the new species at this site on September 28, 2021, and also made subsequent observations on September 29 and October 2, 2021. The following year, we conducted regular observations between September 22–October 2, 2022, and collected specimens for taxonomic research at the site. We compared morphological characteristics such as wing markings, wing venations, and male and female genitalia of the new species with those of other known species. Morphological terms followed Nielsen (1985) and Davis (1999). The eye size index of Hirowatari (1997), i.e. horizontal eye diameter (hd) / minimum distance between eyes in dorsal view (md), and interocular index of Davis (1975), i.e. vertical eye diameter (vd) / interocular distance (id), were calculated for comparing eye sizes of different species. All collected specimens were deposited

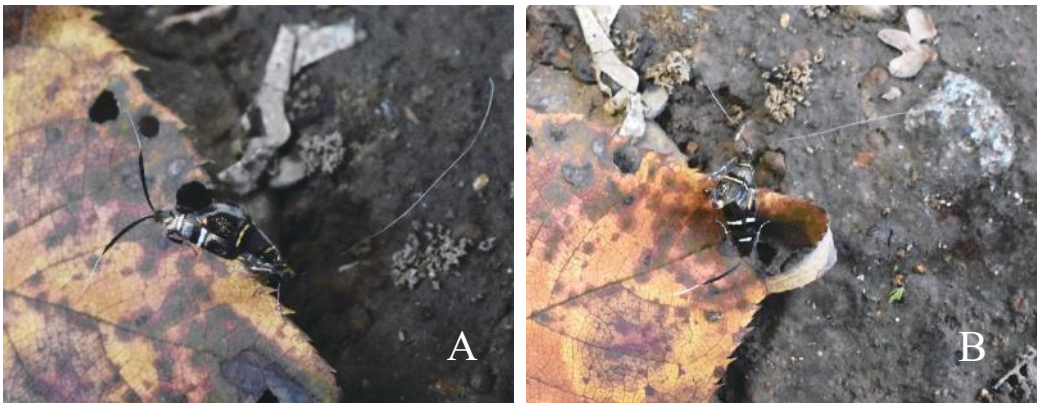

Fig. 1. Mating adults of *Nemophora takaosana* sp. nov. at the foot of Mt. Takao, Tokyo. A. Mating pair found on September 28, 2021. B. *Ditto*, photo from a different angle.

at the Entomological Laboratory of Kyushu University, Japan.

DNA analysis

One male (Sample ID/GenBank accession number: SaY980/PQ299078) and one female (SaY981/PQ299077) specimen of *Nemophora takaosana* sp. nov. were used for DNA analysis. Additionally, two specimens of *Nemophora aurifera* (Butler, 1881) and one of *N. tenuifasciata* (Hirowatari, 2005) were analyzed in this study for comparison (Table 1). The cytochrome c oxidase subunit I (COI) barcodes were analyzed, following Hirowatari et al. (2022). The operational taxonomic units (OTUs) for our phylogenetic analysis were as follows: *Nemophora* species in Hirowatari et al. (2022), the samples in Liao et al. (2023), and several Japanese species of *Nemophora* obtained from this study (Table 1). As outgroups, *Adela purpurea* (Walker, 1863) and *Cauchas cyanella* (Busck, 1915) were downloaded from GenBank (www.ncbi.nlm.nih.gov). The uncorrected pairwise distances (p-distances) were calculated using MEGA 10.2.6 (Stecher et al., 2020). Phylogenetic trees were constructed using the maximum likelihood (ML) method in the IQ-TREE web server, version 1.6.12 (Trifinopoulos et al., 2016), with auto-substitution model selection, ultrafast bootstrap analysis with 1000 repetitions, and Shimodaira–Hasegawa-like approximate likelihood ratio tests (SH-aLRT) with 1000 repetitions. The treefile was visualized using Figtree v1.4.4 (Rambaut, 2018).

Description

Nemophora takaosana **Hirowatari & Yagi** sp. nov. (Figs 1–8)

urn:lsid:zoobank.org:act:1BC6D37B-5C44-4A81-B498-1A2CE50FD09F

Type materials: Holotype ♂ Hatsuzawayama, Hachioji, Tokyo, 1–2. x. 2022, T. Hirowatari, J.-H. Park., K. Ito leg., genitalia slide no.: TH522, Sample ID: SaY980. Paratypes: 1♂, same locality as holotype, 29. ix 2021, K. Ito leg.; 1♀, same label as holotype, genitalia slide no.: TH523, Sample ID: SaY981; 8♂, 5♀, same label as holotype; 14♂, 3♀, same locality and date as holotype, J.-H. Park, T. Hirowatari leg.

Diagnosis: This new species is easily distinguishable from other Japanese species of *Nepmophora* by the small size (forewing length approximately 5.2 mm, whereas approximately 6.0–10.0 mm in other species) and the presence of a pair of narrow, yellowish-white fasciae on the forewings of both sexes. It is similar to *N. duplicifascia* Liao, Hirowatari & Huang, 2023 (reported from Sichuan and Hunan, China) in the forewing patterns, but can be distinguished by the following characteristics: the smaller size (male forewing length is 5.0–5.3 mm in *N. takaosana*, whereas it is 6.0 mm in *N. duplicifascia*); the forewing ground color pale ochreous with bright metallic luster in *N. takaosana* (dark brown to black with bright bronze or coppery red metallic luster in *N. duplicifascia*); the longer male antennae (approximately 3 × the forewing length in *N. takaosana* compared to 1.3 × in *N. duplicifascia*). Regarding the male genitalia, the valvae are widely separated ventrally in *N. takaosana*, whereas they are approximated ventrally in *N. duplicifascia*; the vesica lacks distinct spines (cornuti) in *N. takaosana*, whereas it has two rows of spines in *N. duplicifascia*.

