

## RECENT TEMPORARY EXPOSURES OF THE ANTWERPEN SANDS IN THE ANTWERP CITY AREA: STRATIGRAPHY AND FAUNA

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Three temporary sections exposed in and around Antwerp (Belgium) are described, with special emphasis on the Miocene Antwerpen Sands Member (Berchem Formation). The lithology and macrofauna of these deposits are discussed.

Key words — Antwerpen Sands, Miocene, stratigraphy, Mollusca, Belgium.

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### CONTENTS

Introduction .....	p. 9
Description of the sections .....	p. 9
Discussion .....	p. 10
Acknowledgements .....	p. 12
References .....	p. 12

### INTRODUCTION

Between 1985 and 1990, large-scale construction works in and around Antwerp enabled extensive collecting and detailed stratigraphic observations in the Antwerpen Sands Member (Berchem Formation, Miocene, Hemmoorian). Analyses of large samples taken from the various horizons in these sands led to the establishment of correlations of the shell layers in the Antwerpen Sands as recognised at different locations.

Sections of the Antwerpen Sands Member have previously been published by de Meuter *et al.* (1967), de Meuter *et al.* (1976) and van den Bosch (1966).

### DESCRIPTION OF THE SECTIONS

Three sections (Fig. 1) are discussed: the first was measured in the underground construction works at the Schijnpoort station between November 1985 and April 1986 by Mrs I. Butaye, Mr A. Ratinckx and the author. The second was temporarily

exposed near a new access road to the Kleine Ring motorway near the Luitenant Lippenslaan at Borgerhout in May 1987, and was measured by Mr K. Hoedemakers and the author. The third section was exposed during the construction of garages in the Copernicuslaan in January 1988 and was measured by the author.

Shell bed 1 (Fig. 1) was observed in the underground construction pit and along the motorway; it contained many huge but mostly worn *Glycymeris* shells. The molluscan fauna was rather poor in species but did comprise taxa that are absent from or rare in the other beds: the bivalves *Patinopecten brummeli* (Nyst, 1861), *Pecten* aff. *praebenedictus* Tournouer in Dollfuss & Dautzenberg, 1920, *Pelecycora polytropa nysti* (d'Orbigny, 1852) and *Cyrtodaria angusta* (Nyst & Westendorp, 1839). The last-named species occurs in the Belgian Miocene and Pliocene and is no index fossil; it was found more commonly in this bed than in the others under discussion. The fact that *Patinopecten brummeli* and *Pelecycora* are confined to this part of the Antwerpen Sands Member makes it possible to correlate this bed with a shell layer in Rumst and Terhagen, which is the bed found intercalated between the Rupelian clays and late Cainozoic gravel deposits described by de Ceuster (1976). Gaemers (1988, 1990) also came to the conclusion that this layer was younger than the Edegem Sands Member, with which it had been formerly

placed. This bed was also observed in Koningshooikt (Mechelbaan 91) (province of Antwerp); sands excavated from a garden pond contained *P. brummeli* and *Pelecypora* (observed by K. Hoedemakers and the author, October 1989).

Bed 3 is characterised by the presence of many specimens of the gastropod *Haustator eryna* (d'Orbigny, 1852), which is absent from the overlying beds. The molluscan fauna is richer in species than that of Bed 1 and resembles that of Bed 5.

Bed 5 contains the most diverse molluscan fauna; it is characterised by the presence of many specimens of the bivalve *Panopea angusta inflata* Goldfuss, 1841 in life position. The top of the bed locally yields clusters of another bivalve, *Pteria phalaenacea* (Lamarck, 1819).

The second *Glycymeris* concentration, Bed 6, yields the same assemblage. The *Glycymeris* shells are generally articulated at the base of the bed and single near the top, and are rather small.

Bed 7 contains few fossils. The sediment is darker and coarser than that of Beds 5 and 6.

The next *Glycymeris* bed, 8, contains very few articulated specimens. All *Glycymeris* shells have their convex side up. The molluscan fauna is considerably less diverse in comparison with Beds 5 and 6. A number of species occur more frequently. This bed is very rich in gastropods, e.g. small Turridae and Naticidae, while *Clinura circumfossa* (von Koenen, 1872) is relatively common.

Bed 10, the fourth *Glycymeris* bed again contains single *Glycymeris* valves, convex side up. The fauna is poorer in species.

Unit 11 consists of dark brown clayey sand and is characterised by the occurrence of numerous corals of the genera *Flabellum* Lesson, 1831 and *Ceratocyathus* Seguenza, 1863 (= *Caryophyllia* Lamarck, 1801). The molluscan fauna is of limited diversity; of note are many specimens of the bivalve *Limopsis aurita* (Brocchi, 1814).

