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The occurrence of *Glossiphonia verrucata* in The Netherlands (Hirudinea: Glossiphoniidae)

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With 2 figures and 1 table

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Glossiphonia verrucata is recorded for the first time from The Netherlands. The records are partly based on misidentifications of *G. paludosa*, which has to be removed from the Dutch list.

1 Introduction

Leeches of the genus *Glossiphonia* are inhabitants of freshwaters. In The Netherlands this genus was until recently only known to be represented by two species; *G. complanata* (Linnaeus, 1758) and *G. paludosa* (Carena, 1824) (Drescher & Higler 1982, Cuppen 1994). *G. paludosa* was the most rare species of these two with hitherto only few records. The collectioning of three specimens of *G. verrucata* near Vianen gave rise to an evaluation of all possible records of this species in The Netherlands, including all records of *G. paludosa*. During this revision it soon became clear that *G. paludosa* had been confused with *G. verrucata* in the past. Therefore, *G. paludosa* has to be removed from the Dutch list. As *G. verrucata* in at least a great part of its distribution area is a rare and threatened species (Wilkialis 1996), we take the opportunity to present the available data for this species in The Netherlands.

2 Material

Several records of *G. verrucata* by Cuijpers & Damoiseaux (1981) actually belonged to the species *G. nebulosa* and two of records of *G. paludosa* by the same authors could not be verified due to loss of specimens. The record of *G. paludosa* by Van Zwieten (1981) referred to a specimen of *Alboglossiphonia heteroclita* s.l. (Cuppen 1994). Finally, the records of *G. paludosa* by Cuppen (1994) and Van Beek & Munts (1998) actually belonged to *G. verrucata*.

G. verrucata has been collected on three localities in The Netherlands. Detailed information on locality, date, number of specimens, collector and collection are as follows:

1. Province of Gelderland, Geldermalsen, De Regulieren, ditch (Amersfoort-coordinates 146-438), 05-1988/31-07-1989, many specimens, leg. J. Cuppen, coll. Naturalis (Leiden), Zoological Museum (Amsterdam), Wageningen University (Wageningen), J. Cuppen, H. Cuppen and M. Soes
2. Province of Zuid-Holland, Eiland van Dordrecht, Sluiskil (Amersfoort-coordinates 105-419), 05-1988/31-07-1989, 1 specimen, leg. & coll. Bureau Waardenburg
3. Province of Utrecht, Vianen, Polder Autena, ditch (Amersfoort-coordinates 138-441), 11-07-2002, and 12-02-2004, 5 specimens, leg. Bureau Waardenburg, coll. M. Soes and C. Grosser

3 Description and diagnosis

G. verrucata is a medium sized, oval leech. Dutch material reached up to 16 mm in length, but the species maximum size is much larger (Wilkialis 1996). The head is large and not bulbous. The basic colour is greenish, with a irregular pattern of dark spots (Fig. 1). There are two or three pairs of eyes, of more or less equal size. Prominent, large papillae are present on two of each three mid-body segments. The body margin is heavily serrated.

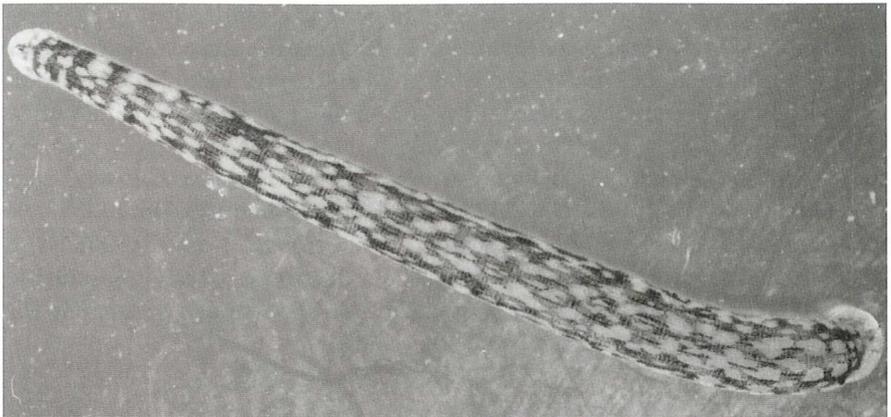


Fig. 1: Living *Glossiphonia verrucata*, Regulieren near Geldermalsen, The Netherlands

