

# A new species of *Didactylomyia* Felt (Diptera: Cecidomyiidae) from Guangxi, China

Rui MA<sup>1\*</sup>, Chen XU<sup>1\*</sup>, Xianru ZENG<sup>2</sup>, Qili LI<sup>2</sup>, Dewei WEI<sup>2①</sup>, Wenjun BU<sup>3</sup>, Kelong JIAO<sup>1,3②</sup>

1. Department of Plant Protection, College of Horticulture and Landscape, Tianjin Agricultural University, Tianjin 300392, China

2. Plant Protection Research Institute, Guangxi Academy of Agricultural Science; Key Laboratory of Green Prevention and Control on Fruits and Vegetables in South China, Ministry of Agriculture and Rural Affairs; Guangxi Key Laboratory of Biology for Crop Diseases and Insect Pests, Nanning, Guangxi 530007, China

3. Institute of Entomology, College of Life Sciences, Nankai University, Tianjin 300071, China

**Abstract:** A new Oriental species belonging to the subfamily Cecidomyiinae, *Didactylomyia dayaoensis* sp. nov., collected from Dayao Mountain in Guangxi Zhuang Autonomous Region of China, is described, illustrated and photographed. It is the first record of the supertribe Stomatosematidi as well as the genus *Didactylomyia* Felt, 1911 from Guangxi. This new species is characterized by the unique aedeagus with the basal 1/5 extremely broadened and the apex slightly swollen to be rounded. The generic diagnosis is revised to include this new species. A comparison between the new species and the other Oriental congeners as well as the two endemic cecidomyiid species reported in Guangxi is provided.

**Key words:** Stomatosematidi; Stomatosematidi; taxonomy

## 中国广西指瘿蚊属 *Didactylomyia* 一新种记述 (双翅目: 瘿蚊科)

马睿<sup>1\*</sup>, 徐晨<sup>1\*</sup>, 曾宪儒<sup>2</sup>, 李其利<sup>2</sup>, 韦德卫<sup>2①</sup>, 卜文俊<sup>3</sup>, 焦克龙<sup>1,3②</sup>

1. 天津农学院园艺园林学院植物保护系, 天津 300392; 2. 广西壮族自治区农业科学院植物保护研究所; 农业农村部华南果蔬绿色防控重点实验室; 广西作物病虫害生物学重点实验室, 广西 南宁 530007; 3. 南开大学生命科学学院昆虫学研究所, 天津 300071

**摘要:** 首次报道指瘿蚊属 *Didactylomyia* Felt, 1911 在中国广西壮族自治区的分布, 记述采自大瑶山的 1 新种: 大瑶指瘿蚊 *Didactylomyia dayaoensis* sp. nov., 作为咀瘿蚊总族在我国广西的首纪录, 该新种阳茎其近基部 1/5 处明显加宽且端部仅略膨大, 可明显区别于属内其他种。文中对指瘿蚊属的属征进行了修订, 并对该新种与同属东洋区种类以及广西地区的瘿蚊特有种进行了比较讨论。

**关键词:** 瘿蚊亚科; 咀瘿蚊总族; 分类

## Introduction

The genus *Didactylomyia*, comprised of 12 described species since its erection by Felt

Accepted 9 May 2023. Published online 14 September 2023. Published 25 September 2023.

① Corresponding authors, E-mails: wdw@gxaas.net; jiaokelong@163.com

\* These authors contributed equally to this work as the first author.

(1911), is the second largest genus in the smaller supertribe Stomatosematidi of the subfamily Cecidomyiinae, just after *Stomatosema* Kieffer including 26 species (Gagné & Jaschhof 2021). Before this study, the cosmopolitan type species, *Didactylomyia longimana* (Felt, 1908), and the Indian *D. conspicua* Grover & Bakhshi, 1978 were the only two known species distributed in the Oriental Region, with the former also being the first species recorded in China by Bu and Li (2003). In Southern China, another new congener, *Didactylomyia dayaoensis* **sp. nov.**, was recently discovered from Dayao Mountain, Jinxiu Yao Autonomous County, Laibin, Guangxi Zhuang Autonomous Region. It is also the first record of the supertribe Stomatosematidi as well as the genus *Didactylomyia* in Guangxi. This new species is described, illustrated and photographed. A comparison is provided between the new species and the other Oriental congeners as well as the two endemic cecidomyiid species reported in Guangxi, China. A revised generic diagnosis of *Didactylomyia* is provided.

