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The freshwater leeches (Hirudinea) of The Netherlands

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With 1 figure and 1 table

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This communication aims to summarize the current knowledge on the distribution and ecology of the fresh-water leeches of The Netherlands. So far, 27 species of fresh-water leeches are reliably known from this country. This does not include several recently described fish-leech species, a fair number of which probably occur here as well. Most information has been collected in the last 20 years. Of several, only recently recognised species information is less complete. Data on the distribution of leeches mainly originate from monitoring projects organised by water board authorities. Of each of the 27 species this paper gives comments on the identification and summarizes the ecological preferences and the geographical distribution within The Netherlands, based on reliable or verified records.

1 Introduction

There are many papers on the subject, but most are not recent or deal with only one or few species. Recently, several important taxonomical discoveries have been made, e.g. in fish leeches, and hydrobiologists in The Netherlands more and more are recognizing species that previously were considered to be only subspecies or varieties (*Erpobdella*, *Glossiphonia*).

Since the 1980's, many water board authorities in The Netherlands have technicians working on macro-invertebrates, using them as indicator species for water quality. Subsequently, an enormous increase followed in the number of leeches being identified. The number of leeches identified by water board authorities technicians, or by companies working for them, exceeds greatly the number of leeches being identified by taxonomists or university specialists. Also, a lot of effort has been done to make these records available to anyone interested. The Limnodata project (STOWA 2002) lists these records with distribution maps and connects them to chemical parameters. An important drawback is that not all records have been checked. Still, the project has made available an enormous amount of leech information. Until the mid 1990's, things were thought to be simple in Dutch "leech land" There were about eight common species, we thought. Quite suddenly, it became clear that several more species commonly occur in the country. This communication already lists 27 species and the list is expected to get much longer in future. We com-

	Provinces										Wadden Islands						
	NH	ZH	ZE	UT	GR	FR	DR	OV	FL	GE	BR	LB	Tx	VI	Ts	Am	Sc
<i>Hemiclepsis marginata</i> (O. F. Müller, 1774)	X	X	X	X	X	X	X	X	X	X	X	X	X				
<i>Placobdella costata</i> (Fr. Müller, 1846)	X	X				X		X		X	X						
<i>Theromyzon tessulatum</i> (O. F. Müller 1774)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PISCICOLIDAE																	
<i>Caspiobdella fadejewi</i> (Epshtein, 1961)		X		X						X		X					
<i>Piscicola brylinskae</i> Bielecki, 2001					X												
<i>Piscicola geometra</i> s.l. (Linnaeus 1761)	X	X	X	X	X	X	X	X	X	X	X	X	X			X	
<i>Piscicola respirans</i> Troschel, 1850		X		X						X							
ERPOBDELLIDAE																	
<i>Dina lineata</i> (O. F. Müller, 1774)					X		X										
<i>Dina punctata</i> Johansson, 1927										X		X					
<i>Erpobdella monostrata</i> (Lindenfeld & Petrusz., 1890)								X									
<i>Erpobdella nigricollis/testacea</i>	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
<i>Erpobdella nigricollis</i> (Brandes, 1900)	X	X		X	X		X	X	X	X	X	X					
<i>Erpobdella octoculata</i> (Linnaeus, 1758)	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
<i>Erpobdella testacea</i> (Savigny, 1822)	X	X	X	X			X	X	X	X	X	X					
<i>Erpobdella vilnensis</i> Lieskiewicz, 1925	X	X		X			X	X			X	X					
<i>Trocheta pseudodina</i> Nesemann, 1990	X	X					X	X		X	X	X					
HAEMOPIIDAE																	
<i>Haemopsis sanguisuga</i> (Linnaeus 1758)	X	X	X	X	X		X	X	X	X	X	X	X	X			
HIRUDINIDAE																	
<i>Hirudo medicinalis</i> Linnaeus, 1758	X	X	X	X	X	X		X		X	X	X	X			X	
SALIFIDAE																	
<i>Barbronia assiuti/weberi</i> Johansson, 1918										X							

