A New Genus of Microdontine Flies (Diptera: Syrphidae) with Notes on the Placement of the Subfamily

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A NEW GENUS OF MICRODONTINE FLIES (DIPTERA: SYRPHIDAE) WITH NOTES ON THE PLACEMENT OF THE SUBFAMILY[1]

BY F. CHRISTIAN THOMPSON[2]

I discovered the following new genus of Syrphidae while reviewing the Neotropical Microdontinae. I had planned to put aside its description until my study of the subfamily was finished. However, publication of a second species assignable to it by van Doesburg (1966) has necessitated publishing a name now for this genus so that it can be included in the Catalog of South American Diptera.

Paragodon, new genus[3]

Very small (4-5 mm.) microdontine flies. Face simple (slightly produced in *paragoides*); cheeks absent, eyes bordering on the oral opening; eyes dichoptic in both sexes; occiput evenly developed. Antennae short, about one-half as long as face; aristae short and thickened.

Thorax about as long as broad; pleura bare except mesopleura pilose and metapleura with microscopic pile; scutellum without apical spines and fringe; metasterna undeveloped and bare; metathoracic spiracles without hair fringes. Legs simple, with no basal setal patches on the femora and with cicatrices only on the hind femora. Wings without the spurious vein, with all apical crossveins straight.

Abdomen oval, lateral margins slightly emarginate and rolled under ventrally, with 1st sternite bare and 1st spiracles without hair fringes. Genitalia simple; ejaculatory apodeme simple, apical portion not triangularly flared; ejaculatory sac not sclerotized; ejaculatory process single, short, not posteriorly fused to ejaculatory hood; ejaculatory hood with anterior ventral portion elongate; sustentacular apodeme present, double, fused anteriorly to base of ejaculatory

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[2]10 Edmunds Road, Wellesley Hills, Massachusetts, 02181. Personal Contribution no. 6.

[3]The name *Paragodon* is formed by adding the first part of *Paragus* to the last part of *Microdon*, thus indicating these flies' resemblance to *Paragus* and their phylogenetic affinity to *Microdon*.

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hood, and connected posteriorly by membrane to dorsal infolded surface of penis sheath; cerci elongate.

Type-species: *Paragodon paragoides*, new species

Paragodon forms the plesiomorphic (primitive) sister group to the rest of the Microdontinae. It is the only known microdontine fly with a simple ejaculatory apodeme and sac. All other Microdontinae have an apical triangularly flared portion to the ejaculatory apodeme which fits into a strongly sclerotized cup-shaped sac (Fig. 8). The other primitive (plesiomorphic) characters which *Paragodon* displays are: 1) short antennae; 2) underdeveloped and bare metasterna; 3) lack of basal setal patches on the femora; 4) lack of a spurious vein; 5) lack of an appendix on the third vein (R4+5); 6) presence of a double sustentacular apodeme; 7) single, free ejaculatory process. The lack of cheeks on the head and the reduced thoracic pile are specialized (apomorphic) conditions. The isolated phylogenetic position of *Paragodon* suggests a number of interesting questions. What will the larvae be like? Will they be found in ant's nests like all other microdontine flies? And could *Paragodon* possibly be the adults of Wheeler's *Nothomicrodon*?

Since *Paragodon* appears to be the most primitive microdontine fly known, a general review of the characteristics and position of the subfamily seems in order.

