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GEOLOGICAL STUDY OF UPPER CRETACEOUS AND PALEOGENE SEDIMENTS OF THE KULJUKTAU MOUNTAINS

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ABSTRACT

This article provides zoning and geological study of the Cretaceous and Paleogene sediments of the Kuljuktau and Auminzatau mountains. Their deposits are confined to certain stratigraphic levels and depend on the peculiarities of the physiographic conditions of the sediment formations in the all sedimentary Cretaceous basin. The geological study of the Cretaceous sediments is based on the geological and geographical principle which consists in grouping the sections according to the composition of their structure. Two subformations are distinguished: the lower belongs to the Oligocene and the upper — to the Miocene. The lower subformation of the Sarbatir Formation is represented by clays, sandstones, and redbeds.

KEYWORDS: *Cretaceous, Paleogene, Section, Fauna, Foraminifera, Stage, Formation.*

INTRODUCTION

The Cretaceous sediments in the Central Kyzylkum are widespread and characterized by transgressive occurrence on the Paleozoic formations and the absence of rocks of Berriasian, Valanginian, Hauterivian and Barremian ages. They are exposed as separate remains and are uncovered by numerous structural boreholes; various minerals are associated with them: iron, gold, uranium, mineral paints, quartz sands, clays. Their deposits are confined to certain stratigraphic levels and depend on the peculiarities of the physiographic conditions of the sediment formations in the all sedimentary Cretaceous basin. The study of sections of the Cretaceous sediments, the definition of the boundaries and volumes of stratigraphic units, the

revealing the causes and nature of changes in events of abiotic and biotic origin allow identifying areas with similar geological structure and the same sedimentation.

MAIN PART

The geological study of the Cretaceous sediments is based on the geological and geographical principle which consists in grouping the sections according to the composition of their structure. The main criteria for identifying the types of sections were recognized as stratigraphic completeness, thickness value, genetic, lithological, facies and faunistic features of deposits.

Cretaceous system

Upper section

Cenomanian Stage

Lower-middle substages

Donguztau Formation

In sections, the distinguished Donguztau Formation (K_2s_{1-2} *dn*) (by Donguztau v., C. Kyzylkum. I.M. Abduazimova, 1988) is represented by fine-grained, brick-red, gray sandstones; silty clays, clayey siltstones, gray, greenish-gray, bluish and light gray; with sandstones, gravelstones and gray conglomerates at the base. The thickness is 40-144 m. The formation with erosion lies at Shuruks one.

The formation is characterized by foraminifera: *Haplophragmoidessibiricus*Zasp., *Gaudryinopsisasiaticus* (N.Byk.), *Paragaudryinainornata*Suleym.;bivalve molluscs: *Lophadichotoma*Bayle, *Exogyratrigeri*Coq., *Chlamyselongatus*Orb., *Amphidontelubrica*Vinok., *Korobkovitrigoniaferganensis* (Arkh.); confined to the lower and upper parts of the Donguztau Formation.

The above complex of paleontological remains indicates the Early-Middle Cenomanian age of the Donguztau Formation. The formation was formed in coastal shallow water or lowland, coastal-marine periodically flooded by the sea.

Cenomanian Stage

Upper substage

Uchkuduk Formation

The Uchkuduk Formation (K_2s_3 *uč*) (by Uchkuduk, C. Kyzylkum. I.M. Abduazimova, 1988), lying according to the Donguztau Formation, and is composed of fine-grained, greenish-gray, brown sandstones in the lower part; consertal, gray gravelstones; silty, greenish-gray clays; fine-grained, gray, greenish-gray sandstones with interlayers of gravelstones in the upper part. The thickness is 5-35 m.

The formation includes foraminifera: *Haplophragmoidessemiinvolutus*Zasp.; *Gaudryinopsisasiaticus* (N.Byk.),*Paragaudryinainornata*Suleym., bivalve molluscs: *Korobkovitrigoniadarwaseana* (Rom.),the characteristic of the Late Cenomanian of the Southwestern spurs of the Gissar Range and the Tajik Depression.

