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TAXONOMIC AND FAUNISTIC STUDIES OF BIG-HEADED FLIES (DIPTERA: PIPUNCULIDAE)

Summary of the Ph.D. thesis

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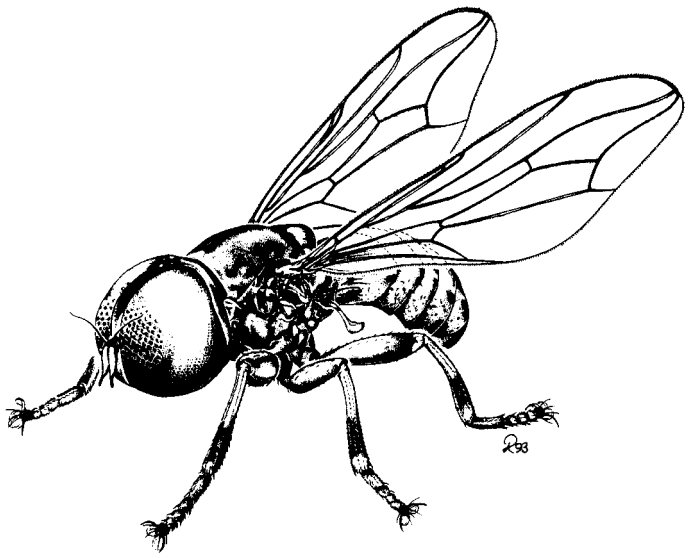

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INTRODUCTION AND OBJECTIVES

Pipunculidae or big-headed flies are usually small or medium sized (body length: 3-15 mm), inconspicuous flies (except for *Nephrocerus* spp.) and are characterised by the large compound eyes occupying most of the hemispherical head. They are closely related to hover flies (Syrphidae), but they can easily be differentiated by the wing venation and the head.

During the larval stage pipunculids are endoparasitoids of leafhoppers (Auchenorrhyncha: Homoptera), mainly of the families Cicadellidae, Delphacidae and Cercopidae. Together with Dryinidae (Hymenoptera) and Strepsiptera they are considered as the most important parasites of Auchenorrhyncha (Freytag 1985, Waloff and Jervis 1987).

The aim of our studies was to reveal species richness in Hungary, Europe and more widely in the Afrotropical Region. Taxonomic and faunistic goals were planned to be reached in terms of thorough descriptions, identification keys, species new to science, synonyms proposed and species lists for the different faunas investigated.

Our work concentrated on four major topics: on the genus *Tomosvaryella* in Central and West Europe, on Pipunculidae of Hungary, on faunistic studies in different parts of Europe and on the revision of the Afrotropical Eudorylini. The genus *Tomosvaryella* needed a revision, since many species were doubtful and very few descriptions were detailed enough (most of them without drawings).

The last specialist who dealt with Hungarian Pipunculidae was Márton Aczél and after he had fled to South America during the 2nd World War, there were no new records and publications, in addition to this rearrangement and identifications based on recent results were also lacking.

As a continuation of the faunistic work we planned to check other European collections (Denmark, Canary Islands and Madeira) in order to reveal the species composition of the West Palaearctic Region.

The most important part of the thesis revises the Afrotropical species of the tribe Eudorylini with special emphasis on new species, to clear the taxonomic status of the existing species, to solve nomenclatorial problems and to give an identification key to the males.

The majority of the thesis deals with the most problematic group, Eudorylini and particularly *Eudorylas*. Since the tribe contained 515 species world-wide in nine genera (De Meyer 1996), serious misinterpretations of what constitutes *Eudorylas* have led to an acute lack of stability within the group. This was solved in two stages: Skevington and Yeates (2001) made a phylogenetic revision of the tribe with redefinitions of the genera, and the International Commission on Zoological Nomenclature (ICZN 2002) issued an opinion to stabilise the genus name *Eudorylas*.