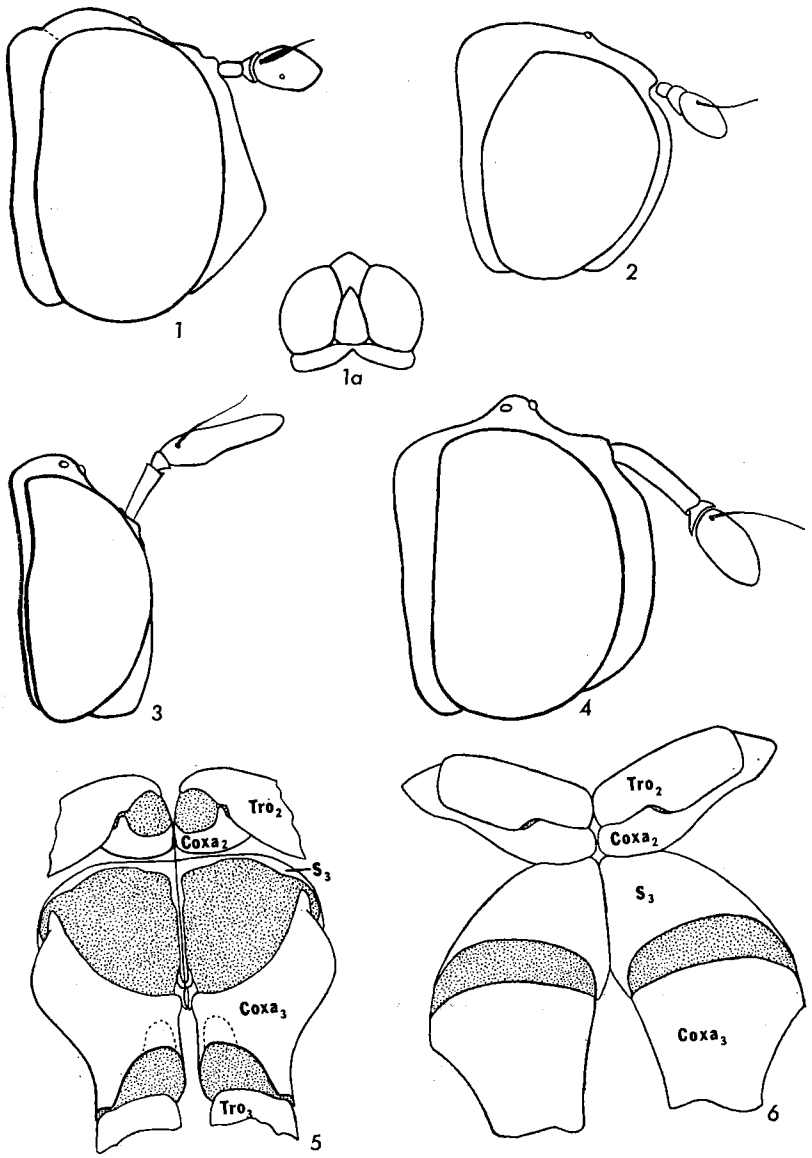
Subfamily Microdontinae

A small (350+ species) group of diverse syrphid flies.

Adults: Head: Face simple except slightly produced on the lower part in *Microdon (Rhopalosyrphus)*, pilose; facial grooves (anterior tentorial pits) reduced to pits; eyes dichoptic in both sexes; antennae usually long, longer than one-half as long as face except shorter in *Paragodon* and *Paramicrodon*, with first segment usually longer than broad except shorter in *Paramicrodon delicatula* Hull; aristae bare.

Thorax: Humeri always pilose, proanepisterna bare, anterior mesoanepisterna pilose except bare in *Microdon (Cerioimicrodon)*, scutellum without ventral hair fringe; plumula not differentiated from subalar; postmetacoxal bridge always present and complete. Legs: femora and usually tibiae with cicatrices. Wings: with first posterior cell (R5) closed and usually obtuse, with apical crossvein (upper turned portion of M1+2) recurrent or straight except directed outward in *Microdon (Aristosyrphus)*, with stigmatic crossvein (sc+r), with anterior crossvein (r+m) before middle of discal cell (2nd M1+2) and without radial sector bristles.

Abdomen: Males with four preabdominal segments, 1st abdominal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spiracles embedded in metathoracic epimera. Genitalia: chitinous box usually spherical and without external lobes; ejaculatory process tubular and elongate; ejaculatory hood elongate, surrounding ejaculatory process, enclosing basal portion of the chitinous box, articulating dorsally with 10th sternite and ventrally with sustentacular apodemes; penis sheath without lobes, with posterior dorsal surface infolded and elongate posteriorly, where it is connected by membrane to the sustentacular apodemes when present; sustentacular apodeme usually present, absent or reduced in the specialized forms *Mixogaster* and *Microdon (Aristosyrphus)*, double, fused anteriorly to form a broad curved plate articulating with ventral end of ejaculatory hood and connected posteriorly by membrane to dorsal infolded surface of penis sheath; ejaculatory apodeme triangularly flared apically except in *Paragodon*; ejaculatory sac sclerotized and usually well-developed except in *Paragodon*.

