



## A generic conspectus of the Microdontinae (Diptera: Syrphidae) with the description of two new genera from Africa and China

XIN-YUE CHENG<sup>1</sup> & F. CHRISTIAN THOMPSON<sup>2</sup>

<sup>1</sup>College of Life Science, Beijing Normal University, Beijing, 100875, China. E-mail: chengxy@bnu.edu.cn

<sup>2</sup>Systematic Entomology Laboratory, PSI, Agricultural Research Service, U. S. Department of Agriculture, NHB-0169, Smithsonian Institution, Washington, D. C. 20013-7012 USA E-mail: chris.thompson@ars.usda.gov

### Abstract

A new genus and species of flower flies is described from China (*Furcantenna* Cheng, type *F. yangi* Cheng). Another new genus is proposed for the Afrotropical species incorrectly placed in *Ceratophya*, *Afromicrodon* Thompson, type *Microdon johanna*e Doesburg. A key is provided to the groups of the Subfamily Microdontinae, along with a checklist of genus-group names proposed within the subfamily and nomenclatural and taxonomic notes on them.

**Key words:** Taxonomy, Syrphidae, Microdontinae, key, China, Afrotropics

### Introduction

Microdontine flies are an unusual group among the flower flies. The adults are rarely encountered as they do not go to flowers and remain close to their breeding sites. The known larvae are predators of ant brood, and, hence, found in ant nests (Andries 1912, Duffield 1981). Adults are found commonly around those nests and do not range far from them. Normally microdontine flies are rare in Malaise and other kind of traps, but if the trap is close to ant nests, then adults can be abundant in the trap samples. This is especially true in the tropics, where ants frequently nest in trees, high in the canopy.

The larvae of microdontine flies are unusual in their appearance, so much so that they have been on four occasions described as mollusks (see below under *Ceratoconcha*, *Parmula* and *Scutelligera*, also Haas (1924)). The larvae and puparia provide excellent characters for identification and phylogeny, but as so few are known and associated with adults, these characters have been and are little used (Thompson 1981a, Doczkal & Schmid 1999 & Schmid 2004).

The greatest diversity of microdontine flies is in the tropics, especially the neotropics (currently 405 species recognized worldwide, 172 occur in the Neotropics (Thompson 2008). Their diversity in the temperate regions is sharply limited. But such diversity pattern is to be expected as it maps that of their hosts, the ants.

Microdon flies were known to Linnaeus and other early naturalists. These flies were segregated early by Meigen (1803, *Microdon*) and Latreille (1804, *Aphritis*) at a generic level and also at a family-group level (Aphritidae Fleming (1821: 55; 1822: 584), Microdonellae Rondani (1845: 451, 1857: 206 (Microdoninae)). Subsequently, as the exotic faunae became known, more genera were described. Thompson (1969, 1972) recognized the primitive (basal) relationship of microdontine flies to all other flower flies, first by re-instating their subfamily status and later by proposing separate family status for the group. He was supported by Speight (1987, 1994), but today all workers accept the microdons only as a subfamily of the Syrphidae. Ståhls et al. (2003) have confirmed with molecular (DNA) sequence data the basal relationship of the Microdontinae

as the sister group to all other Syrphidae (also confirmed by Skevington & Yeates 2000 (DNA) and Rotheray & Gilbert 2008 (larval morphology)).

The subfamily Microdontinae has been well characterized by Thompson (1969, 1972 as a family). Hull (1949) included the genus *Spheginobaccha*, but Thompson (1969, 1974) excluded it. Thompson (1974) suggested that *Spheginobaccha* was the primitive (basal) sister-group to all the other Eristalinae. Recent analyses based on DNA sequence data (Ståhls et al. 2003), however, suggest that this question needs to be revisited as *Spheginobaccha* appears to be a proper member of the Microdontinae based on DNA data. Obviously, one wants to know what the larvae of *Spheginobaccha* do!

Hull (1949: 305) divided the subfamily Microdontinae on the basis of the presence or absence of an appendix on vein R4+5 extending posteriorly into cell R4+5. This character is useful for identification except in one group of Neotropical flies, *Ubristes*, where the character is variable. Hence, we do not recognize his two tribes (Ceratophyini [as Ceratophyani] and Microdontini [as Microdonini], see Sabrosky 1999: 78 & 197). However, given the DNA sequence data, we here accept *Spheginobaccha* as a member of the Microdontinae and recognize it as the sister (tribe) to the other microdons. Other than that major division, the subfamily turns into a series of distinctive groups based on unique, autapomorphic characters. And unfortunately, in many groups these characters are found only in the male.

Today there are some 40 distinct groups, which have names and are recognized by most authors as valid at generic or subgeneric levels. A few other names have been proposed, but these are either objective synonyms or universally accepted as such. Only Hull (1949) attempted an overview of the group as a whole and provided the only key to the genera. The key is entitled "A key to the groups of the Microdontinae," with no indication of the ranks of those groups except for a few marked as new subgenera. Following the key, there are diagnoses for all the recognized groups which are ranked as genera with subgenera. There are six more subgenera in the text that are not in the key. Some subgenera are obviously misplaced: 1) *Stipmorpha*, which is related to *Hypselosyrphus*, *Parocyptamus* and *Archimicrodon*, which are related to *Microdon*, are all placed as subgenera of *Paramixogaster*, a petiolate genus; and 2) *Nannomymrecomyia*, a synonym of *Paramicrodon*, is placed as subgenus of *Spheginobaccha*. Then there are the obvious mistakes, such as *Hypselosyrphus* is in the key and is illustrated as having long pile brushes on the metatibia, but the text says there are "no brushes." All together Hull recognized 16 genera and 17 subgenera.

We present here a key to all these distinct groups currently named and a few which have not yet been named. This includes 9 additional groups not treated by Hull (1949). Not all these groups are of equivalent rank as our research on the higher classification of the microdontine flies remains incomplete. To properly rank these groups requires a full cladistic analysis. Unfortunately, our state of knowledge of the full suite of microdontine characters (immature and DNA sequences) remains very limited. The checklist includes all names proposed and/or used for taxa of the Microdontinae. Some of these names are objective synonyms (having the same type species) and others are subjective synonyms as most authors have recognized that they do not apply to morphological distinctive groups. The relative rank of these distinctive groups has been left as treated in the most recent published works.

The family Syrphidae as a clade is equivalent to the Schizophora, a major clade of Cyclorhapha (Yeates & Wiegmann 2005). Hence, the subfamily Microdontinae is equivalent to at least the Calypttratae, a major subdivision of Schizophora. As no one questions the need to rank subordinate clades or groups of the Calypteratae as families, subfamilies, tribes and genera, most the taxa diagnosed and cataloged below will be recognized at some level of the classification when it is fully resolved. So, we do not hesitate to add two more names for distinctive microdontine groups without them.

So far, only one genus (*Microdon*) is recorded on the Chinese mainland and three more genera recorded from Taiwan (*Paramicrodon*, *Parocyptamus*, *Paramixogaster*). By collecting and identifying the specimens of Syrphidae deposited in Chinese Insect Collections, I (XC) found a very special and marvelous specimen, which belongs to Microdontinae, but differs significantly from all previously described genera. This was the catalyst for a long overdue review of the classification of microdontine flies.

## Format

Terminology follows Thompson (1999). Missing from that glossary is the term *cicatrix* (plural, *cicatrices*), Latin for scar. In all microdontines, the femora have more or less distinct cicatrices, slightly elevated clear lines running around the leg, which are the result of the folding of the femora within the pupa. Also, in that glossary, Thompson recommended the use of *calcar* (plural, *calcars*) for spine / tooth as the proper term for the fixed extension from the apical margin of the scutellum. The term, *mystax*, is a term used for "beard," or clump of strong setose pile on the ventral part of the face. This character is common among asilid flies (Asilidae), but is also found in one microdon group (*Syrphipogon*). Finally, note should be made that petiole and petiolate is used in a broad sense for abdomen shape. Some species are or appear to be wasp-mimics: having the 2nd segment flattened and either constricted so as to be narrower than the 1st and 3rd segments and/or with large basolateral pale maculae (fig. 45), and the 3rd and 4th (males) / 5th segments (females) forming an enlarged club. For these, we used the term petiolate abdomen (figs 18, 28, 32).

Common names for organisms are preferred by many amateurs and citizen scientists over Latin binomens. For example, different cultures have developed unique nomenclature for the large animals, but with English and other European languages, many common names for them are derived from the Latin / Greek names, and, hence, there is overlap between them and Linnaean (scientific) names (such as camel, elephant, gazella, giraffe, hippopotamus, ibex, rhinocerus, and zebra). This is useful. So, where there are no common names for organisms, the best approach would be to adopt the Linnaean name as a common name. Hence, we, here, introduce the use of microdon as an English noun and common name for flies of the tribe Microdontini. We hope as taxonomists develop field guides and other tools for amateur and citizen scientists, they will continue to use microdon for these flies adding appropriate modifiers as necessary.

This key follows the general design of Hull (1949: 306), but corrects a number of errors and adds additional taxa. Some couplets (marked with an asterisk (\*)) have been taken directly from Hull because we have not been able to examine vouchers for the particular taxa.

## Key to the groups of the subfamily Microdontinae

1. Postmetacoxal bridge incomplete; metathoracic anepimera not fused; proanepisternum enlarged, usually with vertical row of long strong pile; occiput with distinct crease on dorsal third (figs 34–35). Vein R4+5 without an appendix (fig. 32) (Tribe Spheginobacchini).....41
  - Postmetacoxal bridge complete; metathoracic anepimera fused medially to form bridge; proanepisternum not greatly enlarged and not with row of long strong pile; occiput without creases (tribe Microdontini)...2
2. Vein R4+5 with an appendix extending posteriorly into cell R4+5 (figs 28, 44, 48–49)..... 15
  - Vein R4+5 without such an appendix (figs 1, 5, 10, 24, 32–33) .....3
3. *Either* vein M1 processive, directed outwardly and cell R4+5 with acute apex (fig. 33); or face with a distinct tubercle under antennae; metasternum underdeveloped, bare (fig.40) (Neotropical) ..... 12
  - Never with vein M1 processive, either straight or slightly recurrent; face without a tubercle under antenna ..... 4
4. Abdomen petiolate; vein M with a short appendix extending anteriorly into cell R4+5 (as in fig, 32); metasternum under developed, reduced to thin line, bare (fig. 40) (New World)..... *Mixogaster*
  - Abdomen not petiolate, oval to elongate; vein M without such an appendix.....5
5. Scape very short, only as long as broad; antenna inserted dorsally on head, at or above dorsal margin of eye (fig. 46); mouthparts absent; male basoflagellomere with multiple furcations (fig. 47) (southern South America) .....*Masarygus*
  - Scape long, much longer than broad (figs 3, 12, 38–39, 43); antenna usually inserted medially, much ven-

