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BITING MIDGEs OF THE SUBGENUS SCIZOFORCIPOMYIA 
OF FORCIPOMYIA IN NORTH AMERICA 
(DIPTERA: CERATOPOGONIDAE)

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ABSTRACT

The subgenus Schizoforcipomyia Chan and LeRoux is diagnosed and a key is pre-

tented to distinguish it from related subgenera of Forcipomyia Meigen. A checklist is 
given of the 11 described species. The sole Nearctic species, Forcipomyia cinetipes 
(Coquillett), is redescribed and figured, and distribution data are recorded from 
four states from Maryland to Florida.

RESUMEN

Se diagnostica el sub-género Schizoforcipomyia chan y LeRoux, y se presenta una 
ela para distinguirla del relacionado sub-género de Forcipomyia Meigen. Se da una 
lista de chequeo de las 11 especies descritas. Se redescribe y figura la única especie 
Nærtica, Forcipomyia cinetipes (coquillett), y se anotan datos de su distribución en 
cuatro estados desde Maryland a la Florida.
Biting midges of the genus *Forcipomyia* Meigen with pale-banded legs have confused taxonomists throughout the world. Kieffer (1917) was the first to propose a supraspecific name for these midges when he proposed the genus *Lepidohelea* for *Ceratopogon chrysolophus* Kieffer from the Seychelles. He based this genus on the presence on the wing and legs of "couvertes d'écaillles striées longitudinalement et appliquées surface alaire poilue ... " Capstrier (1983) re-examined the types of *F. chrysolophus* and gave an excellent redescriptions and figures by which the species and the subgenus *Lepidohelea* can be characterized. Debenham (1987a) gave a detailed account of the taxonomic history of *Lepidohelea* and the closely related species groups of *Forcipomyia* with banded legs. The flattened, striated, appressed scales of *Lepidohelea* are also present in a number of species of *Forcipomyia* in several other subgenera.

The first North American species of *Forcipomyia* with banded legs was described by Coquillett (1905) as *Ceratopogon cinctipes* from Biscayne Bay, Florida. Johannsen (1948) first transferred this species to the genus *Forcipomyia*. In 1952 Wirth erroneously described a species under this name from all stages that he collected under pine bark in California. The California species is a still un-named species of the subgenus *Lepidohelea*, and the "*Forcipomyia cinctipes* Group" that has been used for it and similar species is a misnomer and needs to be changed. This matter will be dealt with in a revision (in preparation by the author) of the American species of that group, which are of some importance in the pollination of cacao (*Theobroma cacao* L.) in tropical America. In the present study it was determined that *Forcipomyia cinctipes* is a true member of the subgenus *Schizoforcipomyia*, which is herein diagnosed and discussed, and *F. cinctipes* is redescribed and figured.

Explanation of the taxonomic characters used can be found in the general papers on *Ceratopogonidae* by Wirth (1952) and Downes and Wirth (1981). Terminology for the larvae and pupae follows that of Saunders (1956) and Chan & LeRoux (1971).

**KEY TO THE SUBGENERA OF *FORCIPOMYIA* RELATED TO *LEPIDOHELEA***

1. Hind tarsal ratio about 1.0; costal ratio about 0.50; second radial cell short; wing usually with pale costal spot or pale mottling ........................................ 2
   — Hind tarsal ratio less than 0.5 or greater than 1.5; costal ratio and second radial cell various; wing usually without pale markings ........................................ 2
   ................................. various other subgenera of *Forcipomyia*

2. Body, wings, and/or legs with flattened, striated scales ranging from long and one-striped setae to broad, short, multistriated scales; palpus with third segment more or less spindle-shaped, slightly more swollen on basal half with sensory pit located at about 1/3 length: legs with characteristic banding of alternating pale and dark bands, at least on hind tibia; male genitalia often with whitish dististyle and bicolored ninth sternum and basistyle; dististyle without long setae on outer margin; aedeagus various ..................................... 3
   — Body, wings and legs without flattened striated scales; palpus with third segment swollen on basal 1/3-1/2, slender distally, with sensory pit located at basal 1/4; legs, if banded, not with alternating pale and dark bands on hind tibia; male dististyle not contrasting whitish, but with well-developed setae on outer margin; aedeagus shield-shaped, with sharp point and median ridge at apex ....................................................... Subgenus *Forcipomyia* s. str.

3. Male parameres with basistylist apodemes forming a U-shaped arch, parameres a pair of slender to stout, straight or bowed, well-sclerotized blades or rods reaching to no more than middle of basistyles; aedeagus various, with low to high basal arch, distal process various, often with recurved points; dististyle straight or slightly curved, tapering to slender tip; palpus 5-segmented;
two spermathecae; scales of body and legs never short and broad ..........  