Larvae: The larvae are exclusively scavengers in ants' nests and can be separated from other syrphid larvae by the following characteristics: 1) lack of body segmentation (Heiss, 1938); 2) lack of segmental spines (Heiss, 1938); 3) absence of cibarial ridges (also in Syrphinae) (Hartley, 1963); 4) presence of sclerotised labial lips (Hartley, 1963); 5) mandibles of a different form than the normal saprophagous types (Hartley, 1963); 6) opening of puparium by three pieces, two dorsal lateral pieces, and one ventral piece instead of two dorsal pieces (Lundbeck, 1916). Some of these characteristics may not be of subfamilial value since the larvae of only *Microdon s. s.* have been studied in detail. The larvae of *Mixogaster* have been described by Greene (1955) and Carrera and Lenko (1958) and appear to agree with the above. However, the existence of larvae like *Nothomicrodon* Wheeler (1924) (which may not be a syrphid) suggests that there may be much greater variability in the larval form than presently known.

Type-genus: *Microdon* Meigen

The genera I include in the Microdontinae are the same as those listed by Hull (1949) except *Spheginobaccha* is excluded. *Spheginobaccha* does not have a postmetacoxal bridge and lacks the specialized structures of the male genitalia. *Indascia* Keiser does belong to the

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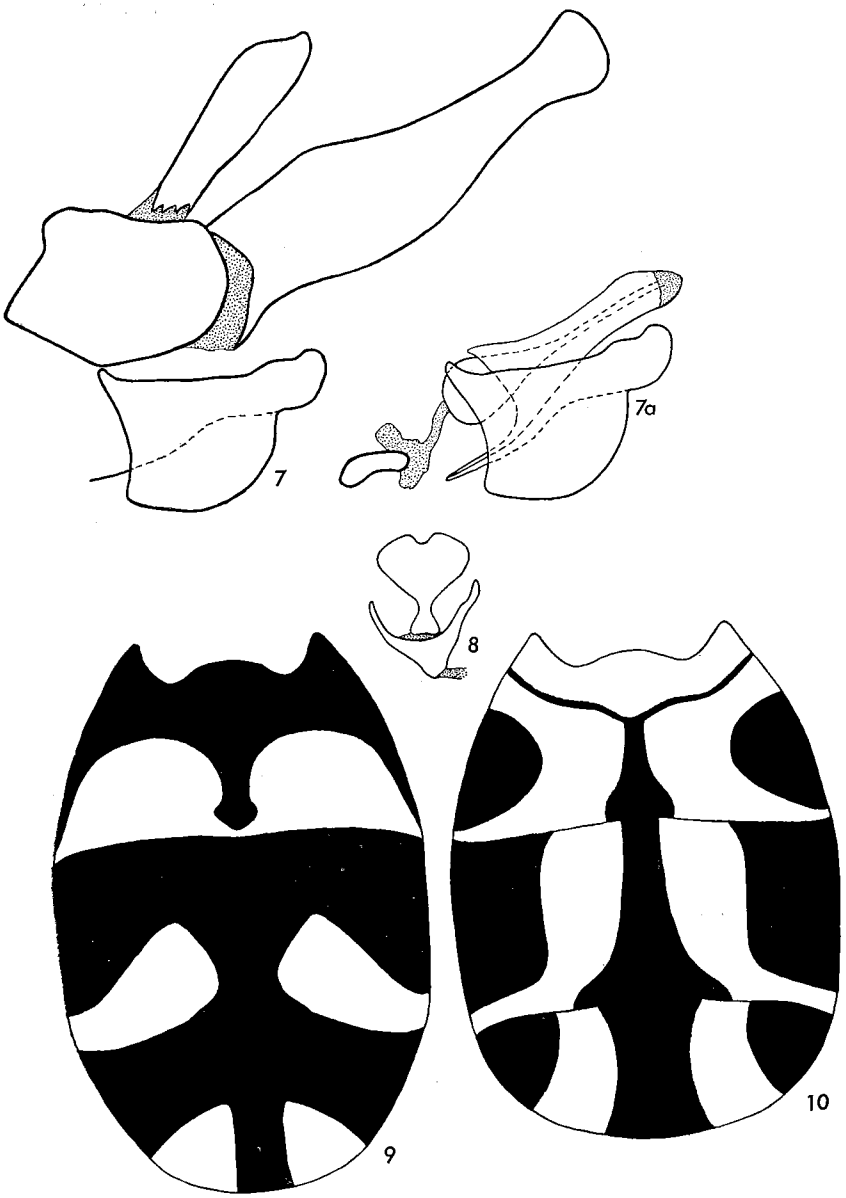
Figs. 1-4, lateral view of heads; 1a, ventral view; 5-6, ventral view of metasterna and surrounding parts. Fig. 1, *Paragodon paragoides*, n. sp., male (HT); 2. *Paramicrodon delicatula* Hull, male (LT); 3. *Microdon (Ubristes) triangularis* Curran, female; 4. *Microdon (Rhoga)* sp. A, female; 5. *Mixogaster cubensis* Curran; 6. *Microdon (Rhopalosyrphus) guntherii* Arribalzaga. HT-Holotype, LT-Lectotype.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Microdontinae, not to the Cheilosinae as supposed by its author (Keiser, 1958).

