

Geographical distribution and habitat selection of species of *Hercostomus* subgenus *Gymnopternus* in the Benelux (Diptera: Dolichopodidae)

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Abstract

All 9 species of the subgenus *Hercostomus* (*Gymnopternus*) which are known from western Europe occur in Belgium and The Netherlands and limited collecting has revealed *H. celer* and *H. brevicornis* in Luxembourg. In Belgium habitat selection was studied using three data sets. Data set I comprises yields from standardized sampling campaigns, data set II contains yields obtained by continuous sampling during complete or almost complete year cycles, whereas data set III consists of all capture records of the separate species.

H. aerosus, *H. cupreus* and *H. celer* are widespread in Belgium and The Netherlands, whereas *H. metallicus* and *H. brevicornis* in particular are considerably scarcer in The Netherlands as compared to Belgium. The remaining species can be termed rare. In Belgium, *H. assimilis* and *H. blankaartensis* are entirely confined to the north-western part of the country. All species are more or less restricted to one or few habitat types. *H. assimilis* and *H. blankaartensis* prefer marshlands and reedmarshes in particular. All other species occur in woodland habitats, where they demonstrate specific preferences for certain woodland types e.g. *H. silvestris* is entirely confined to humid deciduous woodland types. Besides woodlands, *H. aerosus* and *H. angustifrons* are also found very frequently in wooded heathland, whereas *H. celer* is often encountered on riverbanks.

The geographical distribution patterns of the species can be considered as a reflection of the availability of favourable habitats.

Key-words: zoogeography, habitat selection, Diptera, *Gymnopternus*, Benelux.

Samenvatting

De 9 Westeuropese soorten van het subgenus *Hercostomus* (*Gymnopternus*) werden alle in België en Nederland aangetroffen en beperkte vangsten in het Groothertogdom Luxemburg wezen uit dat *H. brevicornis* en *H. celer* er voorkomen. De habitatvoorkeur in België werd onderzocht aan de hand van drie gegevenssets.

Dataset I omvat de opbrengsten van gestandaardiseerde bemonsteringscampagnes, dataset II bestaat uit opbrengsten van jaarcyclussen, terwijl dataset III is samengesteld uit alle vangsten voor de verschillende soorten.

H. aerosus, *H. cupreus* en *H. celer* vertonen een grote verspreiding in België en Nederland, terwijl *H. metallicus* en *H. brevicornis* in het bijzonder veel zeldzamer zijn in Nederland dan in België. De overige soorten kunnen als zeldzaam bestempeld worden. De verspreiding van *H. assimilis* en *H. blankaartensis* is in België overigens beperkt tot het noordwesten. Alle soorten zijn min of meer gebonden aan één of enkele habitattypes. *H. assimilis* en *H. blankaartensis* zijn de enige soorten met een voorkeur voor moerassen en rietlanden in het bijzonder. Alle andere soorten komen voor in bossen, alhoewel bij de verschillende soorten een specifieke preferentie voor welbepaalde bostypes werd aangetroffen. Naast bossen, komen *H. aerosus* en *H. angustifrons* zeer frekwent voor in beboste heide-landschappen, terwijl *H. celer* vaak werd verzameld op rivieroeveren. De geografische verspreiding van de soorten kan beschouwd worden als een weerspiegeling van de aan- of afwezigheid van geschikte biotopen voor de soorten.

Trefwoorden: zoögeografie, habitat-selectie, Diptera, *Gymnopternus*, Benelux.

Introduction

Dolichopodidae or long-legged flies are very small to medium-sized flies with usually metallic shining colours, long legs and protruding mouthparts. Males of many species show specific ornaments on the legs or antennae and a genital apparatus, folded underneath the abdomen. These sometimes extraordinary features are believed to be of great importance for the courtship behaviour. The adult flies as well as the larvae are predatory, although exceptions occur such as the leaf-mining larvae of *Thrypticus* and the flower-visiting adults of *Hercostomus nigripennis*.

