

BASTERIA

TIJDSCHRIFT VAN DE NEDERLANDSCHE
MALACOLOGISCHE VEREENIGING

On the fossil occurrence of *Mya arenaria* L. in the
Netherlands

by

W. S. S. VAN BENTHEM JUTTING
(Zoölogisch Museum, Amsterdam).

The occurrence of *Mya arenaria* in fossil deposits of Western Europe has long been a subject of much controversy and discussion. So long as only rare remains in scattered localities were known, the autochthony of the strata was questioned. Later, when it became obvious that the shells belonged to layers of undisputed age, doubt arose as to the correct identification of the fossils, the current opinion being that we had not to do with genuine *Mya arenaria* L., but with a specifically different form: *Mya pseudarenaria* Schlessch (= *M. truncata ovata* Jensen). The true *Mya arenaria* would, according to this view, not have reached Western Europe until the atlantic, perhaps even subboreal, phase of the Holocene, at any rate dating after the formation of the Strait of Dover. A modification of the latter opinion was upheld by a few authors who acknowledged the presence of true *Mya arenaria* in Pliocene and in Holocene deposits, but its absence in the period between, and who concluded that there must have been two waves of development in the ancestry of the species: a Pliocene one which became extinct towards the Glacial period and a Holocene one beginning after the transgression of the Strait of Dover, a large gap, devoid of Sand-gapers, extending during the greater part of the Pleistocene. Both migrations were assumed to have taken origin in the East coast of the U.S.A.

While the fossil state of *Mya arenaria* has been in the dark for a long time we are much better informed of its recent

distribution. It is a boreal shell¹⁾, occupying the littoral zone from the Norwegian coast to the West coast of France in the Eastern Atlantic, and again in the Western part of the Mediterranean. In the Baltic Sea it penetrates even into the Bothnian Gulf. In Holland it is abundant along the North Sea coast, especially in the Waddenzee and in the estuaries of the provinces of Zuid-Holland and Zeeland. In the Western Atlantic it stretches from Greenland to Florida. Even the North Pacific is inhabited by a race of *Mya arenaria*.

From a general account of fossil *Mya arenaria* and allied species by Böhm (1) it is evident that our species first appeared in Miocene beds of Virginia and Massachusetts. It is further reported in almost continuous strata until recent times and the current opinion is that from the East coast of the U.S.A. it found its way across the Atlantic to Western Europe.

A critical survey of the state of affairs in the countries surrounding the North Sea basin: Britain, Northern France, Belgium, Germany, Denmark and Scandinavia was given by Schlesch (9, 10). The situation in Holland, however, was entirely omitted in this paper, probably because at that time it was not yet possible to form a definite opinion on the conditions in this country, the sporadic notes in boring-reports and only one publication of general interest (13) actually offering too little information.

Yet there is plenty of material, on the whole in good condition, collected in recent years chiefly by the Geologische Dienst (Geological Survey) and by the Rijksinstituut voor Drinkwatervoorziening (State Institute of Water Supply). So far, however, these samples have never been collated in the light of the premisses mentioned in the beginning of my paper, although they would certainly render valuable evidence for a comparison of the conditions in this country and abroad.

Therefore I asked, and obtained most graciously, access

¹⁾ Not arctic, as was established by Jensen (7).

to the collections of the above-named institutions. In was my good fortune to have every possible help from Dr. P. T e s c h, Director, and Dr. J. F. S t e e n h u i s, Geologist, of the Geological Survey, not only as to the loan of specimens, but also concerning the identification of the geological age of the shells.

The oldest deposits in Holland where *Mya arenaria* was found, scarcely it is true, belong to the Upper Pliocene (Amstelian). We have no records from the Middle Pliocene age (Poederlien, Scaldisien) in our country, although in England it appears already in this era.

In the following horizon, the Icenian, *Mya arenaria* is abundant. From the collections of the Geological Survey I could check samples from Dordrecht, Maassluis, Oosterhout, Rozendaal, Dinteloord, Woensdrecht, Haamstede, Barendrecht, Zwijndrecht, The Hague, Schoorl and Schokland. This list, however, is not exhaustive: there are lots of other localities where Icenian *Mya arenaria* are found. The borings did not only yield heaps of fragments, but also several entire valves, justifying the conclusion that the specimens lived on the actual spot were not derivative from some earlier horizon or from some distant biotope.

Very little is published about this Icenian occurrence, in fact there are only a few general remarks by T e s c h that *Mya arenaria* is plentiful in the Lower Pleistocene (14, 15).

The succeeding layers of the Pleistocene, being all deposited in fresh-water facies, consequently do not yield traces of *Mya arenaria*.

Not before the transition of the Mindel-Riss Interglacial period to the Riss glaciation, the first marine horizon after the Icenian, do we meet *Mya arenaria* again. It is in the so-called "mariene inschakeling" (early middle terrace or Ledamyalis-beds), a contemporary of the fluvial high terraces of the rivers Rhine and Meuse. These marine beds are very local, being found only in a limited area in the West and in the North part of the country (15, 16). Only quite recently

did we get evidence that *Mya arenaria* entered this period, since J. Brouwer reported a couple of fragments (chondrophores of left valves with some of the adjoining shell-parts) from a boring near The Hague (3). It has been suggested (14, 16) that the fauna of this marine zone is not autochthonous, but a definite answer to this question has not yet been given. The very scanty remains of *Mya arenaria*, still rarer in the equivalent German horizon, the "Holstein-See" (5), although suggesting a derivative character, are not a sufficient proof, and can perhaps be explained by inconvenient ecological circumstances.

