

## The status of the larger waterstriders in The Netherlands (Heteroptera: Gerridae)

by

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**ABSTRACT.** — Of each of the three species *Gerris najas*, *G. paludum* and *G. rufoscutellatus*, maps indicating fluctuations in distribution within The Netherlands are given, based on recent collecting data, literature and museum specimens. In addition, life cycles and general distributions are discussed.

### Introduction

By larger waterstriders are meant the representatives of *Gerris* belonging to the subgenera *Limnoporos* Stål and *Aquarius* Schellenberg. Three species occur in The Netherlands: *Gerris (Limnoporos) rufoscutellatus* Latreille, *Gerris (Aquarius) najas* DeGeer, and *Gerris (Aquarius) paludum* Fabricius (Nieser, 1982). A special distributional study of *G. najas* in The Netherlands was published by Higler (1967). Data on the other two species are rather scanty, but some can be found in Blöte (1930) and Reclaire (1932, 1951).

The object of this paper is to compile the available data, both from literature and collections, to see how these species have fared in The Netherlands in the last decades.

### Acknowledgements

Many people helped by providing records or allowing us to study collections in their care. Apart from the Museums of Amsterdam, Leiden and Wageningen we had also cooperation of several provincial Water Boards. Two colleagues are to be mentioned specifically, dr. H. P. J. J. Cuppen (Milieuraad, Apeldoorn) for a number of important recent records and dr. L. W. G. Higler (Rijksinstituut voor Natuurbeheer, Leersum) for providing the notes and other materials on which his 1967 paper was based.

### Identification

The three species dealt with in this publication can be distinguished from other NW European species of *Gerris* and between each other by the following characters.

1. Length of antenna subequal to or slightly longer than half the bodylength; hind femur longer than intermediate femur. (Length 13-17 mm, nearly always macropterous, pronotum warm reddish brown, first antennal segment shorter than 2 and 3 combined) ..... *Gerris (Limnoporos) rufoscutellatus*
- Antennae shorter than half the body length; hind femur shorter than or subequal to intermediate femur ..... 2
2. Length 13-17 mm, apices of connexiva long and pointed; hind margin of seventh sternite of ♂ with simple concavity. (First antennal segment longer than 2 and 3 combined) ..... 3
- Length up to 14 mm, apices of connexiva not long and pointed; hind margin of seventh sternite of ♂ with double concavity (except in *lateralis* Schumacher which has a length under 12 mm) ..... *Gerris (Gerris)*
3. Apices of connexiva reaching up to or beyond the apex of the abdomen. (Pronotum laterally with a yellow line; macropters and brachypters) ..... *Gerris (Aquarius) paludum*
- Apices of connexiva do not reach the apex of the abdomen. (Pronotum laterally dark, sometimes with a yellowish dot; the rare macropters have a narrow lateral line on pronotum) ..... *Gerris (Aquarius) najas*

