

**The land molluscs of the Antwerp harbour area, with a new record of  
*Ceruella cespitum* (Draparnaud, 1801) for western Europe**

R. MARQUET

Leerstoel voor Algemene Dierkunde, Rijksuniversitair Centrum Antwerpen,  
Groenenborgerlaan 171, B-2020 Antwerp, Belgium

During the construction of the harbour north of Antwerp between 1910 and 1970, a large area was covered with Pliocene and Pleistocene sands. These sands were excavated from the docks and scooped out of the Schelde river. The Pliocene sands contain much lime, the Pleistocene sands, however, are calcium-deficient.

The original mollusc fauna was partly destroyed. As a consequence of the high lime content of some parts and the scarce vegetation, a suitable habitat was created for a number of species, which did not occur in the Antwerp area before. This paper describes the distribution of those species in the area. It forms part of a larger survey of the zoogeography and ecology of the Belgian land Mollusca.

**MATERIAL AND METHODS**

Between March 1979 and March 1981, 37 samples were taken, mainly along the Scheldelaan and the Noorderlaan and in the area known as Oude Landen (fig. 1). A detailed discussion of the methodology and a list of the sampling stations with their characteristics is given in Marquet (1982). We collected 823 empty shells and living molluscs, belonging to 33 species. This material is kept at the Rijksuniversitair Centrum Antwerpen and will be transferred to the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Section Recent Invertebrates, Brussels (abbreviated K.B.I.N.).

The sampled stations can be divided into six types:

(A) — The Oude Landen were covered before 1914. The soil consists of calcium-deficient sands (0.1% calcium). The vegetation comprises herbs, shrubland and wooded parts. Locality numbers in fig. 1: 1-5.

(B) — The area around the Albertdok was constructed between 1920 and 1930 with Pliocene sands, which are rich in calcium (5.5%). Herbs as well as shrubs are present. Locality numbers: 18, 19, 30-34.

(C) — The parts around the Leopolddok are more recent (1940 to 1950). The soil contains a high amount of calcium; the vegetation is rather sparse and consists of grasses and herbs. Locality numbers 4, 7-15.

(D) — The area along the Hansadok was covered between 1950 and 1955. The soil contains much calcium (1.7 to 5.8%) and the vegetation is sparse. Locality numbers 21, 22, 24.

(E) — The docks B1, B2 and B3 were constructed between 1960 and 1970. The southernmost parts were covered with calcium-rich Pliocene sands, the northern parts with calcium-deficient Pleistocene sediments. The vegetation consists of grasses, herbs and mosses. Locality numbers 25, 27, 28, 29, 36, 37.