Table 1. List of Japanese and Chinese *Nemophora* species used for DNA analysis in this study.

Species name	Sample ID	GenBank accession number	Location	Primer sets for PCR	Reference
Nemophora takaosana sp. nov., male, holotype	SaY980	PQ299078	Japan, Hatsuzawayama, Hachioji, Tokyo	LepF1/LepR1	This study
Nemophora takaosana sp. nov., female, paratype	SaY981	PQ299077	Japan, Hatsuzawayama, Hachioji, Tokyo	LepF1/LepR1	This study
Nemophora aurifera	SaY1034	PQ299076	Japan, Tsushima Island	LepF1/LepR1	This study
Nemophora aurifera	SaY1035	PQ299075	Japan, Hokkaido	LepF1/LepR1	This study
Nemophora tenuifasciata	SaY977	PQ299074	Japan, Okinawa Island	LCO1490/HCO2198	This study
Nemophora albiantenella	LCQ025	PP065968	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemophora sakaii	LCQ037	PP065981	China, Guangxi	LCO1490/HCO2198	Liao et al. (2023)
Nemophora bifasciatella	LCQ042	PP065974	China, Guangxi	LCO1490/HCO2198	Liao et al. (2023)
Nemophora decisella	LCQ058	PP065978	China, Shaanxi	LCO1490/HCO2198	Liao et al. (2023)
Nemophora decisella	LCQ059	PP065979	China, Shaanxi	LCO1490/HCO2198	Liao et al. (2023)
Nemophora askoldella	LCQ248	PP065991	China, Guanyun Mountain Villa, Taiwan	LCO1490/HCO2198	Liao et al. (2023)
Nemophora chionites	LCQQ681	PP065992	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemaphora tanakai	LCQ703	PP065965	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemophora aurifera	LCQ705	PP065977	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemaphora assamensis	LCQ711	PP065990	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemaphora fluorites	LCQ713	PP065963	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemophora basalistriata	LCQ775	PP065989	China, Jiangxi	LCO1490/HCO2198	Liao et al. (2023)
Nemophora badagongshana	LCQ822	PP065976	China, Hunan	LCO1490/HCO2198	Liao et al. (2023)
Nemophora duplicifascia	SaY706	PP066003	China, Sichuan	LCO1490/HCO2198	Liao et al. (2023)
Nemohora duplicifascia	SaY707	PP066004	China, Sichuan	LCO1490/HCO2198	Liao et al. (2023)
Nemophora trimetrella	SaY712	PP066009	Japan, Fukuoka Prefecture	LCO1490/HCO2198	Liao et al. (2023)
Nemophora pruinosa	SaY713	PP066008	Japan, Okinawa Prefecture	LCO1490/HCO2198	Liao et al. (2023)
Nemophora umbripennis	SaY714	PP066007	Japan, Fukuoka Prefecture	LCO1490/HCO2198	Liao et al. (2023)
Nemophora optima	SaY715	PP066001	Japan, Fukuoka Prefecture	LCO1490/HCO2198	Liao et al. (2023)
Nemophora albiantennella	SaY717	PP066002	Japan, Fukuoka Prefecture	LCO1490/HCO2198	Liao et al. (2023)

Male: Forewing length 5.3 mm in holotype, 5.0–5.3 mm in paratypes; Wingspan 11.0 mm in holotype, 10.8–11.3 mm in paratypes (*n*=16).

Head: Vertex with raised yellow hairs; face smooth, scarcely covered with bronze scales having golden luster. Eyes moderate in size, widely separated dorsally; eye size index: ~1.0; interocular index: 0.95. Proboscis pale yellow, basal 1/3 with bronze scales. Maxillary palpus vestigial. Labial palpus short, approximately 0.5 × vertical eye diameter, smooth, pale yellow, sparsely mixed with brown hair. Antenna 15.2–16.4 mm, 2.8–3.3 × forewing length, entirely smooth; dark bronze basally and somewhat paler apically. Legs: fore and mid legs: femur and tibia bronze with metallic purple tinge, tarsus white ringed with dark brown; hind legs: femur silvery white, tibia bronze with long raised brown hairs dorsally and ventrally ringed with dark brown distally; hind tibia covered sparsely with long raised ochreous hairs dorsally; hind tarsus: ochreous, each tarsomere has an apical white ring. Tegula and thorax (dorsum) smooth with golden scales. Forewing: lanceolate, length approximately 3.5 × width; ground color pale ochreous, with bright metallic luster; basal 1/5 with a narrow straight yellowish-white fascia, margined anteriorly and externally with black; middle part with a narrow yellowish-white transverse central fascia margined internally with broad black band and outwardly with

Fig. 2. *Nemophora takaosana* sp. nov. A. Holotype, male. B. Paratype, female. Scales: 5 mm.

