THE IMPORTANCE OF FOSSIL REMAINS OF THE PALEOZOIC FAUNA IN THE MOUNTAINS MUKRI IN STUDYING THE RELATIVE AGE OF ROCKS AND ORGANIC EVOLUTION

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Abstract: In the article the importance of the study of fossil organisms to reconstruct the physico-geographical conditions of the past on the example of paleofauna korbonski sediments of the Eastern part of Mukry (Western spur Zhetysu (Dzhungar) Alatau). The relevance of studying this topic is due to the small study of paleofauna korbonski sediments of the study area, and the insufficient literature data on the problem. The main results on the study of brachiopods brachiopods-paleontological monument mountain Mukri.

The main goal of this research is to reveal features of Mukri for the study of fossil remains of the paleozoic fauna in determining the relative age of rocks and organic evolution.

For a more accurate and effective study, the authors used a large number of qualitative and quantitative methods, especially the methods of organic complexes, which, unlike the method of governing forms, the method of analysis of faunistic and floral complexes, use all available paleontological material. The researchers found out the distribution of all fossils in the section, and found the factor of change of complexes and traced the variability of the complex from section to section (section methodology).

Key-Words: Stratigraphy, middle Carboniferous, paleofauna, Zhetysu (Dzhungar) Alatau, paleontological material, fossil organisms.

1 Introduction

Paleogeographic studies based on the reconstruction of physico-geographical conditions of the past, the study of which allows us to identify patterns in their temporal development.

Paleogeographic reconstructions important as a means of cognition for the study of paleoclimatical, paleoecological the terms of the development of nature in a certain geological epoch, the history of the formation of the modern landscape and as a basis for predicting the future state of geosystems. This allows to some extent to give recommendations for their conservation.

The only real document of the geological past is left over from the geological time layers (sediments). The greatest interest are the sedimentary rocks since their formation is directly related to the specific physical and geographical conditions. Similar deposits are on the territory of mount Mukri the South-Eastern part of the Republic of Kazakhstan.

The article includes sections of a brief description of the study, the characteristics of the methods used in the framework of excavations and field studies, a brief analytical report of laboratory studies on the chemical composition of rocks, the results covered in television and photo reports of local media and brief conclusions about the format of the study and its importance for the entire geographical and historical world.

2 Problem Formulation

In the process of the study were used General methods of research: methods of analysis of financial statements: horizontal, vertical, ratio, comparison, and other.

To study the Paleozoic fauna in Kazakhstan were used General scientific and special research methods:

- review of the regulatory framework;
- analytical method;
- economic-mathematical calculations;
- Biostratigraphic methods: These methods are based on extensive use of fossil organic residues.

The theoretical and methodological basis of the study consists of classical and modern works of domestic and foreign scientists in the field of study of fossil remains of Paleozoic fauna, as well as applied research aimed at analyzing trends and prospects of functioning and development in the study of the relative age of rocks and organic evolution of the remains of Paleozoic fauna in the mountains of Mukri. The methodological base of the research is represented by the reproductive, institutional and situational approaches, the approach based on simulation.

The basis for the development of the problem and the solution of the formulated problems were the principles of the system-structural approach to the study of socio-economic objects and the theory of decision-making. For processing, analysis and generalization of materials in accordance with the goal and formulated tasks used geographical, geodetic, logical, comparative analysis, tabular and graphical methods of representation of fossil data, as well as bootstrap methods and simulation models.

The information and empirical base consisted of the data of official samples of the visiting group of researchers in the area of excavations in the mountains of Mukri, models, factual data taking place in monographic studies and publications of domestic and foreign scientists-geographers, materials of scientific conferences, Internet resources, periodicals, as well as data obtained personally by the authors in the research process.

The working hypothesis of the study is based on the author's assumption that improving the efficiency of the study of the remains of Paleozoic fauna in the mountains of Mukri will make a great contribution to the study of the relative age of rocks and organic evolution.