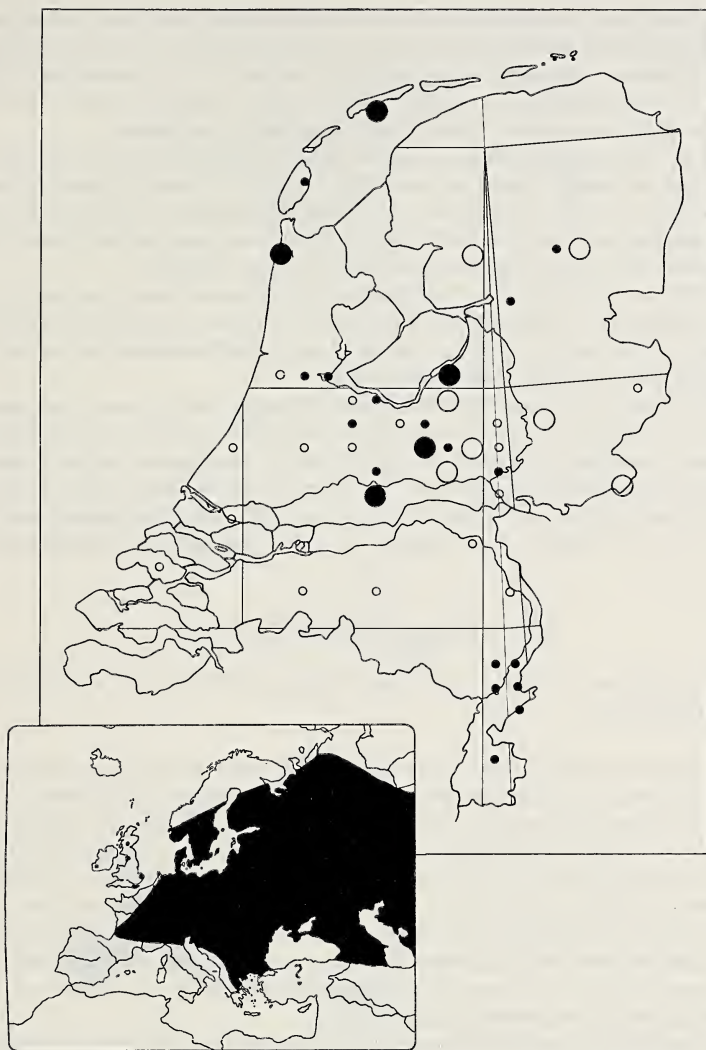


Fig. 1. Distribution of *Gerris rufoscutellatus* Latreille in The Netherlands and Europe.

○ record before 1926; ● record between 1926-1950; ○ record between 1951-1975; ● record after 1975.

*Gerris (Limnopus) rufoscutellatus* Latreille, 1807

*Gerris rufoscutellatus* Latreille, 1807: 136 Poisson, 1957: 218-219, fig. 156; Nieser 1982: 40, figs 88, 95.

The species is common in Central and Eastern Europe (fig. 1). According to Kanyukova (1982) it also occurs in Asia, up to Japan. American records refer to related species. In NW Europe the species is not common. Leston (1956) concludes that *G. rufoscutellatus* is an irregular immigrant in the British Isles and does not breed there.

The Dutch records are compiled in fig. 1. The data on which the maps are based, can be found in more detail in the databank of E.I.S. (RMNH, Leiden). Most Dutch records, espe-

cially in the West have been singletons. In view of the available data there are probably a few reproducing populations in the East and Centre of The Netherlands, but many records refer to migrating individuals. Although the total number of catches of *G. rufoscutellatus* is about the same as for *G. paludum* the former species is more evenly distributed. It seems to be a wide-spread but scarce species. At Weerribben a large population has established.

In Europe *G. rufoscutellatus* occurs on various types of stagnant waters, from fresh to slightly brackish, and on quietly flowing streams. This variability in habitat is probably also due to the strong migratory habits of the species. According to Vepsäläinen (1973) larval habitats are more restricted, predominantly semipermanent or permanent ponds and lake shores with fairly strong insolation, dense shore vegetation and modest aquatic vegetation.

The life cycle has been studied by Vepsäläinen (1974a), whose observations were essentially based on populations in S. Finland. He found adults throughout the season from mid May to mid October. Larvae have been found from mid June to mid September and on one occasion larvae from 2nd to 5th instar were still found on 4. X.

The species is univoltine from Finland to Austria although there are some indications that a few early ♀♀ may oviposit the same season they moult. It is essentially a monomorphic macropterous species, retaining the capacity of flight during the reproductive period although a few brachypterous specimens have been found. There are no data available on life cycles of Dutch populations. The earliest record in the season was on 13. III. 1949 (Wageningen) and the latest one was on 21. X. 1948 (also at Wageningen). All Dutch specimens in collections are macropterous.

*Gerris (Aquarius) najas* (DeGeer, 1773)

*Cimex najas* DeGeer, 1773: 311; *Gerris najas* Poisson, 1957: 222-223, fig. 159-160; Nieser 1982: 40, figs 69, 87, 96.

We are inclined to consider *Gerris cinereus* (Puton) a separate species, as it has been found together with *G. najas* in S. Portugal and S. Spain (Nieser, 1983 and unpublished). In the Balearic Islands *G. najas* only has been found (Nieser & Montes, in press), N. African specimens seen by us are *G. cinereus*. Interesting is an observation by Thiery (1981) who recorded *G. najas* in Morocco at altitudes over 1000 m and *G. cinereus* at lower altitudes. The distribution in Europe (Nieser, 1978) is given in fig. 2. It is essentially a European species with only a few records from Russia, especially in the Leningrad area (Kanyukova, 1982). In the East Mediterranean *G. najas* has been found in Greece (Zimmermann, 1982). Records from Turkey and the Levant apparently refer to *G. ventralis* (Hoberlandt, 1948; Nieser & Moubayed, in press) which is the common streamdwelling *Aquarius* there.