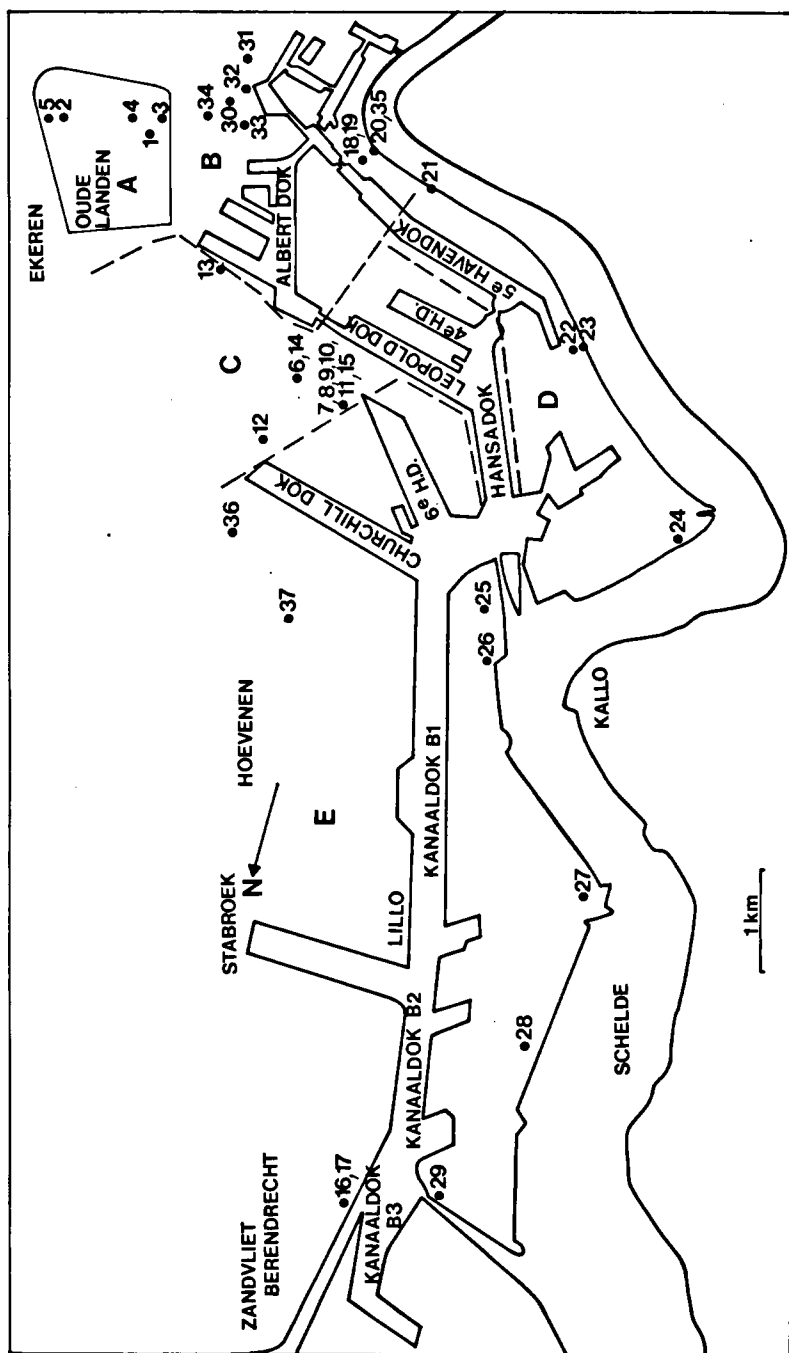


Fig. 1. The Antwerp harbour area with numbered localities where land molluscs have been collected; explanation of numbers in text.

(F) — The areas outside the dikes along the river Schelde were never covered with layers of sand. Therefore they partly conserved their original flora and mollusc fauna. Locality numbers 20, 23, 26, 35.

## OBSERVATIONS

In table 1, the distribution of the molluscs in the area is listed (nomenclature after Van Goethem, 1984).

### *Candidula intersecta* (Poirét, 1801)

This is the most widespread species of its genus in the area investigated. It is present in every part dating from 1900 to 1955, while in the younger part E, only empty shells were collected. In part A it occurs along the south-facing slope of highway E3. Outside the Antwerp harbour this species is found east of Antwerp (along the Albertkanaal), along the coast, in the province of Hainaut and in the Meuse river valley, south of Namur (Marquet, 1982). It has not been recorded from Belgium before 1922 (first records from the coastal dunes). From 1924 onward its occurrence was recorded in the Meuse valley (Adam, 1947a, b, 1960; Anteunis, 1956). It seems to be extending its range in Belgium.

### *Candidula unifasciata* (Poirét, 1801)

This species is much rarer than *C. intersecta*. It is found only in the parts constructed between 1940 and 1955. Outside the harbour area it lives in Belgium in the Westhoek dunes (south of the river IJzer), the southern parts of the Meuse valley, Hainaut and the Gaume (Marquet, 1982). *C. unifasciata* was already recorded in the nineteenth century in Belgium from the whole coastal area (Adam, 1947a). However, according to Adam (1947b), this species has not been found alive anymore along the coast, except between Nieuwpoort and De Panne, where it is still living.

### *Candidula gigaxii* (Pfeiffer, 1850)

I collected this species in parts C and D, while empty shells were recorded in the younger (E, F) as well as in the older (A, B) parts of the harbour. It now lives in the coastal dunes, Hainaut and Brabant (Marquet, 1982). Adam (1947a, b) records it from the coastal area, Hainaut, the Meuse valley, Brabant and the vicinity of Antwerp. I conclude that this species was already present in the Antwerp area before 1910, but its range in Belgium seems to have been reduced since the nineteenth century.

