

Distributional data of the Unionids in Belgium (Mollusca, Bivalvia, Unionidae)

by E. NIJS & J.L. VAN GOETHEM

Abstract

Six species of Unionidae belonging to three genera are currently found in Belgium. The shells are more or less elongate, with a high variability in some species; adult shells always exceed 4 cm in length. Diagnostic features are shape, umbonal sculpture, hinge characters and pattern of muscle scars. Unionids are mainly dioecious and ovoviviparous; the number of eggs may be in the region of 500,000. The calcareously shelled glochidium larvae are first being brooded in the gills, which act as brood-pouches; later on, they are released as temporary parasites of fishes. The species inhabit slow rivers, canals, lowland lakes, reservoirs and ponds. For each species, a distribution map based on the UTM-grid with 10 x 10 km squares is provided. Records pre-1950 and records 1950 onwards are marked by different symbols. At present 792 records of Unionidae pre-1950 and 294 records 1950 onwards are available. This large difference does not necessarily reflect a dramatic decline of the Unionid species in Belgium, but rather seems to be due to the more intensive collecting efforts before 1950. It is suggested to take advantage of the potential offered by large freshwater bivalves and develop their use for nature conservation issues, especially in the field of site protection.

Key-words: Mollusca, Unionidae, biology, distribution, Belgium.

Résumé

Six espèces d'Unionidae appartenant à trois genres sont présentes en Belgique. Les coquilles sont plus ou moins allongées, avec une grande variabilité dans certaines espèces; les coquilles adultes excèdent toujours 4 cm de long. Les caractères d'identification sont: la forme, la sculpture de l'umbo, la structure de la charnière et les empreintes musculaires. Les unionidés sont généralement dioïques et ovovivipares; le nombre d'œufs avoisine 500.000. Les larves, appelées glochidies, à coquille calcaire sont initialement incubées dans les branchies qui servent de poches d'incubation; après leur libération elles passent par un stade de parasite temporaire de poissons. Les espèces vivent dans des rivières calmes, canaux, lacs, réservoirs et étangs. Pour chaque espèce, une carte de distribution est établie sur base d'un quadrillage UTM à carrés de 10 km de côté. Les données datant d'avant 1950 et celles de 1950 à nos jours sont représentées par des symboles différents. Actuellement, 792 données pre-1950 et 294 post-1950 sont disponibles. Cette différence ne reflète pas nécessairement une diminution dramatique des unionidés en Belgique, mais il semblerait plutôt que la récolte de bivalves dulcaquicoles aurait été plus vaste avant 1950. Le potentiel offert par ces grands bivalves est important; aussi, il est suggéré de les utiliser davantage en matière de conservation de la nature, tout particulièrement dans le domaine de la protection des sites.

Mots-clés: Mollusca, Unionidae, biologie, distribution, Belgique.

Introduction

After the publication of a preliminary atlas of the land snails of Belgium (DE WILDE, MARQUET & VAN GOETHEM, 1986), the computerization of the data on freshwater molluscs was started. Since then maps of particular species were published separately:

1. *Anisus leucostomus* (MILLET, 1813) and *Anisus spirorbis* (LINNAEUS, 1758) in SABLON & VAN GOETHEM (1989);
2. *Lymnaea truncatula* (MÜLLER, 1774), *Lymnaea glabra* (MÜLLER, 1774), *Lymnaea auricularia* (LINNAEUS, 1758), *Lymnaea stagnalis* (LINNAEUS, 1758) and *Myxas glutinosa* (MÜLLER, 1774) in SABLON & VAN GOETHEM (1992);
3. *Margaritifera margaritifera* (LINNAEUS, 1758) and *Unio crassus* PHILIPSSON, 1788 in VAN GOETHEM (in press).

The present contribution deals with the six species of Unionidae currently found in Belgium. Their shells are more or less elongate, with a high variability in some species. Adult shells always exceed 4 cm in length. Diagnostic features are shape, umbonal sculpture, hinge characters and the patterns of muscle scars.