A special study of the status of this species in The Netherlands was made by Higler (1967) who compiled the data then available and visited nearly all localities with reasonable possibility of occurrence of the species. His data are shown in fig. 2, which also indicates the decline of the species. The actual situation is even worse as several of the quadrants, in which Higler found the species contained two or more populations. We have found more than one population only in quadrants 20-30 and 20-31 (Table 1).

So the decline already noted by Higler has continued strongly and the status of this species in The Netherlands is now precarious. We have observed only two strong populations (1000 or more specimens in late summer), the remaining populations count only smaller numbers. The localities in which we found the species fulfill the conditions mentioned by Higler (1967), viz. meandering brooks in woods with shaded water. An additional factor may be the absence of run-off of excess dung. Some of the streamlets near Breda (26-24) had stretches which looked like suitable habitats. The most important change since 1967 near those localities seems to be more intensive agricultural practices, especially increased cultivation of maize, which is accompanied by heavy dressing.



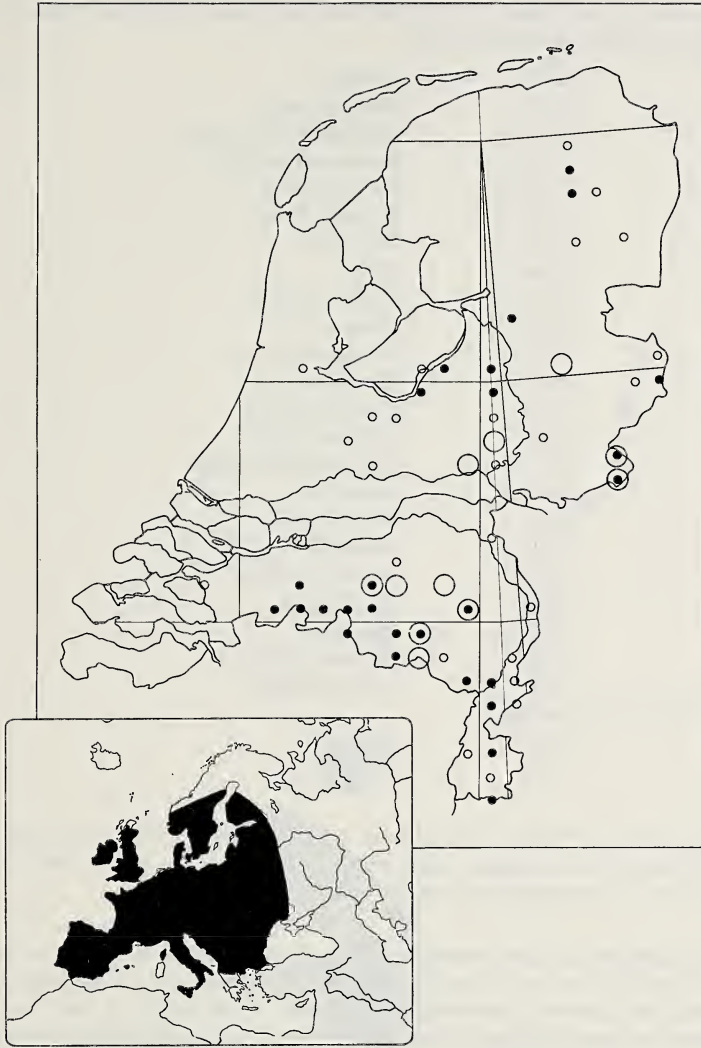


Fig. 2. Distribution of *Gerris najas* (DeGeer) in The Netherlands and Europe.

○ published records based on specimens collected before 1960, not found back by Higler (1967); ● published records based on specimens collected in 1960-1966, not found back in 1983-1985; ⊙ published records based on specimens collected in 1960-1966, still present in 1983-1985; ○ unpublished record (from collections) based on specimens collected before 1960, not mentioned by Higler (1967) and not found back in 1983-1985 either.