### *Cerņuella virgata* (Da Costa, 1778)

This is a rare species in part C and it is absent elsewhere in the harbour. This species lives between De Panne and Bredene along the coast. It was first recorded in Belgium in 1867 (Nieuwpoort) and only rediscovered in 1935 (between Mariakerke and Raversijde) (Staes, 1869; Adam, 1947a, b).

SPECIES	A	B	C	D	E	F
<i>Carychium tridentatum</i> (Risso, 1826)	+	—	—	—	—	—
<i>Assiminea grayana</i> Fleming, 1828	—	—	—	—	—	+
<i>Oxyloma elegans</i> (Risso, 1826)	—	—	—	—	—	+
<i>Cochlicopa lubrica</i> (Müller, 1774) s.s.	+	?	?	—	—	?
<i>Vallonia excentrica</i> Sterki, 1892	+	—	—	—	—	—
<i>Vallonia costata</i> (Müller, 1774)	+	+	?	—	—	—
<i>Punctum pygmaeum</i> (Draparnaud, 1801)	?	—	—	—	—	—
<i>Discus rotundatus</i> (Müller, 1774)	+	—	—	—	—	—
<i>Arion circumscriptus</i> Johnston, 1828 s.l.	+	—	—	—	+	—
<i>Arion hortensis</i> De Férussac, 1819 s.s.	—	—	—	—	—	+
<i>Arion hortensis</i> De Férussac, 1819 s.l.	+	—	—	—	—	—
<i>Arion intermedius</i> Normand, 1852	—	—	+	—	—	—
<i>Vitrina pellucida</i> (Müller, 1774)	?	—	+	—	—	—
<i>Vitrea crystallina</i> (Müller, 1774)	?	—	—	—	—	—
<i>Nesovitrea hammonis</i> (Ström, 1765)	+	—	—	—	—	—
<i>Aegopinella nitidula</i> (Draparnaud, 1805)	+	—	—	—	+	—
<i>Oxychilus draparnaudi</i> (Beck, 1837)	?	+	+	+	—	+
<i>Oxychilus cellarius</i> (Müller, 1774)	+	—	+	—	—	—
<i>Zonitoides nitidus</i> (Müller, 1774)	+	—	+	—	—	+
<i>Deroceras laeve</i> (Müller, 1774)	—	+	+	—	—	+
<i>Deroceras reticulatum</i> (Müller, 1774)	+	+	+	—	+	+
<i>Deroceras caruanae</i> (Pollonera, 1891)	—	—	—	+	—	+
<i>Balea biplicata</i> (Montagu, 1803)	—	—	—	+	—	+
<i>Candidula unifasciata</i> (Poiret, 1801)	—	—	+	—	—	+
<i>Candidula intersepta</i> (Poiret, 1801)	+	?	+	+	?	—
<i>Candidula gigaxii</i> (Pfeiffer, 1850)	—	?	+	+	?	—
<i>Cerņuella virgata</i> (Da Costa, 1778)	—	—	+	—	—	—
<i>Cerņuella neglecta</i> (Draparnaud, 1805)	—	—	+	+	—	—
<i>Cerņuella cespitum</i> (Draparnaud, 1801)	—	—	+	—	—	—
<i>Monacha cartusiana</i> (Müller, 1774)	—	—	+	—	—	—
<i>Monacha cantiana</i> (Montagu, 1803)	—	+	+	+	?	+
<i>Trichia hispida</i> (Linnaeus, 1758)	+	+	+	—	+	+
<i>Cepaea nemoralis</i> (Linnaeus, 1758)	—	?	—	—	—	+
<i>Cepaea hortensis</i> (Müller, 1774)	+	—	—	—	—	—

Table 1. Distribution of the land molluscs in the Antwerp harbour area. + = present (alive), ? = doubtful (empty shells only), — = absent.

