

# Preliminary database on the distribution of Pipunculidae (Diptera) in Europe

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## Abstract

Based on literature references and unpublished data, a preliminary database was compiled for the distribution of Pipunculidae (except the genus *Chalarus*) in Europe. The database shows that the pipunculid fauna is well known for only a limited number of European countries. Especially for southern Europe the data are incomplete. Specific distribution patterns among the Pipunculidae could be distinguished regarding the northernmost limit of their distribution, as well as boreal and boreomontane patterns. The database shows that certain pipunculid genera need a thorough revision, especially the genera *Eudorylas* and *Tomosvaryella*. Also the need is felt for a reliable and updated identification key for European Pipunculidae. Key-words: Pipunculidae, distribution, Europe.

## Samenvatting

Op basis van literatuurgegevens en niet gepubliceerde data, werd een voorlopige database opgesteld voor de verspreiding van Pipunculidae in Europa (met uitzondering van het genus *Chalarus*). Er werd aangetoond dat de pipunculidenfauna slechts voor een beperkt aantal Europese landen goed gekend is. Gegevens voor zuidelijk Europa zijn echter zeer beperkt. Specifieke verspreidingspatronen konden aangetoond worden met betrekking tot de noordelijke verspreidingslimiet, alsook voor boreale of boreomontane soorten. Uit deze studie bleek dat een aantal genera (vooral *Eudorylas* en *Tomosvaryella*) dringend gereviseerd dienen te worden. Ook werd het gemis van een bijgewerkte determinatiesleutel voor de Europese Pipunculidae aangevoeld.

Trefwoorden: Pipunculidae, verspreiding, Europa.

## Introduction

Pipunculidae (Diptera) are small inconspicuous flies, closely related to hoverflies (Syrphidae). During their larval stage they are known as parasitoids of Auchenorrhyncha (Homoptera). Faunistic and taxonomic research on this family in Europe has been extensive during the last decade (DE MEYER, 1989b). Within the scope of a larger Diptera sampling program by the Royal Belgian Institute of Natural Sciences (K.B.I.N./I.R.Sc.N.B.) (see GROOTAERT, 1989) a number of faunal inventories of interesting ecological sites in Belgium have been performed. These surveys have shown the Belgian pipunculid fauna to be much more diverse than initially thought, and also stressed the importance for conservation of certain biotopes in our country (DE MEYER, 1984, 1985; GROOTAERT *et al.*, 1988). Similar studies have been performed in other European countries (DELY-DRASKOVITS, 1983; TESCHNER, in press).

These inventory studies, have however shown that the general distribution of most species throughout Europe is not well known, hence causing problems for general faunal surveys or cartography. TANASIJTSHUK (1988) gives a list of faunal records for all Palaearctic species but this one has proven to be greatly incomplete. Therefore, the need was felt to produce a database on the distribution of the European Pipunculidae which could serve as a preliminary basis for further surveys, and which would also point out the present problems regarding faunistic work on the group.

## Faunal surveys in European countries

The author tried to compile all possible records of occurrence for the European species, based on literature references (listed at the end) and unpublished data kindly provided by colleagues in response to a circular sent in November, 1990.

In total, 134 Pipunculidae species are reported from European countries. Not included in the survey was the U.S.S.R. The results are summarized in Table 1. The genus *Chalarus* was omitted in this table. M. JERVIS (Cardiff, U.K.) has pointed out that several of the European *Chalarus* species recognized at the moment are in fact species complexes (JERVIS, pers. comm.) hence making the records for this genus unreliable. Therefore Table 1 presents the results for the remaining 126 pipunculid species. The records for the genus *Dorylomorpha* were taken from ALBRECHT's recent revision of this genus (ALBRECHT, 1990) with addition of data provided after the revision was published.

Table 1 shows that the pipunculid fauna is known very well for a limited number of countries only, like Belgium, Czechoslovakia, Great Britain and Sweden. This mainly because of recent surveys performed in these countries regarding the pipunculid fauna. All these countries show a total of between 70 and 80 different species. For a number of countries, the pipunculid fauna is partly known, based on revisions of the fauna for certain genera (like *Dorylomorpha* in Finland) or revisions of the fauna of particular areas (TESCHNER pers. comm. for Germany, DE MEYER & STARK, in press) or specified collections (DE MEYER *et al.*, 1990).