It has been suggested to place *G. najas* on a list of protected animals. Although this would do no harm, to prevent extinction of the species in The Netherlands it will be necessary to protect its few remaining habitats, rather than issuing a prohibition to collect an incidental specimen.

In Europe *G. najas* has been found on medium sized to large streams and, less frequently, on large ponds, lakes and canals. On streams it is mostly found at quiet places with low current, open water shaded by trees, often near bridges or overhanging banks. In The Netherlands *G. najas* is found exclusively on medium sized streams, along stretches with shade.

Table 1. Presence (+) or absence (-) in 1983/5 of *Gerris najas* in localities where this species was reported to be present by Higler (1967).

Province	E.I.S.	Locality	1983/5
Drenthe	08-30	Zeegserloopje	-
	09-29	Ruimsloot near Anreep	-
Overijssel	17-32	Ruenenbergerbeek	-
Gelderland	20-30	Henxelse Beek	+
	20-30	Ratumse Beek	+
	21-30	Willinkbeek	+
	21-30	Slinge	+
	16-20	Hoophuizerbeek	-
	16-22	Klaarbeek	-
	16-21	Tongerense Beek	-
N. Brabant	25-14	Broekloop	-
	25-14	Chaamse Beek	-
	26-14	Galderse Beek	-
	26-17	Reusel near Baarschot	-
	26-21	Astense Aa	+
Limburg	29-21	Ittersche Beek	-
	29-21	Thornder Beek	-
	29-22	Grathemse Beek	-
	30-22	Middelgraaf	-
	32-22	Bisse Beek	-
	32-22	Hulsberger Beek	-
	34-22	Geul near Epen	-
	Two new localities can be added:		
N. Brabant	25-17*	Beerze	+
	27-19	Tongelreep	+

Two specimens in the Nieser collection from the population in EIS grid reference 25-17 are probably the source of the reference Vught without exact locality by Higler (1967). In 1960/66 the species did not occur within the boundaries of Vught.

The Dutch population at Asten was monitored in 1984. Development of oocytes starts in the beginning of April. By the end of April most specimens are in copula at daytime and oocytes are fully developed. Larvae I appear around mid June. By the end of August there were already a number of fresh adults and in the second half of September most specimens had had their final moult. Although small numbers of larvae I appear later in the season, most of these do not develop (they are probably eaten by elder specimens (Brinkhurst, 1966)) so that at a given time in summer the larvae of the population are nearly all of about the same age and instar, and there is only one generation/year. These observations agree with those of Brinkhurst (1966) and Von Mitis (1937). Macropterous specimens have not been observed by us and are extremely rare at Windermere (England). Those found there had, moreover, undeveloped indirect flight muscles (Brinkhurst, 1966). In the South of France (Poisson, 1957) and Portugal (Nieser, 1983) macropters are less rare.

A popular article on behaviour of *G. najas*, based on observations of a, now extinct, Dutch population at Hulshorst was published by Leentvaar (1941). Schreijer & Vertegaal (1976) published some observations on the population at Asten.