#### *Cerņuella neglecta* (Draparnaud, 1805)

*C. neglecta* is common in parts C and D. Furthermore, I found this species in 1982 on the left bank of the river Schelde, near the sea lock of Kallo (province of Oost Vlaanderen). It is probably the first landsnail to colonize this extension of the harbour area, constructed after 1975. *C. neglecta* closely resembles *Cerņuella aginnica* (Locard, 1882). The latter species is not known from the harbour near Antwerp, but it occurs in the coastal dunes. The shells of both species show only minor differences. This was also emphasized by Clerx & Gittenberger (1977). The ratio of shell diameter to the um-

bilical width is highly variable in the Antwerp specimens and it is unreliable as a distinguishing feature. The ratio diameter/height is less variable; the shell of *C. neglecta* is slightly flatter than that of *C. aginnica*. Furthermore, the aperture of *C. neglecta* is more rounded and its suture is deeper. Anatomically, *C. neglecta* is distinguished by the larger dart sac and the short penial flagellum (fig. 2) (Clerx & Gittenberger, 1977; Kerney & Cameron, 1980). *C. neglecta* was first recorded from Belgium by Stiva (1973), from the banks of the Albertkanaal at Lanaye (province of Liège).

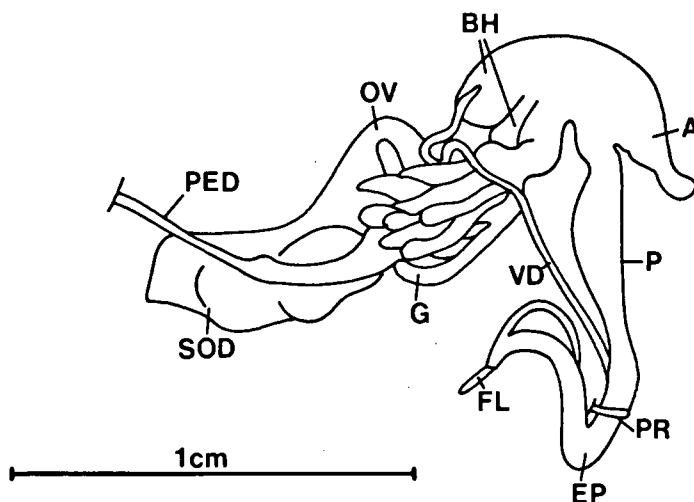


Fig. 2. Genitalia of *Cernuella neglecta* (Drap.) from Antwerp harbour area. Abbreviations: A = atrium; BH = buccal hood; EP = epiphallus; FL = flagellum; G = mucus glands; OV = oviduct; P = penis; PED = pedunculus of bursa copulatrix; PR = penis retractor; SOD = spermoviduct; VD = vas deferens.

#### *Cernuella cespitum* (Draparnaud, 1801)

This species was discovered on I.XI.1980 in a limited part of C. On inspection in May, 1983, the species still occurred here without having extended its range, so that a stable population seems to have been formed. *C. cespitum* can easily be distinguished from both other *Cernuella* species present in the Antwerp harbour by its larger shell (mean width 20.6 mm), which is less flattened than that of *C. neglecta* (mean height 10.8 mm), but less high than that of *C. virgata*. Its umbilicus is less wide in comparison with the shell width than the umbilicus of *C. neglecta*, although this feature is rather variable (mean umbilical width 2.7 mm, Coefficient of Variation 12.5). Some specimens show a wide brown colour band on the shoulder of the last whorl and about three less clearly delimited bands below, but many are completely white. The inside of the aperture is pale pink. Anatomically, *C. cespitum* is characterized by its large dart sacs, long penial flagellum and numerous glandulae mucosae (fig. 3).

Adam (1937, 1947a, 1960) mentioned a record of *C. cespitum* from Austruweel in the Antwerp harbour area from 1936. The only specimen collected, which belonged to the private collection of E. Hostie, was lost, so that identification cannot be checked.

Possibly the species survived from 1936 onward. The records of *C. cespitum* from the coastal dunes in Adam (1947a, 1960) refer to *Cerneuella aginnica* (Locard, 1882). The specimens from Sart, near Liège, collected in 1941, are *C. cespitum*; these shells are in the K.B.I.N. This colony, however, was not reported again and is probably extinct.

