

LITHO- AND BIOSTRATIGRAPHICAL STUDY OF QUATERNARY DEEP
MARINE DEPOSITS OF THE WESTERN BELGIAN COASTAL PLAIN.

MOLLUSC INVESTIGATION

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INTRODUCTION.

The following shell-bearing samples were examined.

193DB5	M61	- 25,7 to - 26,2 m TAW
117DB7	M64	- 26,3 to - 26,8 m
117DB9	M77	- 27,2 to - 27,7 m
117DB12	M66	- 27,6 to - 28,1 m
117DB13	M49	- 18,9 to - 19,4 m

From a faunistical viewpoint all samples are very similar. Therefore they are considered to belong to one single fauna, which is compared with known accurately dated faunas of Eemian- and Holocene times.

MOLLUSCS IN EEMIAN DEPOSITS IN BELGIUM.

Eemian-deposits in Belgium occur around Ghent in the so called "Flemish Valley" and in the actual coastal plain. The fauna of the Flemish Valley is rather poor; it is characterized by *Corbicula fluminalis* and *Venerupis aurea senescens*, as well as *Cerastoderma edule*, *Macoma balthica*, *Mytilus edulis*, *Hydrobia ulvae*, *Nassarius reticulatus*, *Littorina littorea* and *Natica* (PAEPE, 1965). These species are typical for coastal and estuarine environments. *Corbicula fluminalis* is a fresh water species of large rivers, in this case the Scheldt. However, a number of these species have recently been found in marine sediments of Holsteinian age (PAEPE *et al.*, 1981). There is practically no published information on mollusc faunas in the coastal plain. NORDMANN (1908), compared molluscs from 4 borings with known Eemian faunas of Europe. His findings in borings of Ostend, Leffinghe and Petit Crocodile (Nieuwport) contain 88 marine and 6 continental molluscs.

This fauna from about the same depth shows a large similarity with the De Panne borings (see appendix). Stratigraphically NORDMANN situated this fauna in the "système flandrien". After comparison he came to the conclusion that there are some significant differences between the faunas of the Holocene deposits of the "Mer-flandrienne" and those of the Eemian sea. For the De Panne borings we will make the same comparison.

COMPARISON WITH THE DUTCH EEMIAN FAUNAS.

Since the investigations on Belgian Eemian-faunas are still incomplete,

it seems appropriate to compare them with Dutch faunas. The five samples of the De Panne borings contain 113 marine and 11 continental molluscs species.

The following points are of special interest :

1. 21 species are unknown from Dutch Eemian faunas.

(*Acmaea virginea*, *Alvania crassa*, *Calliostoma zzyzphinum*, *Chauvetia minima*, *Cingula semistriata*, *Emarginula reticulata*, *Gibbula tumida*, *Parastrophia asturiana*, *Phasianella pullus picta*, *Skenea nitens*, *Skeneopsis planorbis*, *Velutina velutina*, *Astarte digitaria*, *Chlamys cf. distortus*, *Gari fervensis*, *Kellia suborbicularis*, *Limopsis aurita*, *Musculus niger*, *Phacoides borealis*, *Parvicardium scabrum* and *Venus casina*).

Most of these species have been recorded at other places and in deposits which are older than Eemian; viz. in Pliocene sediments in Italy and England and in several sites of Pleistocene age in Europe. The stratigraphical position is not clear in all the cases, because the conformity between the recent forms and the fossil ones is still uncertain.

There are no records in the literature (WOOD, 1848-1879; HARMER, 1914-1925 and GLIBERT, 1957-1959) on fossil specimens of the following species: *Musculus niger*, *Chauvetia minima*, *Parastrophia asturiana* and *Skeneopsis planorbis*.

For some other species (*Phasianella pullus picta* and *Alvania crassa*), there are only records of fossils in the Mediterranean basin but not from the North Sea.

2. Typical Dutch Eemian species are missing.

The absence of *Venerupis aurea senescens* and *Abra ovata* has been observed already by NORDMANN (1908). Other species such as *Angulus distortus*, *Cardium paucicostatum*, *Divaricella divaricata*, *Turbonilla*-species and *Rissoa radiata balkei* are also absent. *Bittium reticulatum* which is often dominant in Dutch Eemian faunas, has been found only four times in samples of the De Panne borings. It is probable that differences in facies between the Dutch Eemian inland sea and the more open character of the Belgian coastal sea may explain the differences between the two faunas.

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COMPARISON WITH THE FAUNA OF
Angulus pygmaeus.

The De Panne fauna is closely related to the mollusc-fauna with a Lusitanian character found in Holocene sediments of the southern North Sea. This fauna, which is original from the Channel and is typified by *Angulus pygmaeus*, was described under this name by SPAINK in 1973. In spite of the absence of *Angulus pygmaeus* in the samples of De Panne, the remaining part of the fauna is typical for this *Angulus pygmaeus* fauna. It is assumed that this fauna immigrated to the Southern North Sea in the Boreal or the early Atlantic period and spread along the Belgian and Dutch coasts as far as the Wadden Islands.

