

*This contribution is published
to honor Dr. Amnon Freidberg,
a scientist, a colleague and a friend,
on the occasion of his 75th birthday.*

Rediscovery of *Coelodiplosis magnipennis* Kieffer (Diptera: Cecidomyiidae) from Taiwan

RAYMOND J. GAGNÉ

*Systematic Entomology Laboratory, Agricultural Research Service, US Department of Agriculture,
c/o Smithsonian Institution MRC-168, P.O. Box 37012, Washington, DC 20013-7012, USA.
E-mail: rgagne@rcn.com*

ABSTRACT

Specimens of *Coelodiplosis magnipennis* Kieffer (Diptera: Cecidomyiidae), a poorly known species from Taiwan whose types are lost, were discovered among the holdings of the National Museum of Natural History in Washington, DC. The species is redescribed and illustrated for the first time. The species is especially noteworthy for its giant gonopods.

KEYWORDS: Cecidomyiinae, Cecidomyiidi, gall midges, Oriental Region, biodiversity, redescription.

INTRODUCTION

While sorting unidentified gall midges (Diptera: Cecidomyiidae) in the insect collection of the National Museum of Natural History in Washington, DC (USNM), I found four specimens with especially large gonopods (Fig. 1) from Taiwan that belong to the supertribe Cecidomyiidi. All four specimens were separately collected from 1927 to 1934 in Formosa, now Taiwan. Running the specimens in the key to genera in Kieffer (1913*b*) brought me directly to *Coelodiplosis* Kieffer, 1913, a genus known from a single species, *Coelodiplosis magnipennis* Kieffer, 1913. This species was based originally on three males that also came from Taiwan. Although no illustrations accompanied the original and subsequent papers by Kieffer (1913*a, b*), his written descriptions of the taxon, particularly the details of the giant terminalia, are in every way comparable to the four specimens in the USNM that I now attribute to this species. Further mention of *C. magnipennis* until now is found only in keys and catalogs, including Kieffer (1913*b*), Felt (1925) and Gagné & Jaschhof (2017).

I presume that the syntypes of this species are lost. Nothing remains of Kieffer's types except those for which his correspondents paid return postage or the few that he gave visiting scientists. That he did not do overmuch for the preservation of the vast number of species he described reflects in large part the lack of wherewithal and facilities available to him for the task (Gagné 1994).

I am pleased to honor Dr Amnon Freidberg by redescribing and illustrating this species. Amnon Freidberg has had an abiding interest in cecidomyiids, and might have worked on them himself had he been aware of them prior to his seduction by Tephritidae. Early on he expressed to me his astonishment at the large number and diversity of gall midges he encountered on his extensive travels and how he hoped to interest someone to work on them. For finding an excellent student to take on that group he deserves thankful recognition from all those who work on gallmidgery.

MATERIALS AND METHODS

Two of the four specimens available were mounted for study in Canada balsam using techniques outlined in Gagné (1989). Drawings were made with the use of a camera lucida attached to a Wild phase contrast microscope. A third specimen, lacking head and limbs, was mounted on an SEM stub and its terminalia photographed with a Zeiss EVO MA15; a fourth specimen remains mounted on a paper triangle. It was photographed using a Canon 5 DSR with 65 mm lens and Visionary Digital Image, stacked using Zerene. All four specimens are deposited in the insect collection of the National Museum of Natural History in Washington, DC (USNM). A glossary of adult morphological terms can be found in Gagné (2018a).

TAXONOMY

Genus *Coelodiplosis* Kieffer, 1913

Type species: *Coelodiplosis magnipennis* Kieffer, 1913. Monobasic.

