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# The Asiatic clam *Corbicula* (Bivalvia: Corbiculidae) in Belgium

by F. SWINNEN, M. LEYNEN, R. SABLON, L. DUVIVIER & R. VANMAELE

## Abstract

Over the past few years *Corbicula fluminea* (MÜLLER, 1774) and *Corbicula fluminalis* (MÜLLER,1774) started colonizing the river Meuse and some major connecting canals in Belgium.
A map with the presently known distribution in Belgium is provided.

**Key-words**: Bivalvia, Corbiculidae, *Corbicula*, Belgium, biofouling, service water system.

## Résumé

Au cours des quelques dernières années, *Corbicula fluminea* (MÜLLER, 1774) et *Corbicula fluminalis* (MÜLLER, 1774) ont commencé à coloniser en Belgique la Meuse et ses canaux de jonction .
Une carte de répartition actuelle en Belgique est présentée.

**Mots-clefs**: Bivalvia, Corbiculidae, *Corbicula*, Belgique, salissure biologique, circuit de refroidissement

## Introduction

*Corbicula fluminea* , notorious for biofouling power plant service systems world wide, has gradually conquered the river Meuse. In 1994, DUVIVIER & VANMAELE (LABORELEC) identified *Corbicula fluminea* in the nuclear service water system at Chooz (France) along the river Meuse, which is very close to the Belgian border. In the same period, *Corbicula* species including *C. fluminea*, were also found in the river Meuse on Dutch territory (bij de VAATE, 1994). Hence *Corbicula fluminea* could be expected also, like the well-settled *Dreissena polymorpha* (PALLAS, 1771), biofouling service systems along the river Meuse in Belgium. Subsequently *Corbicula fluminea* was found close to power plant service systems at Seraing (river Meuse) and Mol (Canal Bocholt-Herentals).
By 1997 *Corbicula fluminea* was abundantly present in service water systems at Seraing, Tihange, Langerlo and Mol. We assume that by that time, it became well established in the Belgian section of the river Meuse and some of the larger connecting canals and probably is still expanding. Meanwhile the estuarine species *Corbicula fluminalis* has been found, albeit less frequent, in samples from Meerhout, Geel and Langerlo.

## Distribution

Table 1 – presents localities in Belgium known so far to be succesfully colonized by *Corbicula* sp.

| Collector | Date or year | Locality | UTM | *Corbicula fluminea* | *Corbicula fluminalis* | Other species present |
|---|---|---|---|---|---|---|
| DUBRUN * | 1992 | MEERHOUT<br>Fallow land,<br>covered with slush (1) | FS46 | ? | ? | not checked |
| DUVIVIER & VANMAELE | 1994 | CHOOZ (FRANCE),<br>River Meuse | | + | - | *Dreissena polymorpha* |
| LABO ECOL. & AQUACULTURE KUL AND LABORELEC,SPE | 1995 | SERAING<br>River Meuse | FS80 | + | - | *Dreissena polymorpha*<br>*Physella acuta* |
| | | MOL<br>Canal Bocholt-Herentals | FS47 | + | - | *Dreissena polymorpha* |
| DUBRUN * | 21-5-1996 | MEERHOUT (2) | FS46 | + | - | *Dreissena polymorpha* |

