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FORAMINIFERA OF THE PALEOGENE AND NEOGENE OF THE KULJUKTAU MOUNTAINS (CENTRAL KYZYLKUM)

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ANNOTATION
This article is the result of the biostratigraphic studies of the Oligocene-Early Miocene sediments of the foothills of the Kuljuktau Ridge and adjacent territories.
The need to dismember the Oligocene-Early Miocene of this territory of the Central Kyzylkum is dictated by the fact that the current state of the validity of the dismemberment and correlation does not provide the necessary accuracy and adequacy of the correlation with the International Stratigraphic Scale.

Keywords: biostratigraphy, biofunctional analysis, Kuljuktau, fauna, correlation.

INTRODUCTION

The Sarbatir Formation, represented by shallow red-colored sediments of the Oligocene-Early Miocene, was first identified by M.N. Gramm in 1959 in the Central Kyzylkum. The lower parts of the Oligocene part of the Formation are composed of red-motley clays, while the upper parts — of pinkish tinge siltstones clays and rare sandstones. The upper parts of the Miocene part of the Sarbatir Formation are composed of sands and sandstones grey, yellow, often micaceous, with subordinate interbeds of purple clays, siltstones and shells.

It lies erosively on the green strata of the Eocene and is overlaid by the Agitmina or Tashakyr Formations. The Formation was characterized by foraminifera and ostracods, mollusks, which did not include a complete set of faunal remains known from coeval sediments of other regions, which hampered the comparison of sections of the Sarbatir Formation with coeval sediments of the East Paratethys. [2,3,6,8]

The reason for this difficulty was that microfauna samples were rarely taken and weighed 100-200 g. This kind of sample was subjected to elutration in the laboratory. Currently, the requirement of practice for accuracy of correlation and age-related dating has increased, therefore there is a need for detailed micropaleontological study of sections which involves laboratory researches of microfossils, including ostracods and foraminifera.

Practice has shown that the most optimal mass of field samples from microfossils is 1.0 - 2.0 kg. The selection is based on the method of detailed layer-by-layer testing from interbeds of each lithological variety and different genesis, both vertically and on the strike. The maximum sample interval does not exceed 2-3 m. At the same time, the magnifying glass mainly selects the part of the rock containing the shells of ostracods, foraminifera and other organic remains.

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For the first time, the authors identified the representative microfauna complexes in the Sarbatir Formation in the foothills of the Kuljuktau resulting from the practical application of a selection and washing technique, which significantly increased the accuracy of age determination of each part of the Sarbatir Formation.

To date, the scientists have identified 38 foraminifera genera, including more than 60 sandy and calcareous species. Ostracods characterize the upper part of the Formation, represented by 9 genera and 18 forms.

The rich foraminifera in the Sarbatir Formation helped to identified two biozones of this region: *Cyclammina constrictimargo – Cibicidoides tschagalaensis* (lower Oligocene, ryupel) in the lower parts of the Formation and *Porosononion dendriticus* (lower Miocene, Aquitaine) in the upper part.

The lower sections of the Formation (Oligocene) are composed of a bench of variegated clays represented by thin-interbedded grey, green, purple and red clays. The lower parts are composed of red-motley clays with a lithological benchmark - two closely spaced layers of red-colored ferruginous clays those age is characterized by foraminifers as ryupel (early Oligocene). This benchmark has practical significance for the determination of ryupel sediments when mapping.

This part of the Formation corresponds to the *Cyclammina constrictimargo – Cibicidoides tschagalaensis,* zone, characterized mainly by agglutinated (sandy) foraminifera with predominance of zonal species. The complex is represented by *Lagenammina variabilis* (Bogd.), *Rhabdammina cylindrica* Glaessn., *Rhinzammina indivisa* H.Brady, *Hyperammina caucasica* Bogd., *Hormosina gissarensis* Ibrag., *Ammodiscus tenuiculis* Subb., *A. dingus* Ter-Grig., *Haplophragmoides stavropolensis* Ter-Grig., *H. deformabilis (*Andr.), *H. snastolensis* Budach., *Cyclammina constrictimargo* R. Stew. etK. Stew., *C. turosa* Ter-Grig., *Cibicidoides tschagalaensis* (Korov.), *Ammobaculites afflobsanensis* Andr., *Reophax shorensis* Ibrag. The presence of *Haplophragmoides deformabilis and Cyclammina constrictimargo* allows comparing this complex with the *Spiroplectammina oligocenica* zone of the Western Caucasus and the pre-Caucasus. [4,5].

