



CORBICULA FLUMINEA (O. F. MÜLLER, 1774) (BIVALVIA: CORBICULIDAE) – A SPECIES NEW TO THE POLISH MALACOFaUNA

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ABSTRACT: Dispersal of the exotic bivalve *Corbicula fluminea* has been observed in Europe for more than 20 years. In October 2003, the bivalve was for the first time recorded in Poland; its first Polish site is the heated water canal of the Dolna Odra power station in Western Pomerania.

KEY WORDS: bivalves, *Corbicula fluminea*, invasion, Odra River, Western Pomerania

Colonising new areas by alien species is rather frequently observed. Animal invasions may vary in origins and nature. Their current intensification is clearly related to human activities. Modern means of transport facilitate migration of organisms to remote destinations, while habitat transformations change the conditions that various sites offer to their inhabitants and newcomers, making it easier for the latter to settle and persist.

The Chinese mitten crab *Eriocheir sinensis* (H. Milne-Edwards, 1854) was brought to Europe at the end of the 19th or at the beginning of the 20th century, from East Asia in a ship's bilge or ballast water (NOWAK 1971). Dispersal of the zebra mussel *Dreissena*

polymorpha (Pallas, 1771) was accomplished by the water-borne transport once the Ponto-Caspian basin had been connected with that of the Baltic Sea (LEWANDOWSKI & STAŃCZYKOWSKA 2000). It seems likely that larvae of *Anodonta woodiana* (= *Sinanodonta woodiana*) (Lea, 1834) penetrated European waters when the grass carp, *Ctenopharyngodon idella* (Valenciennes, 1884) and the silver carp, *Hypophthalmichthys molitrix* (Richardson, 1845) were introduced as stocked species (KISS 1990). In Poland, the bivalve was recorded for the first time by ZDANOWSKI (1996) from the system of heated Konin Lakes.

The literature review compiled by JANICKI (2002), shows that the Lower Odra area is at present inhab-

Table 1. Shell measurements of live (l) and dead (d) individuals of *Corbicula fluminea* (L, length; H, height; D, convexity) and indices of elongation, height, and convexity

	Values of conchometric parameters [cm], n _l = 69, n _d = 46, Σ = 115											
	L		H		D		L×100/H		H×100/L		H×100/D	
	l	d	l	d	l	d	l	d	l	d	l	d
min.	2.01	1.51	1.83	1.35	1.35	0.96	90.38	105.14	89.54	89.40	91.35	132.34
max.	3.48	3.32	3.22	3.14	2.89	2.15	111.68	111.85	110.64	95.11	184.46	150.00
mean	2.86	2.74	2.67	2.55	1.88	1.80	106.98	107.76	93.55	92.82	142.44	141.03
SD	0.32	0.38	0.28	0.36	0.22	0.24	2.89	1.51	2.75	1.30	8.77	3.70

ited by 38 mollusc species. The bivalves include *Anodonta anatina* (Linnaeus, 1758), *A. cygnea* (Linnaeus, 1758), *Unio pictorum* (Linnaeus, 1758), *U. tumidus* (Philipsson, 1788), *Dreissena polymorpha* (Pallas, 1771),

Sphaerium rivicola (Lamarck, 1818), *S. solidum* (Normand, 1844), *S. corneum* (Linnaeus, 1758), *Pisidium amnicum* (O. F. Müller, 1774), *P. lilljeborgii* (Clessin, 1886), *P. henslovanum* (Sheppard, 1823), *P. hibernicum*



Fig. 1. *Corbicula fluminea*: A – shell shape; B – interior view; C – anterior end and umbo view



(Westerlund, 1894), *P. nitidum* (Jenyns, 1832), and *P. subtruncatum* (Malm, 1855). Two additions have been recently made to the list: *A. woodiana* (DOMAGAŁA et al. 2003) and *Corbicula fluminea*.

C. fluminea is a medium-sized bivalve with a triangular, fairly thick shell (Fig. 1). The shell is rounded in its anterior part and somewhat angular posteriorly. The concentric shell ornamentation with heavy ridges is a distinct feature that sets *C. fluminea* apart from *C. fluminalis* the ridges of which are thinner and spaced closer together (GLOER & MEIER-BROOK 1998, KOHL 2004). The umbo is located more or less centrally. The bivalve has a short ligament.

The original distribution range of *C. fluminea* includes south-eastern China and Korea; it has been also reported from the Ussuri River catchment area (LACHNER et al. 1970). In 1924, the bivalve was reported from the west coast of the United States, which was its first record outside its native range (BALCOM 1994). In Europe, the species was recorded from Portugal and France in the early 1980s. In Germany, *C. fluminea* was reported at first in 1983 in the Wezer, to appear in the Rhine in 1987. In 1988, the bivalve was found in Dutch rivers where it had most probably arrived in 1985 or 1986 (BIJ DE VAATE & GREIJ DANUS-KLAAS 1990). The most recent reports on the species' dispersal come from England (ALDRIDGE & MÜLLER 2001), the Czech Republic where it was found in the Elbe (BERAN 2000), from the Danube in Hungary (CSÁNAI 1998–99), and from some water bodies in Puerto Rico (WILLIAMS et al. 2001).

In October 2003, a bivalve unknown earlier from Poland was found in the heated water canal of the Dolna Odra power station off Nowe Czarnowo near Gryfino (Province of Western Pomerania). The bivalve was identified as *C. fluminea*. Qualitative samples were hand-collected by a scuba diver from the bottom at the depth of 0.5–2 m, 2–20 m away from the shore. A total of 69 individuals and 46 empty shells intercon-

nected by byssus were retrieved. The bivalves were found on sandy bottom, accompanied by *A. anatina*, *A. woodiana*, *U. pictorum*, *U. tumidus*, and *D. polymorpha*, empty shells only being found on the muddy bottom.

On the sampling day, the Odra River water temperature was 9°C. For comparison, the 2002 data showed 9.3 and 20.4°C to be the lowest and the highest October temperatures in the Odra, respectively. The mean October temperature was 14.0°C.

The individuals found on the sandy bottom showed brown-olive periostracum with yellow concentric bands, most distinct in the lower part of the shell. The shells retrieved from mud were dark brown. Young individuals had shells of uniform olive-yellow colour, without any bands, while shells of older bivalves were much darker in colour. The external part of the shells found on the sandy bottom was glossy, whereas the shells found on the mud were matt. The shell internal surface was white with a purple hue.

Neither the pathway nor timing of the Asian bivalve *C. fluminea* introduction to the heated canal of the Dolna Odra power station is known. Perhaps the bivalve appeared in the river together with the fry brought to stock the nearby fish cage cultures. It could have been also thrown in, as a bait, by anglers coming from all over Poland, mainly from the south of the country, to fish in the canal. Another possibility is the juvenile forms of the bivalve were transported by birds, on their feathers or legs. For the time being, the answer remains speculative only.

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