| Collector | Date or year | Locality | UTM | *Corbicula fluminea* | *Corbicula fluminalis* | Other species present |
|---|---|---|---|---|---|---|
| LEYNEN & LABORELEC | 1997 | SERAING<br>Power plant river Meuse | FS80 | + | - | *Dreissena polymorpha*<br>*Physella acuta* |
| | | TIHANGE<br>Nuclear power plant, river Meuse | FS60 | + | - | *Dreissena polymorpha* |
| | | LANGERLO<br>Power plant Albertkanaal | FS74 | + | + | *Dreissena polymorpha*<br>*Physella acuta* |
| | 10-1997 | MOL<br>Power plant Canal Bocholt-Herentals | FS47 | + | - | *Dreissena polymorpha* |
| P. SWINNEN & F. SWINNEN ** | 1997 | GEEL<br>Sluice 7, Canal Bocholt-Herentals | FS37 | + | + | *Lithogliphus naticoides*<br>*Bithynia tentaculata*<br>*Valvata piscinalis* |
| DUBRUN * | 31-10-1997<br>11-12-1997 | MEERHOUT | FS46 | + | + | *Dreissena polymorpha*<br>*Unio pictorum* |
| LEYNEN & SABLON | 26-3-1998 | SERAING<br>Power plant river Meuse | FS80 | + | - | *Dreissena polymorpha*<br>*Physella acuta*<br>*Bithynia tentaculata*<br>*Valvata piscinalis*<br>*Sphaerium rivicola* |
| | | LANGERLO<br>Power plant Albertkanaal | FS74 | + | + | *Dreissena polymorpha*<br>*Physella acuta*<br>*Bithynia tentaculata*<br>*Potamopyrgus antipodarum*<br>*Sphaerium corneum* |
| | | MOL<br>Power plant Canal Bocholt-Herentals | FS47 | + | - | *Dreissena polymorpha*<br>*Physella acuta*<br>*Bithynia tentaculata*<br>*Radix ovata* |
| P. JACOBS * | May 1998 | HERENTALS<br>Canal Bocholt-Herentals | FS27<br>FS37 | + | - | ? |
| | | VIERSEL<br>netekanaal | FS17 | + | - | ? |
| | | GROBBENDONK<br>Albertkanaal | FS27 | + | - | ? |

1 In 1992 it was not sure where the slush came from since it is common practice to transport mud from dredging-works and subsequently dump it in other, often distant, places for various reasons. The collector not being familiar with the species in the Belgian fauna, mistook it for a marine species.
2 By this time it was confirmed that the slush came from dredging-works at the Albertkanaal in the vicinity.
* In collaboration with the RBINS.
** In collaboration with KUL.

## Taxonomy

Ever since MÜLLER described three new species in the genus *Tellina* LINNÉ, 1758: *T. fluminea, T. fluminalis* and *T. fluviatilis*, many living species of *Corbicula* MÜHLFELDT, 1811, have been described in freshwater and estuaries from Southeast Asia and elsewhere in the world (ARAUJO et al., 1993).

Over the past decades *Corbicula* species started conquering Western Europe. To our knowledge *Corbicula* species in Western Europe are present in The Netherlands (GITTENBERGER & VAN PEURSEN, 1992; MIENIS, 1993; MOOLENBEEK, 1993), France and Portugal (MOUTHON, 1981), Spain (ARAUJO et al., 1993) and Germany (KINZELBACH, 1991) and might be expected in Luxemburg (DHUR & MASSARD, 1995).

Everywhere *Corbicula* has frustrated taxonomists because of its great variation in shell morphology and colour, linked with the wide geographical and ecological range. Moreover, according to ARAUJO et al., 1993, there was no proper designation of type specimens for the three in Western Europe living species acknowledged so far, which was adding to the confusion. Therefore ARAUJO et al., 1993, designated type specimens for the three *Corbicula* species. We have adopted this point of view in present publication.

In Belgium, *Corbicula* can't be mistaken for any of the autochtonous bivalves. The shell is thick and heavy and has two equally sized similarly shaped valves, united by a thick external ligament. The shape is oval in juveniles and more or less triangular in adult specimens. Hitherto two *Corbicula* species have been recorded in Belgium. They can be distinguished by to the following characteristics:

*C. fluminea* (MÜLLER, 1774)
- Shell moderately triangular.
- Size up to 30 mm.
- Up to 40 well-marked concentric ridges on the surface
- External surface glossy, dark brown to olive.
- Internally the shell is white with a blaze of purple more or less pronounced along the margin and the muscular impressions.
- Dorsal border thick with strongly developed cardinal (3) and lateral teeth.

