

Contributions to the knowledge of dolichopodid flies in Belgium.

III. The dolichopodid fauna of the nature reserve «Het Molsbroek» at Lokeren (Prov. Eastern Flanders) (Diptera : Dolichopodidae)

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Summary. During the period I.V-9.X.1984, three sites (ruderal reed marsh, reed marsh, cut in winter, and meadow) of the nature reserve «Het Molsbroek» at Lokeren (Eastern Flanders, Belgium) were sampled for Dolichopodidae (Diptera) by means of pitfall trapping. A total of 762 specimens were collected, belonging to 33 species. The very eurytopic *Dolichopus plumipes* and *Chrysotus gramineus* as well as the characteristic marsh inhabiting *Hercostomus «assimilis sp. 2»* were among the most abundant dolichopodids in our samples. Six species obviously preferred the cut reed marsh, some of which were undoubtedly favoured by the presence of large areas with a bare soil surface. *Dolichopus linearis* was completely restricted to the ruderal reed marsh, whereas *C. gramineus*, *Sympycnus pulicarius* and *Micromorphus albipes* were caught in largest numbers in the meadow habitat. The following species proved to be of special faunistic interest as they have been recorded from only a few localities in Western Flanders : *Achalcus cinereus*, *A. flavicollis*, *Argyra vestita*, *Bathycranium bicolorellum*, *Campsicnemus lumbatus*, *Dolichopus linearis*, *D. simplex*, *Hercostomus chalybeus*, *Lamprochromus elegans*, *Rhaphium fasciatum*, *Thinophilus (Schoenophilus) versutus* and *Teuchophorus calcaratus*. Consequently, in order to preserve all rare species, the maintenance of a high diversity of habitats is recommended.

Samenvatting. Bijdrage tot de kennis van de Dolichopodidae in België: III. De Dolichopodidae van het natuurreservaat «Het Molsbroek» te Lokeren (prov. Oost-Vlaanderen) (Diptera : Dolichopodidae)
Tijdens de periode I.V-9.X.1984 werden in het natuurreservaat «Het Molsbroek» te Lokeren (Oost-Vlaanderen) met pitfall-traps de Dolichopodidae geïnventariseerd in drie biotopen (verland rietmoeras, rietmoeras met wintermaaiing en een weide). In totaal werden 762 exemplaren verzameld, behorende tot 33 soorten. De zeer eurytope *Dolichopus plumipes* en *Chrysotus gramineus*, alsook de typische moerassoort *Hercostomus «assimilis sp. 2»*, behoorden tot de gewoonste soorten. Zes soorten bleken een voorkeur te hebben voor het gemaaid rietmoeras, ongetwijfeld omdat ze daar op de grote, open stukken konden leven. *Dolichopus linearis* kwam uitsluitend voor op het verland rietmoeras, terwijl *C. gramineus*, *Sympycnus pulicarius* en *Micromorphus albipes* het meest werden verzameld in het weidebiotoop. De volgende soorten bleken faunistisch erg interessant te zijn omdat ze van slechts enkele plaatsen in West-Vlaanderen bekend zijn : *Achalcus cinereus*, *A. flavicollis*, *Argyra vestita*, *Bathycranium bicolorellum*, *Campsicnemus lumbatus*, *Dolichopus linearis*, *D. simplex*, *Hercostomus chalybeus*, *Lamprochromus elegans*, *Rhaphium fasciatum*, *Thinophilus (Schoenophilus) versutus* en *Teuchophorus calcaratus*. Om alle zeldzame soorten te beschermen moet dus een zo groot mogelijke verscheidenheid in de biotopen worden nagestreefd.