- tral to dorsal margin of eye; mouthparts present; male basoflagellomere usually normal, not multiply furcate, at most with only two branches.....6
6. Postpronotum bare; thorax and abdomen with long thick black bristle-like pile; katatergum bare and smooth on dorsoanterior 1/2 ..... *Surimya*
- Postpronotum pilose; thorax and abdomen without such black bristle-like pile; katatergum microtrichose and rugose.....7
7. Anepimeron bare or with a few long pili on dorsal edge; antenna short, only about 2 as long as face (fig. 36); abdomen oval (Neotropical).....*Paragodon*
- Anepimeron generally pilose; antenna usually long, usually longer than 2 as long as face; if shorter, then abdomen elongate .....8
8. Abdomen oval.....13
- Abdomen narrow, parallel-sided or triangular (figs 19, 16–17, 24) .....9
9. Occiput uniform, as wide dorsally as ventrally (fig. 39 ); metatibia narrow, with long pile; abdomen elongate; small, pale orange to yellow flies (fig.24) (Neotropical)..... *Rhoga*
- Occiput broad dorsally, narrow ventrally (figs 13, 38); metatibia usually without long pile, if with long pile, then pile thick and abdomen triangular (fig. 17) .....10
10. Metatibia broad medially, with row of long pile along dorsal edge (figs 11, 20).....38
- Metatibia narrow, without distinct brush of long pile (fig. 42).....11
11. Transverse suture incomplete medially; anepisternum pilose only on anterodorsal corner and narrowly along posterior edge; metasternum usually pilose (Neotropical, Oriental) ..... *Paramicrodon*
- Transverse suture distinct, continuous across scutum; anepisternum uniformly pilose, without bare medially area; metasternum bare (Oriental) .....*Indascia*
12. Face with a dorsomedial tubercle under antenna; profemur with a distinct spinose pad on basal 1/4 or more ..... *Eurypterosyrphus*
- Face straight or convex, without such a tubercle; profemur without spinose pad..... *Aristosyrphus*
13. Basoflagellomere not furcate, at most twice as long as scape (fig. 1) (Afrotropical) ..... *Afromicrodon*
- Male basoflagellomere furcate; female basoflagellomere greatly elongate, 3 or more times as long as scape (Neotropical, Oriental).....14
14. Metasternum developed, pilose; katepisternum pilose; scutellum medially excavated (fig. ) (Oriental China) ..... *Furciantenna*
- Metasternum reduced, bare; katepisternum bare; scutellum convex apically (Neotropical).....  
..... *Schizoceratomyia*
15. Abdomen oval or parallel-sided.....22
- Abdomen petiolate; 2nd segment flattened, sometimes constricted or with large basolateral pale macula; 3rd and 4th (males) or 5th (females) forming a club .....16
16. Basoflagellomere 3 to 5 times as long scape (fig 43) (Oriental, Australian)..... *Paramixogaster*
- Basoflagellomere never more than twice as long as scape (fig. 30).....17
17. Katepimeron pilose (Southern Nearctic, Neotropical) .....*Rhopalosyrphus*
- Katepimeron bare.....18
18. 2nd abdominal segment cylindrical, longer than thorax (fig. 18); thoracic pile very short and strongly appressed; postpronotum, anterior anepisternum and metasternum appearing bare even under high magnification (Neotropical) ..... *Cerimicrodon*
- 2nd segment shorter than thorax; thoracic pile longer, erect; postpronotum, anterior anepisternum and metasternum usually with long distinct pile .....19
19. Metasternum bare .....21
- Metasternum pilose.....20
20. Vertex swollen, shiny, bare at least anteriorly. Gena reduced, narrow, usually not visible in lateral view

(Neotropical).....	<i>Pseudomicrodon</i>
- Vertex not swollen nor shiny, pilose; face straight, produced ventrally; gena broad (Neotropical).....	..... " <i>Microdon</i> " <i>diaphanus</i>
21. Face without medial tubercle (Afrotropical) .....	" <i>Microdon</i> " <i>illucens</i>
- Face with medial tubercle ventrad to antenna (Neotropical).....	" <i>Microdon</i> " <i>abnormis</i>
22. Metatibia with long pile along dorsal edge, forming a distinct brush of pile (Neotropical) .....	38
- Metatibia without such pile brushes .....	23
23. Basoflagellomere greatly elongate, 4 or more times longer than scape, narrow, 6 or more times longer than broad; scutellum unarmed.....	35
- Basoflagellomere shorter .....	24
24. Scutum and scutellum joined at blunt angle of approximately 120 degrees; scutellum with posterior corner developed into massive pointed cones (Madagascar).....	<i>Megodon</i>
- Scutum and scutellum joined at even level; scutellum without such massive cones .....	25
25. Face with a distinct mystax; scutellum deeply sulcate; very large flies (26-28 mm) (Neotropical) .....	<i>Syrphipogon</i>
-- Face without a mystax; scutellum not deeply sulcate; smaller flies (under 20 mm).....	26
26. Antenna inserted under large shelf-like extension of front; face bulging and prominent ventrally; head and thorax strongly punctate (Neotropical).....	<i>Chrysidimyia</i>
-- Antenna not so inserted; face not bulging nor prominent ventrally; head and thorax not strongly punctate .....	27
27. Face carinate, medially swollen and laterally sunken; hind metatarsus enlarged, quadrate; abdomen oval, with terga and sterna overlapping; with 4th segment bent perpendicular to 2nd (Neotropical)..	<i>Ceratophya</i>
-- Face not carinate, evenly convex from eye to eye; abdomen oval or triangular; terga and sterna not overlapping; abdominal apex not perpendicular to base .....	28
28. Vein M1 (apical crossvein) strongly recurrent on anterior 1/3, usually with an appendix; second abdominal segment with anterior margin rectangular; abdomen broadly triangular, broadest at base (Neotropical) .....	<i>Chymophila</i>
-- Vein M1 rounded, not angulate, without a appendix; 2nd abdominal segment usually without rectangular anterior margin .....	29
29. First two abdominal segments with three distinct depressions, two lateral ones and an anterior medial one; abdomen more or less parallel-sided. Scutellum with apical calcar (Nearctic to Central America).....	<i>Omegasyrphus</i>
-- First two abdominal segments without three distinct depressions; abdomen oval .....	30
30. Scutellum recessed apically, with parallel apically rounded and flattened calcars (Madagascar) .....	<i>Hovamicrodon</i>
- Scutellum rounded apically or with simple calcar .....	31
31. Antenna quite short, especially scape and pedicel (Oriental).....	<i>Archimicrodon</i>
- Antenna long; scape and basoflagellomere several to many times longer than pedicel (all regions) .....	32
*32. Abdomen constricted between 3rd and 4th segments; pro- and mesofemora with basoanterior patches of dense short spinose pile (Oriental) .....	<i>Parocyrtamus</i>
- Abdomen not constricted between 3rd and 4th segments; femora without such patches of pile .....	32
*33. Eye greatly reduced; gena, vertex and occiput each about as long as face; antenna moderate length; basoflagellomere thickened basally, arched, curved (fig. 26) (Australian) .....	<i>Oligeriops</i>
- Eye normal, occiput and vertex not so developed .....	34
34. Male basoflagellomere furcate (fig. 27) (Australian).....	<i>Cervicorniphora</i>
- Male basoflagellomere normal, not furcate (all regions).....	<i>Microdon</i>
35. Male basoflagellomere bare; arista normal, long, thin .....	37

- Male basoflagellomere covered with long pile (fig. 22); arista reduced, short, thick; scape long .....36
- \*36. Abdomen short, conical, about twice as long as wide; head much wider than thorax (Afrotropical) .....  
..... *Ptilobactrum*
- Abdomen elongate, widest apically; with only 3 segments visible dorsally; 4th segment hidden dorsally by shield-like sides of 3rd, is vertical, and appears as hypopygium; hypopygium concealed, only visible ventrally (Oriental) .....*Kryptopyga*
- 37. Basoflagellomere about 4.5 times as long as scape (Afrotropical).....*Myiacerapis*
- Basoflagellomere about 6 times as long as scape (Oceania) ..... *Bardistophus*
- 38. Abdomen oval or rectangular (fig. 16), not triangular (Neotropical) ..... *Ubristes*
- Abdomen triangular, broad basally, strongly narrowed apically (figs 10, 17) .....39
- 39. Male basoflagellomere furcate (fig. 12); female basoflagellomere greatly elongate, about 2.5 times as long as scape; metabasitarsomere enlarged, quadrate; vertex greatly produced dorsally (fig. 12) (Neotropical)..  
..... *Carreriamyia*
- Basoflagellomere not furcate, usually not greatly elongate, usually about twice as long as scape; metabasitarsomere not enlarged, elongate; vertex not greatly produced .....40
- 40. Abdomen short, almost equilateral in shape (Neotropical) .....*Hypselosyrphus*
- Abdomen much longer, not equilateral (fig. 17) (Neotropical) ..... *Stipomorpha*
- 41. Proanepisternum without a row of long stiff pile. Eye bare ..... *Spheginobaccha perialla* group
- Proanepisternum with a ventral row of long stiff pile .....42
- 42. Eye pilose; alula microtrichose (Oriental)..... *Spheginobaccha (sensu stricto)*
- Eye bare; alula partially bare (Afrotropical)..... *Spheginobaccha (Dexiosyrphus)*

## New taxa

### *Afromicrodon* Thompson, gen. nov.

(Figs. 1–2)

Type-species, *Microdon johanna*e van Doesburg.

Face evenly convex, narrow, about 1/5 head width, pilose; mouthparts normal; eye bare; male dichoptic, with eyes separated by about width of ocellar triangle; gena very narrow, not visible in lateral view; antenna short, shorter than face; scape slightly longer than basoflagellomere, about twice as long as wide; basoflagellomere short, about twice as long as wide; ocellar triangle equilateral, anterior, about its length anterior to posterior eye margin; occiput very narrow except slightly expanded on dorsal 1/3.

Thorax: postpronotum pilose; propleuron bare; anepisternum pilose except bare along posterior margin; katepisternum bare; anepimeron bare except pilose ventroposteriorly; katepimeron (barrette) bare; metasternum underdeveloped, bare; transverse suture normal, incomplete medially; scutellum simple, convex or only slightly excavated apically, without teeth; legs normal, not enlarged, without pile brushes; femora with cicatrices indistinct, without spinose patches. Wing: microtrichose; vein R4+5 without appendix; vein M without appendix; crossvein r-m basal, at basal fourth of cell DM; vein M1 straight, joining vein R4+5 perpendicularly; vein M2 present, short; cell DM rounded apicoposteriorly.

Abdomen: oval. Male aedeagus bifid apically, hypandrium posteriorly prolonged and with tuft of long pile (see fig. 2 (De Meyer et al. 1990: 571).

Included species: *Ceratophya comoroensis* De Meyer, De Bruyn & Janssons (1990: 571), *Microdon johanna*e van Doesburg (1957: 109), *Ceratophya madecassa* Keiser (1971: 256) and *Ceratophya stuckenbergi* Keiser (1971: 258).



