

PROBLEMS AND VISTAS OF HOLOCENE VERTREBRATE
BIOSTRATIGRAPHY IN HUNGARY

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Abstract

The latest, and probably most important cold period of the Pleistocene, called Würm III, had its paroxysm at about 18 - 20,000 years ago. It was followed by cool oscillations, by an important warming up between 9-10,000, and - as a tendency - warm climatic fluctuations up to now. This latter period is the Holocene.

At the Pleistocene/Holocene boundary a rather sharp change in the vertebrate fauna can be observed, which scarcely is matched by faunal changes within the Pleistocene. As a consequence, the extremely specialized psychrophilic species of the Late Pleistocene fauna became extinct or very rare. Other Pleistocene species of large ecologic range, and those which had lived under "pejus"-conditions, on the other hand, multiplied, and new species migrated in. It was in this way that the "Holocene" fauna came about, which during its further evolution, under human influence, can possibly start a new faunal wave ("biozone", "Oppel-zone"). The study of this process provides the basis for the subdivision of the probably shortest period of Earth's history. In Holocene biostratigraphy, relying upon vertebrate faunas, problems have their origin in this particular level of accuracy. They may be summed up as follows.

1. Designation of stratotypes of vertebrate biostratigraphy and their fitting into the geological time scale.
2. General problems of biostratigraphical nomenclature have to be settled. Holocene itself is only of such extent as the "line" of stratigraphic boundary in the case of marine sedimentary rocks.

3. Modelling the introductory phases of an interglacial, in paleontology - the biozone level faunal wave change; specific "microproblems" have to be solved by investigating the concomitant range zones and akme zones.

4. Particular attentions has to be paid to fundamental faunal changes due to environmental changes.

5. Accuracy requires the introduction of population - (chrono- and topo-population) level investigations, which have no importance - and at the same time, no possibility - in the case of longer time intervals.

6. Man, as an environment modifying factor, should be taken into account.

The general and methodological problems outlined above should be illustrated in the following by some examples.

a. / KRETZOI (1957, 1964, 1969) established the Bajotian, Körösien, Bükkian and Alföldien phases, on this basis of the microbiostratigraphic faunal analysis of the Jankovich cave, demonstrating Holocene shifts in faunal dominance due to climatic changes. Whether these phases are valid within the facies boundaries of one microenvironment only, or in a wider sense, will be suitable for the biostratigraphic correlation of a more extended area, required further detailed studies.

b. / A population level study was done by the author on bone remnants of about 438 individuals of the bat species Rhinolophus hipposideros. The main results are given below.

The age of the fauna characterized by the predominance of Rhinolophus hipposideros was indentifiable with the climatic optimum (Atlanticum) of the Holocene. Biometric investigations have revealed that juvenile specimens made up 18, adult ones 82 percent of the population. Sex ratio was 70 percent male and 30 percent female for the young and 68-32 percent for the grown-up. In comparison with the recent Hungarian form of the species, the Kiskőhát population was characterized by stronger and bigger forelegs, shorter feet,

bigger skull (particularly bigger facial part) and upper teeth, longer and narrower lower canini, M_2 and M_3 . Accordingly, this older, i. e. theoretically more primitive population differs in "mosaic evolution" from the recent one. Independently from the clearing up of taxonomical problems one can affirm that during the Atlanticum, or even in the Boreal phase, a particular form of Rhinolophus hipposideros invaded the Carpathian basin, having been adapted to the Pleistocene climate; it was unable to acclimatize to further climatic changes, so it died out or retired to unknown areas. It was substituted by the recent Rhinolophus hipposideros, immigrating also from the South, in a new wave of the Subboreal phase. The investigations on the population of this species, together with speleoclimatological data, allowed the author to draw some conclusions: in the Bükk Mountains, at an altitude of 8-900 m a. s. l., at the time of the climatic optimum of the Holocene, the annual mean temperature may have been 10-11 centigrade, at a altitude of 2-300 m - 13-14 centigrade, in contrast to the present-day 8 and 10 centigrades, respectively.

c./ In the Bükk Mountains and on the Aggtelek Karst the studies carried out on vertebrate faunas of 25 finds from 9 localities revealed, how important facies differences may occur even in geographically and geologically very similar areas. The most obvious facies difference is that while in the Jankovich cave the appearance of Holocene fauna is indicated by the absolute predominance of Microtus arvalis, in the Bükk Mts and in the Aggtelek Karst the same role is played by Pitymys and Myodes. Another difference exists in the survival of Pleistocene species in the Bükk and Aggtelek area. While the substantial faunal change occurred in the Bükk during the Boreal phase, on the Aggtelek Karst the actual species assemblage developed after the Atlanticum only. On the Aggtelek Karst the investigations on the Nagyoldal karst chimney allowed us to trace the deforestation activity started by man in the Bronze Age, irreversibly modifying the species ratios of small mammals, thus promoting the pullulation of noxious rodents.

Microbiostratigraphy based on vertebrate faunas of as complete as possible stratotypes, establishing biostratigraphic units of various levels depending on the results, is not intended to replace, but complement stratigraphic subdivisions based on other methods. Vertebrate biostratigraphy has to be correlated as precisely as possible with the results of other approaches (such as palynological, archaeological, and above all of absolute dation), avoiding stratigraphic subdivisions directly relying on climatic changes. The geochronological subdivision of the Holocene is to be established by selecting some very general relationships of some particularly appropriate and multilaterally studied stratotypes.