BIOLOGICAL NOTES AND NEW SYNONYMY IN *FORCIPOMYIA* (DIPTERA: CERATOPOGONIDAE)

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ABSTRACT

Biological notes are given on 2 species of *Forcipomyia* midges that are parasitized by the hymenopteran genus *Forcipestricis* Burks (Encyrtidae). *Forcipomyia (Forcipomyia) picea* (Winnertz) (synonym: *F. simulata* Walley, NEW SYN.) breeds under tree bark in Europe and North America. *Forcipomyia (Microhelea) fuliginosa* (Meigen) is worldwide in distribution, and larvae have been found under damp tree bark in Brazil, on wood in Puerto Rico, from a mossy log in Costa Rica, from bromeliads in Trinidad, from rotting leaves of *Musa* in Ghana, and from mosses, liverworts, and algae on a clay bank in Singapore. *Forcipomyia intonsa* Chan and LeRoux from Singapore is a synonym of *F. fuliginosa* (NEW SYN.).

The hymenopteran parasitic genus *Forcipestricis* was described by Burks (1968) for a single species, *gazeaui* Burks. The description by Gordon Gordh of this laboratory of a second species prompted me to review the literature on the known hymenopteran parasites of the biting midges (Ceratopogonidae) and to summarize the knowledge of the larval biology of the host of the second species, *Forcipestricis portoricensis* Gordh.

A survey of the literature revealed no instance of any hymenopterous parasite having been reared from the Ceratopogonidae, other than from the terrestrial or semi-aquatic genus *Forcipomyia* Meigen. The more aquatic genera in the subfamilies Leptoconopinae, Dasyheleinae, and Ceratopogoninae, and the predominantly aquatic genus *Atrichopogon* Kieffer in the Forcipomyiinae have no known hymenopteran parasites.

In addition to the 2 species of *Forcipestricis* in the family Encyrtidae, there are records of only 2 species of hymenopterous parasites of *Forcipomyia,* these in the genus *Entomacis* Förster in the family Diapriidae: 1) *E. longii* (Ashmead), 1902, described in the genus *Adeliopria* Ashmead, reared from pupae of *Forcipomyia wheeleri* (Long) taken in what appeared to be an abandoned ant nest in Texas; and 2) *E. californica* (Ashmead), 1883, described in the genus *Hemilexis* Förster, without reference to host, from the Santa Cruz Mountains, California, subsequently determined by C. F. W. Muesebeck and recorded by Bedard (1938) from Washington, emerged from larvae of *Forcipomyia.*

Lionel Gazeau reared *Forcipestricis gazeaui* Burks from *Forcipomyia (Forcipomyia) simulata* Walley in Maryland. Close examination of all stages of the American *F. simulata* and comparison with European material of *F. (F.) picea* (Winnertz) revealed no significant differences and I therefore place *F. simulata* as a junior synonym of *F. picea* (NEW SYNONYMY). Larvae of this widespread Holarctic species occur quite frequently under the

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bark of logs and dead trees of a wide variety of plant families. The larvae are gregarious and feed in small groups of 10-40 individuals on various fungi that grow on the rotting cambium tissue of the trees.

It was with great interest, therefore, that I discovered in the L. G. Saunders collection a number of hymenopterous parasites that were reared by Saunders from *Forcipomyia (Microhelea) fuliginosa* (Meigen) in Puerto Rico. Gordon Gordh has kindly determined these parasites as a second species of *Forcipestricis* and has described them in a companion paper in this journal.

Just before his death in 1968, Saunders donated his valuable collection of reared ceratopogonids to the U. S. National Museum in Washington, D. C. He spent a lifetime in a detailed study of the biology and immature stages of *Forcipomyia* midges; his classic publications (1924, 1956) are the best authority in the field. From 1953 until his fatal illness began in 1965 he pioneered in the study of the *Forcipomyia* midges associated with pollination of cocoa, making extensive collections and observations in Puerto Rico, Trinidad, and other Caribbean islands in 1953 and 1957, Costa Rica in 1956 and 1957, the Philippines in 1961, and Ghana in 1963. I am taking this opportunity to report some unpublished rearing records of *Forcipomyia* from his collection and manuscript notes.

Forcipomyia (Microhelea) fuliginosa (Meigen)

The extensive taxonomic literature concerning this cosmopolitan species has been summarized by Wirth (1956, 1972b). The adult females of *F. fuliginosa* attack caterpillars in small swarms, piercing the bodies of the caterpillars with their mouthparts and feeding upon the haemolymph. I (Wirth 1972a) have expressed my belief that the feeding of these midges fits them well to act as vectors of polyhedral viruses or other pathogens. In some situations it is possible that *Forcipomyia* midges may have some role in biological control, bringing a virus infection from "wild" hosts in a field or orchard margin into a caterpillar population on a crop plant. There are many records of *F. fuliginosa* feeding on a wide variety of lepidopterous larvae, but the species has been found occasionally on other unrelated hosts, including sawfly larvae, dragonflies, and meloid beetles. Field workers in biological control are especially urged to keep in mind the potential importance of *Forcipomyia* feeding on caterpillars and other insects and to look carefully for the attacks of these minute parasites. Adults of *F. fuliginosa* also have been found frequently in flowers of cocoa, where at times they may assume some importance in pollination (Kaufmann 1974).

Immature Stages.—The larva of *F. fuliginosa* was first described and figured under the name of *F. inornatipennis* (Austen) by Ingram and Macfie (1924) who reared the larvae in the laboratory in Ghana from eggs obtained from a gravid female imprisoned in a tube containing vegetable debris. Lane (1947) next described the larva and pupa under the name *inornatipennis* var. *ornaticrus* Ingram and Macfie from material which was collected from damp wood under the bark of dead, fallen, and rotting trees in Brazil. Chan and LeRoux (1971) described and figured a new species, *Forcipomyia (Forcipomyia) intonsa* from all stages reared in Singapore, Malaysia, from mosses, liverworts, and blue-green algae collected on a

clay bank. Their species belongs in the subgenus *Microhelea* Kieffer and is identical with *F. fuliginosa* (NEW SYNONYMY).

In the Saunders collection in the U. S. National Museum of Natural History are 4 lots of *F. fuliginosa* reared from larvae, as follows:

COSTA RICA: Hacienda Theobroma, Siquirres, 14 June 1956, from mossy log, L. G. Saunders, all stages (CR31).

GHANA: Tafo, 20 May 1963, from rotting *Musa* leaves, L. G. Saunders, all stages (G26).

PUERTO RICO: Mayagüez, 27 January 1953, on wood, L. G. Saunders, all stages (PR7). The *Forcipestricis* parasites emerged from the host pupae on 23 January.

TRINIDAD: Las Hermanas, 7 August 1957, from epiphytic bromeliad, L. G. Saunders, 2 males, 2 females, 2 pupal exuviae (There are also several adult *F. fuliginosa* specimens in the USNMNH collection that were also reared in Trinidad from bromeliads by R. W. Williams (no. 51, 3-10 September 1963).

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