

- . Bazalni deo slabije razvijen, nikada osobito razvijen i isturen. Forcepsi po pravilu složenije građe . . . . . 5
5. — Na lateralnim lamelama tvorevine u vidu trnova.  
tribus Xylotini
- . Na lateralnim lamelama tvorevine u vidu češljolikih kuka  
tribus Senogasterini

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## I N D E X

- Arctophila Schiner  
 Asemosyrphus Bigot  
 Axona Wiedemann  
 Baccha Fabricius  
 Brachyopa Meigen  
 Brachypalpus Macquart  
 Callicera Panzer  
 Calliprobola Rondani  
 Cerioides Rondani  
 Chamaesyrphus Mik  
 Cheilosia Meigen  
 Chrysogaster Meigen  
 Chrysotoxum Meigen  
 Copestylum Macquart  
 Crepidomyia Shannon  
 Criorrhina Meigen  
 Cynorhina Williston  
 Deineches Walker  
 Didea Macquart  
 Dolichognyna Macquart  
 Doros Meigen  
 Epistrophe Walker  
 Eristalinus Rondani  
 Eristalis Latreille  
 Eristalodes Mik  
 Eristalomyia Rondani  
 Eumerus Meigen  
 Eurhimyia Bigot  
 Ferdinanda Rondani  
 Graptomyza Wiedemann  
 Hammerschmidtia Schummel  
 Helophilus Meigen  
 Heryngia Rondani  
 Ischyrosyrphus Bigot  
 Lasiotricus Rondani  
 Lathyrophthalmus Scopoli  
 Leucozona Schiner  
 Liogaster Rondani  
 Liops Rondani  
 Mallota Meigen  
 Melanostoma Schiner  
 Merodon Meigen  
 Meromacrus Rondani  
 Mesembrius Rondani  
 Microdon Meigen  
 Milesia Latreille  
 Monoceromyia Shannon  
 Myiatropa Rondani  
 Myiolepta Newman  
 Nausigaster Williston  
 Neoascia Williston  
 Orthoneura Macquart  
 Paragus Latreille  
 Parhelophilus Girschner  
 Pelecocera Meigen  
 Penthesilea Meigen  
 Philippimyia Shannon  
 Phytomia Guérin  
 Pilinasoia Malloch  
 Pipiza Fallen  
 Platyiheirus St. Fargeau & Serville  
 Platynochaetus Wiedemann  
 Pocota St. Fargeau & Serville  
 Protolocera Bezzi  
 Psarus Latreille  
 Psilota Meigen  
 Pterallastes Loew  
 Pyrophaena Schiner  
 Rhingia Scopoli  
 Salpinogaster Schiner  
 Senogaster Macquart  
 Sericomomyia Meigen  
 Simoides Loew  
 Somula Macquart  
 Sphaerophoria St. Fargeau & Serville  
 Sphegina Meigen  
 Spilomyia Meigen  
 Sterphus Philippi  
 Syrretta St. Fargeau & Serville  
 Syrphus Fabricius  
 Temnostoma St. Fargeau & Serville  
 Teuchoenemis Osten-Sacken  
 Tropidia Meigen  
 Volucella Geoffroy  
 Xanthandrus Verrall  
 Xanthogramma Mik  
 Xylota Meigen  
 Xylotomima Shannon

(Primljeno 22-I-1960)

## Summary

Slobodan Glumac

**Phylogenetical System of the Syrphid-flies (Syrphidae Diptera) Based upon the Male Genitalia Structure and the Type of the Larvae with Characteristics of the Family and Tribes**

To Prof. Branislav Gojković,  
my first teacher of Biology,  
Author.

## Introduction

The investigation of the Syrphid systematics shows that hitherto opinions about the system of this systematic group are very different. Sack, Smirnow, Shiraki, Hull and others have considered that the most primitive group of the Syrphid-flies is either *Cheilosia* or *Syrphus*. Metcalf's investigation, as well as the investigation done after his time on the male genitalia (Fulke, Coe, Glumac) offer us data for some of the phylogenetical conclusions (Glumac, 1958). Besides, during the same period of time several authors published very interesting papers about larval degree of the Syrphid-flies (Metcalf, Vimmer, Heiss, Hennig and others).

All of these data give us a good chance to come to phylogenetical conclusions on Syrphid-flies systematics.

**Phylogenetical Criterion for the Syrphid Flies System**

The hitherto used criterion in the Syrphid systematics cannot hold on its significance if it undergoes critical analysis, or otherwise the obtained data must be interpreted in some other way. This author stands for the view that hypopygium structure and type of the larvae are the most important criterion, but nevertheless he analyses the sense of the other criterions used in systematics as well.

a. The colouring of the Syrphid species and its significance in the phylogenetical systematics.

The attitude that the black-coloured species are more simple and more similar to the type of species from which other Syrphid species evolved, and that the motley species are in the higher specialized group, is based upon the standpoint that the evolutionary stream in this group has moved into the direction of the formation of motley coloured species. But existing data about this problem cannot justify this standpoint. Paleontological facts indicate that the greatest number of Syrphid genera appeared almost in the same period of time. My opinion is that the role of one or another colour

type in the evolution of some species has to be studied in connection with the biology and the way of life of the species in general. The colouring is the secondary adaptation of the specialized species: in different genera and even among higher categories we can find different species coloured in the same way. In the genus *Cheilosia*, in which the greatest number of the species are black coloured, there is also the motley *Cheilosia illustrata* HARR. whose last segments of abdomen and the thorax are covered with brown-red-white hairs. We can find the same type of haired abdomen with *Zelima sylvorum*, *Cynorrhina ranunculi* and *C. falax* (subfam. *Milesiinae*), with *Erizona syrphoides* (subfam. *Syrphinae*), with *Merodon equestris* (subfam. *Merodoninae*) and with another species of *Cheilosiinae*, but a bit indistinct, with *Cheilosia grossa*. We shall get the same results if we study the *Bombus*-like colour with *Syrphidae*. This colour can be also found with *Volucella bombylans* (subfam. *Volucellinae*), with *Arctophila bombiformis* (subfam. *Cerioidinae*), with *Temnostoma bombylans* and *Pocota apiformis* (subfam. *Temnostominae*). But in all these examined cases, except for the difference in colour, we cannot find convergency in the genitalia structure which is typical for the genera to which these species belong. If we are with the standpoint that the different colour is characteristic for the secondary adaptation, we can make a conclusion that the colouring influences neither the male genitalia structure nor the process of the speciation in different groups.