For the majority of the countries, the pipunculid fauna is poorly known. Many of the records are based on old literature references and not always reliable, except for genera for which a recent revision was published like *Dorylomorpha* (ALBRECHT, 1990) and *Cephalops* and adjacent genera (DE MEYER, 1989a). Especially for southern Europe the data are incomplete.

## Distribution of species

Table 1 shows that a number of pipunculid species are fairly common and generally distributed over most of Europe. 35 species are reported from more than half the countries surveyed and 7 species are known from more than 4/5 of all countries (like *Verrallia aucta*, *Cephalops aeneus*, *Cephalosphaera furcatus*, *Pipunculus campestris*, *Dorylomorpha confusa*, *Tomosvaryella geniculata* and *T. sylvatica*). Most likely these species will occur all over Europe, although because of the lack of records of mediterranean countries they can not be confirmed yet.

On the other hand, 32 species are reported from only 1 or 2 localities. Very often it concerns here obscure species of which the validity is not ascertained, like *Eudorylas dudai*, *E. obtusicornis*, *E. roseri*, *E. straelenis*, *E. straminipes*, *E. trigonus*, *E. triplex*, *Tomosvaryella lyneborgi*, *T. miniscula*, *T. olympicola* and *T. rondanii*. Several of these species are described from South European countries and again because of the lack of recent surveys in these areas their validity is not confirmed. Also the major part of them belong to the genera *Eudorylas* and *Tomosvaryella*, which are in need of a taxonomic revision. For other species, their limited distribution seem to be a true reflection of their uncommon occurrence. This is especially the case for species belonging to genera that were revised recently. For example the few data for species like *Dorylomorpha onegensis*, *D. clavata*, *D. spinosa* and *D. semiclavata* is possible because these species seem indeed to have a limited distribution. The same applies for example for *Cephalops conjunctivus*. This species was originally described from one specimen from Yugoslavia. A collection recently received from Spain has provided a high number of additional material. On the other hand

Table 1. Occurrence of Pipunculidae in Europe, based on literature references and unpublished data (see text): No: Norway, Sw: Sweden, Fi: Finland, Dk: Denmark, Gb: Great Britain, Ir: Ireland, Be: Belgium, Nt: the Netherlands, Ge: Germany (unified), Po: Poland, Fr: France, Zw: Zwitterland, Au: Austria, Cz: Czechoslovakia, Hu: Hungary, Ru: Rumania, Bu: Bulgaria, Yu: Yugoslavia, It: Italy, Sp: Spain, Gr: Greece.

