

Neogene and Quaternary paleomammalogy

Neogene and Quaternary mammals of the Palaearctic. Papers in mammal paleontology honoring Kazimierz Kowalski. A. Nadachowski and L. Werdelin, eds. Acta zoologica cracoviensia 39 (1) 1996, vi + 605 pp. ISBN 83-901631-4-4; ISSN 0065-1710.

The reviewed volume includes the results of the conference entitled: "Neogene and Quaternary mammals of the Palaearctic" organized in Cracow in 1994 to honor Professor Kazimierz Kowalski on the occasion of the 50th anniversary of his activity in the field of paleomammalogy.

More than one hundred participants from twenty six countries contributed sixty two articles to the volume. The introduction includes Kazimierz Kowalski's curriculum vitae, scientific activity and bibliography, as usual in "Festschrift" volumes.

There is neither a general introduction to the conference topic nor any closing chapter summing up the results, and no order has been introduced by the editors into the contents other than the alphabetic sequence of the authors. The book is rather a mosaic of topics that covers the whole field of paleomammalogy and biostratigraphy of the Neogene and Quaternary of the Palaearctic up to the recent time, and thus gives a fairly complete picture of the state of knowledge and methodology.

Short (less than 10 pages) purely taxonomic articles take almost 30% of the volume. The papers dealing with taxonomy directly applied to biostratigraphy amount to about 20% of the volume. Evolution of faunistic complexes in geologic time and space is discussed another 30% of articles, some of them including the systematic basis of the discussion (eg Tschernov p. 513), some others giving just a summary of the current state of knowledge (Forsten p. 161). The remaining papers have been devoted to pure biostratigraphy, age correlations (eg Torre *et al.* p. 559), reconstructions of the paleoenvironment, taphonomy, and anatomy.

The volume covers all the important components of the modern (beginning with the Neogene) Palaearctic fauna, the majority being small mammals, and principally the rodents (more than 30% of the total). This fauna emerged after a great faunal turnover event at the Oligocene/Miocene boundary. A whole array of Paleogene mammalian groups, including the primitive orders Dinocerata, Condylarthra and Creodontia, as well as numerous archaic families belonging to modern orders went extinct or nearly so, whereas modern families emerged and/or have been subject to radiation. With the mammalian fauna of the Neogene we are thus dealing, with quite a familiar assemblage of animals, the general relationships of which are fairly well known. The taxonomic problems which remain to be solved are mainly those of generic and specific levels, instead of higher level relationships. The peculiar character of this fauna bears on the methodology used in the presented studies.

Cladistics, which is the dominant taxonomic method in vertebrate paleontology of to day, is almost absent from these articles. Actually, it is applied in just one paper, the one by Y. A. Semenov on the structure of the auditory bulla in extant and fossil hyaenids (pp. 473–476). In spite of the original Hennigian (1966) claim that taxonomy should give a resolution of relationships up to the species level, the cladistic methodology introduced by the latter author suits better higher taxonomic levels. This methodology simply requires, or works better with the clear-cut discriminative characters than with the slight specific differences between the studied taxa. Instead, the lower level taxonomic problems require studies of intra- and interspecific variability of quantitative characters and application of various statistical methods depending on the quantity of specimens studied and author's invention.

Univariate analysis and simple statistic methods (comparisons of variability ranges, scatter diagrams and so on) are commonly used when sample sizes are small which is often the case with the

non-rodent material, eg Insectivora (Harrison p. 201, Reumer p. 413, Rzebik-Kowalska p. 447) or large mammals as plio-pleistocene dogs (Rook and Torre p. 427). More numerous tooth samples which are usually, but not always, those of rodents (see the article by Fladerer and Reiner on Lagomorpha, p. 147), require more exquisite mathematical treatment of morphological data such as morphotype analysis. Mezzabotta *et al.* (p. 357) and Bustos (p. 435) give concise introductions to this method. According to these authors, tooth characters morphometrically investigated by univariate, bivariate and multivariate statistical methods (analysis of variance, bivariate scatter diagrams and correlations, cluster and factor analyses) are used to group specimens in morphotypes or morphotype classes. The qualitative characters are quantified and combined with morphometric ones. The samples of different age and provenance are compared in terms of frequency of morphotypes.

With this volume at hand, the reader has the impression that the main interests of the paleontology of modern mammals concentrates on faunistic problems. They overshadow those of phyletic reconstructions of individual lineages. The latter are recognized within the groups of closely related species and are heavily based on dense stratigraphic sequence (Garpich and Nadachowski p. 179, Radulescu and Samson p. 401). Both taxonomy and its biostratigraphic context serve to reconstruct the evolution of animal assemblages in geologic time in correspondence with changes of climate, geographical distribution, and paleoenvironment.

Some papers (Fortelius *et al.* p. 167, Sen and Leduc p. 491) are particularly concentrated on paleoecological aspects of faunal evolution. They present results of studies on provinciality and faunal dynamics based on the analysis of species richness and a taxon-free analysis of body size and various aspects of ecomorphology.

Koenigswald *et al.* (p. 235) have reconstructed a middle Weichselian faunal assemblage on the basis of about 600 footprints (with about 30 track ways recognized) left by animals that frequented the studied area at that time. Interestingly, the biomechanical equations used for estimating the travelling speed of these modern mammals have been originally developed by paleoichnologists for dinosaur trace fossils.

Just few papers discuss the role of different biases in paleontological studies, namely in paleoenvironmental (Denys *et al.* p. 103) and biostratigraphic (Martinez and Guex p. 329, Senken and Graham p. 477) interpretations. All the authors suggest an important role of factors such as taphonomic attributes of individual sites, subjectivity of students, and sampling conditions for deformation of the results. The first of these papers (Denys *et al.* p. 103) is a sort of actuopaleontologic study, the influence of taphonomic factors having been observed on the recent pellet assemblages compared to those of small extant mammals of the region. Another paper that intends to eliminate a possibility of bias, this time in taxonomic studies, is that by Viriot (p. 577). The author has experimentally produced wear surfaces in rodents teeth to demonstrate the range of ontogenetic variability in tooth morphology.

The "Festschrift" to Kazimierz Kowalski is a product of a coherent and vital scientific society of the Neogene and Quaternary paleomammalogists united not only by the interests to the most recent section of evolution of a particular vertebrate group – the mammals, but also by a determined, complex, and modern research methodology. The much differentiated international character of this society encompassing the students from both eastern and western countries results in a good covering of the Palaearctic problems and contributes to great scientific importance of this volume.

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