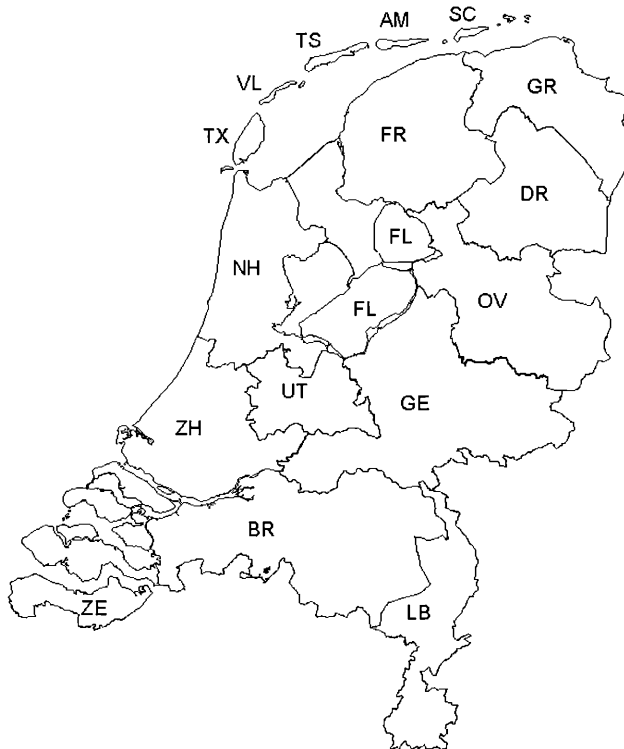


Fig. 1: Geographical map of The Netherlands representing the different provinces and Wadden Islands. Wadden Islands: Texel (TX), Vlieland (VL), Terschelling (TS), Ameland (AM) and Schiermonnikoog (SC); provinces: Noord-Holland (NH), Zuid-Holland (ZH), Zeeland (ZE), Utrecht (UT), Brabant (BR), Limburg (LB), Gelderland (GE), Overijssel (OV), Flevoland (FL), Drenthe (DR), Friesland (FR) and Groningen (GR)

3 Description of the species

Alboglossiphonia heteroclita, *A. byalina* and *A. striata*

The generic name *Alboglossiphonia* was not used by Dresscher & Higler (1982). Instead, they only recognized two species of *Glossiphonia*: *G. complanata* and *G. heteroclita*. For the latter, three varieties were mentioned, but many technicians didn't use them. The three varieties now generally are considered full species: *A. striata* and *A. byalina* are morphologically and genetically different from *A. heteroclita*. Unfortunately, the description of *A. striata* in Neubert & Nesemann (2000) does not quite resemble Dutch specimens.

Identification: *A. heteroclita* can clearly be separated from the other two species by its different head shape. Identification of *A. hyalina* and *A. striata* is still unsatisfactory as it is based on colour pattern only. Older specimens, from which the colour pattern may have disappeared, cannot be identified.

Ecology: Due to their only recent recognition as separate species, little is known on ecological differences within the genus *Alboglossiphonia*. All three species are reported from a wide range of habitats. Both *A. heteroclita* and *A. hyalina* also have been found in slightly brackish waters. Only in semi-permanent waters and in fast currents these species have not been found. Water quality seems not to be of great importance.

Distribution: All three species of *Alboglossiphonia* are widely distributed in The Netherlands. *Alboglossiphonia* is known from four Wadden Islands. Absence in certain provinces of *A. hyalina* and *A. striata* might be due to only recent interest in identifying the three different species, and it should be expected these species will turn up from most if not all provinces. From the first results it seems that *A. heteroclita* and *A. hyalina* are both very common, while *A. striata* is relatively uncommon.

Glossiphonia complanata

Identification: *G. complanata* is only likely to be confused with other species within the genus *Glossiphonia*. Identification is to be based on characteristics like head shape, number and size of eyes, presence of papillae and colour pattern. Preserved specimens may be mistaken for *G. concolor*, for the papillae can be small or absent, especially in juveniles.

Ecology: *G. complanata* is a common leech in The Netherlands, occurring in a wide range of water bodies, such as ditches, streams and lakes. Its occurrence seems to be restricted by the presence of prey (molluscs) and the presence of suitable substrate such as stones, wood, or plants. Water quality seems to be less restrictive, although its requirements are higher than e.g. *Helobdella stagnalis*.

Distribution: *G. complanata* is common and found in every province and is also known from four out of five Wadden Islands.

