

Microvelia reticulata, *Hebrus pusillus* et *Gerris paludum*) sont beaucoup moins abondantes au moment ; seulement les deux dernières sont macroptères. Deux autres espèces ont complètement disparu de la région : l'aptère *Gerris najas* est considéré comme éteint, et le macroptère *G. rufoscutellatus* est un excellent migrateur, ne se reproduisant pas en Belgique. En général, les espèces macroptères sont donc plus communes au moment, tandis que les espèces aptères sont plus rares.

The invertebrate fauna of Belgium is still very poorly known. For most taxa, lists of occurring species have been published at one time, but these are mostly incomplete, and give only very scanty information on distribution. Moreover the Belgian fauna has considerably changed the last 25 years. Some species might have considerably enlarged or reduced their distribution area, others might even have become completely extinct. To establish such on a scientific base, necessary data are mostly lacking, except for some more popular groups such as Lepidoptera and Carabidae. Nevertheless such information is indispensable to give advices concerning nature conservancy (establishment and management of nature reserves) on the one hand, and rural planning (re-allotments, alignments of brooks and rivers, expanse of residential quarters, road-works, etc.) on the other hand.

The one habitat which has changed the most during the last 25 years undoubtedly is surface water. Especially in East and West Flanders, water quality of rivers and canals is very poor nowadays (ANONYMOUS 1979). Mostly, the original physicochemical composition of the water has considerably changed, inevitably changing the faunal composition ; sometimes, biological life even has disappeared completely.

The effect of these changes on the distribution of invertebrates has never been examined in detail. To study this effect, we have chosen the aquatic and semi-aquatic Hemiptera.

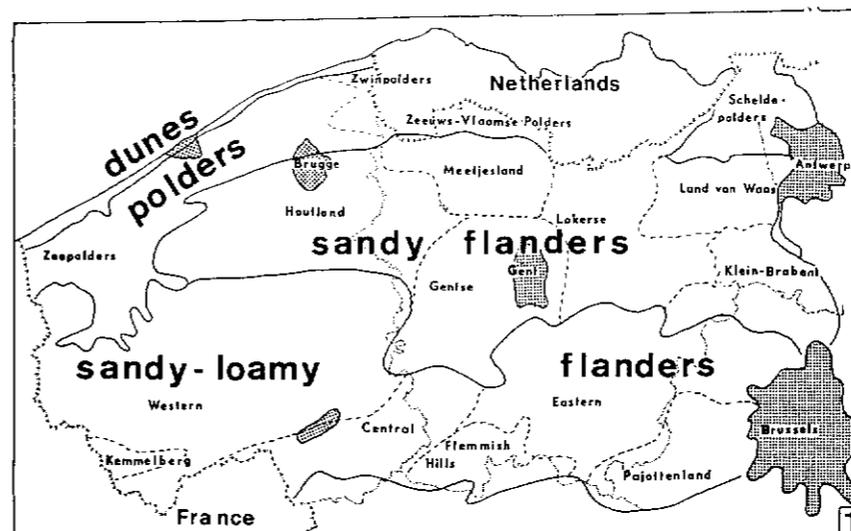
Semi-aquatic and aquatic bugs occur in all kinds of water habitats : stagnant and streaming water, brackish, eutrophic and oligotrophic water ; permanent and temporary water. They have overlapping generations, hence they can be sampled throughout the year.

These insects are thus excellently suited for the above cited purposes. Many of them are also good indicator organisms. In this paper, the results concerning the semi-aquatic bugs are presented.

Results concerning aquatic bugs have been published elsewhere (BOSMANS and D'HULSTER 1982, BOSMANS 1982). Habitat preferences will be discussed later.

Material and methods

Referring to BOSMANS (1982), we only repeat here the most essential facts. About 4500 water bodies were sampled for aquatic macrofauna, and in 811, semi-aquatic water bugs were present. Most samples were taken in 1977-1980. A small number of additional samples were gathered by others in 1981-1984. Species



Map 1. — Regional districts of East and West Flanders.

were identified using the keys of POISSON (1957), MACAN (1965) and NIESER (1968, 1982); identification of larvae was carried out with the key of BRINKHURST (1959a). Classification is according to NIESER (1982).

For a detailed mapping, the current Belgian U.T.M.-grid of 10×10 km has been subdivided into 16 grids of $2,5 \times 2,5$ km. The regional districts of East and West Flanders are shown on map 1 and will be used discussing the distribution of the species.

These actual distributions will be compared with the maps of Belgian semi-aquatic Heteroptera of DETHIER and BOSMANS (1978) and with the catalogue of the same authors (1979).

Adult Gerroidea can be classified into different morph classes. Longwinged or macropterous individuals have fully developed hind wings. Short-winged individuals are classified as apterous, micropterous, brachypterous or submacropterous morphs, depending on their wing length.

Distribution of semi-aquatic water bugs

1. Fam. Mesoveliidae DOUGLAS and SCOTT.

1.1. *Mesovelia furcata* MULSANT and REY (map 2).

DETHIER and BOSMANS (1979) only knew seven old localities of this species, of which four were situated in East Flanders. During the recent survey, *Mesovelia furcata* was recorded in 35 samples, proving this small apterous species to be not so uncommon as previously thought. Probably it has been overlooked by previous collectors, or taken for juvenile specimens of *Gerris*. The species is especially common in isolated meanders of the river Schelde, where it always occurs in large numbers. All collected specimens were apterous. Macropterous specimens appear to be very rare (BUTLER, 1923 ; NIESER, 1968).