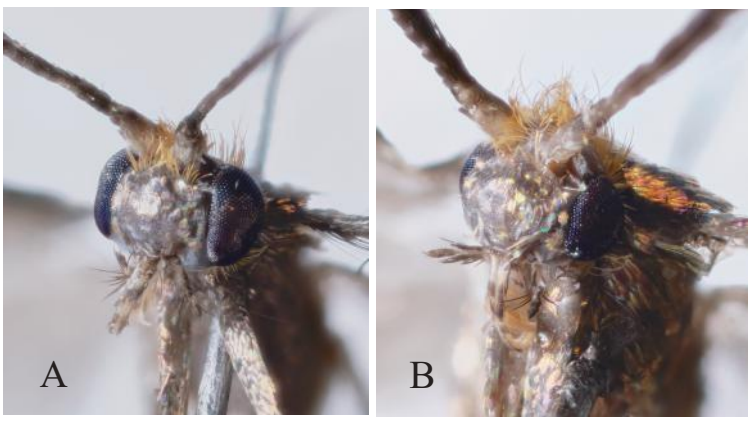

Fig. 3. The head of *Nemophora takaosana* sp. nov. A. Holotype, male. B. Paratype, female.

narrow black band; apical 1/3 scattered with black and yellow scales; cilia: ochreous with bronze metallic luster; R_3 and R_4 stalked; M_1 and M_2 approximate or touch basally (Fig. 6A). Hindwing and cilia dark brown. Abdomen: dark brown; terminal segments with a bundle of black hairs; frenulum consisted of a single long and stout bristle.

Female: Forewing length 4.5–4.9 mm; Wingspan 10.4–10.8 mm (*n*=6).

Head: Vertex with raised yellow hairs; face smooth with golden luster. Eyes: small, eye size index: 0.67, interocular index: 0.7. Labial palpus short, approximately 1 × vertical eye diameter, smooth, mixed with dark brown hair. Antenna 5.2–5.3 mm, 1.1–1.2 × forewing length; basal 2/3 thickened with smooth black scales having metallic blue luster; distal 1/3 silvery white, smooth and slender. Tegula and thorax (dorsum) smooth with golden scales, with posterior dark-blue scales. Forewing: central fascia whitish and somewhat broader than that in males; R_3 and R_4 separate; M_1 and M_2 separate basally (Fig. 6B). Hindwings and cilia dark brown; frenulum consisted of three or four short and thin bristles. The other parts are similar to those of the males.

Male genitalia (Fig. 7): Uncus short with a weak median keel. Vinculum short, about 2.2 × valva. Valvae triangular in ventral view, rounded apically, well separated ventrally. Suspensorium trapezoid; anterior part not beyond posterior margin of vinculum in ventral view. Transtilla narrow medially, wide laterally near valva; median process spiniform. Phallus relatively short and slender, basally broad, weakly curved dorsally; vesica with pair of narrow sclerites near apex; manica with minute dorsal spines. Juxta: arrow-shaped; arrowhead short and small, triangular; lateral arms moderate in length.

Female genitalia (Fig. 8): Apophyses posteriores and anteriores long and slender. Vestibulum membranous, dorsal posterior portion of lamella indistinct. Bursa

Fig. 4. *Nemophora takaosana* sp. nov. and its habitat. A–B. Males perched on leaves. C. Female perched on leaf. D. *Rhododendron* plants on which swarming males were observed.

Fig. 5. *Nemophora takaosana* sp. nov. and its habitat. A–C. Females feeding or perching on the flowers of *Eupatorium makinoi.* D. Habitat where *E. makinoi* grows.

copulatrix short and membranous.

DNA barcode: The COI barcode sequences of male and female *N. takaosana* sp. nov. completely matched (BIN ID: BOLD: AFS1724; Fig. 9, Table 2). The smallest interspecific pairwise distance was 5.32% between *N. takaosana* sp. nov. and *N. pfeifferella* (Hübner, 1813) from France (Process ID/BIN ID: TLMF Lep 05723/ BOLD: ABU7336). The distance was larger than the threshold of empirical interspecific distances (3% in Hebert et al., 2003).

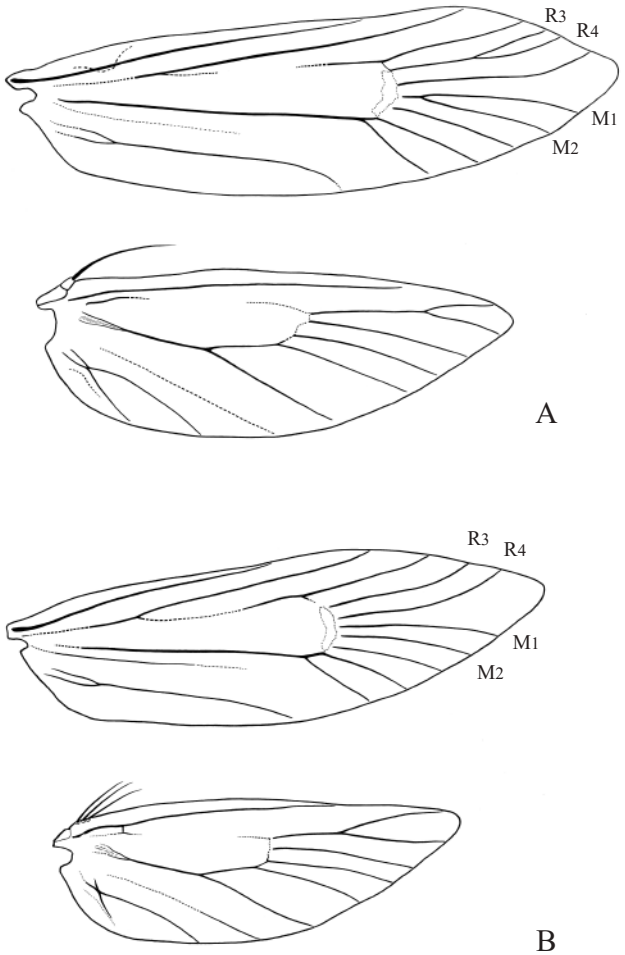

Fig. 6. Wing venation of *Nemophora takaosana* sp. nov. A. Male. B. Female.