Hercostomus is a cosmopolitan genus with its main distribution in the Palaearctic Region (STACKELBERG, 1933). It is situated within the subfamily *Dolichopodinae* which also includes genera such as *Dolichopus*, *Poecilobothrus* and *Hypophyllus*. Generally, *Hercostomus* males do not show conspicuous ornaments and females are very alike and thus sometimes hard to distinguish. *Gymnopternus* is treated as a distinct genus among American dipterists, whereas until recently it was generally not recognized as a taxonomic entity in Europe. POLLET (1990a) reerected this taxon as a subgenus of *Hercostomus*. Its European representatives can be separated from species of the subgenus *Hercostomus* by the possession of all four of the following features in combination: (i) all postoccipital bristles black; (ii) a cluster of hairs in front of the posterior spiracle present; (iii) third and fourth vein almost parallel along whole wing length; (iv) antennae entirely black.

The composition of the Nearctic *Hercostomus* s.l. fauna differs considerably from the Palaearctic: *Hercostomus* s.s. includes only few, whereas *Gymnopternus* proved to be very rich in species in the eastern half of the United States of America (67 species, ROBINSON, 1964). In the western part of the Palaearctic Region, on the contrary, the opposite situation is encountered (PARENT, 1938). Only 9 *Gymnopternus* species have thus far been found in Europe (on the basis of species identified by the first author): *H. aerosus* (FALLÉN), *H. angustifrons* (STAEGER), *H. assimilis* (STAEGER), *H. blankaartensis* POLLET, *H. brevicornis* (STAEGER), *H. celer* (MEIGEN), *H. cupreus* (FALLÉN), *H. metallicus* (STANNIUS) and *H. silvestris* POLLET.

In a recent revision, POLLET (1990a) described 2 new species and examined the phylogenetic and general ecological relationships between the western European species of this subgenus. Somewhat later, additional data were published and information on the habitat selection of the newly recognized species were given (POLLET, 1990b). In the present contribution, the geographical distribution is presented and the habitat selection of all species is more elaborately examined.

Material and methods

Data on the geographical distribution of the species were gathered for The Netherlands, Belgium and Luxembourg, together known as the Benelux. The number of data from Luxembourg was, however, very restricted. Nearly all data are based on specimens identified or examined by the first two authors.

Data on the habitat selection of the species are based on Belgian records collected until 1990. They could be separated into three sets, the records of which are characterized by a unique combination of locality, habitat and sampling year. In this way, sampling yields from two successive years are treated as two separate records. Sampling yields without any indication of habitat type were not used in our analyses.

Data set I: the records of this dataset were derived from samples collected with a standardized collecting method. The trap unit is a small white water trap (diameter: 9 cm, depth: 4.5-6.5 cm), which was filled with a 2.5 % formalin solution. Sufficient detergent was added in order to decline the surface tension. These traps were emptied at weekly to two-monthly intervals, dependent upon the sampling campaign, but one-monthly collections were the rule. In each site, 2 to 10 trap units were in operation during the entire or the main activity period of most dolichopodid species (April-October). The following restrictions were introduced: (i) sites with zero yields for *Gymnopternus* species were excluded ($n = 5$); (ii) only species with a total of 50 or more specimens collected over all sites were considered. In this way, quantitative data on the occurrence of 5 *Gymnopternus* species from 30 sites could be analyzed (Tab. 2).

Data set II: contains the yields of all sampling campaigns carried out on a continuous basis during a complete or most of a year cycle by means of Malaise, pitfall and/or water traps. Accordingly, this set incorporates dataset I. Again, restrictions were applied in order to get more reliable information: (i) records with zero yields for *Gymnopternus* species were excluded; (ii) only records with yields of 10 or more specimens for at least one *Gymnopternus* species were withdrawn for analysis. On this basis, 65 out of the 107 sites were selected for a further analysis (Tab. 3a-b).

Data set III: this set merely consists of all existing sampling data on *Gymnopternus* species. Dataset III includes all records of dataset II, supplemented by one-day sweeping collections. This implies that both full year samples and samples taken at random are concerned. Again, as a rule only samples with 10 or more specimens per species were considered for analysis. In the case of *H. angustifrons*, *H. blankaartensis* and *H. silvestris*, however, all records were considered due to the very few data available (Tab. 4).

