

Status of Dolichopodidae of the Flemish Red Data Book in the Netherlands (Insecta: Diptera)

Marc Pollet, Henk Meuffels & Patrick Grootaert

Abstract

The distribution and status of threatened and rare Flemish dolichopodid species in the Netherlands is investigated. Rarity classes are based on the percentage of sampled UTM 10 km squares with species records, in combination with the most recent capture date. The Dutch fauna comprises 244 species, 22 of which have presumably become extinct. About 52% of the 224 shared species with Flanders seem to be more common in the latter region. Among the 23 species that are more widespread in the Netherlands, saltmarsh-, heathland-inhabiting and riparian species are better represented than in the entire shared fauna. The observed faunal discrepancies might be related to regional differences in both habitat availability, topography and management.

Key words: Diptera, Dolichopodidae, Red Data Book, Flanders, The Netherlands, biodiversity.

Introduction

Dolichopodidae or long-legged flies are usually metallic greenish to bronze coloured with a body size of 1-10 mm. Only a few species feature non-metallic yellow, brown or black bodies. Their body is either stout or slender, sometimes midge-like but always somewhat compressed laterally. In general, long-legged flies prefer humid areas and many species can be found in large numbers especially in humid forests, humid heathland, saltmarshes, dune slacks and on banks of water bodies. Other species like *Medetera* and *Sciapus* species occur mainly on tree trunks and other vertical structures, whereas *Aphrosylus* species are confined to littoral rocks and *Thinophilus* species prefer wet sand or decaying seaweeds on beaches. Except for the leafmining *Thrypticus* larvae, both adult flies and larvae are predacious and feed on soft-bodied invertebrates.

Dolichopodidae meet all criteria – taxonomical, biological, biogeographical and logistic – to make this dipteran family an excellent agent for bio-indication (Pollet & Grootaert 1994). In order to actually use this taxon in nature conservation, a Red Data Book was recently generated for Flanders (Pollet 2000). Indeed, Red Data Books and Red Lists are considered as one of the most important and scientifically best founded instruments in the modern, offensive nature conservation management (Maes et al. 1995). Pollet

(2000) shows that at present 9% of the species that are recorded from Flanders can be considered extinct, another 15% is seriously threatened while 33% is currently rare. Especially communities of saltmarsh habitats are endangered in Flanders, largely because of the scarcity of this habitat type.

Since the early 1970s, the second author systematically compiled all distribution records on dolichopodids in the Netherlands. Data were retrieved from the literature, specimens in the major Dutch museum collections were checked and during the past 30 years a large amount of new material was collected by him, Van Aartsen and other fellow dipterists. However, after the work of Meuffels (1974, 1978, 1981), no overall analysis of this data set had been carried out yet. In the present contribution, the dolichopodid fauna of Flanders is compared to the Dutch fauna with a focus on the threatened and rare Flemish species.

Material and methods

Distribution data until July 1997 were kindly provided by the second author and were converted into an Microsoft Access database. Unfortunately, additional data from recently updated files could not be incorporated in time so the overall comparison of the faunas is based on a summary table prepared by the second author and not on the raw dataset. However, in order to

Table 1
Overview of Red Data Book categories as defined in Pollet (2000).

Rarity % sampled UTM 5 km squares	Extinct 0%	Very rare > 0- < 2%	Rare 2- < 5%	Fairly rare 5- < 10%	Common ≥ 10%
Trend (extent of decline)					
76-100%	0. Extinct	1. Critically endangered	2. Endangered	3. Vulnerable	A. In decline
51-75%	-	2. Endangered	2. Endangered	3. Vulnerable	A. In decline
26-50%	-	3. Vulnerable	3. Vulnerable	3. Vulnerable	A. In decline
≤ 25%	-	zZ. Very rare	Z. Rare	vZ. Fairly rare	N. Safe/at low risk

give an up-to-date account on the status of the threatened, very rare and rare Flemish species in the Netherlands, post-1997 data on the latter species were actually added to the database. Each distribution record consists of the following information: species, sampling locality, number of males and females, sampling date or period, collector or literature reference, collection and relevant remarks. All further information on sampling localities (like locality, toponym, province, UTM 10 km square) and species (full name, systematic position, conservation status in Flanders, habitat affinity) was retrieved from other databases or tables. In order to include as many records as possible in the analysis, lacking or partly lacking collecting dates were completed following the procedure by Pollet (2000). Evidently, only records from localities with a valid 10 km square were used.