2. Fam. Hydrometridae (L.).

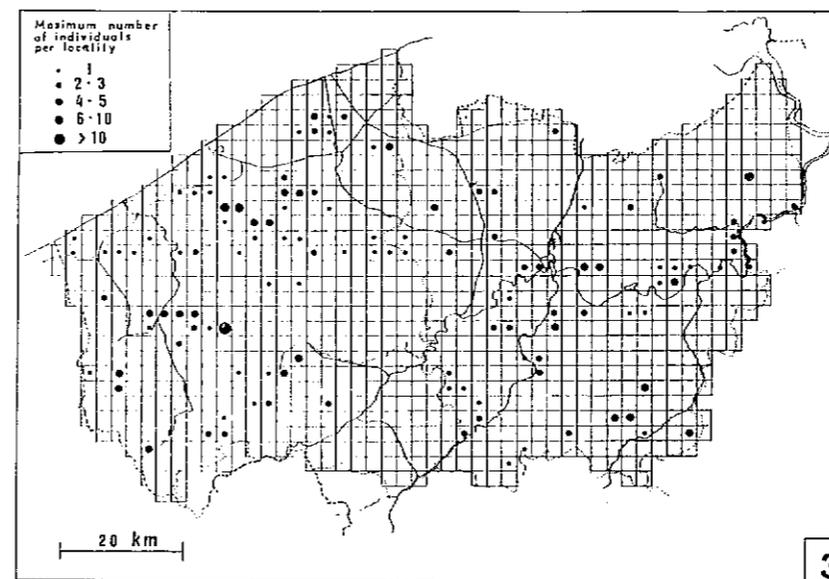
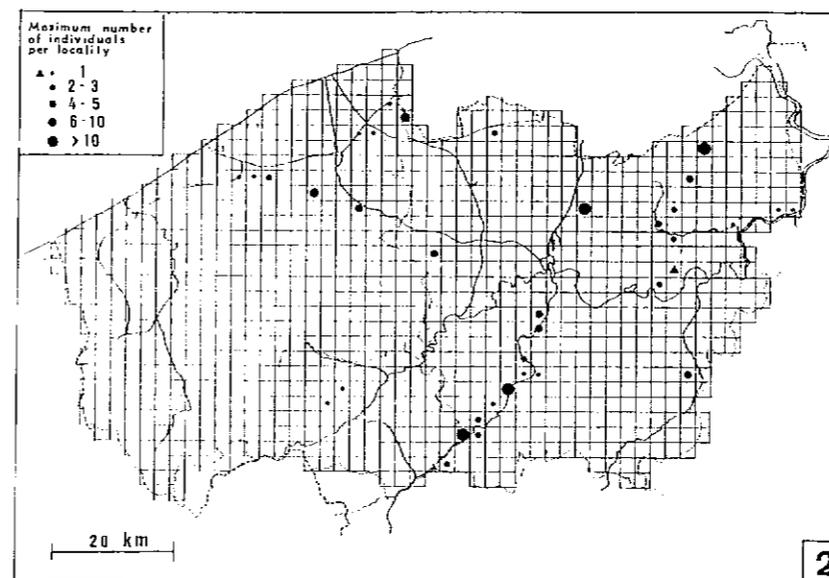
2.1. *Hydrometra gracilentia* HORVATH (map 2)

This species was not found in Belgium until very recently. In East Flanders, it was caught once in an old peat pond in Berlare on 15-V-1980. In 1982, it was also collected in Limburg (BOSMANS and MERCKEN 1984).

Hydrometra gracilentia apparently is very rare in Belgium, although according to NIESER (1982) it is rather common in the Netherlands.

2.2. *Hydrometra stagnorum* (L.) (map 3)

DETHIER and BOSMANS (1979) called this species common all over the country. This can be confirmed here, as it was recorded in 124 samples, well spread all over the area.



Map 2. — Distribution of *Mesovelia furcata* Muls. and Rey (circles) and *Hydrometra gracilentia* Horv. (triangles) in East and West Flanders.

Map 3. — Distribution of *Hydrometra stagnorum* (L.) in East and West Flanders.

Only one macropterous specimen was caught; all others were micropterous. According to POISSON (1924) and WALTON (1943) macropterous populations occur only locally.

3. Fam. Hebridae AMYOT and SERVILLE.

3.1. *Hebrus pusillus* (FALLEN) (map 4)

Hebrus pusillus is a very rare species. DETHIER and BOSMANS (1979) only knew 3 localities in East and West Flanders (De Panne, Assenede, Destelbergen), were it was not recovered now.

We found the species in three localities:

Houtave, Polder water-course, 3 ♂, 2 ♀, 20-IV-1979;
Daknam, river Durme, 1 juv. (stage V), 11-VII-1977;
Steendorp, abandoned clay-pit, 1 ♀, 18-VII-1977.
All specimens were macropterous.

Due to its very small size (2 mm), *Hebrus pusillus* might possibly have been overlooked. However, the fact that another small-sized species (*Microvelia reticulata*) was found in considerable numbers, proves enough attention has been paid to the smaller species.