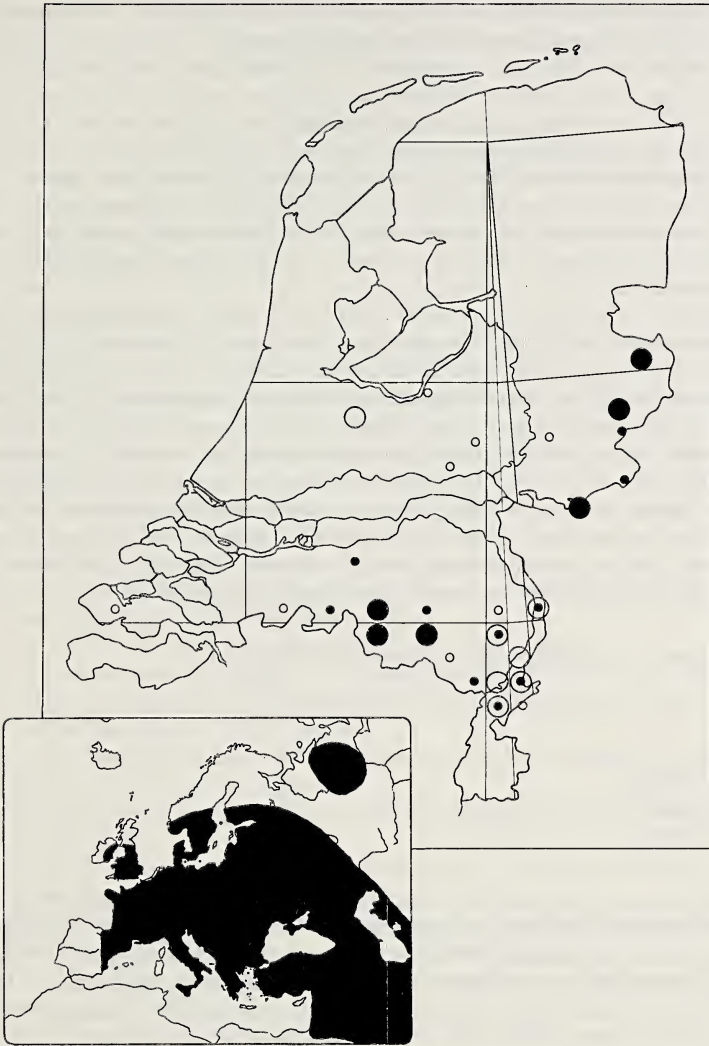


Fig. 3. Distribution of *Gerris paludum* Fabricius in The Netherlands and Europe.

○ record before 1976 on one occasion; ◯ record before 1976 on more than one occasion;  
 ● record after 1975 but only once and in small numbers; ● record after 1975, more than once or in large numbers; ⊙ record before 1976 and afterwards, the later collections from reproducing populations.

*Gerris paludum* Fabricius, 1794

*Gerris paludum* Fabricius, 1794: 188; Poisson, 1957: 220-222, fig. 157, 158; Nieser, 1982: 40, fig. 70; Kanyukova, 1982: 76-77, fig. 5, 90.

The distribution in Europe (Nieser, 1978) is summarized in fig. 3. The species is not common in the westernmost parts of Europe. The isolated area in N. Russia (Kanyukova, 1982) is probably connected with the main area. To the East *G. paludum* occurs throughout Central Asia to



Japan. Kanyukova points out that the Asian subspecies, apart from *G. p. anamiensis* Miyamoto, from the Ryukyu Islands, do not deserve subspecific status.

Fig. 3 compiles the records of *G. paludum* in The Netherlands. Until recently it was considered to be a rare species, poorly represented in collections except in the Cobben (Wageningen) collection. There is a strong suggestion that the species has expanded westward, especially into the province of North-Brabant since 1950. Nowadays *G. paludum* occurs in several localities around Eindhoven (quadrants 26-18; 27-18; 26-20 and 27-20) where it was absent in the period 1950-1955 when the senior author visited this area regularly. On the other hand, in spite of its size, the species may escape the attention of the casual collector and the data may partly reflect the fact that little thorough collecting was done in the past, apart from Cobben's activities in the Roermond area.

In Europe *G. paludum* occurs on larger water bodies without vegetation in the central part, such as quiet rivers, canals, larger ponds and various lakes; it occurs rarely at altitudes over 1000 m. All records from The Netherlands are from habitats on sandy soil, but trophic conditions do not seem relevant. Shore vegetation or bushes are a requirement, as they provide shelter and form a substrate for oviposition. In our country *G. paludum* has rarely been found on running waters. It was collected (table 2) on a few canals, but, more often, on larger ponds (1 ha or more), which are not used for sailing or windsurfing. Specifically the species occurs on a number of fish ponds. Not for rearing fish, but those which are stocked with fish for angling. This type of recreative pond has increased in numbers, at least in North-Brabant, over the last two decennia. This increase in potential habitats may have been one of the factors stimulating the apparent expansion of the species in the Southern part of our country.

Table 2. Types of habitats on which *G. paludum* was collected.

Brooks	3
Canals	5
Fish ponds	5
Ponds in sandy soil	3
Ponds in clay soil	2
Unspecified ponds	5

*G. paludum* is a bivoltine species in England (Brinkhurst, 1959) and in Central Europe (Von Mitis, 1937; Nieser 1981), with a monomorphic brachypterous summer generation which is rather short lived. Vepsäläinen (1974a, b) gathered rather inconclusive data on Finnish populations and found a dimorphic brachypterous/macropterous summer generation in Hungary. In The Netherlands available data point to the same cycle as found in England and Central Europe.

