

New records of *Assiminea grayana* FLEMING, 1828, *Myosotella myosotis* (DRAPARNAUD, 1801) and *Pisidium subtruncatum* MALM, 1855 (Mollusca: Gastropoda, Bivalvia) in the Scheldt estuary

by L. BRUYNDONCX, K. JORDAENS, H. DE WOLF, P. MEIRE & T. BACKELJAU

Abstract

The mollusc fauna of the tidal marshes along the river Scheldt was investigated. To this end, 31 marshes were sampled along a salinity gradient from Berlare (Belgium; freshwater) to Vlissingen (the Netherlands; marine). Our faunistic survey yielded eight new localities for the caenogastropod *Assiminea grayana*, of which seven in the Belgian part. In the marsh of Doel ("Prosperhaven") we discovered the first inland population of the pulmonate mollusc *Myosotella myosotis*, a species which in Belgium was hitherto only known from three coastal localities. Finally, additional records of *Pisidium subtruncatum* for the Scheldt estuary are reported.

Key-words: Mollusca, *Assiminea grayana*, *Myosotella myosotis*, *Pisidium subtruncatum*, Scheldt estuary, faunistics.

Résumé

La faune malacologique des « schorres » intertidaux du Bas-Escaut a été explorée le long d'un gradient de salinité entre Berlare (Belgique; eau douce) et Vlissingen (Pays-Bas; eau salée). Trente-et-un « schorres » ont été échantillonnés. La distribution du caenogastéropode *Assiminea grayana* dans le Bas-Escaut a été complétée avec huit nouvelles localités, dont sept dans la partie belge du Bas-Escaut. Dans le « schorre » de Doel ("Prosperhaven"), on a découvert la quatrième population du gastéropode pulmoné *Myosotella myosotis* en Belgique, les trois autres populations belges connues vivant dans la région côtière. Finalement, des nouvelles observations du bivalve *Pisidium subtruncatum* ont été faites dans l'estuaire du Bas-Escaut.

Mots-clefs: Mollusca, *Assiminea grayana*, *Myosotella myosotis*, *Pisidium subtruncatum*, estuaire du Bas-Escaut, faunistique.

Introduction

The most recent general faunistic accounts of the brackish and freshwater molluscs of Belgium were published by DUMOULIN (1989) and ADAM (1947) respectively, while GITTENBERGER *et al.* (1998), provided an extensive review for the Netherlands.

While making a survey of the molluscs inhabiting the marshes along the river Scheldt, a number of new faunistic observations were made with respect to the brackish water gastropods *Assiminea grayana* FLEMING, 1828, *Myosotella myosotis* (DRAPARNAUD, 1801) and the freshwater bivalve *Pisidium subtruncatum* MALM, 1855.

Material and methods

The river Scheldt originates in France (Saint-Quentin), runs through Belgium and flows into the North Sea near Vlissingen (the Netherlands) (Fig. 1). The part of the river between Ghent and Vlissingen (i.e. Scheldt estuary) is subject to tidal conditions, resulting in a salinity gradient which ranges from sea-water at the river mouth (30 ‰) over brackish conditions, between Hansweert and Kruikebeke (18 ‰ to 0,5 ‰), to freshwater (< 0,5 ‰) (VAN DAMME *et al.*, 1995). The upstream limit of sea-water penetration is highly variable, both seasonally and between years.

From October 1998 till April 1999, molluscs were sampled along the entire salinity gradient of the Scheldt estuary. Sampling was restricted to marshes, i.e. areas that are regularly inundated during spring tides, but not during daily high tides. Sixty-four sampling sites were surveyed in 31 marshes. Sampling was done by hand picking for 20 minutes in an area of 10 m² by two persons and by sifting out surface litter "by eye", collected in a frame of 20 x 20 cm (Marquet, 1979). Only living specimens were considered. The collection has been deposited in the Royal Belgian Institute of Natural Sciences, Brussels where it is registered under catalogue number IG 28791. Here we present a brief account of the new faunistic observations.