Turonian Stage

Lower-middle substages

Jeyrantui Formation

The Jeyrantui and Kendyktubinsk formations are distinguished in this subdivision.

The Jeyrantui Formation (K_2t_1 *džr*) (by Jeyrantui, C. Kyzylkum. I.M. Abduazimova, E.M., 1988) is composed of silty, finely dispersed, greenish-gray clays with interlayers of yellowish, greenish-gray siltstones, gray and pink sandstones in the sections of boreholes and outcrops. The thickness is 40-110 m. The formation with erosion lies at Uchkuduk one.

In the middle part of the formation (Jamanyarsai section), bivalve mollusks were identified: *Inoceramuslabiatus*Schloth., establishing the *Inoceramuslabiatus* zone, by the International Stratigraphic Scale.

In the west and east of the Kuljuktau distribution area, the Early Turonian level is traced in a closed area in numerous boreholes and is characterized by foraminifera: *HaplophragmoidessibiricusZasp., H. turonicus* (Zhuk.), *Cribrostomoidesturonicus* (Zhuk.), *Ammomarginulina*exgr.*amudariensis* (Zhuk.), *Reophaxkysylcumensis*Suleym., *Recurvoideskyngyrtauensis*Suleym., *Ammomarginulinaamudariensis* (Zhuk.), *Vialoviazerabulakensis*Suleym., *Gaudryinopsisasiaticus* (N.Byk.), *G. akrabatensis*Zhuk.; *Paragaudryinaasiaticamedia*Suleym., *P. inornata*Suleym.; rare bivalve molluscs: *Liostreajaxartensis*Zapr., *I. labiatus*Schloth.,*Korobkovitrigonia*sp.,*K.* exgr.*darwaseana* (Rom.); ammonites: BaculitesromanowskiiArkh.

Middle substage

Kendyktubinsk Formation

The Kendyktubinsk Formation (K_2t_2 *knd*) (by Kendyktyube, Bukantau mountains, C. Kyzylkum. I.M. Abduazimova, 1988) is represented in this type by quartz-micaceous, fine-grained, yellowish-green, greenish-yellow sandstones; fine-grained, light gray, variegated, brick-red sandstones with charred vegetative detritus; silty, variegated, greenish-gray clays with interlayers of clay siltstones, yellow. The thickness is 14-45 m. It lies at Jeyrantui one.

The Middle Turonian age of the Kendyktubinsk Formation was substantiated in outcrops and borehole cores by finds of different groups of organic remains. The formation is characterized by bivalve mollusks: *Cucullaea*exgr.*crassa*Burk., *Lima*sp., *Megatrigoniakhoresmensis*Beljak., *Crassatellaregularis*Orb., *Tellinasemicostata* (Roem.), *Liostreajaxartensis* (Sim.) Zapr.;gastropods: *Caucasella*cf.*acanthophora* (Muller), typical of the Middle Turonian; in borehole sections — foraminifera: *Gaudryinopsisasiaticus* (N.Byk.), *Paragaudryinainornatamedia*Suleym., *P.inornatainornata*Suleym.

Turonian Stage

Upper Turonian

substage— Coniacian Stage

Laulau Formation

(lower subformation)

In the Upper Turonian-Coniacian sediments, they are united into the lower subformation of the Laulau Formation (K_2t_3-k ll_1) (by Laulau, C. Kyzylkum, I.M. Abduazimova, 1988). The subformation is composed of yellowish-green, pinkish-lilac, greenish-gray, and gray sands, sandstones, and clays in the lower part; in the upper part — of ferruginized brown sands; yellowish-green sands; and greenish-gray clays. The thickness is 68-87 m. It correspondingly lies at Kendyktubinsk one.