Glossiphonia concolor

Identification: From known Dutch species of *Glossiphonia* it can be separated by the lack of papillae. It differs from *G. paludosa* by the presence of dark stripes and in having six instead of seven crop caeca. In Dresscher & Higler (1982) this species is only mentioned as a variant of *G. complanata*.

Ecology: In The Netherlands, *G. concolor* has mainly been found in ditches and pools with organically rich bottoms. The bottom may be peaty or covered with fallen leaf. Often they have considerable fluctuations of water level. However, *G. concolor* has not yet been found in truly semi-permanent waters. Waters where this species has been found have in general high numbers of molluscs. According to Dresscher & Higler (1982) this species should occur especially in woodland pools. In The Netherlands this seems only true for the eastern part (Pleistocene area).

Distribution: Due to only recent recognition in The Netherlands of *G. concolor* being a separate species, its distribution is not fully known. It seems that it is widespread and fairly common. From nearby Belgium (Kraenepoel, Flanders), there is an unpublished record from a mesotrophic pool, which is surrounded by beeches whose leaves fall into in large amounts (pers. comm. Steven Heylen).

Glossiphonia nebulosa

Identification: The head shape, enlarged posterior eyes, papillae pattern and the continuous dark stripes should make a reliable identification possible.

Ecology: See Soes (this issue).

Distribution: *G. nebulosa* is known from five provinces. Due to difficulties with identification and taxonomy this species has been overlooked. Recent findings suggest that the species is widespread, but rare.

Glossiphonia paludosa

G. paludosa was listed for The Netherlands by Mol (1984) and added to the Dutch fauna by Cuppen (1994). In both instances the material actually belonged to *G. verrucata*. *G. paludosa* is not known from The Netherlands. It seems to be restricted to central and south-eastern Europe.

Glossiphonia verrucata

Identification: The greenish body with heavy dark spots, the papillae pattern and the rough edges of the body separate this species from other species within the genus.

Ecology: See Soes & Cuppen (this issue).

Distribution: *G. verrucata* is very rare and only known from three localities in the western part of The Netherlands.

Helobdella europaea

Identification: The description and drawing of *H. triserialis* (Blanchard, 1849) in Neubert & Nesemann (1999) match to *H. europaea* Kutschera, 1987. The real *H. triserialis* is an American species and probably do not occur in Europe. The species differs, for instance, in the number of caeca, 5 in *H. europaea* and 6 in *H. triserialis* (pers. comm. Kutschera). It is possible that the name *H. striata* has priority and will be reinstated for this species. Also, it is to be noted that a similar American species, *H. punctatolineata* (Moore, 1939), has recently been recorded from Israel and Egypt.

Ecology: The first record of *H. europaea* originates from a fast-running stream in southern Germany. The only Dutch record consists of three specimens, collected on October 25, 1996 in Lingsforterbeek, Lingsfort, Arcen, province of Limburg (coll. Waterschap Roer en Overmaas). They were previously identified as *P. costata*. The slow flowing canalized stream (app. 0,2 m/s) has a concrete bottom and wooden sheathings.

Distribution: Introduced species, so far known only from one record in the Province of Limburg.

Helobdella stagnalis

Identification: This is an unmistakable species, making misidentifications unlikely.

Ecology: The commonest leech in The Netherlands, occurring in all kinds of habitat. It is numerous where its prey occurs in large quantities, especially oligochaetes, chironomids and snails. Many of these species occur in heavily eutrophied or organically polluted waters making the leech an indirect indicator for those conditions. It is most common in smaller, eutrophic, standing waters. In oligo- to mesotrophic waters it is normally absent; it may however be numerous in acidic lakes. It is normally absent from clear, running waters (brooks). From all fresh water leeches *Helobdella stagnalis* it is able to withstand the highest levels of salinity, however, it is normally absent from very brackish waters.

Distribution: Very common in The Netherlands, the most common leech. There are thousands of records from all provinces, and it occurs also on five Wadden Islands.

Hemiclepsis marginata

Identification: This is an unmistakable species, making misidentifications unlikely.

Ecology: A common leech in The Netherlands, occurring in all kinds of habitat, except fast running waters. It is reported in literature that it occurs in brackish waters, but this is hardly the case in The Netherlands. In *Stratiotes* vegetation most specimens were collected in shallow places between dense vegetation (Dresscher & Higler 1982). It is said to be parasitic on amphibian and fish larvae, but it possibly also attacks snails and oligochaetes.

