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IMMIGRATION OF ECHINOGAMMARUS (STEBBING, 1899) (CRUSTACEA: AMPHIPODA) INTO THE NETHERLANDS VIA THE LOWER RHINE

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ABSTRACT

Echinogammarus ischnus (Stebbing), new to the Netherlands, has recently been recorded from two localities in the Lower Rhine, close to the Dutch-German border.

INTRODUCTION

River engineering, discharge of industrial, agricultural and domestic waste, as well as industrial cooling water effluents have drastically changed the Rhine ecosystem. As a result, the original fauna was impoverished, while a large number of allochthonous macroinvertebrates invaded the ecosystem filling the empty niches (Van den Brink et al., 1990, 1991). Since the beginning of the 1980s the number of immigrants in the Lower Rhine is increasing rapidly. These immigrants include a large number of macrocrustaceans, with the amphipods *Corophium curvispinum* Sars, 1895 and *Gammarus tigrinus* Sexton, 1939 as the dominant species at present (Van den Brink et al., 1990, 1991, 1993). The invasion of *G. tigrinus* in the Lower Rhine in 1983 (Van Urk & Bij de Vaate, 1990) has reduced the numbers of the autochthonous *G. pulex* (L., 1758) in this river. Since 1987 the brackish water amphipod *G. zaddachi* Sex-

ton, 1912 has been found in the freshwater part of the Lower Rhine, near Nijmegen, about 100 km upstream from its original distributional area (Den Hartog et al., 1989). In 1991 and 1992 a new amphipod invader, *E. ischnus* (Stebbing, 1906) has been recorded from the Lower Rhine in the Netherlands. This paper describes the first records of *E. ischnus* from the Netherlands. Reference material has been deposited at the Zoological Museum Amsterdam, the Netherlands (ZMA, Amph. 109.130/109.131).

IDENTIFICATION

Echinogammarus ischnus (syn. *Chaetogammarus ischnus*) see for revision of the genus Karaman (1977) can be easily distinguished from other gammarids by the following character (after Schellenberg, 1942) (Fig. 1):

1. Eyes are large, kidney shaped, close to the anteri-

or margin of the head, almost reaching the mid-dorsal line.

2. The third uropod (U3) is relatively large and robust; the inner part is extremely short, scaliform.
 3. Setation is absent or very sparse on peraeopods 5 to 7, on coxal plates 1 to 4, on the dorsal part of the urosome, and on the posterior parts of the epimera.
 4. The ventral margin of the first antennae (A1) up to the middle part and the whole ventral margin of the second antennae (A2) have long curled setae.
 5. The telson is very short, with two lateral spines and three dorsal posterior spines; setae are absent.
- The maximal body length is 12 mm for males, and 11 mm for females.

RECORDS

The species was observed during routine sampling of the stones of groynes of the Lower Rhine in the Netherlands for macroinvertebrates.

As we were carefully brushing the groyne stones, some amphipods, which later proved to be *E. ischnus*, drew our attention by the red colour of their antennae and uropods. In this red colour of the antennae the species resembles the closely related *Echinogammarus berilloni* (Catta, 1878). In both species the colour disappears after preservation in ethanol.

In order to search for more specimens we studied material collected from artificial substrata in the Lower Rhine at Lobith, the Netherlands, which had been sampled on a monthly basis since 1987, as part of a long-term biomonitoring programme (Bij de Vaate and Greijdanus-Klaas, 1990).

RESULTS AND DISCUSSION

E. ischnus belongs to the group of Ponto Caspian species that have advanced farthest in a northwesterly direction up to the North Sea and the Baltic Sea (Jazdzewski, 1980).

Outside its original distributional area, it was first recorded from the River Vistula in 1928. It had most probably arrived there via the rivers Dnjepr, Pripet

and Bug, and the Pripet-Bug Canal (Jazdzewski, 1980). More recently, in 1978, *E. ischnus* was discovered in the Dortmund Ems-Canal. The most probable route seems to be the well developed canal system joining the rivers Vistula, Oder, Elbe and Weser (Jazdzewski, 1980). During 1979-1981 the species was found at several locations in the Mittelland Canal (Herbst, 1982). At the end of the 1980s the species was collected from the Rhine-Herne Canal and from the Wesel-Dattel Canal (Schöll, 1990). These three canals are all connected to the Lower Rhine. In October 1989 the species was found in the German part of the Lower Rhine near Emmerich (Rhine km 857) with a population density of 100 specimens per m² (Schöll, 1990). In the Netherlands the species has been collected in the Lower Rhine near Lobith (Rhine km 860) from artificial substrates on 16 August (1 juvenile) and 27 September (1 female) 1991 and in the main branch of the Lower Rhine, the River Waal near Nijmegen (Rhine km 890.5) from groyne stones on 20 May (1 ovigerous female, 1 female with juveniles), 9 June (1 male) and 17 June 1992 (5 males, 1 ovigerous female, 2 postovigerous females with juveniles). Among the thousands of specimens of *G. tigrinus* monthly collected from the artificial substrates during January 1987 up to June 1992 only two specimens of *E. ischnus* were found. Since the last mentioned species was collected from the German part of the Lower Rhine, close to the Dutch localities, as early as 1989, it is remarkable that it took so long before *E. ischnus* was noticed here. Faunal investigations in the Lower Rhine in the Netherlands have been carried out annually, at least since 1973, and monthly since 1987. *E. ischnus* is regarded as a typical inhabitant of the lower reaches of large streams, the potamon. It lives predominantly in muddy sites under stones. It can be regarded as a eurythermous brackish water species (maximum salinity 13 ‰) (Schellenberg, 1942; Jazdzewski, 1980). It is difficult to predict whether *E. ischnus* will become a dominant species in the Lower Rhine. The presence of two other, earlier, and very successful invaders *Gammarus tigrinus* and *Corophium curvispinum* (Van den Brink et al., 1991, 1993) might prevent a mass development of its population. However, since no informa-

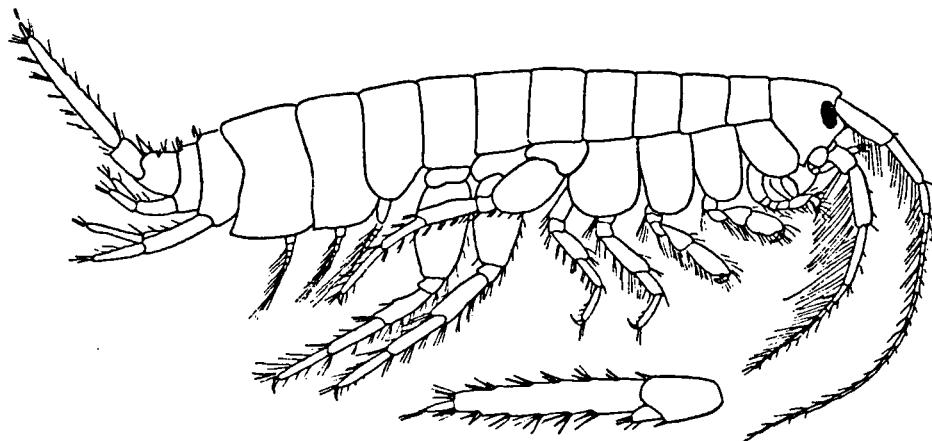


Fig. 1. *Echinogammarus ischnus*.

tion is available about the competitive ability of *E. ischnus*, it will be necessary to continue the faunistic examinations in the Lower Rhine and to study the life history of this new immigrant.

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