The diagnosis is based on the descriptions by Nesemann & Neubert (1999) and Økland (1988). Our specimens were also compared with the pictures in Sawyer (1986) and Wilkialis (1996). In the past taxonomic problems with the species *G. verrucata* raised mainly due to confusion with the long neglected species *G. nebulosa* Kalbe, 1964 and/or *G. paludosa*. Nesemann & Neubert (1999) give

clear characters for separating these three species. *G. paludosa* differs by having no papillae and *G. nebulosa* can be separated from *G. verrucata* by not having a pattern of dark spots and having a different shape of its body.

4 Distribution and biotope

The three localities with *G. verrucata* are all situated in the central part of The Netherlands (Fig. 2). These localities will be described in more detail below. The first locality was studied during more than one year (Cuppen 1994), the second locality was visited only once, and the third locality two times.

The first locality is a dead-end ditch in the nature reserve De Regulieren near Geldermalsen. The ditch has a width of 3.0 m and a depth of 40 cm during summer and 60 cm during winter. The soil consists of a ca. 2 cm thick layer of darkbrown detritus on greyish clay. The ditch had a sparse emergent vegetation (coverage < 2 %) of *Glyceria*, *Carex*, *Rumex*, *Juncus* and *Iris*. The floating leaved vegetation was strongly dominated by *Spirodela polyrhiza* with a coverage of > 90 % in the summer of 1988 and 40 % in the summer of 1989. The submergent vegetation was dominated in the summer by *Elodea nuttallii* and *Lemna trisulca* with a coverage of > 70 % (Cuppen 1994).

The second locality, the Sluiskil, is seven meter wide with a maximum depth of 1.2 m. The soil consists of a ca. 25 cm thick layer of detritus on sand. The Sluiskil had a sparse emergent vegetation of *Rumex hydrolapathum*, *Glyceria maxima* and *Carex riparia*. The floating leaved vegetation consisted of *Hydrocharis morsus-ranae*, *Nuphar lutea* and *Callitriche spec.* with a coverage of < 2 %. Submergent vegetation was absent (Van Beek & Munts 1998).

The last locality is a ditch in the Polder Autena near Vianen. The ditch had a width of 2.5 m and a depth of 10-35 cm during summer and 5-15 cm during winter. The soil consists of a thick layer of detritus on clay. The ditch had some emergent vegetation (coverage about 5 %) of *Glyceria fluitans*, *G. maxima*, *Myosotis scorpioides*, *Rorippa nasturtium-aquaticum* and *Equisetum fluviatile*. The floating leaved vegetation was strongly dominated by *Lemna minor*, *L. trisulca*, *Callitriche spec.* and *Spirodela polyrhiza* with a coverage of about 50 %. The submergent vegetation was dominated in the summer by *Callitriche spec.*, *Ceratophyllum demersum*, *Chara vulgaris*, *Elodea nuttallii* and *Lemna trisulca* with a coverage of about 95 % (Bak & al. 2003).

The physico-chemical spectrum of these waterbodies is given in table 1. This table shows the arithmetic means, the maximum and minimal value of several variables measured at the three localities. These values are within the ranges which can be expected in Dutch fresh water ditches. The rather high maximum chloride value was only temporary.

The accompanying leech fauna on the three sampling-localities was remarkable uniform. The common species *Erpobdella octoculata*, *E. nigricollis*, *Glossiphonia complanata*, *Alboglossiphonia heteroclita* s.l., *Helobdella stagnalis*, *Hemiclepsis marginata* and *Theromyzon tessulatum* were present at each of the three localities. *Piscicola geometra* s.l. was only present in very low numbers at the Regulieren.