Eudorylas has had a troubled taxonomic history. Aczél erected *Eudorylas* on excellent grounds in 1940. Unfortunately, he never examined specimens of the type species that he designated, *Cephalops opacus* Fallén, 1816. He merely selected the oldest available name for the type species from within Becker's (1897) and Cresson's (1910) Group I and Sack's (1935) Group IV. From characters listed by these authors, Aczél was convinced that these groups corresponded to his new genus, *Eudorylas*. It is clear now, that not all species within these groups were correctly placed. Sergey Kuznetzov (St. Petersburg, Russia) and Marc De Meyer (Tervuren, Belgium) recently examined *C. opacus* and they agree it is a species of *Microcephalops* thus Aczél has misidentified the original type species as being *Eudorylas*. To maintain the stability in nomenclature, Article 70.3 of the Code requires the change of the type species for a genus when the former is based on a misidentification (ICZN 1999). After the application of De Meyer and Skevington (2001) the Commission used its plenary power to set aside all previous fixations of type species for *Eudorylas* and to designate *Pipunculus fuscipes* (Zetterstedt, 1844) as the type species.

MATERIALS AND METHODS

1. Collections

Altogether 23 collections have either been visited (e.g. Stockholm, Paris, Brussels, Copenhagen) or have been asked (e.g. Honolulu, New York, Pietermaritzburg, Sapporo) to send material for study. We have seen mostly type specimens and in case of the Afrotropical revision and the faunistic works in general, the unidentified material of the various collections was requested and sent as well.

2. Examination of material

The specimens (both dry and alcohol) were studied with a stereoscopic microscope (with cold light) at magnifications of 10-112.5 times. All external characters were studied and dissections have been carried out with this microscope. The genital parts (microscopic slides) were seen with a light microscope (88–560x magnification) attached with a drawing tube.

3. Microscopic slides

Male genitalia were examined separately, after treatment with 10% of NaOH or KOH for 24 hours. After the different parts had been cleared sufficiently, they were put in lactic acid, 70% alcohol and glycerine. The separated postabdomen was put into a drop of gelatine-glycerine on a microscopic slide. This mixture is solid at room temperature and becomes fluid after careful heating. This feature makes it possible to change the orientation of the specimen and then to fix it until the drawing is finished.

After examination of the specimens the genital parts were cleaned with NaOH or KOH and then placed in a small plastic vial (filled with glycerine) attached to the same pin which bears the specimen.

RESULTS AND DISCUSSION

♦ We revised all known species of the genus *Tomosvaryella* with West and Central European distribution. Two of the fourteen species were described as new to science (*Tomosvaryella magyarica* Földvári et De Meyer and *Tomosvaryella hortobagyiensis* Földvári et De Meyer) and an identification key to males and females was published. All taxa were provided with detailed description and drawings of genitalia of both sexes.

♦ We proposed a new junior synonym to *Tomosvaryella minima* (namely *T. rondanii*) and designated lectotypes for *T. kuthyi* and *T. cilitarsis*.

♦ The fauna of the Aggtelek National Park was studied resulting in a list of 24 species living in the national park and 18 of them were new to the Hungarian fauna (Földvári 1999).

(The 18 new species are *Cephalops aeneus*, *C. subultimus*, *C. ultimus*, *Eudorylas fascipes*, *E. fuscipes*, *E. horridus*, *E. jenkinsoni*, *E. obliquus*, *E. subfascipes*, *E. subterminalis*, *E. zonellus*, *Jassidophaga setosa*, *J. villosa*, *Pipunculus calceatus*, *P. campestris*, *P. fonsecai*, *P. tenuirostris* and *Verrallia aucta.*)

♦ We added new morphological and faunistic data as a result of the revision of the entire Pipunculidae collection held in the Hungarian Natural History Museum (HNHM). One genus and 40 species were found new to the Hungarian fauna (Földvári és Kozánek 2001).

(The new taxa are *Microcephalops* as a genus and *Chalarus argenteus*, *Ch. brevicaudis*, *Ch. clarus*, *Ch. exiguus*, *Ch. fimbriatus*, *Ch. indistinctus*, *Ch. latifrons*, *Cephalops carinatus*, *C. chlorionae*, *C. obtusinervis*, *C. perspicuus*, *C. semifumosus*, *C. signatus*, *C. vittipes*, *Cephalosphaera furcata*, *C. germanica*, *Eudorylas fusculus*, *E. inferus*, *E. kowarzi*, *E. longifrons*, *E. montium*, *E. nemoralis*, *E. obscurus*, *E. restrictus*, *E. ruralis*, *E. terminalis*, *E. unicolor*, *E. zermattensis*, *E. zonatus*, *Microcephalops vestitus*, *Nephrocerus flavicornis*, *N. lapponicus*, *Pipunculus lichtwardti*, *P. oldenbergi*, *P. omissinervis*, *P. spinipes*, *P. thomsoni*, *P. varipes* and *P. zugmayeriae* as species.)