Data of data sets I and II were analyzed by means of the Chi-square test for goodness of fit (SOKAL & ROHLF, 1981). It must, however, be emphasized that the analysis of dataset I is based on the number of specimens/site, whereas in the case of dataset II, only the number of sites where the species were found, were used in the analysis.

Results

Geographical distribution

Table 1 presents the number of UTM-squares in which the different species have been collected. The distribution of *Gymnopternus* species in Luxembourg is not discussed due to a lack of sufficient records.

H. cupreus and *H. aereus* are the most commonly found species of this subgenus in Belgium and The Netherlands. *H. brevicornis* is equally widespread in Belgium, although it is much rarer in The Netherlands. Except for the moderately common *H. metallicus* and *H. celer*, the remaining species (*H. angustifrons*, *H. assimilis*, *H. blankaartensis* and *H. silvestris*) can be termed rare in the former countries. All species have thus far been encountered in Belgium and The Netherlands, though some of them very recently in the latter country (*H. blankaartensis*: 1988; *H. silvestris*: 1990).

Figure 1 shows the distribution of all species in the Benelux.

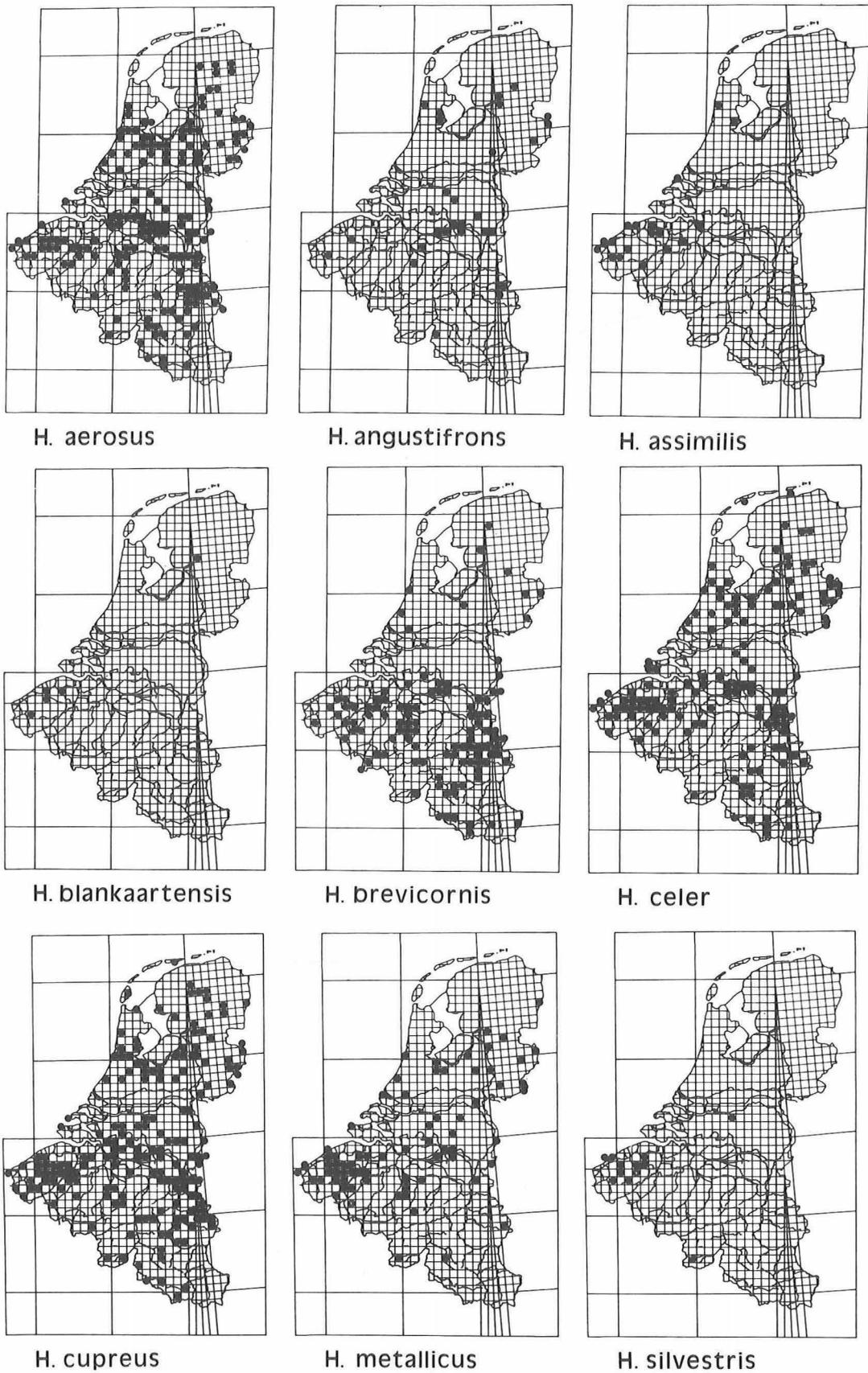


Fig. 1. Distribution of *Gymnopternus* species in the Benelux.

Table 1. Distribution of *Gymnopternus* species in countries of the Benelux. Number of 10 km UTM-squares in which the species was found, based on records gathered until 1990.

Countries	Belgium	The Netherlands	Luxembourg
Number of squares with at least one species	165	148	3
<i>H. aerosus</i>	98	77	-
<i>H. angustifrons</i>	14	14	-
<i>H. assimilis</i>	15	4	-
<i>H. blankaartensis</i>	4	1	-
<i>H. brevicornis</i>	85	20	2
<i>H. celer</i>	69	65	2
<i>H. cupreus</i>	92	84	-
<i>H. metallicus</i>	41	28	-
<i>H. silvestris</i>	11	1	-

H. aerosus and *H. angustifrons* (one third of the records) are both mainly found in the Belgian-Dutch border region and the "Hautes Fagnes" area. These are predominantly sandy or peatbog areas. Exactly the same result has been obtained for The Netherlands. However, *H. angustifrons* is considerably rarer than its congener. Moreover, in contrast with *H. angustifrons*, *H. aerosus* does also occur in the coastal dunes.