Distribution: Common in The Netherlands. There are over a thousand records from all provinces, but, remarkably, it has not been found on any of the Wadden Islands.

Placobdella costata

Identification: Specimens of *Helobdella europaea* have been mistaken for young specimens of *Placobdella costata* (B. van Maanen, pers. comm.) and possibly also *Glossiphonia complanata*, which sometimes has the eyes nearly fused. The colour and papillae patterns in *Placobdella costata* are distinctive, and should be examined to avoid this confusion.

Ecology: *P. costata* is found in stagnant fresh waters with a good water quality. The species prefers larger water bodies with a low ion and phosphate concentration. The chemical demands resemble that of the German records (Grosser 1998).

The occurrence of this species in The Netherlands is remarkable. This bloodsucking species is known for attacking freshwater turtles as its main host (e.g. Neubert & Nesemann 1999), although it is known that other hosts (amphibians, birds and mammals) are used as well (Sawyer 1986). Sub-recent findings of the turtle *Emys orbicularis* indicate that this species has occurred in The Netherlands, but nowadays it doesn't occur here anymore (Fritz 2003). As *P. costata* also occurs in e.g. Great Britain, where there are no turtles either, it's likely that *P. costata* is much less specialized on freshwater turtles than often has been suggested.

Distribution: *P. costata* is a rare species in The Netherlands, with scattered records only. Due to past confusion with *H. europaea* the occurrence of this species needs to be reviewed. Based on recent records this species seems to be rare. The majority of the records are from the fenland area in the central part of The Netherlands and the northern part of Overijssel. The first record of *P. costata* originates from the nature reserve "Botshol" (20 km south of Amsterdam) and was collected on June 11, 1944 (Dresscher & Engel 1947a). The few records from the provinces Limburg and Zeeland needs to be verified.

Theromyzon tessulatum

Identification: This is an unmistakable species, making misidentifications unlikely.

Ecology: A common leech in The Netherlands, occurring in all kinds of habitat, except fast running waters. It is normally found in small numbers. A water bird parasite, the water quality is of little importance for this species.

Distribution: Common in The Netherlands. There are over a thousand of records from all provinces, and it has been collected on five Wadden Islands.

Piscicolidae

For a long time, Dutch hydrobiologists supposed that their country was inhabited by only two species of *Piscicola*: the very abundant fish leech *Piscicola geometra* and *Piscicola respirans*, a species which only occurred in our large rivers such as the Rhine and "het Haringvliet". However, in the late 1990's it became apparent that many more species of fish leech exist (Neubert & Nesemann 1999, Bielecki 1997). Still, the identification of fish leeches remains very difficult. So far, reliably identified specimens of only a few species are available to Dutch hydrobiologists.

In this paper we only comment on the fish leech species of which we are certain about their identification. It's very likely the Dutch leech fauna has many more species of Piscicolidae then described here. Maybe up to 15 to 20 species occur in The Netherlands.

Unpublished records of *P. annae*, *P. baranti*, *P. margaritae* and *P. pawlowskii* still need to be verified by careful examination of the internal anatomy.

Caspiobdella fadejewi

Identification: Due to its superficial resemblance with other Piscicolidae species, it is likely that specimens of *Caspiobdella fadejewi* have often been overlooked. The combination of the size of the posterior sucker, the colour pattern and an area copulatrix, which is not enlarged, makes possible a diagnosis based on external characters.

Ecology: In The Netherlands *C. fadejewi* has been collected from large rivers and one artificial lake with several Ponto-Caspian fauna elements. In contrast to *P. respirans*, this species is found regularly away from its host, e.g. on stones or plants. Free-living specimens have been found both in spring and in the autumn. Hosts from Dutch specimens, which were collected from fish, include bream (*Abramis brama*), white bream (*Abramis bjoerkna*), barbel (*Barbus barbus*), roach (*Rutilus rutilus*) and pikeperch (*Stizostedion lucioperca*). The majority of the specimens were found in the head region, other specimens were be-

tween pectoral fins. Clearly the favourite spot for this species is in and around the branchial cavity. One specimen was found in the oral cavity of a bream.

