The First Finds of Paleoaplysin (*Palaeoaplisina*) In Reef Formations of Western Uzbekistan

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ABSTRACT

For the first time, data are presented confirming the presence in the reef complexes of the Takhtatau molasse formation of organic remains represented by one of the enigmatic groups called paleoaplysins. Despite the problematic origin, these organisms are of interest as active rock formers and indispensable participants in the creation of reef massifs, bioherms, and biostromes. This is extremely important to reflect the high scientific accuracy in the construction of a series of geological maps of the new generation.

Keywords: *Reef complex, molasses, Permian, paleoaplysins, map, localization*

Introduction. The central Kyzylkum is a plain mostly covered with eolian sands, among which there are low mountain structures of the Paleozoic. The most significant of them is the Bukantau mountain system, which consists of isolated uplands of Koppatas, Dzhartas, Dzhetymtau I and II, Takhtatau separated by drainless basins.The largest of these depressions is Minbulakskaya with a drop to -16m.[2]. The mountain heights of the Kyzylkum were associated with the Tien Shan by origin and development. A.D. Arkhangelsky (Geological structure and geological history of the SSSR, 1941) noted that the Kyzylkums are a link between the Paleozoic structures of the Urals and Tien Shan.

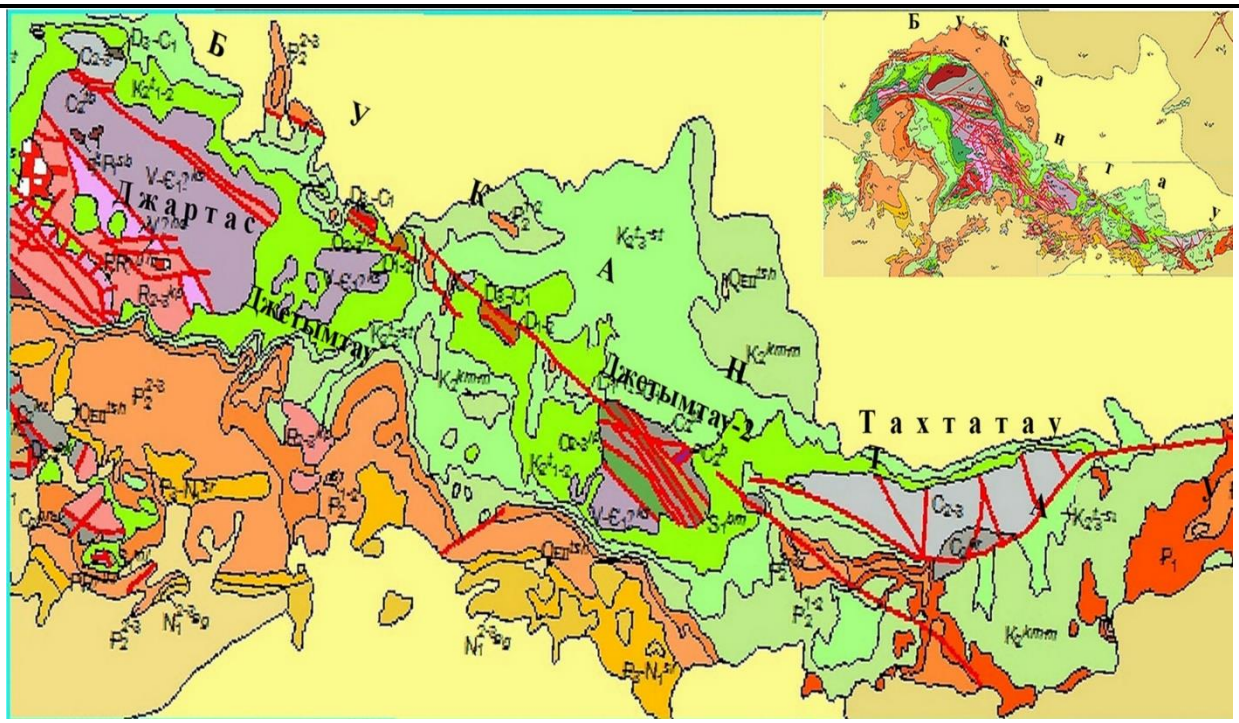

Fig.1. A fragment of a schematic geological map of the East Bukantau area, scale 1:500 000, edited by V.V. Mikhailova 2013y.