2.1 Source data and research methods

To explore the origin of basic types and habitat fingerprint of the Paleozoic fauna argillite, silt, clay and shale deposits of the mountain Mukri conducted research in 2012-2016 in the stratigraphic laboratory of the research Institute of geological Sciences n.a. K. I. Satpayev and paleontological laboratory of the Institute of Zoology of the Ministry of education and science of the Republic of Kazakhstan under the guidance of doctor of geological-mineralogical Sciences G. K. Ergalieva and candidate of biological Sciences F. A. Tleuberdina.

3 Problem Solution

Stratigraphic studies korbonski deposits within this area were not carried out and studied. Not many and literature data on this issue. Therefore, the study and conservation in view of the growing anthropogenic load of paleontological monument of nature Mukri is an urgent task and has practical and scientific value.

These include paleontological nature monument mountain Mokry located in the West of Zhetysu (Dzhungar) Alatau to the South-East of the Republic of Kazakhstan. According to the geological maps of the mountains Zhuantobe (East spur of mount Mukri) facing the surface of the unique monument of nature, preserved imprints of extinct marine organisms formed on the bottom of the terrigenous sediments as the result of condensation, dehydration and cementation argillicola, aleuropelitic, clay and shale sedimentary rocks Visean and Tournaisian tier of the Carboniferous system.

The territory of the study area is characterized by widespread deposits of Tournaisian and Visean tier of the Carboniferous system in the middle of the lower Carboniferous, which are mostly on the West side of the valley of the same river. According to the stratigraphic column argillicola capacity, silt, clay and shale terrigenous Visean tier of the lower Carboniferous reach 650m. From the upper part of the section identified brachiopods Schuchertella BF. librovitchi salt., Orthotetes Ms. S. archarlensis Dictyoclostus deruptus (ROM). Spiriferella captivity (hall)Buxtoniaex gr. dengisiNal.Flora: Sublepidodendronsp. Nov.Archaesigillariasp.Dr and Nov. [Table1].

Under Quaternary and Neogene systems of different Genesis, in addition to the widely developed terrigenous-carbonate and terrigenous argillite the deposition of the lower Carboniferous within the study area are deposits of the Visean and

Tournaisian tier lower and middle Carboniferous [figure 1].

The study of fossil remains of organism's paleontology the monument proves that the Devonian and Lower Carboniferous on the site of modern Zhetysu (Dzhungar) Alatau in the South-East of the Republic of Kazakhstan survived the geosynclinals regime, which was completed by the end of the Paleozoic.

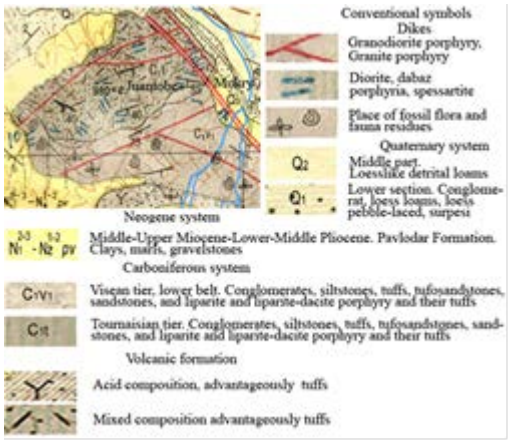

Figure 1. Geological schematic map of territory. Distribution of fossil flora and fauna

The study of fossil remains of paleofauna was carried out in field period 2012-2016 in within the paleontological monument Mukri. According to the geological studies of outcrops, which were subjected to the study belong to the Visean and Tournaisian tiers lower and middle Carboniferous. Biofatsialnye the results of the analysis showed that the sediments in the study region of the prints of extinct organisms belong to the type of brachiopoda brachiopods lived in shallow seas in the place of modern Zhetysu (Dzhungar) Alatau in the middle and upper Devonian, 350-400 million years ago.