Distribution: *C. fadejewi* is known from the Dutch large rivers and the "Plas Heenvliet", an artificial lake. It is regarded as a non-indigenous species from the Ponto-Caspian area. The first confirmed record of this species dates from September 2000 (Klink 2000). This species has become quickly the dominant fish leech in the Waal and the Neder-Rijn and this is probably also the case in the other Dutch large rivers.

Piscicola brylinskae

This species is only known from its type locality, the isolated Lake Vechten (province of Utrecht) in the village of Bunnik. It was collected in February 1986. Lake Vechten is man-made with an average depth of six meters. According to Bielecki (2001), the differences with *P. margaritae* are minor. He suggests that it is most likely a Cyprinid parasite.

Piscicola geometra

This is the fish leech, of which there are many thousands of records. However, an unknown part of records of *P. geometra* will refer to other fish leech species.

This species is probably the commonest fish leech species and can be found in probably any water with fish. It may be much less common in even slightly brackish waters.

Piscicola respirans

Identification: The dorsoventral compressed body of this leech is very characteristic, making confusion with the other known, indigenous leeches of The Netherlands unlikely. But, as within the Piscicolinae several European species are present which can occur in The Netherlands and may be mistaken for *P. respirans*, it is recommendable to use Bielecki (1997) for an unambiguous diagnosis.

Ecology: In The Netherlands *P. respirans* has only been collected in large rivers. Most specimens have been collected from different species of fish from the end of March until the end of April. No sampling has been done in the beginning of May, so the exact end of the period in which *P. respirans* can be found on their hosts in The Netherlands is not known. The data are largely consistent with the lifecycle described by Hoffmann (1959) and Molls & Borcherding (1997). The known hosts from the Dutch material are bream (*Abramis brama*),

white bream (*Abramis bjoerkna*) and roach (*Rutilus rutilus*), the three dominant cyprinids of the Dutch river system.

The species' cocoons have long resting stages. Hatched *P. respirans* immediately attach them self to there host and stay put until reproduction. Therefore, this species is only rarely collected during routine sampling of macro-invertebrates (Molls & Borcherdig 1997). Only during the reproduction period, which lasts about a month (Bielecki 1997) somewhere in May to June, it is likely that free-living specimens occur in bottom samples. A Dutch autumn record (Cuppen 1997) therefore needs confirmation.

Distribution: This species is only known from the Dutch large river system: Waal, Neder-Rijn, Lek, Hollands Diep and Haringvliet. Based on samples of river macro-invertebrates this species is considered very rare (Diepen & Verdonschot 2001). Material collected from fishes caught in the Neder-Rijn indicates that this species is actually not uncommon in the Dutch large rivers and that it is likely to also occur in the rivers Maas (Meuse) and IJssel.

Dina lineata

This species has repeatedly been recorded from The Netherlands from eutrophic brooks, small rivers, marshes and temporary pools (e.g. Dresscher & Higler 1982, Verdonschot 1990). Some of the records from The Netherlands may concern misidentifications and probably refer to *Erpobdella vilnensis* or even *Trocheta pseudodina*, as its main distribution area is supposed to be the south-western Mediterranean (Neubert & Nesemann 1999). In The Netherlands we have been able to confirm two records from the provinces Utrecht (coll. Waterschap Vallei en Eem) and Drenthe (coll. Waterschap Velt en Vecht). The records from Overijssel and Brabant have not been verified.

Dina punctata

There are only few records of *D. punctata* in The Netherlands. Three records from floodplain pools along the river Waal near Ewijk and Millingen (GE) and one in the Geul (LB). These records may indicate that the species is non-indigenous, its occurrence in The Netherlands being explained by drift.

Erpobdella monostriata

Identification: This species has been confused with *E. vilnensis* and also it has been presented as a subspecies of *E. testacea* (Gedroyc 1916). Until the publication of Neubert & Nesemann (1999), this species, as *E. vilnensis*, was simply unknown in The Netherlands. *Erpobdella monostriata* differs from *E. vilnensis* in having the genital pores separated by four annuli, compared to three in *E.*

vilnensis. The dark median streak on the dorsal side may fade when the leeches are preserved in ethanol.