1



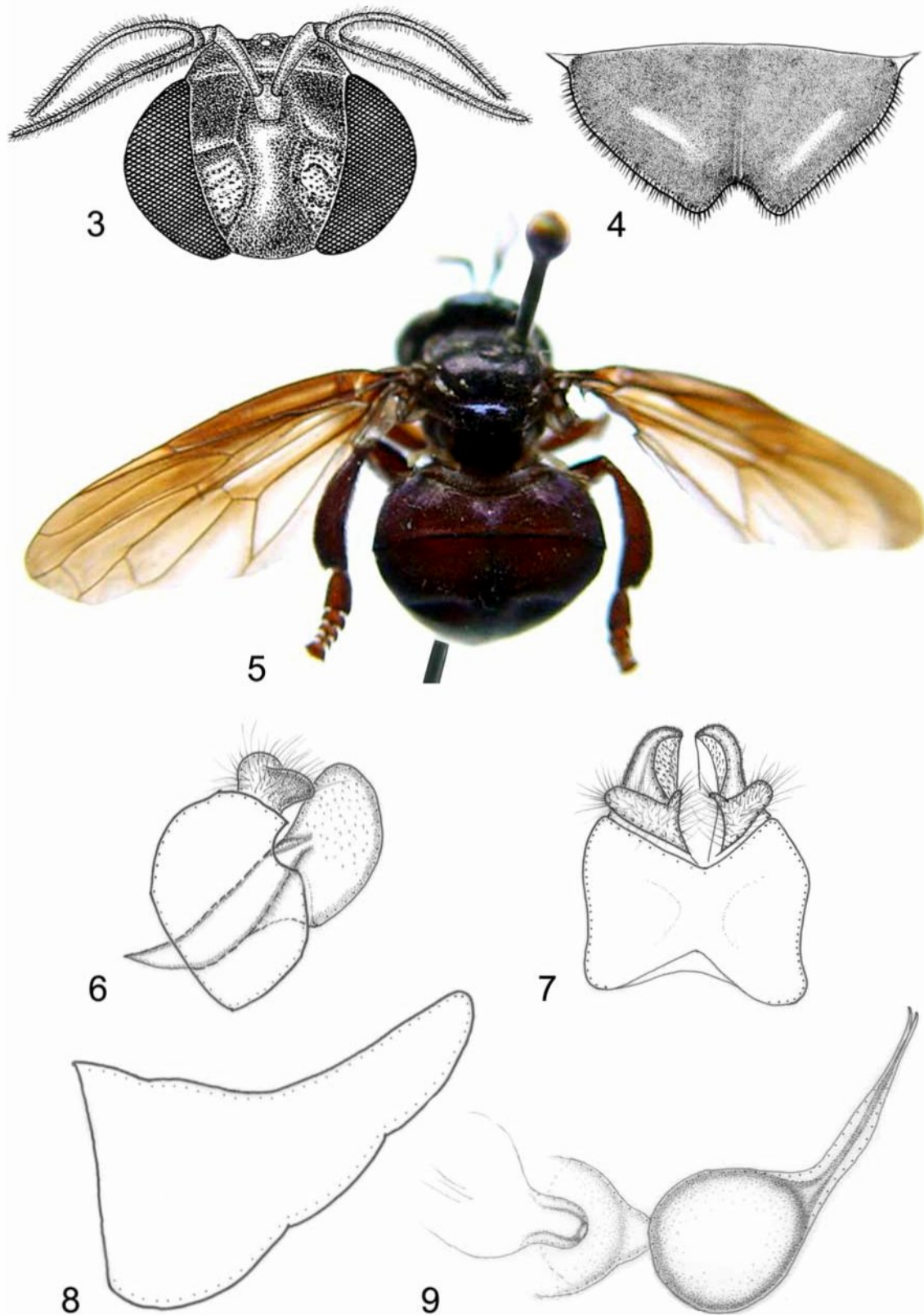
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**FIGURES 1–2.** *Afromicrodon johannae* (van Doesburg). 1, male, habitus, lateral view. 2, male, thorax, dorsal view.

Distribution. All known species are restricted to the Malagasy Region.

*Afromicrodon* is easily recognized among the microdons as 1) lacking an appendix on vein R4+5, 2) short antenna, about as long as face or shorter; 3) basoflagellomere simple; 4) scutellum simple, without calcar; and 5) abdomen oval. The species of *Afromicrodon* were previously and erroneously placed in the genus *Cerato-physa* due to an error in Hull's world key to the genera of Microdontinae (1949: 306).

Etymology. The name, *Afromicrodon*, is a combination of "Afro," from the Afrotropical region, and "Microdon," and is to be treated as masculine.



**FIGURES 3–9.** *Furcantenna yangi* Cheng. 3, male, head, frontal view. 4, male, scutellum, dorsal view. 5, male, habitus, posterior view. 6–9, male genitalia, lateral view.



***Furcantenna* Cheng, gen. nov.**

(Figs. 3–9)

Type-species: *Furcantenna yangi* Cheng, sp. nov.

Body broad, flat, without chetae (bristles).

Head very broad, short, thin, obviously wider than thorax. Face narrowed downwards, straight in lateral view. Frons parallel on both sides, about half the width of head. Vertex very high and protuberant, obviously distinguish from frons. Eye bare; broadly dichoptic. Antenna set on the middle of head, elongate, slender; scape and basoflagellomere several to many times longer than the second; basoflagellomere is more than two times of the first; produced into two deeply furcation, and furnished with obvious pubescence on them; arista absent.

Thorax: postpronotum pilose; scutellum small, with apical margin deeply sulcate medially, almost divided into two lobes; propleuron bare; anepisternum and katepisternum pilose; anepimeron bare; katepimeron (Barrette) bare; katatergum microtrichose; metasternum developed and pilose.

Wing: crossvein r-m at middle of  $M_2$  cell, vein  $M_1$  nearly rectangular to vein  $R_{4+5}$ , cross-vein dm-cu recessive, vein  $R_{4+5}$  without an appendix; vein  $M$  also without an appendix anterior into cell  $R_{4+5}$ . Legs: femora with distinct cicatrices on basal  $1/4$ ; metafemur slightly thickened; tibiae slightly curved, thin basally, thick apically; tarsi broad, short.

Abdomen slightly arched, short, compact, oval, broad, wider than thorax, length almost as long as wide, widest at junction second and third segment. Male genitalia. Aedeagus bifid, divided apically into two processes.

Included species: Only the type species is known.

This genus is similar to the genus *Schizoceratomyia*. They differ from each other by the shapes of scutellum. The scutellum of the *Furcantenna* is divided into two lobes by a deep sulcus or cleft in the middle of posterior (apical) margin.

*Etymology.* The name *Furcantenna* is a combination of *furca*, Latin for fork, and *antenna*, Latin for "sail-yard" but now universally used for the sensory appendage on the head of insects (Brown 1956). The name is to be treated as feminine.

***Furcantenna yangi* Cheng, sp. nov.**

Male: Body broad and flat. Head obviously wider than thorax, black with strong violet shining. Vertex very high and protuberant, obviously distinguished from frons. Frons about as half width of head, parallel on both sides, with a large area on each side of frons barely and punctuated densely, divided from face clearly. Face slightly narrowed downwards, straight in lateral view. A broad and shiny longitudinal ridge at mid face, furnished a longitudinal sulcus on each side of it. Pile on head very short, but white and dense on face and occiput. Antenna set on a small brown sclerite in mid frons, brownish-black; scape moderate long, clavate, thicken apically; pedicel very small; basoflagellomere brown, especially long, furcate basally, with inner branch is straight, pole-like, slightly longer than outer one, with outer branch slightly curve, both branch densely, short yellowish-brown microtrichose. Arista absent.

Thorax. Scutum square, black except brownish laterally from postpronotum to postalar callus, with strong violet shine, very short black and white pilose. Scutellum small, shiny, concolorous with scutum, deeply sulcate at the middle of hind margin and divided it into two lobes. Pleuron brown except with shiny blackish-brown maculae on propleuron and anepisternum, long white pilose on anepisternum and katepisternum; halter pale yellow; calypter blackish brown.

Legs: femora with cicatrices on basal 1/4 distinct; tibiae slightly curve, thin on the base and thick on the end. Tarsi broad and short. Pro- and mesolegs reddish brown, but blackish brown and shining on the base of mesofemur, black pilose; metaleg brownish black except black on base of femur, with violet shine, black pilose except with intermixed pale pile on tibia. Pile on legs mainly black, mix with pale pili on metatibia. Wing: microtrichose, brown, darken on anterior half.

Abdomen. Terga black, except reddish brown on apex, with violet shiny, finely punctate finely, short pale pilose except longer yellow pilose on apex; sterna black, yellow pilose.

Length: body, 9 mm; wing, 11 mm.

Female: Unknown.

Holotype: male, China: Guangxi (Oriental): Jinxiu: Dayaoshan, 14.VI.1982, collected by Yang Ji-kun. Type specimen deposited in the Institute of Zoology, Chinese Academy of Science, Beijing.

Etymology. The species is named in honor of its collector, Yang Ji-kun.

### Checklist with nomenclatural and taxonomy notes

For each name, the basic nomenclatural data (name, author, year, source (in references), page, and status) is given. For valid (recognized) taxa, the name is in bold italics, followed by the distribution (biotic regions only) and the number of species. For available names (except replacement names and emendations), the type species is given with the manner of its fixation. Invalid names are in italics and unavailable names are in regular (roman) type. Notes are inserted as necessary. Arrangement is alphabetic.

***Afromicrodon***. Afrotropics; 4 species.

*Afromicrodon* Thompson, new genus this paper, type *Microdon johanna* van Doesburg by original designation. *Afromicrodon* is here described for those afrotropical species incorrectly placed in *Ceratophya* (see below).

*Aphritis* Latreille 1804: 193, type *auropubescens* Latreille by subsequent monotypy in Latreille 1805: 358. = *Microdon mutabilis* Linnaeus. Subjective synonym of *Microdon* sensu stricto (Meigen 1822: 164).

All the European species of *Microdon* form a small monophyletic group (see under *Microdon*), but the synonymy of the species of this group are not clearly resolved. Meigen (1822) recognized only one group and treated *auropubescens* Latreille, the type of *Aphritis*, as a synonym of *apiformis* DeGeer. Today, these names are accepted as synonyms of *mutabilis* Linnaeus (Doczkal & Schmid 1994: 46).