Assiminea grayana FLEMING, 1828

Assiminea grayana (fam. Assimineidae) is a small caenogastropod (maximal height 7,5 mm) that lives along the European Atlantic coasts, from the Wadden Sea to the Northwest of Spain (VERDONSCHOT & DE WOLF, 1980). ADAM (1947, 1960) reported *A. grayana* from three sites in Belgium, i.e. near the coast at Knokke (Zwin) and Nieuwpoort (IJzermondig), and along the Scheldt estuary downstream of Antwerp. These sites were confirmed by DUMOULIN (1989), who specified the presence of *A. grayana* at the marshes of Doel, Lillo and Liefkenshoek and the polder of Lillo. MARQUET (1985) mentioned another four sites along the Scheldt just north of Antwerp. Our study extends this distribution pattern considerably by adding seven new localities, six of which are situated upstream of Antwerp (Table 1, Fig. 1).

For the following UTM squares, ES96 and ES86, no previ-

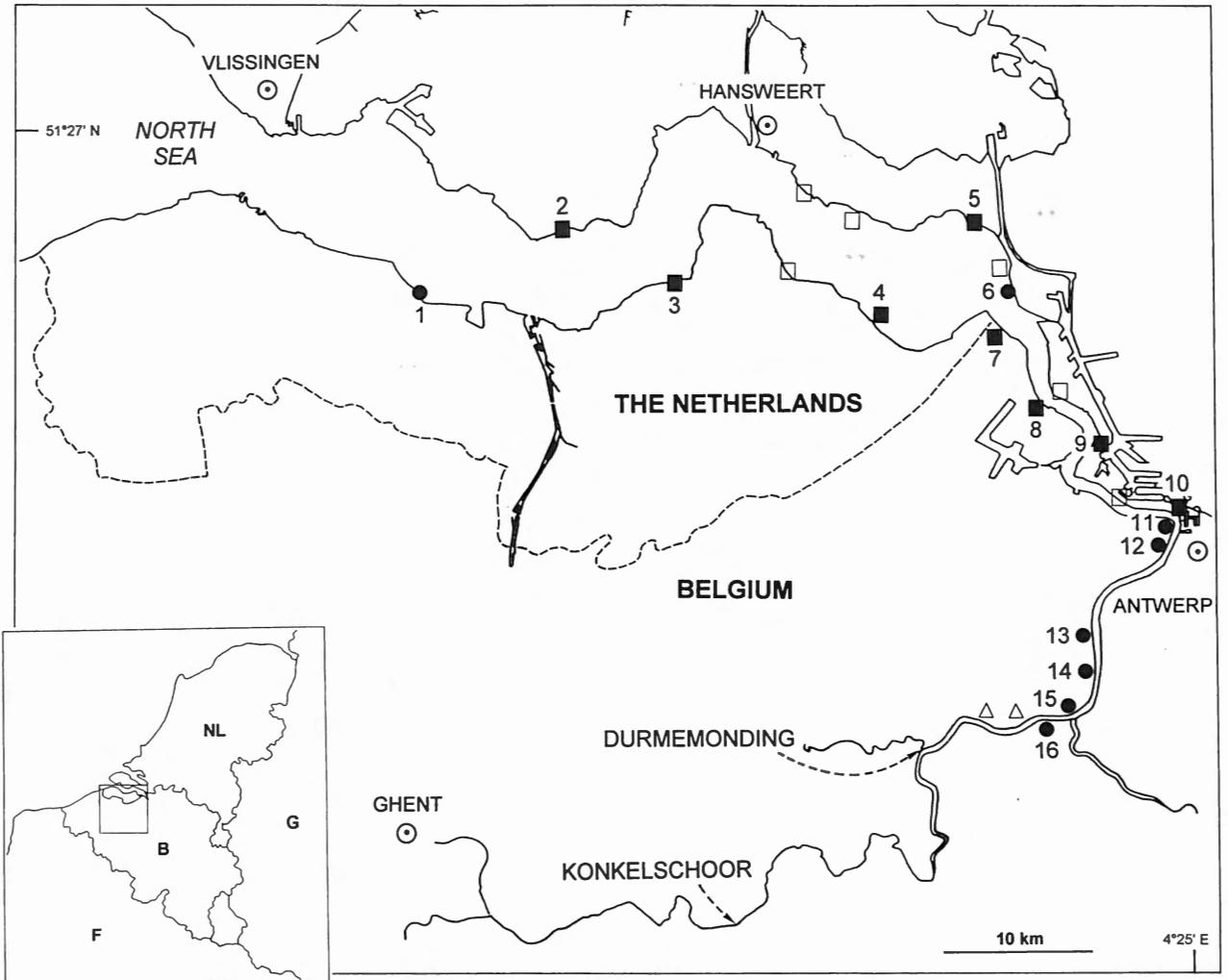


Fig. 1 - Distribution of *Assiminea grayana* and Belgian records of *Myosotella myosotis* and *Pisidium subtruncatum* along the Scheldt estuary: ● new records of *A. grayana*; ■ confirmation of previous records of *A. grayana*; □ records of *A. grayana* from the literature; △ previous sampling sites of *Pisidium*. Locality numbers refer to table 1.

ous records were available. The marsh at Hingene ("Notelaar", 0,57 ‰) seems to be the most inland situated sampling site of *A. grayana*, since the Durmemonding marshland, located a few kilometres more upstream, was also repeatedly investigated, but without yielding any specimen of *A. grayana* (Fig. 1).

In the Netherlands, *A. grayana* occurs at the Frisian Islands, the saltmarshes of Groningen and nine saltmarshes along the river Scheldt (GITTENBERGER *et al.*, 1998). Compared to these records, we found *A. grayana* more upstream in the estuary at the saltmarsh of Biervliet (Paulinapolder) (Fig. 1). *A. grayana* withstands large fluctuations in salt concentrations and as a consequence the species occurs in salt- as well as in brackish and freshwater marshes with an optimal salinity between 9 ‰ and 18 ‰. The species is restricted to intertidal areas for its reproduction, since eggs need to be flooded before they can hatch (SEELEMAN, 1968b). According to GITTENBERGER *et al.