3.2. *Hebrus ruficeps* THOMSON (map 4)

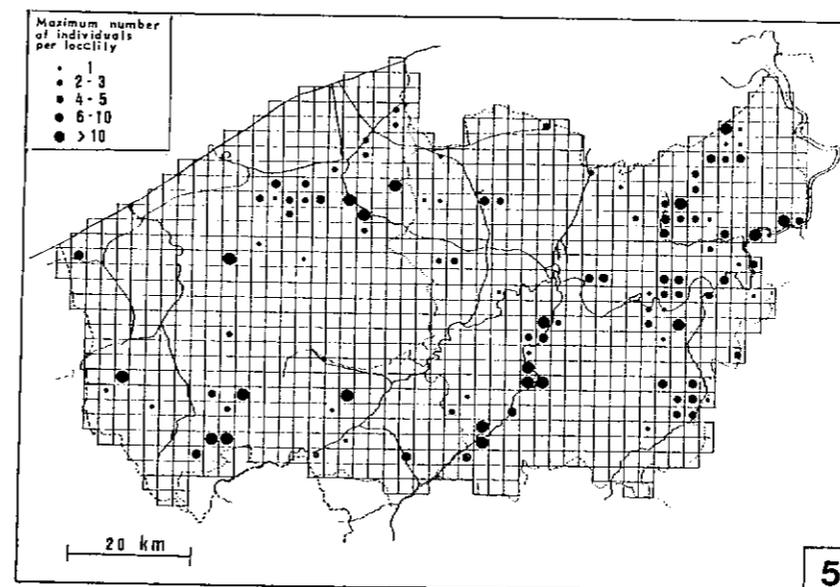
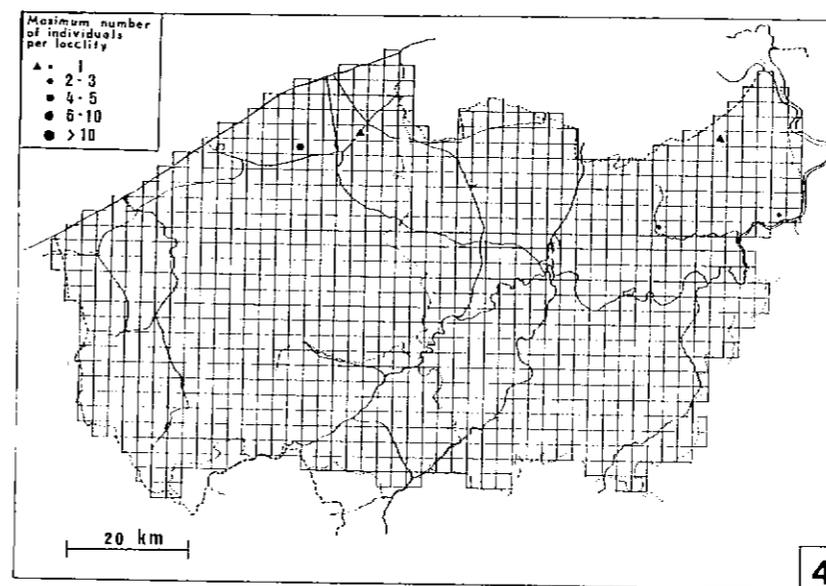
This species is even rarer than the preceding one. We recorded it only twice:

Meerdonk, Panneweel, 8-VI-1981, 1 ♀;
Damme, old city rampart, 22-VII-1982, 1 ind. (K. DECLEER leg.).
Both specimens were apterous.
DETHIER and BOSMANS (1979) cite this species from 5 Belgian loci of which one in East Flanders (Gent). It was not recaptured there.

4. Fam. Gerridae FABRICIUS

4.1. *Gerris argentatus* SCHUMMEL (map 5)

This water strider appeared to be a common species, as it was recorded in 139 samples. It is however almost absent from the highly urbanized northern part of Western Sandy-loamy Flanders. It is very common in the valleys of the rivers Schelde, Dender and Durme, but absent in the Leie valley. It is also very common south of Brugge.



Map 4. — Distribution of *Hebrus pusillus* (Fall.) (circles) and *Hebrus ruficeps* (Thms.) (triangles) in East and West Flanders.

Map 5. — Distribution of *Gerris argentatus* Schm. in East and West Flanders.

Gerris argentatus is a dimorphic species, as shown in table I. The predominant morph is macropterous and occurs all over the year. Apterous individuals were found in June, July and September, but these are only predominant in July. They represent a short-living summer generation. This is in agreement with observations in different parts of Europe (VON MITIS, 1937; BRINKHURST, 1959b; VERSALAINEN and NIESER, 1977).

4.2. *Gerris gibbifer* SCHUMMEL (map 6)

DETHIER and BOSMANS (1979) knew no East of West Flemish records of this species, and they presumed it was absent or at least very rare. The last case is obviously true, as we recorded it in 5 samples:

Maldegem, rivulet Ede, 1 ♂, 2-VIII-1978;

Serskamp, rivulet, 1 ♂, 16-IV-1977;

Ronse, park pond, 1 ♂, 10-V-1978;

Ronse, forest pond, 1 ♂, 1 ♀, 16-V-1978;

Kemmel, Willebeek, 2 ind., 9-V-1983 (R. PILLEN leg.).

The localities are far apart, and are small shaded rivulets or ponds. All specimens collected were macropterous.

4.3. *Gerris lacustris* (L.) (map 7)

According to DETHIER and BOSMANS (1979) this is the commonest Belgian water strider. In the study area, this is however not the case, as it is less abundant than *G. thoracicus*. We recorded the species in 207 samples, almost all situated in the north-eastern half of the study area. *G. lacustris* is absent from the whole Polder area (it avoids brackish water), and is very rare in West and Central Sandy-loamy Flanders. In the Houtland and east of the river Schelde however it is very common.

Gerris lacustris is a dimorphic species. During the whole year, both macropterous and brachypterous individuals can be found (VON MITIS, 1937; BRINKHURST, 1959b; ANDERSON, 1973; VEPSALAINEN and NIESER, 1977). This is also the case in Belgium, as can be seen in table I.

Brachypterous individuals were dominant in June-July, representing a predominantly short-winged summer generation, as in *G. argentatus* and also in September-November, when macropte-

TABLE I

Number of individuals of each morph and total number of samples per species and per month.