## Material and methods

The adult midge specimens were preserved in 90% ethanol in the field immediately after collection by Malaise traps. For morphological observation, all the ethanol-preserved specimens were dissected into four parts: head, thorax without wings, abdomen, and wings. They were then mounted on slides using Canada balsam. The morphological terminology follows Gagné (1981). The holotype and paratype are both deposited in Institute of Entomology, College of Life Sciences, Nankai University (NKUM), Tianjin, China. All the figures are based on the holotype of this new species (slide number: NKUCecid. No. SDD001), Figs 1, 2 are line drawings and Fig. 3 is photographed by microscope and photomontaged by Auto-Montage software (Helicon Focus 5.3 Pro).

## Taxonomy

### *Didactylomyia* Felt, 1911

*Didactylomyia* Felt, 1911: 39. Type species: *Colpodia longimana* Felt, 1908.

*Hallomyia* Kieffer, 1912: 25. Type species: *Hallomyia iris* Kieffer, 1912.

Revised Diagnosis. Eyes holoptic on vertex. Ocelli absent. Palpus with 4 segments. Antenna having 13 fixed flagellomeres, all uninodal with prolonged neck and subcylindrical node except for the last one with an elongate and narrow apical process, first and second fused. Vein Rs complete, and as strong as vein R<sub>5</sub>. R<sub>5</sub> joining vein C beyond the wing apex. Vein CuA forked. Legs having five tarsomeres, with the first one distinctly much shorter than the second one. All tarsal claws toothed with the empodia upward curved. Male genitalia with the splayed and elongate gonocoxites free, not fused ventrally, with the gonostylus greatly prolonged and extremely slender. Male cerci, hypoproct, aedeagus and gonocoxal mediobasal lobes all greatly reduced, much shorter than half length of gonocoxite. Gonocoxites having only one gonocoxal mediobasal lobe away from aedeagus, dorsally divided into two distinct sublobes: one longer and slender and the other shorter and stouter. Female ovipositor with the cerci two-segmented.

Comments. The latest diagnosis of the genus *Didactylomyia* was provided by Fedotova

(2011). In this paper, the generic diagnosis is revised to show a more detail to include the new species. *Didactylomyia* is characterised in the supertribe Stomatosematidi by the representative greatly-reduced cerci, hypoproct, aedeagus and gonocoxal mediobasal lobes in males, less than half length of gonocoxite. This genus is also distinguishable from the other Stomatosematidi genera by the unique following combination of three characters: male gonostylus greatly prolonged and extremely slender; male gonocoxal mediobasal lobe dorsally with one longer and slender sublobe and another shorter and stouter sublobe; and female cerci two-segmented.

***Didactylomyia dayaoensis* Jiao, Wei & Bu sp. nov.** (Figs 1–3)

<http://zoobank.org/urn:lsid:zoobank.org:act:DDBAF657-E751-4171-BEEA-6367B5B7E81A>

Description. Body color light yellow. Body length: 1.58–1.60 mm ( $n = 2$ ). Wing length (measured from the base): 1.56–1.58 mm ( $n = 2$ ). Wing width: 0.60–0.61 mm ( $n = 2$ ).