Biology: On September 28, 2021, at approximately 10:30, the second author observed a swarm of this species. More than 10 males flew approximately 1 m above the shoots of *Viburnum dilatatum* Thunb. (Adoxaceae) protruding from azalea (*Rhododendron* sp., Ericaceae) plantation on the slope, and on the tips of the thin branches of *Akebia quinata* Decne. (Lardizabalaceae) entwined with the hedge of azaleas. He then discovered a mating pair that had fallen to the ground (Fig. 1A, B). On September 29 and October 2, 2021, at the same place, he confirmed that the males were actively flying between 10:30–13:00. The weather on September 28 and 29 was cloudy and occasionally sunny.

In 2022, the second author observed one male flying around 12:15 on September 22, and a group of 3–4 males swarming around 7:30 on September 25. On October 1, 2022 (sunny, 17–28℃), during 13:00–16:00, we observed some males perching on the leaves (Fig. 2), and a swarm of 3–5 males at the same site where he first found the species. Between 14:00–15:00, we observed many females (Fig. 3) and a small number of males sucking nectar from *Eupatorium makinoi* T. Kawahara et Yahara (Asteraceae) at the same location where the females were found in 2021. *Patrinia villosa* (Thunb.) Juss. (Caprifoliaceae) flowers, which are known ovipositing plants for adelids, were also found nearby, but no ovipositing behavior of the females was confirmed. In addition, some visiting moths were preyed upon by the flower spider *Ebrechtella tricuspidata* (Fabricius, 1775), which is considered an important natural enemy. On October 2, 2022 (sunny, 16–29℃), around 14:00, Hirowatari and Park also observed the flight of 2 males at the planting of azaleas, and observed 2 females visiting a *Eupatorium makinoi* flower.

In summary, from 2021 to 2022, the occurrence of this species was confirmed from late September to early October (September 22 to October 6), and the swarming of males was observed at various times during the day. We also surveyed other areas around this site, but this species was found only in a limited area.

Distribution: Tokyo, Japan.

Etymology: Derived from mountain range of the type locality of the new species.

Remarks. DNA analysis showed *N. takaosana* sp. nov. formed a clade with *N. umbripennis* Stringer, 1930, *N. askoldella* (Millière, 1879), and *N. purinosa* Hirowatari, 2005 with high SH-aLRT support/ultrafast bootstrap support (91.9/98). The uncorrected pairwise distances between *N. takaosana* sp. nov. and these species were 6.1–6.9%. This clade is supported by the presence of a median keel on the uncus of the male genitalia. However, this species may be related to *N. aurifera* which has a pair of narrow sclerites on the vesica of male genitalia. However, the barcode region for this species was 7.1–7.4%. In addition, the pairwise distance between *N. takaosana* sp. nov. and *N. duplicifascia*, whose appearance was similar to that of the new species, was 7.1%. Further analysis is required to identify the close relatives of this species.

In Japan, adelid moths are active, and swarms can be seen during the day in spring. In summer, when the daytime is hot and dry, swarms can be seen cloudy or around sunset (Hirowatari and Nagaike, 1998; Sasaki et