As noted earlier [3], - "there are no Upper Carboniferous, Permian, and Triassic deposits in the Central Kyzylkum". However, geological surveys carried out in recent years (2015-2021) among the Upper Paleozoic formations of Western Uzbekistan have established deposits of the Permian system, which are of great theoretical interest in understanding the history of the geological development of the region. Advances in biostratigraphy have made it possible to more reasonably identify and compare fossil biocenoses, carry out biostratigraphic constructions, and, as a result, move to a higher level in determining the picture of the Permian paleobasin. The reefs found in the study area contain a large complex of organic remains, which are important source material for biostratigraphic and lithofacies studies.The study of the genesis, time and conditions of the formation of sedimentary formations allows us to make paleogeographic reconstructions and related minerals. The coastal zone of marine shallow water in the northeastern part of the Takhtatau mountains is composed of coarse clastic rock varieties: conglomerates, gravelstones, and sandstones are widely developed here. To a lesser extent, mudstones and limestones are present. Carbonates are represented by layered, organogenic-detrital bioherm structures of various types. Sedimentation in this zone was extremely unstable, with frequent drying, erosion, and sliding of some of the deposits. Exploring the reef complexes of the eastern end of the Takhtatau mountains, together with calcareous sponges, corals, algae, and stromatolithamines, unusual organic remains were discovered - paleoaplysins, which are rock-forming organisms [2]. It should be noted here that some coral colonies are often overturned by the epithecus (sm. Fig. 2). All this testifies to the extreme shallowness of the basin under the constant influence of regular waves.

Stratigraphic significance of Palaeoaplysina. These animals were first described by P.I. Krotov (1888) under the generic name PalaeoaplysinaKrotow, 1988 who attributed them to sponges. [3].Despite the problematic origin and the complexity of the taxonomic position, these organisms are of interest as active rock formers and indispensable participants in the creation of reef massifs, bioherms, and biostromes [4]. Their area of distribution is an important indicator of the biogeographic relationships of sedimentation basins, since the morphological

features of paleoaplysines allow easy, unmistakable identification even in the field

Fig.2. Fragment of an upturned epitheca of a coral colony in a Paleoaplysin bioherm edifice, Takhtatau Mountains

In subsequent years, V.N. Ryabinin (1915) identified a new genus Uralotimania from the Carboniferous deposits of the Western Urals and Timan, which he assigned to the order Tubulariae of the class Hydrozoa. Much later, Ryabinin (1955) summarized all the available information regarding the named organisms and concluded that all three genera Uralotimania and Palaeoaplysina are the same organism, which, by right of priority, should be retained the name Palaeoaplysina [3].

Fig.3. Fragment of a colony of Palaeoaplysina bucanti Smirn., sp. nov. in reef deposits of the Upper Takhtatau Subformation of the Takhtatau Mountains.

This group of organic remains is described for the first time on the territory of Western Uzbekistan.

Currently, more and more information is being received about new finds of paleoaplysin,

and their wide geographical distribution is being established

Fig.4. Fragment of a colony of Palaeoaplysina bossaica Smirn., sp. nov. in reef deposits of the Upper Takhtatau Subformation of the Takhtatau Mountains

Source materials. In the northeastern part of the Takhtatau mountains, they form lenticular carbonate bodies of bioherms with a thickness of 3.5 m. up to 10-15m. and a few hundred meters long. Their formation took place in the coastal shallow water zone, under conditions of an active hydrodynamic regime, where there were separate areas of a relatively elevated relief, where terrigenous material entered in insignificant quantities. In the areas of these shoals, paleoaplysins also developed. Numerous algae, sea urchins, foramenifera, sponges, and corals are found here together with them [1]. Paleoaplysins are fairly widespread in the Permian bioherms of North America, Idaho (Breuninger, 1969), and the Yukon Province (Davies, 1971) of Arctic Canada. Paleoaplysin remains have also been noted in Permian deposits along the eastern margin of the Russian Platform, at a great distance from the Polar Urals to the extreme southern outcrops of the Ural carbonate Permian [3]. Analysis of their finds makes it possible to establish free routes of migration of organisms between Europe, North America, through the Barents Sea, the Cis-Ural trough, Kazakhstan and the Central Kyzylkum, Pamir.