***Archimicrodon***. Old World tropics; 3 species.

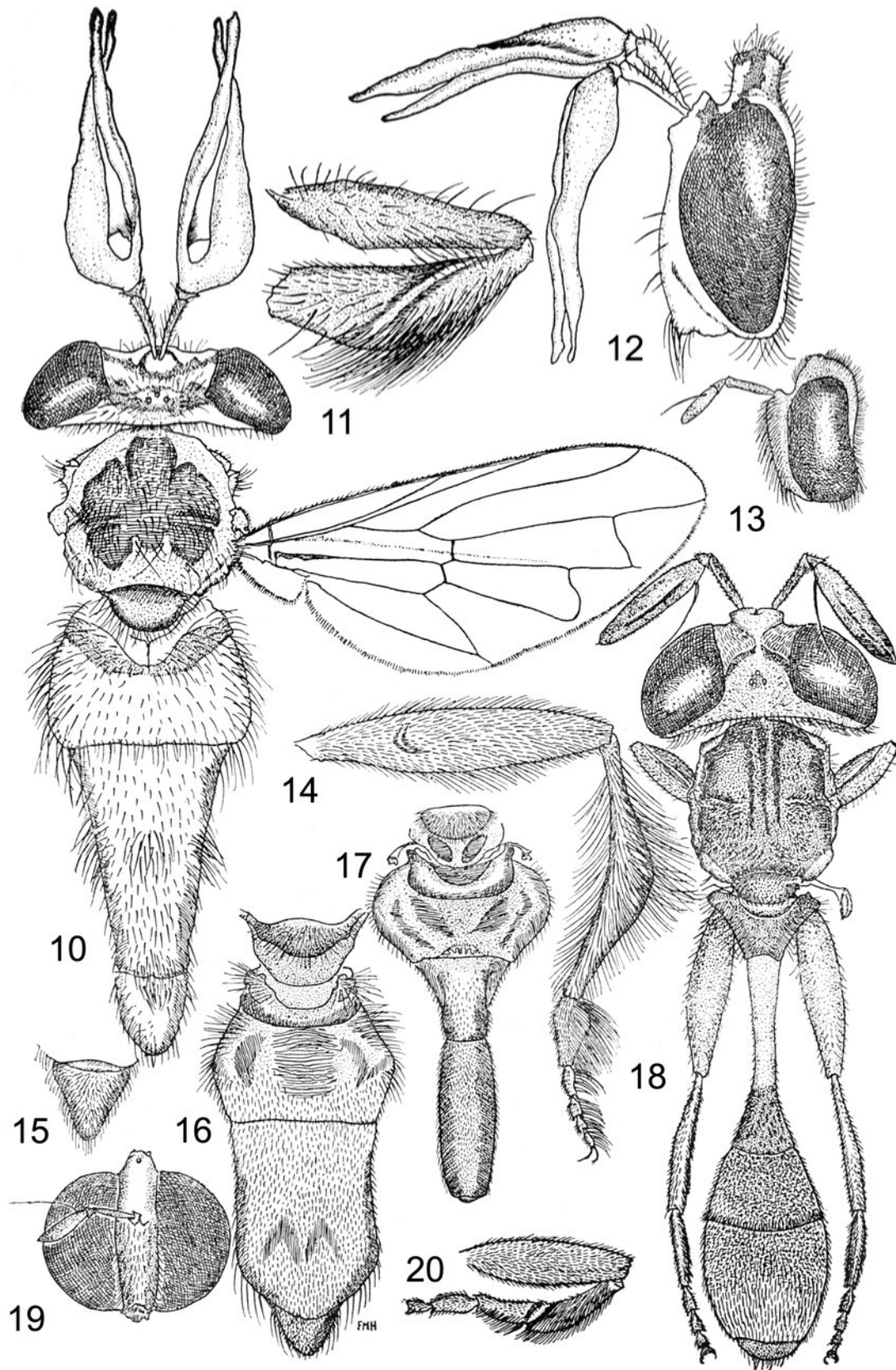
*Archimicrodon* Hull 1945b: 75, type *Microdon digitator* Hull by original designation; proposed as a subgenus of *Microdon*.

*Archimicrodon* was proposed for those Australasian species of *Microdon* which have antennae short, "quite short and are about as long as in some species of *Syrphus*", which were considered a primitive character by Hull (1945a, 1949). Some Afrotropical species, like *brevicornis* Loew, may also belong here.

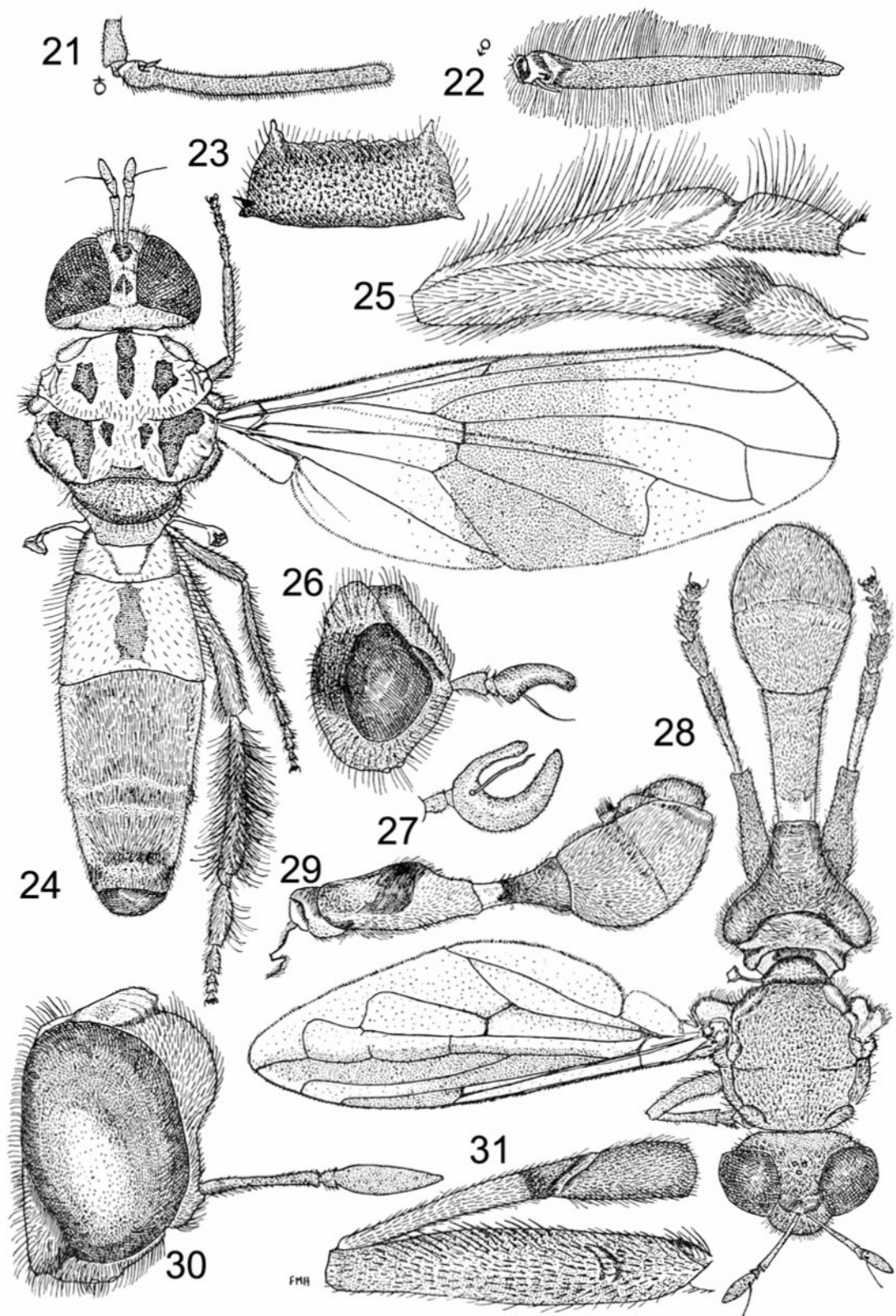
***Aristosyrphus***. Neotropical; 6 species

*Aristosyrphus* Curran 1941: 247, 252, type *primus* Curran by original designation.

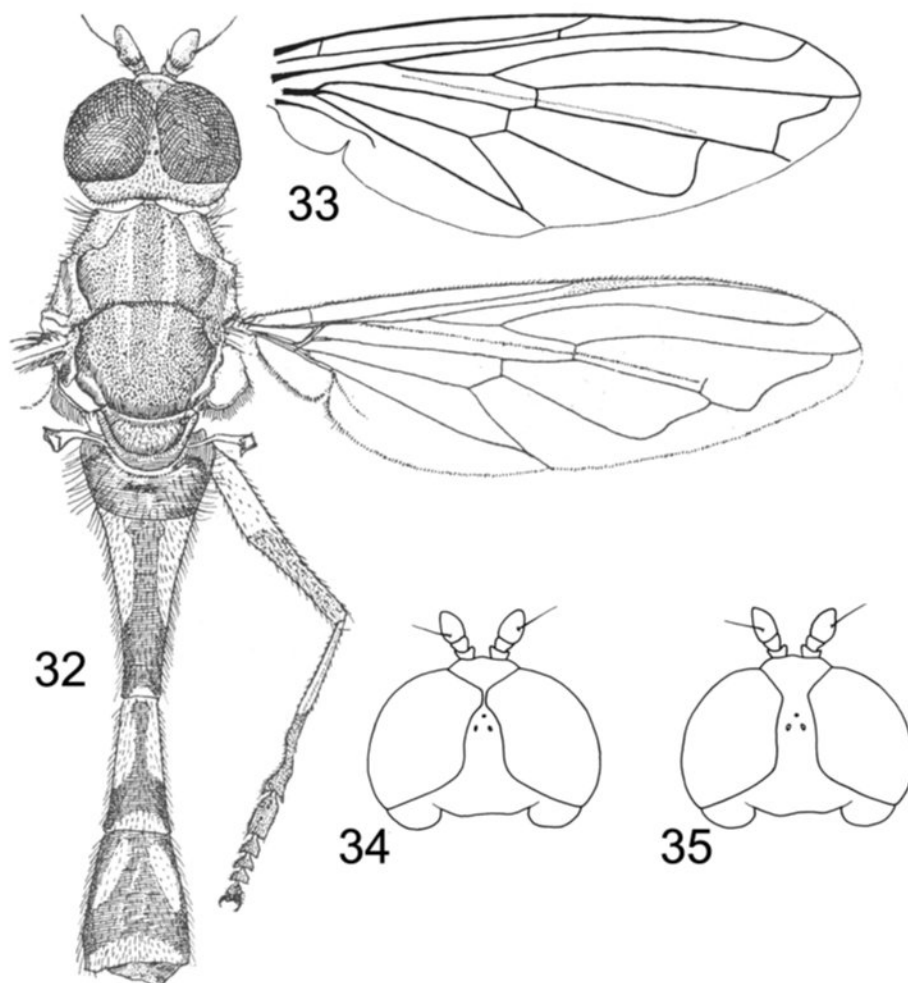
*Aristosyrphus* is a distinctive Neotropical group characterized by wing venation, facial and antenna shape. The group as currently circumscribed includes two subgenera (*ss* & *Eurypterosyrphus*) and was revised by Thompson and Marinoni (2007).



**FIGURES 11–20.** *Microdon* adults and parts. 10–12, *Carreramyia megacephalus* (Shannon). 10, habitus, dorsal. 11, metaleg, lateral. 12, head, lateral. 13, 15, 19, 20. *Ubristes* (*Hypselosyrphus*) *scutellaris* (Shannon). 13, head, lateral. 15, scutellum, dorsal. 19, head, frontal. 20, metaleg, lateral. 14, 16. *Ubristes* (*Ubristes*) *flavitibia* Walker. 14, metaleg, lateral. 16, abdomen, dorsal. 17, *Ubristes* (*Stipomorpha*) *fraudator* (Shannon). 17, abdomen, dorsal. 18, *Ceriomicrodon petiolatus* Hull, habitus, dorsal. From Hull (1949: 313, fig. 13).



