



First Record of *Atrichopogon (Psilokempia) palmatus* Tokunaga, 1962 (Diptera: Ceratopogonidae) from Taiwan

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ABSTRACT

The biting midge *Atrichopogon (Psilokempia) palmatus* Tokunaga, 1962 is recorded from Taiwan for the first time. The identification is supported by the distinctive caudomedian palmate projection on the female 7th sternite. This record extends the known distribution of the species to the southernmost limit of its range within the East Asian arc. Both sexes are described, and their key diagnostic characters are illustrated. Biological features of the species, including habitat preference and nocturnal behavior, are discussed based on available occurrence records.

Key words: Biting midges, morphological characteristics, *Psilokempia*, soil emergence trap, urban green space

The genus *Atrichopogon* Kieffer, 1906 (Diptera: Ceratopogonidae: Forcipomyiinae) comprises 513 species worldwide (Borkent and Dominiak, 2020). Members of this genus are widely distributed and commonly inhabit moist terrestrial environments. Adult females of this genus primarily feed on haemolymph of other insects to support ovarian development (Downes, 1958; Glukhova, 1989; Szadziewski *et al.*, 1997; Borkent and Rocha-Filho, 2006). Notably, some species have also been observed feeding on pollen, which provides a protein-rich resource for females (Downes, 1955; Szadziewski, 2001). In addition, several *Atrichopogon* species also act as pollinators

(Kaufmann, 1975; Winder, 1997; de Santana *et al.*, 2023). Despite its global diversity, the genus has received little attention in Taiwan, where only 12 valid species are currently recognized. These species were originally described in the early 20th century by Kieffer (1912, 1916a, b, 1918, 1921, 1922) and Tokunaga (1940a, b), and subsequently revised by Szadziewski and Dominiak (2009). To investigate the evolution of feeding habits in *Atrichopogon* and to clarify its ecological roles in Taiwan, taxonomy provides a crucial framework.

Between 2023 and 2024, specimens of *Atrichopogon* were collected using soil emergence traps (60 cm × 60 cm × 60 cm,



Fig. 1. A soil emergence trap in the habitat of *Atrichopogon (Psilokempia) palmatus*.

MegaView, Taiwan, model BT2016) (Fig. 1) that were set in the urban green spaces of the National Museum of Natural Science, Taichung, Taiwan. The obtained *Atrichopogon* specimens were examined under a Leica EZ4 microscope (Wetzlar, Germany), and measurements and photographs were taken using a VHX-7000N digital microscope (Keyence Corporation, Japan). Species identifications were based on the works of Yu *et al.* (2005), Szadziwski and Dominiak (2009), and He *et al.* (2024). The examined material contained individuals of *A. (Psilokempia) palmatus* Tokunaga, 1962. The present paper reports this species from Taiwan for the first time.

Adult morphological terminology follows Yu *et al.* (2005). The following abbreviations for ratios of measurements are used: antennal ratio (AR), palpal ratio (PR), tarsal ratio (TR), costal ratio (CR), tarsus1/tarsus2 of foreleg (FTR), Tarsus1/tarsus2 of middle leg (MTR), and Tarsus1/tarsus2 of hind leg (HTR). The specimens were preserved in ethanol and have been deposited in the National Museum of Natural Science (NMNS), Taichung, Taiwan.

***Atrichopogon (Psilokempia) palmatus*
Tokunaga 掌葉裸蠓 (Fig. 2)**

Atrichopogon palmatus Tokunaga, 1962: 160.

Atrichopogon sentus Yu and Qi, 1990: 218 in Liu, Qi and Yu, 1990.

Diagnosis. Adult scutellum with two submedian bristles (Fig. 2E, arrow) and four to five setae on posterior margin. Female with a single elliptical spermatheca; 7th abdominal sternite with a palmate projection caudomedially; 8th sternite with two pairs of wing-like projections, outer one longer; 9th sternite with a pair of projections (Fig. 2F). Male with upper part of paramere depressed; base of aedeagus higher than paramere (Fig. 2G).