H. assimilis and *H. blankaartensis* are both clearly restricted to the coastal areas. The latter species is distinctly rarer than *H. assimilis*, which can be found often in very large numbers in the coastal dunes.

In The Netherlands, *H. brevicornis* is more or less restricted to the extreme south: 50 % of all Dutch records are known from the province of Limburg. In Belgium, this species is apparently more widespread. Nevertheless, it is found in high numbers only at inland sites. Indeed, the most northwestern records are all based on very few or single specimens and it has thus far not been collected at the coast. It is most abundantly found in the central (Zoniënwood) and the eastern parts of Belgium.

H. celer is very closely related to *H. brevicornis* as both have a thickening of the costal vein. However, in contrast to the latter, *H. celer* is much more common in The Netherlands, where it is mainly found in the central and southern region. In Belgium, distribution patterns of both species show distinct discrepancies: records of *H. celer* are concentrated in the northern part of the country and in particular in the littoral zone. Moreover, a sampling campaign in a humid coastal woodland site yielded over 700 specimens of this species. *H. cupreus* is undoubtedly the most common species of this subgenus both in Belgium and The Netherlands and is more or less equally distributed in both countries.

H. metallicus is somewhat rarer in The Netherlands as compared to Belgium but does not show a clear distribution pattern in the former country. In Belgium, however, it is almost completely

confined to the northern part. Only 3 records originate from the region south of the line formed by the Sambre and Meuse rivers. It has also been found in suitable habitats at the coast.

In Belgium, nearly all records of *H. silvestris* are located in the extreme north-west. The only exception is the Lake of Virelles Nature Reserve at Chimay in the south, where the species has been found in rather high numbers. The only Dutch record is also known from an inland locality.

Habitat selection

Tables 2-4 summarize the results of the analyses on data sets I-III. The analyses are based either on the numbers of specimens per site (Tab. 2) or the number of capture sites per species (Tab. 3b).