The great number of the Syrphid species, of different genera and subfamilies, shows a great variability in the type of colouring. Great number of varieties is based upon the different colours of the parts of the body in the genera: *Paragus*, *Sphaerophoria*, *Eristalomyia*, *Myiatropa* and others. We can find a number of the melanoid specimens in the different species, too: *Lasipticus pyrastris* — var. *unicolor* CURT., *Melanostoma melinum* L. (GLUMAC, 1958) exs. But all of these differently coloured and melanoid species have a typical shape of the male genitalia structure.

Convergency in the colouring of species of different genera and colour variability lessen the significance of the colour as the systematical character which we can use for the investigation of the origin of some *Syrphidae* group. But the colour will be, for a long time, very important character for the systematical determination.

#### b. Male genitalia structure and the type of the wing innervation

The elementary character for the systematization in the old systems was wing innervation. But I should like to remark that the new suggested system, is not contrary to the results of wing innervation system. The hitherto criterion for the separation of subfamilies are the position of *r-m* nerv and its relation to *M<sub>2</sub>* cell, and the presence or the absence of the annex on the *m* and the *cu<sub>1</sub>*. But this criterion has not been consistently used. In the *Milisiinae*

subfamily, whose species should not have annex on the *m* and the *cu*<sub>1</sub> in some of the genera we can find these annex, and wings resembling the wings of the typical *Syrphus* and *Cheilosia* species.

Another remark could be made too, that some of *Cheilosia* species are characteristic for the group they belong to, (*Ch. coerulescens* Meig.), or even within the same species (*Ch. soror* Zett.) there are specimens with or without annex on the *m* and the *cu*<sub>1</sub>.

At last in different genera and species, we can find more or less aberration in the wing innervation. Such specimens with this aberration could be found in the field in large number, and we can conclude that the aberration has not the great influence on their vitality. On the other hand we cannot often find aberration in the male genitalia structure. It is obvious, when we know that even the smallest genitalia aberration could eliminate a specimen from the breeding process. We can confirm this standpoint if we point out to the convergency of the wing innervation which we find with some *Eristalinae*, as well as with *Syrphus* group: it is either characteristic of genus (gen. *Didea*) or a characteristic of species (*S. arcuatus* in the genus *Syrphus*). It seems that the male genitalia structure is stabler character than the wing innervation.

The wing innervation type, and the system based upon this criterion, in fact is not contrary to the system we suggest-based upon the male genitalia structure. Species and genera of *Syrphus* and *Cheilosia* groups in their wing innervation type are more related to the *Milesiinae* than to the *Eristalinae*. If we hold to the old system based upon the colour and wing innervation type, we must suppose that in evolution of Syrphid species »first« innervation type may be changed (as it could be found in the *Eristalis* type), but that later there was return back to the type of Syrphid group similar *Milesiinae*.

According to the new system based upon the male genitalia structure the fam. *Eristalinae* are closely related to the primitive *Protosyrphus* type. More complicated type of wing innervation is the secondary process, dependent on biology of some species and connected with exertion and work of wing during flying.

#### Corelation Between Male Genitalia Structure and Larvae Type of the *Syrphidae*

The hitherto systematization of the *Syrphid* species is based mainly upon the external morphology of species, but as far biological or larval moments they are minimally used or not at all. This author has not the possibility to investigate the larval degree of *Syrphidae*, but data given in the papers of Metcalf, Heiss, Vimmer and Hennig offer a satisfactory representation of necessary facts.

Genus *Heringia* belongs to the *Cheilosinae* in the old system. Larvae of this genus are aphidophagous, unlike the other *Cheilosinae*. The species from this genus have the male genitalia stru-

cture which is similar to the other aphidophagous *Syrphinae* (especially to the *Melanostoma* tribe), not to the other *Cheilossinae*. We find the similar case in the genus *Pipiza*, whose larvae are aphidophagous too. In the other large group — *Eristalinae*, larvae are saprophagous. One of the genera, gen. *Merodon*, has larvae which develop in the plant tissue (*M. equestris* and other *Merodon* species). The similar type of larval degree, habit or appearance could be found in genus *Eumerus* which, in the old system belong to the quite different subfamily. To my way of thinking the identical type of the male genitalia structure could not be explained as an accident.

If the former system is accepted we must assume either that the larval stage of *Syrphidae* is quite independent on the evolutionary process in this family, what is rather unbelievable, as the great number of *Syrphidae* species pass most of the time at the larval degree; or we have to suppose that the »primitive« species whose larvae are phytophagous (subfam. *Cheilosiinae*) become species whose larvae are aphidophagous (subfam. *Syrphinae*) and from these become the species whose larvae live in the rotten matter (subfam. *Eristalinae*) so that at last they should become species whose larvae are phytophagous and inhabit the living plants (subfam. *Milesiinae* p. p.).

In the system based upon the male genitalia structure the *Eristalis* group has the simplest male genitalia structure. The larvae of this family are saprophagous. From this group, in divergent directions other *Syrphid* groups are formed. The carnivorous *Syrphidae* could be developed through the phytophagous species. Davidson has recorded that the carnivorous maggot of the *Melanostoma obscurum* could be at the early stage phytophagous. The same phenomenon is recorded for *M. mellinum* and for some of *Platycheirus* species. It is interesting to mention that tribus *Melanostomini*, to which these species belong in respect of the male genitalia structure, takes also an intermediary position between two typical *Syrphidae* groups — phytophagous *Cheilosiinae* and carnivorous *Syrphinae*. The genitalia structure of the genus *Chrysotoxini* is typical for the aphidophagous group. The larval stage of this tribus are unknown, but some authors (Heiss) suppose that it are aphidophagous. Some subfamily from the Sack system are united with the *Syrphid* group. They are *Bacchinae* with aphidophagous larvae, and with male genitalia structure typical for the aphidophagous species. The *Psarus* and *Rhingia* species have very complicated male genitalia structure, and their group has intermediary position between *Syrphinae* and *Cheilosiinae* and belong to the *Syrphidae* which have the highest evolutionary position. From the primary saprophagous species, phytophagous species could evolve through the species whose larvae live in the tree holes in decaying matter. Such way of evolution could be found in some *Eristalinae*. Some larvae of *Milesia* species live on plant saps, and from these species we can explain the evolutionary way of the type feeding on living plant tissue.