They are representatives of shallow shelf facies and develop best within marginal troughs interbedded with clastic material. Sedimentation in this zone was extremely unstable, with frequent drainage of the basin, erosion and slumping of part of the sediments.

Conclusions. Together with paleoaplysins, foramenifera are identified here: *Neoschwagerina pinguis* Skinner., *Kahlerina ex gr. Siciliana* Skinner., *K. ex gr. Globiformis* Sosnina, *K. constricta* Chedija, Reichelina sp., *Dunbarula nana* Kochansky-Devide et Ramovs, *Sumatrina var. annae* Volz, одиночные ругозы: *Lophocarinophyllum pulchrum* Kropatcheva, *Lop.* sp.*, Lop. chandalasicum* Iljina. The latter are well known within the Tethyan region of the Pamirs, the Caucasus, the Crimea, Indonesia, and even in the Ussuri Territory of the Southern Primorye, where they are found in the Vchandalaz Formation of the basin of the river. Artemovka, containing fusulinids of the *Yabeina–Lepidolina* Zone of the Upper Permian [4]. Paleoaplysins found in the sections of the Takhtatau Mountains are plates of various thicknesses with parallel, wavy, curved, shell-shaped surfaces. The length of the plates is from

3-5cm to 8.0cm. with a thickness of up to 0.4 - 0.5 cm. (See Fig. 3.4). The study of these organic remains makes it possible to supplement information on the composition of the biota of the Takhtatau reefs, to supplement information on the morphology of paleoaplysins and their geographical and facies distribution. In the sections of Uzbekistan, they characterize the Upper Permian composition of the biota.

Family Palaeoaplysinidae Tchuvashov

Genus Palaeoaplysina Krotow, 1988

Genus Uralotimania Rybinin 1915

Palaeoaplysina bucanti Smirn., sp. nov.

Table 1. Fig.1-3.Fig.3.

species name *bucanti*- (Bukantau mountains)

Description. Cenosteum lamellar, shell-shaped or spherical, oval, not sustained in thickness.

The maximum length of the cenosteum is 6-8 cm. Thickness 4-5mm. The observed width is 2-3cm. The upper surface is smooth. Lower, slightly hummocky, transmitting substrate surface.

The entire space of the cenosteum is filled with tissue forming a complex fibrous texture similar to cotton wool.

Comparison. From the view *Palaeoaplysina laminaeformis* Krotow differs in the absence of vertical zooid tubes, smaller sizes.

Spreading. Kyzylkum. Northern slope of Takhtatau, upper Takhtatau subformation P_2tt_3.

Palaeoaplysina bassaica Smirn., sp. nov.

Table 1. Fig.4,5. Fig.4.

Species name *bassaica* given at the location of the Bassai tract.

Description. Cenosteum undulate, horseshoe-shaped or shell-shaped, with oval outlines, irregular in thickness, with slight swelling in places. The maximum length of the cenosteum is 5-7 cm, rarely up to 10 cm. Thickness 6-8mm. The observed width is from 3 to 6 cm.

The entire space of the cenosteum is filled with fine-mesh tissue forming a complex mesh texture. The cells are clearly limited, have a rhombic-angled, less often pentagonal shape with well-defined partitions. The upper and lower surfaces are slightly hummocky, conveying the surface of the substrate. The packaging of individual individuals is quite dense. On one square decimeter, there are up to 35-40 individuals.

Comparison. From the view *Palaeoaplysina laminaeformis* Krotow. differs by the absence of vertical zooid tubes, the mesh texture of the coenosteum. From *P.bucanti* Smirn., sp. nov. differs in the internal structure of the coenosteum and in size.

Spreading. Kyzylkum. Northern slope of Takhtatau, upper Takhtatau subformation P_2tt_3.

Explanation for the table. 1. Figures 1-3. *Palaeoaplysina bucanti* Smirn., sp. nov.

Fig. 2. Vertical section of the coenosteum (x10), in the horizontal section, the structure of the tissue of the coenosteum is well expressed.