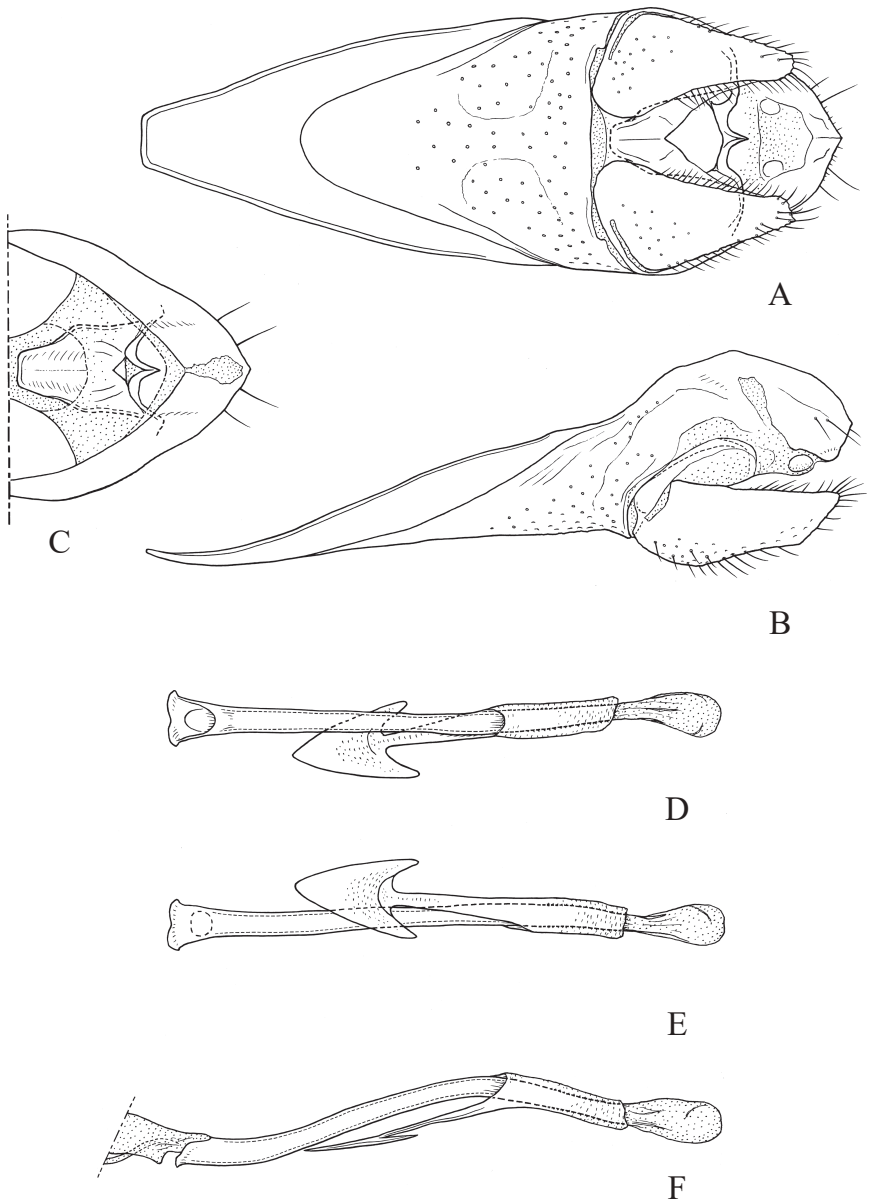

Fig. 7. Male genitalia of *Nemophora takaosana* sp. nov. (holotype). A. Whole genitalia except for the phallus (ventral view). B. *Ditto* (lateral view). C. Dorsum (dorsal view). D. Phallus and juxta (dorsal view). E. *Ditto* (ventral view). F. *Ditto* (lateral view).

al., 2017). In the case of this species, since it occurs in autumn and the temperature is between 16 and 29°C, it is assumed that they are active throughout the day.

Surprisingly, this species was discovered near a residential area at the foot of Mt. Takao in Tokyo. The reason this species has not been noticed until now may be due to its small size in the family Adelidae. In fact, males flying in groups looked like swarming mosquitoes rather than typical adelid moths. Another reason is the late emergence time from late September to early October, which is exceptional in Japanese Adelidae.

Although this species has only been confirmed at the foot of Mt. Takao, it may also inhabit the surrounding areas. It is also necessary to pay attention to its occurrence in other regions of Japan.

Acknowledgments

We thank Mikhail Kozlov (University of Turku, Turku),

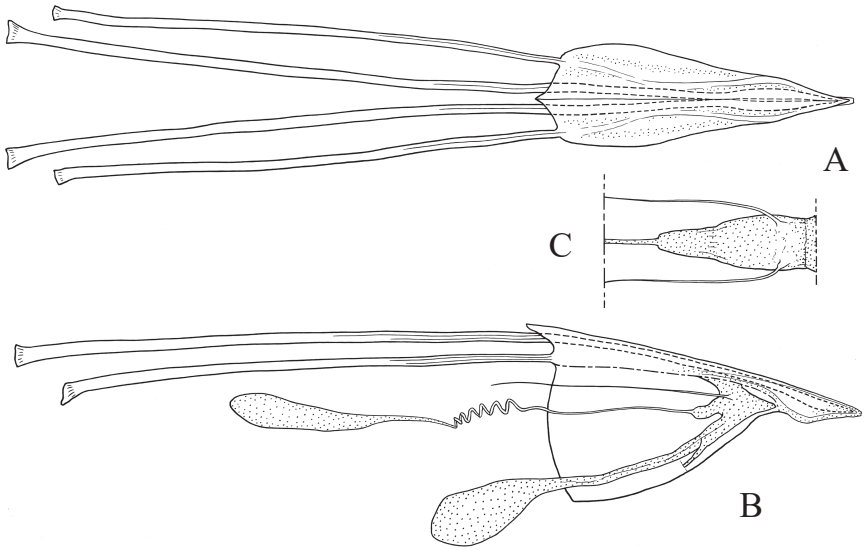

Fig. 8. Female genitalia of *Nemophora takaosana* sp. nov. (paratype). A. Terminalia (dorsal view). B. *Ditto* (lateral view). C. Vestibulum (dorsal view).

Guo-Hua Huang (Hunan Agricultural University, Changsha), and Cheng-Qing Liao (Gannan Normal University, Ganzhou) for providing us with recent information on Adelidae. Rio Shida (Kyushu University, Fukuoka) identified a flower spider preying on the new *Nemophora* species. Jae-Cheon Sohn (Gongju National University of Education, Gongju) and Shigeki Kobayashi (Osaka Metropolitan University, Sakai) kindly edited the manuscript of this paper. This work was partially supported by the JSPS and NSFC under the Japan–China Scientific Cooperation Program and JSPS KAKENHI (grant number JP23H02236).

References

Davis DR, 1975. West Indian moths of the family Psychidae with descriptions of new taxa and immature stages. *Smithsonian Contribution to Zoology* **188**: 1–66.

Davis DR, 1999. The Monotrysian Heteroneura (Incurvariidae). In Kristensen NP, Schmidt-Rhaesa A (eds), Lepidoptera, Moths, and Butterflies 1, Handbook of Zoology: 65–90. Walter de Gruyter, Berlin/New York.

Hebert PD, Cywinska A, Ball SL, DeWaard JR, 2003. Biological identifications through DNA barcodes. *Proceedings of the Royal Society B*: *Biological Sciences* **270**: 313–321.

Hirowatari T, 1997. A taxonomic revision of the genus *Adela* Latreille (Lepidoptera, Adelidae) from Japan. *Transactions of Lepidopterological Society of Japan* **48**: 271–290.