	No	Sw	Fi	Dk	Gb	Ir	Be	Nt	Ge	Po	Fr	Zw	Au	Cz	Hu	Ru	Bu	Yu	It	Sp	Gr		No	Sw	Fi	Dk	Gb	Ir	Be	Nt	Ge	Po	Fr	Zw	Au	Cz	Hu	Ru	Bu	Yu	It	Sp	Gr
VERRALLIA																						TOMOSVARYELLA																					
aucta (Fallén)																						ciliferata (Becker)																					
JASSIDOPHAGA																						cillitarsis (Strobl)																					
beatricis Coe																						coquilletti (Kertész)																					
pilosa (Zett.)																						frontata (Becker)																					
setosa Verrall																						geniculata (Meigen)																					
villosa (von Roser)																						hirticollis (Becker)																					
NEPHROCERUS																						kuthyi (Aczél)																					
Flavicornis Zett.																						littoralis (Becker)																					
lapponicus Zett.																						lyneborgi (Coe)																					
scutellatus (Macq.)																						minia (Becker)																					
CEPHALOPS																						miniscula (Collin)																					
aeneus Fallén																						mutata (Becker)																					
carinatus (Verrall)																						nigronitida (Collin)																					
chlorionae (Frey)																						olympicola (Janssens)																					
conjunctivus Collin																						palliditarsis (Collin)																					
grandiaembranus De Meyer																						rondanii (Collin)																					
obtusinervis (Zett.)																						sylvatica (Meigen)																					
perspicuus (de Meijere)																						EUDORYLAS																					
semifumosus (Kowarz)																						arcanus Coe																					
signatus (Becker)																						coloratus (Becker)																					
subulianus Collin																						dissimilis Coe																					
ultianus (Becker)																						dudai (Hardy)																					
vittipes (Zett.)																						electus (Hardy)																					
CEPHALOSPHERA																						elephas (Becker)																					
Furcata (Egger)																						fascipes (Zett.)																					
germanica Aczél																						fluviatilis (Becker)																					
MICROCEPHALOPS																						furvulus Collin																					
vestitus (Becker)																						fuscipes (Zett.)																					
BECKERIAS																						fusculus (Zett.)																					
pannonicus Aczél																						halteratus (Meigen)																					
PIPUNCULUS																						horridus (Becker)																					
calceatus von Roser																						imperfectus (Becker)																					
canpestris Latreille																						inferus Collin																					
fonseci Coe																						jenkinsoni Coe																					
lichtwardti Kozanek																						kowarzi (Becker)																					
oldenbergti Collin																						longifrons Coe																					
omissinervis Becker																						melanostolus (Becker)																					
phaeton Coe																						modestus (Haliday)																					
spinipes Meigen																						montius (Becker)																					
tenuirostris Kozanek																						obliquus Coe																					
thomsoni Becker																						obtusicornis (Duda)																					
varipes Meigen																						obscurus Coe																					
zugmayeriae Kowarz																						opacus (Fallén)																					
DORYLORPHA																						pannonicus (Becker)																					
aczei Hardy																						restrictus Coe																					
albitarsis (Zett.)																						roseri (Becker)																					
anderssoni Albrecht																						ruralis (Meigen)																					
beckeri (Aczél)																						sericeus (Becker)																					
borealis (Wahlgren)																						setosus (Becker)																					
canadensis Hardy																						straeleni (Janssens)																					
clavata Albrecht																						straminipes (Becker)																					
clavifera Coe																						subfascipes Collin																					
confusa (Verrall)																						subterminalis Collin																					
extricata (Collin)																						sulcatus (Becker)																					
fennica Albrecht																						terminalis (Thomson)																					
hackmani Albrecht																						trapezoides (Becker)																					
haemorrhoidalis (Zett.)																						trigonus (Becker)																					
hungarica (Aczél)																						triplex (Becker)																					
imparata (Collin)																						trochanteratus (Becker)																					
incognita (Verrall)																						unicolor (Zett.)																					
infirnata (Collin)																						zernattensis (Becker)																					
lautereri Albrecht																						zonatus (Zett.)																					
maculata (Walker)																						zonellus Collin																					
occidens (Hardy)																																											
onegensis Albrecht																																											
platystylis Albrecht																																											
praetermissa Albrecht																																											
rufipes (Meigen)																																											
seniclavata Albrecht																																											

extensive collections from Central and North European countries has not given any specimens. This species has most likely a mediterranean distribution, and a preliminary study of genital structures, has revealed that it is closely related to some Afrotropical species like *Cephalops obtusus* (see DE MEYER, in press).

### Distribution patterns

Again, because of the lack of southern European records, it is not possible yet to give complete distribution patterns for pipunculid species. However, because of the fair amount of data from Central and northern Europe, some interesting conclusions can be drawn regarding northernmost distribution limits for several species. ALBRECHT (1990) divides northern Europe into three parts (northern and southern Fennoscandia and Central Europe) for its flight period diagrams and distribution of *Dorylomorpha* species. The borders between the three regions roughly equals the 1000 degree and 1400 degree centigrade effective temperature sum isopleth respectively. These isopleths seem to equal approximately the northernmost distribution limits of several pipunculid species.

- species occurring all over Central and northern Europe and well into the northern Fennoscandia region (region A of ALBRECHT, 1990), for example *Tomosvaryella sylvatica*, *Pipunculus campestris*, *Cephalops aeneus*, *C. vittipes*, *Dorylomorpha maculata* and *D. xanthopus* (Fig. 1).
- species with a northernmost limit equaling the southern Fennoscandia region (region B of ALBRECHT, 1990), for example *Cephalops obtusinervis*, *C. subultimus*, *Cephalosphaera furcata*, *Verrallia aucta*, *Dorylomorpha imparata* and *D. confusa* (Fig. 2).
- species with a northernmost limit equaling Central Europe (region C of ALBRECHT, 1990), for example *Dorylomorpha hungarica*, *Eudorylas zermattensis*, *E. subterminalis*, and *Pipunculus zugmayeriae* (Fig. 3).