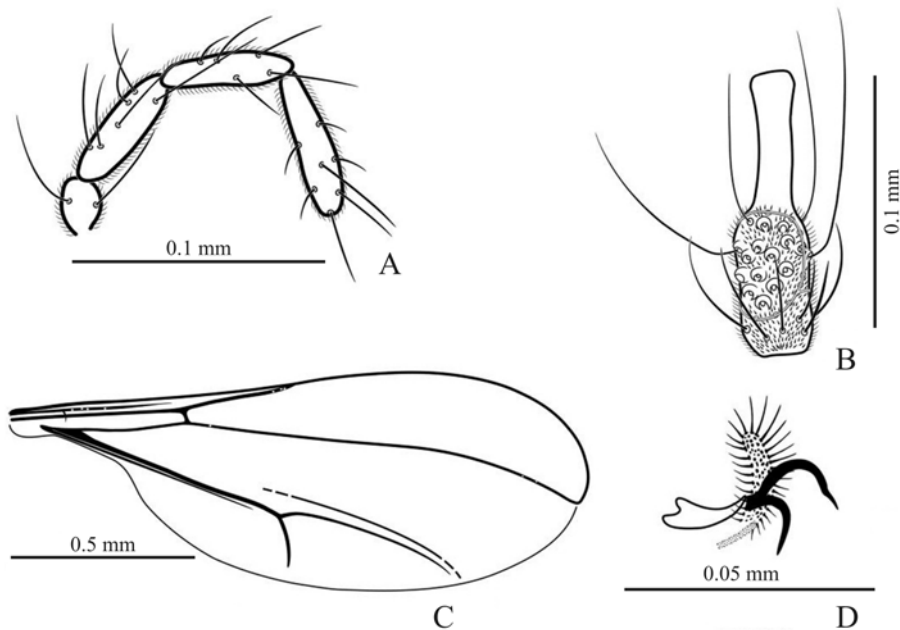


Figure 1. *Didactylomyia dayaoensis* sp. nov. (Male holotype, NKUCecid. No. SDD001). A. Palpus, lateral view; B. Third flagellomere, ventral view; C. Wing, dorsoventral view; D. Fore tarsal claw with empodium and pulvillus, lateral view.

Head (Figs 1A, 1B, 3A). Eye bridge 7–8 facets long in the middle of vertex. Palpus sparsely setose, with the last three segments much longer than the first (Figs. 1A, 3A). Scape larger than pedicel, both covered with setae ventrally. All flagellomeres (Figs. 1B, 3A) with the node covered with a dozen of horseshoe-shaped alveoli at the distal 2/3 and microtrichia elsewhere; each node with one lap and half lap of mostly latitudinal, appressed, band-shaped circumfila, subbasally and subapically respectively, linked by two similar longitudinal circumfila, and 2 whorls of long, strong, and irregular setae, one at the subbasal and the other at the subapex. 3rd male flagellomere (Fig. 1B) with the node 2.02–2.09 times as long as wide and the neck 3.84–4.00 times as long as wide, 0.91–0.94 times length of node.

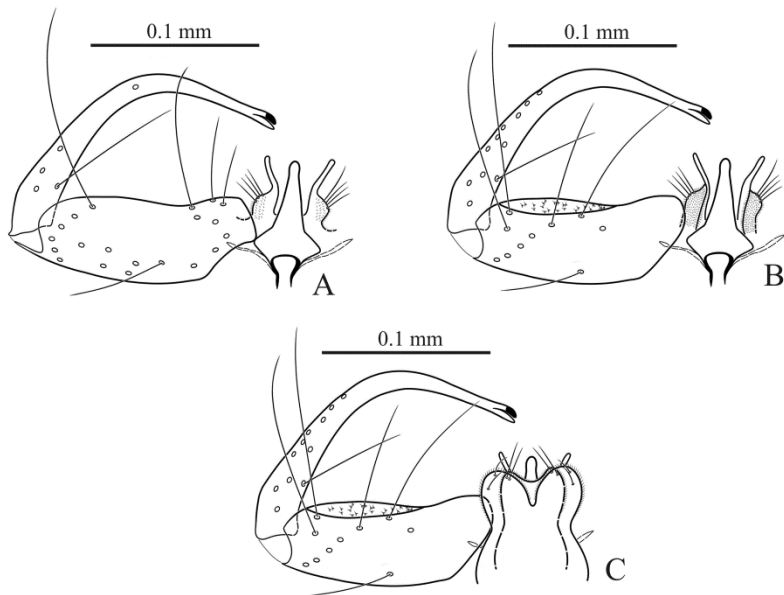


Figure 2. *Didactylomyia dayaoensis* **sp. nov.** (Male holotype, NKUCecid. No. SDD001). A. Genitalia, cerci, hypoproct and right gonopod removed, ventral view; B. Genitalia, cerci, hypoproct and right gonopod removed, dorsal view; C. Genitalia, right gonopod removed, dorsal view.