The conservation status of a species is unequivocally reflected by its Red Data Book category, which is the combination of a rarity and trend criterion:

1. Species rarity is expressed as the absolute or proportional number of geographical entities (sampling sites, localities, UTM squares) where the species has recently been found. The final choice of approach and entities largely depends on the amount of data and the distribution of these data in time;
2. The trend criterion reflects the evolution of geographical distribution (or rarity estimates) over time but for practical reasons, is mostly assessed by comparing distributions between two time periods separated by the so-called pivot year.

In the case of the Red Data Book of Flanders (Pollet 2000, see table 1), UTM 5 km squares were selected as geographical entities as they comprise sufficiently detailed information on the geographical distribution in this region and, moreover, are not affected by the results of intensive sampling activities within a restricted area (which might, in contrast, largely increase the number of localities or sampling sites). On the other hand, 1980 was selected as pivot year as 1. the distribution of sampled squares was nearly equal between 1850-1980 (n = 171) and 1981-1997 (n = 167) and 2. since the early eighties of the last century, new collecting techniques (e.g. Malaise traps, water traps, emergence traps) were introduced in sampling campaigns in Belgium and largely replaced the traditional net sweeping. Coincidentally, also the number of collected species was largely comparable between both time periods (214 in 1850-1980 versus 226 in 1981-1997).

The selection of a reliable pivot year proved to be impossible for the Dutch dataset as the current database did not contain all distribution records (see above). Moreover, even 1975, which split the distribution data in two comparable sets (with 242 10 km squares sampled until and 221 squares after 1975) was considered too artificial and therefore not sufficiently reliable as it was situated within the peak collecting activities of the second author and Van Aartsen in particular (1967-2000) who gathered most of the recent data. As a result, rarity of the Dutch species was determined in a slightly different way. Species with no distribution records since 1967 (= start of large scale sampling activities by Van Aartsen) are considered extinct in the Netherlands. For the

remaining species, an overall (and not current!) rarity was calculated as the proportional number of 10 km squares in which the species has thus far been discovered (1853-2000) to the total number of squares sampled, regardless of any decrease in distribution over time. Analogous to Pollet (2000), the following rarity classes were distinguished:

- zZ (very rare): species found in < 2% of the sampled squares;
- Z (rare): species found in 2% - < 5% of the sampled squares;
- vZ (fairly rare): species found in 5 - < 10% of the sampled squares;
- A (common): species found in ≥ 10% of the sampled squares.

For reasons of comparability, Belgian and Flemish data sets were analyzed in exactly the same way.

The Dutch dataset yielded 7562 records with a unique combination of species, 10 km square and sampling year, and 7773 records uniquely defined by species, locality and sampling year. In comparison, the Belgian database comprises 9527 and 10 214 of these records respectively, whereas the Flemish database contains 7156

records of unique combinations of species, 5 km square and sampling year, and 7217 entries of species, locality and sampling year.

The null hypothesis for the comparison of Flemish and Dutch dolichopodid faunas states that each species is equally rare or common in both regions. Comparisons with the Belgian fauna are limited as no Red Data Book of dolichopodid flies of Belgium is available, and the southern part of Belgium houses a large number of (Central European) species that do not occur in the Netherlands.

Results

Dolichopodid flies are known from 333 of 480 Dutch 10 km squares which represents 69.4% of the area. In Belgium, slightly fewer (66.9%) squares were investigated, but sampling yielded considerably more species and records (see above).