Among the species whose larvae are feeding on the plant tissue *Merodon* group has a very interesting position. The male genitalia structure characteristic for the two typical phytophagous genera, *Eumerus* and *Merodon*, can be found in the other two genera, *Syritta* and *Tropidia*. It must be remarked that Heiss has recorded that *Eumerus* larvae are very similar to the *Syritta* larvae. Larvae *Syritta* and *Tropidia* are feeding on the horse and ox manure, but they are known for a fact in decaying potatoes, narcissus and onions too. It is possible that this is the way in which the typical phytophagous group is developed from the saprophagous.

The *Microdon* group has a different male genitalia structure and a different larval type in comparison with the other *Merodoninae*. But similarity between this group and the other *Merodonidae* is remarkable.

The system based upon the larval type supposes that the elementary group of *Syrphoidea* are *Eristalidae*. One branch of this group has evolved aphidophagous and phytophagous — *Syrphidae s. str.*, including *Syrphinae* and *Cheilosiniinae*. The other branch are *Milesidae* which are saprophagous and partly phytophagous. The special position have *Merodonidae*, whose larvae are phytophagous, too (exc. *Microdon* group).

If our conception of *Syrphoidea* phylogeny is correct, we can foresee larval developing type of some species. The *Nausigaster* species live in plant tissue then they must have *Eumerus* similar structure of the male genitalia. The *Graptomyza* larvae must be carnivorous as well as *Chamaesyrrhus* and *Chrysotoxum* larvae too.

#### The Genitalia Structure of the Genus *Eristalomyia*

It was recorded (Glumac 1959) that the male genitalia structure of the *Eristalomyia tenax* specimens from the different geographical regions had the same male genitalia structure. So, it seems that the male genitalia structure is a very constant character suitable for the systematical determination.

#### Key to the Families and Subfamilies of the Superfamily *Syrphoidea*

1. — Spermatophoric tube even. Basal phallus part well developed. Lateral wings well developed, too. (Fam. *Merodonidae*) . . . . . 3
- . Spermatophoric tube single and basal part of phallus undeveloped, or if it is well developed then the lateral wings have not comblike hooks on the top . . . . . 2
2. — Basal phallus part undeveloped. Lateral wings are either simple, or with pointed part on the top. . . . . 4
- . The basal part of the phallus well developed and higher than the lateral wings are. (Fam. *Syrphidae s. str.*) . . . . . 3

3. — Distyli extended. Basistyl undeveloped. Apical part of the phallus with complicated structure.  
subfam. *Volucellinae* p. p.
- . Distyli normally structured. Basistyl well developed. If the apical part of the phallus has complicated structure distyli without extended part. . . . . 6
4. — Basal part of the phallus undeveloped. It is never higher than  $\frac{1}{3}$  of the total phallus height . . . . . 5
- . Basal part of the phallus well developed and it is higher than  $\frac{1}{3}$  of the total phallus height. Lateral wings with pricklike creation, which are, sometimes, comblike. In this cases the spermatophoric tube is simple. Larvae are phytophagous or are feeding on the rotten plant matter. . . . . 9
5. — Lateral wings undeveloped. The spermatophoric tube with hyalinisated part on the top, higher than the lateral wings of the phallus are (Fam. *Syrphidae* s. str.). . . . .  
subfam. *Sphaerophorinae*
- . Lateral wings well developed, as a rule without emphasized hitinised and hyalinisated part. Exceptionally, there are more hyalinisated hooklike parts, but then not on the wings top. Larvae are saprophagous, sometime live in the decaying plant matter or in the tree hole etc. . . . . 6
6. — Distyli elongated without enlarged lateral parts.  
. . . . . subfam. *Sphegininae*
- . Distyli not elongated nor with enlarged lateral parts.  
. . . . . subfam. *Eristalinae*  
. . . . . subfam. *Volucellinae* p. p.
7. — Lateral phallus wings elliptic. Spermatophoric tube on the top more or less dilatated. Larvae of this subfamily ar carnivorous, oftenly aphidophagous. . . . .  
subfam. *Cheilosinae*
- . Lateral wings of the phallus with two branches on the top. The effusions part of the spermatophoric tube has complicated structure. Larvae of this group are fooding on the living plant tissue, exeptionally are saprophagous.  
. . . . . subfam. *Cheilosinae*
8. — Lateral wings without hooks on the top. Spermatophoric tube, from which one is less developed, to the top straitened. Larvae of this group live in the ants nests.  
. . . . . subfam. *Microdontinae*
- . Lateral wings with comblike hitinised hooks on the top. Spermatophoric tube well developed, on the top enlarged. Larvae of the specis which belong to this



- group are feeding on living plant tissue (are phytophagous) or on decaying plant tissue, or with the manure. . . . . subfam. *Merodontinae*
9. — Species without hooks on the lateral wings. Forceps with moderately developed basistyl and distyls. Distyls simply structured . . . . . subfam. *Milesiinae*
- . Species with hooks on the lateral wings. Distyls more developed than basistyl is. The basal part of wings enlarged or modified. Heterogenous group containing different genera. . . . . 10
10. — Lateral wings archlike. Forceps asymmetrically structured. . . . . subfam. *Ceriodinae*
- . Lateral wings are not archlike. . . . . 11
11. — Basal part of the phallus especially developed and enlarged. Lateral wings with hitinous, especially enlarged apical part. Forceps simply structured. . . . . subfam. *Temnostominae*
- . Basal part of the phallus less developed, never enlarged. On the lateral wings hitinous prickles. Forceps structure, as a rule, complicated. . . . subfam. *Hylotinae*

Key to the Tribes  
Fam. *Eristalidae*

1. — Lateral wings of the phallus with prickles on the front part, or the top of the spermatophoric tube with the comblike creation. . . . . 2
- . Lateral wings of the phallus without prickles on the front part. Spermatophoric tube without comblike creations . . . . . 3
2. — The top of the spermatophoric tube with the comblike creation . . . . . Tribus *Dolichognyni*
- . Lateral wings of the phallus with prickles on the front part. . . . . Tribus *Pilnascini*
3. — Forceps with lateral enlarged parts on the distyls. . . . . Tribus *Tubiferini*
- . Forceps without lateral enlarged parts on the distyls. 4
4. — Basal part of the phallus undeveloped. . . . . Tribus *Eristalini*
- . Basal part of the phallus well developed. . . . . 5
5. — Apical part of the lateral wings metamorphosed in the hooks. Larvae are feeding in the vesp nests. . . . . Tribus *Volucellini*
- . Apical part of the lateral wings only enlarged, not metamorphosed in the hooks. . . . . Tribus *Spheginini*

Family *Merodonidae*

- 1. — Lateral wings of the phallus without comblike hooks on the top. Spermatophoric tube higher than the phallus on the top straitened. (subfam. *Microdontinae*) . . .  
tribus *Microdontini*
- Lateral wings of the phallus with comblike hooks on the top. Spermatophoric tube on the top enlarged, not higher than the phallus (subfam. *Merodontinae*) . . . 2
- 2. — Forceps simply structured, without especially enlarged part on the distyls apical part. Larvae are living in the decaying plant matter or in animal manure, etc. . . .  
Tribus *Syrittini*
- Forceps complicated structure, often with dilateted more hitinised Distyls base, Larvae are phytophagous 3
- 3. — Forceps of complicated structure, apical part of the distyls straitened. The structure of the basal part of the distyls especially complicated . . . . . Tribus *Eumerini*
- Forceps of less complicated structure. Apical part of the distyls as a rule dilatated. . . . . Tribus *Merodontini*

Fam. *Syrphidae* s. str.