Since Rondani (1856-57) first divided the Syrphidae into supergeneric groups, most authors have accepted the Microdontinae as a distinct and separate group. However, Williston (1886), Goffe (1952), and Wirth *et al* (1965) have treated it as a tribe in one or another subfamily. Williston placed the "tribe" Microdontini in the Syrphinae, and Goffe and Wirth *et al* have placed it in the Milesinae (Sphixinae Goffe). The relative ranking of a group depends on its position in the phylogeny of the whole group, so when one finds a group given two different rankings by different workers one expects to find differences in their phylogenies of the group. This is the case with the Microdontinae. Hull (1949) has placed the Microdontinae with the Eumerinae and Nausigasterinae in his first phylogenetic dichotomy of the Syrphidae; whereas Goffe (1952) considers the microdontines to have diverged long after the Syrphinae.

These different views of the phylogeny of the Syrphidae can best be illustrated and compared by Hennig-type diagrams. The following diagrams (see text figure) illustrate the interpretations of Goffe (1952), Wirth *et al* (1965), and myself; I follow Hull (1949) except that I exclude the Eumerinae and Nausigasterinae from the *Microdon* line. Plan 1, my arrangement, clearly indicates that the Microdontinae should be considered the first divergence in the phylogeny of the family. Only one character state (#8) could be used to place the microdontine divergence second. If the reduction of preabdominal segments in the male (character #8) is not convergent in the Microdontinae and Pipizini, then the Microdontinae would have to be considered to have arisen after the Syrphinae (Plan 2).

Plan 2 explains Goffe's (1952) groupings. However, it is difficult to follow Goffe's "phylogenetic reasoning", which seems inconsistent with the modern "synthetic" theory of evolution and systematics. This plan creates more convergences than it solves. It seems to me more logical to consider the *reduction* of a character — in this case reduction of the abdominal segments in the male — as due to convergence than to suppose the development of a highly complex character such as aphidophagous larvae to be convergent.

Fig. 7, lateral view of male genitalia with axial system removed; 7a, lateral view of penis sheath and axial system; 8, ejaculatory apodeme and sac; 9-10, dorsal view of abdomen. Fig. 7, *Paragodon paragoides*, n. sp. (HT); 8. *Microdon (Cerioimicrodon) petiolatus* Hull (HT); 9, *Paragodon paragoides*, n. sp. (HT); 10, *Paragodon minutula* van Doesburg (after van Doesburg, 1966).

Wirth *et al* (1965) *have* used the larval state to define the first phylogenetic divergence and thus to define subfamilies of the syrphids (Plan 3). This arrangement too creates more problems than it solves. Placing the syrphine before the microdontine divergence leaves no synapomorphic characters for the Milesinae and creates even more convergences than Plan 2.

In short, Plan 1 seems to offer the most logical illustration of the relationship of the Microdontinae to the other syrphids. However, much is still to be learned about the phylogeny of the Syrphidae, and my placement of the Microdontinae must be accepted only as the best possible *present* arrangement. The strongly plesiomorphic nature of the subfamily suggests that the microdons might best be considered as a separate family (as Martin (1968) has done with the Leptogasteridae). However, regardless of the phylogenetic position of the microdontine flies, they should be clearly recognized as a subfamily equivalent to the Syrphinae and Milesinae.

No other groups have been derived from the microdontine line. Hull (1949) included the Eumerinae[4] and Nausigasterinae[4] in the microdontine divergence. However, these groups belong to the milesine line and are probably derived from a myoleptine ancestor. Eumerinae and Nausigasterinae could not have evolved from the Microdontinae for a number of reasons. Both of these groups lack a number of the specialized characteristics of the Microdontinae which one would expect to find in any derived group; for example, they lack 1) a complete postmetacoxal bridge, 2) the dorsal infolding of the penis sheath, 3) the double sustentacular apodeme or its absence, and 4) other genitalic characters. It is also highly unlikely that the phytophagous larvae of Eumerinae and the saprophytic larvae of Nausigasterinae could have evolved from a specialized larval form like *Microdon* which lacks segmentation and segmental spines and possesses specialized mouthparts.