Since 1853, 244 dolichopodid species have been discovered in the Netherlands, as compared to 260 in Flanders and 295 in Belgium (Pollet 2000), while 224 species are shared with Flanders. Ten species are exclusively recorded from the Netherlands (see table 2). *Chrysosoma exsul* (Parent, 1932) is a Neotropical species which was apparently introduced in greenhouses

Table 2

Overview of the rarity status of dolichopodid species in the Netherlands ranked according to Flemish Red Data Book categories.

Red Data Book category (FI)	Rarity classes (NL)					not known from NL	Total no. of species
	extinct	very rare	rare	fairly rare	common		
0. Extinct in the wild	3	6	3	-	1	9	22
1. Critically endangered	1	2	6	1	-	-	10
2. Endangered	-	6	2	5	1	-	14
3. Vulnerable	1	4	3	6	1	1	16
zZ. Very rare	5	11	4	1	-	4*	25
Z. Rare	2	13	9	4	-	1	29
vZ. Fairly rare	-	8	10	11	3	1	33
?. Insufficiently known	1	11	3	2	1	20	38
N. Safe/At low risk	-	1	11	22	39	-	73
Not known from Flanders	4	6	-	-	-	-	10
Not known from Belgium	5	3	2	-	-	-	10
Total no. of species	22	71	53	52	46	36	280

* including the recently discovered *Neurigona lineata*

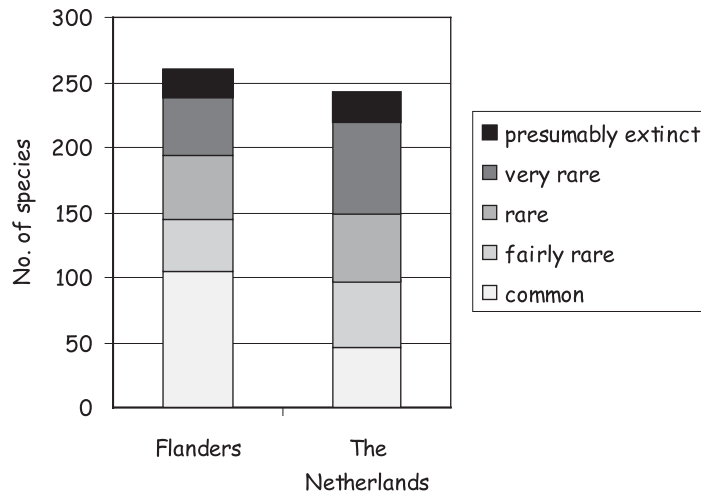


Figure 1
Species distribution over rarity classes.

in Amsterdam and Leiden and collected there during the late thirties and early forties of the last century. Of the other exclusively Dutch species, only *Medetera obscura* (Zetterstedt, 1838) and *Sciapus basilicus* Meuffels & Grootaert, 1990 were collected in fair numbers and in more than 2% of the sampled squares. All the remaining species are known from only one single or, at most, two specimens. Four species (*Acropsilus niger* (Loew, 1869), *Chrysosoma exsul*, *Dolichopus calinotus* Loew, 1871, *Medetera pinicola* Kowarz, 1877) have not been found since 1967 and must be considered extinct.

About 53% of all shared dolichopodid species seem to be significantly more widespread in Flanders than in the Netherlands (table 3). As can be seen in figure 1, about 40% of all Flemish species can be termed common, whereas the very rare, rare and fairly rare species occupy a comparable proportion of the fauna. The Dutch dataset shows a quite different composition in which very rare species with 29.1% (n = 71) are the major group. This discrepancy with the Flemish fauna is explained by a less productive sampling strategy and/or a strategy focused on rare species in special or protected habitats in the Netherlands. About 20% of the Dutch sampled squares have records of only one or two species as compared to 8.4% of the Flemish squares.