**FIGURES 21–31.** *Microdon* adults and parts. 21, 22, *Ptilobactrum neavei* Bezzi. 21, antenna, lateral, female. 22, basoflagellomere, lateral, male. 23, *Microdon (Chymophila) fulgens* Wiedemann, scutellum, dorsal. 24–25, *Rhoga sepulchrasilva* (Hull). 24, habitus, dorsal. 25, metaleg, lateral. 26, *Oligeriops chalybeus* (Ferguson), head, lateral. 27, *Cervicorniphora alcicornis* (Ferguson), antenna, lateral. 28–31, *Rhopalosyrphus guntherii* (Lynch Arribalzaga). 28, habitus, dorsal. 29, abdomen, lateral. 30, head, lateral. 31, metaleg, lateral. From Hull (1949: 315, fig. 14).



**FIGURES 32–35.** Microdon adults and parts. 32, 34. *Spheginobaccha chillcotti* Thompson. 32, habitus, dorsal, male. 34, head, dorsal, male. 33, *Aristosyrphus primus* Curran, wing, dorsal. 35, *Spheginobaccha vandoesburgi* Thompson, head, dorsal, male. Figure 32 from Hull (1949: 337, fig. 17A); 33 from Thompson (1969: 82, fig. 11); 34–35 from Thompson (1974: 260, figs 7–8).

*Bardistopus* Thompson & Vockeroth 1989: 437, misspelling of *Bardistopus* Mann

***Bardistopus*.** Oceania; 1 species.

*Bardistopus* Mann 1920: 61, type *papuanum* Mann by original designation.

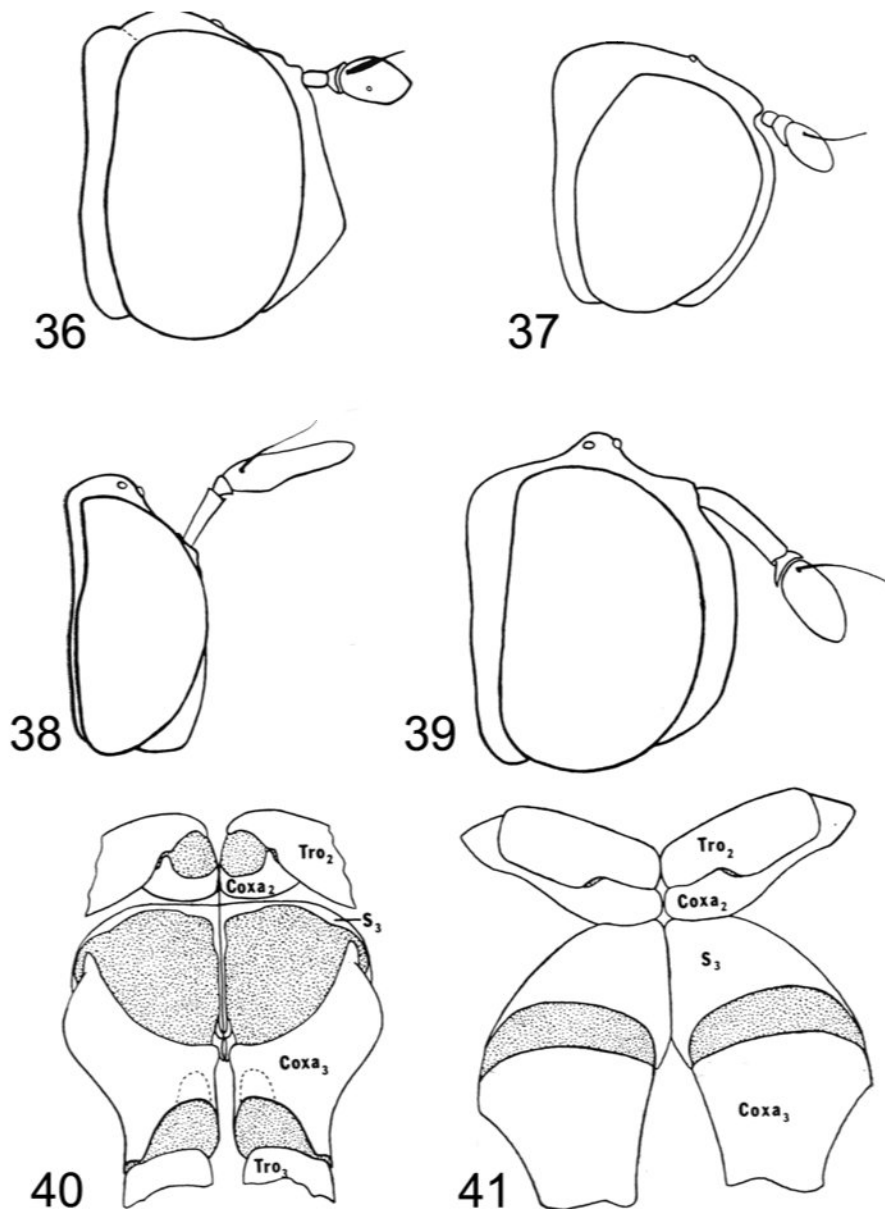
*Bardistopus* was established for a *Microdon* species, which has a greatly elongate basoflagellomere. The species is endemic to the Solomon Islands. While the description states that the species was based on two female types, these are males.

***Carreramyia*.** Neotropical; 1 species.

*Carreramyia* Doesburg 1966: 93, type *Microdon megacephalus* Shannon by original designation.

*Carreramyia* was established for a *Ubristes* species with a furcate basoflagellomere in the male; females have a normal elongate basoflagellomere. *Microdon megacephalus* also differs from other *Ubristes* species in having the vertex greatly enlarged and metabasitarsomere enlarged and quadrate, but we view these as only of subgeneric character.

*Cerathophya* Wiedemann 1830: 79, misspelling of *Ceratophya* Wiedemann. Also Keiser (1971: 256).



**FIGURES 36–41.** Microdon adults and parts. 36, *Paragodon paragoides* Thompson, head, lateral. 37, *Paramicrodon delicatula* Hull, head, lateral. 38, *Ubristes (Hypselosyrphus) triangularis* (Curran), head, lateral. 39, *Rhoga* sp., head, lateral. 40–41, Metasternum and bases of meso- and metalegs, ventral. 40, *Mixogaster cubensis* Curran 41. *Rhopalosyrphus guntherii* Lynch Arribalzaga. Figures from Thompson (1969: 76, figs 16).

*Ceratoconcha* Simroth 1907: 796, type *schultzei* Simroth by monotypy. Preocc. Kramberger-Gorjanovic 1889.

The status of *Ceratoconcha* can not now be assessed as the name is based on the characters of the larva of an unknown adult. However, from a nomenclatural point of view, this is irrelevant as the name can not be used as it is a primary junior homonym.

***Ceratophya*.** Neotropical; 5 species

*Ceratophya* Wiedemann 1824: 14, type *notata* Wiedemann by subsequent designation of Blanchard (1846: 145).

*Ceratophya* is a distinct subgroup of *Microdon* restricted to the neotropics. *Ceratophya* has had a confused history. Wiedemann (1824: 14) erected the group for two species similar to *Microdon* but differing by

having a more slender habitus, much longer basoflagellomere and simple scutellum without calar. He described two species, *notata* and *longicornis*, of which *notata* was figured (our figure 48). Subsequently *notata* was selected as the type of the genus (Blanchard 1846: 145, also Coquillett 1910: 520, Curran 1941: 253). Macquart (1834: 488) recognized the genus following Wiedemann's characters and described a new species (*fuscipennis*, now *Microdon* (ss)) from Philadelphia. Later Walker described three additional species (*variegata* Walker 1852: 220, now *Paramixogaster*; *bicolor* 1857: 79, now *Microdon* (ss), and *luridescens* Walker 1857: 151, now *Microdon* (ss)). Williston (1886: 310, 1887: 4) did not recognize the genus as he felt it was based on the lack of scutellar calcars, which he considered a trivial character. Kertész (1910: 360) cataloged the genus as valid and included five species. Subsequent authors followed Williston until Curran (1941: 247, 253) resurrected the genus. Curran without explanation recognized the group as having no appendix on vein R4+5 and included a diverse group of species in his *Ceratophya* (*notata* Wiedemann = type; *longicornis* Wiedemann = *Ceratophya*, *goettei* Shannon = *Ubristes* (ss), *flukei* Curran = *Paramicrodon*, *bicolor* Walker = *Microdon* (ss), *plaumanni* Curran = *Ubristes* (ss), *analisis* Curran = *Ubristes* (ss) and *macroptera* Curran = *Aristosyrphus* (ss)). Due to his error in placing *Ceratophya* as a genus without an appendix, subsequent workers mis-identified the genus. Hence, the genus does not properly key out in Hull world key (1949: 306), so this name was mis-identified by Keiser and others. The Malagasy species previously assigned to *Ceratophya* are here placed into the genus *Afromicrodon*.

The presence or absence of an appendix on vein R4+5 has obviously been critical in the placement of this name. In the original figure this appendix shows as running from vein R4+5 to vein M, but later (Wiedemann 1830, pl. 9, fig. 5; our figure 49) this was corrected to on the left side to show an appendix clearly separated from vein M, but on the right side without any appendix. Could this have been the basis of Curran's error, that is, looking only at the right side?

I (FCT) have examined the type of *Ceratophya notata* Wiedemann and find that it corresponds well to Wiedemann's original figure, but the appendix on vein R4+5 while long does not end in vein M. The species is also structurally similar to *Microdon panamensis* Curran.

*Ceratophya* Osten Sacken 1858: 46, misspelling of *Ceratophya* Wiedemann.

*Ceratrichomyia* Seguy 1951: 14, type *behara* Seguy by original designation). **New subjective synonym** of *Ptilobactrum*.

Seguy included excellent figures of the male and female heads as well as the apical wing venation in his description of *Ceratichomyia*. He contrasted his new genus with *Schizoceratomyia* and made no mention of *Ptilobactrum*. We can find no significant differences between his genus and *Ptilobactrum*, so we consider them synonyms.

*Cerioimicrodon* Hull 1937a: 25, incorrect original spelling of *Cerimicrodon* by the revision of Thompson, Vockeroth & Sedman (1976: 60).

***Cerimicrodon***. Neotropical; 1 species.

*Cerimicrodon* Hull 1937a: 25, type *petiolatus* Hull by original designation.

*Cerimicrodon* was described for a very narrow petiolate species with a large head. Besides the type, only two subsequent specimens have been collected. As the aedeagus is bifid, Thompson et alia (1976: 60) reduced the group to a subgenus of *Microdon*.

***Cervicorniphora***. Australian; 1 species.

*Cervicorniphora* Hull 1945: 75, type *Microdon alcornis* Ferguson by original designation; proposed as a subgenus of *Microdon*.

