Holocene malacofaunal assemblages in Hungary

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A biostratigraphical subdivision of the Holocene deposits of Hungary is presented. For the medium high mountain ranges four assemblage zones are proposed, based on terrestrial molluscs. Also for the subsided areas four such zones are introduced, based on the freshwater molluscs.

Contents

Introduction

Malacological investigations of Quaternary sediments in Hungary during the last twenty years have improved the knowledge on the development of the molluscan faunas, which made it possible to carry out a biostratigraphical subdivision of the Hungarian Holocene deposits (Fűköh, 1992). Sediments of both the medium high mountain ranges and the subsided zones yield numerous and well-preserved molluscs. Taking into account the characteristics of these two territories a description of the following assemblage zones is possible.

Malacozones in Hungary

Medium high mountain ranges

Vallonia costata Zone (8200-6500 BP)

The final disappearance of Pleistocene faunal elements, such as *Pupilla sterri* (Voith, 1838), *Vallonia tenuilabris* (Braun, 1843) and *Columella columella* (von Martens, 1830), is taken as the lower boundary of this zone. The zone is characterised by the dominance of species from steppe environments. Index species are *Vallonia costata* (Müller, 1774), *Granaria frumentum* (Draparnaud, 1801), *Cochlicopa lubrica* (Müller, 1774), *C. lubricella* (Porro, 1847), *Chondrina clienta* (Westerlund, 1883), and *Chondrula tridens* (Müller, 1774). The upper boundary is a minimum in the occurrence of *Vallonia costata*.

Clausiliidae Zone (6500-4500 BP)

During this interval a closed-forest fauna developed. The characteristic species are *Clausilia cruciata* Studer, 1820, *Laciniaria plicata* (Draparnaud, 1801), *Ruthenica filograna* (Rossmässler, 1836), *Cochlodina orthostoma* (Menke, 1830), *Truncatellina claustralis* (Gredler, 1856), *Vallonia pulchella* (Müller, 1774), *Oxychilus orientalis* (Clessin, 1887), and *Daudebardia rufa* (Draparnaud, 1805). The upper boundary of this zone is defined by a renewed appearance of species preferring steppe environments.

Granaria frumentum Zone (4500-2500 BP)

Next to elements from closed-forests faunas, species from open areas and steppe are found again. The re-appearance of *Granaria frumentum* is taken as the lower boundary of this zone. Characteristic species from open areas and steppe are *Vallonia costata, Granaria frumentum, Aegopinella minor* (Stabile, 1864), and *Pyramidula rupestris* (Draparnaud, 1801), but their relative frequency with respect to the closed-forest species remains below 30%.

Helicigona faustina-Acicula polita Zone (2500-0 BP)

During this zone the occurrence of forest species increases again to 85-90% and *Helicigona faustina* (Rossmässler, 1835) is found for the first time. Later on this species will become a common constituent of Recent faunas. The presence of *Acicula polita* (Hartmann, 1840) also is characteristic for this zone. Other index species are *Vertigo pusilla* Müller, 1774, *Carychium tridentatum* (Risso, 1826) and *Orcula dolium* (Draparnaud, 1801).

Subsided zones

Lithoglyphus naticoides-Valvata piscinalis Zone (8200-6500 BP)

The two species *Lithoglyphus naticoides* (Pfeiffer, 1828) and *Valvata piscinalis* (Müller, 1774) characterise the lower boundary of this zone. More upward, approaching the upper boundary of the zone, a strong decrease of these species is sometimes found, or even a partial disappearing. Apart from the index species, *Valvata pulchella* Studer, 1820 and *Lymnaea auricularia* (Linné, 1758) are sometimes found to be present in this zone.

