

# *Mactromeris polynyma* (Stimpson, 1860) (Mollusca, Mactridae) from the Upper Pliocene of the Netherlands and Belgium

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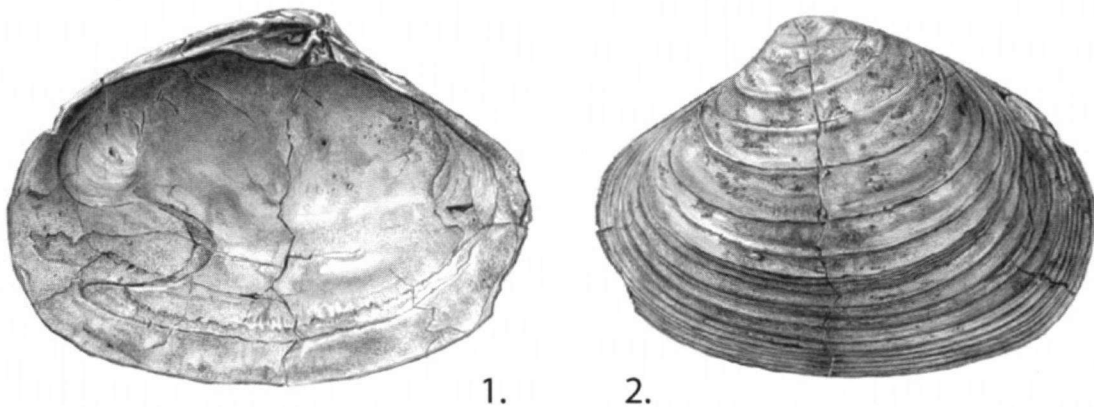
The Arctic surf clam, *Mactromeris polynyma*, is recorded from strata of Late Pliocene (Reuverian) age in the North Sea Basin for the first time; this species represents a Pacific invader which became extinct in Europe, but survived to the present day along the eastern American coast.

KEY WORDS: Mollusca, Bivalvia, Mactridae, Pliocene, North Sea Basin.

## Introduction

A hinge fragment of a large fossil mactroid, dredged from the Westerschelde (the Netherlands), which could not be attributed to any of the known species from the southern North Sea Basin, is here assigned to the extant Arctic surf clam, *Mactromeris polynyma* (Stimpson, 1860). Subsequently, more identifiable fragments have been recognised in fossil collections from the Westerschelde. In view of the fact that dredged fossil shells from the Westerschelde are

predominantly of Pliocene and Pleistocene age, a search was conducted for *in situ* records of *M. polynyma*. Two complete valves are now known from the Late Pliocene (Reuverian) Kruisschans Member (and possibly Merksem Member; Lillo Formation) in the Antwerp area (Belgium). These had previously been attributed to *Spisula arcuata* (Sowerby, 1817). The present paper provides illustrations of *M. polynyma* from the North Sea Basin Neogene; differences between this species and coeval mactroids in this area are discussed.



Figures 1, 2. *Mactromeris polynyma* (Stimpson, 1860), RGM 456 091, from Antwerp (Belgium), 9th harbour dock, Pliocene, Lillo Formation, Kruisschans Member (or Merksem Member), length of valve 105 mm.

## Description and distribution

The near-equilateral shell of *Mactromeris polynyma* (Fig-

ures 1, 2) is large, up to in excess of *c.* 130 mm, with the umbo slightly prosogyrate. The anterior end is lower than the posterior one and narrowly rounded, somewhat cu-

neate. The anterior dorsal margin is either straight or concave; broadly rounded at the posterior end, more or less truncated. The ventral margin is curved. The hinge shows a large resilifer, forming a bulge in the ventral margin of the hinge plate. The lateral teeth are short and unornamented (not grooved as in *Spisula*). The pallial sinus is quite deep and ventrally not confluent with the pallial line.

At present, *M. polynyma* occurs in the boreal Pacific and northwest Atlantic, having been recorded from the Sea of Okhotsk, Bering Sea, Alaska, south to Puget Sound and from Hudson Bay to Massachusetts, living in mud of exposed areas from low in the intertidal zone to depths of about 110 metres (Coan *et al.*, 2000). From the fossil record, Marinovich (1983) mentioned this species from as early as the Middle Miocene of Alaska, Japan and eastern Siberia. The present paper aims to document the presence of *M. polynyma* in the Netherlands and Belgium during the Late Pliocene (Reuverian, according to the standard used by TNO-NITG, Utrecht). The earliest record from eastern North America is that of Richards (1962), who listed it as a fossil from the Pleistocene of Maine.