Subgenus Schizotribicornia  

Male parameres separate or with basistylar apodemes indistinctly joined in a linear or hyaline anteromesal bridge; parameres various, usually straight slender rods nearly as long as basistyle and tapering to filamentous tip; aedeagus usually much longer than broad, basal arch low or absent, usually stout distally; dististyle often sinuate with expanded tip; palpus 4- or 5-segmented; one or two spermathecae; scales of body and legs often short and broad .......... Subgenus Lepidohelea  

Subgenus Schizotribicornia Chan & LeRoux  


References. De Meillon, Meiswinkel & Wirth, 1982: 133 (key to Afrotropical species); Debenham, 1967b: 632 (taxonomy; diagnosis; revision of Australian species).  

Diagnosis. Very similar to species of Forcipomyia s. str. and subgenus Lepidohelea. Female antenna with proximal segments moderately elongate, swollen basally, each with two curved hyaline sensilla trichodea; distal segments moderately long and tapering; antennal ratio about 1.0. Palpus 5-segmented; fourth and fifth segments distinct; third segment moderately swollen at midportion, with distinct, deep, sensory pit. Wing usually with pattern of dark and light macrotrichia and flattened scalelike macrotrichia; costal ratio 0.45-0.50; first radial cell obliterated, second small and moderately wide. Tibiae without hastate setae on extensor side; hind tarsal ratio 0.7-1.0. Two ovipos spermathecae with short stout necks. Male genitalia with ninth segment and basistyles rather short and stout; dististyles moderately short, straight or slightly curved, tapered to slender tip; aedeagus with low to high basal arch, distal process various, often with recurved points; parameres with basistylar apodemes forming a U-shaped arch bearing a pair of slender to stout, straight or bowed, well-sclerotized blades or rods reaching to no more than middle of basistyles.  

Immature Stages (after Chan & LeRoux 1971). Larva similar to that of Forcipomyia s. str.; head hypognathous, p and q hairs almost as long as head length, s hairs absent; antenna with filament longer and more pointed than in Forcipomyia s. str.; body setae numerous, moderately long; a hairs spear-shaped, not so rounded as in Forcipomyia; b hairs long, thickened basally; prothoracic pseudopod medially divided, each half again unequally and indistinctly subdivided, the larger outer quarter bearing a crown of hooklets on apex; anal pseudopod bilobed, each lobe bearing eight hooklets; anal papillae four, outer pair unequally bilobed; cauda small, bluntly conical. Larval exuviae retained on tail of pupa. Pupa spiny with many moderately long tubercles, most bearing a short seta at apex; prothoracic respiratory horn thumb-shaped, short, with about 11 spiracular openings curving across apex and posterior margin; male sexual processes small, dorsally oriented.  

Habita. Chan & LeRoux (1971) found larvae between bark and wood of a decaying tree.  

Distribution.—Worldwide; 10 species.  

species, *F. anna* de Meillon, 1959 and *F. rudebecki* de Meillon, 1959, were placed in the subgenus *Schizoforcipomyia* by Wirth et al. (1980), and de Meillon and Wirth (1981) added *F. warreni* and de Meillon et al. (1982) added *lecordeurorum* from South Africa. Debenham (1987b) added *F. clavulus* and *monoceros* from New South Wales, and *yirrkala* from Australia Northern Territory. Krivosheina (1968) described all stages of *F. (Lepidochelea) tinia* Krivosheina from the USSR and in 1987b Debenham placed this species in *Schizoforcipomyia*. The list of included species in *Schizoforcipomyia* is as follows:

*anna* de Meillon, 1959: 311. Transvaal.
*borbonica* Clastrier, 1959: 436 (September). Réunion I.
*cinctipes* (Coquillett), 1905: 64 (*Ceratopogon*). Florida.
*lecordeurorum* de Meillon, Meiswinkel & Wirth, 1983: 132. Transvaal.
*stabilis* Sen & Das Gupta, 1968: 95. India. Synonym of *borbonica* Clastrier.
*warreni* de Meillon & Wirth, 1981: 528. Transvaal.

*Forcipomyia* (Schizoforcipomyia) *cinctipes* (Coquillett)
(Figs. 1-10)

*Ceratopogon cinctipes* Coquillett, 1905: 64 (female; Florida).
*Forcipomyia* (Forcipomyia) *cinctipes* (Coquillett); Johannsen, 1943: 777 combination; in list; Wirth & Williams, 1957: 9 (compared with *F. varipennis* from Bermuda); Wirth & Hubert, 1960: 642 (compared with *F. christiansoni* from California); Wirth, 1965: 125 (in catalog; Florida, California, Mexico).

*Diagnosis.* A small, dark brown species with banded tibiae and tarsi, pictured wings, and dark halteres; mesonotum with long, semi-erect, brown hairs and scattered broad, appressed, whitish scales.

*Female.* Wing length 0.96 mm; breadth 0.35 mm; costal ratio 0.49.