- 1. — Lateral wings elyptic. Spermatophoric tube enlarged on the top. Larvae carnivorous, oftenly aphidophagous (subfam. *Syrphinae*). . . . . 3
- Lateral wings with two tops. Apical part of the spermatophoric tube is not enlarged . . . . . 2
- 2. — Apical part of the spermatophoric tube with hyalinised part at the top. Distyls especially dilatated with hooklike creatures. (subfam. *Sphaerophorinae*) . . . . .  
Tribus *Sphaerophorini*
- Apical part of the spermatophoric tube simple, without hyalinised part on the top. Lateral wings with two tops. Larvae aphidophagous, exceptionally saprophagous, and then are similar to *Eristalis* type. (subfam. *Cheilosini*) . . . . . 8
- 3. — Apical par of the spermatophoric tube dilatated and enlarged. Forceps simple, distyls and basistyl normaly developed . . . . . 6
- Apical part of the spermatophoric tube is not especialy dilatated and elongated. Lamelae elongated or especialy curved . . . . . 4
- 4. — Phallus as high as it is long. Its apical, changed part about 1/4 of its height . . . . . Tribus *Paragini*
- Phallus much higher than longer. Its apical, different part less than 1/4 of its height . . . . . 5

5. — Forceps with elongated basistyl. If basistyl on the forceps is not elongated, then there are emphasized hitinised parts on the lateral wings. . . . . Tribus *Pipizini*
- . Distyls developed as much as basistyl is, Lateral wings have not emphasized hitinised parts.  
Tribus *Melanostomini*
6. — Apical part of the phallus wings metamorphosed in the comblike hooks . . . . . Tribus *Psarini*
- . Apical part of the phallus wings not metamorphosed in the comblike hooks . . . . . 7
7. — Phallus with fingerlike creation in the front part of the phallobasa. Tribuses: . . . . . *Syrphini*  
. . . . . *Chrysotoxini*,  
. . . . . *Bacchini*
- . Phallus without fingerlike creations.  
Tribus *Graptomuzini*
8. — Basal part of the phallus undeveloped. Forceps elongated with dilatated creation on the internal part of the distyls basis. Larvae saprophagous.  
Tribus *Chrysogasterini*
- . Basal part of the phallus well developed. Larvae phytophagous or are feeding on decaying plant matter . . . 9
9. — Forceps simple. On the lateral wings of the phallus two tops. . . . . Tribus *Cheilosini*
- . Forceps of complicated structure, with enlarged parts on the distyls. On the phallus, parts with especially hitinised creations . . . . . 10
10. — Forceps with enlarged lateral part. Basistyl less developed than distyls . . . . . Tribus *Callicerini*
- . Forceps without enlarged lateral parts. Phallus with pricklike creations. . . . . Tribus *Ferdinandini*

Fam. *Milesiidae*

1. — Species without hooks and pricklike creations on the lateral wings. Distyls as developed as basistyl. Distyls of simple structure (subfam. *Milesiinae*) . . . . .
- . Species with hooks and pricklike creations on the lateral wings, or with archlike creations. Forceps with well developed distyls. On the distyls, the basal part enlarged, or its structure complicated . . . . . 3
2. — Basal phallus part half of the phallus height in its front.  
Tribus *Philippimyini*
- . Basal phallus part more than 1/3 of the phallus height in its front part. . . . . Tribus *Milesiini*

3. — Lateral wings metamorphosed in the archlike creations. Forceps asymmetrically structured (subfam. *Ceriodinae* . . . . . Tribus *Ceriodini*)
- Basal phallus part not metamorphosed in the archlike creations. . . . . 4
4. — Basal phallus part especially developed and bulged. Lateral wings with hitinised apical part. Forceps simply structured . . . . . Tribus *Temnostomini*
- Basal phallus part less developed, never especially developed or bulged. Forceps structure complicated. (subfam. *Xylotinae*) . . . . . 5
5. — On the lateral wings pricklike creations Tribus *Xylotini*  
 Lateral wings with comblike hooks. Tribus *Senogasterini*

### Characteristics of the Investigated Tribes

#### Superfamily Syrphoidese

##### I tribus *Eristalini*

Contain genera which basal part of the phallus are undeveloped. Lateral wings are two lamella not especially differenced. Forceps simple structured. Distyls developed as that the basistyl is. Larvae saprophagous. To this group belong following genera: *Eristalis* Latreille, *Myiatropa* Rondani, *Simoides* Loew, *Arona* Wiedemann, *Phytomyia* Guerin, *Protyllocera* Bezzi, *Eristalomyia* Rondani, *Liops* Rondani, *Aemosyrphus* Bigot.

##### II tribus *Helophilini*

The male genitalia structure complicat as than in the *Eristalis* group are. Lateral wings grows together in the front part with the great number of investigated genera. Forceps has complicated structure too. Larvae saprophagous and similar to the *Eristalis* larvae. From the investigated, to this group belong following genera: *Helophilus* Meigen, *Eurhimyia* Bigot, *Eristalinus* Rondani, *Lathyrophthalmus* Scopoli, *Eristalodes* Mik, *Mesembrius* Rondani, *Parhelophilus* Girschner, *Mallota* Meigen.

##### III tribus *Dolichognyni*

Monogeneric tribe. Basal part of the phallus undeveloped. Lateral wings well develop but his apical part not especially differenced. On the front part of the lateral wings especially hitinised prickles. Forceps simple, only the basis of the distyls dilatate. Larval stage unknown. Only one genera — *Dolichognyna* Macquart.