All five species show distinct preferences for certain habitat types (Tab. 2) which is confirmed by the analysis of data set II (Tab. 3b). However, the habitat preference of *H. aerosus* and *H. metallicus* proved not to be significant. On the basis on Tables 2-4 and direct observations in the field, the habitat selection in *Gymnopternus* species can be described as follows:

H. aerosus is the most eurytopic species of the subgenus as it occurs in almost every habitat type sampled. Its capture sites range from humid woodland to dry coastal dune grassland. Nevertheless, it demonstrates a clear preference for heathlands and to a lesser extend woodlands. Although it occurs in different kinds of woodland, carrs are highly preferred to other woodland types. *H. aerosus* is very characteristic for the muddy and well-lit flat banks of oligotrophic ponds in sandy areas and at these sites, it is often found as the far most abundant dipteran species. In The Netherlands too, it seems to occur in large numbers in heathlands. There, it clearly prefers humid heathland to dry sites.

Table 2. Habitat preferences in *Gymnopternus* species, based on species abundances per habitat type (data set I, see text). Abundance expressed as the total number of specimens collected per habitat type during a complete year cycle. df: degrees of freedom; ***: $p < 0.001$.

Dataset I	deciduous woodland	heathland grassland	marshland reedmarsh	total	Chi-square	df	signif. level
<i>H. aerosus</i>	16	56	0	72	262.87	2	***
<i>H. assimilis</i>	0	0	96	92	125.54	2	***
<i>H. brevicornis</i>	81	0	0	81	105.92	2	***
<i>H. cupreus</i>	865	26	1	892	1049.42	2	***
<i>H. metallicus</i>	136	3	0	139	168.56	2	***
Number of sites	13	4	13	30			

Even more than the previous species, *H. angustifrons* seems to be entirely confined to woodland, heathland and peatmoor habitats. At these sites, it is most often encountered near open water. Nearly all woodland sites where this species has been collected, are located within heathland

areas. Exclusively sandy and peaty soils are preferred, which holds true for both Belgian and Dutch records.

H. assimilis demonstrates a distinct preference for marshlands and reedmarshes in particular. It also occurs in meadows and in the coastal dunes. In the latter sites, it is confined to rather humid grasslands and shows distinct aggregations within *Carex*-vegetations surrounding small pools. Nevertheless, *H. assimilis* appears to be characteristic for littoral reedmarshes where it is sometimes one of the dominant dolichopodid species. It is mainly observed sitting or running on broad-leaved herbs within the reed vegetations.

H. blankaartensis is more stenotopic than the previous species as it is entirely confined to reedmarshes. Moreover, within these habitats the presence of trees such as willows or poplars seems to be essential for its occurrence. These highly specific ecological demands were confirmed by observations in Great Britain (B.D. LAURENCE, in litt.). This species has very recently been described from De Blankaart Nature Reserve, a marshland site in Belgium in which a large population was discovered in 1984 (POLLET, 1990a).

Table 3a. Habitat preference of *Gymnopternus* species, based on data from continuous sampling by means of Malaise, water or pitfall traps (data set II, see Text). Numbers indicate the number of sites in which 10 or more specimens of the species were collected. Hae: *H. aerosus*, Hass: *H. assimilis*, Hbla: *H. blankaartensis*, Hbre: *H. brevicornis*, Hcel: *H. celer*, Hcup: *H. cupreus*, Hmet: *H. metallicus*, Hsil: *H. silvestris*.

Species	No. sites	Hae	Hass	Hbla	Hbre	Hcel	Hcup	Hmet	Hsil
<i>Habitat type totals</i>									
TOTAL WOODLAND	38	12	-	-	11	5	26	19	4
Deciduous woodlands	36	11	-	-	11	4	24	18	4
- Beech	11	1	-	-	11	-	2	1	-
- Oak/mixed oak	10	2	-	-	-	1	10	5	-
- Birch	5	1	-	-	-	-	5	3	-
- Carrs	9	7	-	-	-	3	6	9	4
- Miscellaneous	1	-	-	-	-	-	1	-	-
Coniferous woodlands	2	1	-	-	-	1	2	1	-
TOTAL HEATHLAND	4	4	-	-	-	-	4	1	-
TOTAL GRASSLAND	2	-	1	-	-	-	-	-	-
TOTAL MARSHLAND	22	2	19	7	-	-	-	5	-
- Reedmarshes	20	2	17	7	-	-	-	5	-
- Miscellaneous	2	-	2	-	-	-	-	-	-
No. of sites with one or more species	66	18	20	7	11	5	30	25	4

Table 3b. Habitat preference of *Gymnopternus* species, based on data set II (see Text). Numbers indicate the number of sites in which 10 or more specimens of the species were collected. df: degrees of freedom; n.s.: not significant; ***: $p < 0.001$; -: no sufficient data available to enable Chi-square test.