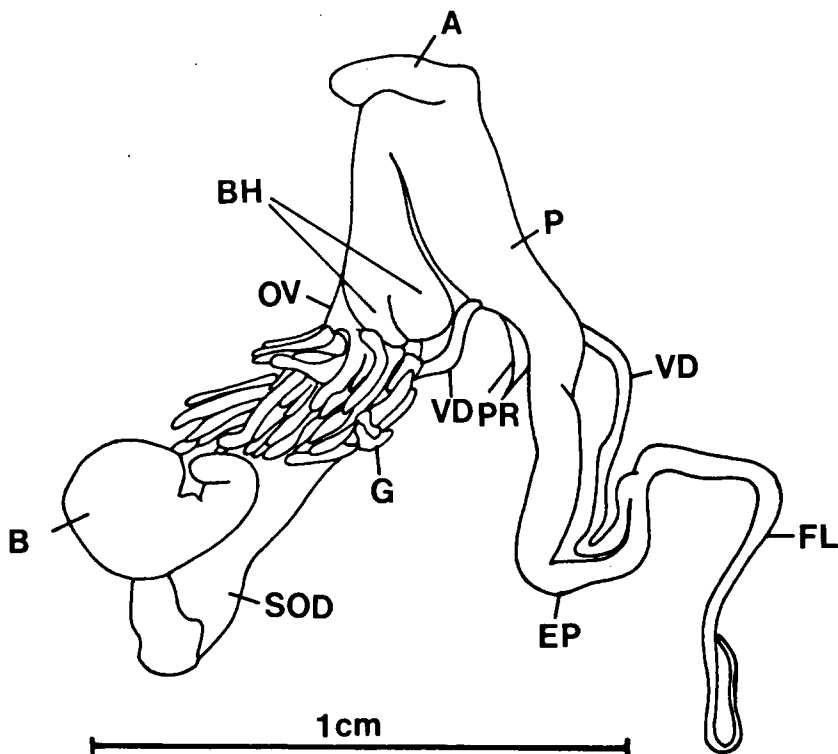


Fig. 3. Genitalia of *Cerneuella cespitum* (Drap.) from Antwerp harbour area. Abbreviations: A = atrium; B = bursa copulatrix; BH = dart sacs; EP = epiphallus; FL = flagellum; G = mucus glands; OV = oviduct; P = penis; PR = penis retractor; SOD = spermoviduct; VD = vas deferens.

*Monacha cartusiana* (Müller, 1774)

I found this rare species only in part C. It was collected in Belgium outside the harbour area only in two localities in Hainaut and in the dunes.

*Monacha cantiana* (Montagu, 1803)

This species is common in every part of the harbour, except in the Oude Landen. It lives in the whole Schelde basin and in the coastal dunes. Along the Schelde, it abounds in rather dry grasses and herbs, so it was probably already present in the area before the harbour construction. It is the only species of the original fauna which has been able to recolonize the area.

## CONCLUSIONS

The original fauna of the investigated area is now confined to the area outside the dikes. Mostly hygrophile species were found, such as *Cochlicopa lubrica* (Müller, 1774), *Oxyloma elegans* (Risso, 1826), *Oxychilus draparnaudi* (Beck, 1837), *Deroceras laeve* (Müller, 1774), *Deroceras reticulatum* (Müller, 1774), and *Balea biplicata* (Montagu, 1803), with *Monacha cantiana* (Montagu, 1803) only in the drier parts.

I consider six or seven of the snail species found as introduced into the harbour area: *Candidula unifasciata*, *Candidula intersecta*, *Candidula gigaxii* (possibly present before harbour construction), *Cerņuella virgata*, *Cerņuella neglecta*, *Cerņuella cespitum*, and *Monacha cartusiana*. The slug *Deroceras caruanae* is another recent introduction in Belgium, but not specific for the harbour area. The oldest parts (Oude Landen and Albertdok) shelter only a few species. Only two xerophilous, calcicole species have spread over these parts; *Candidula intersecta* occurs in Oude Landen only along the verge of the E3 highway, constructed after 1955. Parts C and D of the harbour, constructed between 1940 and 1955, contain the highest number of xerophilous species, the three *Candidula* species, the three *Cerņuella* species, and *Monacha cartusiana*. The parts younger than 1960 exhibit a very poor fauna, characteristic of waste grounds, with *Aegopinella nitidula* (Draparnaud, 1805), *Deroceras reticulatum* and *Trichia hispida* (L., 1758). The soil is sufficiently rich in calcium for the occurrence of the seven calcicole species. I conclude that they have not yet been able to colonize this part, although one species has already extended its range to the left bank of the river Schelde after 1975. It is improbable that the coastal dunes are the source of introduction of the seven species, because *Cerņuella neglecta* and *Cerņuella cespitum* are absent here. Therefore, I cannot determine the origin of this fauna; I think introduction is due to transport from outside the country.