*Cervicorniphora* was described for an Australian *Microdon* species in which the basoflagellomere "is deeply cleft into two prongs widely separated." However, Hull should have read what Ferguson (1926: 171) wrote of this species, "the antennal structure is most extraordinary, but I do not think sufficient to justify the erection of a new genus, as in all other respects the species is in agreement with other Australian species of *Microdon* and the antennae are most variable in the genus." See also under *Oligeriops*.

*Chimophila* Osten Sacken 1875: 46, misspelling of *Chymophila* Macquart.

*Chrysidimyia* Thompson, Vockeroth & Sedman 1976: 59, emendation of *Chysidimyia* Hull

***Chrysidimyia***. Neotropical; 3 species.

*Chrysidimyia* Hull 1937b: 116, type *chrysidimima* Hull by original designation. Name emended by Thompson et alia 1976.

*Chrysidimyia* was described for a small, metallic green fly with dense punctation that had an "astonishing resemblance" to chrysidid wasps (Hymenoptera: Chrysididae). Thompson et alia (1976: 59) treated it as a synonym of *Microdon* as it is only one of a couple of species groups of metallic green chrysidid mimics.

***Chymophila***. New World (southern USA to Argentina); 19 species

*Chymophila* Macquart 1834: 485, type *splendens* Macquart by monotypy, current name of type, *fulgens* Wiedemann.

*Chymophila* was based on a composite type species. The holotype is a body of *fulgens* with the head of a conopid glued on. To avoid disrupting the generic nomenclature of Conopidae, Thompson (2008) selected the body as the lectotype for the species and genus-group name. This action, however, made *Eumicrodon* a junior objective synonym (see *Eumicrodon*).

*Chysidimyia* Hull 1937b: 117, incorrect original spelling of *Chrysidimyia* Hull.

While Thompson et alia (1976: 59) emended the incorrect original spelling, this action is no longer necessary as under the 4th edition of the International Code of Zoological Nomenclature, the subsequent spelling is fixed by usage under Art. 33.3.1.

*Colacis* Gistel 1848: x, new name for *Microdon* Meigen. Objective synonym of *Microdon* (*sensu stricto*).

***Dexiosyrphus*** Hull 1944: 131 (as subgenus), type *Spheginobaccha funeralis* Hull by original designation. Subjective synonym of *Spheginobaccha* (Thompson 1974: 256).

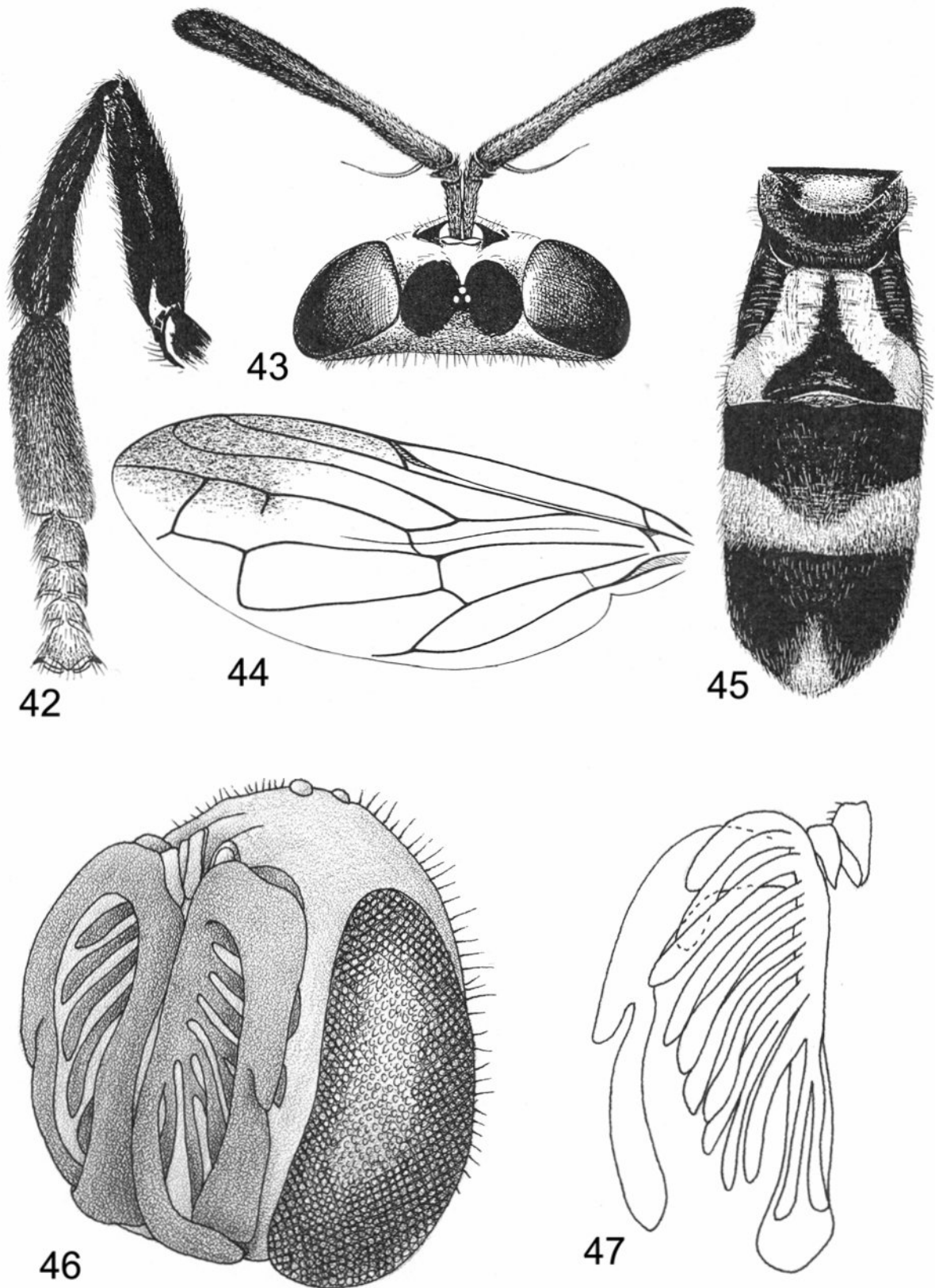
*Dimeraspis* Newman 1838: 372, type *podagra* Newman by monotypy = *globosus* Fabricius). Subjective synonym of *Microdon* (*sensu stricto*) (Walker 1849: 540).

Walker (1849: 540) placed *Dimeraspis podagra* Newman as a synonym of *Microdon globosus* (Fabricius) without comment. All subsequent workers have accepted this synonymy.

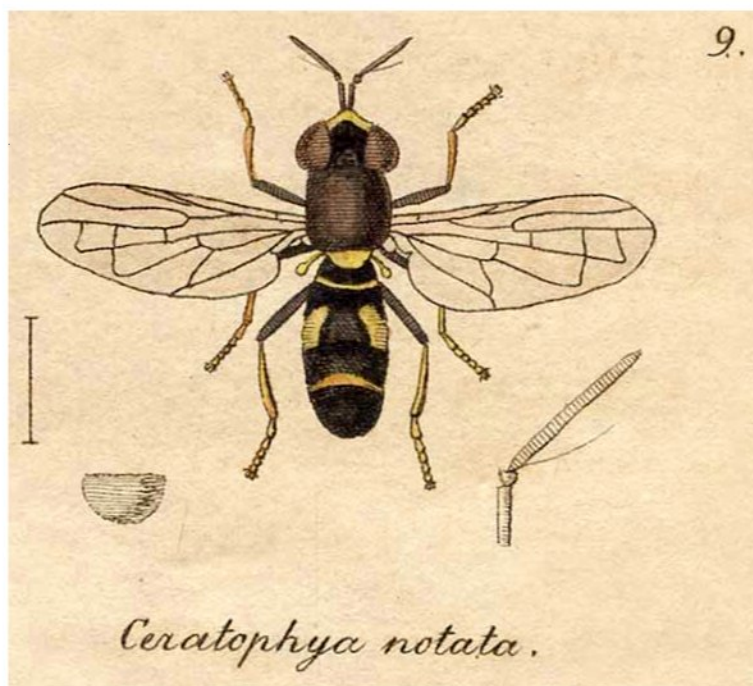
*Eumicrodon* Curran 1925: 50, type *Microdon fulgens* Wiedemann by original designation; proposed as a subgenus of *Microdon*. Objective synonym of *Chymophila*.

*Eumicrodon* was established by Curran for those larger New World species of *Microdon* in which the anterior portion of vein M1 is recurrent and has an appendix at the point where the vein is redirected basally. Also, the abdomen is of a particular shape, with the 2nd tergum rectangular with anterobasal corners square. This is a very distinctive species group, unfortunately it has a senior synonym, *Chymophila*.





**FIGURES 42–47.** *Microdon* adults and parts. 42–45, *Paramixogaster wegneri* Keiser. 42, metaleg, lateral. 43, head, dorsal. 44, wing, dorsal. 45, abdomen, dorsal. 46–47, *Masarygus* sp. Figures 42–45 from Keiser (1964: 85, figs 1–4); 46–47 new original.



48



49

**FIGURES 48–49.** *Ceratophya notata* Wiedemann, habitus, dorsal. From Wiedemann (1824, plate, fig. 9; 1830: pl. 9, fig. 5).

***Eurypterosyrphus*.** Neotropical; 2 species.

*Eurypterosyrphus* Barretto & Lane 1947: 141, type *melanopterus* Barretto & Lane by original designation.

*Eurypterosyrphus* is recognized as a subgenus of *Aristosyrphus*, differing from the typical subgenus by having a dorsomedial tubercle on the face ventrad to the antenna and usually having the apical crossvein (vein M1) straight, not processive.

***Furcantenna*.** Oriental; 1 species.

*Furcantenna* Cheng this paper, type *yangi* Cheng by original designation.

*Holmbergia* Lynch Arribalzaga 1891: 196, type *guntherii* Lynch Arribalzaga by monotypy. An objective synonym of *Rhopalosyrphus* Giglio-Tos.

***Hovamicrodon*.** Afrotropical; 4 species.

*Hovamicrodon* Keiser 1971: 248, type *silvester* Keiser by original designation.

*Hovamicrodon* is based on a particular type of scutellar calcar, which is broad and blunt apically. We treat it as only a subgroup of *Microdon*. The group seems to be endemic to the Malagasy subregion.

*Hypselosyrphus* Hull 1937a: 21, type *trigonus* Hull by original designation. Subjective synonym of *Ubristes* (Thompson et alia 1976: 61).

*Hypselosyrphus* is based on an *Ubristes* species in which the 4th abdominal segment is short and triangular. As with *Stipomorpha*, this character is considered only of species group value. See under *Ubristes*.

***Indascia***. Oriental; 2 species.

*Indascia* Keiser 1958: 221, type *Ascia brachystoma* Wiedemann by original designation.

*Indascia* was originally placed in the tribe Spheginini, subfamily Cheilosini [= Eristalini]. The genus, however, clearly belongs to the subfamily Microdontinae and is very similar to *Paramicrodon*. The type-species was described from "India orientalis," and another species was described from Sri Lanka.