A few special cases show that these isopleths can form the border of northernmost and southernmost limit for closely related species. ALBRECHT mentioned the case of *D. hungarica* and *D. haemorrhoidalis* (ALBRECHT, 1990, pers. comm). A similar distribution may be the case for *Nephrocercus flavicornis* and *N. scutellatus* (see GROOTAERT & DE MEYER, 1986) although the records for a number of the countries have to be revised in this respect.

A fourth limit of northernmost distribution can be differentiated, running approximately from Czechoslovakia, the southern part of former West Germany, Belgium (possibly with the southern part of the Netherlands) and the southern part of England (Fig. 4), as can be seen in species like *Microcephalops vestitus*, *Tomosvaryella kuthyi*, *Eudorylas obliquus* and *E. horridus*.

In addition a number of other distribution patterns could be detected. Number of species appear to have a purely boreal distribution, like *Dorylomorpha clavata*. Others typical boreomontane distribution like *D. borealis*, and maybe also *D. beckeri*. A well illustrated case is *Tomosvaryella cilitarsis* which also has a boreomontane distribution with reported distribution from the Scottish Highlands, the Boreal region of Fennoscandia, Czechoslovakia, Austria and Belgium. In Belgium, the distribution of this species is restricted to the 'Hautes Fagnes' a mountainous area in the East of the country which is famous for its boreomontane fauna (GROOTAERT, 1989).

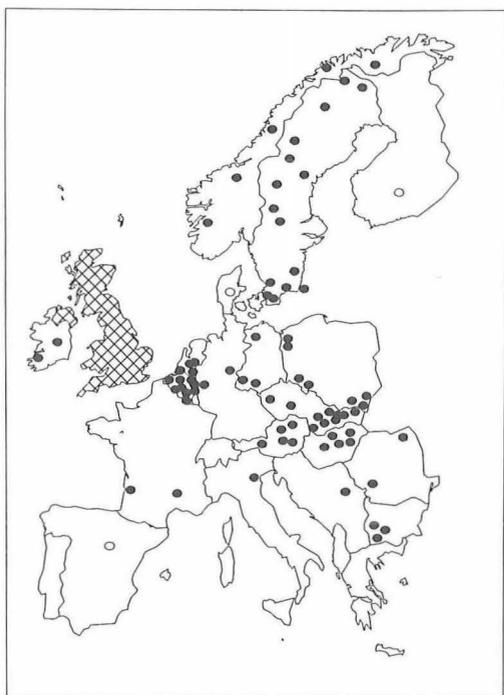


Fig. 1. Distribution of *Tomosvaryella sylvatica* in Europe (solid dots indicate localities; open circles indicate presence in a certain country without knowing the exact localities; barred area represents widespread species throughout the country).

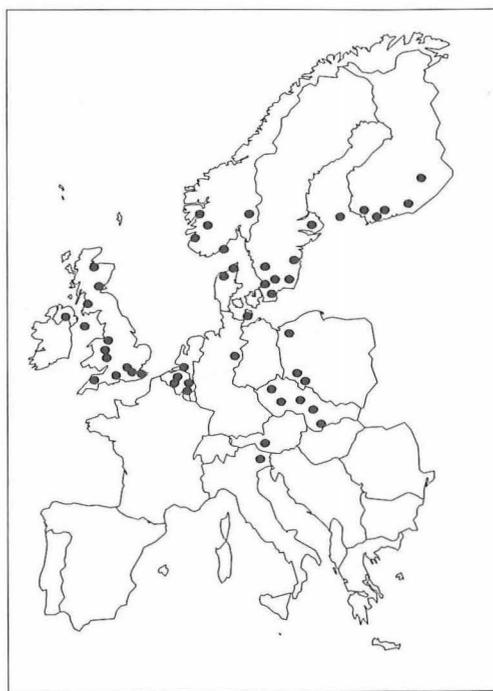


Fig. 2. Distribution of *Cephalops obtusinervis* in Europe (symbols as in Fig. 1).