Provisional key to the New World genera and subgenera of Microdontinae

1. Abdomen petiolate; metasterna undeveloped, reduced to a thin line and bare (Fig. 5) ..... *Mixogaster* Macquart
   Abdomen usually not petiolate; if petiolate then metasterna well-developed, not reduced and usually pilose (Fig. 6) 2

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[4]The use of these groups as subfamilies follows Hull (1949); I presently regard these two groups as forming one tribe with *Merodon*, *Alipumilio* and *Psilota* under the Milesinae.

2. Pteropleura bare ..... *Paragodon* Thompson
   Pteropleura pilose 3
3. Antennae short, less than one-half as long as face; first antennal segment never more than twice as long as broad (Fig. 2) .... *Paramicrodon* de Meijere
   Antennae long, always longer than one-half as long as face; first antennal segment always much more than twice as long as broad (Figs. 4 & 5) ..... *Microdon* Meigen ..... 4[5]
4. Apical cross-vein angled outward on anterior one-half (Fig. 11) ..... *Aristosyrphus* Curran
   Apical cross-vein not so, straight or slightly curved inward 5
5. Barrette (dorsal portion of hypopleura) bare 6
   Barrette pilose ..... *Rhopalosyrphus* Giglio-Tos
6. Hind tibiae with distinct brushes of pile[6] 7
   Hind tibiae without brushes 8
7. Occiput uniformly developed, collar-like (Fig. 4) .... *Rhoga* Walker
   Occiput not uniformly developed (Fig. 3) ..... *Ubristes* Walker
8. Anterior mesopleura bare; abdomen petiolate, petiole as long as thorax or longer; face slightly bulging below .... *Cerioimicrodon* Hull
   Anterior mesopleura pilose; abdomen usually not petiolate; if petiolate, then petiolate short and face not bulging below .... *Microdon* Meigen

Key to the species of *Paragodon*

1. Face with medial brown stripe; hind tibiae black .... *paragoides*, new species (Mexico)
   Face without medial brown stripe; hind tibiae whitish yellow .... *minutula* van Doesburg 1966 (Surinam)

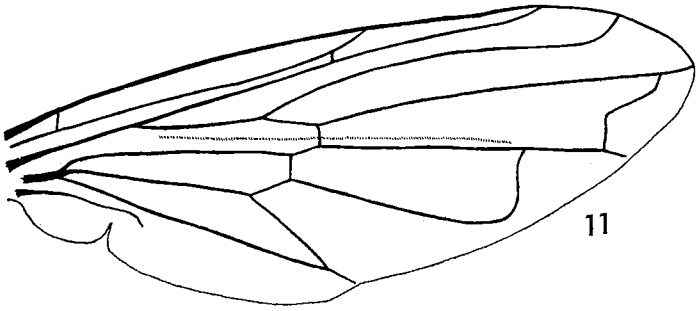
Paragodon paragoides, new species

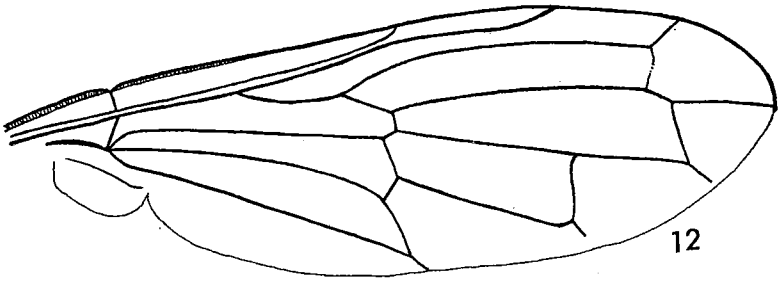
Face slightly produced medially, yellowish, with a diffuse medial brown stripe; thorax and abdomen brownish with yellow spots; legs black except front four tibiae and all tarsi orange.

Male. Head: face yellowish white except for diffuse medial brownish area, with white pile; front and vertex brownish black with pale pile; occiput black, grayish pollinose, with pale pile. Face narrower at oral opening than width of vertex, widest at base of

[5]On the whole the separation of *Microdon* into subgenera, couplets 4-8, is not satisfactory. I do not recognize these subgenera as anything more than distinctive species groups.