*C. fluminalis* (MÜLLER, 1774)
- Shell triangular with very pronounced umbos.
- Size up to 25 mm.
- Up to 45-55 well-marked concentric ridges on the surface.
- External surface glossy, dark brown to olive.
- Internally the shell has a deep purple blaze.
- Dorsal border very thick, teeth same as *C. fluminea.*

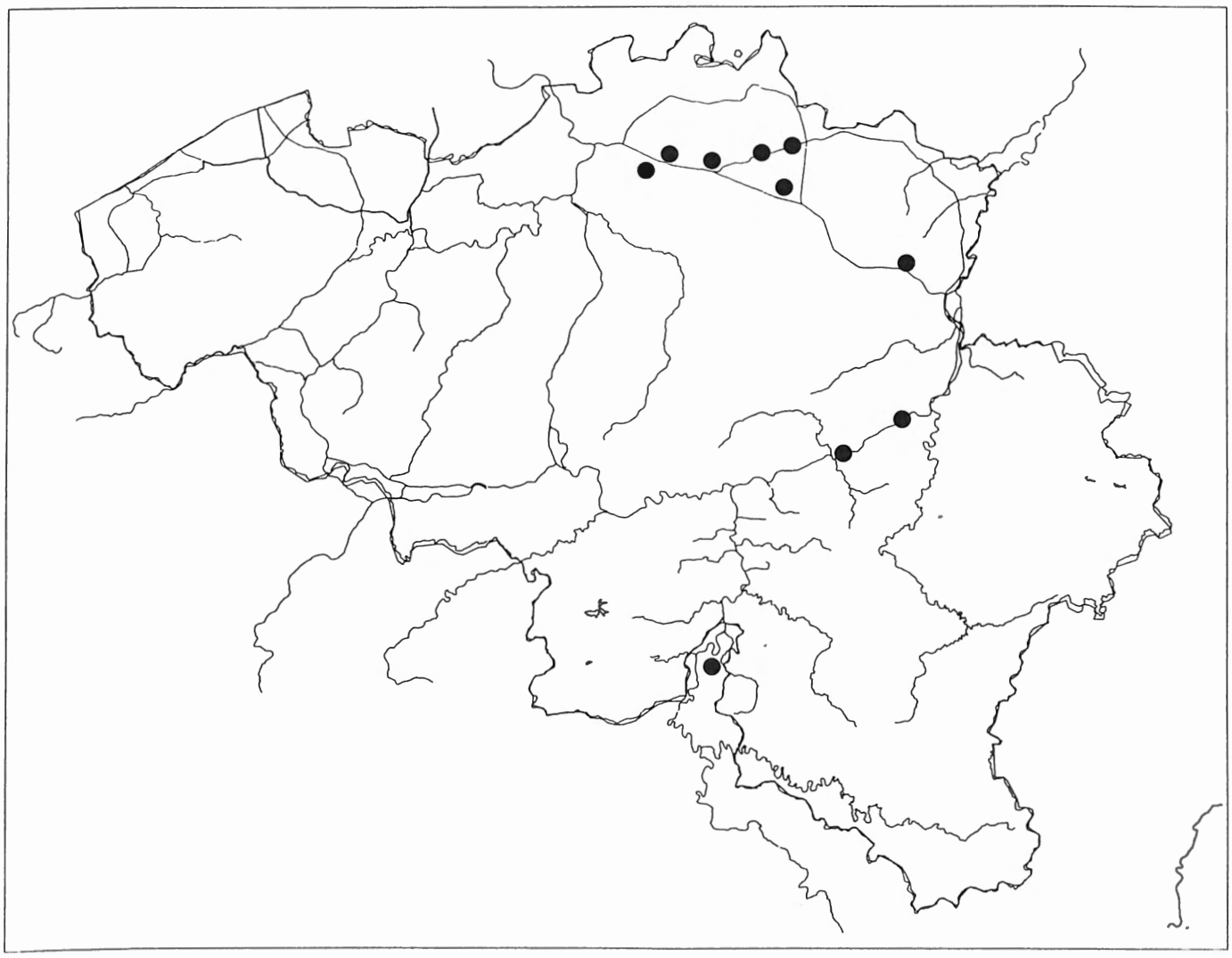


Fig. 1. – Presently known distribution of *Corbicula* species in Belgium. From left to right, top to bottom: Viersel, Grobbendonk, Herentals, Geel, Mol, Meerhout, Langerlo, Seraing, Tihange and Chooz (France).

