

A REVISED ARVICOLID BIOSTRATIGRAPHY FOR THE EARLY PLEISTOCENE OF THE NORTH SEA BASIN

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Abstract

This article presents a brief summary of a revised arvicolid biostratigraphy for the Early Pleistocene of the North Sea Basin, based on the system for the Pliocene and Early Pleistocene proposed by Tesakov (2004) for Southeast Europe. The system has been tested in the last few years against UK, Dutch and Central European arvicolid assemblages (Mayhew, 2011) and is considered to be applicable to Western Europe, including the North Sea Basin.

Samenvatting

Dit artikel geeft een beknopt overzicht van een gereviseerde arvicolide biostratigrafie voor het Vroeg Pleistoceen van het Noordzeebekken. Deze biostratigrafie is gebaseerd op het systeem voor het Plioceen en Vroeg Pleistoceen van Zuidoost Europa zoals dat is voorgesteld door Tesakov (2004). Het systeem is de laatste jaren getest voor Britse, Nederlandse en Midden-Europese arvicolide assemblages (Mayhew, 2011) en wordt toepasbaar geacht voor West Europa, inclusief het Noordzeebekken.

The new biostratigraphy recognises for the Gelasian stage (2.58-1.80Ma) five biozones based on arvicolid species present and their evolutionary level. The assignment to biozones proposed by Tesakov (2004) uses in particular the evolution of the water vole *Mimomys praepliocaenicus* and its descendant *M. pliocaenicus*, based on measurements and statistically supported evidence of crown height increase. It also includes reference to other lineages such as *Borsodia* (rooted lagurid voles), *Pitymimomys*, and *Mimomys hintoni*-*Mimomys reidi*-*M. pusillus*.

For the UK, the three earliest biozones shown in fig.1 (MNR3-MNR1) cover the period of deposition of the “Weybourne” and Norwich Crag, and, possibly, part of the underlying Red Crag. The “Weybourne Crag” (currently included in the Wroxham Crag Formation) arvicolids fall within biozone MNR1. The Norwich Crag arvicolids fall within biozone MNR2, with two distinct levels (Mayhew & Stuart, 1986).

The later level, dating from the end of biozone MNR2, includes the arvicolids from deposits exposed on the Suffolk coast near Southwold, including Easton Bavents. These underlie the type deposits of the Baventian Stage. For example, at Easton Wood, near Southwold a late biozone MNR2 assemblage has been recovered with the earliest UK occurrence of *Mimomys tigliensis*, and a new species of vole (*Mimomys glendae*) closely related (possibly ancestral) to *Mimomys hordijki* from the Netherlands (Mayhew, 2011).

The arvicolid assemblages of the earlier part of the Norwich Crag are assigned to the beginning of biozone MNR2 (or just possibly the end of biozone MNR3) and come from deposits including the type Bramertonian of Bramerton (Norfolk) and those at and near the surface at Sizewell (Suffolk).

On the basis of palaeomagnetic calibration in Central and Southeast Europe, the three levels of the UK sequence correspond to absolute age limits of 2.1-2.25Ma (“Weybourne Crag”), 2.25-2.35 Ma (later Norwich Crag) and 2.35-2.45 Ma (earlier Norwich Crag).

For the Netherlands, Tesakov (2004) already noted in his biostratigraphy the position of some Dutch localities. Thus, the small mammal assemblage of Tegelen (channel filling, type of “Tiglian C5” of the pollen sequence) is allocated to biozone MNR1, and the lowest part of the Zuurland (near Brielle) borehole faunas (here as: Zuurland 91-101m) is placed in the uppermost part of biozone MNR2. These correlations are corroborated by new results from the Moriaan-shoofd, Schouwen-Duiveland, borehole sunk in 2008, where the basal unit (ca 50 m) corresponds to Zuurland 91-101m and to the uppermost Norwich Crag (biozone MNR2). The assemblages from Zuurland 60-65m appear to correspond to biozone MNR1.

The new biostratigraphy for the North Sea Basin area is believed to have a potential resolution of the order of plus or minus 80Ka (=2 x 40Ka climate cycles). The accuracy may be greater after calibration by palaeomagnetic results being obtained by current work, and after the application of the principles of sequence stratigraphy and allostratigraphy to the analysis of UK crag deposits. In the Netherlands, work on boreholes recognises successive cycles, believed climate based, in the Gelasian (Slupik *et al.*, 2007). Current work is aimed at correlating these cycles across the North Sea, using the new arvicolid biostratigraphy, thus also relating continental and marine deposits.