Diagnosis: Among Cecidomyiidae *Coelodiplosis* belongs to the supertribe Cecidomyiidi because of the regular 12 flagellomeres, each divided in the male into a basal and a distal node, the two nodes separated by a cylindrical internode, the distal node of each flagellomere except the last ending in a cylindrical neck, the basal node with a single looped circumfilum, the distal with two looped circumfila (Fig. 2). The genus is distinctive for its extremely large gonopods (Fig. 1). This condition is not unique in Cecidomyiidae but is rare and sporadic (Gagné 2018b). Other Cecidomyiidi with large gonopods include the genera *Ametrodiplosis* Rübsaamen, *Gigantodiplosis* Fedotova and *Thaumadiplosis* Gagné, none of which shows any apparent similarity to the others or to *Coelodiplosis*. Unique particularities of the terminalia include the shape of the hypoproct, aedeagus and gonostylus, including its remarkably peculiar distal “tooth” that has the appearance of the end of an open box of thin spaghetti (Fig. 11). Additional distinguishing attributes of *Coelodiplosis* are the absence of a dorsal occipital protuberance, the large wings (Fig. 1) with Rs vein reduced to a stub and closer to the arculus than to the end of R_1 , the hind legs nearly twice the length of the wing, and claws that are untoothed and evenly curved (Fig. 4). The genus is classified among the 147 other genera not now assignable to a particular tribe within the supertribe Cecidomyiidi.

Coelodiplosis magnipennis Kieffer, 1913

(Figs 1–11)

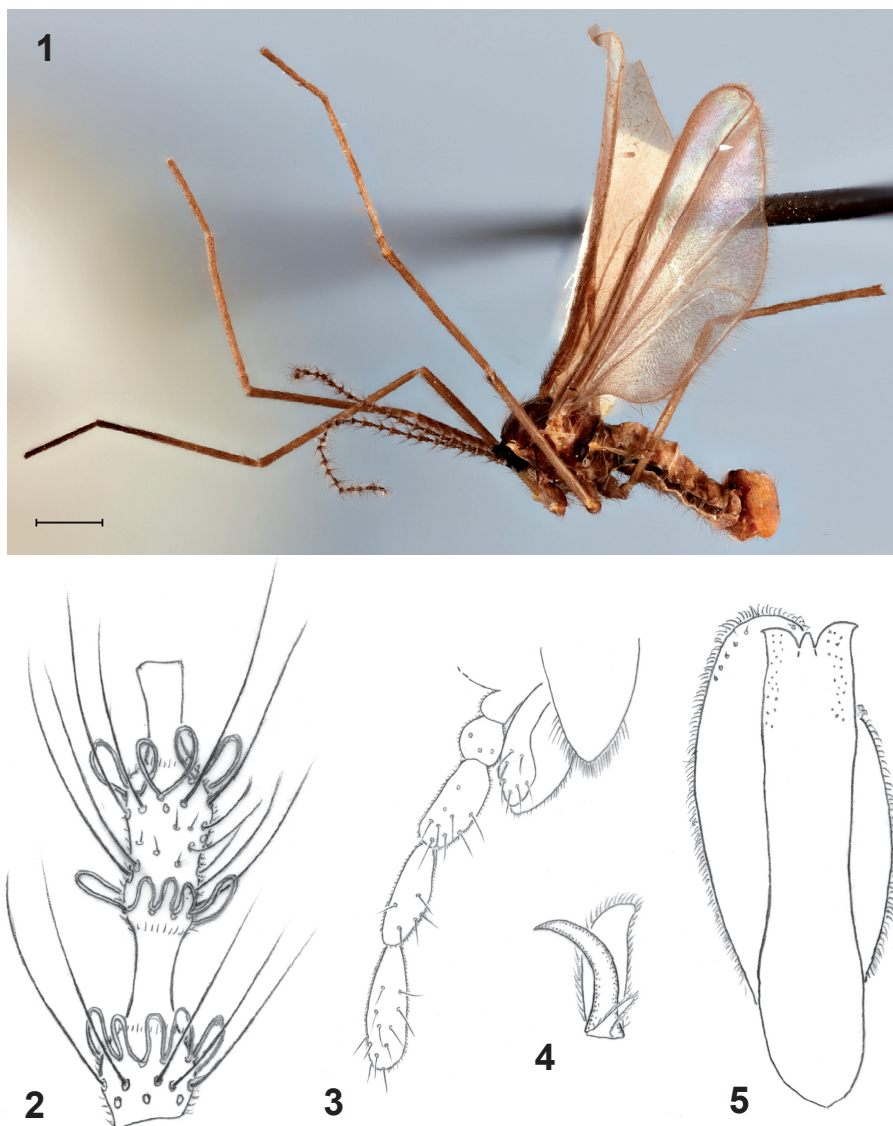
Coelodiplosis magnipennis: Kieffer 1913a: 43 (3♂ syntypes, Taihorin, Formosa [Taiwan], H. Sauter (presumed lost)).