Specimens examined. 6♂6♀, TAIWAN. TAICHUNG: green space of NMNS, 5–19.IX.2024, soil emergence trap, C. C. Fan-Jiang and C. L. Chung leg.; 1♂, same but 6.IX–11.X.2024; 1♀, same but 12–26.IX.2024; 1♀, same but 4–18.X.2023, T. Y. Lin leg.; 1♀, same but 15–29.XI.2023, T. Y. Lin leg.

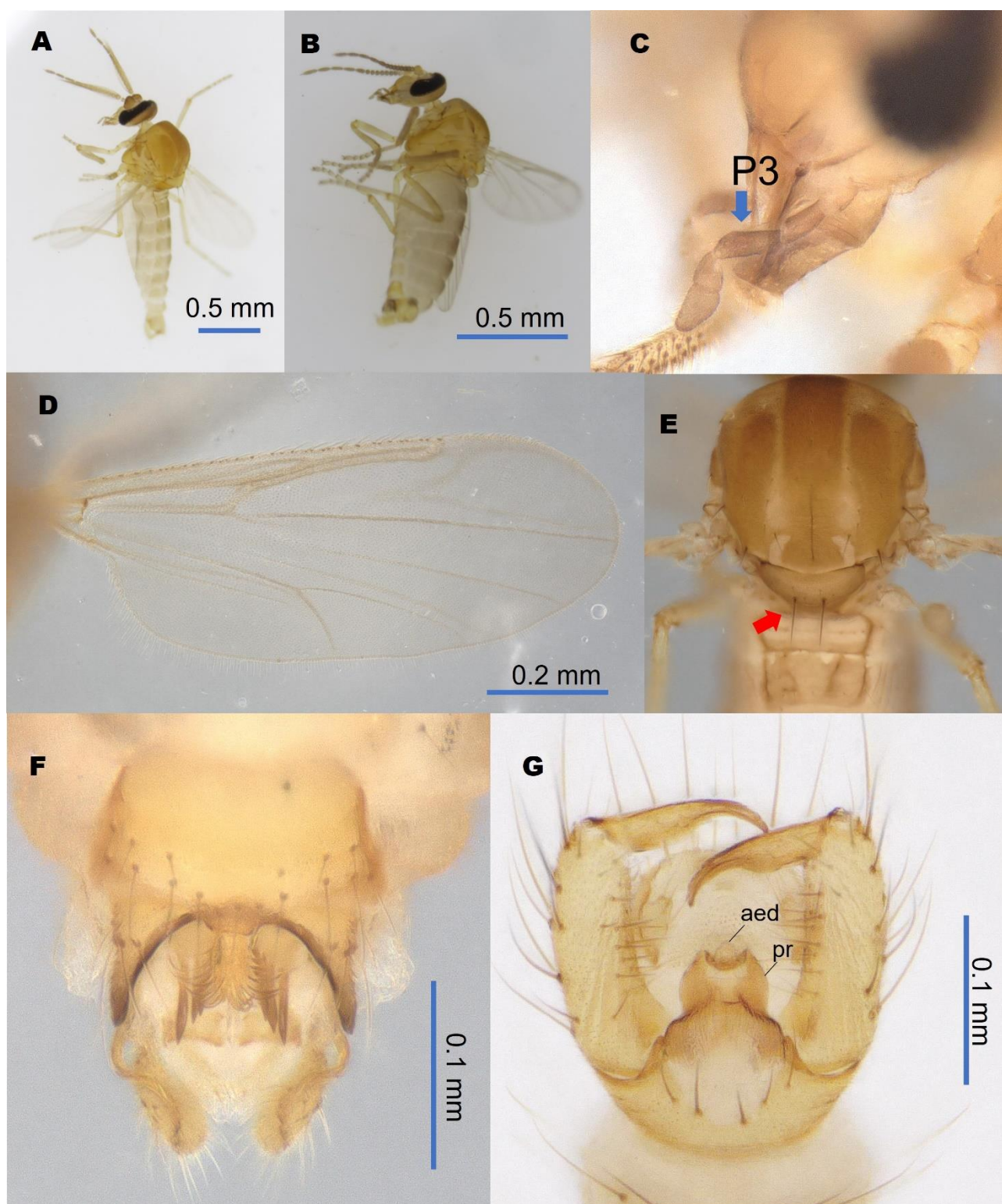


Fig. 2. *Atrichopogon (Psilokempia) palmatus* (A) male, lateral view; (B) female, lateral view; (C) left palpus of female, P3: third palpomere (blue arrow); (D) right wing of female, dorsal view (E) scutellum of female, two bristles shown by red arrow, (F) female abdomen (segments VII to X), ventral view; (G) male genitalia, ventral view, pr = paramere, aed = aedeagus.