Ecology: Very little is known of the ecology of this species in The Netherlands as there is only one record (2002). This record originates from De Leiding, near Witharen in the province of Overijssel. The sampling site is a ditch of about 3 meters wide, normally containing stagnant but at times running water (serving the lower lying adjacent agricultural area). It has a naturally laid-out bank, covered with vegetation; the water itself has no submerged vegetation.

According to Agapow & Bielecki (1992) the species prefers shallow water along lake shores, where it can be found on stones or branches. It is also found in rivers. The most abundant populations were found near springs on a stony or gravelly-stony bottom. Along the river Pripyat (near Turov, Belarus) several specimens were collected in a densely vegetated branch of the river and in flood pools (coll. AquaSense).

Distribution: So far, only this first record of *Erpobdella monostriata* in The Netherlands is known, originating from the province of Overijssel.

Erpobdella nigricollis

Identification: Until the mid 90's of last century, most technicians in The Netherlands followed Dresscher & Higler (1982) who regarded this species to be just a subspecies of *E. testacea*. Unfortunately, until 1995 most people simply put *E. testacea* on their lists, which results in far fewer records of this species than should be expected (and, of course, too many records of *E. testacea*). However, the dark neckband can easily be seen in living specimens but can be hardly visible in preserved specimens. They may be mistaken for *E. testacea* when the head is not slightly pressed or when the large anterior sucker in this species is overlooked.

Ecology: In The Netherlands *E. nigricollis* occurs in all kinds of waters, from small streams to large rivers, the littoral of lakes and small standing waters like ditches with clean water and submerged vegetation. *E. nigricollis* avoids brackish and organically polluted waters. It is able to co-exist with *E. testacea* and *E. octoculata* in unpolluted waters, but is much more sensitive for a decrease in oxygen-level. The species also prefers waters low in nutrients and Kat ions (Mg, Na, Ca) (STOWA 2002).

Distribution: Very common in most of the lower parts of The Netherlands, including the Meuse- and Rhine river basin. A few records from the provinces Gelderland, Groningen, Brabant and Limburg. No known records from (the more brackish areas) Zeeland, Friesland and the Wadden Islands (there are some unverified records of *E. testacea/nigricollis* from three Wadden Islands).

Erpobdella octoculata

Identification: This species can easily be identified by the presence of dark dorsal pigmentation, but it can be reduced or totally absent. In the latter case it resembles *E. testacea*, from which it can be separated on the number of annuli between the genital pores. Some of the earlier records may belong to *E. vilnensis*.

Ecology: *E. octoculata* can be found in nearly all kinds of water bodies, except fast flowing. They are recorded from ditches, drains, pools, lakes, rivers, brooks (especially lower reaches), oxbows etc. The species tolerates brackish or organically polluted water and is able to withstand several days of anaerobic conditions. Together with *Helobdella stagnalis* and sometimes *E. testacea*, it is one of the few leech species that can be found beneath a thick layer of duckweed (*Lemna*). It is suggested that the abundance of prey (snails, worms) in organically polluted water is the key-factor.

Distribution: One of the most common leech species in The Netherlands. It occurs throughout the country, but so far there are no records from the Wadden Islands Vlieland and Schiermonnikoog.

Erpobdella testacea

Identification: *Erpobdella testacea* may be mistaken for *Erpobdella nigricollis* or uni-coloured *Erpobdella octoculata* (forma *pallida*). *E. testacea* differs in the number of annuli between the genital pores and the absence of the neckband. *E. nigricollis* was formerly regarded as just a variant of *E. testacea*. Therefore, most old records of *E. testacea* refer to both species. Records from our large rivers (Meuse and Rhine) probably all belong to *E. nigricollis*. According to van Eijk (1977) *Erpobdella testacea* may sometimes have a lighter or darker dorsal longitudinal line. This is most likely *E. vilnensis*.

Ecology: *E. testacea* occurs in almost all kinds of stagnant and slow flowing water bodies, especially where organic materials accumulates. She is able to withstand a low oxygen level, but is sensitive for saltification. It is found in ditches, pools, the littoral of lakes, lowland streams, marshes and bogs. It's absent from hill-streams, large rivers, brackish and temporary waters.

It is usually found together with *E. octoculata* and in cleaner water with *E. nigricollis*.