Table 3 shows the ratio of macropterous and brachypterous specimens in various months in Dutch specimens.

Table 3. Fraction of brachypterous and macropterous specimens in adult *G. paludum* collected in various months.

Month	1-15							16-31	
	X/III	IV	V	VI	VII	VIII	VIII	IX	
Fraction brach.	—	0	0	0	.25	1	.16	0	
Fraction macr.	—	1	1	1	.75	0	.84	1	
Number of specimens	—	25	16	36	24	10	43	40	

Brachypters occur in significant numbers by the end of July and beginning of August only. The population at Mariapeel was monitored during the season of 1984. Four adults observed on 20.VII. were all brachypterous. On 6.IX. all adults observed were macropterous and there

was still a large fraction of larvae (mostly instar V). The size of the population on 6.IX.84 was distinctly smaller than on 26.VIII.83, probably due to the rather cold summer.

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Dit overzichtswerk van de hand van de nestor der Duitse myrmecologen behandelt een aantal aspecten van de sociobiologie en ecologie van mieren. Door de nadruk op veldbiologische gegevens en de fraaie illustraties is het met name geschikt als introductie tot deze diergroep. De opgenomen determineersleutel voor de werksterkaste van Middeneuropese soorten bestrijkt tevens de gehele Nederlandse mierenfauna. De ervaring leert echter dat determinaties in soortenrijke genera zoals *Myrmica* moeizaam kunnen verlopen als niet ook mannetjes en koninginnen verzameld zijn. Recente werken van Kutter (1978) en Collingwood (1979) geven sleutels voor alle kasten en kunnen in dergelijke gevallen uitkomst bieden.

De hoofdstukken „Beispiele von Ameisenarten” en „Parasiten der Ameisen” vatten de veelal oude en weinig toegankelijke literatuur op dit terrein uitstekend samen en zijn als zodanig zonder precedent. Hoofdstukken over „Die Entwicklung des Ameisenstaates”, „Komplexe Gesellschaften” en „Nestbau” geven een breed overzicht en zijn ongeveer gelijkwaardig aan soortgelijke hoofdstukken bij Wilson „The Insect Societies” (1971) en Brian „Social Insects Ecology and Behavioural Biology” (1983). Bij een vergelijking met deze en andere recent verschenen boeken over sociale insecten (zie recensie Brian (1983) door H. H. W. Velthuis, *Ent. Ber.* 44, 1.X.1984) blijken evenwel tevens de beperkingen van Gösswalds boek.

Het totaal aantal van 136 verwijzingen in de literatuurlijst steekt wat schril af tegen de — wat mieren betreft — circa 500 in Brian (1983) en circa 650 in Wilson (1971). Met name het ontbreken van Engelstalige referenties (slechts 4 van na 1970) is opvallend. Een aantal belangrijke ontwikkelingen in het onderzoek aan sociale insecten, die de afgelopen 20 jaar vooral in de Angelsaksische landen plaatsvonden, blijven dan ook volledig onvermeld. Het feit dat dit boek kennelijk niet primair bedoeld is voor een publiek van wetenschappers is nauwelijks als excuus hiervoor aan te voeren, aangezien de hoofdlijnen van polymorfisme, haplodiploïde kastendeterminatie en -verwantschappen, werkster-koningin conflict, kin-selectie, oudermanipulatie en optimalisatie theorie zeer wel in niet mathematische termen en voor een brede lezerskring bespreekbaar zijn. Nu wordt de aandacht eenzijdig geconcentreerd op het concept van de mierenkolonie als harmonisch en gebalanceerd superorganisme en blijft de evolutionaire interpretatie in termen van natuurlijke selectie op gen- en individu-niveau geheel achterwege.

Voor wie met deze lacunes kan leven is dit boek een nuttige introductie in de myrmecologie, met veel voorbeelden van mieren dicht bij huis. Voor diegenen die een meer volledige en diepgaander benadering prefereren lijkt het me nuttig te weten dat de paperback uitgave van Wilson (1971) en Brian (1983) samen evenveel kosten als deze alleen in gebonden editie beschikbare uitgave. — J. J. Boomsma