* (1998), *A. grayana* occurs on muddy sediments and in litter on higher, drier parts of the marsh. Although DUMOULIN (1989) described an association between *A. grayana* and *Phragmites australis* and *Puccinellietum maritima*, we found no connection with spe-

cific plants. In a favourable habitat and depending of the season, population densities may reach more than 40 000 specimens per m² (DUMOULIN, 1989). We estimated population densities at 12 000 animals per m² in the marsh at Doel (Table 1).

Myosotella myosotis (DRAPARNAUD, 1801)

Myosotella myosotis (fam. Ellobiidae) is a pulmonate mollusc, which is distributed from Great Britain and Denmark to the Mediterranean and the Black Sea (GITTENBERGER *et al.*, 1998). In Belgium, *M. myosotis* has hitherto been recorded from only three sites, i.e. at Knokke (Zwin), Nieuwpoort (IJzermending) and Bredene, all of them situated at the North Sea coast (DUMOULIN, 1989). We discovered a fourth population of *M. myosotis* at the marsh of Doel (Fig. 1). The specimens were found under stones near the dike, between the grass vegetation. This site is probably the most inland locality of *M. myosotis* along the river Scheldt.

In the Netherlands *M. myosotis* is common in the Frisian Islands and in Zeeland (GITTENBERGER *et al.*, 1998). We sam-

pled *M. myosotis* at six marshes (Ritthem, N=53; Hoofdplaat, N=133; Biervliet, N=67; Ellewoutsdijk, N=461; Hontenisse, N=22; Prosperpolder, N=21) along the Scheldt, two of which are new records, i.e. the saltmarshes at Biervliet and Hoofdplaat. Similar to GITTENBERGER *et al.* (1998), *M. myosotis* was always sampled on the higher, drier parts of the marsh, where the animals lived on the soil between the dense vegetation, with *Elymus athericus* and *Halimione portulacoides* as the dominant plant species. *M. myosotis* lives in salt- as well as in freshwater, but the optimum salinity for growth and egg production is 10‰ (SEELEMAN, 1968a).