[6]Not all *Ubristes* types have distinct brushes of pile.





Figs. 11-12, wings; 11, *Microdon (Aristosyrphus) primus* Curran; 12, *Paragodon paragoides*, n. sp. (HT).

antennae, and slightly produced between oral margin and antennal bases; front wider than face. Antennae short, about one-third length of face; first two segments black with black pile; third segment pointed apically, light brown, with small round sensory pit near middle on ventral portion. Aristae short, about as long as third segment, thick, light brown. Antennal ratio: 2:1:6.

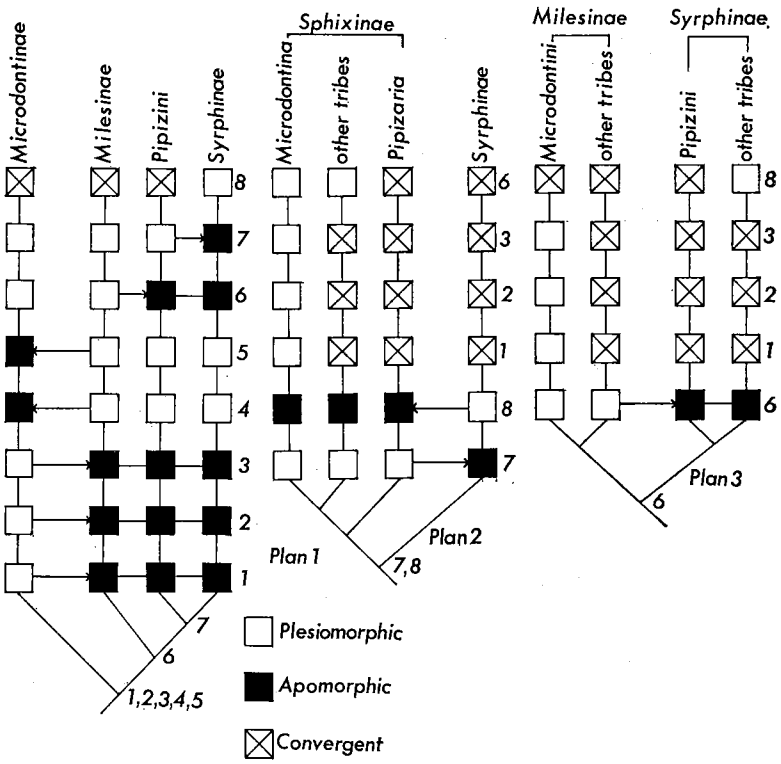
Thorax: brownish black except for humeri, postalar calli and dorsal surface of stenopleura dirty white; thoracic pile yellow except for transverse J-shaped spot of black pile above each wing base. Wings grayish, almost completely microtrichose, with bases of first and second basal cell bare; wing venation as figured (Fig. 12). Halteres yellow. Squamae gray with dark margins. Legs black except as follows: tips of femora, front four tibiae, and all tarsi orange; with pile dark except for light pile on front four tibiae.

Abdomen: Dorsum with black and yellow pattern as figured (Fig. 9); venter yellow; abdominal pile appressed black on black areas and pale yellow on yellow areas. Genitalia: as figured (Fig. 7, 7a); brown.

Holotype — male: Mazatlan, Sinaloa, MEXICO; 16 August 1964,

at sea level; J. F. McAlpine, collector; holotype in Canadian National Collection, Ottawa.

Discussion: Paragodon paragoides is distinct from *minutula* van Doesburg, the only other known species of *Paragodon*. Besides the key characters and abdominal patterns (Figs. 9, 10), *paragoides* shows the following differences from *minutula*: 1) face produced forward in middle (Fig. 1); 2) sides of face not parallel, converging to oral margin; 3) third antennal segment three times as long as first, not equal; 4) an appendix present on second vein (connected to third vein on one side); 5) with spurs on first and second posterior cells.



Explanation of Argumentation plans. Apomorphic character states: 1, Single sustentacular apodeme; 2, complex faces; 3, absence of cicatrices on legs; 4, dorsal infolding of penis sheath; 5, lack of segmentation and segmental spines in the larvae; 6, carnivorous larvae; 7, bare humeri; 8, four preabdominal segments in the male.

The nomenclature used in describing the genitalia of the male is that of Metcalf (1921).

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