## ACKNOWLEDGEMENTS

My wife and Messrs. T. Backeljau and W. Wendelen helped with the field work. The drawings were made by W. Wendelen and R. van Tichelen. Dr. E. Gittenberger confirmed the identification of *Cerņuella neglecta*, while Dr. A. Norris identified *Cerņuella cespitum* and provided material from France for comparison. Dr. J. van Goethem and Prof. Dr. W.N. Verheyen critically read the manuscript. To all these persons my special thanks are due. This work was financially supported by the Belgian Fund for Joint Basic Research (project F.K.F.O. no. I.0073.77). It was carried out at the Biology Field Station of Antwerp University at Kalmthout.

## SAMENVATTING

Tussen 1910 en 1970 werden grote gebieden ten noorden van Antwerpen opgespoten met Pliocene en Plistocene zandgrond. De oorspronkelijke malacofauna werd vrijwel geheel vernietigd. Restpopulaties worden nog aangetroffen buiten de dijken van de Schelde. Zeven droogte- en kalkminnende soorten werden onopzettelijk ingevoerd tussen 1940 en 1950. Van deze was *Cerņuella neglecta* (Drap.) in België van slechts één andere vindplaats bekend, terwijl *C. cespitum* (Drap.) vermoedelijk op de enig bekende vindplaats in België uitgestorven was. Twee van de ingevoerde soorten hebben zich over het havengebied verspreid, terwijl de overige nog beperkt zijn tot de gebieden waar van 1940 tot 1950 gewerkt werd. Gebieden van na 1960 hebben nog slechts een zeer beperkte malacofauna.

## REFERENCES

- ADAM, W., 1937. Notes sur les gastéropodes. V. Sur la découverte de *Cochlostoma septemspirale* (Razoumowsky, 1789) et *Helicella cespitum* (Draparnaud, 1801) en Belgique. — Bull. Mus. r. Hist. nat. Belg. 13 (11): 1-4.
- , 1947a. Révision des mollusques de la Belgique. I. Mollusques terrestres et dulcicoles. — Mém. Mus. r. Hist. nat. Belg. 106: 1-298.
- , 1947b. Notes sur les gastéropodes. XV. Recherches sur la faune malacologique des dunes littorales de la Belgique. — Bull. Mus. r. Hist. nat. Belg. 23 (27): 1-26.
- , 1960. Mollusques. Tome I. Mollusques terrestres et dulcicoles de la Belgique. — Faune de Belgique: 1-402. Brussels.
- ANTEUNIS, A., 1956. Biosociologische studie van de Belgische zeeduinen. Verband tussen plantengroei en molluskenfauna. — Verh. K. Vl. Acad. (Wet.) 54: 1-194.
- CLERX, J.P.M. & E. GITTENBERGER, 1977. Einiges über *Cernuella* (Pulmonata, Helicidae). — Zool. Meded. Leiden 52: 27-56.
- GOETHEM, J.L. VAN, 1984. Lijst van recente niet-mariene mollusken van België. — Doc. Trav. Inst. r. Sci. nat. Belg. 16: 1-35.
- KERNEY, M.P. & R.A.D. CAMERON, 1980. Elseviers slakkengids: 1-310. Amsterdam.
- MARQUET, R., 1982. Studie over de verspreiding en de ecologie van de Belgische landmollusken. — Ph. D. thesis, Univ. of Antwerp: 1-567 (unpublished).
- STAES, C., 1869. Rapport sur l'excursion, faite à Nieuport par la Société. — Ann. Soc. Malac. Belg. 4: 25-40.
- STIVA, A., 1973. *Cernuella neglecta* (Drap.), een nieuwe soort voor België. — Basteria 37: 29-30.