Distribution: Probably a common species throughout the country. In some provinces there are no verified records of this species, for instance Groningen, Friesland and the Wadden Islands. Records of *E. testacea* from three Wadden Islands, refer to *E. testacea* or *E. nigricollis*. This is also true for records of *E. testacea* from Noord-Holland in the atlas of the Province Noord-Holland (Steenbergen 1993).

Erpobdella vilnensis

Identification: This species was not distinguished from *E. octoculata* for a long time. So old records of *E. octoculata*, *E. monostriata* or even *E. testacea* may refer to *E. vilnensis*. Also, most Dutch records of *Dina lineata* may refer to *E. vilnensis*. As the annuli of *E. vilnensis* are sometimes irregular in width, the colour pattern of *E. vilnensis* resembles *Dina lineata*, so mistakes are likely to occur.

Ecology: In the Pleistocene area of The Netherlands (the eastern and south-eastern part of the country, which has mainly sandy soils) this species prefers large or small rivers or brooks, especially larger hill-streams. Occasionally it may be found in lowland brooks. In the Holocene part (west- and northwest) it is rare, but has been found in the province Noord- and Zuid-Holland and Utrecht in ditches, a canal, an old flood pool behind Lake IJsselmeer (Barnegat) and the bank of the river Hollandse IJssel.

Distribution: The first published record of *E. vilnensis* dates back from 1959 and originates from the Delta area (south-western part of The Netherlands) (den Hartog 1959). It was published as *Erpobdella octoculata* f. *monostriata* sensu Pawlowski. Material of the collection at Naturalis Museum (Leiden) shows that the species was quite common in the Delta area in 1958-1963. The specimens were collected by the former Hydrobiological Institute and identified as *E. monostriata*.

Nowadays it is a common species in the Pleistocene area and rare in the Holocene part. In central-Europe this species is mentioned as a rheophilic species of brooks and smaller rivers ("rhitral") and occasionally the littoral of lakes. So an expansion of its distribution-area in The Netherlands seems unlikely, although she has been caught outside its normal habitat (ditches!). This species is not yet known from the Wadden Islands.

Trocheta bykowskii

All records of this species must be considered doubtful. Most likely *T. bykowskii* has been confused with *T. pseudodina*. The real *T. bykowskii* is a central European species occurring in springs, brooks and caves and occasionally in the littoral of lakes. It was originally described from a spring in the Carpathian Mountains.

Trocheta pseudodina

Identification: This species may be mistaken for other representatives of the genus or even *Dina*. Careful examination of the genitalia, annuli and the dorsal papillae should be sufficient. Coloured specimens as in Neubert & Nesemann

(1999) are very rare. That is why it is easily mistaken for the more or less colourless *T. bykowskii*.

Ecology: *T. pseudodina* is an amphibious, rheophilic species that can be collected under stones, in sandy-silty bottoms, between the roots of reed or other plants or under an algae carpet. The water bodies along which the species had been collected are usually low in bicarbonate, calcium and other ions (Mg, Na) but rich in nutrients (nitrogen and phosphorus combinations) (STOWA 2002).

Distribution: The first recorded specimen is from 1925 from a garden-centre in Leiden (Hartog & Rossum 1957 as *T. bykowskii*). Its main distribution area is the Rhine-Meuse delta area and the littoral of Lake IJsselmeer and adjacent brooks.

Haemopsis sanguisuga

Identification: The species is quite unmistakable. However, more vividly coloured individuals occur scarcely, which may be mistaken for *Hirudo medicinalis*. Also, it is suspected some technicians have wrongly claimed individuals of *Erpobdella* species to be *Haemopsis sanguisuga*. There are no known records of specimens with a dark ventral side and a lighter dorsal side.

Ecology: It occurs mainly in or along both small and larger standing waters but has also been recorded from the banks of larger, slowly flowing waters as rivers. It can be found in the riparian zone under stones but it can be found free-living in ditches, and fens. When found on land, water is close by: semi-aquatic species. Water quality seems to be of no concern to the species, its presence is explained by the presence of prey (snails, insects, worms etc.). It seems to prefer clay-bottoms.

Distribution: The species is known from hundreds of localities throughout The Netherlands, but it seems to be markedly less common in the partly brackish provinces of Zeeland (South-west of the country), Friesland and Groningen; moreover, from the Wadden Islands it is only known from Texel and an old record from Vlieland (Vos 1949).