Hirowatari T, 2013. Adelidae. In Hirowatari T, Nasu Y, Sakamaki Y, Kishida Y (eds), The Standard of Moths in Japan III: 102–110. Gakken Education Publishing, Tokyo. (In Japanese)

Hirowatari T, 2023. Adelidae. In Nasu Y, Hirowatari T, Sakamaki Y, Kishida Y (eds), Microlepidoptera of Japan: 16–19. Gakken Education Publishing, Tokyo. (In Japanese)

Hirowatari T, Nagaike T, 1998. Biological notes on *Nemophora paradisea* (Butler, 1881) (Lepidoptera, Adelidae). *Transactions of Lepidopterological Society of Japan* **49**: 288–294.

Hirowatari T, Kametani K, 1999. Mating behavior of *Nemophora ahenea* Stringer, 1930 (Lepidoptera, Adelidae). *Transactions of Lepidopterological Society of Japan* **50**: 85–92.

Hirowatari T, Yagi S, Liao CQ, Huang GH, Wang M, 2022. *Nemophora chrysoprasias* Meyrick (Lepidoptera, Adelidae) from China, with notes on its related species. *Journal of Asia-Pacific Biodiversity* **15**: 391–400.

Hori S, Sakurai M, 2015. Butterflies and moths of Hokkaido. 422 pp. Hokkaido Shinbun Press, Sapporo. (In Japanese)

Kozlov MV, 2023. Fairy moths of the genus *Nemophora* Hoffmannsegg, 1798 (Lepidoptera: Adelidae) of India and Sri Lanka. *Zootaxa* **5300**: 1–81.

Liao CQ, Hirowatari T, Yagi S, Wang M, Wang X, Huang GH, 2023. The fauna of the family Adelidae (Insecta, Lepidoptera, Adeloidea) from China. *Zootaxa* **5348**: 1–152.

Nielsen ES, 1985. A taxonomic review of the adelid genus *Nematopogon* Zeller (Lepidoptera: Incurvarioidea). *Entomologica scandinavica* **Suppl. 25**: 1–66.

Rambaut A, 2018. FigTree v1.4.4. Available from: https://github.com/rambaut/figtree. [accessed June 2019].

Sasaki K, Yagi S, Hirowatari T, 2017. Biological notes on an upsurge of *Nemophora optima* in the vicinity of Fukuoka city, Japan. *Yadoriga* **254**: 2–10. (In Japanese)

Stecher G, Tamura K, Kumar S, 2020. Molecular evolutionary genetics analysis (MEGA) for macOS. *Molecular Biology and Evolution* **37**: 1237–1239.