Bed 12 contains only few complete shells; all are strongly eroded. Many concentrations of shell grit can be noted.

*Glycymeris* Bed 17 contains many Pectinidae, especially *Flabellipecten duwelzi* (Nyst, 1861). Other bivalves, *Neopycnodonte navicularis* (Brocchi, 1814) and *Glycymeris*, are also common.

The shell beds overlying Bed 18 cannot be referred to the Antwerpen Sands Member. In the underground works, Bed 19 contains remanié *Glycymeris* shells and grey sandstones, phosphorite nodules and shells belonging to the Early Pliocene Kat-

tendijk Formation. Layer 20 should also be referred to this formation; it contains large numbers of the serpulid *Ditrupa* sp. Overlying this bed are sediments of the Lillo Formation, yielding mostly derived shell material.

Along the Kleine Ring motorway the Kattendijk Formation is missing and the Antwerpen Sands Member is directly overlain by a Lillo Formation shell bed, containing remanié molluscs, sandstones and phosphorite nodules, similar to the basal bed of the Kattendijk Formation in the underground works.

#### DISCUSSION

Beds 5 and 6, the *Panopea* bed and the overlying *Glycymeris* concentration, seem to be *in situ* deposits. The specimens of *Panopea*, a genus whose species live infaunally, are all in life position. Both layers could have resulted from a single depositional event, during which the epifaunal *Glycymeris* population and the *Panopea* infauna were rapidly buried. All other shell layers observed appear to contain derived thanatocoenoses. They probably formed in the same way as Beds 5 and 6, but were reworked before final burial. Gradual accumulation of shells over longer periods seems unlikely, following the conclusions reached by Davies *et al.* (1989).

The *Panopea* layer has often been misinterpreted by previous authors. Glibert (1952, p. 3) referred it to the Edegem Sands Member; however, the Edegem Sands are in fact separated from this *Panopea* bed by Beds 1 to 4, as well as by the Kiel Sands Member. Bearing this in mind, Glibert's (1952, p. 3) statement that the Antwerpen Sands contained only few molluscan species is understandable. Glibert (1945, 1952) recorded but 96 bivalve and 120 gastropod species from the Antwerpen and Edegem Sands Members together. In our material, 123 bivalve, 214 gastropod, 9 scaphopod and 2 amphineuran species have been identified exclusively from the Antwerpen Sands and new species for the area are still recognised in sieving residues.

The error of referring the *Panopea* bed to the Edegem Sands can be traced back to van den Broeck (1879, p. lxxiv). He was the first to observe the superposition of the *Glycymeris* beds and the *Panopea* bed and correlated the latter with the Edegem type locality.

Janssen (1984, p. 388) gave a list of 19 index species for the Hemmoorian (Hemmoor Stufe). Some of these were previously unknown from the Antwerp area, but now at least ten of them have