Biology of unionids

Unionids inhabit slow running rivers, canals, lowland lakes, reservoirs and ponds with moderate calcium concentration. They are mainly dioecious and ovoviviparous (in Belgium only *Anodonta cygnea* is monoecious). The number of eggs may be in the region of 500,000 per spawning. The eggs are incubated in the gills for a period of several months and develop into a bivalve shelled type of larva: glochidium. At the end of the incubation period (February or March in *Anodonta* spp.) the glochidia are released into the water through the exhalant siphon and sink slowly or are carried passively by water currents. If a fish passes, they are at once stimulated into intense activity. Often larvae will fix themselves on fins or gills of passing fishes by snapping the valves. The skin of the fish grows then up around it like a cyst. This parasitic phase lasts from 2 to 4 weeks and is the main dispersal mechanism of unionids. For more details see ENGEL & WÄCHTLER (1989), JOKELA *et al.* (1991), SCHOLZ (1992) and PEKKARINEN (1993).

Materials and methods

A total of 376 UTM-squares are considered for Belgium, including squares with partial covering of Belgian territory and some trapezoidal spaces in the eastern part of the country inherent to the UTM-grid. Records are indicated by six different symbols. The distributional maps are based on the general collection of the R.B.I.N.S. supplemented by:

- 1) additional data from private collections;
- 2) data from the literature (up to December 1993);
- 3) data from localities just across the Belgian border.

Results and discussion

In addition to the formerly published distribution maps of freshwater molluscs, we can at this moment present distributional data of the six unionid species living in Belgium.

Unio pictorum (LINNAEUS, 1758), Fig. 1, map based on 199 records representing 1,111 specimens.

Unio tumidus PHILIPSSON, 1788, Fig. 2, map based on 153 records representing 1,503 specimens.

Unio crassus PHILIPSSON, 1788, Fig. 3, map based on 176 records representing 1,406 specimens.

Anodonta cygnea (LINNAEUS, 1758), Fig. 4, map based on 264 records representing 1,345 specimens.

Anodonta anatina (LINNAEUS, 1758), Fig. 5, map based on 254 records representing 4,953 specimens.

Pseudanodonta complanata (ROSSMÄSSLER, 1835), Fig. 6, map based on 40 records representing 109 specimens.

At present 792 records of the unionids pre-1950 are available, distributed over 31% of the 10 km squares. Records from 1950 onwards total 294, distributed over more than 18% of the 10 km squares. The total number of freshwater molluscs records pre-1950 is 4,323 (Fig. 7), 1950 onwards is 4,042 (Fig. 8).

Some areas haven't been sampled adequately. It seems that these large bivalves have been sampled more intensively in the period before 1950 than 1950 onwards.

Comparison of the corresponding maps compiling all the records for a given species shows that both *Anodonta* species seems to be the most common in Belgium. They are more densely distributed in Lower and Middle Belgium. *Anodonta anatina* has been found by the authors in stagnant waters as well as in rivers. On the other hand, *Anodonta cygnea* is essentially a species of stagnant waters (could be in relation with the monoecious reproduction mode of this species).

Unio pictorum and *Unio tumidus* are also more frequent in Lower and Middle Belgium than in Upper Belgium. Both species have about the same ecological range, but in general the former is more often found in stagnant waters.

Unio crassus is more distributed in Upper Belgium. Almost all observations of this species are from localities with slow running waters.

In contrast with the former species, *Pseudanodonta complanata* seems to be less common in Belgium with a limited number of populations. So far only 40 records are known, of which 36 from the period pre-1950 and only 4 records 1950 onwards. Due to the small number of observations and the lack of ecological data, it is impossible to discuss the ecology of this species. In fact the distribution of *Pseudanodonta complanata* may be underestimated because the animals live buried into the bottom and are easily overlooked. However it is not excluded that this species is less common because of environmental conditions.