Towards the end of the Pleistocene we had another marine deposit in Holland, the so-called Eem-layers, formed in the Riss-Würm Interglacial period. The fauna of the Eem strata is rich and well-preserved. Large quantities of material from various parts of the country have been brought to the surface, but so far not a single fragment of *Mya arenaria* has come to our knowledge. The same deficiency has been observed in Germany and in Denmark (5, 8).

How we must biologically explain this temporary extinction is not yet sufficiently clear. There is no reason to make the temperature responsible, nor the salinity, even the facies cannot account for it.

In the Holocene the species is found again: sparsely in the Lower Holocene (boreal phase), abundant in the Upper Holocene (atlantic and younger phases) (12, 11). The fact that the Sand-gaper was found in the Lower Holocene, i.e. before the transgression of the Strait of Dover, proves that its reestablishment in these regions antedates this important moment in the history of Western Europe. Therefore *Mya arenaria* was certainly not a modern immigrant in historical times. Its settlement in this country dates from centuries before the Christian era, and the way in which it reached us led round the North at first. It is possible that after the opening of the Strait of Dover migration from the South also put in a word, accelerating the acclimatization. It must be emphasized that

Mya arenaria was still far from plentiful at the beginning of the Christian era, because its shells were never found in the "terpen" (terp-mounds). Introduction into the Western part of the Baltic Sea began about the year 1000 (6, 4).

The first record of living *Mya arenaria* in Holland is embodied in the chapter "Van de Slik-Mosselen of Gaapers" by Baster (2). He found the Sand-gaper in great abundance in the Dijkwater near Zierikzee (Province of Zeeland). This condition agrees with the present circumstances.

Resuming we may say that 1. the stratigraphical age of the fossil *Mya arenaria* shells in Holland is satisfactorily ascertained, 2. there is no doubt as to the specific position of the fossils, 3. *Mya arenaria* occurred in our country without interruption in all marine horizons from the Upper Pliocene until the present day with the exception of the Eem-layers, 4. the interruption during the Eem period has nothing to do with the transgression of the Strait of Dover, for the simple reason that it occurred some thousands of years earlier. A definite explanation of this interruption has not yet been given.

Literature:

1. Böhm, Joh., 1926. Über tertiäre Versteinerungen von den Bogenfelder Diamantfeldern, in: Erich Kaiser, Die Diamantwüste Südwestafrikas, Vol. 2, p. 55—87, pl. 31—34
2. Baster, J., 1765: Natuurkundige Uitspanningen &c. — Vol. 2, Part 5, p. 72
3. Brouwer, J., 1941. Bijdrage tot de kennis van het Hoogterras in mariene facies in den ondergrond van 's-Gravenhage. — Geologie & Mijnbouw, Vol. 3, p. 73—84 and 247—252
4. Grähle, H. O., 1932. Zur Wanderung von *Petricola pholadiformis* Lam. — Natur & Museum, Vol. 62, p. 61—64
5. —, 1936. Die Ablagerungen der Holstein-See (Mar. Interglaz. I), ihre Verbreitung, Fossilführung und Schichtenfolge in Schleswig-Holstein. — Abh. Preuss. Geol. Landesanstalt, N. F. Heft 172, 110 pp., 1 pl.
6. Howorth, Sir Henry H., 1909. Some living shells, their recent biology and the light they throw on the latest Physical Change in the Earth. I. *Mya arenaria*. — Proc. Zool. Soc. London, p. 745—767
7. Jensen, A. S., 1900. Studier over nordiske Mollusker. I. *Mya*. — Vidensk. Medd. naturh. Foren, p. 133—158
8. Nordmann, V., 1928. La position stratigraphique des Dépôts d'Eem. — Danm. Geol. Unders. (2) Nr. 47, 81 pp. 4 pl.

9. Schlesch, H., 1931. Studien über Mya-Arten. — Arch. Moll. Kunde, Vol. 63, p. 137—149, pl. 13—15
10. —, 1932. Über die Einwanderung nordamerikanischer Meeresmollusken in Europa unter Berücksichtigung von *Petricola pholadiformis* Lam. und ihrer Verbreitung im dänischen Gebiet. — Arch. Moll. Kunde, Vol. 64, p. 146—154 (especially p. 147, footnote 5)
11. Steenhuis, J. F., 1920. Nieuwe bijdrage tot de kennis van het Kwartair van den ondergrond van Nederland (Boringen op Vlieland, Marken en het Fort Pampus). — Tijdschr. Kon. Ned. Aardr. Gen. (2) Vol. 37, p. 621—633
12. —, 1936. Nota inzake de geologische resultaten van het onderzoek. Een nieuwe bijdrage tot de kennis van den geologischen bouw en de geologische wordingsgeschiedenis van de Wieringermeer. — Bijlage 9 in: Geo-hydrologische gesteldheid van de Wieringermeer, Rapp. & Meded. betr. de Zuiderzeewerken, Nr. 5, p. 49—66
13. Tesch, P., 1912. Beiträge zur Kenntnis der marinen Mollusken im westeuropäischen Pliozänbecken. — Meded. Rijksopsporingsdienst Delfst. Nr 4, 96 pp., 1 map
14. —, 1934. De opeenvolging van de oud-plistoceene lagen in Nederland. — Tijdschr. Kon. Ned. Aardr. Gen. (2) Vol. 51, p. 649—675
15. —, 1937. Het voetstuk van Nederland. — Tijdschr. Kon. Ned. Aardr. Gen. (2) Vol. 54, p. 7—16
16. —, 1939. De mariene inschakeling in de „Hoogterras-afzettingen” in het Westen en Noorden van Nederland. — Geologie & Mijnbouw, Vol. 1, p. 9—13