Hirudo medicinalis

Identification: This large leech is only likely to be confused with *Haemopsis sanguisuga* and the not yet recorded *Hirudo verbana*. Its characteristic colour pattern, described e.g. in Neubert & Nesemann (1999), should be sufficient for a correct identification.

In a recent study on *H. medicinalis* in The Netherlands (Felix & Van der Velde 2000), no attention has been paid to the possibility of occurrence of *H. verbana* in The Netherlands. This species differs from *H. medicinalis* by its unspotted ventral side and a different dorsal colour pattern. As *H. verbana* was

commonly used in commercial trade, it seems to be not impossible that it has formerly occurred as a free-living species in The Netherlands, next to *H. medicinalis*. The possible (former) occurrence of *H. verbana* is supported by Oudemans in Dresscher & Engel (1947b). Oudemans (1864) distinguishes two species, both being used for medical purposes: the grey leech (*Sanguisuga medicinalis* Sav.; syn. to *H. medicinalis*) with a spotted ventral side, and the green leech (*Sanguisuga officinalis*; syn. to *H. verbana*) with an unspotted ventral side and somewhat different dorsal colour pattern. The green leech was imported from southern Europe, the grey leech mainly from Poland. Both species not only differ in morphology but also in behaviour: "*S. officinalis* rapidly clings itself to the host and sucks up quickly. It will however not take in more than its body weight in blood. It leaves wounds that continue to bleed for only a short period of time. By contrast, *S. medicinalis* needs much more time to cling itself to the host but, on the other hand, can take in an amount of blood twice its weight and leaves wounds that continue to bleed much longer" This description of this leech' behaviour is puzzling as it does not fully match the current knowledge on the behaviour of *Hirudo*. However, the possibility that *H. verbana* was imported from southern Europe and managed to escape does remain. Recent findings of *H. verbana* are not likely. Further research in museums will hopefully ascertain the possibility of the former occurrence of free-living specimens of *H. verbana* in The Netherlands.

Ecology: The majority of *H. medicinalis* records, 71 %, originate from sandy soil, 20 % from river areas and only 9 % from fens and clay areas other than river areas. Usually the localities have good to reasonable water quality, warm up easily and support a rich vertebrate fauna (amphibians, waterfowl and/or mammals) (Felix & Van der Velde 2000).

Distribution: Currently *H. medicinalis* is only known from about eleven populations in the provinces Zuid-Holland, Zeeland, Brabant, Limburg and Gelderland. In the past this species was much more widespread. The decline might have been caused by decline in water quality and changes in cattle-breeding (Felix & Van der Velde 2000).

***Barbronia assiuti/weberi*-complex**

There is a single record of a *Barbronia* species from The Netherlands. This specimen was collected in the river Waal at Opijnen on 23rd May 2003 on stones from a groyne, together with *Caspiobdella fadejewi*. This adult individual could not be identified on morphology only. As *B. assiuti* Hussein & El-Shimy, 1982 was a species from Egypt, it was non-officially published as *B. weberi* (R. Blanchard, 1897) (Haaren 2003). But during the international leech meeting in Leipzig in October 2003 the Dutch specimen could be verified with numerous

German specimens of *B. weberi* from the Clemens Grosser collection. It became clear that the German specimens were different from the Dutch specimens. In the Dutch specimen two accessory ventral copulatory pores in addition to the usual pores and numerous minute papillae on the body surface are clearly present. In contradiction to the German specimens of *B. weberi* and the description in Neubert & Nesemann (1999) the body is slightly compressed, less long and therefore resembles *B. assiuti*. Hasko Nesemann (pers. comm.) even suggested that it might be *B. assiuti* or even a new species. Until now it is not quite clear which *Barbronia* species does occur in The Netherlands.

B. weberi originates from south- and eastern Asia, but was collected in Europe in the 1970's in England, in 1994 in an industrial pond of BASF at Ludwigshaven and in an old riverbed of the Rhine at Mannheim. In 1995 it was collected in Milstätter See, Austria and in 1998 in the river Rhine at Koblenz (Nesemann 1997, Potel et al. 1998). *B. assiuti* is only known from the lower Nile in Egypt.

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