Résumé. Contribution à la connaissance des Dolichopodidae en Belgique: III. Les Dolichopodidae de la réserve naturelle «Het Molsbroek» à Lokeren (prov. Flandre orientale) (Diptera : Dolichopodidae)

La faune des Dolichopodidae de la réserve naturelle «Het Molsbroek» à Lokeren fut inventoriée durant la période allant du 1 mai au 9 octobre 1984 et ce au moyen de pièges au sol. Une comparaison est effectuée entre la faune d'une roselière et celle de ce même biotope dont les roseaux sont coupés en hiver, ainsi que celle d'une prairie. Au total 762 exemplaires furent recoltés, appartenant à 33 espèces. Les espèces les plus courantes étaient *Dolichopus plumipes* et *Chrysotus gramineus* (espèces principalement eurytopiques) de même que *Hercostomus «assimilis sp. 2»* également une espèce essentiellement associée aux marais. 6 espèces préféraient manifestement le biotope de roseaux coupés. Certaines de celles-ci se concentraient sur les endroits incultes. *Dolichopus linearis* semble

exclusivement associé au marais à roseaux alors que *C. gramineus*, *Sympycnus pulicarius* et *Micromorphus albipes* furent récoltés en majorité dans la prairie. Les espèces suivantes semblent particulièrement intéressantes suite au fait qu'elles n'ont été observées qu'en quelques endroits de Flandre occidentale : *Achalcus cinereus*, *A. flavicollis*, *Argyra vestita*, *Bathycranium bicolorellum*, *Campsicnemus lumbatus*, *Dolichopus linearis*, *D. simplex*, *Hercostomus chalybeus*, *Lamprochromus elegans*, *Rhaphium fasciatum*, *Thinophilus (Schoenophilus) versutus* et *Teuchophorus calcaratus*. Aux fins de protection d'un maximum d'espèces intéressantes il est conseillé de maintenir une grande diversité de biotopes.

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Introduction

The pitfall trap method is one of the most efficient and most widely applied techniques for sampling soil surface active invertebrates. Although mostly carabid beetles and spiders are collected in this way, it appears to be a very useful sampling device for other soil-dwelling arthropods too. Especially in very humid sites, large numbers of dolichopodid flies can be gathered using traps as proved POLLET et al. (1986).

Only very recently was attention drawn to the insect group mentioned above because so very little was known about their ecology and distribution in Belgium. Since then, many sites have been intensively investigated, some of which are mentioned by POLLET et al. (1987). As most dolichopodid species are strongly hygrophilous, wetlands and marshes as well as humid woodlands need special attention. In this context, the second author started an ecological survey on the ground beetle and spider fauna of several wetlands in Eastern and Western Flanders (Belgium). One of the marshes studied was the nature reserve «Het Molsbroek» at Lokeren. In this paper, we present the results of our studies of the dolichopodid fauna.

I. Study site, material and methods

The nature reserve «Het Molsbroek» is situated in the central part of Flanders (Belgium) (Fig. 1). It is a former grassland area along the river Durme, mainly on a heavy alluvial clay soil, which has been completely isolated from the surrounding water system by the construction of a dike in 1963. A great variety of biotopes are present or have developed since : large ponds, meadows, reed marshes, ruderal sites and water-meadow forests. The whole area is normally subject to winter flooding.

During this study, three sites were sampled in detail :

- (i) site A: a ruderal marsh (surface approx. 1 ha) with an undisturbed development since 1963. As a result of the absence of cutting management, the herb layer is very poorly developed and a litter layer of approximately 15 cm is present. There is almost no bare soil;
- (ii) site B: a small, isolated belt of reeds (surface approx. 0.11 ha) with a well developed and species rich herb vegetation due to annual winter cutting. Apart from reed, *Glyceria maxima* and *Symphytum officinale* are most

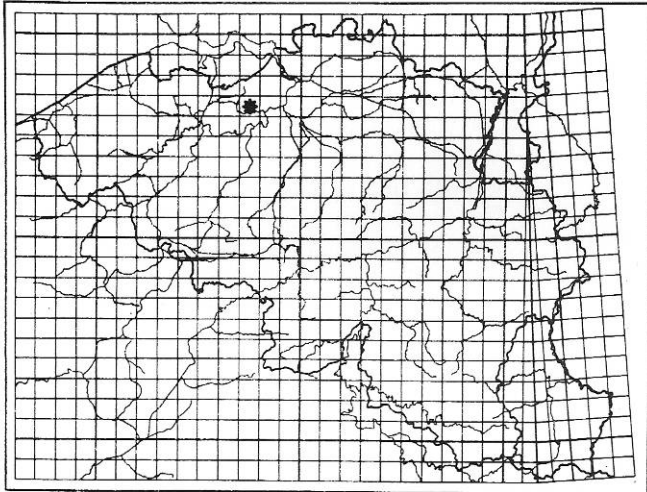


Figure 1 : Location of the nature reserve «Het Molsbroek» in Belgium.