Species	Number of samples with:	A	M	J	J	A	S	O	N
<i>Gerris argentatus</i>	macropterous ind.	10	19	4	7	4	42	23	-
	apterous ind.	-	-	1	19	-	1	-	-
	total number of samples	10	19	5	22	4	42	23	-
<i>Gerris lacustris</i>	macropterous ind.	2	23	2	5	4	46	11	-
	brachypterous ind.	3	15	4	8	3	52	29	4
	total number of samples	5	29	5	11	4	88	41	7
<i>Gerris odontogaster</i>	macropterous ind.	7	8	3	1	2	13	7	-
	micropterous ind.	-	-	1	5	6	1	-	-
	brachypterous ind.	-	-	-	-	-	-	-	2
	total number of samples	7	8	6	7	7	16	8	-
<i>Gerris thuracicus</i>	macropterous ind.	35	35	21	26	27	74	43	-
	submacropterous ind.	-	-	1	5	1	3	-	-
	total number of samples	35	37	33	33	39	80	48	-
<i>Microvelia reticulata</i>	macropterous ind.	2	5	1	8	3	11	13	-
	apterous ind.	-	-	-	1	1	3	1	-
	total number of samples	2	5	1	8	3	12	13	-

rous individuals fly away to overwintering sites. This is in agreement with the observations of VEPSALAINEN (1974a).

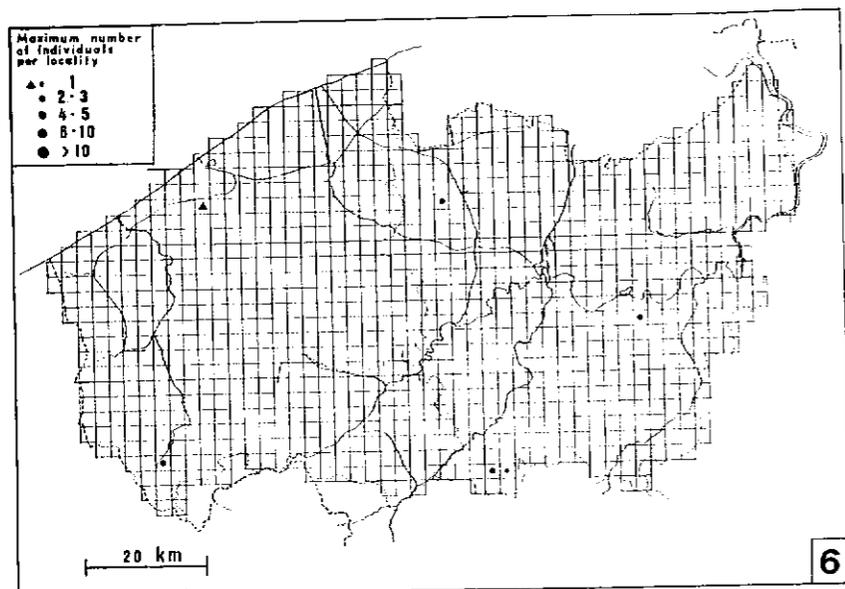
4.4 *Gerris lateralis* SCHUMMEL (map 6)

Gerris lateralis is a species of Northern Europe and very rare in Belgium. DETHIER and BOSMANS (1979) only cite 4 Belgian localities none of them in the study area.

We recorded the species only once:

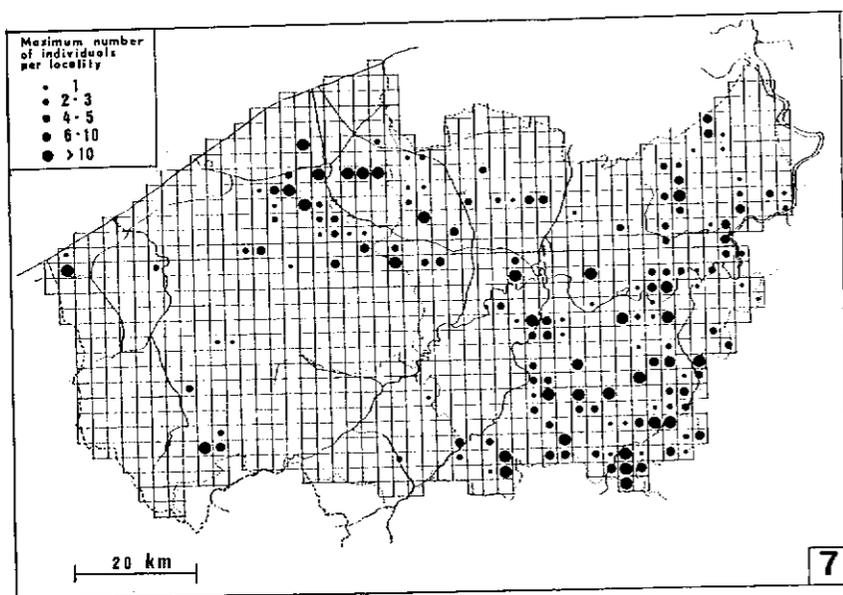
Snaaskerke, abandoned clay-pit, 19-X-1978, 1 ♀.

The species was captured in a dense *Phragmites* vegetation, together with *G. odontogaster* and *Microvelia reticulata*. The specimen was apterous, indicating it reproduced on the pond. VEPSALAINEN (1974a) stated that isolated lowland-populations are almost always apterous, and according to DIETZE (1940), these can survive for a very long time. During a second visit to the clay-pit on 7-X-1980, only *G. odontogaster* was captured; on 22-IX-1984, again, only *G. odontogaster* was present on the water, but an adult apterous female was captured in *Phragmites* litter at about 1 m from the water side. This proves the species is still surviving!



Map 6. — Distribution of *Gerris gibbifer* Schm. (circles) and *Gerris lateralis* Schm. (triangles) in East and West Flanders.

Map 7. — Distribution of *Gerris lacustris* (L.) in East and West Flanders.