Dataset II	deciduous/ coniferous woodland	heathland grassland	marshland reedmarshes	total	Chi- square	df	signif. level
<i>H. aereus</i>	12	4	2	18	0.70	1	n.s.
<i>H. assimilis</i>	0	2	18	20	35.94	1	***
<i>H. brevicornis</i>	11	0	0	11	8.32	1	***
<i>H. cupreus</i>	26	4	0	30	10.82	1	***
<i>H. metallicus</i>	18	2	5	25	2.32	1	n.s.
<i>H. blankaartensis</i>	0	0	7	7	-		
<i>H. celer</i>	5	0	0	5	-		
<i>H. silvestris</i>	3	1	0	4	-		
Total no. of sites	37	7	21	65			

Table 4. Habitat preferences of *Gymnopternus* species, based on all collecting data available (data set III, see text). Numbers indicate the number of sites where 10 or more specimens of the corresponding species were collected. For *H. angustifrons*, *H. blankaartensis* en *H. silvestris*, all data were included. Disturbed sites comprise ruderal sites, parks, orchards and gardens.

Habitat types	deciduous/ coniferous woodland	heathland	grassland	marshland reedmarshes	disturbed sites	river banks
Species						
<i>H. aereus</i>	26	18	3	5	-	1
<i>H. angustifrons</i>	11	6	-	-	-	-
<i>H. assimilis</i>	-	-	1	26	-	-
<i>H. blankaartensis</i>	-	-	-	21	-	-
<i>H. brevicornis</i>	24	5	-	-	1	3
<i>H. celer</i>	12	-	1	1	-	7
<i>H. cupreus</i>	44	12	2	1	2	-
<i>H. metallicus</i>	29	2	-	19	-	1
<i>H. silvestris</i>	21	-	-	8	1	-

H. brevicornis is a true woodland-inhabiting species, where it reaches significant higher abundances as compared to grasslands, heathlands and marshlands. Beech woodlands are clearly favoured, although this species has also been encountered in fair numbers in other mature humid woodlands. All non-woodland capture sites were adjacent to woodland areas, although these samples mostly contained very few specimens of this species.

In accordance with the previous species, *H. celer* is mainly found in woodland habitats too. However, not a single specimen was collected in the beech woodlands investigated, whereas mainly carrs (especially alder carrs) seem to be preferred. Unlike other species of this subgenus,

H. celer also occurs in fair numbers on riverbanks, especially when a well developed vegetation is available.

Despite its commonness, *H. cupreus* can be termed a eurytopic woodland species. It has not only been encountered in significantly highest numbers in woodlands, but proved to occur in fair numbers both in deciduous and coniferous stands. Nevertheless, within woodland habitats it seems to prefer oak, mixed oak, birch woodlands and carrs to beech forests. In any case, it is exclusively found in relatively old and stable woodland habitats and does not seem to occur in young poplar plantations without old woodland in the direct vicinity. It is also frequently found in wooded heathland and more occasionally in other habitat types.

H. metallicus is more exigent than the previous species concerning its habitat. Similar to *H. cupreus*, it is a true woodland-inhabiting species but with a clear preference for carrs and humid birch, oak and mixed oak stands. It seems to wander occasionally into neighbouring heathland but its frequent and abundant occurrence in marshlands could always be related to the presence of neighbouring willow carrs.

H. silvestris is obviously a stenotopic species with a preference for rather old willow or poplar carrs on a loamy soil. Although highest abundances are reported from inland sites, this species has been collected in small numbers in humid dune woodlands too and even in wooded marshlands. At the latter sites, it can sometimes be found together with *H. blankaartensis*. POLLET (1990a) described *H. silvestris* from De Mandelhoek Nature Reserve at Ingelmunster (Belgium).