Most species have never been found alive along the Dutch coast. However, a number of them are presently found more to the south along the Belgian coast, in the Channel, close to the southern coast of England, along the French West-coast as far as the Gulf of Biscay and also at the Norwegian coast probably due to the warm Gulfstream (SPAINK, 1973). The De Panne fauna is also in good agreement with faunas from seacoasts in front of the Belgian coast near Ostend, where the *Angulus pygmaeus* fauna has also been found (SPAINK, 1979). An interesting site was the open excavation of Loon Plage (Dep. du Nord, France). In the exposures during construction works in the Port Rapide of Dunkerque, marine sediments could be studied *in situ*. The *Angulus pygmaeus* fauna was found at a depth of 20 m. Though *Angulus pygmaeus* itself was absent throughout, the fauna could be very well correlated with faunas from sea borings that were made in front of the same spot.

LAND MOLLUSCS.

Except for sample 117DB7, all samples contain some continental molluscs. Landmolluscs only occur in 117DB13: *Pupilla muscorum*, *Succinea elegans/putris*, *Succinea oblonga* and *Trichia hispida*. They point to wet as well as to dry conditions in the neighbourhood of fresh water. All species are still living at the places of the borings. *Pupilla muscorum*, *Succinea oblonga* and *Trichia hispida* are known in the Netherlands ever since the Tiglian.

FRESH WATER MOLLUSCS.

They are present in all samples. Their ecological conditions vary from brackish water to stagnant fresh and running water. *Bithynia tentaculata*, *Lymnaea palustris* and *Planorbis leucostoma* occur in W. Europe since the Tiglian.

Pisidium clessini occurs since the Tiglian and disappears in the Saalian. *Corbicula fluminalis* belonged to the Pleistocene fauna from the Tiglian up to and including the Eemian. After that period this species withdrew to the eastern Mediterranean and Asia Minor.

Recently *Corbicula fluminalis* was recorded again in Spain and Portugal.

Summarizing, it can be concluded that only one pre-Saalian continental

species is present, and that it was probably introduced into the system. Given the presence of middle Pleistocene sediments in the studied area it can be accepted that the original fauna has been reworked.

TERTIARY MOLLUSCS.

The sediments examined during this study are underlain by Eocene Ieperian clay. This clay is the most probable source of nummuliths and fragments of *Turritella solanderi* which occur in all samples. A top-fragment of *Neptunea contraria* is also of tertiary age. This species is commonly present in the Pliocene deposits of Belgium. Also the sharkteeth, found in some samples, are considered to belong to the Tertiary age.

CONCLUSIONS.

The five samples contain a rich marine mollusc fauna.

An Eemian age for the sediments is difficult to accept for the following reasons:

1. The typical Dutch Eemian species are missing.
2. Some fossil species are unknown in the fossil record from the North Sea-basin, including the southern part.
3. Some species are completely unknown in the fossil record.

Given the close similarity with the *Angulus pygmaeus* fauna, a Holocene Subboreal age appears to be most probable. This Holocene dating implies that during this period the sea cut deeply into the Eocene clay, and removed Holsteinian and Eemian deposits. The Eemian age for sample 117DB7, found on the basis of pollen and diatomic analysis, could not be confirmed by the mollusc fauna.

A possible explanation could be found in the differences in facies and the geographical position between the Dutch and Belgian Eemian sea. On the other hand, if an Eemian age should be admitted, the stratigraphical distribution of a number of molluscs would have to be revised.

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RADIOCARBON DATING

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The weight of the peaty-clay sample 193 DB 5/M53 from Adinkerke-Lebbe was 1035 g. It contained a lot of small shells. Most of the organic fraction was separated from the peat by decantation and sieving of the sample deluted with water.

Since the organic particles were inbedded in a calcareous clay (shells) a severe impregnation of younger humic acids was not feared.

Nevertheless the sample was washed with a hot solution of 1 % NaOH. Since shell carbonate can have a bad influence on the date a severe washing with a hot HCl-solution was necessary to eliminate all the carbonate.

After washing with distilled water and drying, 35 g of the sample was combusted. The combustion yield only 0.27 mol CO₂, meaning that most of the combusted material was still inorganic.

The CO₂ was converted into CH₄ and counted in a proportional counter. The activity of the sample was compared with the activity of a N. B. S. modern standard which resulted in a conventional radiocarbon date of 7795 ± 130 BP (lab. n° IRPA/439).

At present there is no calibration curve available to convert conventional radiocarbon dates into calendar dates for samples older than 7240 BP. The only correction that can be made is the 3% increase of the sample age due to the conversion from the Libby Half-life (commonly used in radiocarbon dating) to the real ¹⁴C half-life. This gives us a date of 6080 ± 130 years BC.

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