4.5. *Gerris odontogaster* (ZETTERSTEDT) (map 8)

DETHIER and BOSMANS (1979) considered this species as rather rare in Belgium. Before 1970, it was never recorded in East or West Flanders. Considering we captured it now in 72 localities, this species must have increased its range considerably, in agreement with the observations of JORDAN (1943), and NIESER (1968) in Germany and the Netherlands respectively.

The localities are scattered over both provinces, but are somewhat aggregated in the Zeeuws-Vlaamse Polders and Central and Eastern Sandy-loamy Flanders. In Western Sandy-loamy Flanders, the Houtland, and the Gent Area it is almost absent.

Gerris odontogaster has the same phenology type as *G. argentatus*, as shown in table I.

Macropterous individuals predominate almost throughout the year. The micropterous morph is predominant in July and August, coinciding with a short-winged and short-living summer generation, as stated by BRINKHURST (1959b), VEPSALAINEN (1971) and ANDERSEN (1973) in Great Britain, Finland and Denmark respectively. The presence of brachypterous individuals at the end of the breeding season was also stated by VEPSALAINEN (1971).

4.6. *Gerris paludum* (FABRICIUS) (map 9)

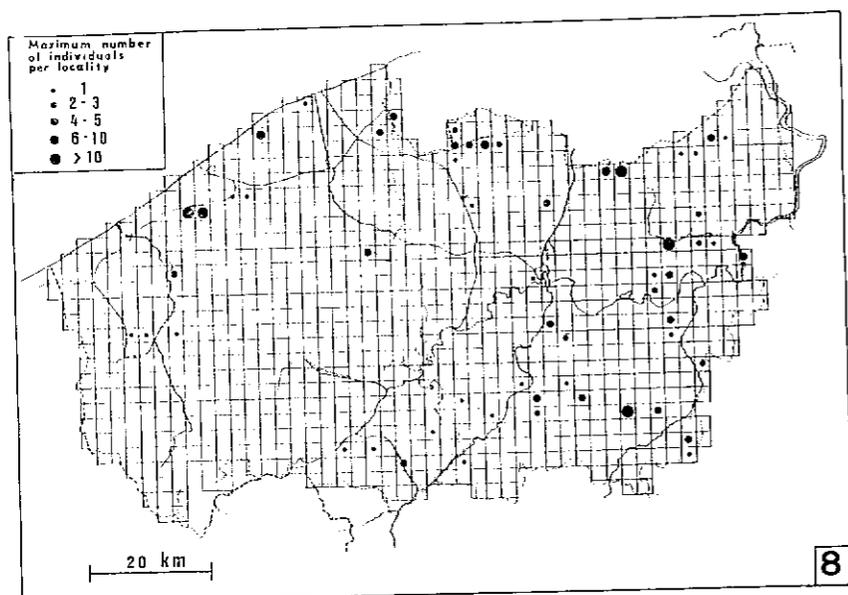
According to DETHIER and BOSMANS (1979), *Gerris paludum* occurs in the whole country except the coastal area. They knew four localities in East Flanders, and none in West Flanders. The present survey revealed the species in 35 localities, all situated in the south-eastern part of the study area.

In Eastern Sandy-loamy Flanders, *Gerris paludum* can even be considered as common. In West-Flanders, it was only recorded five times.

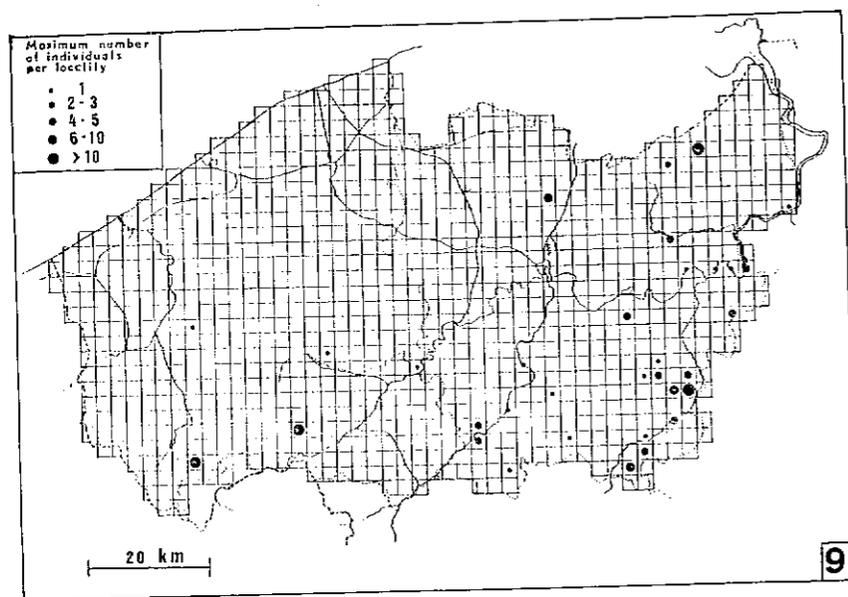
Only macropterous individuals were caught. VON MITIS (1937), BRINKHURST (1959b) and VEPSALAINEN (1974a) however stated a brachypterous summer generation in their countries. Probably this was not stated by us, by scarcity of summer observations.

4.7. *Gerris thoracicus* SCHUMMEL (map. 10).

Gerris thoracicus is the commonest water strider of East and West Flanders. It was found in 367 localities. DETHIER and BOSMANS (1979) considered *G. lacustris* as the commonest Belgian species,



Map 8. — Distribution of *Gerris odontogaster* (Zett.) in East and West Flanders.