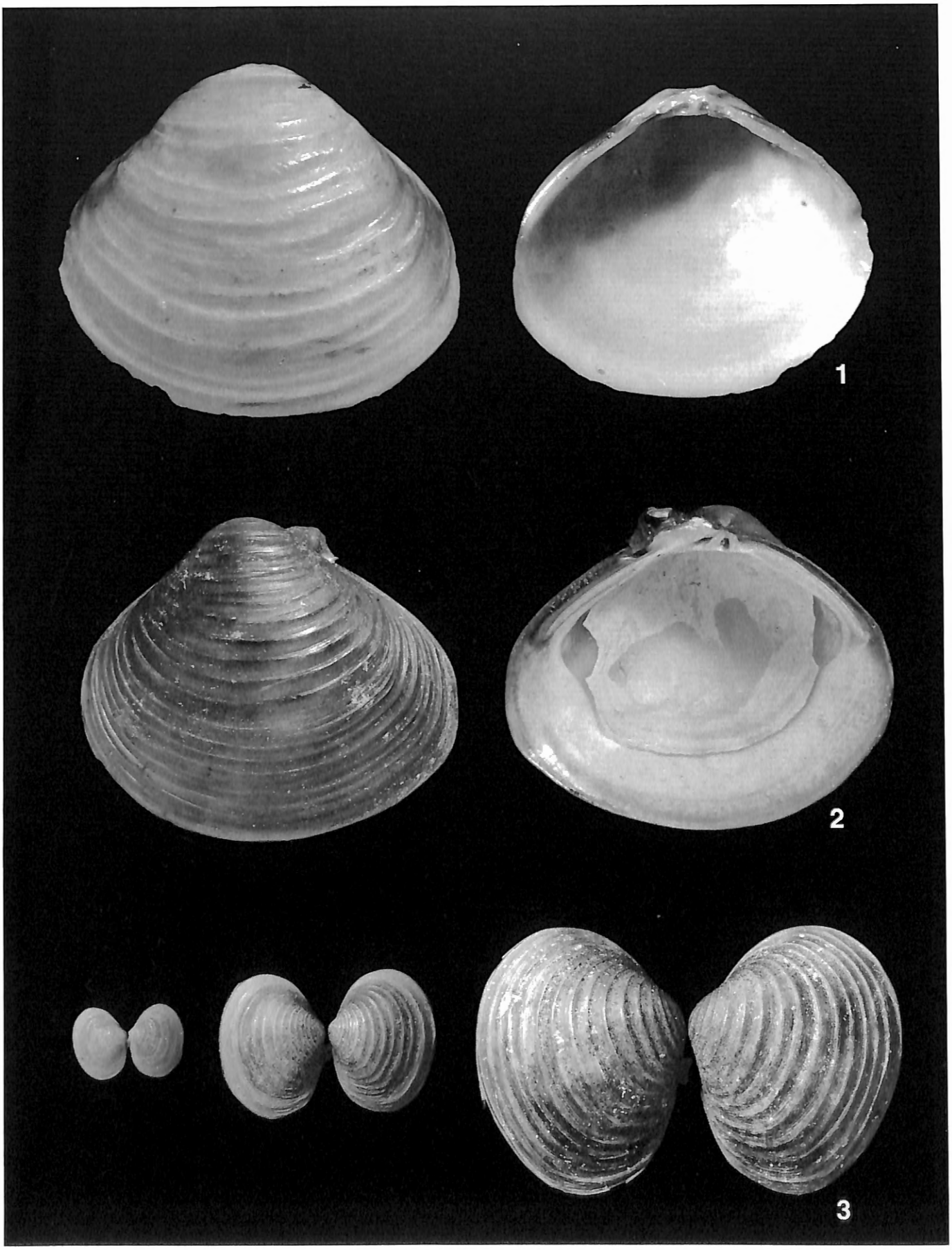