IV tribus *Pilinascini*

Monogeneric tribe. Basal part of the phallus undeveloped. Lateral wings well developed, but their apical part not especially differentiated. On the front part of the lateral wings especially hitinized prickles. Forceps simple, only in the basis of the distyls dilated. Larval stage unknown. Only one genera: *Pilinascia* Malloch.

Subfam. *Sphegininae*I tribus *Spheginini*

Basal part of the phallus best developed. Lateral wings enlarged, but not especially differentiated on the top. Forceps simple structured. Distyls elongated. Developing stage of the larvae of this group are not satisfactory known. The completed investigation indicated that larval stage of this species are connected with rotten organic matter. From the investigation, to this tribe belong following genera: *Sphegina* Meigen and *Neoscia* Williston.

Subfam. *Volucellinae*I tribus *Volucellini*

Tribe Volucellini is not homogenous. One of the investigated species (*V. inanis*) has a different male genitalia structure than other Volucellini have.

Basal part of the phallus reduced on the basal armature. Forceps elongated, on the top differentiated: dilated or thickened. Distyls narrow, curved inside. Larvae saprophagous or scavengers in the vesp nests.

By the *Volucella inanis* is the basal part of the phallus well developed. Lateral wings undeveloped. Forceps especially distyls dilated. From the investigated species and genera to this group belong only gen. *Volucella* Geoffroy.

II tribus *Copestilini*

Monogeneric tribe. Basal part of the phallus developed through growing together the lateral wings, which are not on the top differentiated. Spermatophoric tube similar to the Syrphus type (!). Forceps simple, in the part in which basistyl is connected with distyls, straitened. Larvae developing type unknown. Only one genus — *Copestylum* Macquart.

Family *Milesiidae*Subfam. *Milesiinae*I tribus *Milesiini*

Basal part of the phallus well developed, and the lateral wings on the top metamorphosed in the hooks with prickles. Spermatophoric tube single, has complicate structure in the apical part. Forceps

in the basal part of the distyls dilatated. In the species and genera of this tribe which larvae developing stage are known, larvae are living in the decaying trunks. To this tribe belong following genera: *Milesia* Latreille, *Spilomyia* Rondani, *Myiolepta* Newman, *Brachypalpus* Macquart, *Calliprobola* Rondani, *Sterphus* Philippi.

#### II tribus *Philippimyini*

This tribus contained genera which are nearest to the *Eristalis* type. Basal part of the phallus enlarged through growing together the lateral wings. Spermatophoric tube simple structured. Lateral wings not metamorphosed in the hooks on the tops. Forceps simple structured, only slightly metamorphosed. Larval stadium partly unknown. In the some cases larvae are living in the decayed trunks. From investigated species, to this group belong following: *Philippimyia* Shannon, *Hammerschmidtia* Schummel. In this group I classify genus *Brachyopa* Meigen too, which may be belong to the genus *Spheginini*?

#### Subfam. *Xylotinae* Tribus *Xylotini*

Basal part of the phallus moderately develop. Lateral wings with pricklike creature on the top. Apical part of the spermatophoric tube complicate structured. Forceps enlarged in the basal part of the distyls. Larvae living in the decaying trunks. To this tribe belong following genera: *Xylota* Meigen, *Xylotomima* Shannon and *Crepidomyia* Shannon.

#### Subfam. *Temnostominae* I tribus *Temnostomini*

Basal part of the phallus well developed, enlarged, and in the front part bulged. Apical part of the spermatophoric tube complicate structured. Lateral wings well developed, hooklike, curved on the top and especially hitinised. On the forceps basistyl undeveloped, distyls well developed, with pricklike hairs. Authors suppose that larvae are living in the decaying trunks. To this tribe belong genera: *Temnostoma* St. Fargeau & Serville, *Deineches* Walker and *Somula* Macquart.

#### II tribus *Senogasterini*

Basal part of the phallus well developed, lateral wings with comblike hooks on the top. Spermatophoric tube single, his apical part has complicate structure. Forceps with strong hairs. Distyls dilatated in the basal part, in the apical sometime asymmetrical. Developing of the larvae of this tribe took place in the decayed trunks. From the investigated, to this tribe belong following genera: *Criorrhina* Meigen, *Senogaster* Macquart, *Penthesilea* Meigen.

III tribus *Pterallastini*

Basal part of the phallus well developed, higher than  $2/3$  of the total phallus high. Lateral wings metamorphosed in the hooks not especially hitinised on the top. Spermatophoric tube simple structured, simple. Forceps with undeveloped basistyl. Distyls well develop, partly especially hitinised. Larvae of this tribe are living in the decayed trunks or are unknown. From the investigated genera to this tribe belong: *Pterallastes* Loew, *Cynorhina* Williston Pocota St. Fargeau & Serville, *Teuchocnemis* Ost-Sacken.

Subfam. *Cerioidinae*

Heterogenous group which united two tribe — Cerioidini and Sericomyni. Both have complicated phallus and forceps structure.

I tribus *Cerioidini*

Basal part of the phallus well develop, often has complicate structur. Lateral wings well developed too, have tassels on the top. Forceps with undeveloped basistyl and distyls has complicate structur, not homogenous haired. Larvae are living in the decayed trunks. From the investigated genera folowing belong to the *Cerioidini*: *Cerioides* Rondani and *Monoceromyia* Shannon.

II tribus *Sericomyini*

The male genitalia structure different from the structure we find in the Cerioidini, but similarity between two tribe — Cerioidini and Sericomyni caused unity of this two tribe in the one subfamily.

Basal part moderatly developed. Lateral wings have arclike structur. In the investigat genera distyls has ansymmetrical structure, and one of the distyls-side is best developed. As much as it is known, larvae are living in the decayeding trunks. From the investigat, to this tribe belong folowing genera: *Sericomyia* Meigen and *Arctophila* Schiner.

## Family Syrphidae senso stricto

Subfam. *Syrphinae*I tribus *Syrphini*

Basal part of the phallus well developed, in the front part has fingerlike creature, spermatophoric tube well develop and auto phallus high, in the apical part enlarged. Lateral wings moderatly develop, more or less oval. This tribe is connect with typical Cheilosini throught genus *Pyrophaena*. Distyls develop as that the basistyl is. Distyls structur simple. Larvae carnivorous, but by some species juvenil stage are phytophagous. From the investigated species to this group belong folowing: *Syrphus* Meigen, *Didea* Mac-

quart, *Ischyrosyrphus* Bigot, *Epistrophe* Walker, *Xanthogramma* Mik, *Lasiopticus* Rondani, *Leucozona* Schiner, *Pyrophaena* Schiner and *Chamaesyrphus* Mik.