Moreover, over half of the Flemish squares contain more than 20 species, whereas this species richness has been established in only about a quarter of the Dutch squares (fig. 2). Most Dutch species have been collected in Hilversum (n = 96) and Elsloo (n = 85) and adjacent localities, obviously favourite collecting sites of De Meijere and Meuffels, respectively.

Nine of the 22 currently extinct Flemish species have never been recorded from the Netherlands and of three other species, *Diaphorus winthemi* Meigen, 1824, *Dolichopus plumitaris* Fallén, 1823 and *Tachytrechus ammobates* Haliday, 1851, only old Dutch records exist. The remaining species of RDB category '0' still seem to occur in the Netherlands. Except for *Hercostronus germanus* (Wiedemann, 1817), all of these species are rare to very rare in the Netherlands, although some species can locally be abundant, like *Neurigona pallida* (Fallén, 1823) on the Sint-Pietersberg (province of Limburg) and *Hydrophorus balticus* (Meigen, 1824) on some of the Wadden Islands (Vlieland and Terschelling). In contrast to its apparent commonness (known of nine out of 12 Dutch provinces), *H. germanus* mainly occurs in dry inland habitats in the northern and central parts of the Netherlands. Despite the fact that suitable habitats seem to be present in the south as well, the

Table 3
Comparison of species rarity in Flanders and the Netherlands.

Relative distribution *	No. of species
Significantly more common in Flanders	118
Not significantly more common in Flanders	41
Equally common in Flanders and The Netherlands	41
Not significantly more common in The Netherlands	13
Significantly more common in The Netherlands	11
Total no. of shared species	224

* significant difference: χ^2 test, $p < 0.005$ or $p < 0.010$; not significant difference: $\geq 1\%$ of sampled UTM 10 km squares between both regions; equally common: difference of $< 1\%$ of sampled UTM 10 km squares.

species has been found only once after 1950 in the provinces of Noord-Brabant and Limburg. Both *H. germanus* and *Diaphorus hoffmannseggi* Meigen, 1830 are significantly more widespread in the Netherlands than in Flanders. Only one 'Critically endangered' Flemish species, *Dolichopus latipennis* Fallén, 1823, seems to be currently extinct in the Netherlands despite the fact that during the first half of the 20th century this species was found in numbers in several localities in the province of Noord-Holland. Especially at Diemen, it seemed to be rather abundant. Five in Flanders critically endangered species seem to be more common in the Netherlands: *Dolichopus clavipes* Haliday, 1832,

Machaerium maritimae Haliday, 1832, *Tachytrechus insignis* (Stannius, 1831), *Thinophilus flavipalpis* (Zetterstedt, 1843) and *T. ruficornis* (Haliday, 1838), the first two even significantly so. *Tachytrechus insignis* is mainly known from dune slacks whereas the other four species are strictly halophilous.

All 14 species of the RDB category 'Endangered' still occur in the Netherlands but the majority seems to be less common there except for *Sciapus longulus* (Fallén, 1823) and *S. laetus* (Meigen, 1838). Moreover, in contrast to its scattered distribution in Flanders, *S. longulus* has been sampled in 11 out of 12 provinces in the Netherlands and at some sites (e.g. Heerenveen,