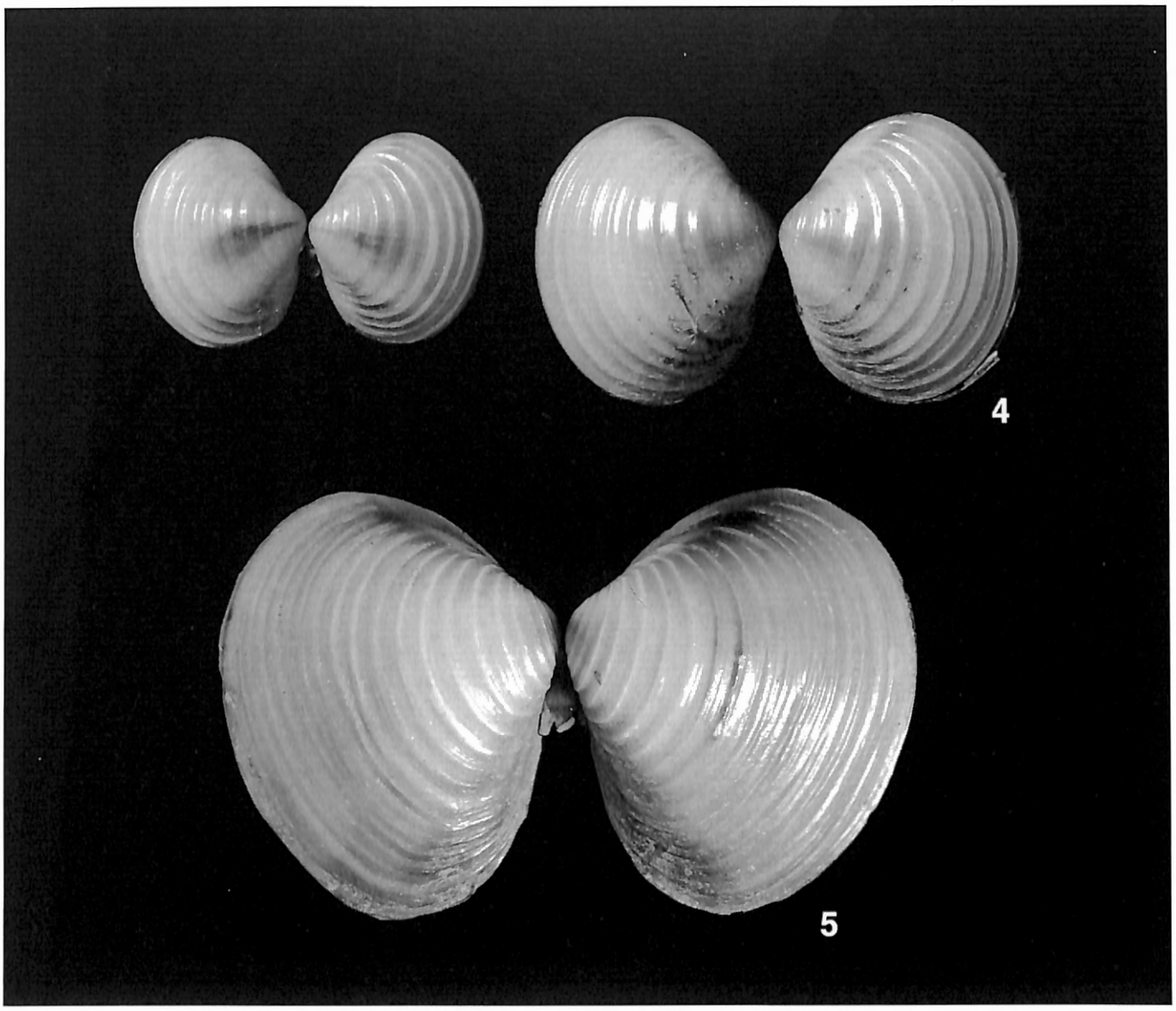