The ecological data of all the species are corresponding with the data given by ADAM (1960), SCHOLZ (1992) and WALLBRINK (1992). According to these authors *Pseudanodonta complanata* is essentially a species of running waters.

It seems that unionids can be used as environmental indicators. According to SCHOLZ (1992) *Pseudanodonta complanata*, *Unio crassus* and to a lesser extent *Unio tumidus* are sensitive to disturbances of the freshwater ecosystem, while *Unio pictorum* and *Anodonta* spp. are less sensitive to environmental changes.

Conclusion

Unionids form a fascinating group of bivalve molluscs with a peculiar and complex life cycle.

Distributional data from the six species living in Belgium vary. In particular the distribution of *Pseudanodonta complanata* is poorly known. At present 792 records of Unionidae pre-1950 and 294 records 1950 onwards are available. This large difference does not necessarily reflect a dramatic decline of the Unionid species in Belgium, but rather seems to be due to the more intensive collecting efforts before 1950. Therefore naturalists and all professional or non-professional malacologists are being invited to communicate data on freshwater molluscs, in order to complete our knowledge.

We suggest to take advantage of the potential offered by these large freshwater bivalves and develop their use for nature conservation issues, especially in the field of site protection.

Acknowledgements

Thanks are due to Dr. T. BACKELJAU and Dr. P. WILLENZ for commenting upon the manuscript and to H. VAN PAESSCHEN for preparing the illustrations.

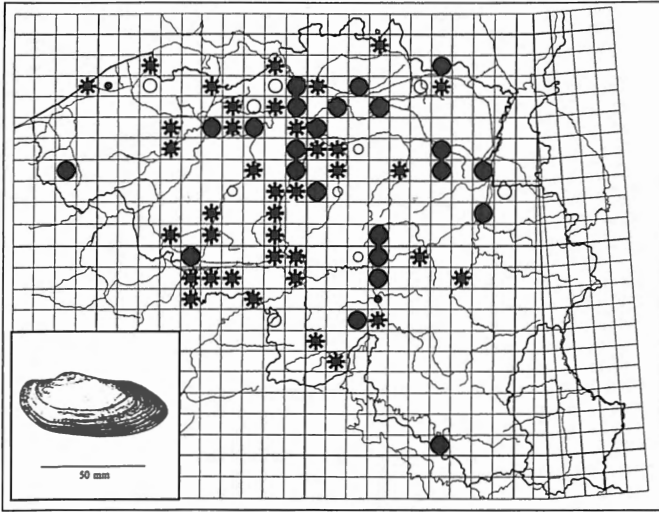


Fig. 1. – *Unio pictorum*.

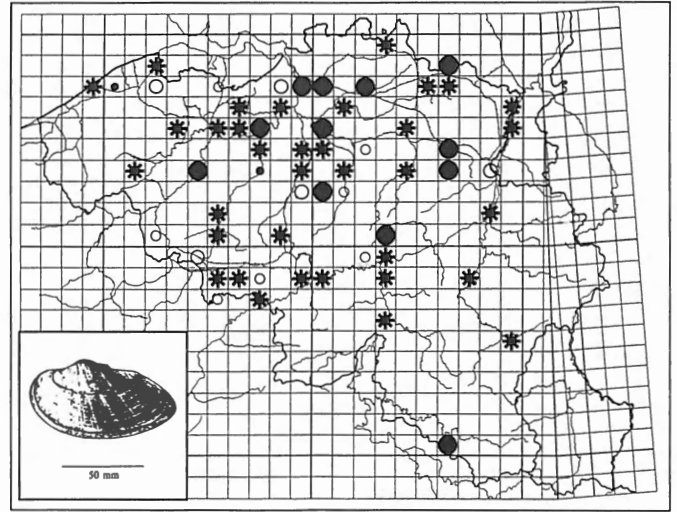


Fig. 2. – *Unio tumidus*.