The age of the subformation is faunistically substantiated by bivalve mollusks, gastropods, and foraminifera: *Cucullaeacrassa*Burk., *Inoceramuspercostatus*Muller, *Megatrigoniasyrdariensis* (Arkh.); *Solariellaamudariensis*Arust., *Rostellindasubdalli*Pčel., *Nairiellaasiatica*Pčel., *Uxiauxima*Stol., *Gyrodessubtenellus*Pčel., *Clanculuspulchra*Arust.; *Gaudryinellapseudoasiatica*N.Byk., *Pseudoclavulinakasarinovi*Suleym. etArap., developing in the Late Turonian and Coniacian of the Pitnyak uplift and the Southwestern spurs of the Gissar Range.

Santonian Stage

Laulau Formation

(upper subformation)

In the Kuljuktau sections, the Santonian level is established in the upper subformation of Laulau Formation (K_2st ll_2) (by Laulau, C. Kyzylkum. I.M Abduazimova, 1988), represented by clay, silty, greenish-gray, tobacco-green; sandstones, fine-grained, dark brown, greenish-yellow; sands of fine-grained, quartz, yellowish-green, with interlayers of shell rocks. The thickness is 23-75 m. The subformation lies eroded on the underlying formations.

The age of this part of the section was established from foraminifera: *Gaudryinellapseudoasiatica* N.Byk.; bivalve molluscs: *Chlamyssingularis*Vinok., *Ostreaitemirensis*Vinok., *Exogyradzharanensis*Vinok., *Anomiacryptostriata*Rom., *Korobkovitrigonia*exgr.*akkaptschigensis*Beljak., *Gyropleuravakhschensis*Bobk.; ammonites: *Stantonoceraspolyopsisamudariensis*Iljin., characteristic of the Santonian of the Central Asian paleobiogeographicarea.

Campanian Stage

Karakatin Formation

(lower subformation)

In the Kuljuktau type, the Campanian deposits are identified in the lower subformation of the Karakatin Formation (K_2kkr_1) (by Karakatin basin, C. Kyzylkum. I.M. Abduazimova, 1988). The subformation in the section is represented by sands, sandstones, fine-grained, quartz, greenish-yellow, greenish; silty gray clays. The thickness is 4-65 m.

The age of the deposits is established from the bivalve mollusks: *Liostreaacutirostris*Nilsson, *Inoceramus*sp.(exgr.*balticus*Boehm.); foraminifera: *Trochammina*exgr.*senonica*Belous., *T.* aff.*uzbekistanensis*Zhuk., *Ammoglobigerina*exgr.*tenuisa* (Belous.) (Jamanyarsai sections) developed in the Campanian deposits of the Central Asian paleobiogeographicarea. The clays contain shark teeth *Hybodus*sp.,*Scapanorhynchusrhaphidon* (Ag.),

*Heterodontus*sp.,*Squaliconar*sp.,*Cretolamnaappendiculata, Lamniformis*indet.,(the Temirtash-Kampirsay section).

Maastrichtian Stage— K_2m

In sections of the Kuljuktau type, the Maastrichtian formations are composed of greenish-yellow, consertal sandstones, with ferruginous concretions, with interlayers of clays and limestones. The thickness is 4-27 m.

Bivalve mollusks were identified in the limestones: *Chlamysdujardini*Roem., *Liostrealehmannii*Rom. In the Balakarak, Chengeldy section, inoceramus: *Inoceramusbarabini*Mort., *Inoceramusdjasalensis*Vin., typical of Maastrichtian deposits of the same age in the Central Asian paleobiogeographicarea, were found in sandstones, except *Liostrealehmannii*.

The **Paleogene sediments** of the Central Kyzylkum desert are widely spread with an interrupted band bordering the Paleozoic outcrops in the Tamdytau, Auminzatau, Kuljuktau, Bukantau, Djetimtau, as well as exposed in the Karakatin, Minbulak, Ukuzkak and other basins. The Paleogene sediments lie according to Maastrichtian formations, or with erosion on the lower levels of the Upper Cretaceous or Paleozoic. According to the lithological and facies features, the Paleogene formations are distinguished, compared by the complex of organic remains with the General Stratigraphic Scale.