Fig. 2. – *C. fluminea* (MÜLLER, 1774), 1. Seraing (27x24 mm), 2. Tihange (22x19.5 mm); 3. Seraing (3.5x2 mm), (8x4.5 mm), (18x11 mm), 4. Mol (8.5x6 mm), (11.5x9.5 mm), 5. Genk (Langerlo) (22x17.5 mm).




Shell size seems to be the most variable feature in European *Corbicula* populations. For that reason, shell shape rather than size at different locations should be compared (ARAUJO et al., 1993).

**Corbicula as a biofouling organism**

The freshwater clam *Corbicula fluminea* has effectively fouled service water systems in power plants because this environment fulfils the ecological needs of the species i.e. temperature over 20°C most of the year, there is sufficient oxygen and food supply and there are no natural enemies. Hence growth and reproduction within these systems is considerable (PAGE et al., 1986).
Problems caused by fouling are multifold: 1. flow blockage at the bottom of the intake structure and intake tunnels; 2. accumulation in cooling tower bassins, fire protection lines and discharge canals; 3. clogging filters.

Control techniques include mechanical, physical and chemical controls. In Belgïan plants, clams are removed physically on a periodic schedule. Since 1993, different control methods such as chlorination and ozonization, are thoroughly studied at the Laboratory for Ecology and Aquaculture (KUL) in collaboration with ELECTRABEL,SPE and LABORELEC.
Ecological demands, sexual strategy and life span are different in both *C. fluminea* and *C. fluminalis* which certainly has an impact on expansion (MORTON, 1982). The former species is essentially a stream dweller that incubates fertilized eggs and has a life span of approximately 3 years, the latter prefers lentic estuaries, lives for much longer and fertilized eggs are usually not retained (MORTON, 1982). From this perspective, invasion in Belgium is followed at the RBINS, blending in with the general project on freshwater molluscs which is treating historical as well as recent data on occurrence, loss or expansion of the autochtonous malacofauna and its causality.