*Johnsoniodon* Curran 1947: 1, type *malleri* Curran by original designation. Subjective synonym of *Schizoceratomyia* (Papavero 1962: 322).

*Johnsoniodon* was described for a female with furcate basoflagellomere. In all other known species with furcate antennae, this condition is only found in the males. Papavero (1952: 322) treat all the groups based on furcate antennae as synonyms of *Masarygus*. *Johnsoniodon* is very similar to *Schizoceratomyia* only differing in the state of the arista. The arista in *Johnsoniodon* is distinct and about 1.5 times as long as the pedicel, but in *Schizoceratomyia* the arista is absent or less than 2 as long as pedicel. We consider this difference that of species, not genus-group taxa and continue to treat this name as a synonym of *Schizoceratomyia*. The name, *Schizoceratomyia*, was published in short paper on 12 July and the name, *Johnsoniodon*, was published on 14 July.

***Kryptopyga***. Oriental; 1 species.

*Kryptopyga* Hull 1944: 129, type *pendulosa* Hull by original designation.

*Kryptopyga* was based on an Oriental species from Java with a particular abdominal shape. We do not know the species and leave the group as unrecognized.

***Masarygus***. Neotropical; 1 species.

*Masarygus* Bréthes 1909: 441, type *planifrons* Bréthes by original designation.

*Masarygus* was first described as representing a new family related to Conopidae or possibly Oestridae due to its reduced mouthparts. Bezzi (1910: 67) correctly recognized the group as belonging to the family Syrphidae and suggested the name was a probably synonym of *Ceratophya*. Shannon (1925: 212) placed the name as a subgenus of *Microdon* and later (1928: 37) considered the name a synonym of *Microdon*. Bréthes (1928) objected to Shannon's synonymy. Later Papavero (1962: 322) used *Masarygus* as the senior name for all *Microdon* with furcate basoflagellomeres and treated *Schizoceratomyia* and *Johnsoniodon* as synonyms. He provided a key to species. Thompson et alia (1976: 60) followed Papavero.

I (FCT) have now studied syntypes of *planifrons* Bréthes and find them to represent a group quite distinct from *Schizoceratomyia* as noted in the above key.

***Megodon***. Afrotropical; 1 species.

*Megodon* Keiser 1971: 252, type *stuckenbergi* Keiser by original designation.

*Megodon* was proposed for a species from Madagascar with an unusual scutellum. We have not seen the species, hence, can not comment on the status of the taxon.

*Mesophila* Walker 1849: 1157, type *Ceratophya fuscipennis* Macquart by monotypy. Subjective synonym of *Microdon* (Osten Sacken 1875: 41, 1878: 119).

In his "Errata and Addenda" Walker (1849: 1157) established the name *Mesophila* for *Ceratophya fuscipennis* Macquart and placed his *Microdon agapenor* as a synonym of it. He provided no descriptive information, merely a new name. Osten Sacken (1875: 41) placed the species, *fuscipennis*, and the name, *Mesophila*, under *Ceratophya*, and later (Osten Sacken 1878: 119) he moved *fuscipennis* to *Microdon* without comment.

**Microdon.** All regions; 249 species.

*Microdon* Meigen 1803: 275, type *Musca mutabilis* Linnaeus by monotypy.

*Microdon* is the nominotypic group, hence, remains somewhat a catch all for various unrelated species not placed in other genera. The species related to the type, *mutabilis* Linnaeus, are restricted to the North Temperate region and are characterized by long antenna, scutellum with apical calcars, vein R4+5 with an appendix, simple legs and abdomen. The European species have been revised (Doczkal & Schmid 1999, Schmid 2004), Nearctic (Thompson 1981b) and Japanese (Maruyama & Hironaga 2004, Hironaga & Maruyama 2004).

**Mixogaster.** New World; 19 species.

*Mixogaster* Macquart 1842: 74, type *conopsoides* Macquart by original designation.

*Mixogaster* is a group of petiolate *Microdon* flies restricted to the New World. They are distinguished from all other petiolate *Microdon* groups by 1) lacking an appendix on vein R4+5, 2) having a reduced and bare metasternum; 3) unarmed scutellum; and 4) usually an appendix on vein M extending in cell R4+5. Some earlier authors more broadly interpreted the concept of this genus and described species now placed elsewhere [*aphritina* Thomson = *Paramixogaster*, *bellula* Williston = *Pseudomicrodon*, *cinctella* Sack = *Paramicrodon*, *claripennis* Hine = *Pseudomicrodon*, *nigripennis* Sack = *Paramicrodon*, *variegata* Sack = *Paramixogaster*, and *vespiformis* Brunetti = *Paramixogaster*]. Hull (1954) provided a revision of the genus.

**Myiacerapis.** Afrotropical; 1 species.

*Myiacerapis* Hull 1949: 309, type *Microdon villosus* Bezzi by original designation; proposed as a subgenus of *Microdon*.

*Myiacerapis* is the name Hull (1949: 309) gave to Bezzi's group 6 (1915: 134) of *Microdon* and was erected for a single species, *villosus* Bezzi, which "is distinguished from any other by the very remarkable structure of the antenna. The antennae are also carried in a different manner; instead of being pendulous they are erect and curved outwards ..." (Bezzi 1915: 134). The basoflagellomere is elongate, about 4.5 times as long as pedicel, and the scutellum is simple, without calcars. We have not seen the species, hence, can not comment on the status of the group.

*Myxogaster* Kertész 1910: 351, misspelling of *Mixogaster* Macquart.

*Myxogaster* Shiraki 1930: 8, misspelling of *Mixogaster* Macquart.

*Myxogasteroides* Shiraki 1930: 9, *Myxogaster nigripennis* Sack by original designation. Subjective synonym of *Paramicrodon* (Hull 1949: 317).

*Myxogasteroides* was established for *Myxogaster nigripennis* Sack as Shiraki (1930: 9) correctly recognized that the species did not belong to the New World genus *Mixogaster*. While Shiraki recognized his new genus was similar to *Syrphinella* Herve-Bazin, he separated the two as he felt that *nigripennis* had a much bigger head ["... sehr grossen Kopf (viel breiter als der Thorax ...)"] and a longer pedicel. I (FCT) have examined the type of *nigripennis* Sack and find the head and antennal shape are well within the typical species variation

of *Paramicrodon*. So, we follow Knutson et al. (1975: 373) and continue to accept this name as a synonym of *Paramicrodon*.

*Nannomyrmeomyia* Hull 1945: 75, type *Paramicrodon delicatulus* Hull by original designation; proposed as a subgenus of *Microdon*. Subjective synonym of *Paramicrodon* (Thompson 1969: 75, Thompson et al. 1976: 57).

Hull (1937a: 24) originally described and placed the type species of this group in *Paramicrodon*, later he erected a new subgenus for the species (1945: 75) within the genus *Microdon*, stating that "I do not believe that this fly is congeneric with *Paramicrodon* of Asiatic species" and finally transferred the group to *Spheginobaccha*. Why Hull (1949) became confused about the placement of this species may be explained because he never properly labeled his types and forgot what his species was (Thompson 1981a: 111).

***Nothomicrodon***. Neotropical, 1 species.

*Nothomicrodon* Wheeler 1924: 243, type *aztecarum* Wheeler by original designation.

The name *Nothomicrodon* is based on an unusual larva found in the carton nest of the ant, *Azteca trigona*. Shannon (1925: 213) without comment placed *Nothomicrodon* as synonym of *Microdon*. These larvae have none of the characteristics of Syrphidae and probably belong to another family, perhaps, Phoridae. The species has not been seen since the original collection was made.

***Oligeriops***. Australian; 1 species.

*Oligeriops* Hull 1937a: 26, type *Microdon chalybeus* Ferguson by original designation.

Hull in describing *Oligeriops* does not provide any diagnostic information, only a description. In his key to world genera of Microdontinae (Hull 1949), he uses two characters, the "greatly reduced" size of the eyes, hence, the larger gena, vertex and occiput, and the shape of the basoflagellomere. As noted by Ferguson (1926: 171) in respect to another Australian species with an unusual basoflagellomere (*alcicornis* Ferguson, type of *Cervicorniphora*), "the antennae are most variable in the genus" *Microdon*. He later emphasized this variation by illustrating the antennae of most Australian *Microdon* species. From those illustrations one can see that at least the antennal structure of *chalybeus* is not unique, but common among Australian species. Whether these other species have reduced eyes remains to be seen!

***Omegasyrphus***. New World (southern North America); 5 species.

*Omegasyrphus* Giglio-Tos 1891: 4, type *Microdon coarctatus* Loew by subsequent designation of Giglio-Tos (1892: 3).

*Omegasyrphus* was established for some small *Microdon* species with a distinctive abdominal shape: 2nd segment is widened, flattened, flared, with its lateral margin subcircular, thickened and rounded; and the rest of abdomen (3rd–5th segments) narrowed and cylindrical (Hull 1949: 309).

*Papiliomyia* Hull 1937a: 27, type *sepulchrasilva* Hull by original designation. Subjective synonym of *Rhoga* (Hull 1949: 316).

*Paraceratophya* Fluke 1957: 38, misspelling of *Protoceratophya* Hull.

***Paragodon***. Neotropical; 1 species.

*Paragodon* Thompson 1969: 74, type *paragoides* Thompson by original designation.

*Paragodon* was established for two small (4–5 mm) *Microdon* flies which differ from all other species by their simple male genitalia and were considered the most primitive microdotine species. Other characters are scutellum simple, without calcar; metasternum reduced and bare; anepimeron bare; and vein R4+5 without appendix.

**Paramicrodon.** Oriental, Australian, Neotropical; 8 species.

*Paramicrodon* Meijere 1913: 359, type *lorentzi* Meijere by monotypy.

*Paramicrodon* was established for a new species, *lorentzi* de Meijere, from New Guinea, which differ from *Microdon* by its short antenna and lack of an appendix on vein R 4+5.

**Paramixogaster.** Oriental, Australian; 5 species.

*Paramixogaster* Brunetti 1923: 319, 320, type *Mixogaster vespiformis* Brunetti by original designation.

*Paramixogaster* was established for *Mixogaster vespiformis* Brunetti when Brunetti (1923: 319) recognized his species differed from *Mixogaster* of Macquart. *Paramixogaster* has an appendix on vein R4+5 (absent in *Mixogaster*), greatly elongate basoflagellomere, and pilose and developed metasternum.

*Paramixogasteroides* Shiraki 1930: 8, type *Myxogaster variegata* Sack by original designation. **New** subjective synonym of *Paramixogaster*.

*Paramixogasteroides* was established for *Myxogaster variegata* Sack as Shiraki (1930) correctly noted that the species did not belong to the New World genus *Mixogaster*. *Paramixogasteroides* Shiraki was stated to be very close to *Paramixogaster* but differed in head and abdominal shape: The basoflagellomere is not as long (4 times as long as wide, not 6 times) and the 2nd tergum is not as strongly constricted basally. These differences are trivial when additional species are considered, such as *wegneri* Keiser, which has the abdomen shape of *variegata* Sack and the antenna of *vespiformis* Brunetti. Hence, we treat the name as a junior synonym of *Paramixogaster*.