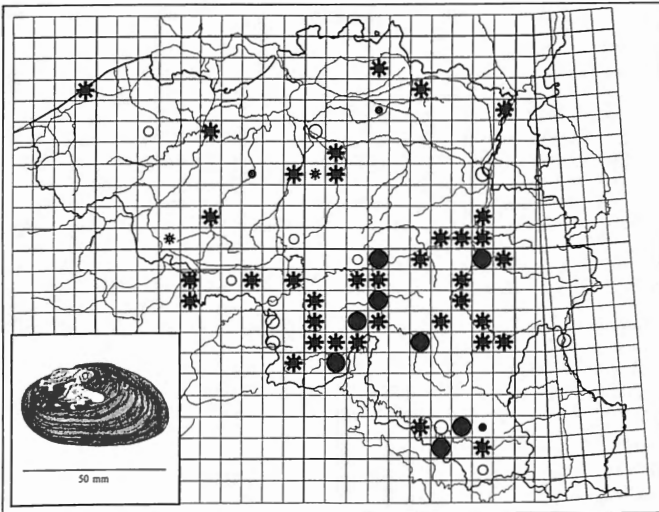


Fig. 3. – *Unio crassus*.

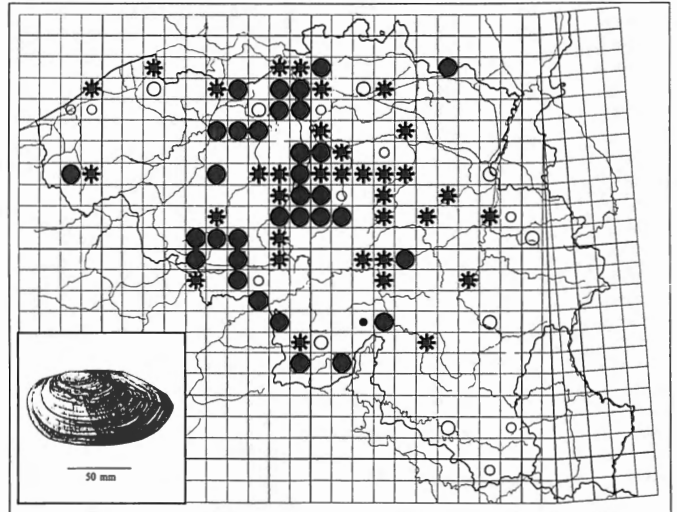


Fig. 4. – *Anodonta cygnea*.

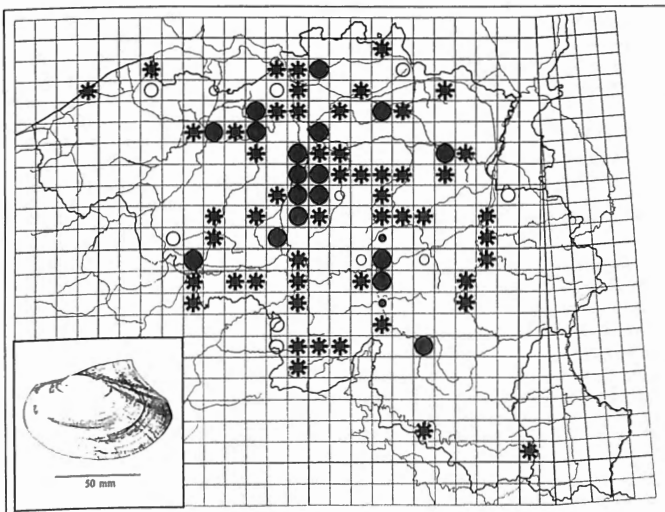


Fig. 5. – *Anodonta anatina*.

