

Two new records of *Somatochlora flavomaculata* from The Netherlands (Odonata: Corduliidae)

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Abstract: Two new records of *Somatochlora flavomaculata* (Vander Linden) from The Netherlands were made in 1982, following a nine-year period of apparent absence of the species. Both records, one from the Province of Drenthe and one from the Frisian Island of Vlieland, probably refer to immigrants; the status of this species as indigenous remains uncertain.

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Introduction

During an ecological study on dragonflies in the Fochteloërveen peat moor in 1982 (Beukeboom, 1985), *Somatochlora flavomaculata* (Vander Linden, 1825) was recorded in The Netherlands after having been apparently absent for nine years. In the same year it was also observed on the Island of Vlieland.

Orange spots on the frons near the edges of the eyes, yellow side marks on the abdominal segments 1-8, and the structure of the appendages are characteristic for this species (Geijskes & Van Tol, 1983).

One old female of this species (in coll. Rijksmuseum van Natuurlijke Historie, Leiden) was captured on 4 August 1982 in the Bankenbosch, a part of the Fochteloërveen. The latter is an extensive peat moor at the border of the provinces of Drenthe and Friesland in the northeastern part of The Netherlands (UTM-grid number LD2577). The female was attacked by a male of *Somatochlora metallica* (Vander Linden, 1825) while flying over a drainage canal. During the struggle which followed it dropped into the water, where it was collected. The drainage canal runs through an area of mixed forest on peaty soil; it is about 6 m wide and 1 m deep and holds stagnant water. The banks are mainly covered with grasses and ferns, some parts have overhanging shrubs.

On the same day a male of *S. flavomaculata* (det. T. Zeegers and others) was caught at the Nieuwe Eendenkooi on the Dutch Frisian Island of Vlieland (UTM-grid number FV3405), a duck pond with shallow water on sandy soil and surrounded by high trees. It is one of the few fresh water bodies on the island. One male and one female were seen two days later in the same place, sitting on a tree ca. 8 m above ground level (identification by use of a 40× telescope). Both individuals were sunning and made short flights from their positions.

Distribution, habitat and status of *S. flavomaculata*

S. flavomaculata is a lowland species with a distribution ranging from Western Europe to 90° E in Siberia and from the Mediterranean to southern Scandinavia (fig. 1) (Belyshev, 1973; Niehuis, 1984; St. Quentin, 1960; Schmidt, 1978). It does not occur on the British Isles (Hammond, 1983). The area comprising The Netherlands, Belgium, Luxemburg and northern German Federal Republic can be regarded as an area of disjunct distribution. A continuous distribution runs from northern France via southern German Federal Republic and western German Democratic Republic to southern Sweden (Altmüller et al., 1981;