Danish-Zealand (*P_1^1d-zak(d). The Akdzhar Formation* is represented by limestones, white, yellowish, brecciform sandstones, fragmented rock, light and dark gray. The thickness is up to 12 m. It occurs with erosion on the Maastrichtian deposits or on the lower Cretaceous levels. It is faunistically substantiated by bivalve mollusks: *Madioluselegans* Sow., *Fususlapparenti*Br.rt Corn., *Tornatellaparisiensis* (Desh.).

Thanetian Stage(P_1^2 t^1bh). The Bukhara Formation is represented by white, sandy limestones. The thickness is up to 5 m. It lies eroded on the Akjar Formation or Maastrichtian deposits. It contains bivalve mollusks: *Carditaturkmenica*Vial., *Corbula (Cuncocorbula) asiatica*Vial., *C. (C.) triangulanta*Vial.

Thanetian Stage(P_1^2 t^2kz). The Kazakhtau Formation is represented by sands, clays, yellow, and gray. The thickness is up to 8 m. The formation lies on the Bukhara one. The fauna is characterized by bivalve mollusks: *Glicymerisduponti*Cossm., *G. Cornet* (Koen), *Pitarduponti* (Cossm.), *Corbula (Cuncocorbula) asiatiaca*Vial., *C. regulbiensis*Morris, *Thraciaprestwichi*Desh., *Jujibinusquadrangulatus* (Br.etCorn.) typical of the Thanetian Stage.

Ypresian Stage (lower) (P_2^1 inr). The Nurin Formation is represented by gray, green clays with limonitized sections. The thickness is up to 20 m. The formation is deposited according to the Kazakhtau Formation or with erosion on various levels of the Upper Cretaceous; in some areas of the Kyzylkum, it facially replaces the lower part of the Sugralin Formation. It is faunistically characterized by foraminifera: *Anectinapaleocenica*Suleym., *Haplophragmoidessubsperoides*Subb., *Pigenerinapaleogenica*Suleym., typical of the Early Eocene of the Ypresian Stage.

It correlates with the upper part of the Kyzyltakyr Formation of the South Prearal and the Kaynarbulak Formation of the Pretashkent area. it It corresponds to the middle part of the Givar

Formation of Southwestern Gissar and overlaps with the SugralinFormation. It is attributed to the Lower Eocene (Ypresian Stage).

Ypresian-Lutetian Stages (lower part)(P_2^{1-2}*bsg)*. The Sugralin Formation is represented by gray and light brown marls with interlayers of white limestones with fish scales and vertebrae and organogenous detritus. The thickness of the formation is up to 40 m. The formation lies at Nurinsk one.

There is a complex of foraminifera: *Bolivinopsiscarinatiformis* (Moroz.), *Lenticulinailjini* (N.Byk.), *Anomalinaammophilia*Balakh., *Globigerinaeocaenica* (Gumb.), *G. Inaequispira*Subb., *G. pseudoeocaena*Subb., *Morozovellaaragonensis*Nutt., *Globorotaliapseudoscitula*Glaessn., *Uvigerinellacompacta* (Balakhm.). This complex allows the *Morozovellaaragonensis*zone to be distinguished and compared with the zone of the same name in other areas (Prearal, Ustyurt, Caucasus, Europe).

Lutetian (upper part) — Bartonian stages(P_2^2*l-bkl(t))*. The Kultaban Formation is represented by thin-layered, greenish, greenish gray, and weakly ferruginized clays. The thickness is up to 180 m. It lies at the Sugralin Formation and is overlain by the Maralsk Formation or by the Sarbatir Formation with erosion. It belongs to the Middle Eocene (Bartonian Stage).