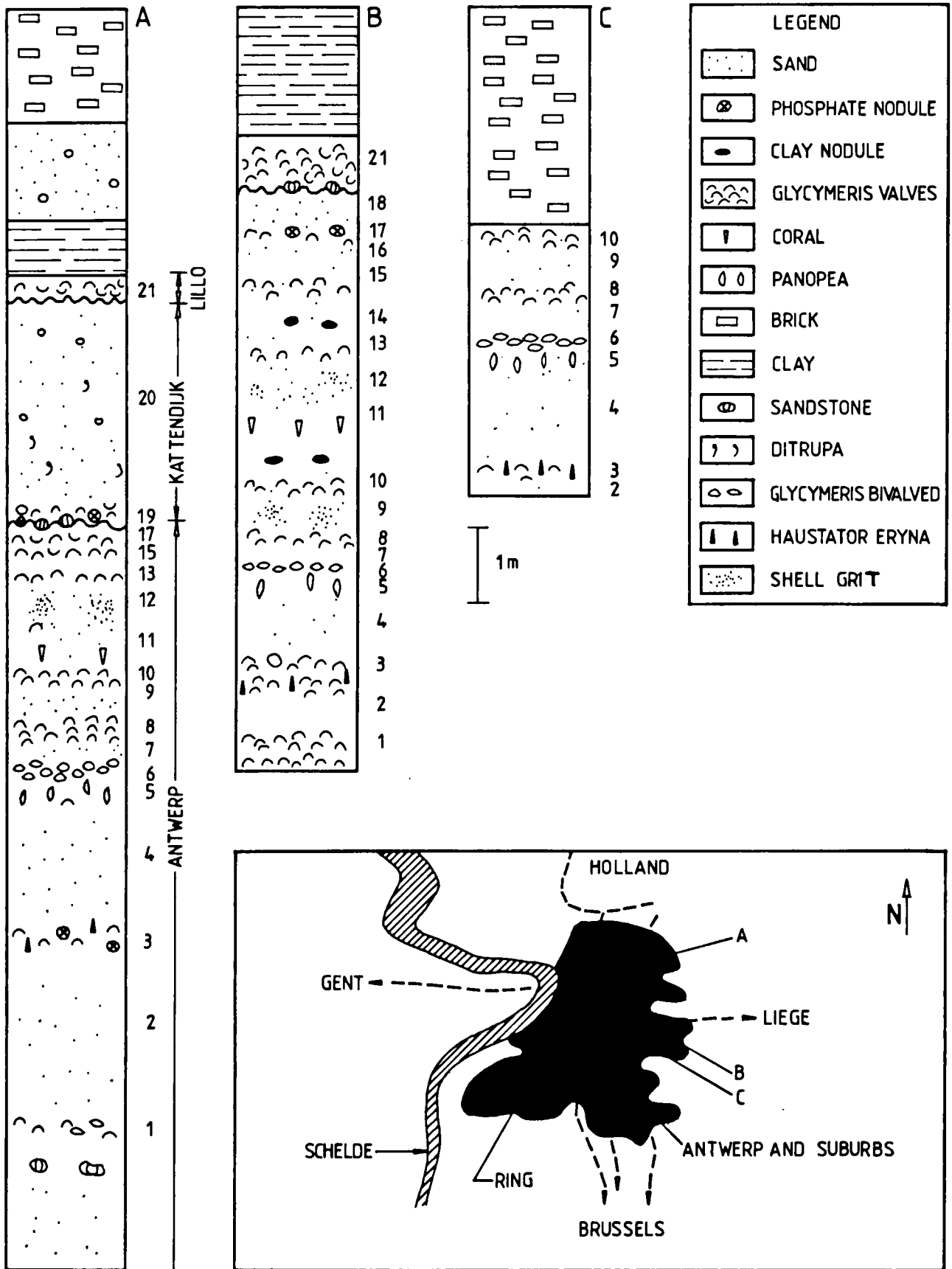


Fig. 1. Lithologic logs of three temporary exposures in the Antwerp city area.  
 A: section exposed at underground construction pits at Schijnpoort station, Antwerp. B: section exposed on the site of a new access road to Ring motorway near the Luitenant Lippenslaan, Bergerhout, Antwerp. C: section exposed during construction of garages in the Copernicuslaan, Antwerp.

been found to occur in Beds 3 to 6: the bivalves *Cubitostrea digitalina* (Dubois de Montperreux, 1831), *Abra berchemensis* van der Mark, 1968, *Clausinella scalaris* (Bronn, 1831), *Clavagella bacillum* (Brocchi, 1814), and the gastropods *Astraea belgica* Glibert, 1952, *Haustator eryna* (d'Orbigny, 1852), *Serpulorbis ingens* (Colbeau, 1864), *Erato exmaugeriae hemmoorensis* (Schilder, 1929), *Subula fuscata* (Brocchi, 1814) and *Actaeopyramis elatus* (von Koenen, 1882). Other species that have also been recorded from Winterswijk-Miste (The Netherlands, Janssen, 1984) occur in Beds 3 to 6, viz. the bivalves *Monterosatus macoma* (Nordsieck, 1972), *Haliris* sp., and the gastropods *Solariella marthae* Kautsky, 1925, *S. straeleni* Glibert, 1952, *Couthouya* aff. *roberti* (de Morgan, 1915), *Distorsio tortuosa* (Borson, 1820), *Bursa pelouatensis* (Cossmann & Peyrot, 1923), *Trigonostoma pouwi* Janssen, 1984, *Euthria* sp., *Exilifusus attenuatus* (Philippi, 1846) and *Bullichna paucistriata* (Ravn, 1907). These species are all absent in the shell beds above Bed 6. This bed seems to divide the Antwerpen Sands into two units, a lower with a high number of typical Hemmoor species and a higher in which these species are not found.

Van den Bosch (1966) observed in part the same beds in a construction pit in the Ploegstraat (Antwerp). However, he described additional beds below the *Haustator eryna* bed, with yet another *Glycymeris* bed between -6.05 and -6.15 m below surface.

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