abundant. The litter layer is approximately 2 cm thick in summer but bare soil remains present to some extent throughout the year. It is surrounded by meadow habitats and is the wettest sampling site;

(iii) site C: a meadow (surface approx. 1.2 ha), in the vicinity of site B and showing a very dense vegetation (height maximum 1 m). Dominant herb species are *Carex disticha*, *Phalaris arundinacea*, *Poa trivialis* and *Symphytum officinale*. The litter layer is at most 5 cm thick but is removed during summer mowing management. Bare soil is completely absent. Although rather humid, this is the driest of the investigated sites.

In each site, 6 pitfall traps were installed during the period 1.V-9.X.1984 (A, B) and 5.VI-9.X.1984 (C). They consisted of glass jam jars with a diameter and a depth of 9 cm. These traps were filled to one third with 10% formalin solution and emptied approximately at fortnightly intervals. Since catches during the first three periods were extremely low, data collected only during the period 5.VI-9.X.1984 were compared. In the laboratory, Carabidae, Araneae, Dolichopodidae and Empididae were sorted out. The dolichopodid flies were identified by means of D'ASSIS FONSECA (1978) and PARENT (1938) as well as some improved, unpublished keys by H. MEUFFELS (The Netherlands). Nomenclature is according to MEUFFELS & GROOTAERT (1987). The specimens collected are deposited in 70% alcohol solution partly in the «Koninklijk Belgisch Instituut voor Natuurwetenschappen» (Brussels) and partly in the collection of the first author.

II. Results and discussion

1. General conclusions

Table 1 presents the species list with an indication of numbers per site. From 5.VI.1984 until 9.X.1984, a total number of 762 specimens were collected, belonging to 33 species. The species indicated by *Hercostomus*

«*assimilis* sp. 2» is one of the three species, which appear to belong to *Hercostomus assimilis*, according to the keys of D'ASSIS FONSECA (1978), PARENT (1938) and STACKELBERG (1934). Nevertheless, distinct morphological differences were found between these species. In this context, the first author is working on a revision of the species of the subgenus *Gymnopternus* LOEW, 1857 from western Europe.

Comparison of the fauna of the three sites revealed that the largest number of flies was sampled in site B, whereas most species were obtained in the meadow (site C). Site A was the poorest concerning both species richness and abundance. The following species were the most numerous dolichopodids in our samples: *Dolichopus plumipes*, *Chrysotus gramineus*, *Hercostomus* «*assimilis* sp. 2», *Campsicnemus curvipes*, *Teuchophorus calcaratus*, *Sympycnus pulicarius*, *Campsicnemus scambus*, *C. picticornis* and *Rhaphium fasciatum*.

2. Distribution over the sites and habitat preference

The most abundant species in site B were: *Dolichopus plumipes*, *Campsicnemus curvipes*, *C. scambus*, *Teuchophorus calcaratus*, *Dolichopus simplex* and *Rhaphium fasciatum*. Apparently, the *Campsicnemus* species and *Teuchophorus calcaratus* are favoured by the presence of bare muddy soil in site B as they exhibit a distinct soil surface activity. They are often found in extremely large numbers and represented by several species in such places. (POLLET & GROOTAERT 1987; POLLET et al. 1987). Many of the species listed in this section are known to prefer open water, although the first three can be found in various habitat types (EMEIS 1964; POLLET et al. 1987). However, *C. curvipes* and *C. scambus* are regular woodland-floor dwellers, whilst *D. plumipes* is mostly found in more open places. MEUFFELS (i. litt.) mentions *T. calcaratus* occurring on the borders of small ponds within woodland areas. According to EMEIS (1964), *D. simplex* can be considered as a very eurytopic species and is reported from all kinds of habitats. For *R. fasciatum*, no literature data were available concerning its habitat preference. However, according to our current knowledge (based upon unpubl. data), it can be termed a true marsh inhabiting species and is often found together with *Argyra vestita*, *Hercostomus* «*assimilis* sp. 2», *Hercostomus chalybeus*, *Lamprochromus elegans* and *Teuchophorus spinigerellus*.