Thorax (Figs 1C, 1D, 3B–D). Thorax with one persistent and distinctly dark stripe along lateral side (Fig. 3B). Wing (Figs 1C, 3C) hyaline, 2.57–2.58 times as long as wide, sparsely covered with narrow scales and setose. Rs complete, and as strong as C, R<sub>1</sub> and R<sub>5</sub>; Sc weak, with four pores at distal half; R<sub>1</sub> bent upward, joining C at the half wing, with three pores at subdistal; R<sub>5</sub> bent upward at basal 1/4 and backward at distal 1/3, joining C beyond the wing apex, with one pore at basal 1/3 and two pores at distal 1/8; M<sub>3</sub> so weak as to be almost invisible both at basal half and the distal; CuA forked, vein CuP parallel with the base of CuA. Legs densely covered with narrow scales and sparse setae, hindleg distinctly longer than foreleg and midleg. Tarsal claw (Figs 1D, 3D) normally curved inward from the base to the subapex except for the apex almost straight, all with a longer basal tooth; empodium upward curved, setulose, as long as the claw; pulvillus cylindrical, much shorter than 1/2 length of the claw.

Abdomen (Fig. 3E). Each tergite and sternite covered uniformly with scales. First to seventh tergites stripe-shaped, with a regularly single, posterior row of setae, with several lateral setae and central setae; seventh tergite narrower than sixth; eighth tergite similar to seventh but distinctly narrower. Second to sixth sternites subrectangular with an irregular but mostly single, posterior row of setae, and covered with many scattered lateral and central setae except for second and third ones having only with few lateral and central setae; seventh sternite as sixth but narrower, covered with many more lateral and central setae; eighth sternite as seventh but much narrower. Male genitalia (Figs 2A–C, 3F): gonocoxite slender, covered with many scattered longer setae, with only one gonocoxal mediobasal lobe dorsally divided into two structurally distinct sublobes: one longer, slender, glabrous sublobe distinctly longer than aedeagus, and the other shorter, stouter, setulose sublobe approximately half length of the former, covered with four distinct elongate setae along lateral side; gonostylus

distinctly longer than gonocoxite and able to reach the apex of aedeagus, curved sharply inward at the distal 2/5, with sparse setae at the basal 3/5, and distally with a strongly sclerotized tooth and a slender spindle-shaped lobe just below the tooth; cerci moderately separated with a Y-shaped depression forming two elliptoid lobes with two apical setae; hypoproct approximately as long as cerci, emarginated with a wider and shallower depression forming two broad subtriangular lobes, each with two prolonged setae; aedeagus gradually tapered from the basal 2/5 to subapex, with the basal 1/5 extremely broadened and the apex slightly swollen to be rounded.

Female is unknown.

**Holotype.** ♂, **China**, Guangxi, Laibin, Jinxiu Yao Autonomous County, Dayao Mountain, Huawang Mountain Villa, 24.02°N, 110.12°E, 15–17-IV-2002, Huaijun XUE leg., altitude 400 m, Malaise trap, NKUCecid. No. SDD001. **Paratype.** 1♂, same data as holotype, NKUCecid. No. SDD002. The holotype and paratype are both deposited in NKUM.

**Etymology.** The specific epithet *dayaoensis* refers to Dayao Mountain where this new species was discovered.

**Diagnosis.** This new species *Didactylomyia dayaoensis* **sp. nov.** is characterized by the unique aedeagus gradually tapered from the basal 2/5 to subapex, with the basal 1/5 extremely broadened and the apex slightly swollen and rounded.