♦ A critical list of Diptera species occurring in Hungary has been published (Checklist of the Diptera of Hungary), where only those species were given whose records were reliable, based on literature and voucher specimen data. Altogether 58 species out of the now existing 86 have been reported for the first time following our studies on Hungarian Pipunculidae.

♦ During the study of the fauna of the Canary Islands and Madeira we found 14 species, 13 of them from the Canary Islands and 3 for Madeira. Seven species are reported for the first time from the islands. *Tomosvaryella glabrum*, formerly considered a synonym of *T. subvirescens*, is re-instated as a separate species with *T. tecta* as a proposed junior synonym. *Tomosvaryella ornatipes*, formerly considered a synonym of *T. frontata* is re-instated as a separate species.
(The seven new species are *Chalarus perplexus*, *Eudorylas clavatus*, *Tomosvaryella brachybasis*, *T. freidbergi*, *T. glabrum, T. kuthyi* and *T. parakuthyi*.)

♦ As part of a survey on the dipterous fauna of Denmark the collection of the Zoological Museum, University of Copenhagen (ZMUC) was revised (Földvári, Dempewolf és Petersen 2002). This provided a list of 79 species of Pipunculidae expected to occur in Denmark, and reliable records exist for 62 of them.

♦ All four genera *(Claraeola, Clistoabdominalis, Dasydorylas, Eudorylas)* of the tribe existing in the Afrotropical Region and 78 species have been treated, 21 of them proved to be new to science.
(The new species are: *Clistoabdominalis lomholdti*, *C. namibiensis*, *Dasydorylas bodocsi*, *D. okongoensis*, *Eudorylas amanii*, *E. angolae*, *E. barracloughi*, *E. brandbergensis*, *E. femoralis*, *E. gabela*, *E. hirsutus*, *E. lobus*, *E. pectinatus*, *E. pilulus*, *E. pondolandi*, *E. protumidus*, *E. rooibergensis*, *E. scharffi*, *E. skorpionensis*, *E. swanengi* and *E. tanzaniensis*.)

♦ Type material for all available species was studied and species were described in detail. Drawings of male and female genitalia were produced and an identification key to the males (only males were available in the majority of the species) is provided as well as diagnoses for easier species recognition.

♦ New synonyms are proposed (in 9 cases) together with discussion on earlier methodology of species descriptions within this group, in particular that of D. E. Hardy's works, who described the majority of the Afrotropical species.
(Proposed new junior synonyms are: *Dorilas (Eudorylas) dorsalis* and *Dorilas (Eudorylas) apiculatus* to *Dasydorylas evanidus*, *Pipunculus (Eudorylas) fractus* to *Eudorylas amitinus*, *Dorilas (Eudorylas) pusillus* to *Eudorylas diversus*, *Dorilas (Eudorylas) modicus* to *Eudorylas encerus*, *Dorilas (Eudorylas) definitus* to *Eudorylas excisus*, *Dorilas (Eudorylas) megacanthus* to *Eudorylas garambensis* and *Dorilas (Eudorylas) quadratus* and *Pipunculus (Eudorylas) eremnoptera* to *Pipunculus mutillatus*.)

PUBLICATIONS RELATED TO THE THESIS

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DE MEYER, M., FÖLDVÁRI, M. and BÁEZ, M. (2001): The Pipunculidae (Diptera) fauna of the Canary Islands and Madeira. — *Bulletin de la Société royale belge d'Entomologie* **136**(2000): 144-152.

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PUBLICATIONS NOT INCLUDED IN THE THESIS

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PAPP, L. and FÖLDVÁRI, M. (2002): A new genus and three new species of Hybotidae with new records of the Hungarian Empidoidea (Diptera). — *Acta Zoologica Academiae Scientiarum Hungaricae* **47**(2001): 349-361.

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FÖLDVÁRI, M. (2001): Empididae. — *In*: Papp, L. (ed.): *Checklist of the Diptera of Hungary*, Hungarian Natural History Museum, Budapest, pp. 184-203.

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Other publication:

FÖLDVÁRI, M. and MEIER, R. (2002): On the natural history and all life-history stages of the only European stalk-eyed fly, Sphyracephala europaea Papp et Földvári (Diopsidae: Diptera). — *In*: Yeates, D.K. (ed): *Abstracts Volume, Fifth International Congress of Dipterology, The University of Queensland, Brisbane, Australia*, p. 71.