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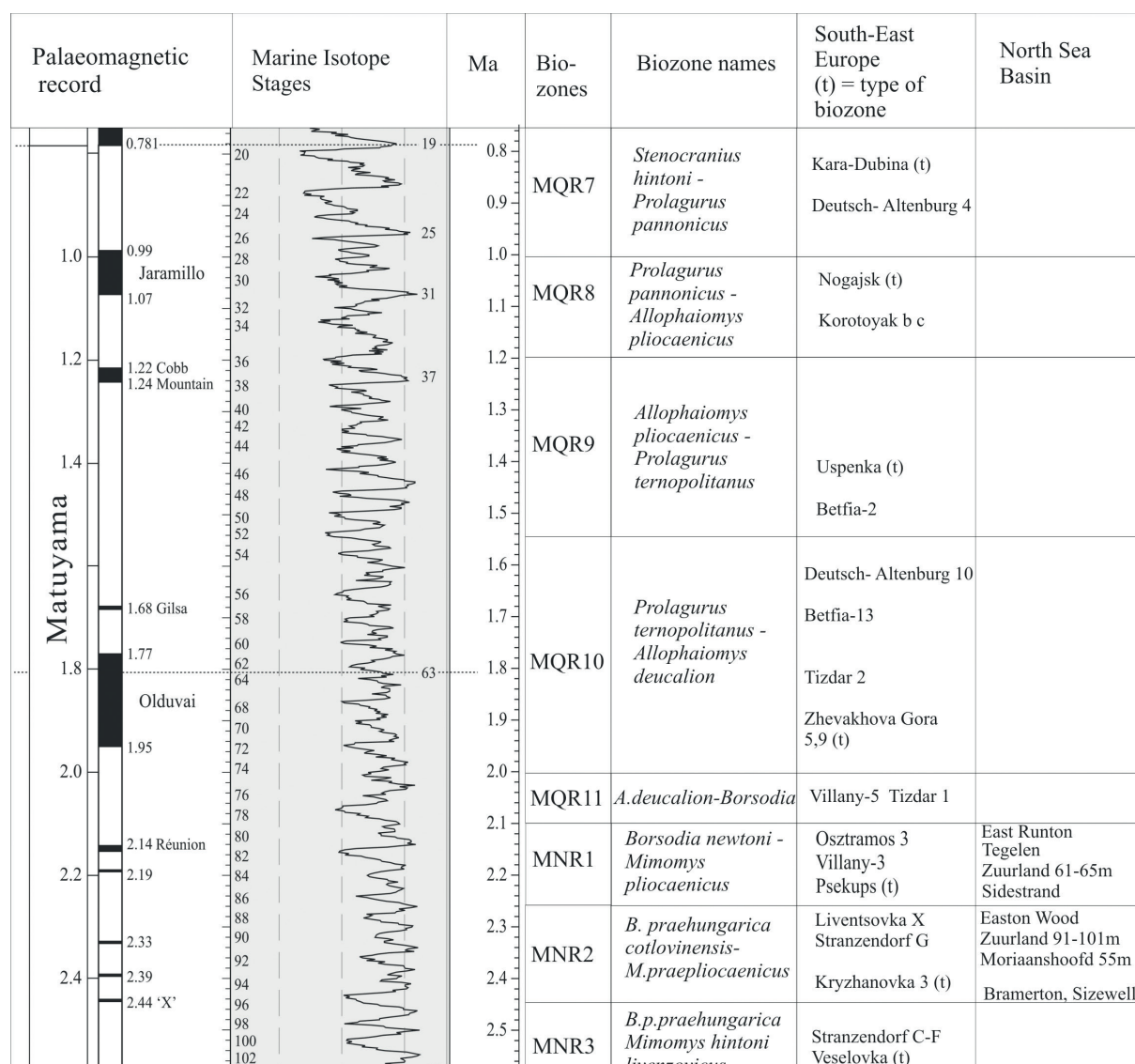


Fig. 1 New biostratigraphy for the Early Pleistocene of the North Sea Basin

Nieuwe biostratigrafie voor het Vroeg-Pleistoceen van het Noordzeebekken

(Based on Tesakov, 2004, Tesakov et al. 2007, and original. The palaeomagnetic record and marine isotope stages are taken from the Global stratigraphical correlation table for the last 2.7 million years v. 2010 (IGS/SQS): <http://www.quaternary.stratigraphy.org.uk/correlation/chart.html>).