Description: *Male*. Body of dried, pinned specimens brown, terminalia yellow-brown, wings covered with fuscous microtrichia. Head: Eyes large, nearly connate; eye bridge about 7 facets long; facets circular, closely approximated except separated at vertex by diameter of $\frac{1}{2}$ to 1 facet. Occiput without dorsal protuberance. Antenna with 12 flagellomeres, all binodal (Fig. 2) but 12th with a narrow apical prolongation, basal node shorter than distal, with 1 circumfilum, distal node with 2, circumfila all with uniformly short loops; internode and necks long, each about as long as basal node (Fig. 2). Frons with 6–8 strong setae on each side. Mouthparts (Fig. 3): Labella broad in frontal view, with several short, thin setae; palpus 4-segmented with scattered, uniformly thin setae of similar size as on labella, without scales, palpiger prominent.

Thorax: Scutum with 4 discrete longitudinal ranks of setae, median ranks with mostly 2 rows of continuous setae, lateral ranks with multiple rows but interrupted near midlength. Scutellum covered with setae on dorsum. Thoracic pleura bare except for 19–23 setae ($n=2$) on anepimeron. Wing (Fig. 1): length, 5.0–5.3 mm ($n=2$); C broken at juncture with R_5 ; R_5 strongly curved apically to join C posterior to wing apex; R_s reduced to stub, closer to arculus than to apex of R_1 ; wing fold faint; M_4 and CuA forming a fork. Legs: equally slender throughout, elongate, hindleg nearly twice wing length; acromere (Fig. 4) with robust, gradually and gently curved claws lacking basal tooth, empodia as long as claws, pulvilli about $\frac{1}{4}$ as long as claws.

Male abdomen: Tergites 1–6 entire, rectangular, each with mostly double, closely-set row of setae along posterior margin, a group of many lateral setae, a pair of widely spaced anterior trichoid sensilla, and elsewhere covered with long setiform scales; tergite 7 with posterior third membranous and consequently without posterior rows of setae, with group of lateral setae on each side, anterior pair of trichoid sensilla and setiform scales covering anteromesal $\frac{2}{3}$; tergite 8 foreshortened, bare except for a few anterolateral setae on each side and pair of trichoid sensilla anteriorly. Sternites 2–8 with several rows of strong posterior setae, and pair of closely set anterior trichoid sensilla, these not visible on sternite 8 of the two available slide-mounted specimens, elsewhere covered with setae and setiform scales. Terminalia (Figs 5–11): cerci partly hidden by ninth tergum (two rounded bulges of Fig. 9), rhomboid, longest laterally, with several short setae near pointed apex and fewer along caudal edge; hypoproct (Fig. 5) elliptical, much longer than cerci, dorsoventrally flattened, thickly covered with long, retrorse microtrichia on both surfaces, with several, short, apicolateral, ventral setae; aedeagus elongate, dorsoventrally flattened, nearly parallel-sided throughout, divided apically into median conical lobe and 2 laterally flared and pointed lobes, distal fourth of aedeagus with about 20 bare papillae on