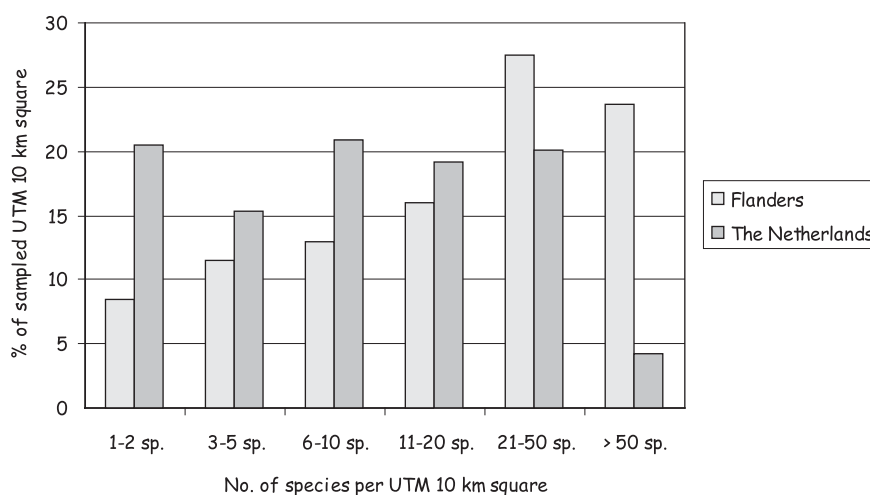


Figure 2
Distribution of species numbers over UTM 10 km squares in The Netherlands and Flanders.

province Limburg, and Pannerden, province Gelderland) even in fair numbers. Although less pronounced than in Flanders, in The Netherlands *Hercostomus nigripennis* (Fallén, 1823) also shows a recent, though not significant, decline of 30% since 1975 ($\chi^2= 2.05$, n.s.).

Chrysotus monochaetus Kowarz, 1874 is the only 'Vulnerable' Flemish species which seems to be currently extinct in the Netherlands as its only capture dates from 1918 (Denekamp, province of Overijssel). *Syntormon aulicum* (Meigen, 1824) on the other hand has not yet been recorded from the Netherlands, although it has recently been detected in several reedmarsh sites close to the Dutch border. All other species are equally rare or even rarer in the Netherlands except for *Dolichopus migrans* Zetterstedt, 1843 and *Hydrophorus oceanus* (Macquart, 1838) which are confined to dry forests on sandy soils and saltmarshes, respectively.

Of the 24 'Very rare' Flemish species, three are unknown to the Netherlands (*Campsicnemus pusillus* (Meigen, 1824), *Dolichopus apicalis* Zetterstedt, 1849, *Hercostomus parvilamellatus* (Macquart, 1827)) while five have not been collected there since 1967 (*Lamprochromus strobli* Parent, 1925, *Syntormon metathesis* (Loew, 1850), *S. tarsatum* (Fallén, 1823), *Telmaturgus*

tumidulus (Raddatz, 1873), *Thrypticus smaragdinus* Gerstäcker, 1864) and should be considered extinct. However, all are of modest size and might just have been overlooked. Moreover, they all have even been discovered only recently in Flanders (since 1981). Three species are more common in the Netherlands: *Dolichopus rupestris* Haliday, 1833, *Hydrophorus nebulosus* Fallén, 1823 and *Rhaphium nasutum* (Fallén, 1823).

Medetera muralis Meigen, 1824 and *Syntormon monile* (Haliday, 1851) are the only 'Rare' Flemish species with only old Dutch records: the former was most recently collected in 1939, the only record of the second species dates from 1896! No Dutch records are present for *Achalcus phragmitidis* Pollet, 1996 despite its occurrence in reedmarshes in 'Het Meetjeslandse Krekengebied' near the Dutch border. Only the saltmarsh-inhabiting *Dolichopus diadema* Haliday, 1832 appears to be more widespread in the Netherlands than in Flanders.

Figure 3 compares species that are shared by Flanders and the Netherlands with species that are more common in the Netherlands from an ecological point of view. Saltmarsh species and, to a lesser extent, riparian and heathland-inhabiting species are better represented in the Netherlands than in the shared fauna. In contrast, not a single