Clay rose pink with interbeds of yellow sands and sandstones and siltstones pink, grey with a pinkish tinge with rare shells, the foraminifera *Ammodiscus tenuiculis* Subb., *Pseudopolymorphina obscura* (Roem.), *Paradentalina aff. jonesi* (Cushm. et Ozawa), *Paradentalina kizilkumica* Averburg (msc), *Globulina minuta (*Roemer), *Hanzawaia eurina* Min et Averb.(msc), *Nonion granosus* (Orb.), *Lagena vulgaris* Williamson, *Cibicidoides sumsarensis* (N. Byk.), *Uvigerinella californica* Cushm., *Uvigerinella californica uruchensis* Bogd, *Hyperammina djanaica* Bogd., *Quinquiloculina akneriana rotunda* (Orb.), characterizing this part of the Formation as a late Oligocene

In the Eastern Caucasus, *Haplophragmoides kjurendagensis* zone corresponds to this level.

The upper part of the Sarbatir Formation is composed of sands and sandstones grey with interbeds of siltstones and brown clays, at the base with shells. In the roof of the

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Miocene part of the Formation there is a paleontological benchmark with balanomorphs, well observed on the area and characterized by the Sakaraul fauna (foraminifera).

In this part of the Sarbatir Formation, the *Porosononion dendriticus* zone is distinguished by the first appearance of the specie - index, the presence of *Cibicidoides stavropolensis* (Bogd.). The Miocene part of the Formation is characterized by foraminiferas: *Hyperammina caucasica* Bogd., *Haplophragmoides perifero excavatus* Subb., *Gaudryina sp.*, *Lagena vulgaris* Orb., *Lagena aff. striata* Orb. *Lenticulina ex gr. paupercula* (Reuss.), *Astacolus sp., Nodosaria soluta* (Reuss.), *Pseudodentalina aff. jonesi* (Cushm. etOzawa), *Sigmoilina minuta* Bogd., *Pseudopolymorphina aff. obscura* (Roem.), *Globulina minuta* Roem., *Globulina kusinae* O.Djan., *Guttulina makarovae* Tzaz., *Cibicidoides ex. gr. oligosenicus* (Sam.), *Cibicidoides stavropolensis* (Bogd.), *Cibicidoides laculaensis* (Min) (mcs), *Gavelinella crassa* Min (msc), *Nonion granosus* (Orb.), *Porosononion ex gr. dendriticus* (Chal.), *Elphidium onerosum* Bogd., *Uvigerinella californica* Cushm., *Uvigerinella californicasub sp. caucasica* Bogd., *Caucasina ex gr. schischkinskyae* (Sam.)

In the lower part of the Sarbatir Formation, the lithological benchmark of ryupel time, represented by two ferruginous levels, was revealed for the first time, and in the upper part - paleontological benchmark with balanomorphs of the Sakaraul time. The boundary between the Sarbatir and Agitmina Formations of the Early-Middle Miocene passes along the roof of the paleontological benchmark. The microfauna contributed to determining the position of the benchmarks in the section, which has practical importance when mapping the Sarbatir Formation.

Biostratigraphic studies paleontologically characterized the Sarbatir Formation in the lower foothills of Kuljuktau, represented in the lower part by the ryupel and Hutt sediments, and in the upper part – by Caucasus-Sakaraul sediments.

The analysis of the biofacies conditions of microfossils showed that the Sarbatir Formation was sedimented on the shallow coastal waters at a salinity of 30.5-34 ‰ and a depth of 200 m. In the Hutt time the salinity changed periodically. In the early Miocene time, it was a marine littoral with a muddy bottom with a slight salinity over 17 ‰. (Table No.1-2). [6]

The mass spectrometric analysis, applied by the authors, revealed in the foothills of Kuljuktau in sandstones and sands, less often in sandy siltstones and clay, characterized by foraminifera as late Oligocene (Hutt), rare-earth elements - lanthanides, the content of which in the rock is several times higher than clark ones [1].

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Biofacies analysis of foraminifera of the lower part of the Sarbatir subformation (Rupelian Stage) of the Karakata trough.

