

博士論文要約 (Summary)

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タイトル	Taxonomic and ecological studies on gall midges (Diptera: Cecidomyiidae) belonging to the tribe Asphondyliini
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キーワード (**Cecidomyiidae**) (**Asphondyliini**) (**Systematics**)

「第 1 章」

The larval and pupal descriptions are essential part of taxonomic papers of gall midges (Diptera: Cecidomyiidae) and their characters are important to identify species and genera of gall midges. The larvae are well-described because they can be obtained under suitable condition from their galls, and their body can be cleared and examined in detail under the light microscopes. In contrast, gall midge pupae have been observed only from the anterior and ventral parts of head and dorsal tergites of abdomen. The pupal thoracic characters, except the prothoracic spiracle, and the abdominal sternites have never reported in descriptions due to the sclerotized antennal, wing, and leg sheaths that cover most of the ventral side and disturbing the observation of characters of the dorsal side comfortably. Use of a scanning electron microscope can partially help us to observe the general morphology of dorsal thorax, but it is sometimes not sufficient to examine and determine the position and number of the tiny dorsal papillae. The present study aims to describe the dorsal thoracic characters of pupae for the first time in gall midges through a new simple dissecting method

of pupal exuviae. To evaluate the taxonomic importance of the newly observed thoracic characters in gall midges, examinations and descriptions of the pupae of 33 species belonging to seven genera of Asphondyliini were done.

「第 2 章」

Gall midges (Diptera: Cecidomyiidae) are one of the largest groups of gall-inducing arthropods and many species have been recognized as serious pests on economically important plants, e.g. the soybean pod gall midge *Asphondylia yushimai* Yukawa & Uechi, and the Asian rice gall midge *Orseolia oryzae* (Riley). During our investigations of gall midges associated with agricultural crops in Japan, a gall midge species inducing bottle-shaped leaf galls on the cultivated grape *Vitis coignetiae* c.v. Suzumi-murasaki was found in Fukushima Prefecture, northern Honshu. This species was previously identified by Shinji (1944) as *Cecidomyia viticola* Osten Sacken [= *Schizomyia viticola* (Osten Sacken)], a Nearctic species associated with *Vitis* spp., but taxonomic re-examination is needed because this identification was based only on the similarity of gall shapes. Although similar galls were recorded also from various wild grapes in Japan, including *Vitis coignetiae*, *V. flexuosa* and *V. ficifolia*, detailed taxonomic studies have not yet been conducted due to the lack of adult specimens. To proceed taxonomic studies of this gall midge, we collected its galls from the three Japanese *Vitis* species and successfully reared adults. After careful morphological examinations of this gall midge as well as three Nearctic *Schizomyia* species associated with *Vitis* spp., i.e. *S. viticola*, *S. vitiscoryloides* (Packard), *S. vitispomum* (Osten Sacken),

we concluded that: (1) the Japanese species is not identical to *S. viticola* but new to science; (2) the Japanese species and Nearctic *Vitis*-associated *Schizomyia* should be treated as an independent genus close to *Schizomyia*. In the present study a new genus will be erected for the *Vitis*-associated gall midges in Japan. Moreover, a molecular phylogenetic analysis was conducted to confirm the host range of the Japanese species.

「第 3 章」

The Schizomyiina genera (Cecidomyiidae: Asphondyliini) *Asteralobia* Kovalev and *Schizomyia* Kieffer are known to be very similar morphologically, and they differ only in the constrictions on the cylindrical male flagellomeres which present in *Asteralobia*. In the present study, taxonomic revision and molecular phylogenetic analysis were conducted on the two genera to re-examine their taxonomic status. The morphological examinations clarified that there are no synapomorphic differences between the two genera and the constrictions of male flagellomeres were present in some *Schizomyia* species. In the phylogenetic analysis both genera constructed a monophyletic clade. Therefore, the genus *Asteralobia* was synonymized under *Schizomyia*, and eight new *Schizomyia* species to science were described.

「第 4 章」

Different gall inducers belonging to distinct insect orders are rarely known to induce similar gall shapes on the same host plant organs. Here, I report that an *Asphondylia* sp. (Diptera:

Cecidomyiidae) and *Ceratoneura* sp. (Hymenoptera: Eulophidae) are associated with leaf bud galls on *Schoepfia jasminodora* Sieb. et Zucc. (Schoepfiaceae). First, the gall midge species was described as new to science and conduct a phylogenetic analysis for known Japanese *Asphondylia*. Second, the life history of both species was surveyed monthly during 2015–2017 and discovered that both taxa are multivoltine; *Asphondylia* sp. overwinters as first instars in galls while *Ceratoneura* sp. possibly does so as adults outside the galls. In addition, the internal structure of galls differed between the two species. Galls containing *Asphondylia* sp. consist of a single chamber with inner walls clearly covered with whitish fungal mycelia after the gall midges develop into second instars, while those containing the *Ceratoneura* sp. have multiple chambers with hard black inner walls. Although some eulophids are known to be inquilines of galls induced by *Asphondylia*, we consider that the *Ceratoneura* sp. is probably a true gall inducer because of the different gall structure and absence of fungal mycelia in their galls. The present study is the first report detailing the annual life history of a *Ceratoneura*. *Asphondylia* sp. represents the first example of a monophagous *Asphondylia* species with a multivoltine life history on a deciduous tree.

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その他の例：第1章、第2章、第3章などの各章ごとに短くまとめる。

序論、本論、結論などの各段落ごとに短くまとめる。

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※注2 特許、知的財産等に係る部分は記載しないでください。

※注3 全体で4頁～5頁を目処にしてください。

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