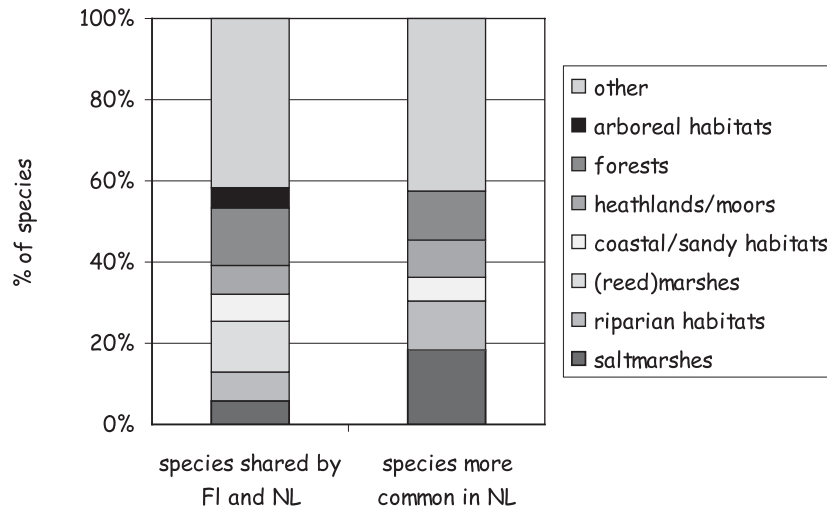


Figure 3 Comparison of species distribution over ecological groups.

marshland-inhabiting or arboreal species seems to be more common in the Netherlands.

The following ten species have not yet been collected in Flanders, but are shared by Wallony (southern Belgium) and The Netherlands: *Campsicnemus marginatus* Loew, 1857, *Dolichopus arbustorum* Stannius, 1831, *D. phaeopus* Haliday, 1851, *Hercostomus exarticulatus* Loew, 1857, *Neurigona erichsoni* (Zetterstedt, 1843), *N. suturalis* (Fallén, 1823), *Sciapus albifrons* (Meigen, 1830), *S. pallens* (Wiedemann, 1830), *Sympycnus aeneicoxa* (Meigen, 1824) and *Syntormon zelleri* (Loew, 1850). Both *Neurigona* species, *H. exarticulatus* and *S. zelleri* are confined to the southeastern Dutch province of Limburg.

Finally, another 47 Belgian species are unknown to the Netherlands (including the recently discovered *Neurigona lineata* (Oldenberg, 1904)), 25 of which are only recorded from Wallony.

Discussion

Comparing regional faunas is always a challenge because of the amount of factors that bias the different data sets. More than two thirds of shared species between Flanders and the Netherlands appear to be less common in the Netherlands (fig. 1), but this seems to be strongly affected by the applied collecting techniques. Even now, most Dutch dipterists usually use sweepnets to collect flies whereas white water traps and Malaise traps are the main sampling techniques in Flanders. It is evident that the latter collecting methods have considerable advantages to sweepnetting: 1. the sampling effort is much higher and continuous, 2. inaccessible habitats or habitats that hardly allow collecting by sweeping (e.g. reedmarshes) can easily be sampled and 3. the attractiveness of the traps and the activity and local abundances of the species are the main factors that influence the yields, regardless of the species size. Nevertheless, it is very hard to believe that common Flemish species like the woodland-inhabiting *Dolichopus wahlbergi* Zetterstedt, 1843, the eurytopic *Medetera saxatilis* Collin, 1941 and *Syntormon denticulatum* Zetterstedt, 1843 are actually rare in the Netherlands. The lack of records of *Achalcus phragmitidis* Pollet, 1996 (Z, rare), *Hercostomus pilifer* (Loew, 1859) (vZ, fairly rare) and *Syntormon aulicum* (Meigen, 1824) (3, vulnerable) is

also surprising. *Syntormon aulicum* and *A. phragmitidis* occur in reedmarshes along creeks in northern East Flanders near the Dutch border and there is no reason to assume that they do not inhabit similar habitats in the southern part of Zeeuws Vlaanderen (province Zeeland) across the border. On the other hand, rarity estimates as percentages of sampled squares should be interpreted with great caution as they are sometimes misleading. For instance, *Hercostomus gracilis* (Stannius, 1831) is known from 12 10 km squares or 9.2% of the sampled Flemish squares. In the Netherlands, it is only recorded from 6.0% which, however, represents nearly twice as many squares, indicating that this species is actually observed in a considerably larger area in the Netherlands.