System	branch	Tier, subtier	Index	Stratigraphic column	Thickness, m	Characteristic of rocks
Quaternary	Upper-modern		Q_2-Q_4		111	Sands, gravel, loam, boulder-gravels
	Lower		Q_1		160	Koturbulak suite "Upper Gobi "conglomerates, loess loam
Neogene	Miocene-Pliocene		$N_1^{2-3}N_2^1$ pv		>190	Pavlodar suite. Conglomerates, gypsum-bearing clay, marl, grits
Carboniferous	Middle	Visean tier, the	C_1v_3+n-C_2b		600-1000	a. Conglomerates, mixed effusive and tuffs, tufoaglomeraty, siltstone. Flora: *Asterocalamites*
	Lower	Visean	C_1v_1		650	Lower tier, sandstones, conglomerates, tuffaceous sandstones, lenses of coal, shale. Fauna: *Dictyoclostus deruptus (*Rom). *Spiriferella plena* (Hall) *Buxtonia* ex gr. *dengisi* Nal. Flora*: Sublepidodendron* sp. nov. *Archaesi gillaria* sp.nov.
		Tournaisian	C_1t		860	Conglomerates, siltstones, tuffs, tuff sandstone, sandstone, liparite-dacite porphyry. Fauna: *Productus* ex gr. *magnus* M.W.*Spirifer* cf *missouriensis* Swall *Athyris* cf *lamellosa* L.E v. Flora: *Sphenopteridium* sp. *Archasosigillaria* sp.

Table 1. Stratigraphic column territory of paleontological monument Zhuantobe.

This area in 1906 was researched by famous Russian geologist A. K. a Maester, and made a geological map at a scale of 20 versts to the inch.

As a result of field survey of the outcrops we sampled 10 specimens of fossils, in determining systematic which was 4 representatives of paleofauna carbonscape period, which are representatives of type Brachiopoda.

In determining the types of fossil organisms carbonscape period

the study region used identification keys of the following authors: Fotieva N. N. (1985) A. N. Hodalevich and A. F. Torbakov (1965), L. Sh. Davitashvili (1973); Orlov, Y. A. (1968); O. B. Bondarenko and I. A. Mikhailova (1984).

A systematic review, was in the area of research paleofauna presented in table 2 [table 2].

Table 2. Systematic paleo faunal list of the study area

Type	Class	Group	Kind	Period
Brachiopoda	Articulata	Platustrophia	Chonetes corboniferus	Silur, Devon, carbon
		Curthospirifer Nalivkie	Curthospirifer disjunctus	Silur, Devon, carbon

		Productida	Productius	Silur, Devon, carbon
			Strophlosiahorrescens	Silur, Devon, carbon
Echinodermata	Echinodea	ArchaeocidarisM'Coy	Echlnocrysovatus	Devonian, Carboniferous, Permian

In General, paleofauna in the mountains Mukri preserved on a small area and occurs unevenly. Mainly in argillite terrigenous, silt and clay and shale deposits of the fauna is found evenly. According to the geological and paleontological research scientists of the Silurian, Devonian and lower Carboniferous terrigenous sediments on the territory of Zhetysu (Dzhungar) Alatau found Chonetes corboni ferus, Curthospiriferdisjunctus etc. [figure 2].

Figure 2. Prints castle without castle brahiopody argillite clastic sediments at the foot of the mountain Zhuantobe:1- Chonetes corboni f erus; 2- Curthospiriferdisjunctus; 3- prints brachiopods.

If terrigenous sediments are preserved prints of external forms of extinct organisms, they are called the fingerprints of the outer core of the body. If prints are stored internal parts they are called prints the inner core of the body [table 3].

Biofatsialnye analysis of sediments of the study area allows

describe the burial of the fossils outcrops of the following marine organisms: Productus ex gr. Magnus M.W. Spirifercfmissouriensis Swall Athyriscflamellosa L.E v; flora Sphenopteridium sp. Archasosigillaria sp. [table 1].

Table 3. Classification of fingerprints-extinct species of mountain Mukri

Fully preserved	The remains of skeletons		prints	
	changed	unmodified	The inner and outer core	Hard and soft part of the body
Prints				
the soft part	the hard part		The inner and outer core	
Traces, movement, footprints, teeth and skeletons			Waste products, animal experiments, other parts of the body	
Turned into coal	Mineralized			
	rammed	fossils	Phosphorylated	

Mass settlement of brachiopods characteristic of the seabed shallow pool. The presence of brachiopods, which are stenohaline organisms, suggests that the salinity of the sea for the studied period on the territory of mount Mukri was normal.

In Almaty region in the floodplain of the Mukri river is a unique monument of archeology. On the clay-sand rock traces of extinct subclass of cephalopods – shells of Ammonites.