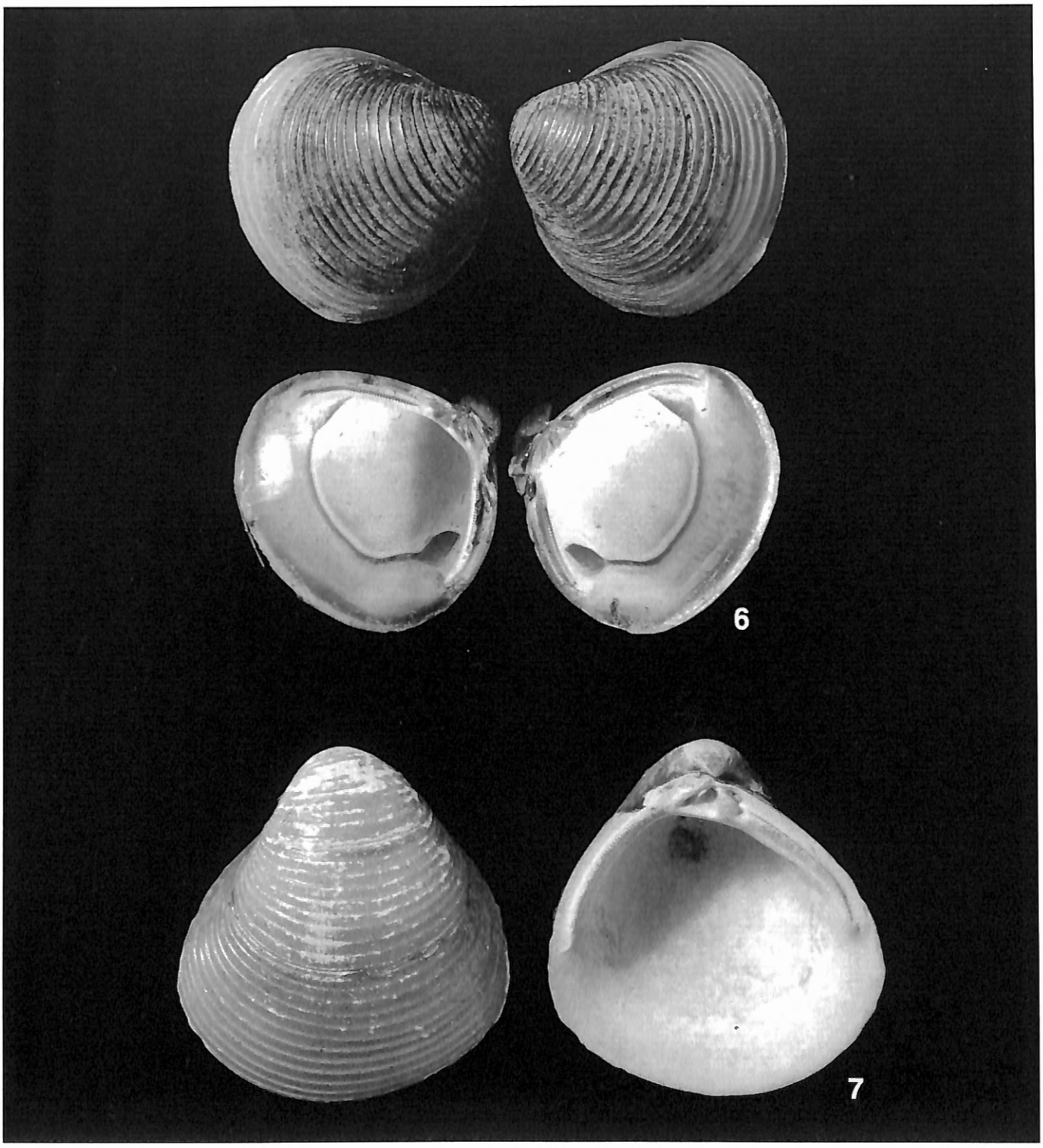



Fig. 3. – *C. fluminalis* (MÜLLER, 1774), 6. Genk (Langerlo) (12.5x13 mm), 7. Meerhout (15x16 mm).

## Conclusion

Since the expansion of the Asiatic clam (*Corbicula)* across the United States in the late 1950s and early 1960s, people became aware of the bivalve mostly in a series of negative encounters. The clogging of pipes and vessels in some kind of industrial operations has been one of the most costly ways in which the Asiatic clam has created problems in the USA (BRITTON & MORTON, 1982). From North America it was successfully introduced in Europe in the early 1980s.

At this moment the knowledge of the extent, let alone of the biological impact, of the invasion on Belgian territory is still in a premature fase. It's evolution in Belgium however needs to be followed , preferably from different angles.

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Frank SWINNEN
Lutlommel 10
B-3920 Lommel, Belgium

Michel LEYNEN
KULeuven
Laboratory of Ecology and Aquaculture
Naamsestraat 59
B-3000 Leuven, Belgium

Rose SABLON
Royal Belgian Institute of Natural Sciences
Malacology Section
Vautierstraat 29
B-1000 Brussels, Belgium

Léon DUVIVIER & Ria VANMAELE
Laborelec
Rue de Rhode 125
B-1630 Linkebeek, Belgium