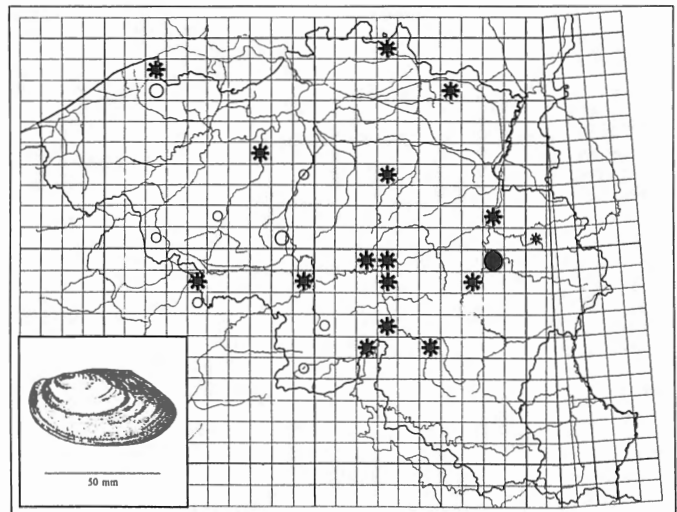


Fig. 6. – *Pseudanodonta complanata*.

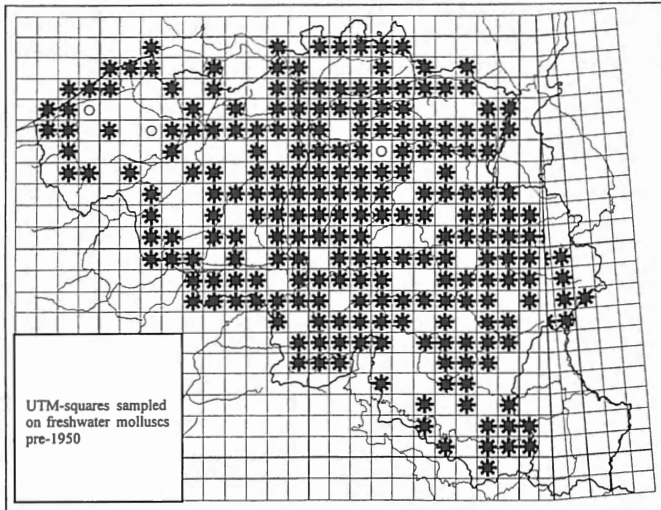


Fig. 7. – All 10 km UTM-squares with records on freshwater molluscs pre-1950 only.

- * records based on collections
 - o records based on literature
- Situation 30 June 1994.

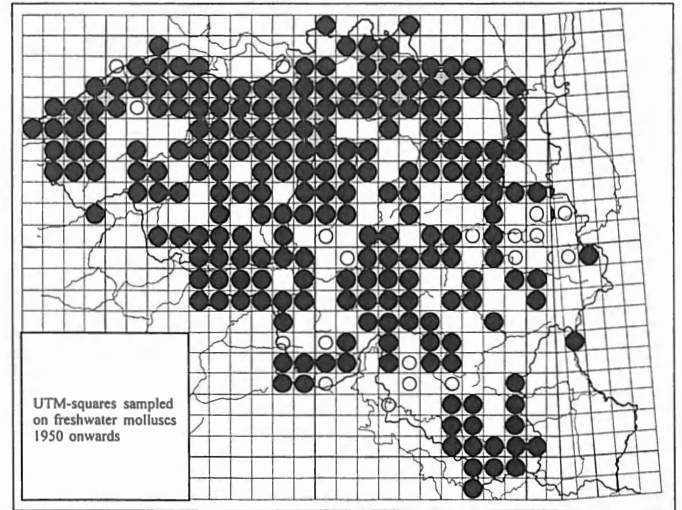


Fig. 8. – All 10 km UTM-squares with records on freshwater molluscs 1950 onwards.

- records based on collections
 - o records based on literature or communications
- Situation 30 June 1994.