Sun H, Wang SX, Li HH, 2022. Review of the *degeerella* species

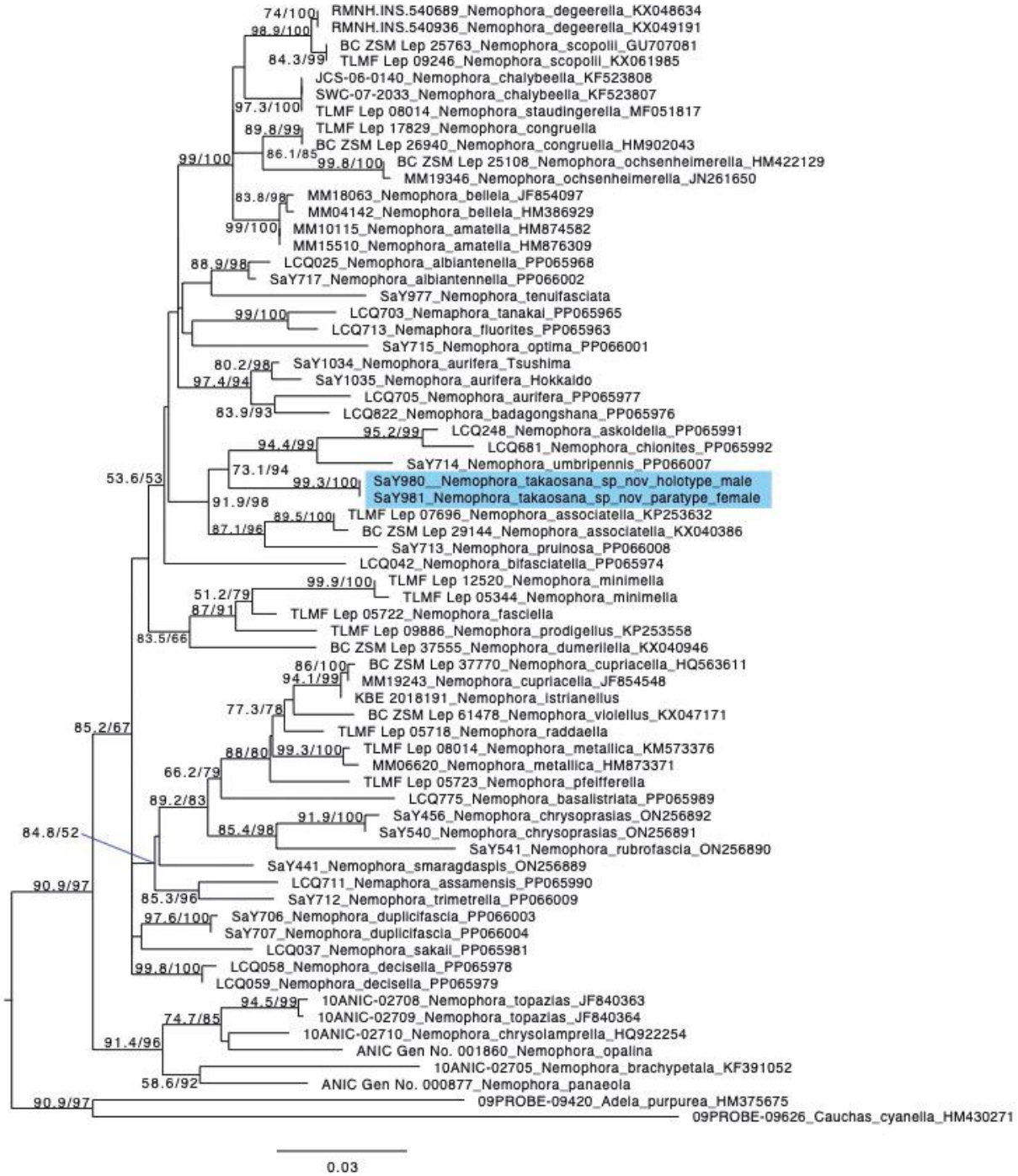

Fig. 9. ML tree of the genus *Nemophora* based on DNA barcode region generated using the IQ-TREE web server. The numbers near each node are SH-aLRT support (%) / ultrafast bootstrap support (%). Numbers are indicated in case both support values are higher than 50%.

group of the genus *Nemophora* Hoffmannsegg, 1798 (Lepidoptera: Adelidae) from China. *Zootaxa* **5219**: 301–338.

Trifinopoulos J, Nguyen LT, von Haeseler A, Minh BQ, 2016. W-IQ-TREE: a fast online phylogenetic tool for maximum likelihood analysis. *Nucleic Acids Research* **44**: 232–235.

摘　要

東京都高尾山麓で発見されたウスベニヒゲナガ属の1新種（鱗翅目，ヒゲナガガ科）（広渡俊哉・伊藤健一・朴　鎮亨・屋宜禎央）

Table 2. Interspecific and intraspecific pairwise p-distances in the COI barcode region of *Nemophora* species which were similar to *Nemophora takaosana* sp. nov.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	SaY980_Nemophora_takaosana_sp_nov_male_holotype																									
2	SaY981_Nemophora_takaosana_sp_nov_female_paratype	0.0000																								
3	TLMF Lep 05723_Nemophora_pfeifferella	0.0532	0.0532																							
4	TLMF Lep 05722_Nemophora_fasciella	0.0562	0.0562	0.0502																						
5	LCQ059_Nemophora_decisella_PP065979	0.0562	0.0562	0.0593	0.0532																					
6	LCQ058_Nemophora_decisella_PP065978	0.0608	0.0608	0.0638	0.0578	0.0046																				
7	LCQ711_Nemaphora_assamensis_PP065990	0.0608	0.0608	0.0593	0.0562	0.0517	0.0562																			
8	BC ZSM Lep 29144_Nemophora_associatella_KX040386	0.0611	0.0611	0.0721	0.0580	0.0658	0.0705	0.0627																		
9	TLMF Lep 07696_Nemophora_associatella_KP253632	0.0618	0.0618	0.0713	0.0571	0.0634	0.0681	0.0666	0.0032																	
10	TLMF Lep 09886_Nemophora_prodigellus_KP253558	0.0623	0.0623	0.0607	0.0367	0.0575	0.0623	0.0671	0.0672	0.0656																
11	SaY712_Nemophora_trimetrella_PP066009	0.0638	0.0638	0.0669	0.0502	0.0547	0.0593	0.0380	0.0580	0.0618	0.0671															
12	SaY713_Nemophora_pruinosa_PP066008	0.0638	0.0638	0.0836	0.0669	0.0714	0.0729	0.0714	0.0517	0.0507	0.0719	0.0684														
13	LCQ037_Nemophora_sakaii_PP065981	0.0653	0.0653	0.0608	0.0502	0.0471	0.0517	0.0608	0.0737	0.0729	0.0591	0.0547	0.0745													
14	LCQ822_Nemophora_bdagongshana_PP065976	0.0653	0.0653	0.0669	0.0486	0.0547	0.0593	0.0669	0.0690	0.0697	0.0527	0.0578	0.0745	0.0638												
15	LCQQ681_Nemophora_chionites_PP065992	0.0653	0.0653	0.0790	0.0790	0.0714	0.0760	0.0760	0.0799	0.0808	0.0815	0.0775	0.0745	0.0790	0.0775											
16	MM19243_Nemophora_cupriacella_JF854548	0.0654	0.0654	0.0426	0.0609	0.0594	0.0639	0.0578	0.0721	0.0729	0.0703	0.0594	0.0852	0.0594	0.0761	0.0776										
17	TLMF Lep 05718_Nemophora_raddaella	0.0669	0.0669	0.0410	0.0638	0.0608	0.0653	0.0623	0.0784	0.0824	0.0783	0.0623	0.0866	0.0638	0.0745	0.0821	0.0396									
18	LCQ713_Nemaphora_fluorites_PP065963	0.0669	0.0669	0.0714	0.0684	0.0547	0.0593	0.0593	0.0721	0.0745	0.0687	0.0623	0.0805	0.0669	0.0653	0.0821	0.0685	0.0714								
19	SaY441_Nemophora_smaragdaspis_ON256889	0.0669	0.0669	0.0669	0.0623	0.0562	0.0608	0.0669	0.0752	0.0745	0.0687	0.0578	0.0714	0.0593	0.0729	0.0805	0.0563	0.0653	0.0699							
20	BC ZSM Lep 37770_Nemophora_cupriacella_HQ563611	0.0676	0.0676	0.0456	0.0629	0.0582	0.0629	0.0613	0.0740	0.0745	0.0719	0.0582	0.0849	0.0613	0.0755	0.0818	0.0047	0.0409	0.0723	0.0566						
21	ANIC Gen No. 000877_Nemophora_panaeola	0.0678	0.0678	0.0709	0.0586	0.0709	0.0755	0.0740	0.0747	0.0740	0.0660	0.0663	0.0724	0.0724	0.0724	0.0924	0.0741	0.0770	0.0724	0.0693	0.0734					
22	SaY714_Nemophora_umbripennis_PP066007	0.0684	0.0684	0.0760	0.0608	0.0745	0.0790	0.0669	0.0690	0.0713	0.0735	0.0653	0.0653	0.0760	0.0729	0.0608	0.0715	0.0729	0.0821	0.0714	0.0739	0.0909				
23	BC ZSM Lep 37555_Nemophora_dumerilella_KX040946	0.0689	0.0689	0.0593	0.0417	0.0497	0.0545	0.0577	0.0690	0.0675	0.0515	0.0705	0.0689	0.0577	0.0609	0.0801	0.0625	0.0657	0.0705	0.0689	0.0641	0.0689	0.0705			
24	BC ZSM Lep 61478_Nemophora_violellus_KX047171	0.0694	0.0694	0.0562	0.0711	0.0744	0.0793	0.0694	0.0828	0.0861	0.0849	0.0760	0.0893	0.0727	0.0843	0.0876	0.0463	0.0479	0.0826	0.0727	0.0512	0.0923	0.0876	0.0738		
25	KBE 2018191_Nemophora_istrianellus	0.0695	0.0695	0.0442	0.0616	0.0569	0.0616	0.0585	0.0728	0.0729	0.0719	0.0600	0.0821	0.0600	0.0711	0.0758	0.0174	0.0379	0.0742	0.0585	0.0221	0.0753	0.0711	0.0625	0.0512	
26	LCQ248_Nemophora_askoldella_PP065991	0.0699	0.0699	0.0851	0.0805	0.0821	0.0866	0.0790	0.0815	0.0824	0.0847	0.0775	0.0790	0.0821	0.0881	0.0426	0.0807	0.0790	0.0881	0.0836	0.0849	0.1002	0.0547	0.0817	0.0893	0.0837

