

THE ROLE OF PALEOPALYNOLOGICAL INVESTIGATIONS DURING THE STUDY OF QUATERNARY DEPOSITS

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ABSTRACT

1. The main criterion for establishing the main stratigraphic subdivisions (system, division, stage) in all the deposits from Proterozoic to Neogen inclusive is their paleontological as well as paleopalynological character.

On the basis of successive change of complexes of species and genera of animals and plants there have been constructed the stratigraphic and geochronological scales for these sediments.

2. The paleontological data cannot be used for stratigraphic subdivision and dating of the Quaternary deposits because during the Quaternary "period" there was no time for formation of new species of plants which emergence and extension help to judge about the age of sediments. According to the paleobotanical data the absolute majority of existing species of plants appeared in Cretaceous, Paleogene and Neogene periods and the whole history of flora of the Quaternary "period" must be estimated by the time not exceeding the age (stage).

3. On the basis of the up-to-date paleopalynological investigations it is not possible to solve to what part of the section the investigated Quaternary deposits belong. The results of these investigations may explain only some questions of botanical-geographic, climatic and physico-geographic character.

4. In order to use the paleopalynological data more effective during the study of the Quaternary deposits it is necessary to study spores and pollen in great detail than now. Thus the most important tasks are: (1) the establishment of plant species by their spore and pollen fossils; (2) the study of spore and pollen of existing species of plants and first of all those which live in the investigated region and in the adjacent territories in order to reconstruct the ways of sequence and time of these or those species using the spores and pollen finds in fossil state (3) the creation of "types" of spore-pollen diagrams for different parts of the Quaternary time and (4) the separation of plant species by their spores and pollen which can be the reliable correlates and further probably the age indicators.

BASIC for subdivision of deposits of any age from the Late Proterozoic up to Neogene inclusively is paleontological characteristic of sediments because "paleontologic criteria appear to be the most important and the most objective criteria for the distinction and especially for the correlation of the basic subdivisions of the stratigraphic and geochronologic

scales" as it is justly said on p. 11 of instruction of Interdepartmental Stratigraphic Committee of the USSR under the title "Stratigraphic classification and terminology" published in 1960.

The biological taxa of different rank correspond to different geochronological (stratigraphic) subdivisions. Period (system) is characterized by typical "families and genera of great vertical extent in the fauna and by genera and species in the flora" (p. 17). Usually it is expressed in the appearance and wide development of new groups of major systematic rank (genera, families, etc.).

Epochs (sections) are characterized by the presence of "relatively major systematic groups of fauna and flora (subfamilies, genera, etc.) distinctive only for them or typical of them in their predominant spreading, though essential changes (renovations) in the content of the flora often take place sooner (before) than in the content of the marine fauna" (p. 18). Age (stage) is characterized by genera, subgenera and groups of species typical for the given stage and peculiar only to it" (p. 19). Time (zone) is defined by "the limits of the extent of a definite grouping of widely distributed and preferably rapidly changing organisms constituting the zonal faunal (or floral) assemblage, which is not repeated either in the overlying or in the underlying deposits" (p. 20).

Paleontologists, studying the organic remains from the Quaternary deposits, came to the conclusion about the very finite possibility of using paleozoological and paleobotanical data for the stratigraphic subdivision of the Quaternary deposits and their correlation, because during the Quaternary time of evolution of the earth, due to its shortness, there could not be formed not only the new genera but also species of animals and plants which can be the reliable criteria for stratification of the Quaternary deposits.

From the geochronological position flora and vegetation of the whole Quaternary "period" may be taken as characteristic only for the period of time not more than age (stage).

It follows naturally that the main criterion which is used for the subdivision of sediments of all the systems — the emergence and settlement of new groups of organisms — cannot serve for establishing correlation and dating of the Quaternary deposits.

Taking into account some specific features in the history of evolution of the earth and its organic world during the Quaternary time the group of Soviet investigators (G. S. Ganeshin, V. A. Zubakov, I. M. Pokrovskaja, J. P. Seliverstov, J. F. Chemekov, S. V. Epshtein and S. V. Jakovleva) affirmed in 1961 that "on the whole, the Quaternary deposits, according to their biostratigraphic importance, are not more than stage of a unique stratigraphic scale". Then in 1962 they suggested to subdivide the Lower, Middle and Upper Quaternary and Recent deposits as "links" (zveno). There was a proposal to divide stages into links and further subdivisions on the basis of climatic — stratigraphic principle.

Paleopalynologists who wanted to create the paleopalynological basis for subdivision of the Quaternary deposits began in fact to distribute the established spore-pollen complexes to composite and individual stratigraphic sections created by geologists or they attributed palynological spectra to the sediments which constructed terraces of different levels. In the main it is not faulty if the palynologists can work out complexes which are characteristic only for the given period of time on the basis of findings which can help in future to date deposits regardless of the opinions of the other investigators.

The spore-pollen complexes established from any bed of the Quaternary deposits may explain only some questions of botanical-geographic, climatic and physico-geographic character but not the stratigraphic.

According to the change of paleopalynological characters in layers we may reconstruct the main phases in the history of evolution of vegetation and register the

appearance and disappearance of representatives of diverse genera and families, which may be to some extent a correlative feature but only in the limits of restricted territories, with the identical history of geological development.

In many regions of the northern part of the earth there was observed an attempt to create paleopalynological diagrams assigning deposits to a definite stratigraphic subdivision of Pleistocene.

In order to increase the role of paleopalynological investigations in solving the stratigraphic and paleogeographic questions of the Quaternary time it is necessary to reorganize radically the methods of determination of spores and pollen from the Quaternary deposits. It is now, insufficient to establish the identity of pollen either to this or that genus or family.

Taking into consideration the fact that the majority of living species of plants have been formed during the Quaternary time it is necessary to start the determination of fossils of spores and pollen more precisely up to: subgenera, sections, species.

The boundaries of areas of the majority of plants changed repeatedly under the influence of change of climate. The representatives of many genera had to leave their shelter and in favourable conditions they appeared over a widespread area.

The time of immigration of representatives of these genera of plants, the replacing of one species by the other, may be the reliable correlates in comparison of sections of the Quaternary deposits, in limited territories, with the identical history of vegetation during the Pleistocene time.

The solution of this question as the author considers is possible only by way of study of spores and pollen of living plants, in the limits of intrageneric categories and in the first place species living on the territory of investigations, for the subsequent comparison of fossils with them.

The paleopalynological characteristics of the Quaternary deposits without detailed determination of fossils due to their elementariness will soon lose their importance, first of all, in solving the questions of paleogeography and history of vegetation.

REFERENCE

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