The formation contains foraminifera characteristic of the Middle Eocene of the Bartonian Stage: *Globigerinapseudoeocaenacompacta*Subb., *G. boweri* (Bolli.),*G.pseudobulloides*Blow., *Globorotaliavesicular*Averb., *Ammophiliaammophila* (Gumb.), *A. crassa* (Balakh.), *Uvigerinabukovae*Bolli., *A. interposita*Subb., *A. pentacamerata* (Glaessn.).

Priabonian Stage *(*P_2^3*mr)*. The Maral Formation is represented by greenish-gray, white clays. The thickness is up to 52 m. It lies concordantly at the Kultaban Formation, overlain by the Oligocene or with erosion by various Neogene levels. It belongs to the Upper Eocene, Priabonian Stage.

The Priabonian age of the Formation is determined by the complex of foraminifera included in the zones *Bolivinaantegressa*Subb, *Buliminatruncate* (Gumb.), *Eponidellalucida* (Min.), *Nonionellaazerbaidjanica*Chal., *Bolivinanobilis*Hantk., *Speroplectamminatuaevi*Moroz., *Lenticulinahermanni*Botz., *Globigerinathecatropicalis*Blow. etc.

Oligocene-Early Miocene undivided. Sarbatir Formation(P_3-N_1^1*sr)*. The Formation is represented by shallow marine red-colored-variegated clays, sands, sandstones, and shell rocks. Two subformations are distinguished: the lower belongs to the Oligocene and the upper — to the Miocene. The lower subformation of the Sarbatir Formation is represented by clays, sandstones, and redbeds. The thickness is 60 m. It overlies the upper subformation of the Sarbatir Formation with erosion on various levels of the Eocene. The age of the subformation is Oligocene (Rupelian-Chattian stages) determined by foraminifera and bivalve molluscs: *Cribrononionone rosum*Bogd., *Parasononiondendriticus* (Chal.), *Heterolepaornatus* (Bogd.), *Noniongranosus*Orb., *Pseudopolymorphinaspatulosa* (Terq.), *Saccaminavariabilis*Bogd., *Reophaxsplendidus*Bogd., *Popoviaterensa*Tsatsir, *Verneulinoidescompressa* (Andrv.): *Chlamysbifidabifida*Munst., *Nuculaperegrine*Defr., *Magcardiopsisustjurtensis*Iljina, *Cyprinarotundataelliptica*Speyer., *Lentidiumgaretzkiigaretzkii*Merki. [5;6;7;8]

REFERENCE LIST

1. The Atlas of fossil fauna and flora of Phanerozoic Eon of Uzbekistan. Vol. 2. Mesozoic and Cenozoic (Jurassic, Cretaceous, Paleogene) (2007). (pp.136-157). Tashkent: State Committee of the Republic of Uzbekistan on geology and mineral resources.
2. Biostratigraphy of sedimentary formations of Uzbekistan (1970). (pp. 336-352). Leningrad.: Nedra.
3. Nesov L.A. Dinosaurs of Northern Eurasia; new data on the composition of the complexes, ecology and paleogegraphy. (1995). St. Petersburg.
4. Nesov L.A. Cretaceous non-marine vertebrates of Northern Eurasia. (1997). St. Petersburg.
5. Musaeva N.A. Қулжуқтов (МарказийҚизилқум) палеогенётқизиқларинингстратиграфиясивафораминиферасиниўргаништарихи. (2021). (pp. 6-8). Tashkent. Ecological Bulletin of Uzbekistan.
6. Samsonov S.K. Fossil flora of the Itemir-Dzharakuduk basin. — In the book: Jurassic and Cretaceous sediments of the west of Central Asia. (1970). (pp. 39-54). Moscow.
7. Stratigraphic dictionary of Uzbekistan (2001) // Tr. IMR. Tashkent: HYDROINGEO, 371.
8. Vakhrameev V.A., Abduazimova I.M., Shvetsova E.M. and others. (1985). (pp. 61-71). Stratigraphy of the Lower Cretaceous of the Central Kyzylkum. Soviet Geology. No. 4.