Map 9. — Distribution of *Gerris paludum* (F.) in East and West Flanders.

but this is obviously not the case in the two Western provinces. The species is most common in Western and Central Sandy-loamy Flanders, and somewhat rarer in the Lokerse and the Flemish Hills. Table 1 summarizes the phenology data of this species. The macropterous morph is strongly predominant throughout the year. In summer, a small percentage of the population is submacropterous.

According to VEPSALAINEN (1974b), *Gerris thoracicus* is monomorphic macropterous in Poland, but BRINKHURST (1959b) mentions a submacropterous summer generation in England. From our data we conclude that submacropterous individuals make out only a small fraction of the total summer generation.

5. Fam. Veliidae AMYOT and SERVILLE

5.1. *Velia caprai* TAMANINI (map 11)

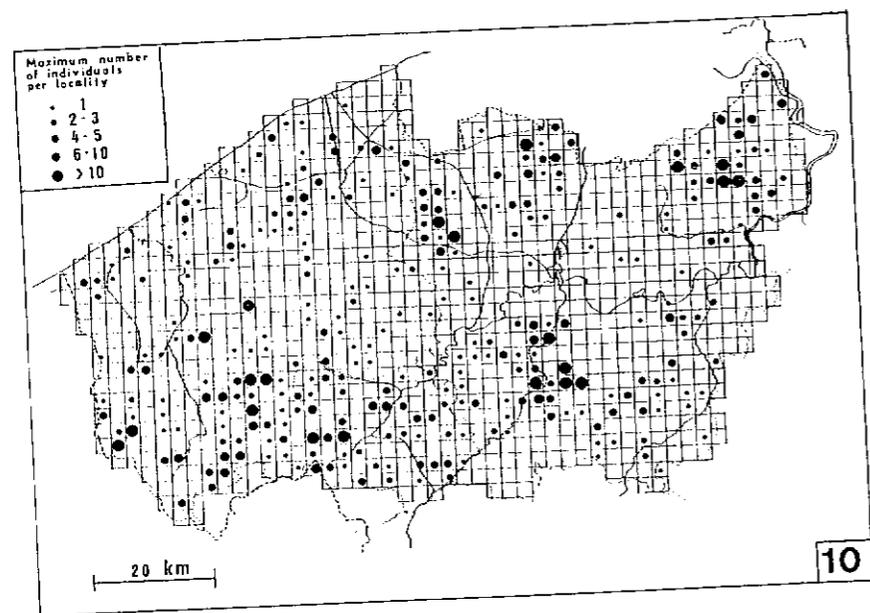
Velia caprai is a species of small, fast-flowing streams. DETHIER and BOSMANS (1979) considered it common in the Ardennen, and locally present in the rest of the country. During the recent survey, the species was found in 111 samples. However the localities are not evenly spread over the area. *Velia caprai* is very abundant in Eastern and Central Sandy-loamy Flanders and in the Houtland, but totally absent from the Polder area. The watershed line between the rivers Leie and IJzer is remarkably well marked on the map by the semi-circular pattern of dots. Due to a strong pollution of flowing water in this area, the species is limited here to the uppermost part of rivulets. *Velia caprai* is predominantly apterous, as stated by all other authors. We caught 251 individuals only one of them being macropterous.

5.2. *Microvelia pygmaea* (DUFOR) (map 12)

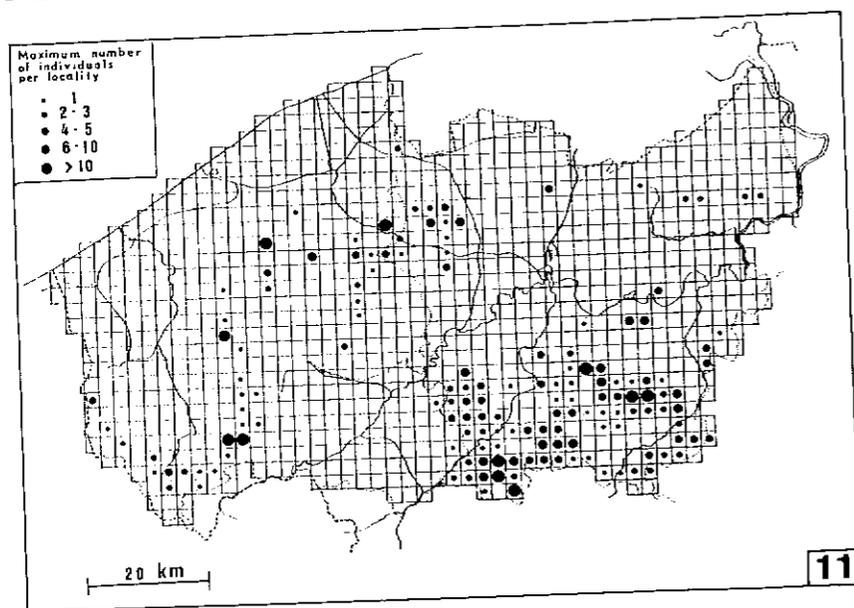
Microvelia pygmaea is one of the very rare Belgian bugs. DETHIER and BOSMANS (1979) only cite one locality in the Kempen. One more can be added here: Meldert, Kravaalbos, forest pond, 11-V-1977, 1 ♂. The only specimen caught was apterous.

5.3. *Microvelia reticulata* (BURMEISTER) (Map 13)

Microvelia reticulata is the commonest species of the genus. DETHIER and BOSMANS (1979) only knew very few localities, but



Map 10. — Distribution of *Gerris thoracicus* Schm. in East and West Flanders.



Map 11. — Distribution of *Velia caprai* Tam. in East and West Flanders.

they presumed previous collectors overlooked the species by its very small size. NIESER (1982) called it very common in the Netherlands.