If our conception of the Syrphids phylogeny are correct, genus *Chamaesyrphus*, which in the old system belong to the *Pelecocerinae*, belong to this tribe, and his larvae must be carnivorous.

#### II tribus *Chrysotoxini*

This tribus has indentical male genitalia structure which we found in the some genera of the previous tribe. In the one case (*Ch. cautum*) forceps are asymmetrical. The larvae develop type are unknown. We can suppose that the larvae of this group are carnivorous, and in this case we must united this tribe to the previous. Only one genus *Chrysotoxum* Meig.

#### III tribus *Bacchini*

This tribus contain genera which basal part of the phallus are well develop, and the lateral wings and spermatophoric tube are construct as that in the *Syrphus* group case are. The male genitalia structure of this genus are very similar to the *Syrphus* type but other morphological character separated this tribe in the special group. Forceps are simple structured too, and basistyl is developed as the distyls are. If our oppinien about Syrphids phylogeny are correct, the larvae must be carnivorous. From the investigated to this group belong genera: *Baccha* Fabricius, *Salpinogaster* Schiner and *Doros* Meigen.

#### IV tribus *Graptomyizini*

Basal part of the phallus well developed but without fingerlike creature in the front part. Spermatophoric tube in the apical part enlarged, and after that again straitened. Lateral wings structured as well as in the *Syrphus* grupe. Forceps structur simple. Larval stage unknown. On the basis of the male genitalia structur we can suppose that it must be similar to the aphidophagous type. Only one genera — *Graptomyza* Wiedemann.

#### V tribus *Psarini*

Basal part of the phallus well develop, but without fingerlike creature in the front part. Spermatophoric tube constructon similar to the *Syrphus* type. Lateral wings have complicat structur, similar to the *Syrphus* tupe too, but his apical part has comblike hooks. Forceps simple, basistyl developed as that the distyls are. Spermatophoric tube single. Larval developopting stage unknown. This tribe has a great number of the characters which are common with *Syrphus* type, and we cannot make a conclusions about larval stage trouh analogy. From the investigated species to this group belong following: *Psarus* Latreille, *Rhingia* Scopoli and *Pelecocera* Meigen.



VI tribus *Paragini*

Basal part of the phallus undeveloped. Lateral wings well developed, curved. Spermatophoric tube single, his apical part has complicated structure. Distyls developed as that the basistyl is. Distyls simple structured, something dilatated. Larvae carnivorous-aphidophagous. Monogeneric tribe, only one genus *Paragus* Lateille.

VII tribus *Melanostomini*

Basal part of the phallus well developed, but without fingerlike creature in the front part. Spermatophoric tube single. Lateral wings oval, sometime elongated. Forceps in the rule with developed basistyl and distyls. On the inereside the distyls basis dilatat part. Larvae of this group are carnivorous. From the investigat species to this group belong folowing: *Melanostoma* Schiner, *Platycheirus* St. Fargeau & Serville, *Xanthandrus* Verrall.

VIII tribus *Pipizini*

Basal part of the phallus well develop. Spermatophoric tube single, simple structur. Lateral wings of the phallus partly more hitiniseat, or with hairs. Forceps simple structur, basistyl as developed as the distyls are. Exceptly, basistyl especially enlarged (gen. *Pipiza*). Larvae of this tribe are carnivorous. To this tribe belong two from the investigated genera: *Pipiza* Fallen and *Heryngia* Rondani.

Subfam. *Sphaerophorinae*I tribus *Sphaerophorini*

Basal part of the phallus undeveloped. Spermatophoric tube complicate structur, with hyaliniseat creatures on the top. Basistyl undeveloped, distyls complicate structured, with excrescence in the basal and distal part. Larvae aphidophagous. Monogeneric tribe — *Sphaerophoria* St. Fargeau & Serville.

Subfam. *Cheilosini*I tribus *Cheilosini*

Basal part well developed but without fingerlike creature in the front part. Spermatophoric tube single, with complicat apical part. Lateral wings crescent, with two tops. Forceps construction simple basistyl as developed as the distyls are. Distyls without especially hitiniseat parts or strong hairs. Developing of the larvae took place in the living tissue. Monogeneric tribe with great number of the species. Only one genera — *Cheilosia* Meigen.

II tribus *Chrysogasterini*

Basal part of the phallus well developed, with curved hooks on the top. Spermatophoric tube single. Forceps well develop, but

distyls best than basistyl. On the inerside of the distyls dilatated part. Larvae saprophagous. From the investigat, to this group belong folowing genera: *Chrysogaster* Meigen, *Liogaster* Rondani and *Orthoneura* Macquart.

### III tribus *Callicerini*

Basal part of the phallus well develop, in the front part bulged. Lateral wings combllike structur with some more hitinisat structure in his front part. Spermatophoric tube single, complicat constructed in his apical part. Basistyl undevelop. Distyls in the basal part enlarged, in the distal curved autsaid. It seemes that larvae live in the decayeding plant matter. Only one genus *Callicera* Panzer.

### IV tribus *Ferdinandini*

Basal part of the phallus well develop. Lateral wings complicate structur, in the front part with prickles. Behind part of the wings have combllike hooks. Forceps simple. Distyls curved to the outside. Basistyl less developed. Larvae live in the decayed matter in the trees holes. Monogeneric tribe — *Ferdinandea* Rondani.

### Subfam. *Psilotinae*

#### I tribus *Psilotini*

Basal part of the phallus is higher than  $\frac{1}{2}$  of the total phallus high, and have excrescence in the front part. Lateral wings well developed, bulged on the top. There are not more hitinisat part on them. Spermatophoric tube single, and his upper part higher than the phallus high is. Distyls with two branch on any styl. Basistyl undevelop. Food habit on the larvae unknown. From the investigated species to this group belong only gen. *Psilota* Meigen.

### Family *Merodonidae*

#### Subfam. *Merodontinae*

#### I tribus *Merodontini*

Basal part of the phallus well develop. Lateral wings well develop, with combllike hooks. Spermatophoric tube even and his apical part dilatat. Forceps with less develop basistyl. Distyls complicate structur with lateral more hitinisat parts in basal and apical part. Larvae live in the living plant tissue. From the investigat, to this tribe belong two genera: *Merodon* Meig and *Platynochaetus* Wiedemann.

#### II tribus *Eumerini*

The phallus structure indential to the structure which has previous tribe. Forceps have complicat structure. On the outside and inside of the distyls are number of the dilatat parts or part

in the different degree haired. Larvae live in the living plant tissue (phytophagous). To this tribe belong genus *Eumerus* Meigen. We can expect that the gen. *Nausigaster* belong to this tribe too.