Table No.1

Table No.1

System	Series	Subseries	Stage	m / f Zone	Name of species	Salinity		Temperature		Behaviour		Habitat
						Stenohaline	Euryhaline	Stenothermic	Eurythermic	Benthic	Planktic	
1	2	3	4	5	6	7	8	9	10	11	12	13
Paleogene	Oligocene	Lower	Ryupel	Cyclammina constrictimargo = Spiroplectammina oligocenica	*Saccamina variabilis* Bogd.	+		+		+		Depth 1100-2000 м
					Hyperammina caucasica Bogd.	+		+	+	+		
					Hyperammina sp.	+		+	+	+		
					Ammodiscus insertus Orb.	+		+		+		Sublittoral zone 50 -200 м
					Ammodiscus tenuiculus Subb.	+		+		+		
					Ammobaculites aff. lobsanensis Andr.	+		+		+		
					Reophax splendidus Grzybow	+			+	+		
					Trochammina masini Suleim.	+		+		+		The lower part of the bathyal zone (750-2000 м)
					Trochammina aff caucasica Ter – Grig.	+		+		+		
					Haplophragmoides lectus Averb. sp.nova	+		+		+		
					Cyclammina aff. constrictimargo R. et K. Stew	+		+		+		
					Cyclammina sp.	+		+		+		
					Pseudopolymorphina aff. obscura (Roem)	+		+		+		The upper part of the bathyal zone (200-750м)
					Cornuspira involvens (Reuss)	+		+		+		
					Planorbella sp.	+		+		+		

Conclusion

The forms of foraminifera characterize their containing sediments as the lower Oligocene of the Rupelian Stage. Basically, these are benthic forms. They are represented by sandy forms of the genera: Saccamina, Hyperammina, Ammodiscus, Reophax, Haplophragmoides, Cyclammina, Ammobaculites and calcareous: Cornuspira, Pseudopolymorphina. Sandy forms prevail. And almost all the forms are stenothermic, sea temperature is 2.50 - 80, salinity - 33.5-34.5%. Sand forms affected mainly in the lower part of the bathyal zone (750-2000 m). Only species of the genera: Reophax, Ammodiscus, Ammobaculites affected in the sublittoral zone with depths of 50-200 m. Calcareous forms of foraminifera affected in the bathyal zone (200-2000 m).

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Table No.2

System	Series	Subseries	Stage	m / f Zone	Name of species	Salinity		Temperature		Behaviour		Habitat
						Stenohaline	Euryhaline	Stenothermic	Eurythermic	Benthic	Planktic	
1	2	3	4	5	6	7	8	9	10	11	12	13
Neogene	Miocene	Lower	Aquitaine	Porosononion dendriticus	*Nodosaria capitata* Boll	+		+		+		Sublittoral zone 50 -200 м
					Lagena vulgaris Reuss.	+		+		+		
					Lenticulina ex. gr. paupercula (Reuss)	+		+		+		
					Saracenaria sp.	+		+		+		
					Pseudopolymorphina obscura (Roemer)	+		+		+		
					Pseudopolymorphina sp.	+		+		+		
					Glandulina minuta Bogd.	+		+		+		
					Cibicidoides sumsarensis (N. Byk)	+		+		+		
					Cibicidoides stavropolensis (Bogd)	+		+		+		
					Nonion granosus (Orb)		+	+		+		
					Nonion uzbekistanensis N. Byk.		+	+		+		
					Melonis dosularensis Chal.	+		+		+		
					Porosononion dendriticus (Chal.)	+		+		+		
					Caucasina ex gr. schischkinskyac (Sam.)	+		+		+		
					Uvigerinella ex gr. californica Cushm.	+		+		+		

Conclusion

The presence of foraminifera in Aquitaine sediments indicates marine habitat. The complex is represented by benthic forms. Most of foraminifera living in the basin are stenohaline (33.5-34.5%). Only species of the Nonion genera withstood salinity excursions. All the forms affected in the Early Miocene - the Porosononion dendriticus zone. They are stenothermic forms, living at a certain temperature of 8-100°. Foraminifera are dwellers of the sublittoral zone with depths of 50-200m. Pseudopolymorphina aff. obscura (Roem) constantly live there.

CONCLUSION

The entire studied territory indicated two closely spaced layers of red-colored ferruginous in the lower part of the Sarbatir Formation, which are well observed in the area. Their age was first justified by foraminifera as Rupelian (Early Oligocene). These levels are the lithological benchmark for the Oligocene part of the Formation and have practical importance in mapping.

The boundary between the Paleogene and Neogene passes inside the Sarbatir Formation along the bottom of the upper sandy part of the Formation (Caucasian Regional Stage) and corresponds to the boundary between the Hutt and Aquitaine.

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