**Remarks.** In the genus *Didactylomyia*, the male *D. dayaoensis* **sp. nov.** can be identified by the uniqueness of the irregularly-tapered aedeagus. This new species is also distinguishable from the other congeners by the combination of gonostylus distinctly longer than gonocoxite, able to reach the apex of aedeagus and curved sharply inward at the distal 2/5, gonocoxal mediobasal lobe distinctly longer than aedeagus but the basal width of former close to the middle width of the latter. And the cosmopolitan *D. longimana* (Felt, 1908) is the closest to this new species with similar male flagellomeres, thoracic dark lateral stripe, male hypoproct and aedeagus apex, but differs from this new species by its gonostylus shorter than gonocoxite so as not to reach the apex of aedeagus and curved sharply inward at the distal 1/3, aedeagus distinctly longer than gonocoxal mediobasal lobe, but the basal width of the latter narrower than the middle width of the former, the longer and slender gonocoxal mediobasal sublobe having several elongate apical setae. With respect to the Indian *D. conspicua* Grover & Bakhshi, it is easy to spot that its aedeagus is approximately as long as gonocoxal mediobasal lobe, and the shorter, stouter, setulose gonocoxal mediobasal sublobe has no elongate setae. In *D. dayaoensis* **sp. nov.**, besides the morphological characters of gonocoxite, gonostylus and aedeagus mentioned above, the gonocoxal mediobasal lobe has the longer and slender sublobe wholly glabrous without any setae, and the other shorter, stouter, setulose sublobe is covered with four distinct elongate setae along lateral side.

With regard to the two endemic cecidomyiid species previously recorded in Guangxi, China below (Jiao *et al.* 2016, 2018; Gagné & Jaschhof 2021), *Pennaticoxita tauricornuta* Jiao & Bu is characterised by its peculiar gonocoxite with a wing-shaped dorsal lobe and a sub-frustoconical mediobasal lobe as well as unforked CuA vein, and *Procontarinia fructiculi* Jiao, Wang, Bu & Kolesik by its gonocoxite with a heavily sclerotized, rounded and setulose mediobasal lobe as well as the male cerci nearly entirely fused. In contrast, *D. dayaoensis* **sp. nov.** possesses a complete, strong Rs vein and two divided gonocoxal mediobasal sublobes.