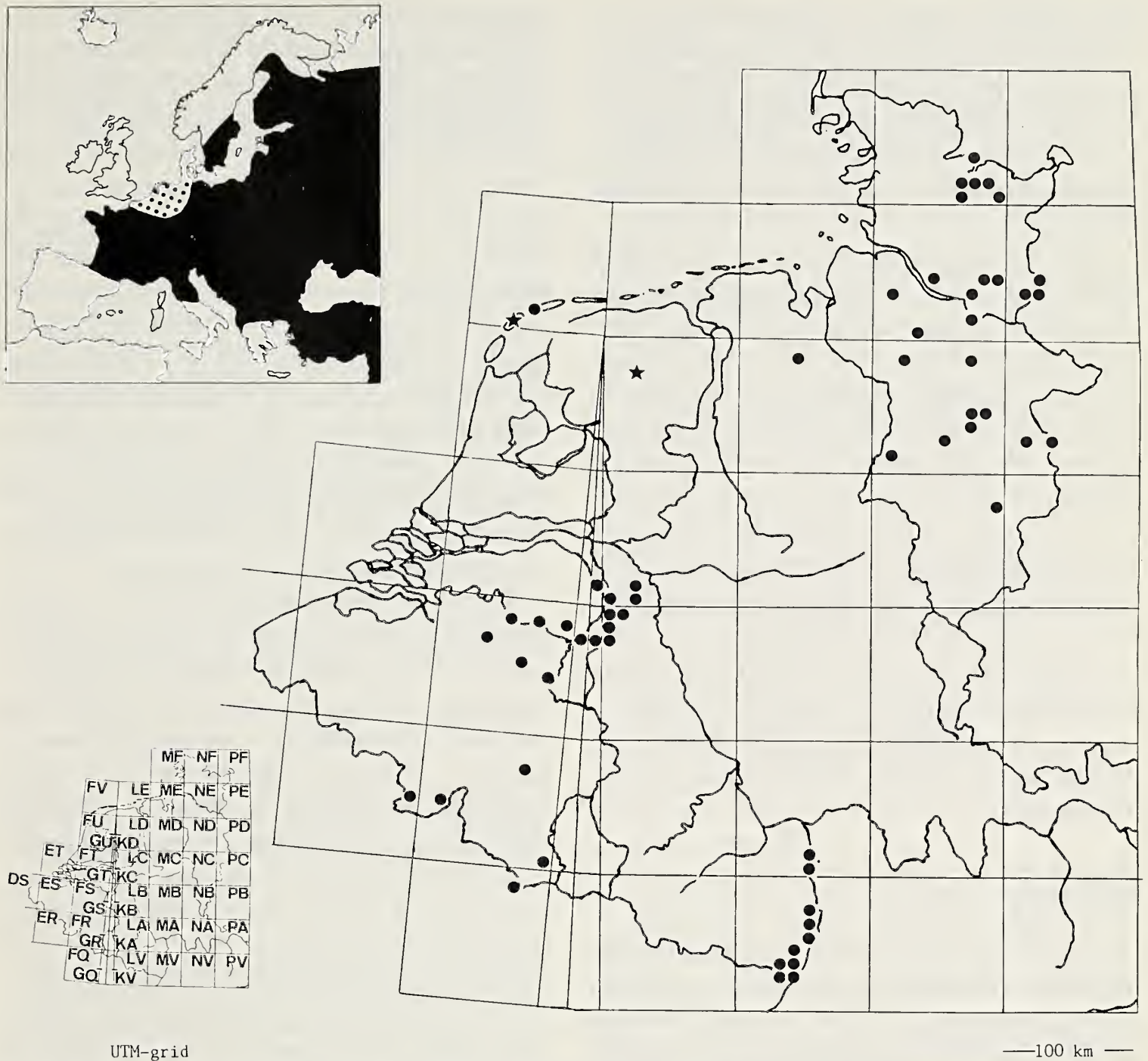


Fig. 1. Distribution of *Somatochlora flavomaculata* in Europe and records from The Netherlands and adjacent areas after 1960 (data from Aguilar et al., 1985; Altmüller et al., 1981; Geijskes & Van Tol, 1983; Greven, 1970; Härmäläinen, 1983; Jödicke, 1984; Kikillus & Weitzel, 1981; Michiels et al., 1986; Niehuis, 1984; Schmidt, 1977; Valtonen, 1980; Ziebell & Benken, 1982). The continuous distribution range is given in solid black, the disjunct distribution range is stippled. Records after 1960 are given as black circles, the new records of 1982 described in this article as stars.

Buchwald et al., 1986; Kuhn & Fischer, 1986; Michiels et al., 1986; Niehuis, 1984; Sahlén, 1985). Records from The Netherlands and adjacent areas after 1960 are shown in figure 1.

S. flavomaculata inhabits mainly mesotrophic peat moors, sedge marshes and reedlands surrounded by forests (Geijskes & Van Tol, 1983; Lohman, 1980). Males prefer to fly above small peat ditches and fens; they avoid open water. Females are found in forests flying over open spots and sandy tracks. Eggs are deposited in gullies in sedge vegetations. The larvae develop in the mud of these habitats

(Schiemenz, 1953). The flight period in The Netherlands lasts from May till August (Geijskes & Van Tol, 1983).