Relatively more species of saltmarshes (*D. clavipes*, *D. diadema*, *H. oceanus*, *M. maritimae*, *T. flavipalpis*, *T. ruficornis*), humid heathlands and peatbogs (*D. simplex*, *D. vitripennis*, *H. nebulosus*) and riparian habitats (*D. hoffmannseggi*, *H. litoreus* Fallén, 1823, *R. nasutum*, *T. insignis*) than of any other ecological group prove to be more common in the Netherlands. This can undoubtedly be explained by the fact that these habitats are more widespread in the Netherlands and occupy larger surfaces. In this way, habitats can easily be recolonized when a local population becomes extinct. This is not the case in Flanders, especially in West Flanders, with only two saltmarshes present (De IJzermondig NR at Nieuwpoort and Het Zwin NR at Knokke) and only a few scattered heathland relicts.

On the other hand, not a single marshland or arboreal species seems to be more common in the Netherlands than in Flanders, which is particularly hard to believe for the reedmarsh faunas. It might, however, be related to the relatively little attention that has been drawn to these faunas thus far.

This faunal comparison clearly indicates that a Red Data Book of a certain region is not fully applicable for even an adjacent region. This is not only due to differences in the representation of habitat types or a different topography but also a result of a past and/or present management. Several species of springs or clean running water that have recently become extinct in Flanders, still occur in the Netherlands (*D. hoffmannseggi*, *Hercostomus chetifer* (Walker, 1849), *H. longi-*

ventris (Loew, 1857), *Liancalus virens* (Scopoli, 1763)). On the other hand, four out of eight *Hydrophorus* species shared by Flanders and the Netherlands seem to be more common in the Netherlands (*H. balticus*, *H. litoreus*, *H. nebulosus*, *H. oceanus*). Species of this genus are usually observed skating on the surface of shallow water bodies in search for mates or prey. As they are good indicators for (the condition of) this substrate, their wider distribution in the Netherlands might reflect the presence of more shallow water and/or a superior surface water quality than in Flanders. And this is not a local phenomenon as *Hydrophorus* species are highly stenotopic and restricted to strongly different habitat types like humid heathlands (*H. nebulosus*) and saltmarshes (*H. oceanus*).

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References

- Maes, D., J.-P. Maelfait & E. Kuijken 1995. Rode Lijsten: een onmisbaar instrument in het moderne Vlaamse natuurbehoud. – *Wielewaal* 61: 149-156.
- Meuffels, H.J.G. 1974. Nederlandse Dolichopodidae (Dipt.). – *Entomologische Berichten, Amsterdam* 34: 32-35.
- Meuffels, H.J.G. 1978. Nieuwe gegevens over Nederlandse Dolichopodidae (Dipt.). – *Entomologische Berichten, Amsterdam* 38: 65-70.
- Meuffels, H.J.G. 1981. Nieuwe gegevens over Nederlandse Dolichopodidae (Diptera) II. – *Entomologische Berichten, Amsterdam* 41: 67-70.
- Pollet, M. 2000. A documented Red List of the dolichopodid flies (Diptera: Dolichopodidae) of Flanders. – *Communications of the Institute of Nature Conservation* 8: 1-190. [in Dutch with English summary.]
- Pollet, M. & P. Grootaert 1994. Dolichopodidae (Diptera) as agents for bio-indication. – *Abstracts of the 3th International Congress of Dipterology, Guelph, Canada, August 15-19, 1994*: 179-180.

M. Pollet
Dept of Entomology
Royal Belgian Institute of Natural Sciences
Vautierstraat 29
B-1000 Brussels
Belgium
MP@iwt.be

H.J.G. Meuffels
Rijksweg 103
6325 AC Vilt
The Netherlands
hmeuffels@wanadoo.nl

P. Grootaert
Dept. of Entomology
Royal Belgian Institute of Natural Sciences
Vautierstraat 29
B-1000 Brussels
Belgium
patrick.grootaert@natuurwetenschappen.be