### III tribus *Syrittini*

Basal phallus part well develop. Lateral wings curved with comblike hooks on the top. Spermatophoric tube even with complicat apical part. Forceps simple structur. Basistyl moderatly develop. Distyls on the basis enlarg. Larvae live in the decayeding organic matter plant nature. To this tribe belong two genera: *Syritta* St. Fargeau & Serville and *Tropidia* Meigen.

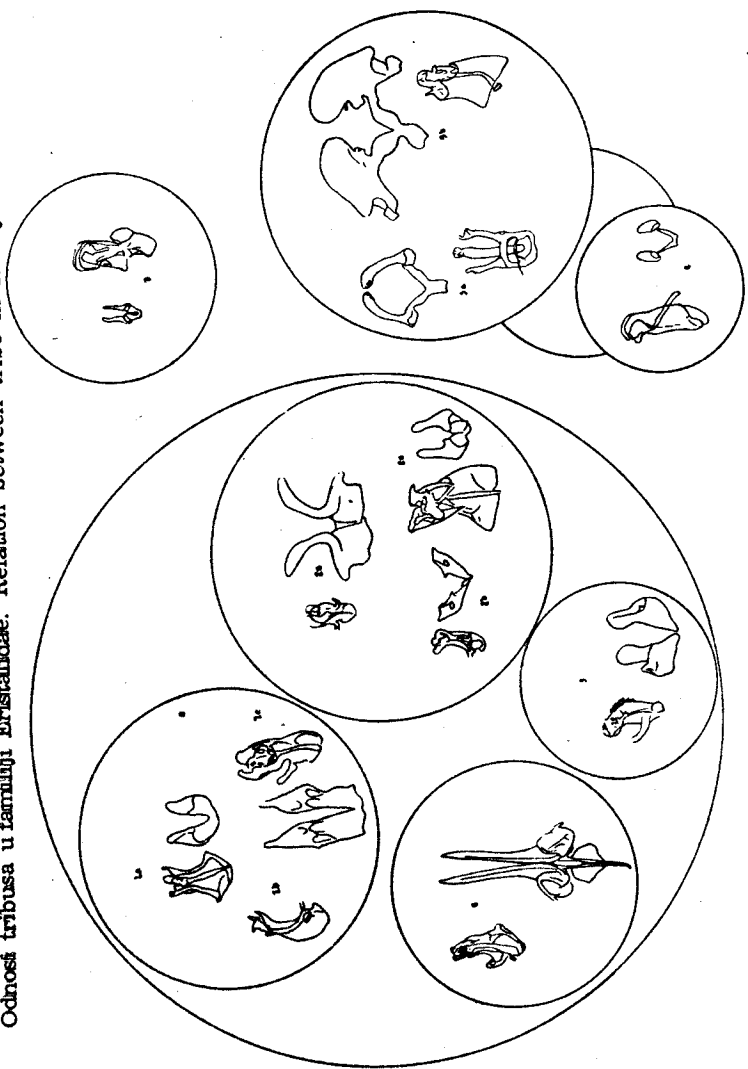
### Subfam. *Microdontinae*

#### I tribus *Microdontini*

Basal part of the phallus well develop, with dilatat lateral wings which top are not especially differenc. Spermatophoric tube even, on the top straiten. Forceps with moderatly develop basistyl. Distyls well develop, with diferent creature not surppass general triangle structure. Larvae live as a scavengers in the ant nests. Only one genus from the investigated — *Microdon* Meigen.

(Received at 22-I-1960)

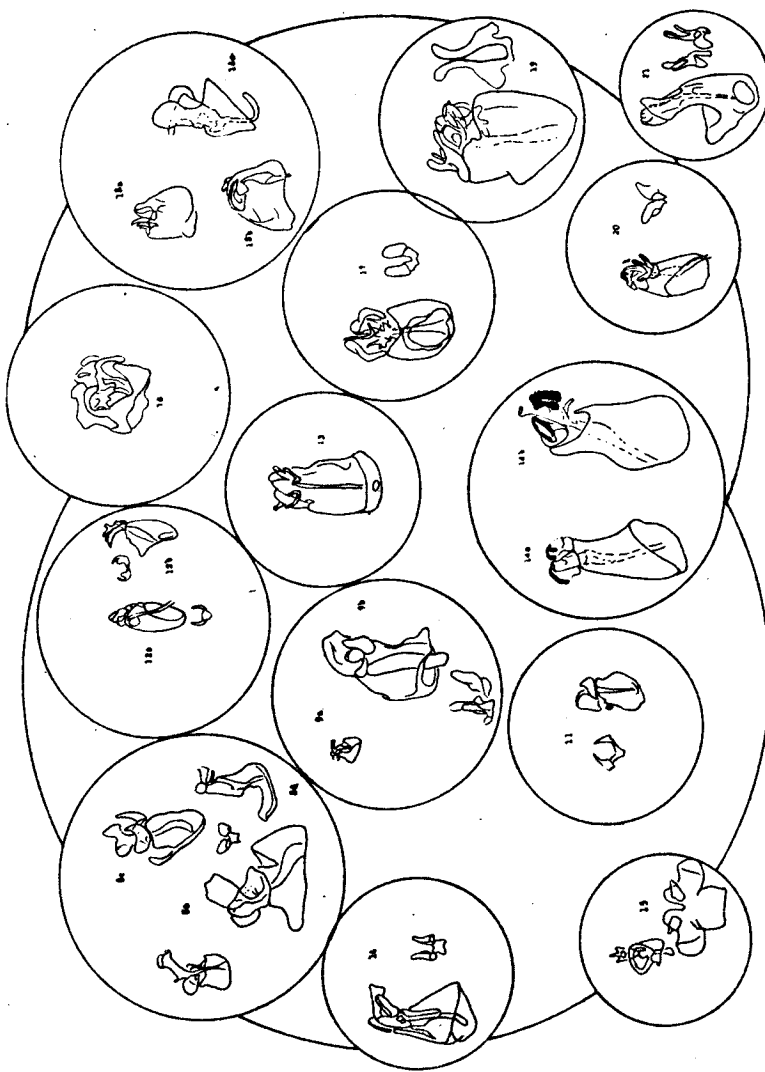
Tab. I  
Odnosť tribusů u farniliji Eristalidaj. Relation between tribes in family Eristalidae