Pisidium subtruncatum MALM, 1855

Pisidium subtruncatum (fam. Sphaeriidae) is widely distributed in Europe (GITTENBERGER *et al.*, 1998). ADAM (1947) described this species as common in a large part of Belgium and although he mentioned the Scheldt basin as distribution area (p. 236), his map (p. 265) shows only one sampling site along the Scheldt, situated in the brackish part near Lillo. In this work, *P. subtruncatum* was sampled at two freshwater marshes, in Tielrode (Durmemoning, UTM ES86, March-April 1999, N=29) and in Berlare (Konkelschoor, UTM ES75, 14 October 1998, N=1) (Fig.1). Both sampling sites

were very muddy and were inundated regularly during high tides. Previous records of *Pisidium* in the Scheldt estuary date from 1989 (ROSSAERT, 1989), who found a single specimen at Temse ("Ballooi") and five specimens at the marsh of Steendorp ("Kijkverdriet") (Fig. 1). Yet, the specimens were only identified at the genus level. In Belgium, *P. subtruncatum* is common in running waters, but scarce in stagnant waters (ADAM, 1960). In the Netherlands, it is the most common *Pisidium* species and is for instance very abundant in the mudflats of the tidal freshwater areas, where it can reach densities of 777 specimens per m² near the low water level (KUIPER & WOLFF, 1970). Sometimes *P. subtruncatum* is observed on land, but only in very wet sites (DEVRIESE *et al.*, 1997). The species is rather resistant to pollution (KUIPER & WOLFF, 1970) and withstands relatively high salinity concentrations (max. 3‰) (GITTENBERGER *et al.*, 1998).

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TABLE 1

Sampling sites and numbers of individuals (N, number of plots per sampling site in parentheses) collected of *Assimea grayana*, B: Belgium; NL: the Netherlands. Salinity is expressed in g salts per kg water: the figures are average values for 1996 (Institute of Nature Conservation, Brussels).

N°	Sampling sites	Country	UTM	Salinity	Date	N
	Ritthem (Rammekenshoek)	NL	ES49	30,55	10/04/99	0
	Hoofdplaat	NL	ES49	30,55	09/04/99	0
	Borssele (Kaloot)	NL	ES49	30,55	10/04/99	0
1	Biervliet (Paulinapolder)	NL	ES48	28,93	14/12/98	9 (1)
2	Ellewoutsdijk (Zuidgors)	NL	ES59	27,12	10/04/99	11 (1)
3	Hontenisse (Hellegatpolder)	NL	ES69	24,41	14/12/98	100 (2)
4	Prosperpolder (Saeftinge)	NL	ES79	18,09	21/04/99	903 (2)
5	Bath	NL	ES89	15,56	01/12/98	953 (2)
6	Zandvliet (Groot Buitenschoor)	B	ES89	11,41	18/10/98	871 (4)
7	Beveren (Doel)	B	ES88	10,87	21/10/98	2321 (6)
8	Antwerpen (Liefkenshoek)	B	ES88	10,32	27/10/98	149 (1)
9	Antwerpen (Cauwelaertsluis)	B	ES98	6,00	31/10/98	745 (1)
10	Antwerpen (Oosterweel)	B	ES97	3,28	31/10/98	448 (1)
11	Antwerpen (Sint Annastrand)	B	ES97	3,28	31/10/98	176 (1)
12	Burcht (Galgenweel)	B	ES97	2,38	13/10/98	190 (3)
13	Kruikeke (Barbierbeek)	B	ES96	1,48	07/11/98	52 (2)
14	Hemiksem (Kallebeekveer)	B	ES96	0,93	07/11/98	8 (1)
15	Rupelmonde	B	ES96	0,93	10/11/98	1 (1)
16	Hingene (Notelaar)	B	ES86	0,57	03/11/98	1 (1)
17	Tielrode (Durmemoning)	B	ES86	0,39	25/10/98	0