Source: http://www.zakon.kz/4750124-v-almatinskojj-oblasti-v-pojjme-reki.html

The photo shows a group of young scientists during a research expedition in the mountains of Mukry under the guidance of associate Professor Erkyn Tokpanov.

Scientists are sounding the alarm: if you do not take care of this monument, it will soon disappear from the face of the Earth, writes "Express K".

This monument of antiquity in 1906 was opened by the Russian scientist Maester. He found clay in the rock prints the brachiopods brachiopoda. Research in 1987 continued scholar Musketov, but soon prospecting work reversed itself. If not for the candidate of geographical Sciences Erkyn Tokpanov, the memories of this unique natural monument would have sunk into Oblivion.

-I have been studying these clay – sand slabs for ten years, - says Erkyn Tokpanov. - I found a lot of interesting artifacts that show that 300 million years ago there were sea or ocean depths. Such monuments of paleontology discovered in Alakol, Eskeldy, Kerbulak and areas where found the bones of mammoths. But all this is not protected.

Source: http://www.zakon.kz/4750124-v-almatinskojj-oblasti-v-pojjme-reki.html
Photo TVradio Corporation «Zhetysu»

The study of the structure of brachiopods (thickness, topography, the presence of special fixtures), and the nature of their placement in the rock give us information about what the plot of the studied Paleocene sea basin were absent strong currents and high tides, the bottom was silt. Fossil fauna found in the upper horizons, suggesting that the transgression of the sea in an earlier age and lower salinity in the absence within the study of Paleocene marine organisms and regression in the later era.

In conditions of wet climate in the shallow seas prevailed brahiopody, mussels, corals and sea hedgehogs. This is evidenced by the imprints of the external core brahiopody, sea urchins paleontological monument Mukri.

The result of the Hercynian Aragonese in the upper Carboniferous and Permian in the place of geosynclinal formed Zhetysu (Dzhungar) Alatau. Due to land elevation has occurred regression of the seas. In the process of mountain building under the influence of magmatism, temperature and pressure on terrigenous sediment fingerprints of external and internal cores of extinct fossil organisms.

In the process of mountain building, ancient shallow seas gradually dried up and expanded the land area. Changing paleoecological and paleoclimatic conditions in the middle and upper Paleozoic led to the mutational changes of aquatic invertebrates and vertebrate organisms.

Stratigraphic studies of sediments of the Carboniferous system show that a large part of geologic time a substantial area of the territory of Kazakhstan was occupied by shallow epicontinental seas which were boiling in the varied life of the Cambrian, represented by the remains of skeletons. The result of the Caledonian, Hercynian Aragonesa due to land elevation and regression of the seas, the area of continents has expanded significantly.

With the change of paleoecological and paleoclimatic conditions of the inhabitants of these seas and their communities gradually evolutionary, the inhabitants of shallow seas gradually came to land. And this has led to adaptation of the environment and strong mutation to change organisms.

Therefore, the remains of organisms with great accuracy the share of the sediment by geological age and correlate with each other, even on separate distance. In this regard, the prints of fossil animals are invertebrates factological the basis for biostratigraphic studies.

The results of the analysis of the stratigraphic columns geological maps, in order to recognize different geological structures and on this basis to determine the relative age of rocks, to conduct prospecting and exploration of minerals.

4 Conclusion

Thus, the study of palaeobiocoenoses outcrops of the study area has great potential for development. The set of studied samples has a value for local, interregional and global correlations, and to understand the development of the marine biota of the region as a whole.

Further study will give a more accurate representation of the evolution of species on the border of upper Devonian, Carboniferous and Permian period, describe the geographical conditions of the past and identify new types of paleofauna, to complement the paleontological characteristics of the stratigraphic units of the Moscow layer of Zhetysu (Dzhungar) Alatau.

Since 2005, all monuments belonging to the paleontological period, automatically fall under the protection of the state. Director of the Almaty regional center for the protection of historical and cultural heritage Eset Daurenbayev said that it is easy to get a security certificate-it is enough to apply. Then a team of scientists will go to the place and, if the fact of the existence of the Paleozoic rock is confirmed, then it's for formalities. However, they last the longest.

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