Dolichopus linearis is the only species which appeared to be completely restricted to site A. Having very few records, EMEIS (1964) was not able to determine the habitat type of this species. According to our knowledge, it has been found on the borders of fish ponds (VERBEKE, pers. comm.), in gardens, deciduous woodland and on dirt roads. The only constant feature of these sites was the presence of a shrub layer or a high herb vegetation, which corresponds with our present results.

Chrysotus gramineus, *Sympycnus pulicarius* and *Micromorphus albipes* were found most abundantly in site C: the first two species are widely distributed all over Belgium and are among the more common species in several parts of

Table 1. Species list of the Dolichopodidae collected by means of pitfall traps during 5.VI-9.X.1984 in three sites of the nature reserve «Het Molsbroek» at Lokeren (Eastern Flanders, Belgium) (males/females; column A: site A; B: site B; C: site C; D: total number; E: number of 2.5 km-U.T.M. squares in Western Flanders (Belgium) of which a particular species has been recorded (cfr. POLLET et al. 1987)).

Dolichopodid species (Dolichopodidae)	A	B	C	D	E
<i>Achalcus cinereus</i> (HALIDAY, 1851)	-	-	/1	/1	3
<i>Achalcus flavicollis</i> (MEIGEN, 1824)	/1	2/3	1/3	3/7	-
<i>Argyra leucocephala</i> (MEIGEN, 1824)	-	/2	-	/2	16
<i>Argyra vestita</i> (WIEDEMANN, 1817)	-	-	/1	/1	4
<i>Bathycranium bicolorellum</i> (ZETTERSTEDT, 1843)	-	/2	-	/2	6
<i>Campsicnemus curvipes</i> (FALLEN, 1823)	7/8	35/16	/1	42/25	31
<i>Campsicnemus lumbatus</i> LOEW, 1857	-	-	/1	/1	4
<i>Campsicnemus picticornis</i> (ZETTERSTEDT, 1843)	1/1	11/15	19/7	31/23	22
<i>Campsicnemus scambus</i> (FALLEN, 1823)	7/6	20/19	3/2	30/27	19
<i>Chrysotus cilipes</i> MEIGEN, 1824	-	-	1/2	1/2	7
<i>Chrysotus gramineus</i> FALLEN, 1823	2/4	1/1	57/37	60/42	20
<i>Dolichopus latilimbatus</i> MACQUART, 1827	-	1/	/1	1/1	17
<i>Dolichopus linearis</i> MEIGEN, 1824	8/9	-	-	8/9	7
<i>Dolichopus nubilus</i> MEIGEN, 1824	2/4	-	/7	2/11	28
<i>Dolichopus pennatus</i> MEIGEN, 1824	-	/2	/1	/3	13
<i>Dolichopus plumipes</i> (SCOPOLI, 1763)	2/6	24/67	6/9	32/82	38
<i>Dolichopus simplex</i> MEIGEN, 1824	-	8/4	-	8/4	1
<i>Dolichopus unguulatus</i> (LINNAEUS, 1758)	-	/3	/1	/4	45
<i>Hercostomus aerosus</i> (FALLEN, 1823)	-	2/1	-	2/1	16
<i>Hercostomus «assimilis sp. 2»</i>	6/22	12/24	9/10	27/56	?
<i>Hercostomus chalybeus</i> (WIEDEMANN, 1817)	1/	/6	/1	1/7	6
<i>Hercostomus chrysozygos</i> (WIEDEMANN, 1817)	/1	/1	/2	/4	16
<i>Lamprochromus elegans</i> (MEIGEN, 1830)	-	/1	-	/1	4
<i>Medetera truncorum</i> MEIGEN, 1824	-	-	1/3	1/3	23
<i>Micromorphus albipes</i> (ZETTERSTEDT, 1845)	-	1/	5/3	6/3	16
<i>Rhaphium caliginosum</i> MEIGEN, 1824	-	/2	/1	/3	24
<i>Rhaphium fasciatum</i> MEIGEN, 1824	1/	9/24	6/13	16/37	4
<i>Thinophilus (Schoenophilus) versutus</i> (HALIDAY, 1851)	-	-	1/1	1/1	5
<i>Sympycnus pulicarius</i> (FALLEN, 1823)	1/2	-	26/28	27/30	37
<i>Syntormon pallipes</i> (FABRICIUS, 1794)	-	-	/2	/2	29
<i>Syntormon pumilus</i> (MEIGEN, 1824)	-	-	2/	2/	17
<i>Teuchophorus calcaratus</i> (MACQUART, 1828)	2/4	19/26	1/9	22/39	-
<i>Teuchophorus spinigerellus</i> (ZETTERSTEDT, 1843)	-	1/2	1/1	2/3	13
number of species	22	14	27	33	
number of specimens	367	108	287	762	