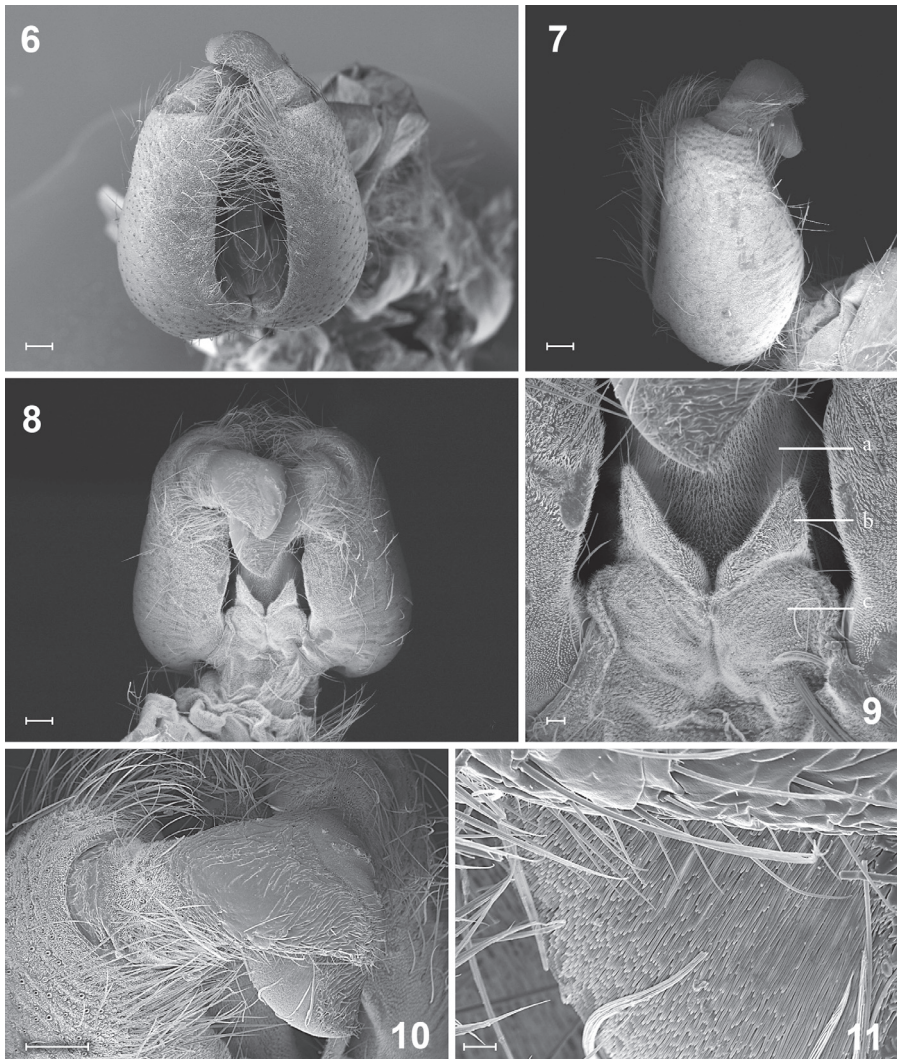
each side; gonopods greatly enlarged, broader than and more than a quarter as long as remainder of abdomen, the gonocoxites (Figs 6–8) cylindrical, inclined towards one another apically, concave mesally, longest apicoventrally, distal fourth more densely covered with stout setae than elsewhere; gonostylus (Figs 8, 10) robust,



Figs 1–5: *Coelodiplosis magnipennis* Kieffer, male: (1) habitus (scale line = 1 mm); (2) third antennal flagellomere, ventral; (3) labrum, labellum and palpus; (4) acromere; (5) aedeagus and hypoproct, ventral.

broad, compressed dorsoventrally, somewhat pinched near $\frac{1}{3}$ of its length, basal third covered with strong setae and microtrichia, distal two thirds with some carinae, glabrous, with short setae laterally and basad of apical tooth, tooth consisting of a multitude of minute, parallel, cylindrical fibers (Fig. 11).

Female, pupa and larva unknown.



Figs 6–11: *Coelodiplosis magnipennis* Kieffer, male terminalia: (6) ventral; (7) lateral; (8) dorsal; (9) detail of triangular cerci with hypoproct in background (a – hypoproct, b – cercus, c – ninth tergum); (10) detail of left gonostylus; (11) detail of structures constituting apical margin of right gonostylus. Scale lines: Figs 6–8, 10 = 100 μ m; Fig. 9 = 20 μ m; Fig. 11 = 10 μ m.

Material examined: 4♂ (USNM), **Taiwan:** “Noko, 8,000 ft, VI-26-1927, S.T. Issiki” (body divided among three slides and glycerin vial (terminalia only); “Mizuho, IV-22-1932, L. Gressitt” (on slide); “Arisan, VI-2-1932, L. Gressitt” (thorax and abdomen only, on SEM stub); “Taiheisan, VII-6-1934, L. Gressitt” (on pin).