ウスベニヒゲナガ *Nemophora* 属は，全世界から約200 種が知られている．日本では 28 種が知られているが，近年は新たな種が見つかっていなかった．しかし，東京都高尾山麓の初沢山でまったく予期しなかった未知種が発見された．本種の発見は，著者の一人（伊藤）が 2021 年 9 月下旬に本種の交尾個体を高尾山麓で撮影し，その写真をネット上のある掲示板に投稿したことに端を発する．広渡が偶然その写真を見て，日本では未知の種であることを確信した．2022 年 10 月上旬に伊藤の案内で広渡と朴が現地に同行し，複数個体を採集するとともに，若干の生態的な情報を得ることができた．得られた標本は，翅の斑紋，翅脈，雌雄交尾器の形態等を既知種と比較するとともに，屋宜が DNA バーコード領域を解析し既存データと比較した．その結果，本種は未記載種であることが判明したので新種として記載した．

Nemophora takaosana Hirowatari & Yagi sp. nov. タカオコヒゲナガ（新種）（Figs 1–8）
2021 年と 2022 年に，ツツジ類の植栽の上で飛翔（群飛）する ♂ 成虫やヒヨドリバナの花で吸蜜している ♂♀ 成虫を採集した．

分布 : 東京都八王子市初沢山

本種は *Nemophora* 属の中でももっとも小型であること，また，前翅に 2 対の黄白帯をもつことで日本産の他種と容易に区別できる．外見は最近中国から記載された *N. duplicifascia* Liao, Hirowatari & Huang, 2023 に似るが，より小型であること，前翅が赤銅色を帯びないこと，雄交尾器のバルバが腹面で離れること，vesica に顕著な刺（cornuti）をもたないなどで区別できる．また，バーコード領域の配列も 7.1％異なっていた．また，オス交尾器の vesica にみられる骨片の形状からホソオビヒゲナガ *N. aurifera* に近縁である可能性もあるが，バーコード領域は 7.1–7.4％異なっていた．一方で，DNA 解析の結果ではキオビクロヒゲナガ *N. umbripennis*, リュウキュウクロヒゲナガ *N. purinosa*, ギンヒゲナガ *N. askoldella* などと同じクレードに含まれ，クレード内の各種のバーコード領域は 6.1–6.9％異なっていた．以上のことから，本種が既知種のどれとも異なることは明らかだが，どの種に近縁かはさらに検討する必要がある．

本種が東京都高尾山麓の住宅地に近い場所で発見されたのは驚きであったが，これまで発見されなかった理由として本種が非常に小型であることがあげられる．実際に群飛をしている ♂ は蚊柱のようだった．また 9 月下旬～10 月上旬に出現することなど他のヒゲナガガと比較して出現時期が遅いことも気付かれにくかった理由の 1 つであろう．本種は現時点では高尾山麓の初沢山でしか確認されていないが，その周辺や日本各地にも生息している可能性があるため，注意を喚起したい．

(Received February 16, 2024. Accepted March 16, 2024)