*Parmula* Heyden 1825: 589, type *cocciformis* Heyden by monotypy = *mutabilis* Linnaeus. Objective synonym of *Microdon* (*sensu stricto*).

The taxonomy of the European species of *Microdon* based on larval and puparial characters remains incomplete (Dockal & Schmid 1999, Schmid 2004). Schlotthauber (1840) followed by Elditt (1845) were the first to recognize that *Parmula* and *Scutelligera* were not molluscans, but the immature stages of flies. Elditt consider both names to be synonyms of *Microdon mutabilis*, but while larval characters are now known, no one has re-examined these earlier names to see what modern species concepts they apply to. Hence, the possibility remains that *cocciformis* is not a synonym of *mutabilis*, but another species.

**Parocyptamus.** Oriental; 2 species

*Parocyptamus* Shiraki 1930: 2, type *sonamii* Shiraki by original designation.

Shiraki described *Parocyptamus* as belonging to the subfamily Microdontinae but related his genus to *Ocyptamus* Macquart, a member of the subfamily Syrphinae. Later Hull (1937a: 26) named this group *Stenomicrodon*. The critical character which both author focused on was the narrow elongate abdomen. Later Hull (1949: 312) noted the unusually well-developed basal patches of short thick setae on pro- and mesofemora and placed his genus as a junior synonym of *Parocyptamus*. In overall habitus, these species are similar to the Neotropical *bidens* species group, which lacks the distinctive basal femoral setal patches.

*Protoceratophya* Hull 1949: 314, type *Ceratophya carpenteri* Hull by original designation; proposed as a subgenus of *Ceratophya*. Subjective synonym of *Aristosyrphus* (Thompson & Marinoni 2008).

**Pseudomicrodon.** Neotropical; 13 species.

*Pseudomicrodon* Hull 1937a: 24, type *Microdon beebei* Curran by original designation.

*Pseudomicrodon* was established for *beebei* Curran, a *Microdon* species with a petiolate abdomen. The group is restricted to the New World tropics and can be distinguished from other microdontine flies, which have petiolate abdomens, as follows, from: *Mixogaster* by having an appendix on vein R4+5 in cell R4+5 and

a well-developed metasternum; from *Rhopalosyrphus* by having a bare katepimeron; from *Ceriomicrodon* by having the abdominal petiole shorter, shorter than thorax and thoracic pile long; from other species groups of *Microdon*, by having a swollen, shiny vertex and the ventral face not produced and gena narrow and linear.

In his original description, Hull wrote "I have seen a number of species which fit with tolerable accuracy and certainty into the concept above; among them may be mentioned *Microdon nigrispinosus* Shannon, *illucens* Bezzi and probably *bellula* Williston" (Hull 1937a: 25). In his revision of syrphid genera (Hull 1949: 311), he included these same species and added a new subgenus (*Tanaopicera*) for the Australian species, *Ceratophya variegatus* Walker. This Australian species clearly does not belong to *Pseudomicrodon* as here delimited and belongs the Oriental genus *Paramixogaster*.

The Afrotropical species, *illucens* Bezzi, is very similar to *Pseudomicrodon* in appearance but differs in having a normal vertex, neither swollen nor shiny, metasternum and first sternum bare, not pilose. Keiser (1971: 254) described another *Pseudomicrodon* species (*elisabethae*) from Madagascar. As we have not studied the unique type we do not know whether it agrees with *illucens* and whether these species deserve recognition as a separate taxon.

In the Neotropics, there are a number of species that are similar in appearance to *Pseudomicrodon* as they have a petiolate abdomen. These are clustered into two species groups: *abnormis* and *diaphanus* groups. *Microdon abnormis* does not have the shiny protuberant vertex and has a small medial tubercle under the antenna and pilose eyes. The species of the *diaphanus* group (*aureoscutus* Hull, *aureus* Hull, *corona* Curran, *fenestratus* Hull, *hermetia* Curran, *hermatiodes* Curran, *trilinea* Hull, and *trivittatum* Curran) differ in head shape. The face is strongly developed ventrally, straight, not convex; the gena are broad, distinct; the basoflagellomere is longer than the pedicel and scape together. These species are related to the *bidens* species group.

***Ptilobactrum***. Afrotropical; 2 species.

*Ptilobactrum* Bezzi 1915: 136, type *neavei* Bezzi by original designation.

*Ptilobactrum* was erected by Bezzi (1915: 136) for a *Microdon* species which had a very broad head and the basoflagellomere was elongate and densely pilose in the male. We have not seen this species, hence, can not comment on the status of the group.

***Rhoga***. Neotropical; 5 species.

*Rhoga* Walker 1857: 157, type *lutescens* Walker by monotypy.

*Rhoga* are small, delicate, pale yellowish flies, with distinct black pilose brushes on the metatibia. The head shape is also characteristic with the occiput being of uniform development, as wide dorsally as ventrally in lateral view. These flies are probably mimics of stingless (trigonal) bees (Family Apidae, tribe Meliponini).

***Rhopalosyrphus***. Nearctic & Neotropical; 3 species. Revision Weems et al. (2003).

*Rhopalosyrphus* Giglio-Tos 1891: 3, type *Holmbergia guentherii* Lynch Arribalzaga by subsequent designation of Giglio-Tos (1892: 2).

*Rhopalosyrphus* was described by Giglio-Tos for an unnamed species. Later Giglio-Tos (1892: 2) declared that his unnamed species was the same as one earlier described by Lynch Arribalzaga from Argentina. *Rhopalosyrphus* is a group of *Microdon* flies with a distinctive petiolate abdomen and pilose meropleuron. The group was recently revised by Weems et al. (2003).

***Schizoceratomyia***. Neotropical, 3 species.

*Schizoceratomyia* Carrera, Lopes & Lane 1947: 245, type *barretoii* Carrera, Lopes & Lane by original designation.

*Schizoceratomyia* was erected for *Microdon* flies with the basoflagellomere furcate in the males. In establishing the genus, the authors made no reference to other *Microdon* flies. In their second paper on the group, they discussed *Aristosyrphus*, *Ceratophya* and *Rhoga*, but were apparently unaware of other microdon groups based on furcate antennae. Hull (1949: 316) and then Papavero (1962: 322) united all the microdon groups based on furcate antennae under the oldest name, *Masarygus*. Papavero (1962: 323) provided a key to the species, but omitted *megacephalus* Shannon. *Schizoceratomyia* differs from *Masarygus* and *Carreramyia* as noted in the key and is recognized as distinct.

*Scutelligera* Spix 1824: 124, type *ammerlandia* Spix by monotypy = *mutabilis* Linnaeus. Objective synonym of *Microdon* (*sensu stricto*).

See note under *Parmula* about species taxonomy.

*Scutigrella* Hass 1924: 148, misspelling of *Scutelligera* Spix.

*Serichlamys* Curran 1925: 50, type *Aphritis rufipes* Macquart by monotypy; proposed as a subgenus of *Microdon*. Subjective synonym of *Microdon* (Wirth et alia 1965: 597).

*Serichlamys* was established for a North American *Microdon* species which has pilose eyes. This is nothing more than a species character.

***Spheginobaccha***. Afrotropical, 5 species (2 Madagascar); Oriental, 8 species.

*Spheginobaccha* de Meijere 1908: 327, type ?*Sphegina macropoda* Bigot by monotypy.

*Spheginobaccha* was placed in the subfamily Microdontinae by Hull (1949: 318, also Shatalkin 1975) and this placement has been confirmed by DNA sequence evidence (Ståhls et al. 2003). Thompson (1974) reviewed the earlier classification of the genus and considered the group as the basal clade within the Eristalinae (that is, first divergence from other eristaline groups). The genus is readily separated from other microdons by the incomplete metathoracic bridge, round/oval basoflagellomere, occiput with a dorsolateral crease and other characters (see key). The species were revised by Thompson (1974), with additions by Dirickx (1995). *Spheginobaccha christiani* Sodhi and Singh (1991: 319) is not a microdontine fly, but is a xylotine fly, probably a species of *Syritta*.

*Stenomicrodon* Hull 1937a: 26, type *purpureus* Hull by original designation. Subjective synonym of *Parocyptamus* (Hull 1949: 311).

*Stipomorpha* Hull 1945: 74, type *Microdon fraudator* Shannon by original designation; proposed as a subgenus of *Microdon*. Subjective synonym of *Ubristes* (Thompson et alia 1976: 61).

*Stipomorpha* was established for those *Microdon* species "with the first two abdominal segments greatly flared and flattened and wider than the thorax; [with] remainder of abdomen immediately compressed into rounded, subcylindrical pipe-like form." This character is of little more than species group significance (see *Ubristes*).

***Surimya***. Neotropical, 2 species.

*Surimya* Reemer 2008: 179, type *rolanderi* Reemer by original designation.

*Surimya* was established for two species similar to *Paragodon* but with bristle-like pile on the thorax and abdomen as well as bare postpronotum.

*Syrphinella* Herve-Bazin 1926: 73, type *miranda* Herve-Bazin by monotypy. Subjective synonym of *Paramicrodon* (Hull 1937a: 23).



**Syrphipogon.** Neotropical, 2 species.

*Syrphipogon* Hull 1937b: 120, type *fucatissimus* Hull by original designation. Subjective synonym of *Microdon* (Steyskal 1953: 3).

*Syrphipogon* was erected for a very large microdon fly (25 mm), which had a deeply sulcate scutellum and a facial mystax. Subsequently Steyskal (1953) described an additional species and considered the genus a synonym of *Microdon*. These species are mimics of the large euglossine bee (*Eulaema*).

*Tanaopicera* Hull 1945: 76, type **Ceratophya variegatus** Walker by original designation; proposed as a sub-genus of *Pseudomicrodon*. *New subjective* synonym of *Paramixogaster*.

*Tanaopicera* was proposed for *variegatus* as the species differs from typical *Pseudomicrodon* according to Hull (1945: 76) "by the straight, non-convex face, the high, greatly developed vertex." The first character mentioned by Hull is trivial and the second is strange as *Pseudomicrodon* also has a highly developed vertex. The type species, *variegatus* Walker, however, falls easily into the current circumscription of *Paramixogaster*. Hence, we consider the name a junior synonym of *Paramixogaster*.

**Ubristes.** Neotropical; 61 species.

*Ubristes* Walker 1852: 217, type *flavitibia* Walker by monotypy.

*Ubristes* is characterized by the metatibia usually enlarged but always with a brush of long pile on the dorsal edge. These flies appear to be mimics of stingless (trigoniform) bees (Family Apidae, tribe Meliponini). The presence or absence of the appendix on vein R4+5 is variable in this group. The group is divided into an number of subgroups (*Hypselosyrphus*, *Stipomorpha*, *Ubristes*) on the basis of the shape of the abdomen.

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Microdontine flies have always interested the junior author and a revision of their classification was to have been his PhD thesis years ago. The exigency of the Vietnam War required that another topic be pursued. The discovery of the marvelous new furcate group from China by the senior author provided an excuse to summarize our accumulated knowledge of these flies.

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