Fig. 2: Distribution of *Glossiphonia verrucata* in The Netherlands

Tab. 1: Physico-chemical spectrum of waterbodies with *G. verrucata* in The Netherlands

	pH	Conductivity µS/cm	Cl ⁻ mg/l	O ₂ %	NH ₄ mg/l N	NO ₂ mg/l N	NO ₃ mg/l N	Total PO ₄ mg/l P	SO ₄ mg/l
mean	7.7	511	103	63	0.52	0.04	0.26	0.19	23
max	9.3	823	456	146	7.10	0.06	0.77	1.13	39
min	6.2	197	12	20	0.03	<0.002	0.07	0.04	7

5 Discussion

In this study the occurrence of *G. verrucata* in The Netherlands could be settled. This mainly boreal species is known from Ireland, Great Britain, Norway, Sweden, Denmark, Poland, Germany (Tegeler lake near Berlin, Upper Danube) and former Russian states (Bennike 1943, Nesemann & Csányi 1993, Nesemann & Neubert 1999, Økland 1988, Sawyer 1986, Wilkialis 1996). Records from Belgium, France, Switzerland and Italy need confirmation as due to taxonomical problems in the past confusion with *G. nebulosa* is likely (Bacchetta & Magnetti 1999, Sawyer 1986). So far the populations in The Netherlands seem quite isolated as no populations are known in the western part of Germany. The findings of *G. verrucata* along the upper Danube in Germany are regarded as Pleistocene glacial relicts (Nesemann & Csányi 1993). However, the presence of *G. verrucata* should not be considered as a Pleistocene glacial relict in The Netherlands, as all localities are situated in the Holocene parts of the country.

Within The Netherlands *G. verrucata* seems to be very rare (Fig. 2). Wilkialis (1996) and Bennike (1943) found this species to be rare in Poland and Denmark, respectively. Thus, rarity in a certain country seems to be not an exception for this species. The few records of *G. verrucata* in The Netherlands might be due to overlooking of this species. However, several specialists in the identification of macrozoobenthos stated after having seen specimens of *G. verrucata*, that they with certainty never had seen it before. Especially the green colour, which stays quite a while after preservation in 70 % ethanol, will alert experienced researchers. The extensive study of macrozoobenthos in Dutch waters for reasons of water quality management in combination with the statements above justify the conclusion that *G. verrucata* is a very rare species in The Netherlands.

At the different sites densities of *G. verrucata* were remarkable low. In the Regulieren, the population was followed during one year at monthly (winter) or two weekly (summer) intervals. The mean density was less than two specimens per square metre (Cuppen 1994). All other leech species, with the exception of *Piscicola geometra* s.l., occurred here in much higher densities. Also at the other two localities densities were low, less than one specimen per square meter. It is concluded that *G. verrucata* is not only nationally a rare species, but also on local scale occurs in low densities.

G. verrucata is known from oxbow lakes, ponds and slow running stretches of rivers and streams. Often this species is associated with well developed submersed vegetations of e.g. *Chara* or *Elodea* (Bennike 1943, Nesemann & Neubert 1999, Økland 1988, Wilkialis 1996). In The Netherlands the species was found in shallow, standing waters. Two water bodies had a dense aquatic vege-

tation, the third one had only a sparse vegetation. The water quality on the sites of this species was reasonable to good according to Dutch standards. The physico-chemical spectrum of waters with *G. verrucata* when compared with spectra of other species of leeches shows that *G. verrucata* does not have high demands for water quality (Grosser & al. 2001). Waters like the ones in which *G. verrucata* has been found in The Netherlands are very abundant in The Netherlands and contrasts with the rarity of the leech.

It is clear that *G. verrucata* is a very rare species in The Netherlands. With the present information it is not possible to give a thorough explanation for its rarity. Its requirements based on analysis of the Dutch sites suggest that the species is not high demanding on water quality variables nor vegetation. A better study of all aspects of the ecology of this leech seems necessary for a better understanding of the relationships between occurrence, rarity and biotope.

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