Remarks: Kieffer’s three original syntypes were from Taihorin, Formosa, collected by H. Sauter (Kieffer 1913a). These are presumed lost as is most of Kieffer’s type material. Because the four other listed specimens from Taiwan all appear to belong to one species and are referable to Kieffer’s species, there does not appear to be a pressing need to designate a neotype at this time.

It should be of interest to readers that all three collectors of lost and extant material of *C. magnipennis* were noteworthy scientists. Hans Sauter (1871–1943), collector of the original type series, was a German entomologist and ichthyologist, who moved to Formosa (now Taiwan) in 1905 and remained there until his death. Lysley Gressitt (1914–1982), collector of three of the four extant specimens on three separate occasions, was born in Japan and died in an airplane crash in China. He was an outstanding American entomologist and collector of an enormous number of Oriental and Pacific insects (W.C. Gagné 1982). The collector of the fourth extant specimen was Syûti T. Issiki, a Japanese microlepidopterist who served between 1920–1948 as Professor of Agriculture at the Imperial University at Taipei (Davis 1973).

ACKNOWLEDGEMENTS

I thank Mike Althaus (Silver Spring, Maryland, USA) for the final arrangement and labeling of the plates; Alyssa B. Seemann (Systematic Entomology Laboratory, Agricultural Research Service, US Department of Agriculture) for the habitus photograph, Scott Whittaker (Manager, SEM Laboratory, Smithsonian Institution) for assistance with the SEM; and Netta Dorchin (Tel Aviv University, Israel), Keith M. Harris (Ripley, United Kingdom), Mathias Jaschhof (Station Linné, Ölands, Skogsby, Sweden), Peter Kolesik (Bionomics Ltd, Adelaide, Australia), and Makoto Tokuda (Department of Applied Biological Sciences, Saga University, Japan) for their comments on the manuscript.

Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA. USDA is an equal opportunity provider and employer.

REFERENCES

- DAVIS, D.R. 1973. Issiki collection of microlepidoptera to the Smithsonian Institution. *Journal of the Lepidopterists' Society* **27**: 159–160.
<https://www.biodiversitylibrary.org/item/127735#page/473>
- FELT, E.P. 1925. Key to gall midges (A resumé of studies I–VII, Itonididae). *New York State Museum Bulletin* **257**: 3–239, 8 pls.
<https://www.biodiversitylibrary.org/item/262133#page/509/mode/1up>
- GAGNÉ, R.J. 1989. *The plant-feeding gall midges of North America*. Cornell University Press, Ithaca, New York. xi+356 pp.
- 1994. *The gall midges of the Neotropical Region*. Cornell University Press, Ithaca, New York. xv+352 pp.
- 2018a. Key to adults of North American genera of the subfamily Cecidomyiinae (Diptera: Cecidomyiidae). *Zootaxa* **4392**: 401–457.
<http://dx.doi.org/10.11646/zootaxa.4392.3.1>

- 2018*b*. The gall midges (Diptera: Cecidomyiidae) of mountainmints, *Pycnanthemum* spp. (Lamiaceae). *Proceedings of the Entomological Society of Washington* **120**: 748–778.
<https://doi.org/10.4289/0013-8797.120.4.748>
- GAGNÉ, R.J. & JASCHHOF, M. 2017. *A catalog of Cecidomyiidae of the World*. 4th Ed. 762 pp.
https://www.ars.usda.gov/ARUserFiles/80420580/Gagne_2017_World_Cat_4th_ed.pdf
- GAGNÉ, W.C. 1982. J. Linsley Gressitt: his contributions to science and conservation. In: Smith, C.W. (Ed.), *Proceedings of the Fourth Conference in Natural Sciences Hawaii Volcanoes National Park*. 1982 June 2–4; Honolulu. Honolulu (HI): University of Hawaii at Manoa, p 73–75.
<http://hdl.handle.net/10125/18436>
- KIEFFER, J.-J. 1913*a*. Description de deux remarquables cécidomyies de Formose. *Marcellia* **12**: 42–44.
- 1913*b*. Diptera. Fam. Cecidomyiidae. In: Wytzman, P. (Ed.), *Genera insectorum*. Fasc. 152. Bruxelles. 346 pp, 15 pls.