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References

- ADAM, W., 1947. Révision des Mollusques de la Belgique. I Mollusques terrestres et dulcicoles. *Mémoires du Musée royal d'Histoire naturelle de Belgique*, 106, 298 pp.
- ADAM, W., 1960. Faune de Belgique. Mollusques terrestres et dulcicoles. Institut royal des Sciences naturelles de Belgique, 402 pp.
- DEVRIESE, R., WARMOES, T. & VERCOUTERE, B., 1997. Land- en zoetwater mollusken van de Benelux. Jeugdbond voor Natuurstudie en Milieubescherming, Gent, 192 pp.
- DUMOULIN, E., 1989. Overzicht van de brakwatermollusken van België. In: Verhandelingen van het symposium "Invertebraten van België", Brussel, 87-94.
- GITTENBERGER, E., JANSSEN, A.W., KUIJPER, W.J., KUIPER, J.G.J., MEIJER, T., VAN DER VELDE, G. & DE VRIES, J.N., 1998. De Nederlandse zoetwatermollusken. Recente en fossiele weekdieren uit zoet en brak water. Nederlandse Fauna 2. Nationaal Natuurhistorisch Museum Naturalis, KNNV Uitgeverij, Leiden, 288 pp.
- KUIPER, J.G.J. & WOLFF, W.J., 1970. The mollusca of the estuarine region of the rivers Rhine, Meuse and Scheldt in relation to the hydrography of the area. III The genus *Pisidium*. *Basteria*, 34: 1-42.
- MARQUET, R., 1979. Terrestrisch ecologisch onderzoek toegepast op natuurbeheer. Verband tussen molluskenfauna en bodem. Rijksuniversitair Centrum Antwerpen, Veldbiologisch Station Kalmthout Rapport 8, 62 pp.
- MARQUET, R., 1985. The land molluscs of the Antwerp harbour area, with a new record of *Cerzuela cespitum* (Draparnaud, 1801) for western Europe. *Basteria*, 49: 3-10.
- MEIRE, P., ROSSAERT, G., DEREGGE, N., YSEBAERT, T. & KUIJKEN, E., 1992. Het Schelde-estuarium: ecologische beschrijving en een visie op de toekomst. Rapport Rijksuniversiteit Gent - WWE, nr.28, Rapport Instituut voor Natuurbehoud nr. A. 92.57, 150 pp.
- ROSSAERT, G. 1989. Voorkomen van Watervogels langs de Zeeschelde: sterk beïnvloed door de watervervuiling? Licentiaatsveraandering, Rijksuniversiteit Gent.
- SEELEMAN, U., 1968a. Zur Überwindung der biologischen Grenze Meer-Land durch Mollusken. Untersuchungen an *Alderia modesta* (Opisth.) und *Ovatella myosotis* (Pulmonat.). *Oecologia*, 1: 130-154.
- SEELEMAN, U., 1968b. Zur Überwindung der biologischen Grenze Meer-Land durch Mollusken, II. Untersuchungen an *Limapontia capitata*, *Limapontia depressa* und *Assiminea grayana*. *Oecologia*, 1: 356-368.
- VAN DAMME, S., MEIRE, P., MAECKELBERGHE, H., VERDIEVEL, M., BOURGOING, L., TAVERNIERS, E., YSEBAERT, T. & WATTEL, G., 1995. De waterkwaliteit van de Zeeschelde: evolutie in de voorbije dertig jaar. *Water*, 85: 244-256.
- VERDONSCHOT, P.F.M. & DE WOLF, L., 1980. De levenscyclus en verspreiding van *Assiminea grayana* (FLEMING, 1828). Rapporten en Verslagen Delta Instituut voor Hydrobiologisch Onderzoek, Yerseke, 12: 1-25.

L. BRUYNDONCX & T. BACKELJAU
Royal Belgian Institute of Natural Sciences
Malacology Section
Vautierstraat 29
B-1000 Brussels, Belgium

K. JORDAENS
University of Antwerp (R.U.C.A.)
Evolutionary Biology Group
Groenenborgerlaan 171
B-2020 Antwerp, Belgium

H. DE WOLF
University of Antwerp (R.U.C.A.)
Laboratory of Ecophysiology and Biochemistry
Groenenborgerlaan 171
B-2020 Antwerp, Belgium

P. MEIRE
University of Antwerp (U.I.A.)
Ecosystem Management Research Group
Universiteitsplein 1
B-2610 Wilrijk, Belgium