Trib. 1 — Eristalini; Trib. 2 — Tubiferini; Trib. 3 — Plinascini; Trib. 4 — Dolichognyni;  
Trib. 5 — Volucellini; Trib. 6 — Copestylini; Trib. 7 — Sphegini;

Tab. II

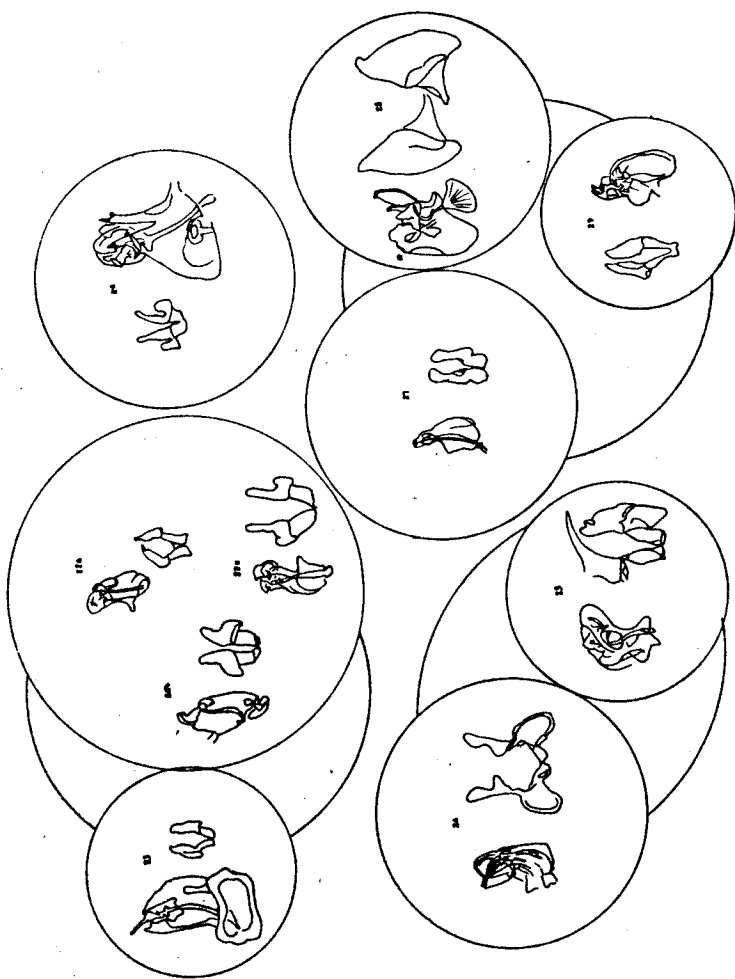
Odnosi tribusa u farništiji Syrphidae s. str. Relation between tribe in family Syrphidae s. str.



Trib. 8 — Syrphini; Trib. 9 — Bacchini; Trib. 10 — Chrysotoxini; Trib. 11 — Graptomyzini; Trib. 12 — Melanostomini; Trib. 13 — Pipizini; Trib. 14 — Psarini; Trib. 15 — Sphaerophorini; Trib. 16 — Faragini; Trib. 17 — Chelosiini; Trib. 18 — Chrysogasterini; Trib. 19 — Callicerini; Trib. 20 — Ferdinandini; Trib. 21 — Psilotini;

Tab. III

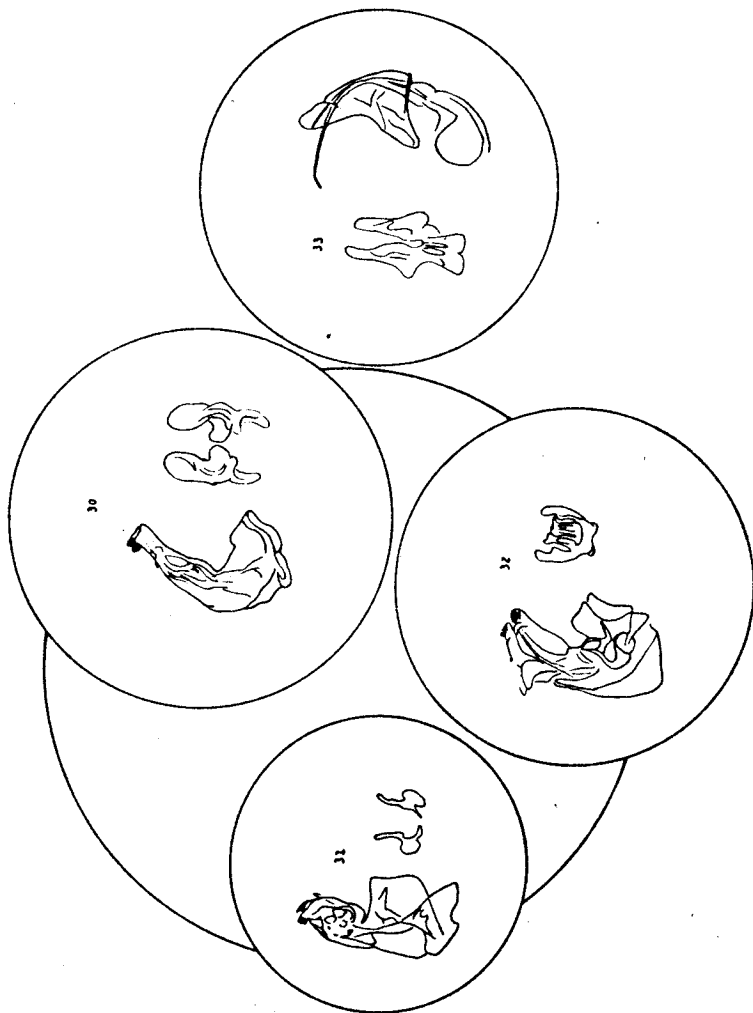
Odnosi tribusa u familiji Milesidae. Relation between tribe in family Milesidae



Trib. 22 — Milesini; Trib. 23 — Philippomyini; Trib. 24 — Cerioidini; Trib. 25 — Sericomomyini;  
 Trib. 26 — Xyotini; Trib. 27 — Senogasterini; Trib. 28 — Temnostomini; Trib. 29 — Pterallastini

Tab. IV

Odnosi tribusa u familiji Merodontidae. Relation between tribe in family Merodontidae.



Trib. 30 — Merodontini; Trib. 31 — Syrittini; Trib. 32 — Eumerini; Trib. 33 — Micrododontini;

Tab. V Odnosi familija i tribusa u superfamiliji Syrphoidea  
Relation between tribe and family in the superfamily Syrphoidea