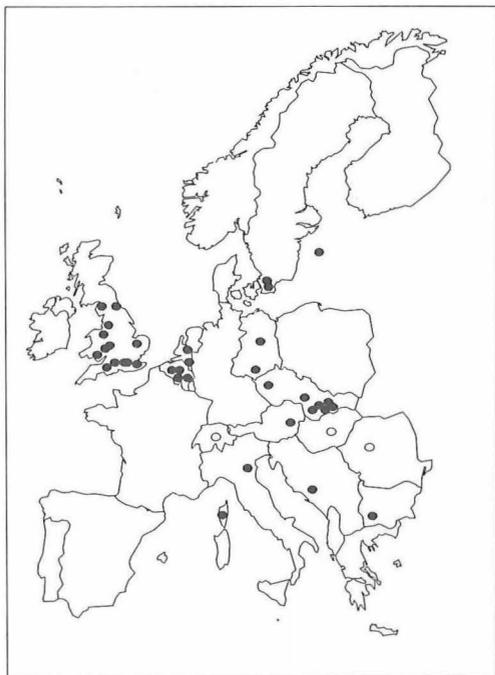


Fig. 3. Distribution of *Eudorylas subterminalis* in Europe (symbols as in Fig. 1).

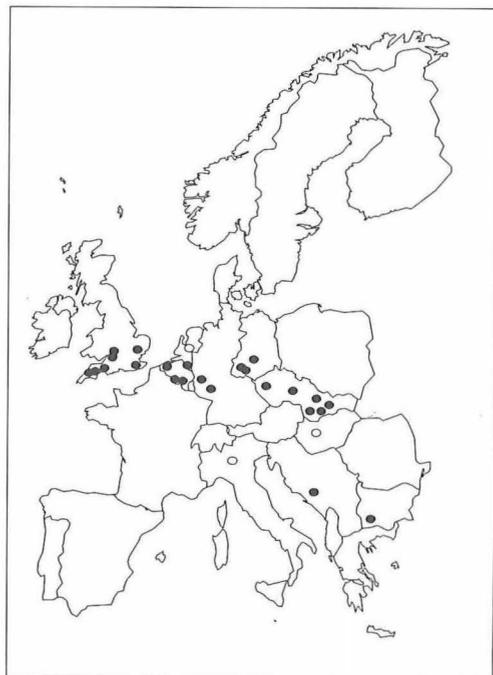


Fig. 4. Distribution of *Eudorylas horridus* in Europe (symbols as in Fig. 1).

## Pipunculid fauna and specific biotopes

With respect to the importance of conservation of certain biotopes, it is necessary to know the relationship of the organisms present and their environment. Pipunculidae can have a specific relationship with their environment, indirectly through their hosts (Homoptera) and their relationship to the vegetation. Only limited studies have been done in this respect (for example WALOFF (1975) for acidic grasslands).

Our study of certain specific biotopes in Belgium and a preliminary cartography (DE MEYER, 1983; DE MEYER & DE BRUYN, 1985), has given some indications that the occurrence of certain Pipunculidae seem to be related to specific environments. The restricted occurrence of *T. cilitarsis* in the "Hautes Fagnes", as mentioned above, is one of them. *D. albitarsis* seems to be restricted to meadows and peatbogs, which is confirmed by findings in other countries like Czechoslovakia and Finland (ALBRECHT, 1990; LAUTERER, 1981). *Eudorylas horridus* mainly occurs in calcareous regions in our country, with the exception of one finding at the coastal area. LAUTERER (1983) describes this as a thermoxerophilous species. *Tomosvaryella littoralis* seems to be indeed a littoral species, occurring in the Atlantic region (the finding of Poland has to be confirmed). In general however, the data are too limited to make any definite conclusions for most pipunculid species.

## Conclusion

This is a first attempt to bring together all available data on distribution of Pipunculidae in Europe. Because of the small size of the family this is still quite feasible.

From this preliminary study it is felt that a number of general problems have to be solved first, before reliable faunal surveys and cartography can be undertaken. A number of genera are in need of systematic revisions, especially *Eudorylas* and *Tomosvaryella*. In this respect there is also a necessity for extensive sampling in areas which are not well known at the moment, especially in southern Europe. The taxonomic problems for the genus *Chalarus* have been mentioned in the introduction. For other genera, revisions exist or the groups are fairly small (ALBRECHT, 1990; DE MEYER, 1989a; GROOTAERT & DE MEYER, 1986; LAUTERER, 1981). Also an updated identification key is a necessity if reliable surveys would be undertaken.

Only when these problems are solved, a more in depth study can be undertaken in order to look for specificity of species for certain habitats, and the possible link with their environment.

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