Discussion

Literature data on the distribution of *Gymnopternus* species are mostly rather inaccurate and therefore not very useful. Nevertheless, the distribution in the surrounding countries is very similar to that in the Benelux. *H. aerosus*, *H. cupreus* and *H. celer* seem to be common in Denmark, Great Britain and Schleswig-Holstein too. *H. metallicus* is somewhat rarer everywhere, whereas *H. angustifrons* and *H. assimilis* are considered rare in most neighbouring countries (LUNDBECK, 1912; EMEIS, 1968; ASSIS FONSECA, 1978). The distinct difference observed between the distribution patterns of *H. brevicornis* and *H. celer* in The Benelux are also found in Great Britain: *H. celer* is not uncommon in the north but becomes scarcer southwards while *H. brevicornis* is locally very common in the south (ASSIS FONSECA, 1978).

Most information on the habitat selection of *Gymnopternus* species in the literature corresponds strikingly well with our own observations. *H. aerosus* has been recorded mainly from woodland and moorland (LUNDBECK, 1912; GOETGHEBUER, 1943; SOMMER, 1978; OLEJNICEK, 1985; POLLET & GROOTAERT, 1987; POLLET *et al.*, 1988; POLLET *et al.*, 1989; MEYER & HEYDEMANN, 1990; POLLET, 1991; POLLET & GROOTAERT, 1991). The most accurate information is given by EMEIS (1964). In Schleswig-Holstein, this author found *H. aerosus* mainly in woodland, both deciduous and coniferous stands. It seemed to prefer alder carrs, whereas it could also be collected in wooded heathland and moorland. These results are almost identical to those gathered in the present study.

Despite its rarity in our adjacent countries too, *H. angustifrons* has been mainly recorded from moorland and peatmoors (EMEIS, 1964; SOMMER, 1978; DRAKE, 1991; POLLET, 1991). LUNDBECK (1912) only gives "in humid places, especially at the border of water on water plants",

whereas, on the contrary, DRAKE (1991) gives very precise descriptions of the capture sites: in Cumbria and Shropshire (U.K.), this species was collected in raised mires with mainly peat vegetations. Open as well as covered sites seemed to be favoured.

Very few literature data are available on the ecological demands of *H. assimilis*. In contrast to our findings (see also POLLET & DECLEER, 1989), both GOETGHEBUER (1943) and EMEIS (1964) record it from woodland sites. Most probably, these records might be based upon captures of *H. silvestris*, which was first recognized as a true species as late as 1990.

H. brevicornis is mainly known from woodland and to a lesser extent wooded moorland (LUNDBECK, 1912; GOETGHEBUER, 1931; SOMMER, 1978). Only MEYER & HEYDEMANN (1990) report beech and oak woodlands as capture sites of this species. Investigations on the emergence of aquatic and semi-aquatic insects also revealed the presence of this species along streams and brooks (CASPER & WAGNER, 1982; BELLSTEDT, 1989).

The findings of EMEIS (1964) correspond exactly with our results for *H. celer*. This author too recorded this species mainly from woodlands and from borders of waterbodies. LUNDBECK (1912) claimed that the species occurs in meadows, on humid places and at borders of woodland pools. Other authors mentioned it only from woodland sites (GOETGHEBUER, 1943; POLLET *et al.*, 1986; POLLET & GROOTAERT, 1987; TAYOUB *et al.*, 1990).

Most authors reported collections of *H. cupreus* from woodland and moorland (LUNDBECK, 1912; GOETGHEBUER, 1943; EMEIS, 1964; SOMMER, 1978; POLLET *et al.*, 1986; POLLET & GROOTAERT, 1987; POLLET *et al.*, 1989; MEYER & HEYDEMANN, 1990; TAYOUB *et al.*, 1990; POLLET & GROOTAERT, 1991). However, not all data are equally valuable. Highly interesting observations were made by EMEIS (1964): "It likes insolation and the vicinity of open water. It occurs in very different woodland types, from beech woodland in the east of Schleswig-Holstein over oak-hornbeam to oak-birch woodland. It is often encountered at woodland edges too. Occasionally, it wanders into meadows and moorland." Again, that is in full agreement with our own results. In the frame of a large scale sampling campaign in the littoral zones in northern Germany, not a single specimens of *H. cupreus* was collected in saltmarsh and other marshland habitats. In sharp contrast, it was abundantly found in some of the adjacent more inland moorlands, oak and coniferous woodlands (SOMMER, 1978; MEYER & HEYDEMANN, 1990).