The female was previously described by Tokunaga (1962) and Yu *et al.* (2005), the male by He *et al.* (2024). Measurements of the specimens from Taiwan: body size 1.90 (1.88–

1.93) mm in male (n = 5, Fig. 2A), 1.57 (1.46–1.62) mm in female (n = 5, Fig. 2B); length of flagellomeres I–XIII: 45, 37, 37, 37, 37, 39, 41, 42, 41, 66, 85, 76, 106 μ m, AR = 1.04 (0.99–1.06)

in male ($n = 5$) and 34, 28, 26, 26, 24, 25, 26, 29, 59, 68, 70, 76, 96 μm , $\text{AR} = 0.87$ (0.80–0.92) in female ($n = 5$); length of palpal segments I–V: 35, 32, 48, 27, 43 μm , $\text{PR} = 2.95$ (2.56–3.20) in male ($n = 5$), 31, 32, 45, 31, 35 μm , PR (Fig. 2C) = 2.47 (2.00–3.06) in female ($n = 5$); wing length: 1,084 μm , $\text{CR} = 0.69$ (0.66–0.72) in male ($n = 5$) and 1,044 μm , $\text{CR} = 0.70$ (0.68–0.72) in female ($n = 5$, Fig. 2D); leg: $\text{FTR} = 3.7$ (3.2–4.4), $\text{MTR} = 3.2$ (2.9–3.5), $\text{HTR} = 2.8$ (2.6–3.0) in male ($n = 5$), $\text{FTR} = 3.2$ (3.0–3.5), $\text{MTR} = 3.4$ (2.5–4.4), $\text{HTR} = 2.7$ (2.4–3.1) in female ($n = 5$).

Distribution. JAPAN: Ryukyu and Honshu (Tokunaga, 1962); CHINA: Gansu and Hainan (Liu *et al.*, 1990; He *et al.*, 2024); TAIWAN: Taichung (**new record**).

Remarks. The remarkable projection of the female 7th sternite is the diagnostic character for the subgenus *Psilokempia* Enderlein, 1936. Only one species of the subgenus, *Atrichopogon* (*P.*) *myrmedon* Kieffer, 1921, has been recorded from Taiwan (Szadziwski and Dominiak, 2009). The female of *A. (P.) palmatus* is easily distinguished from *A. (P.) myrmedon* by the projection on the 7th sternite (Fig. 2F), whereas the latter species exhibits only a single, finger-like caudomedian process on the 7th sternite. *Atrichopogon (P.) palmatus* has been reported from Gansu and Hainan of China and the Ryukyus of Japan. The new record from Taiwan represents the southernmost known locality of the species in the East Asian arc. Scattered records across a vast area suggest the species is likely widely distributed throughout southern China. The ecology of *A. (P.) palmatus* can be inferred from the collection methods. He *et al.* (2024) collected both sexes using light traps in forests of mountainous areas (~600 m above sea level), suggesting that the species is attracted to light and may be nocturnal. In the present study, adults of both sexes were collected from soil emergence traps, indicating a larval habitat preference and suggesting their potential for occurrence in human-affected environments, such as urban green spaces at low elevations (<50 m above sea level).

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掌葉裸蠓 (*Atrichopogon (Psilokempia) palmatus* Tokunaga, 1962) (雙翅目：蠓科) 的臺灣新紀錄

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摘 要

本研究根據調查之裸蠓 (*Atrichopogon*) 物種雌蟲第七腹節具有掌葉狀突起，將之鑑定為掌葉裸蠓 (*Atrichopogon (Psilokempia) palmatus* Tokunaga, 1962)，此為該物種於臺灣的首次紀錄，亦為東亞島弧之最南端分布。另根據物種的發生資料，探討其棲息地與夜行性等生物學特徵。

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