Gyraulus albus-Bithynia tentaculata Zone (6500-4500 BP)

The species *Gyraulus albus* (Müller, 1774) is common in the lower part of the zone, whereas *Bithynia tentaculata* (Linné, 1758) is more abundant in its upper part. The importance of *B. tentaculata* decreases significantly or the species even disappears completely from the upper zone boundary upward. In some cases an alternating dominance of the species *B. tentaculata* and *B. leachi* (Sheppard, 1823) is observed at the boundary of this zone and the following.

Bithynia leachi-Gyraulus riparius Zone (4500-2500 BP)

The base of this zone is characterised by the first appearance of *Gyraulus riparius* (Westerlund, 1865). Its final appearance is at the upper zone boundary. The species is absent from the Recent Hungarian fauna, its actual distribution area being situated N and W of Hungary. This species is also known from Pleistocene sediments of the Great Plain. It is a typical level index species.

Unnamed zone (2500-0 BP)

As anthropogenous influences werė so significant during this interval it has been impossible to identify the composition of the original, natural fauna. Biotopes have been the subject of so many and so rapid changes effectuated by man that it has not been possible to characterise the sediments biostratigraphically.

The biostratigraphical zonation as outlined here may not be a final one. It can be improved or further subdivided by the results of further malacological or sedimentological investigations. The publication of our preliminary results, however, was thought to be stimulative for further stratigraphical research.

Comparison with other central European malacofaunas

Published data for a comparison of the freshwater deposits are not available. Based on the terrestrial molluscs the following comparisons can be made.

Czechoslovakia

Horaček & Ložek (1988) subdivided the Holocene in seven assemblage zones, based on the occurrence of both Mollusca and vertebrates. Their data can well be compared with the Hungarian results. Zones C1 and C2, dated Preboreal to Boreal, are characterised by the occurrence of steppe species. The D zone (Atlantic) demonstrates a dominance of forest species and a decrease of *Vallonia costata*. During the Epi-Atlantic E zone there is an optimum of forest species and a complete disappearance of *Vallonia costata*. In the F1 zone (Subboreal) the forest species decrease in importance, and the appearance and spreading of species preferring open space is observed. During the Subatlantic F2 zone an immigration of modern species takes place, with a strong spreading during the Subrecent F3 zone, the maximum of *Laciniaria biplicata* (Montagu, 1803). A correlation of these zones with the results from Hungaria is given in Fig. 1.

Poland

Alexandrowicz et al. (1985) published data on the Polish Holocene malacofauna. According to these authors the Early Holocene (Boreal) deposits are characterised by the abundance of *Vallonia costata*, and during the Atlantic there is an abundance of forest species. In the Late Holocene a xerotherm fauna (*Pyramidula rupestris, Truncatellina cylindrica* and other species) is found in the limestone territories.

Fig. 1. Synoptic table of Hungarian Holocene molluscan biostratigraphy.

Absolute age	Chronostratigraphy (Horaček & Ložek, 1988)		Biostratigraphy (Füköh, 1990)	
2000	Subatlantic	Subrecent F3	*Helicigona faustina - Acicula polita* Zone	unnamed zone
		Subatlantic F2		
4000	Subboreal	Subboreal F1	*Granaria frumentum* Zone	*Bithynia leachi - Gyraulus riparius* Zone
6000	Atlantic	Epi-Atlantic E	Clausiliidae Zone	*Gyraulus albus - Bithynia tentaculata* Zone
8000		Atlantic D	*Vallonia costata* Zone	*Lithoglyphus naticoides - Valvata piscinalis* Zone
10 000	Boreal	Boreal C2 C1		

Germany

The Early Holocene (Postglacial) mollusc fauna of Germany is outlined by Dehm (1976), who studied material from 50 localities. As in Hungary this author established the presence around the Pleistocene-Holocene boundary of species like *Chondrula tridens, Granaria frumentum, Orcula dolium* and *Oxychilus depressus* (Sterki, 1880). Rähle (1983, 1987) described the general tendency that after the Pleistocene the ratio of species preferring open space increases, whereas it decreases again during the Middle Holocene.

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