Very few ecological data could be found in the literature concerning *H. metallicus*. It is mostly considered a true woodland species (LUNDBECK, 1912; GOETGHEBUER, 1943; EMEIS, 1964; POLLET & GROOTAERT, 1987), though it has been collected on the banks of waterbodies too (LUNDBECK, 1912).

From both our own findings and literature data, it can be concluded that *H. brevicornis* and *H. celer* clearly differ in their distribution and ecology. Although both species have been reported to occur together on the banks of brooks and rivers (CASPER & WAGNER, 1982; BELLSTEDT, 1989; POLLET, unpubl. data) and woodland (TAYOUB *et al.*, 1990), they are never found together in equal abundances.

Besides the geographical distribution and the macrohabitat selection, more detailed information has been gathered on the ecology of the *H. (Gymnopternus)* species discussed here.

In the first place, the attractiveness of Dolichopodidae to differently coloured water traps was investigated by POLLET & GROOTAERT (1987). In the humid poplar stand studied, *H. celer*, *H.*

cupreus, *H. metallicus* and *H. silvestris* were collected in significantly higher numbers in the white water traps as compared to blue and red ones. *H. aerosus* was attracted to the white and red water traps to the same extent. Later sampling campaigns by the first author, however, revealed that this colour attraction is not constant and at other sites, *H. metallicus*, *H. celer* and *H. silvestris* were collected most numerously in red devices.

Data on microhabitat selection of some *Gymnopternus* species was studied by POLLET & GROOTAERT (1987) and TAYOUB *et al.* (1990). The first authors examined the distribution of dolichopodid species on a light/humidity gradient within a woodland habitat. The most wet and well-lit sites were favoured by the *Gymnopternus* species mentioned above. Moreover, the same results were retrieved from the successive sampling campaign at the same site during 1987 (POLLET & GROOTAERT, 1991). TAYOUB *et al.* (1990) sampled several sites, ranging from regularly flooded pond banks to rather dry oak-birch woodlands. Their study showed that *H. aerosus*, *H. angustifrons*, *H. brevicornis*, *H. celer* and *H. cupreus* occurred in each of the sampled sites. Nevertheless, *H. celer* clearly preferred the oak birch woodland sites, whereas *H. brevicornis* did not demonstrate a distinct habitat preference.

Finally, investigations on the vertical distribution of some species from the soil surface to 80 cm height in a woodland habitat proved that a clear interspecific variation is evident (POLLET & GROOTAERT, 1991). *H. aerosus* was mainly found near the soil surface, *H. celer* and *H. silvestris* were collected in highest numbers in the highest levels whereas *H. metallicus* and *H. cupreus* were more equally, though not significantly, distributed over the different levels.

Summarizing, all representatives of the subgenus *Gymnopternus* show a more or less distinct habitat affinity. Although *H. aerosus* and *H. cupreus* are the most eurytopic, both have considerably stronger ecological requirements as compared to species such as *Dolichopus ungulatus* and *D. plumipes*. In this regard, the geographical distribution of species of *Gymnopternus* can be considered as a reflection of the presence or absence of suitable sites for the different species e.g. *H. angustifrons* is almost exclusively recorded from sandy and peatbog areas in Belgium and The Netherlands. In Belgium, the reedmarsh-inhabiting *H. assimilis* and *H. blankaartensis* seem to be confined to the north-western part. In this way, the distribution of, at least, *H. assimilis* is very similar to that of the chloropid *Lipara lucens* MEIGEN, which is known as a monospecific parasite of common reed (DE BRUYN, 1989). However, for the stenotopic *H. silvestris*, its restricted occurrence in the extreme north-western part of Belgium is not fully explained by its pronounced preference for willow and poplar carrs. The only southern record from Belgium and the single Dutch inland record already suggested that it might actually be distributed far beyond its currently known distribution area. This hypothesis was confirmed by a very recent collection campaign (June 1991) in the extreme east of Belgium, where this species was encountered in fair numbers in a flooded alder carr.

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