*Head:* Dark brown including antennae and palpi. Antenna (Fig. 1) with lengths of flagellar segments in proportion of 13-12-12-12-13-14-14-16-16-17-17-23, antennal ratio (11-15-3-10) 0.86. Palpus (Fig. 2) with lengths of segments in proportion of 7-11-22-9-10; third segment swollen proximad, slender on distal fourth, with small, round, deep sensory pit, palpal ratio (L/W) 2.5. Vertex, occiput, clypeus, antennae, and palp provided with abundant, long, bristly setae.

*Thorax:* Dark brown; mesonotum with long, semi-erect brown setae and scattered broad, appressed, whitish scales. Legs (Fig. 9) dark brown; trochanters and extreme bases of femora paler; knee spots pale; tibiae with narrow sub-basal pale rings, often faint on fore and mid legs; hind tibia with narrow apex pale; tarsi with narrow pale rings at the joints, tarsomere 5 entirely pale. Hind leg with lengths from femur to tarsomere 5 as 140-140-45-40-30-22-10, tarsal ratio (T1/T2) 1.12; hind tibial comb with 3 spines, the spur short and pointed with proximal setulae. Empodium small, claws slender and curved, not expanded in midportions. Wing (Fig. 3) broad, provided with dense vestiture of long, semi-appressed macrotricha giving it a shaggy appearance;
Figs. 1-10. *Forcipomyia cinetipes*; 1-3, 5-6, 9-10, female; 4, 7-8, male: 1, antenna; 2, palpus, 3-4, wing; 5, spermathecae; 6, genital sclerotization; 7, aedeagus; 8, genitalia, aedeagus omitted; 9, fore, mid and hind legs (top to bottom); 10, hind tibial comb.

These especially coarse along anterior margin of wing, over radial cells, and in a broad band across midpoint of cell R5, and to a lesser extent along posterior veins; in these areas the macrotrichia are flattened and single-striated; macrotrichia paler and finer, without striations, in large areas before and after radial cells, and near apices of cells R5, M1, M2, M4, and anal cell, giving appearance of mottled wing. Halter brown, flat end of knob whitish.

Abdomen: Dark brown; clothed with numerous long, brown, flattened, single-striated hairs similar to wing macrotrichia; intermixed on sternites with smaller fine setae; no broad, flattened scales present. Genital sclerotization (Figs. 6) with small transverse area of heavily pigmented spicules. Spermathecae (Fig. 5) two, oval with short, slender necks; slightly unequal, measuring 0.059 by 0.041 mm and 0.048 by 0.035 mm.

*Male.* Similar to the female with the usual sexual differences; wing length 1.17 mm; breadth 0.35 mm; crustal ratio 0.43.

Head: Antenna with moderately dense plume of long brownish verticils; lengths of flagellar segments in proportion of 14-12-12-12-13-14-15-16-17-43-27-20-26; antennal ratio (12-15/3-11) 0.93. Palpus with lengths of segments in proportion of 8-10-23-10-11; more slender than in female, palpal ratio 2.3.

Thorax: As in female. Legs with pale bands on tibiae more prominent; erect extensor setae on tibiae and basitarsi long and bristle-like, the longest twice as long as length of
basitarsus. Hind leg with lengths from femur to tarsomere 5 as 140-140-50-47-33-35-38; tarsal ratio 1.06. Claws about half as long as in female. Wing (Fig. 4) much narrower than in female; much paler, with slender whitish macrotrichia overall except coarse, single-striated, brown macrotrichia narrowly along anterior margin and in patches over radial cells, at midportion of cell R5, and at apices of veins M1, M2, M3+4, and Cul.

Abdomen: Dark brown; vestiture of intermixed long and short, bristle-like nonstriated setae, especially long on lateral margins of segments, those on basistyles up to three times length of basistyle. Genitalia (Fig. 8) dark brown, dististyle whitish. Ninth sternum slightly tapered to base, about as broad as long; basistyle about twice as long as broad, lacking the erect hyaline setae on mesal margin that are present in F. borbonica; dististyle slightly sinuate, nearly straight distally, tapering to moderately slender, simple tip. Aedeagus (Fig. 7) deeply pigmented; basal breadth subequal to total length; basal arch not quite half of total length, basal arms stout; distal process stout, rounded caudad, with a pair of small submedian lobes at apex. Parameres with well-sclerotized basistylar apodemes joined anteriorly in a complete anterior arch, bearing a pair of curved, bladelike, well-sclerotized posterior processes with pointed apices meeting caudally on midline.

Distribution. Eastern United States.

Type. Holotype female (pinned), Biscayne Bay, Dade Co., Florida (Mrs. A. T. Slosson), type no. 8367, U.S.N.M.


Discussion. The species that Wirth (1952) described and figured as Forcipomyia cinetiipes from California, including the immature stages, was misdetermined and actually belongs to a group of banded-legged species in the subgenus Lepidochelea. Therefore the cinetiipes Group of Wirth and other authors is a misnomer and must take a new name based on an included species. This action will be the subject of another publication now in preparation. Forcipomyia cinetiipes appears to be the only species of the subgenus Schizoforcipomyia represented in the Western Hemisphere.

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