Europe (EMEIS 1964; MEUFFELS 1974; POLLET et al. 1987). Accordingly, they occur in very diverse places, mainly those with a well developed herb layer (*C. gramineus*) and which are rather humid (*S. pulicarius*). On the contrary, *M. albipes* is mainly found in meadow and marsh situations, including salt marshes.

Furthermore, numbers of *Campsicnemus picticornis* are equally distributed over sites A and C. Thus despite their very different appearance, both places must offer comparable microclimatological conditions which favour this species. *C. picticornis* is characteristic of open, very humid places and is one of

the dominant species of the nymphaeid-dominated aquatic systems in The Netherlands (VAN DER VELDE et al. 1985). Compared to *C. curvipes* and *C. scambus*, it was found distinctly more often in the meadow. In woodland ecosystems, it seems to differ concerning its ecological demands from the other species too: *C. scambus* prefers the wettest places, whereas *C. curvipes* is distributed evenly; *C. picticornis* on the other hand proved to be most abundant at a well-lit spot with a thin grass vegetation (POLLET & GROGTAERT 1987). Although most common in site B, *R. fasciatum* appeared to be rather abundant in site C too. Finally, only *H. «assimilis sp. 2»* seemed to have no distinct preference for any site investigated.

3. Species of special faunistic interest

Table 1 also indicates the number of 2.5 km-U.T.M. squares for which the corresponding species were recorded in Western Flanders (POLLET et al. 1987). Although «Het Molsbroek» is situated in Eastern Flanders, comparisons can be made as the dolichopodid fauna of many sites in this province is rather similar to that of Western Flanders (GOETGHEBUER 1930, 1943). POLLET et al. (1987) did not find *Achalcus flavicollis* nor *Teuchophorus calcaratus* for Western Flanders. However, recent investigations proved that they do occur in this province. Furthermore, because of the previously mentioned systematic problems, the distribution of *H. «assimilis sp. 2»* in Western Flanders (and Belgium) has not been fully established yet.

Till this study, only three records were known of *Achalcus flavicollis* from Belgium, including a capture at Lokeren, mentioned by PARENT (1924). For more information about this species, we refer to POLLET et al. (in press). *A. vestita*, *Bathycranium bicolorillum*, *H. chalybeus*, *L. elegans* and *R. fasciatum* are rare marsh inhabiting species. Apart from *A. vestita*, which was found in a humid woodland site by EMEIS (1964), no literature data on the ecology of the other species were found. Together with the related *C. picticornis*, *Campsicnemus lumbatus* is considered as typical for nymphaeid-dominated plant systems in The Netherlands (VAN DER VELDE et al. 1985). It was reported new to the Dutch fauna as late as 1974 (MEUFFELS 1974). In Western Flanders, it has been found in various places, though always near open water.

Although *D. simplex* is not rare at all in the eastern parts of Belgium and can be met with very abundantly in peatbog areas (POLLET et al., 1988), only one record is known for Western Flanders. As already mentioned, this species seems to be quite eurytopic (EMEIS 1964). According to the latter author, *Thinophilus (Schoenophilus) versutus* is a halophilous species, occurring in salt marshes and amongst *Scirpus maritimus* and *Spartina* sp.. This is in full agreement with our findings for Western Flanders where it is known only from the polders and the coastal region. However, it has also been recorded from water-meadow forests (EMEIS 1964).