Fig. 3. The structure of the tissue of the upper surface of the coenosteum. Fig. 4. Palaeoaplysina bassaica Smirn., sp. nov., vertical section of the plate. The coenosteum consists of numerous diamond-shaped cells (x 10) separated by thin calcite walls.

Fig. 5. Horizontal section of the cellular tissue of the cenosteum. (x10).

Fig. 6. *Neoschwagerina pingus* Srinner, slightly beveled axial section (x15).

Fig. 7. *Dunbarula nana* Kochansky-Devide et Ramovs. (x50) axial section.

Sumatrina var. annae Volz.

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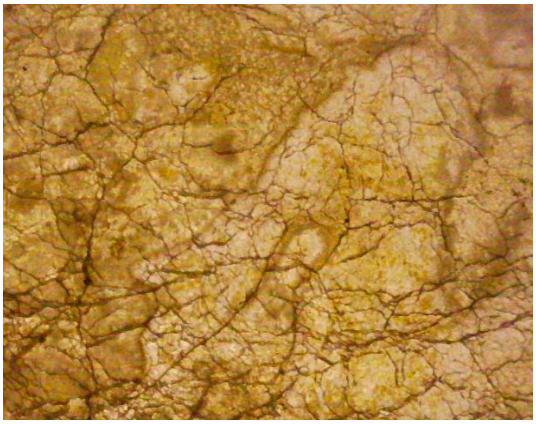

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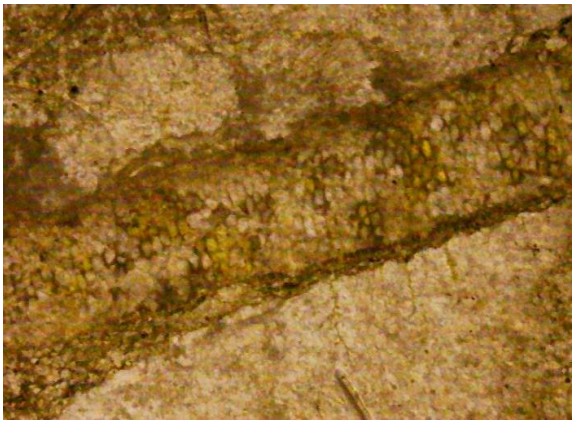

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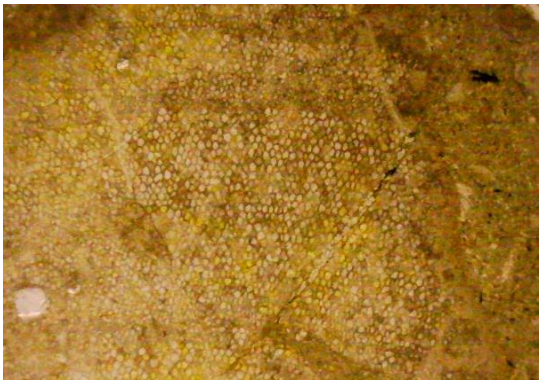

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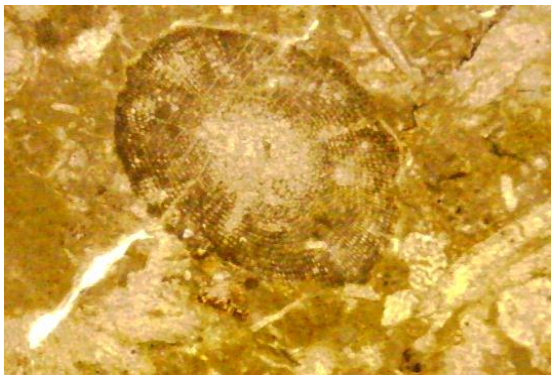

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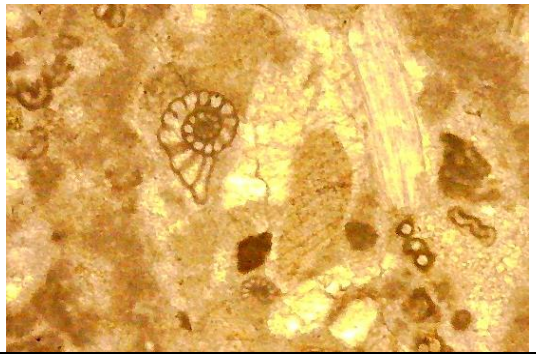

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