During the recent survey, *Microvelia reticulata* was found in 58 samples. There are three distinct aggregations: one in Western Sandy-loamy Flanders, the second around Brugge, and the third east of the line Schelde — canal Gent-Terneuzen. The dominant morph of *Microvelia reticulata* is the apterous one, as shown in table 1. Macropterous specimens occur in summer and early autumn, allowing emigration to new habitats. WALTON (1949) and NIESER (1982) also stated the rarity of the macropterous morph.

5.4. *Microvelia umbricola* WRÓBLEWSKI (Map 12)

Microvelia umbricola is a species of Western Europe. DETHIER and BOSMANS (1979) knew no Belgian localities, but they presumed its presence in Belgium. During the recent survey, the species was found in 9 samples, as already published by BOSMANS and MERCKE (1984).

Except one, all localities are situated in the North-eastern part of East Flanders, especially in the Lokerse. All specimens were apterous.

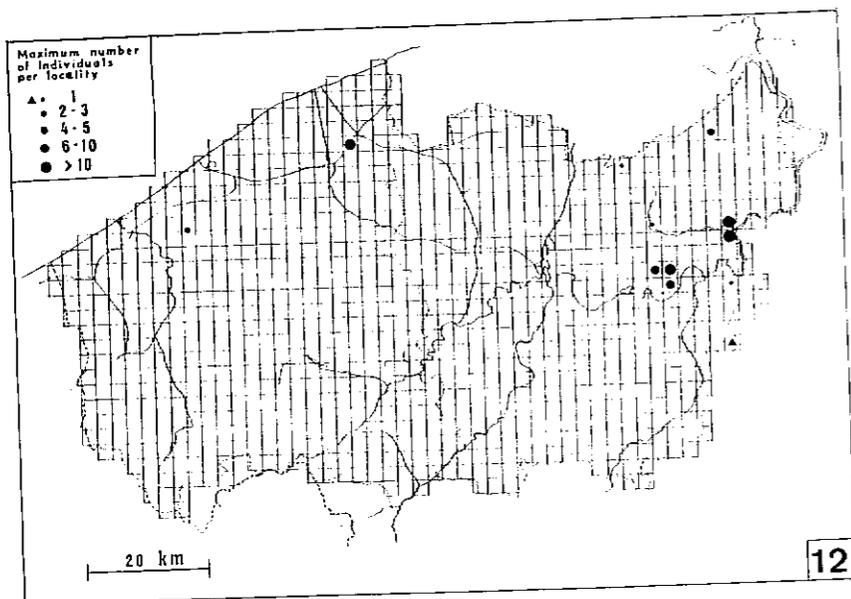
6. Previously occurring species

The catalogue of DETHIER and BOSMANS (1979) mentions 2 species which were not recovered during the recent survey, viz. *Gerris najas* and *G. rufoscutellatus*.

6.1. *Gerris najas* (DE GEER)

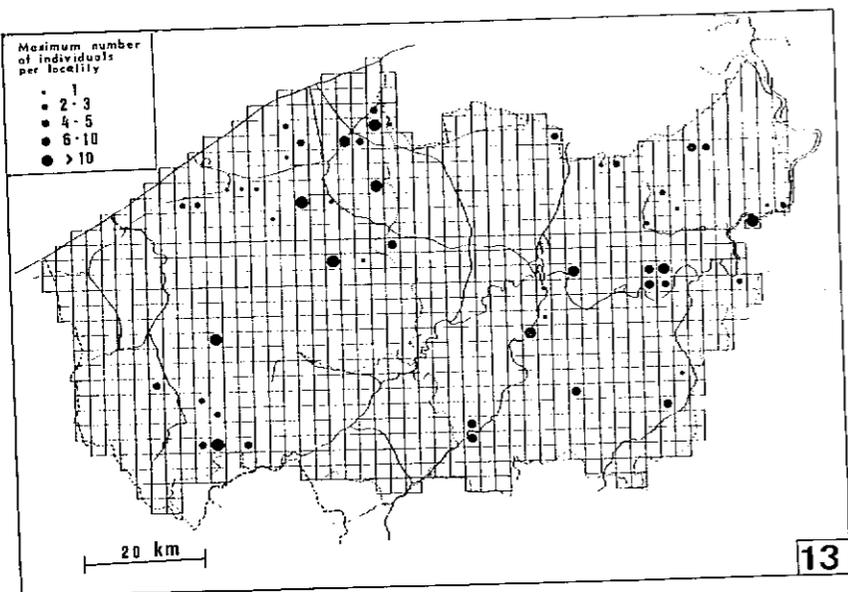
DETHIER and BOSMANS (op. cit.) cited 4 localities in East Flanders, the last one in 1943.

Gerris najas is a flowing water species, inhabiting not too small rivers and rivulets. As all flowing water of East and West Flanders is very polluted (ANONYMOUS, 1979), *Gerris najas* is probably extinct now in the study area. HIGLER (1970) stated a strong decrease in the Netherlands.



Map 12. — Distribution of *Microvelia pygmaea* (Duf.) (triangle) and *Microvelia umbricola* Wrób. (circles) in East and West Flanders.

Map 13. — Distribution of *Microvelia reticulata* (Burm.) in East and West Flanders.



6.2. *Gerris rufoscutellatus* LATREILLE

G. rufoscutellatus is a central European species.

DETHIER and BOSMANS (1979) gave four certain Belgian localities, all in East Flanders, and the last one in 1942.

During the recent survey, *G. rufoscutellatus* was not captured. The species is known as an excellent migrant. All English records concern solitary, macropterous specimens, and the species was never found to reproduce (LESTON 1956). The Belgian specimens also probably were migrants.

Increase or decrease of species

Table II summarizes the number of known localities of each species before the recent survey, and afterwards. We also calculated for both their ratio with the total number of water bodies where semi-aquatic water bugs were captured. Comparing these ratios, we find an indication for decrease or increase of a certain species. If a species is relatively less captured nowadays, we consider it as decreasing, and vice versa.