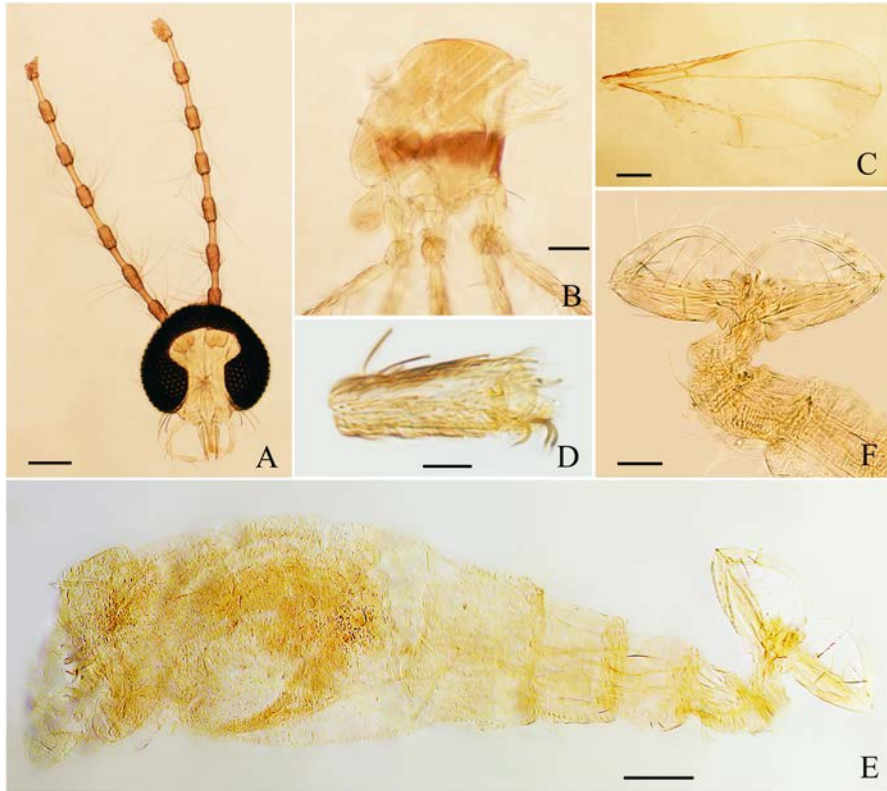


Figure 3. *Didactylomyia dayaoensis* **sp. nov.** (Male holotype, NKUCecid. No. SDD001, photomontaged by Auto-Montage Essentials software). A. Head with basal part of the antenna, anterior view; B. Thorax, wings and distal part of legs removed, lateral view; C. Wing, dorsoventral view; D. Fore fifth tarsomere with tarsal claw, lateral view; E. Abdomen, ventral view; F. Genitalia and abdominal segment 8, ventral view. Scale bars = 100  $\mu\text{m}$  (A, B); 200  $\mu\text{m}$  (C); 20  $\mu\text{m}$  (D); 100  $\mu\text{m}$  (E); 50  $\mu\text{m}$  (F).

As for the biology, compared to other genera in the subfamily Cecidomyiinae valued for their economic importance, all the larvae of the genus *Didactylomyia* remain unknown so far. More interestingly, the adults of *D. longimana* had been recorded as a cleptoparasite feeding on the fluid-covered prey being consumed by spiders on webs (Sivinsky & Stowe 1981). Therefore, there is still much more to discover about the biology of these *Didactylomyia* species both in Oriental Region and around the world.

### Acknowledgements

We are grateful to Prof. Huaijun XUE (Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, China) for collecting specimens from Dayao Mountain, Guangxi, China. This study was supported by the Major Science and Technology Projects of Guangxi (AA17202018) and Guangxi Key Laboratory Foundation for Crop Disease and Pest Biology (22-035-31-22ST04).

## Nomenclatural acts

The ZooBank Life Science Identifier (LSID) for this publication is: <http://zoobank.org/urn:lsid:zoobank.org:pub:7F4ECCA2-542F-46ED-BBCF-9C667C419D73>.

## References

- Bu W & Li J. 2003. Diptera: Cecidomyiidae (1). In: Huang B (Ed.), *Fauna of Insects in Fujian Province of China, Vol. 8*. Fujian Science and Technology Publishing House, Fuzhou, pp. 135–141.
- Fedotova ZA. 2011. Gall midges of the supertribe Didactylomiina (Diptera, Cecidomyiidae, Stomatosematidi) with descriptions of new taxa from Russian Far East. *International Journal of Dipterological Research*, 22: 11–53.
- Felt EP. 1908. Appendix D. In his 23d report of the State Entomologist on injurious and other insects of the State of New York 1907. *New York State Museum Bulletin*, 124: 286–422, 489–510.
- Felt EP. 1911. A generic synopsis of the Itonidae. *Journal of the New York Entomological Society*, 19: 31–62.
- Gagné RJ. 1981. Chapter 16, Cecidomyiidae. In: McAlpine JF *et al.* (Eds.), *Manual of Nearctic Diptera. Vol. 1*. Research Branch, Ottawa, pp. 257–292.
- Gagné RJ & Jaschhof M. 2021. *A Catalog of the Cecidomyiidae (Diptera) of the World. 5th Edition*. U.S. Department of Agriculture, Washington DC, 813 pp.
- Grover P & Bakhshi M. 1978. On the study of one new genus and thirty-one new species (Cecidomyiidae: Diptera) from India. *Cecidologia Indica*, 12–13: 5–267.
- Jiao K, Han P, Wang Y & Bu W. 2016. General review of the tribe Brachineurini (Diptera: Cecidomyiidae) with description of *Pennaticoxita tauricornuta* gen. & sp. nov. from China. *Zoological Systematics*, 41: 307–314.
- Jiao KL, Wang H, Wei DW, Mo JY, Wang YH, Bu WJ & Kolesik P. 2018. A new species of *Procontarinia* (Diptera: Cecidomyiidae) damaging fruit of mango, *Mangifera indica* (Anacardiaceae), in China. *Zootaxa*, 4413: 368–376.
- Kieffer JJ. 1912. Cecidomyies de Ceylan décrites. *Spolia Zeylanica*, 8: 25–29.
- Sivinsky J & Stowe M. 1981. A kleptoparasitic cecidomyiid and other flies associated with spiders. *Psyche*, 87: 337–348.