Before 1940 *S. flavomaculata* was indigenous and locally abundant in the southern part of The Netherlands (Van Tol & Geijskes, 1981, Geijskes & Van Tol, 1983). After 1940 it was rediscovered by Greven (1970) in six localities in the province of Limburg. In 1969 it was observed at Gritjesplak on the Frisian Island of Terschelling (1 adult 12.viii.1969, record in dragonfly archives of the European Invertebrate Survey). Belle (1972) found the species in

De Malpie, Borkel, Valkenswaard (3 ♂ 7.vii.1970, 4 ♂ 12.vii.1970). It was also collected by Mol (1980) at this locality (1 ♂ 1.vii.1973). By 1973 this population appears to have been exterminated, there are no further records. The records of 1982 are the first after nine years.

The nearest existing populations are known from the German Federal Republic, east of Roermond (at least one population in UTM-grid number KB97; Jödicke, 1984 & pers. comm.). In Belgium populations are known at four places, namely Postel, Rekem, Hachy and Virelles (Michiels et al., 1986 & pers. comm.). Further to the southeast several populations can be found in Rheinland-Pfalz along the river Rhine (Niehuis, 1984). These populations can be regarded as the nearest ones being part of the continuous distribution range. There are no populations known anymore in western Lower-Saxony (pers. comm. R. Altmüller), eastern Lower-Saxony (pers. comm. R. Wagner) and Schleswig-Holstein (pers. comm. E. Schmidt).

Discussion

The question arises whether these new records represent individuals from newly established local populations, or refer to migrants from abroad. The latter explanation seems to be the most likely. First of all, only few individuals were seen. Moreover, all records fall within a very short period. Suitable habitat for reproduction is scarcely available. Although both new localities have several features which correspond to the habitat preferences of both sexes, reproduction at these places seems to be unlikely, because mesotrophic conditions with vegetations of sedges were lacking. A possible favourable site for reproduction was found in the southern part of the Fochtelooërveen, ca. 4 km from the Bankenbosch locality; a drainage canal with seepage and a dense *Carex* vegetation (Beukeboom, 1985). However no adults were found at this place. Another reason is the suitable weather conditions for migration during the preceding days. Dragonflies are known to migrate during periods of hot

weather following a spell of cool weather (Dumont & Hinnekint, 1973). The weather of the 6 days preceding the first day of recording had been fine, with maximum temperatures between 28-31 °C. Previously, a period of cooler weather had occurred with maximum temperatures between 20-24 °C and some rainfall. Records of migrating butterflies during the same period (Lempke, 1983) also suggest that it was a favourable time for migration. Finally, records of single individuals are known from other islands such as the West Frisian Island of Terschelling, the East Frisian Island of Wangerooge (Heymer, 1958) and Helgoland (Schmidt, 1980). These fall far outside of the normal distribution range and do suggest that this species can travel long distances.

Judged by the present distribution, a migration from the south seems to be the most probable one. Dragonflies are generally believed to use optical landmarks for their orientation, e.g. the coastline, riverbanks, or even treelines and railways (Dumont & Hinnekint, 1973; Schmidt, 1974). With a probable migration along landmarks in mind, a migration of individuals originating from the large populations in Rheinland-Pfalz by way of the river Rhine seems to be a fair guess.

In The Netherlands *S. flavomaculata* is severely endangered according to Geijskes & Van Tol (1983). The indigenous status of this species in this country is questionable. Potential breeding habitats have disappeared almost completely. Climatological conditions may also play a role in the establishment and survival of populations.

Protection of *S. flavomaculata* can only be achieved by preservation of its habitat. Creating new habitats by regenerating peat moors may improve the chances of re-establishment of this species in The Netherlands (Beukeboom, 1986; Wildermuth & Krebs, 1983).

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