## Discussion

Previously, shell fragments from the Westerschelde and the two specimens from the Pliocene of Antwerp have been confused with *Spisula arcuata*. Both Geys & Marquet (1979, pl. 35, fig. 4; pl. 36, fig. 1) and Janssen *et al.* (1984, fig. 135a, b) illustrated valves of *M. polynyma* under the name of *S. arcuata*. That species is well known in the North Sea Basin Pliocene (for good illustrations see Wood, 1857, pl. 23, fig. 5; Nyst, 1878, pl. 24, fig. 1a-c; Marquet, 1993, pl. 2, figs 3, 4). The quite long, grooved lateral hinge teeth of *S. arcuata* clearly demonstrate that it is a representative of the genus *Spisula*. In addition, *Spisula arcuata* differs from *M. polynyma* in having a less equilateral and smaller shell (up to c. 82 mm), and in having a convex anterior dorsal margin. Other large mactroid species described from the Pliocene of the North Sea Basin are: *Maetra glauca* Born, 1778, *M. stultorum* Linné, 1758, *Spisula artopta* (Wood, 1857) and *S. procrassa* (Wood, 1857). Of these, *M. glauca* mostly closely resembles *M. polynyma*, but its anterior dorsal margin is convex and the ventral margin of the hinge plate is almost straight; in addition, it has longer lateral hinge teeth than *M. polynyma*. *Maetra stultorum* is decidedly smaller than *M. polynyma*, its anterior dorsal margin is also convex rather than straight or concave and the lateral hinge teeth are longer. *Spisula artopta* is clearly related to *S. arcuata* judging from the inequilateral shell, but is triangular in outline and more inflated. Both *Spisula artopta* and *S. procrassa* have grooved lateral hinge teeth.

Wood (1879) mentioned a single specimen of '*Maetra ponderosa* Stimpson', albeit with a query, from the Red Crag of Waldringfield, sent to him by a Dr Reed, who had identified the shell as *M. ponderosa* after Stimpson (1851). *Maetra ponderosa* Philippi, 1844 (*non* Eichwald, 1830, *nec* Conrad, 1830) is a junior synonym of *M. polynyma*. Judging from the illustration, however, this shell differs

from typical *M. polynyma*. Unfortunately, Wood did not illustrate, nor describe, the valve's interior; his material has not yet been retraced. It cannot be ruled out that this shell belongs to *M. polynyma* as well.

Specimens of *S. arcuata* from the Pliocene of Iceland, illustrated by Gladenkov *et al.* (1980), are more equilateral than typical *S. arcuata* and show a more strongly curved ventral margin. In fact, they are more closely similar to Wood's *S. procrassa* than to *S. arcuata*. Judging from the quite long lateral hinge teeth they obviously cannot be assigned to *M. polynyma*.

Coan *et al.* (2000) presented an extensive synonymy of *M. polynyma* and were of the opinion that a more careful examination might well lead to the recognition of one or more subspecies. The handful of specimens and fragments from the North Sea Basin cannot be distinguished on shell outline, characters of the hinge and pallial/adductor scars from extant *M. polynyma*.

*Mactromeris polynyma* is a representative of a faunal invasion from the Pacific into the northern Atlantic which occurred during the Middle and Late Pliocene and Early Pleistocene (Meijer, 1993), being one of the cooler-water components of this fauna. Together with *e.g.* *Yoldia myalis* (Couthouy, 1838), *Megayoldia thraciaeformis* (Storer, 1838) (see Janse *et al.*, 2003) and *Mya arenaria* Linné, 1758, *M. polynyma* represents a group of Pacific bivalve immigrants which became extinct in Europe but survived to the present day along the eastern American coast. The absence of this species from deposits both older and younger than the Late Pliocene Kruisschans Member (and possibly Merkssem Member) is a reflection of a relatively short presence of *M. polynyma* in the North Sea Basin. It is of note that the oldest record from eastern North America is of Pleistocene age.

*Material studied* – RGM 456 091 (leg. P.A.M. Gaemers, 13 March 1976, 1 left valve, Antwerp, 9th harbour dock; Pliocene, Lillo Formation, Kruisschans Member (or Merkssem Member); 1 right valve (present whereabouts unknown), Antwerp, Kallo harbour works, Lillo Formation, Kruisschans Member (see Geys & Marquet, 1979, pl. 35, fig. 4; pl. 36, fig. 1); RGM unregistered (leg. de Vreede, 1 fragment of right valve (+ fragments of right ? valve and fragments of shell edge?), Westerschelde, near Ellewoutsdijk (province of Zeeland, the Netherlands), derived from Pliocene sediments; RGM 395 748 (leg. H. Smits, 1950-1954, 2 fragments of left valve, Westerschelde near Ellewoutsdijk, derived from Pliocene sediments); 1 fragment of right valve (A. Goetheer Colln, 23 August 1997), Westerschelde near Baarland (province of Zeeland, the Netherlands), derived from Pliocene sediments.

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