4. Concluding remarks concerning management

Dolichopodid species can be collected by means of different techniques :

former studies proved that Malaise traps and water traps were the most efficient. Especially white coloured water traps are very attractive to many species of this family (POLLET & GROOTAERT 1987). Nevertheless, particularly in very humid sites, the pitfall trap method has appeared to be a feasible device for sampling these flies too, as many species (e.g. *Campsicnemus* sp., *Teuchophorus* sp.) demonstrate a predominantly soil-dwelling behaviour (POLLET et al. 1986). However, since other species only occur in the foliage of herbs and shrubs or on tree trunks, pitfall trap catches for all species cannot be compared. Moreover, the development of the litter layer and the structure of the herb layer undoubtedly effect the yields. Subsequently, data gathered by only one sampling method are very difficult to interpret and undoubtedly only represent part of the present fauna. Thus because of the sampling technique used, this study is mainly devoted to the species which occur on or near the soil surface.

Nevertheless, some general conclusions can be drawn : the large number of bare soil patches in the winter cut site B obviously had a positive effect on the abundance of the soil surface active species in contrast to the unmanaged reed marsh site A. The well developed grassy herb layer in site C, however, favoured predominantly leaf-dwelling dolichopodids such as *Chrysotus gramineus*. Furthermore, the larval stages of most species live in muddy or very wet soil (DYTE 1959; GOETGHEBUER 1930), which explains the high abundances of the adults of some species. Almost 60% of the rare species proved to be restricted to only one of these habitats. It was also noticed that many species of special faunistic interest occurred rather abundantly in at least one of the sites. Thus management, directed to the protection of rare species, should maintain the diversity of habitat types.

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Boekbesprekingen

Brugge, B. : *Wapenvliegental.*

14,5 x 21 cm, 76 p., 58 verspreidingskaartjes, 71 tekstfiguren, Jeugdbondsuitgeverij, Kortrijksepoortstraat 140, 9000 Gent, 1987, geniet, 135,- BFr. (ISBN 90-5107-004-7).

De Wapenvliegen (Stratiomyidae) danken hun naam aan de doortjes die op het schildje van de meeste soorten voorkomen. Reeds in 1959 verscheen een NJN-tabel over deze groep die in 1968 nog een tweede druk beleefde. Het aantal opgenomen soorten was echter beperkt, de gehanteerde determinatiekenmerken niet altijd even duidelijk en de nomenclatuur verouderd. Met het verschijnen van het standaardwerk voor Europa door ROZKOSNY in 1982 en 1983 werd de basis gelegd voor een nieuwe tabel voor Nederland en België. 48 soorten worden uiteindelijk behandeld, aangevuld met nog enkele soorten die in de nabije toekomst in het gebied eventueel kunnen worden aangetroffen en nog 3 soorten van de nauwverwante Solvidae.

De auteur heeft geen moeite gespaard om zoveel mogelijk informatie over de verschillende soorten bij elkaar te brengen. Habitat, vliegtijd, biologie en talrijkheid worden achtereenvolgens besproken, aangevuld met areaalkaartjes van Europa (waarvan de bron evenwel niet vermeld wordt) en verspreidingskaartjes van Nederland. Als concept is het geheel ongetwijfeld uniek en navolging waard. De determineertabel zelf is af en toe misschien wat te beknopt gehouden, maar de vele tekeningen brengen verduidelijking. De habitustekeningen van Jeroen DE ROND zijn ronduit schitterend en daarbij vergeleken maken sommige achterlijfstekeningen helaas een wat slordige indruk (b.v. fig. 45 en 46). Misschien is dit iets voor een volgende druk.

Wat vooral de beginner ten goede zou komen is een inleidend hoofdstukje over het vangen van wapenvliegen. Slechts enkele soorten zijn immers frekwente bloembezoekers, het gros houdt zich meestal op in de vegetatie, zonnend op bladeren en bestaat bovendien uit relatief kleine soorten. Het slepen of het gebruik van malaise-vallen is daarom onontbeerlijk bij elke inventarisatie. Vele Wapenvliegen zijn goede indicatoren voor de kwaliteit van het milieu omdat de larven sterk verschillende en vaak gespecialiseerde eisen stellen. Mede door de eenvoudige determinatie is deze groep dan ook erg geschikt om te worden gebruikt bij de evaluatie van natuurgebieden.

K. Decler