

*Lauterbornia* 38: 23-26, D-86424 Dinkelscherben, 2000-06-15

## **Range extension of the Asiatic clam *Corbicula fluminea* (MÜLLER 1774) in the River Danube: first record from Romania**

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With 1 figure and 2 tables

**Schlagwörter:** Corbicula, Bivalvia, Mollusca, Donau, Rumänien, Erstfund

**Keywords:** Corbicula, Bivalvia, Mollusca, Danube, Romania, first record

**Range extension of the Asiatic clam *Corbicula fluminea* was observed in the River Danube. On October 30, 1999, 26 living specimens were found in the downstream reaches, in the littoral zone of the right bank in the vicinity of Vadu Oii (river km 238), being the first observation of the species in Romania**

### **1 Introduction**

Asiatic clams, *Corbicula fluminea* (MÜLLER 1774) were found in 1997 for the first time in the River Danube in its upstream reaches in Germany (TITTIZER & TAXACHER, 1997). They were expected to reach this river from the River Rhine via the Main-Danube canal, the interconnection of both rivers basins which was opened in September 1992 for shipping (TITTIZER et al., 1994).

Colonisation of the River Rhine was concluded to start around 1986, after the species was found for the first time in the delta area in 1988 (BIJ DE VAATE & GREIJNDANUS-KLAAS, 1990; BLANKEN, 1990). Range extension in upstream direction in the River Rhine was estimated to place with a speed of about 85-115 km per year (BIJ DE VAATE, 1991). In 1990 the species was found in the middle reaches of the River Rhine (BIJ DE VAATE, 1991), and in November 1991 in the lower part of the River Main (KINZELBACH, 1991). Range extension in the next year was observed by SCHLEUTER (1992). When the upper reaches of the River Danube were colonised in 1997 (TITTIZER & TAXACHER, 1997), range extension in down stream direction (and in direction to the Ponto-Caspian area) could be expected. A new phenomenon because until now only macroinvertebrates from the River Danube were able to use the Main-Danube canal for range extension (e.g. BIJ DE VAATE & KLINK 1995, SCHLEUTER & SCHLEUTER 1995, KLINK & BIJ DE VAATE 1996, TITTIZER 1996a, REINHOLD & TITTIZER 1998, SCHLEUTER & SCHLEUTER 1998).

## 2 Methods

Living *C. fluminea* was collected manually from the bottom in the littoral zone. Sampling devices were lacking because it was not intended to collect macroinvertebrates during the visit to the location where they were found. Empty doublets of *C. fluminea* on the river bank attracted the attention and was the reason for looking for living animals. On the sampling date water level in the River Danube was relatively low enabling collection of the clams in the unusual way described. Shell dimensions of the specimens collected were measured with a callipers to the nearest 0.5 mm.

## 3 Results and discussion

On October 30, 1999, 26 living specimens of *C. fluminea* were found in the littoral zone of the right bank in the vicinity of Vadu Oii (river km 238). The bottom in which the animals were found consisted of a mixture sand and mud, characteristic for relatively slow flowing rivers. Shell length (measured from the anterior to the posterior margin) ranged from 9-20 mm (Fig. 1) indicating the presence of at least two generations (BIJ DE VAATE & GREIJIDANUS-KLAAS 1990).

Maximum shell length of the empty doublets was 32 mm.

Size ratios of the living specimens did not significantly differ from *C. fluminea* (n=79; range: 9-20 mm shell length) found in the Rhine delta (River Lek; sampling date June 15, 1998) in a comparable bottom (Table 1).

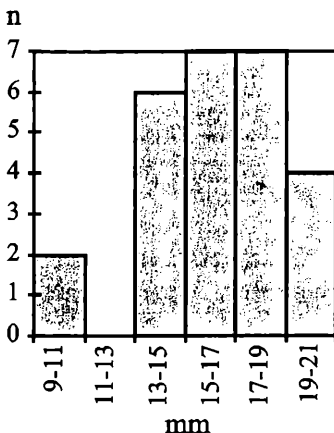


Fig. 1: length frequency of *C. fluminea* found in the river Danube

Although *C. fluminea* is new to the Romanian fauna, subfossil specimens of both *C. fluminea* and *C. fluminalis* were found in the flood plain of the Romanian part of the River Danube by GROSSU (1962). Obvious is that he already de-

scribed the same habitat requirements for both subfossil species as found for *C. fluminea* and *C. fluminalis* in the River Rhine: a muddy sand bottom and coarse sand to fine gravel respectively.

**Tab. 1. Overview of size ratios of *C. fluminea* found in the rivers Danube and Rhine**

| Ratio           | Mean   |       | Median |       | Range     |           |
|-----------------|--------|-------|--------|-------|-----------|-----------|
|                 | Danube | Rhine | Danube | Rhine | Danube    | Rhine     |
| length : width  | 1.48   | 1.61  | 1.48   | 1.60  | 1.40-1.60 | 1.46-1.74 |
| height : width  | 1.34   | 1.42  | 1.36   | 1.42  | 1.20-1.44 | 1.29-1.49 |
| length : height | 1.10   | 1.13  | 1.11   | 1.13  | 1.03-1.18 | 1.05-1.21 |

Based on the habitus, TITTIZER & TAXACHER (1997) were not able to identify clearly the *Corbicula* specimens they found in the upstream section of the River Danube and called them therefore *C. fluminea/fluminalis*. However, in general both species can be distinguished clearly if size ratios are taken into account (Tab. 2). In addition, the concentric sulcations on the shell which are more widely spaced in *C. fluminea* compared to *C. fluminalis* can contribute to a right identification as well. *C. fluminea* is expected to colonise oligohaline parts of the Black Sea as well because of its salt tolerance (EVANS & al. 1979).

Main exchange direction of macroinvertebrates between the Rhine and Danube river basins via the Main-Danube canal is in the direction of the River Rhine, because the upper section of this canal is continuously filled ( $150 \cdot 10^6 \text{ m}^3 \cdot \text{year}^{-1}$ ; TITTIZER 1996b) with water from the Danube basin. Mobile macroinvertebrate species like Crustacea are able to take advantage of this artificial flow for range extension. Range extension of other species in both directions is expected to be taken place mainly by shipping: attached to a ship's hull or transported in wet places.

In addition to *C. fluminea/fluminalis* migrating from the Rhine into the Danube basin (TITTIZER & TAXACHER 1997), WITTMANN (1995) mentions the Main-Danube canal as a possibility for the freshwater shrimp *Atyaephyra desmaresti* to migrate. However, migration patterns of this Mediterranean species are not clear.

**Tab. 2. Overview of size ratios of *C. fluminalis* from the River Meuse (location: Amer section; date: August 5, 1998; n = 62; range: 9-20 mm shell length)**

| Ratio           | Mean | Median | Range     |
|-----------------|------|--------|-----------|
| length : width  | 1.24 | 1.27   | 1.11-1.31 |
| height : width  | 1.28 | 1.29   | 1.15-1.36 |
| length : height | 0.96 | 0.97   | 0.91-1.03 |

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*Received:* 1999-12-03

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Zeitschrift/Journal: [Lauterbornia](#)

Jahr/Year: 2000

Band/Volume: [2000\\_38](#)

Autor(en)/Author(s): bij de Vaate Abraham, Hulea Orieta

Artikel/Article: [Range extension of the Asiatic clam \*Corbicula fluminea\* \(Müller 1774\) in the River Danube: first record from Romania. 23-26](#)