Only one species seems to have increased in the area, viz. *Gerris odontogaster*. Before 1950, it was not once captured in neither of the two provinces. This species has enlarged its area into Belgium, as discussed before.

Three species, viz. *G. thoracicus*, *G. lacustris* and *G. argentatus* seem to be rather stable in the area. The first species is an inhabitant of small, unstable, slightly polluted habitats such as pools for watering cattle, ditches and farm-moats, and this kind of habitats is very abundant in the area. The other two species occur commonly in more stable, unpolluted habitats, such as fish-ponds. During the last 20 years, these have increased frequently, especially in river valleys, and the two species are thus commonly found there. Moreover, all three species are predominantly macropterous, allowing them to colonize new habitats easily.

Hydrometra stagnorum, *Velia caprai*, *Microvelia reticulata*, *Mesovelia furcata*, *Hebrus pusillus* and *Gerris paludum* obviously have diminished in the study area. The first four species are predominantly apterous, and are therefore limited to stable waters. The

TABLE II

Number of recent localities, previously known localities, and their respective ratio with the total number of localities were bugs were captured.

Species	Number of recent localities	Number of previous localities	Ratio recent localities/total number of recent localities (x100)	Ratio previous localities/total number of previous localities (x100)
<i>Gerris thoracicus</i>	367	10	41,66	38,46
<i>Gerris lacustris</i>	207	5	23,50	19,23
<i>Gerris argentatus</i>	139	5	15,78	19,23
<i>Hydrometra stagnorum</i>	124	14	14,07	53,85
<i>Velia caprai</i>	111	7	12,60	26,92
<i>Gerris odontogaster</i>	72	0	8,17	---
<i>Microvelia reticulata</i>	56	6	6,36	23,08
<i>Gerris paludum</i>	32	4	3,63	15,38
<i>Microvelia umbricola</i>	10	0	0,84	---
<i>Gerris gibbifer</i>	5	0	0,57	---
<i>Hebrus pusillus</i>	3	3	0,34	11,54
<i>Hebrus ruficeps</i>	2	1	0,02	3,85
<i>Microvelia pygmaea</i>	1	0	0,01	---
<i>Hydrometra gracilentata</i>	1	0	0,01	---
<i>Gerris lateralis</i>	1	0	---	15,38
<i>Gerris rufoscutellatus</i>	0	4	---	15,38
<i>Gerris najas</i>	0	4	---	---

biology of them is not yet very well known, but they live preferably on quiet waters between floating or overhanging vegetation. In fish-ponds, which compose the most suited habitats in the region, such vegetation is often removed for angling purposes, and pollution also has diminished it. All these factors might explain the decrease of these four species. The two last species are predominantly macropterous. *Hebrus pusillus* has the same habitat preferences as the preceding species, and its decrease can be explained in the same way. Finally, *Gerris paludum* was perhaps more collected in the past by its very large size making it look commoner than it really was. Its preferable habitat (large water bodies with open water) has however also become less suited, by intensification of angling, recreation and pollution.

Two species have disappeared completely from the study area. *Gerris rufoscutellatus* is however a good migrant, and its presence in Belgium is only temporary, as in England. *Gerris najas* on the contrary is apterous and considered as extinct in East and West

Flanders now, since all suited habitats are polluted. A recolonization seems very problematical.

It can be concluded that semi-aquatic water bugs have decreased in East and West Flanders, not only considering number of species, but also abundance of species.

Acknowledgements

The author acknowledges C. DECLER, L. MERCKEN, R. PILLEN, J. VAN STALLE and B. VLAMINCK for the communication of some recent data.

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Hydraenidae (Col. Hydrophiloidea)
del Nord Africa
XV Contributo alla conoscenza
degli Hydraenidae*

di Giorgio FERRO**

Ringraziamenti

Mi è qui doveroso ringraziare il Prof. M. Dakki, Capo del Dipartimento di Zoologia ed Ecologia dell'Istituto Scientifico Charia Ibn Batouta di Rabat, per l'invio di una parte del materiale oggetto del presente studio. Ringrazio inoltre il Dr. Zoltan Kaszab Direttore del Museo di Storia Naturale di Budapest e la Sign. Perrin del Museo Nazionale di Storia Naturale di Parigi per l'invio di alcuni paratypi.

Riassunto

Nel presente studio, l'Autore descrive quattro nuove specie di *Ochthebius* : *O. (H.) griotes*, *O. (H.) merinidicus*, *O. (H.) perpusillus*, *O. (B.) berbericus*. e una nuova sottospecie di *Ochthebius (D.) salinator lanarotis*. Da notizie sulla geonemia dell'*O. (D.) salinator* e del *Limnebius aegatensis*. I disegni dei falli delle nuove entità, quello di *Limnebius aegatensis* e quelli di *Hydraena numidica* e *H. leprieuri* (raffigurati per la prima volta) completano il lavoro.

Résumé

Dans ce travail, l'auteur donne la description de quatre nouvelles espèces d'*Ochthebius* : *O. (H.) griotes*, *O. (H.) merinidicus*, *O. (H.) perpusillus*, *O. (B.) berbericus*, et d'une nouvelle sous-espèce d'*Ochthebius (D.) salinator lanarotis*. Il donne aussi des renseignements sur la géonémie d'*O. (D.) salinator* et de *Limnebius aegatensis*. Les dessins des édéages des nouveaux taxa, ceux de *Limnebius aegatensis* et d'*Hydraena numidica* et *H. leprieuri* (figurés pour la première fois) complètent le travail.

* Déposé le 3 octobre 1984.

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