Legend of figs 1-6

- pre-1950, data drawn on literature or communications (not checked by the authors).
- 1950 onwards, data drawn on literature or communications (not checked by the authors).
- * pre-1950, empty shells, faded or broken.
- * pre-1950, collected alive or observed alive.
- 1950 onwards, empty shells, faded or broken.
- 1950 onwards, collected alive or observed alive.

Drawings of the unionids:

from ADAM, W., 1960. Mollusques. I. Mollusques terrestres et dulcicoles. *Patrimoine de l'Institut royal des Sciences naturelles de Belgique, série Faune de Belgique*: 1-402, figs 1-163, pls 1-16, col. pls A-D.

References

- ADAM, W., 1960. Mollusques. I. Mollusques terrestres et dulcicoles. *Patrimoine de l'Institut royal des Sciences naturelles de Belgique, série Faune de Belgique*: 1-402, figs 1-163, pls 1-16, col. pls A-D.
- DE WILDE, J., MARQUET, R. & VAN GOETHEM, J.L., 1986. Voorlopige Atlas van de landslakken van België / Atlas provisoire des gastéropodes terrestres de la Belgique. *Patrimoine de l'Institut royal des Sciences naturelles de Belgique*: 1-285, pls 1-133.
- ENGEL, H. & WÄCHTLER, K., 1989. Some peculiarities in developmental biology of two forms of the freshwater bivalve *Unio crassus* in northern Germany. *Archiv für Hydrobiologie*, 115 (3): 441-450, figs 1-7.
- JOKELA, J., VALTONEN, E. T. & LAPPALAINEN, M., 1991. Development of glochidia of *Anodonta piscinalis* and their infection of fish in a small lake in northern Finland. *Archiv für Hydrobiologie*, 120 (3): 345-355, figs 1-5.
- PEKKARINEN, M., 1993. Reproduction and condition of unionid mussels in the Vantaa River, South Finland. *Archiv für Hydrobiologie*, 127 (3): 357-375, figs 1-13.
- SABLON, R. & VAN GOETHEM, J.L., 1989. Drie soorten Planorbidae nieuw voor de Belgische fauna (Mollusca, Gastropoda). In: WOUTERS, K. & BAERT, L. (Eds), *Proceedings of the Symposium "Invertebrates of Belgium"*, Brussel, 25-26 nov. 1988: 113-118, figs 1-8.
- SABLON, R. & VAN GOETHEM, J.L., 1992. Towards a compilation of an atlas of the freshwater molluscs of Belgium: a preliminary report. In: VAN GOETHEM, J.L. & GROOTAERT, P. (Eds), *Proceedings of the 8th International E.I.S. Colloquium, Brussels, 9-10 sept. 1991*: 195-198, figs 1-5.
- SCHOLZ, A., 1992. Die Grossmuscheln (Unionidae) im Regierungsbezirk Detmold - Verbreitung, Biologie und Ökologie der Ostwestfälischen Najaden. *Naturschutz - Landschaftspflege im Regierungsbezirk Detmold, Sonderheft*: 1-73.
- VAN GOETHEM, J.L., 1987. Nieuwe naamlijst met aantekeningen van de recente niet-mariene weekdieren van België. *Studiedocumenten van het K.B.I.N.*, 44: 1-65, 1 fig.
- VAN GOETHEM, J.L., in press. Report on the E.I.S. mapping programme: Belgium 1990-92. *Mitteilungen der Deutschen Malakozoologischen Gesellschaft*: 2 pp., 2 figs.
- WALLBRINK, H., 1992. De Unionidae van Lek en Waal. *Correspondentieblad van de Nederlandse Malacologische Vereniging*, 266: 986-994, figs 1-4.

E. NIJS & J.L. VAN GOETHEM
Koninklijk Belgisch Instituut voor Natuurwetenschappen
Malacology Section
Vautierstraat 29
1040 Brussels, Belgium